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Кафедра профессионального иностранного языка для
естественнонаучных специальностей

ENGLISH FOR POSTGRADUATE SRUDENTS

Курс английского языка для аспирантов

Учебно-методическое пособие

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Настоящее пособие адресовано аспирантам, которые специализируются в различных отраслях знаний и которым предстоит сдавать экзамен по английскому языку. Пособие может быть использовано как для аудиторных занятий с преподавателем, так и для самостоятельной работы.

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СОДЕРЖАНИЕ

Предисловие

Настоящее пособие адресуется аспирантам, которые специализируются в различных отраслях знаний, и которым предстоит сдавать кандидатский экзамен по английскому языку. Пособие рассчитано в первую очередь на специалистов в области естественно-научных и инженерно-математических направлений, но может быть использовано и в группах гуманитарных направлений.

Целью пособия является развитие навыков чтения и перевода научной литературы на базе знаний, предусмотренных программой по английскому языку для неязыковых направлений, навыков аннотирования и реферирования научной литературы, а так же коммуникативных навыков, позволяющих аспирантам использовать их в научной работе.

Пособие состоит из 6 разделов. В Разделе I описывается содержание, структура и порядок сдачи кандидатского экзамена по английскому языку. Раздел II содержит информацию об особенностях реферирования и аннотирования научного текста, примеры аннотаций, клишированные фразы для реферата – резюме. Кроме того, в разделе содержится образец сообщения аспиранта для беседы с экзаменаторами по вопросам, связанным с биографией, профессиональной деятельностью и научно-исследовательской работой. Раздел III включает в себя тексты для ознакомительного чтения и перевода, посвященные обучению в аспирантуре.

Раздел IV включает в себя вокабуляр, тексты о послевузовском обучении и программах.

Раздел V содержит научные тексты для письменного и устного реферирования (аннотирования). При отборе текстов авторы стремились к тому, чтобы каждый текст носим общенаучный характер и был насыщен лексикой, связанной с научной работой. Активный лексический и грамматический минимум определяется тематикой направлений, представленных в пособии.

Раздел VI предлагает общий минимум необходимых сведений по чтению числительных и формул по математике, физике, химии.

Учебно-методическое пособие предназначено для работы в группах аспирантов, готовящихся к сдаче кандидатского экзамена, под руководством преподавателя или самостоятельно. Материалы пособия апробированы на практических занятиях в группах аспирантов естественно-научных и инженерно-математических направлений.

РАЗДЕЛ I. СОДЕРЖАНИЕ, СТРУКТУРА И ПОРЯДОК СДАЧИ КАНДИДАТСКОГО ЭКЗАМЕНА ПО АНГЛИЙСКОМУ ЯЗЫКУ

1.1. Содержание и структура кандидатского экзамена

На кандидатском экзамене аспирант (соискатель) должен продемонстрировать умение пользоваться иностранным языком как средством профессионального общения и научной деятельности. Аспиранты (соискатели) должны владеть орфографической, орфоэпической, лексической и грамматической нормами изучаемого языка и правильно использовать их во всех видах речевой коммуникации, представленных в сфере научного общения.

Говорение. На кандидатском экзамене аспирант (соискатель) должен продемонстрировать владение подготовленной монологической речью, а также неподготовленной монологической и диалогической речью в ситуации официального общения в пределах программных требований.

Оценивается содержательность, адекватная реализация коммуникативного намерения, логичность, связность, смысловая и структурная завершенность, нормативность высказывания.

Чтение. Аспиранты (соискатели) должны продемонстрировать умение читать оригинальную литературу по специальности, опираясь на изученный языковой материал, фоновые страноведческие и профессиональные знания, навыки языковой и контекстуальной догадки.

Объектом контроля на кандидатском экзамене являются навыки изучающего и беглого чтения.

В первом случае оценивается умение максимально точно и адекватно извлекать основную информацию, содержащуюся в тексте, проводить обобщение и анализ основных положений предъявленного научного текста для последующего перевода на

язык обучения, а также для составления резюме на иностранном языке.

Письменный перевод научного текста по специальности оценивается с учетом общей адекватности перевода, то есть отсутствия смысловых искажений, соответствия норме и узусу языка перевода, включая употребление терминов.

Резюме прочитанного текста оценивается с учетом объема и правильности извлеченной информации, адекватности реализации коммуникативного намерения, содержательности, логичности, смысловой и структурной завершенности, нормативности текста.

При беглом чтении оценивается умение в течение короткого времени (1-2 минуты) определить круг рассматриваемых в тексте вопросов и выявить основные положения прочитанного.

Передача извлеченной информации может осуществляться на иностранном языке (гуманитарные специальности) или на языке обучения (естественнонаучные специальности).
Оценивается объем и правильность извлеченной информации.

Структура экзамена

Кандидатский экзамен по иностранному языку проводится в два этапа.

На первом этапе аспирант (соискатель) выполняет письменный перевод научного текста по специальности с английского на русский язык (допуск). Объем текста — 15000 печатных знаков. Успешное выполнение письменного перевода является условием допуска ко второму этапу экзамена. Качество перевода оценивается по зачетной системе.

Второй этап экзамена проводится устно и включает в себя три задания:

1. Изучающее чтение оригинального текста по специальности. Объем 2000 − 3000 печатных знаков(2-2,5 стр.). Время выполнения работы − 45-60 минут. Форма проверки - передача

основного содержания текста на иностранном языке в форме резюме.
2. Беглое чтение оригинального текста по специальности. Объем − 1000 - 1 500 печатных знаков. Время выполнения − 1-2 минуты.
Форма проверки − передача извлеченной информации на иностранном языке (гуманитарные специальности) и на языке обучения (естественнонаучные специальности).
3. Беседа с экзаменаторами на иностранном языке по вопросам, связанном со специальностью и научной работой аспиранта (соискателя).
(Выписка из "Программы минимума кандидатского экзамена по общенаучной дисциплине «Иностранный язык»" Министерство образования и науки Российской Федерации, 2007)
Результаты экзамена оцениваются по пятибалльной системе.

1.2. Порядок сдачи кандидатского экзамена по английскому языку

1.2.1. Первый этап. Письменный перевод научного текста. Допуск.

На первом этапе кандидатского экзамена по английскому языку аспирант (соискатель) переводит на русский язык англоязычный научный текст, близкий по содержанию теме его научного исследования. Это должен быть текст по специальности (15 000 печатных знаков), извлеченный из оригинальной англоязычной литературы (книги или журнала), имеющий научный характер.
Не разрешается перевод учебно-методических пособий, практикумов и т.п. При отборе литературы предпочтение отдается книгам, изданным в последние 10-15 лет.

Перевод на русский язык должен быть адекватным, с учетом специфики синтаксических и лексико-грамматических структур русского языка. Следует избегать смысловых искажений и не допускать пропуска переводимых отрезков или

предложений. Для получения допуска необходимо представить в отдел аспирантуры в печатном виде реферат, выполненный соискателем перевод, а также англо-русский словарь профессиональной лексики (можно в рукописном варианте, желательно постраничный). К реферату прилагается и ксерокопия оригинального англоязычного текста, переведенного на русский язык. Титульный лист оформляется по образцу: фамилия, имя, отчество автора, название книги с выходными данными на русском и на английском языке + шифр специальности.

1.2.2. Второй этап. Устный экзамен.

На кандидатском экзамене аспиранту (соискателю) предлагается отрывок оригинального англоязычного текста (до 3 000 печатных знаков), близкого по содержанию теме его научного исследования, выдается лист устного ответа и словарь.

Словарем на экзамене пользоваться можно.

Лист устного ответа - это официальный документ, поэтому в нем не должно быть ошибок в английском языке.

В листе устного ответа заполняются следующие графы: фамилия, имя, отчество аспиранта (соискателя), шифр и название специальности; лист устного ответа подписывается на обороте.

В листе устного ответа должен быть написан полный письменный перевод на русский язык первых 10 строчек текста.

В листе устного ответа аспирант (соискатель) передает в письменной форме основное содержание текста па английском языке в форме резюме. Здесь же могут быть написаны некоторые вводные слова и выражения, которые помогут аспиранту (соискателю) в беседе с экзаменатором по теме научного исследования.

Время подготовки (выполнения) письменного перевода и составления письменного резюме - 60 минут.

Устный ответ на экзамене начинается с чтения вслух 10-15 строчек, отмеченных в тексте экзаменатором.

Во время чтения соблюдайте интонационный рисунок повествовательных и вопросительных предложений, отрицаний и вводных предложений.

Прочитанный отрывок переводится на русский язык. Перевод должен быть аутентичен, соответствовать нормам русского языка ив то же время быть приближенным к содержанию переводимого текста.

Лексико-синтаксические структуры резюме чрезвычайно разнообразны.

Резюме научного текста, представленный в письменном виде в листе устного ответа, воспроизводится аспирантом (соискателем) в устной форме для членов экзаменационной комиссии.

Далее экзаменаторы выдают научный текст для устного реферирования, содержащий до 1,5 тысяч печатных знаков для просмотрового (беглого) чтения в течение 2-3 минут.

Затем происходит беседа с экзаменатором по вопросам, связанным с биографией и научной работой аспиранта (соискателя). В ходе подготовки к ответу не пытайтесь записать ваше устное сообщение: у Вас не будет возможности прочитать написанное, так как экзаменаторы начнут задавать вопросы. Объем Вашего сообщения должен быть не менее 20-25 фраз. Сообщение должно иметь логическое завершение. Старайтесь придать Вашему сообщению научную направленность. Можно рекомендовать осветить в сообщении четыре блока тем:

1. Мое образование. Учеба в университете.

2. Моя профессиональная деятельность. Место работы. Занимаемая должность. Обязанности по занимаемой должности.

3.Моя научная работа:

* тема диссертации;

* ее актуальность, новизна, теоретическое и практическое применение, цели, задачи; в занятия в библиотеке;

* мои публикации;

4. Мой научный руководитель.

Ответы на вопросы экзаменаторов являются обязательной частью работы − уделите им повышенное внимание.

В ходе ответа старайтесь максимально использовать известные вам формулы разговорной речи.

Пример оформления титульного листа реферата

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ

Удмуртский государственный университет
Институт языка и литературы
Отделение профессионального иностранного языка

РЕФЕРАТ ДЛЯ СДАЧИ КАНДИДАТСКОГО ЭКЗАМЕНА ПО АНГЛИЙСКОМУ ЯЗЫКУ ПО КНИГЕ:

Выполнил:
Проверил:

Ижевск 2016

РАЗДЕЛ II. ОСОБЕННОСТИ РЕФЕРИРОВАНИЯ И АННТОТИРОВАНИЯ НАУЧНОГО ТЕКСТА

2.1. Письменное реферирование научного текста

Реферат − сжатое, краткое изложение основного содержания оригинала (статьи, главы, параграфа, целой книги, монографии, брошюры, патента) по всем затронутым в нем вопросам, полученное в результате его смысловой обработки.

Основным назначением реферата является оперативное распространение важнейшей научно-технической информации в максимально сжатом виде и ее использование читателями различных категорий. Реферат имеет следующую структуру:

1) предметная рубрика: наименование области или раздела знаний, к которым относится реферируемый документ;

2) тема: более узкая предметная отнесенность источника или ряда источников;

3) выходные данные источника или совокупность источников на иностранном и русском языках: фамилия и инициалы автора, заглавие, издательство, место, год издания (для журнала - название и номер);

4) главная мысль, идея реферируемого материала: реферат сжато формулирует главную мысль, не внося в нее своих комментариев, даже если она лишь подразумевается автором в тексте;

5) изложение содержания: − содержание реферируемого материала излагается в последовательности, в которой он приводится в источнике;

6) комментарий, примечание референта: это чаще всего указание адресата, на которого рассчитан реферируемый материал.

Рефераты делятся на:

а) информативные, или рефераты-конспекты,

б) индикативные, или рефераты-резюме. Первые достаточно полно излагают все основные положения, доказательства и выводы. Вторые перечисляют лишь главные положения и выводы по ним без изложения доказательств.

Оба вида рефератов могут быть: а) монографическими, составленными на основании одного источника; б) сводными, излагающими содержание нескольких источников, объединенных общей темой; в) обзорными, излагающими результат обзора многих источников по определенной тематике, плану.

Основные разделы реферата-резюме

1. Анализ работы. Выходные данные.
2. Структура работы (построение по разделам и главам).
3. Характеристика работы (описание того, что собой представляет работа).
4. Оценка работы. Рекомендации. Заключение.

Характеристика и описание работы

Чтобы охарактеризовать работу, т. е. описать предмет исследования, основную цель, принципы, положенные в основу данной работы, расположение материала и пр., пользуйтесь следующими существительными, глаголами и сочетаниями: book, work, paper − книга, работа, научная статья; monograph, review − монография, обзорная работа (обозрение);

content − содержание; material − материал (содержание работы); the book under review − рассматриваемая (рецензируемая) книга; the book constitutes, comprises, deals with, treats, discusses, presents, summarizes − книга представляет собой, включает, касается, затрагивает, суммирует (обобщает); be given, be presented (material) − (материал) подан, представлен; be devoted, be referred to − (книга) посвящена, относится к...; be emphasized − подчеркивается.

Структура работы

Характеристика построения книги и её разделов

Говоря о структуре работы, нужно знать следующие существительные: volume − том; part − часть; chapter − глава; section − раздел; paragraph − параграф, абзац; illustrations − рисунки, пояснения; references − ссылки; list of literature − список литературы.

Наиболее употребительные глаголы: constitute − представлять собой; comprise − состоять (из); cover − охватывать, занимать; analyze, deal with, treat − инализировать, рассматривать, затрагивать; give, present подавать, представлять (материал); reflect, illustrate − отражать, иллюстрировать; arrange − располагать, классифицировать (материал); be followed − следовать (за), сопровождаться; be referred (to) − ссылаться (на), отсылать (к); the book comprises − книга состоит из, исключает.

Вводная часть. Историческая справка. Выходные данные

Лексико-синтаксические структуры, используемые авторами рецензии во вводной части, чрезвычайно разнообразны. Все зависит от рецензируемой работы и задачи рецензента.

The book (the work) under review − рассматриваемая, рецензируемая книга (работа); the first (the second etc.) edition − первое (второе и т. д.) издание; content − содержание; publication − опубликование (издание); reason - причина; the main reason (why, of, for) - основная причина того, что (почему, для чего), именно поэтому; achievement − достижение, событие; revision − переработка, изменение;attempt − попытка, make an attempt − пытаться, стараться; discuss, explore, handle − рассматривать, обсуждать; mention − упоминать; publish − публиковать, издавать; undertake − предпринимать;

witness − свидетельствовать; revise − пересматривать, исправлять, перерабатывать, revised and completed − исправленное и дополненное.

Keep (bear) in mind − помнить; is to be presumed − следует ожидать; to mention just a few... − приводя (упоминая) только несколько...; to (warmly) welcome − всячески приветствовать; to appear in print − выходить из печати; recently, lately − за последнее время; the last few decades (months, years) − (за) последние десятилетия (месяцы, годы).

Основные достоинства и недостатки работы

Обсуждение достоинств и недостатков любой работы неизбежно связано с субъективной оценкой автора рецензии. Однако лексико-синтаксические клише здесь достаточно определенны,

Advantages − преимущества, достоинства, merits достоинства; achievement − достижение; contribution вклад; grasp − обзор, охват, понимание; coverage − объем, охват; depth − глубина; foundation − основа, обоснование; considerations − соображения, выводы; success − успех; survey − обзор, анализ; treatment − анализ, разбор, рассмотрение; starting point − исходный момент, начало.

Contain − содержать, включать (в себя); deal with, survey, treat − рассматривать, разбирать, исследовать.

Adequate − точный: clear − четкий; comprehensive − полный, исчерпывающий; exclusive − исключительный, уникальный; deep − глубокий; original оригинальный, самостоятельный, первый (в данной oh ласти); profound − глубокий, вдумчивый; rich − богатый (по содержанию), глубокий; successful − успешный; various − разнообразный; up-to-date − современный.

Extensive cover of (literature, material) − широкий охнат, исчерпывающий; a great variety of − большое разнообразие, множество; a wide and intelligent grasp of − обширный, проницательный критический обзор; at the high level − на высоком уровне; in addition to, besides − помимо (того), кроме.

Difficult − трудный; disappointing − разочаровывающий, вызывающий разочарование; erroneus − ошибочный; generalized

− обобщенный; inadequate − несоответственный, неточный, не отвечающий требованиям; outdated − устаревший, несовременный; regretful − вызывающий сожаление; scarce − редкий, малое количество; tedious − скучный, утомительный; unpardonable − непростительный; unfortunately, regretfully − к сожалению; it is to be regretted остается пожалеть, можно пожалеть.

Оценка работы. Рекомендации. Заключение

В обычной рецензии заключительный абзац или предложение включает оценку и иногда рекомендации. Для написания заключения авторы рецензий чаще всего пользуются клише:

in conclusion − в заключение; it can be said − можно сказать;
it can be highly recommended − можно с уверенностью рекомендовать;
it is an outstanding event (achievement) − это выдающееся событие (достижение);
it is to be warmly welcomed − нужно всячески (горячо) приветствовать;
in spite of (minor faults) it should be recommended − несмотря на (мелкие погрешности), она должна (может) быть рекомендована;
valuable as it is to ... it is of even greater value to... − при всей своей ценности для... она представляет еще большую ценность (значение) для...;
an invaluable aspect of the book is. − неоценимое значение книги в том, что...;
incidental (mistakes) in no way prevent. − случайные (ошибки) никоим образом не мешают (не умаляют).

Аннотация. Сущность аннотаций

Заключается в том, что она дает предельно сжатую характеристику материала, излагая содержание оригинала в

виде перечня основных вопросов и иногда давая критическую оценку. Она имеет чисто информационное или справочно-библиографическое назначение. Аннотация (abstract), в отличие от реферата (summary), не раскрывает содержание материала, а лишь сообщает о наличии материала на определенную тему, указывает источник и дает самое общее представление о его содержании.

Аннотация должна дать читателю предварительное представление о незнакомой ему публикации и тем самым помочь ему в поиске необходимой информации.

Виды аннотаций.

Различают два типа аннотаций: ***справочная (описательная) и рекомендательная***.

Справочная аннотация имеет наибольшее распространение в научно- информационной деятельности и особенно при аннотировании публикаций, изданных на иностранном языке. Справочная аннотация предназначена для быстрого и беглого просмотра, поэтому краткие аннотации предпочтительнее подробных. Для справочных аннотаций характерно сочетание конкретности и достаточной полноты с определенным лаконизмом изложения.

Рекомендательные аннотации имеют целью не только дать предварительное представление о документе, но также и заинтересовать читателя и показать место данной публикации среди других публикаций на аналогичную тематику.

Основное назначение рекомендательной аннотации − оценка документа.

Требование сжатости и лаконичности, предъявляемое к справочной аннотации, не имеет для рекомендательной аннотации особого значения.

В рекомендательной аннотации должны органически сочетаться характеристика содержания аннотируемого произведения с характеристикой

автора, разъяснением значения и сущности трактуемых вопросов, их актуальности и интереса.

Структура аннотации.

Аннотация, как правило, состоит из трех частей:
1 вводная (сюда входят выходные данные);
2 текст аннотации (описание основных положений работы);
3 заключительная часть (вывод составителя аннотации).
Текст справочной аннотации обычно включает следующие сведения:
− тему аннотируемого документа, характеристику его проблематики и основного содержания, основные выводы автора;
− вид аннотируемого документа (книга, диссертация, справочник, статья и т.п.);
− назначение аннотируемого документа;
− задачи, поставленные автором аннотируемого документа;
− метод, используемый автором (при аннотировании научных и технических публикаций);
− сведения об авторе (авторах);
− характеристику вспомогательных и иллюстративных материалов, включая библиографию;
− характеристику новизны, оригинальности проблем, рассматриваемых в аннотируемом документе, а также теоретической и практической ценности аннотируемой работы и др.

Требования, предъявляемые к аннотациям.

Аннотации не стандартизированы. Общие требования, которые необходимо учитывать при составлении аннотаций, особенно справочных, сводятся к следующим:
1. Композиция аннотаций должна быть логичной и может расходиться с композицией аннотируемого документа.
2. Язык аннотации должен быть лаконичным, простым и ясным, без длинных и сложных периодов. Нередко справочные аннотации состоят всего из нескольких назывных предложений.

3. Отбор сведений для аннотации и порядок их следования зависят от характера аннотируемого документа и от назначения аннотации.

2.2. Пример работы с научным текстом и составление реферата-резюме

COMPUTERS, CURRICULUM AND THE LEARNING ENVIRONMENT

By N. Thompson

Anyone who is planning to use computers in a school, a college or for industrial training should make an effort to understand their capabilities, and limitations; and − at least as − the implications for the way in which tutors, teachers and lecturers need to operate in order to get the best of them. The easy part − and even the cheap part − is to buy and install the equipment. Much higher costs are involved in providing the in-service training of teachers, which is essential if the computer or more recent technologies are to be used effectively.

This is not to say that training in computer science, let alone programming is required, but rather how to manage learning in partnership with the technology. Long and sad experience shows that if this dimension is neglected, the learning process under a computer regime can be more costly and less effective than by traditional methods.

If, however, we apply accumulated knowledge and understanding, we can achieve the exact opposite result: a more effective and flexible learning system and a better return on both the initial outlay and the continuing costs.

Computers can enhance the learning environment in a variety of different ways, which I will now attempt to outline.

(*a) By making learning more PRACTICAL*

There is great potential in computer simulations, control activities, word processing; and DTP exercises (such as a generation

of a newspaper) for enabling the tutor to catalyze student interest and activity. From this discussion and concept building can follow, based on the actions of pupils themselves and the discoveries which pupils themselves have made. This quality of the microcomputer used to be concentrated in science departments, because it is written to be a way in which practical science could be made less like the traditional laboratory experiment and more like the real processes of science, involving genuine experimentation and open-ended investigation. More recently it is being recognized that this characteristic is relevant to work in many other subjects across the curriculum. No wonder that computer work has promoted group activities and language development, for these are the natural consequences of the computer's ability to make learning more practical and more relevant.

(b) By making learning more PROVISIONAL

I need not labour the educational potential of the flexibility of the computer and the ease with which computer-generated material can be changed − whether it is based on a spreadsheet, a word processor or a database − or otherwise. There has been a major change in the way students now approach the generation of written material, for it is no longer a punishment to ask a student to redraft a word-processed document. It is a natural process, which encourages experimentation and the generation of self-critical standards. It is now a natural process based on the recognition that students' work should-be seen as developmental, a series of steps from getting something reasonably right, then improving it and refining it until satisfaction is achieved. It is difficult to underestimate the importance of this new freedom, which unleashes creativity and develops critical faculties. And it is just as relevant to children in the early years of schooling as it is to continuing education and adult training.

(c) By improving the learners ACCESS to learning

The most dramatic example of this is seen when a computer enables a person with communication difficulties to have a new window on the world, to socialize, to obtain qualifications and to hold down a job in a community of people who are not, in general, similarly

handicapped. But there are many other examples where the power of the computer can provide a totally new access to skills and experiences − e.g. high levels of musical experience can be achieved without the need to learn all the specialist skills required to become proficient on a particular instrument. Or it can bring achievement in Art, which can capitalize on creativity when technical skill has not been developed to a sufficient level to exploit it. Art, which for many was a frustrating experience because of the barrier of technical skill now becomes truly creative for the first time.

But even more important is the capability of the computer to be used with sophisticated learning systems, which provide guidance to the potential student on career choices and the selection of appropriate courses of study. The importance of matching education and training provision to «Indents' needs cannot be overstated − either in social terms «ml the rights of individuals or in national economic terms where failure and drop-out represent a gross waste of resource. The latest developments in North America and the U.K. amongst other countries, show that for the first time we have affordable computing power to tackle this sensitive and sophisticated need effectively, especially when the machine-based system is working in partnership with the professionally trained counselor. In many countries the number of the latter is small compared with the call on their services. The computer can provide the solution.

(d) By improving the focus on HIGHER ORDER skills

An early achievement of the first generation of microcomputers in schools and colleges was based on its fundamental ability to tackle low level, manipulative tasks and calculations which freed the learner for higher order activities, such as decision making, forecasting and planning; for "what if speculation, analysis, inference and so on. More recently, the more powerful generations of microcomputers and much more sophisticated software have themselves greatly enhanced the possibilities of the learner engaging in these higher level skills.

To quote a rather banal example the "what if capabilities of spreadsheets are now accepted without question and used in routine ways which would not have been possible only a few years ape. The newer technologies involving interactive systems and mass storage are extending these capabilities dramatically, raising the premium skill; of searching and organizing information, though some might say at the expense of certain levels of fundamental comprehension. The battle for the use of calculators in examinations was not easily won in Britain nor, I imagine, in other countries also. Similar battle may be expected as computers make possible higher level comprehension and manipulation, mathematics, which are fast becoming outdated by the advent of calculators.

(From: "Computer Education". Vol. 16, #1, Great Britain, 1991.)

I. Этап работы с заголовком текста и выходными данными источника

1.Найдите заголовок, автора и выходные данные статьи. Прочитайте их.

2.Прочитайте заголовок и скажите, о чем, по вашему мнению, будет идти речь в тексте.

3.Переведите заголовок. Уточните вашу догадку о возможном содержании текста.

4. Закончите начальные фразы рецензии, используя клише: The paper under review is entitled... It is written by... It is published in...

II. Дотекстовый этап

1. Просмотрите текст, определите его характер: рассуждение (discussion), описание (description), критический обзор (critical review), повествование (narration) и т.д.

2. Охарактеризуйте текст, используя клише: The scientific paper constitutes a critical review of...

3. Определите структурно-композиционные особенности текста:

а) на сколько частей можно разделить статью? Укажите выделенные части;
б) выделите вводную часть (introduction);
в) выделите основную часть и разделы основной части;
г) составьте общее представление о содержании текста по вводной и основной частям;
д) охарактеризуйте композиционную структуру статьи по-английски, используя клише: The paper comprises ... parts.

III. Текстовый этап
Вводная часть статьи

1. Сколько абзацев во вводной части?
2. Прочитайте первый абзац. Найдите в нем предложение (предложения), выражающее главную информацию (основную мысль) статьи:
а) выделите в нем ключевые фразы;
б) используя ключевые фразы, выразите
главную идею статьи своими словами предельно просто. Используйте клише: In introduction the author states that...
3. Найдите в первом абзаце введения информацию, аргументирующую и детализирующую главную мысль.
4. Прочитайте второй абзац введения. Подтверждает ли он выделенную в первом абзаце аргументирующую информацию?
5. Используя ключевые фразы, кратко и просто
изложите аргументирующую часть введения.
6. Найдите заключительное предложение вводной части, предваряющее основную часть:
а) выделите в нем ключевые фразы;
б) используя ключевые фразы, выразите основную мысль статьи своими словами предельно просто.

Основная часть статьи

Прочитайте первый абзац основной части. Соответствует ли название раздела "By making learning more practical"

содержанию абзаца? Выделите основной тезис данного абзаца. Проиллюстрируйте его примером или примерами из данного абзаца. Изложите основной тезис и его аргументацию на английском языке. Аналогичным образом выделите основные мысли из каждого раздела основной части.

IV. Послетекстовый этап

1. Подтвердилась ли ваша догадка о содержании статьи по ее заголовку?
2. Составьте резюме статьи.

Итоговое резюме (реферат)

The scientific article under review is entitled COMPUTERS, CURRICULUM AND THE LEARNING ENVIRONMENT. The author of the article is N Thompson. It is published in the journal "Computer Education ", VOLUME 16, NUMBER 1, 1991, printed in Great Britain.

The paper constitutes a critical review of learning process with the help of computers.

The article comprises 5 parts: the introduction and 4paragraphs of the main part.

In the introduction the author states that before using computers in a school or a, college it is necessary to understand their capabilities and limitations. It is easy and cheap to buy a computer, but to use the computers effectively means to apply the present understanding of learning. In the author's opinion, if rise teachers manage learning and partnership with technology, they get a more effective and flexible learning system.

In the main part the author outlines 4 different ways which can enhance the learning environment: by making learning more practical and more provisionally, improving the learners9 access to learning and be increasing the focus on higher order skills.

In the paragraph headlined "By making learning more practical" it is written, that there is a great potential in computer stimulations, control activities and word processing for enabling the tutor to

catalyze student interest and activity. Computers involve genuine experimentation and investigation.

The paragraph "By making learning more provisional" demonstrates the flexibility of the computer and the ease with which computer-generated material can be changed. It is no longer a punishment to ask a student to redraft a word-processed document The students work is seen now as development, which enlarges creativity and develops criticism (self-critical standards).

In the paragraph “By improving the learners access to learning” the author shows that a computer enables a person: with communication difficulties to have a new window of the world, to socialize and to gel a qualification. But what is more; important is the capability of the computer to be used with sophisticated learning systems, which provide help in career choice and the selection of courses of study.

The paragraph "By increasing the focus on higher order skills" is devoted to the increasing of capabilities of modern computers. The newer technologies involving interactive systems and mass storage greatly enlarged the\ possibilities of learners, raising the premium on searching and comprehension.

The paragraph is not finished yet but I find the article i informative and actual for further discussion in class for specialists and students as well.

РАЗДЕЛ III. ВОПРОСЫ И КЛИШИРОВАННЫЕ ФРАЗЫ

3.1. Пример сообщения “О себе” для беседы с экзаменаторами, по вопросам, связанным с биографией, профессиональной деятельностью и научными интересами аспиранта (соискателя). При составлении собственного сообщения используйте слова и выражения, данные в ПРИЛОЖЕНИИ пособия.

Пример сообщения "О себе"

My name is Olga Ivanova. I'm 28 years old. I was born in the family of teachers in Izhevsk in 1986.

I am a school teacher. I work at gymnasium in Izhevsk. I graduated from the Udmurt State University in 2008. I studied at the Chemistry department from 2003. I work at scool as an organizer of school activities and a teacher of chemistry. Our school works on Alkonin - Davydov methods. Every teacher of our school works at a separate scientific theme. Since the institute I've been interested in the developing of personality and self-consciousness. When working at school I faced the problem of individual approach in the process of chemistry teaching. I work as a counselor helping to bring up children. And I try to fulfill my work using the principles of technology and methodology of the bringing- up process. I plan to be a postgraduate of the pedagogics department of the Udmurt State University.

I am interested in the process of the development of school students' individual self-consciousness and the influence of the differentiation of school instruction on child's self-consciousness. I work on the problem of choosing a trade and personal self-consciousness of a school-leaver.

The topic of my dissertation is the development of personal self-consciousness in the process of school instruction and choice of trade of a school-leaver. The main aim of my study is to determine the basic conditions for the development of self-consciousness to find out psychological and pedagogical methods of stimulation of

slackening of self-consciousness. The second aim is to find out the dependence of the professional choice of school-leaver and differentiation of school instruction on the level of self-consciousness.

It is not the time to speak about the results. The work is in the stage of accumulating statistic data. The psychological and pedagogical experiment is in its initial stage (the analysis and preliminary results will be got in a year). The theoretical value of my investigation is the fact that the problem of self-consciousness as a part of consciousness was not investigated earlier. Some fragments of this problem can be met in the works of Leontyev, Vygotsky, Merlen and other psychologists and pedagogists» But there is no integral picture of personal development of consciousness. Studying the differentiation of school instruction recalls the basics of psychological peculiarities of differential school instruction and its influence on personal consciousness. If we know the ways of development of self-consciousness we can influence the professional choice of a school-leaver with the help of psychological and pedagogical modes.

My scientific advisor (supervisor, counsellor) is Doctor of pedagogical science, academician Petrov V. S. His area of research is Pedagogics of development. During last 5 years he published several books and articles on the problems of innovations in secondary schools and in higher schools.

I regularly read scientific books and articles. The last book I read is “Psychology Applied to Teaching” edited by California University. The book consists of 16 parts. This book is for teachers-theories. It represents age-level characteristics, principles and theories. It shows different types of learning, teaching skills and motivation of learning and teaching.

3.2 Варианты вопросов и ответов по темам биографии, профессиональной деятельности и научным интересам аспиранта (соискателя)

About myself and my research work
About my studies and job.
1. *What school did you study in/at?*
I studied at school № 24.
2. *Where did you study?*
I finished school № 2.
3. *When did you enter the University*?
I entered the Udmurt State University in 2000.
4. *When did you graduate from the University?*
I graduated from the University in 2005.
5. *What department did you study at?*
I studied at the Department of Russian Philology (Foreign Languages, Psychology, Physics, Physical Training, Elementary Studies, Natural Science, Institute of Economics and Accounting, Institute of Managing).
6. *When and where did you study after school?*
I studied at the University from 2000 till 2005.
7. *What is your major?*
My major is Mathematics.
8.*What were your favourite subjects at university?*
My favourite subjects were Russian History and Psychology.
9. *Who was your favourite teacher (why)?*
My favourite teacher was... because...
10. *What is your profession (occupation ?*
11. *What is your position at the University?*
I am a teacher (a seminar teacher, a lecturer).
12. *How long have you been working at the University?*
I have been working at the University for two years.
13.*Since when have you been working at the University?*
Since 2008.
14. *Are you a postgraduate?*
Yes, I am a postgraduate, study by correspondence.
15. *When did you enter the postgraduate courses*?
I entered the postgraduate courses in 2009,
16. *Are you a first or a second year postgraduate?*

I am a first year postgraduate.
17. *Do you have to get ready for the classes?*
Yes, it takes me 2 or 3 hours to get ready for the classes.
18. *Do you have any free time?*
I am sorry, but I am busy with my work all days long.
19. *What is your hobby?*
My hobby is reading (music, hitch-hiking).
III 1. *What are you interested in?*
I am interested in ... My research interests are
2. *What is your field? What is your area of research?*
My area of research is...
My research interests lie in...
3 *What is the topic (theme) of your investigation thesis, dissertation)?*
The topic of my research work is...
4. *What are the main objectives of your work?*
The objectives of my dissertation are to analyze/ to work out/ to develop/ to characterize
5.*What methods of scientific investigation are used in research work?*
I used several methods in my research work. They are a statistical method, a qualitative method methods described by professor N., and modem methods of linguistic analysis.
6. *What is the theoretical value of your investigation?*
The theoretical value of my investigation lies in a new scheme of the analysis of...
7.*What is the practical value of your study?*
The results of my study can be used in the course of lectures in... and seminars in...
8.*What are the preliminary results of your study?*
The preliminary results of our investigation confirm our hypothesis.
9. *Do you have any articles on the results of your study published?*

Yes, I've got 3 articles published in some specialized journals / devoted to the results of the VSHU teachers' research work. I also have a manual published. It is devoted to the problems of …

I am sorry to say, but I haven't got any articles published yet.

IV.1. *Do you regularly go to the library to read scientific books, journals and articles?*

Yes, I visit the library at least once or twice a week /a fortnight, a month/. One of the most important stages of my investigation is scientific analysis of books, journals and articles on the problems of my research work. I also look through all Russian journals on…

2. *What book (or article) have you read recently?*

I have recently read a very interesting book edited by Oxford Publishing House. This is a book"..." after N. The book was published in 1995 in Oxford. The book is devoted to the description/ analysis/ depiction/ investigation etc.

V.1. Who is your scientific adviser (supervisor)?

My scientific adviser is Doctor..., Professor...,

Associate Professor...

My adviser is famous for his investigations in the field of...

She is the author of some books and many articles published in Russia and abroad.

My adviser helped me to choose the topic of my investigation, to work out the scheme of the research analysis, to carry out my experiments, to analyze the preliminary results of my investigation. I am much obliged to my adviser.

3.3 Клише и устойчивые выражения для реферата-резюме и аннотации научного текста

1. The article under review is taken from the book (chapter, section) entitled ... (after N)
2. It's headlined... It has a subtitle...
3. The author of this book is...
4. The main idea of the article is to show/depict...

5. The article is devoted to the description/definition. It's concerned with/ dwells upon/ touches upon/ deals with...
6. The author states/ touches upon/ points out/ stresses/ mentions/ shows/ assumes/ considers/ reviews / goes on to consider/ examines/ illustrates... The author illustrates the main point of his theory with the analysis of... He represents the correlation between... He has thrown a new light on... His researches has shown... Some facts are easy to recognize.
7. It is shown/ suggested/ indicated/ stressed that/stated/ revealed/ emphasized/ argued that.
8. It's quite obvious. There's no doubt that...
Evidently...
In fact...
The fact is that...
According to the author...
9. It should be noted that/ taken into
account/remembered...
10. In conclusion the author says.../at the end the
concludes that...
11. I find the article useful, helpful, necessary, actual,
Important, and modern. It gives a material for further discussion.

3.4. Вопросы для обсуждения содержания научной статьи

1. What is the subject area of the article (judging by the title)?
2. What information or knowledge do you already have about the subject (before you have read the article)?
3. What is your purpose in reading this article? Have you been given any guidelines for reading this article? If so, what are they?
4. What are the writer's basic assumptions, his hypothesis (or hypotheses), and his main thesis?
What historical or other background material does the writer provide?
6. What is the writer's plan or method of organization? Does any one type of text structure dominate this article? Does the writer define a word or concept?

a) Does the writer compare/contrast two ideas?
b) Does the writer describe a historical event − causes leading up to the event, results of the event or both?
c) Does the writer analyze a situation or event, providing us at the outset with a generalization and following this up by supporting evidence (deductive organization)?
d) Does the writer begin with the details and end with a generalization (inductive organization)?
e) Does the writer first present the arguments of other writers, only to refute them, and then finally, present his own viewpoint on the subject?
f) Does the writer use some combination of the above rhetorical text structures and organizing patterns to develop his argument?
7. What is/was the writer's purpose in writing this article?
8. What kind of writing characterizes this article (expressive? informational? A combination of both? Which one of them dominating?)
9. What questions or problems are discussed?
10. What other researchers who support his point of view does he mention?
11. What points of view other than his own does the writer present?
12. What evidence or data does the writer present to support his ideas?
13. What definitions (of special terminology, or terms he uses in a special way) are presented by the writer.
14. What examples does he bring in to illustrate each of his ideas?
15. What reservations or qualifications are made by the writer? Is he making a strong or weak claim for each of the points in the thesis?
16. Is he convincing? Why (or why not)?
17. Determine if, and where, the writer makes use of such rhetorical devices as: (a) irony; (b) humor;
(c) appeal to the emotions; (d) analogy; (e) figures of speech
18. (metaphors, similes); (f) repetition for purposes of stressing important points; rhetorical questions.
19. Summarize the main points of this article in 2-3 paragraphs.

20. What difficulties did you have in reading this text?
(Vocabulary? Sentence structure? Following the writer's argument? Missing background information?) How closely does this article fit in with the lectures and course work for which you are reading it?)

РАЗДЕЛ IV POSTGRADUATE STUDY
Academic degrees and postgraduate studies
VOCABULARY LIST:

science – наука
natural ~ (or the natural sciences) – естественные науки
the exact ~es – точные науки
the mathematical ~ (or the mathematical sciences) – математические науки
social ~ (or the social sciences) – общественные науки
~ and technology – наука и техника
scientific – научный
~ method/approach/principle – научный метод/подход/принцип
~ work/research – научная работа/исследование
scientist – ученый (естественные науки)
scholar – ученый (гуманитарные науки)
learned – научный
~ society – научное общество
~ work/ article/language – научный труд/журнал/статья
~ paper – научный доклад
~ journal – научный журнал
arts – гуманитарные науки (humanities)
liberal ~ – гуманитарные науки (язык, философия, история и т.д.)
Candidate/Doctor of Philology – кандидат/доктор филологических наук
~ of psychology – кандидат/доктор психологических наук
~ of education – кандидат/доктор педагогических наук
~ of economics – кандидат/доктор экономических наук
~ of laws – кандидат/доктор юридических наук
research– исследование, научно-исследовательская работа
to do/carry out /conduct ~ (on/in/into) – проводить исследования (по)
to be engaged (in) ~ – проводить исследования
~ degree – ученая степень
~ institute – научно-исследовательский институт
~ center – исследовательский центр

~ student – аспирант (postgraduate student)
~ subject / topic – тема исследования17
~ worker/researcher – научный работник
degree – степень (ученая)
to award/confer a ~ – присвоить степень
to get/take/receive a ~ – получить степень
to hold/have a ~ – иметь степень
first ~ – диплом бакалавра наук
Bachelor's ~ – степень бакалавра
higher ~ – ученая степень
Master's ~ – степень магистра
Doctorate ~ (PhD) – степень кандидата наук
~ of Candidate of sciences (Candidate's degree) – степень кандидата наук
~ of Doctor (Doctor of sciences) – степень доктора наук
dissertation/ thesis – научная работа, диссертация
to defend one's ~ – защитить диссертацию
to submit a ~ for hearing at the session of the Academic Council – представить диссертацию для обсуждения на заседании Ученого совета.
field of study – область исследований

TEXT 1 ACADEMIC DEGREES ABROAD

Modern academic education in our country comprises three stages: Bachelor's degree, Master's degree, Postgraduate degree. Academic degrees abroad differ in many ways which is the point of our further discussion.

A degree is an academic qualification awarded on completion of a higher education course (a first degree, usually known as Bachelor's degree) or a piece of research (a higher/further degree, doctorate and so on). There exists considerable diversity of degrees in various countries. But in spite of the lack of equivalence of degrees some similarities can be found among certain groups of

countries, particularly those of the British Commonwealth, continental Europe, America and the Far East.

One can distinguish the principal types of academic degrees – bachelor, master, and doctor which represent different levels of academic achievements. The naming of degrees eventually became linked with the subject studied, arts is used for the humanities, science – for natural and exact sciences.

The Bachelor's Degree is the oldest and best known academic degree.

Some varieties of bachelor's, or baccalaureate, degrees are Bachelor of Arts (BA) degree and Bachelor of Science (BSc). Abbreviations vary between institutions.

Other baccalaureate degrees offered by most universities are Bachelor of Education, Bachelor of Music, Bachelor of Business Administration, Bachelor of Divinity, Bachelor of Home Economics.

The Bachelor's degree can be attained by students who pass their university, or in some cases other examinations of equivalent level. This normally involves at least three years of full-time study after passing the advanced level certificate of education at the age of about eighteen, so most people who become BA, BSc, etc. do so at the age of at least twenty-one. First degrees in medicine require six years of study, some others four.

It is now quite usual for students in subject such as engineering to spend periods during their degree courses away from their academic studies, in industrial location so that they may get practical experience. A student of a foreign language normally spends a year in a country where that language is spoken.

Bachelors' degrees are usually awarded on the basis of answers to several three-hour examinations together with practical work or long essays or dissertations written in conjunction with class work. Degrees are classified. About a tenth (or less) of candidates win first-class, honours degrees, three quarters - second-class, and the rest - third class, or pass without fail. A person studying for a degree at a British university is called an undergraduate.

About 33 per cent of students continue to study for degrees of Master (ofArts, Science, Education, Business Administration, Music, Fine Arts, Philosophy, etc.). About 45 varieties of Master of Arts and 40 varieties of Master of Science degrees are reported. The degree of Master in general requires one or two further years of study, with examination papers and substantial dissertation.

Bachelors' and Masters' degree can be conferred "with honours" in various classes and divisions, or "with distinction". This is indicated by the abbreviation "(Hons") and is often a prerequisite for progression to a higher level of study.

A minority (about 15 per cent) goes on further, preparing theses which must make original contributions to knowledge, for the most advanced degree of Doctor of Philosophy (Phd) or Doctor of Science (DSc). Abbreviations for degrees can place the level either before or after the faculty or discipline depending on the institution. For example, DSc and ScD both stand for the doctorate of science.

Doctor's degrees in many foreign countries are of two distinct types: professional or practitioner's degrees, and research degrees.

The former represent advanced training for the practice of various professions, chiefly in medicine and law. The principal ones are Doctor of Sc. Medicine, Doctor of Dental Science of Dental Surgery, Doctor of Veterinary Medicine, Doctor of Pharmacy, and Doctor of Jurisprudence. These degrees carry on implication of advanced research.

Quite different in character are the research doctorates which represent prolonged periods of advanced study, usually at least three years beyond the baccalaureate, accompanied by a dissertation designed to be a substantial contribution to the advancement of knowledge. The most important of these is the

Doctor of Philosophy, which represents advanced research in any major field of knowledge.

Second in importance and much more recent as a research degree is the Doctor of Sc. Education (Ed.D.) It was first awarded by Harvard in 1920, but was preceded by the equivalent Doctor of Pedagogy first conferred by New York University in 1891. The only

other earned doctorates of the research type currently conferred by 10 or more institutions are the Doctor of the Science of Law and the Doctor of Business Administration.

Read the following dialogie in parts

Q: What do you do after you receive your bachelor's degree?

A: With a bachelor's degree you can apply to a graduate school and start working towards a master's degree. If you have a bachelor's degree you can also go to a professional school.

Q: What is professional school?

A: Law and medical schools are considered professional schools. If you go to a medical school it's a four years program, and then you usually have internship. You usually have to be on intern for a year. But it depends on your speciality. If you're going into surgery you may have another year. Well, anyway it can be a far longer program than four years. In the end you get a M.D., Doctor of Medicine degree. Medical schools are Mm by the American Medical Association, A.M.A. and law schools by the American Bar Association, A.B.A. It's a three year program and you get a J.D., Juris Doctor degree.

Q: And if you go to a graduate school, how many years does it take to get a master's and a doctorate?

A: I think it depends on the program and every program is different. Usually a master's is a couple of years and a doctorate is another two or three years. Usually Ph. D. and master's programs are in the same place and you simply continue. The master's degree is not very important, it's a step on the way to get a Ph. D. You simply stay on the same program and continue. But you can change. You can get a master's degree in one place and then change schools and get a Ph. D. degree in another one.

Q: What do you know about honorary degrees?

A:I don't know much about that. But I do know that my

College gives honorary degrees. For example at the graduation ceremony when I got my bachelor's degree they awarded some very accomplished elderly man a Doctor of Letters degree. It's an honorary degree and it means the institution recognizes that person.

Q: What is the most important division at an American university?
A: It's a department But you don't belong to a department.
You're a student and you have a major. Your major is in one department and usually your advisor is also in that department. So the department requires certain courses. In order to major you have to do these certain courses. Perhaps a quarter or a half of
your courses are in the direction of your major department.
Q: Could you name the positions which are occupied by the university teachers?
A: O.K. I'll start with the bottom. A private institution can hire anyone. The lowest rank is instructor. Actually he teaches anything they need. For instance, you can have a native speaker who teaches some conversation courses. You hire that person and he may have no advanced degree whatsoever. I think the assistant professor is the next highest. Usually when you hire an assistant professor that's someone who is likely to be on a tenure track. That's a lower rank and it's assumed you eventually would achieve a higher rank. They do anything, they do whatever the department decides. An assistant professor usually has a master's degree. Now when there are so few university jobs they are usually people who have almost a Ph.D. or already have a Ph.D., people who are writing their dissertations or are close to a Ph.D. and it's assumed they will finish their Ph.D. They couldn't move you up until you get your Ph.D. You really have to have it before you get an associate professor or full professor.
Q: What is a tenure position?
A: Each department has some tenure positions which are J lifetime positions. It's an academic protection. You can't fire that J person. An associate professor who after a number of years has done his Ph.D. is considered for tenure. Say, there are four tenure positions and someone is retired and if you're considered qualified enough you get tenure. It's a very long and difficult process the college or university is committing itself to you to that person. And if you don't get tenure, and you're turned down, usually quit and go to another university.
Q: It is important not only what position you have but also where you work?

A: That's right. Each organization, basically, runs its own show. A major university, Berkeley, for example, has its own research organizations connected with the university. If you're associated with the university you may have an academic title or simply be a part of the research organization at Berkeley, I think in a lot of areas you're considered important and accomplished if you are senior associate at Berkeley research institute. Because Berkeley' is very important Because Berkeley is a big name. Every field has its big names.

1.1 Discuss the problems in the dialogue

1.2 Make a list of the most important points for a person to be qualified as a scientist in an English-speaking country

Discussion: *Since there is no full equivalence in foreign and native academic degrees system, draw an approximate parallels and compare them. It may be of some interest for you to acquaint yourself with the curriculum and post-graduate training programs in other countries.*

TEXT 2 POSTGRADUATE TRAINING PROGRAMS

Read the text carefully and find some differences and similarities in the postgraduate course in the United Kingdom and that of our country.

All further education which comes after baccalaureate can be regarded as postgraduate education. It presupposes carrying a lot of research work, acquiring knowledge of new methodologies and new trends. It may lead to either a Master's degree (a three-year program of study) or PhD (usually a two-year course of study).

Postgraduate programmes are either research degrees or taught courses.

Taught courses last one or more years and are either designed so that you deepen your knowledge gained from your first degree or for you to convert you expertise to another field of study. Examples of these include changing to law to become a solicitor and training to become a teacher.

Degrees by instruction are very similar to undergraduate courses in that most of the time is devoted to attending lectures. This may take up the first eight or nine months of the course and is followed by written examinations. A period of research lasting from two or three months usually follows and the results of it are presented in the form of a thesis. Finally, an oral examination is held, lasting perhaps an hour or two, to test the knowledge accumulated throughout the year. Most programmes, which involve classes and seminars lead up to a dissertation.20

Research course is quite a different type of study from a taught course. First of all it lasts longer, for about three years providing Master's or doctorate qualifications.

They allow you to conduct investigations into your own topic of choice and are of use in jobs where there are high levels of research and development.

The most well-known research qualification is the Doctor of Philosophy (PhD, a three-year study programme). There is a shorter version called a Master of Philosophy (MPh) which takes the minimum amount of time of two years.

Both of these qualifications require the students to carry out a piece of innovative research in a particular area of study. Also possible is the research based on Master of Science (MSc.) and Master of Arts (MA) degrees. A recent development is the Master of Research (MRes), which provides a blend of research and taught courses in research methods and may be a taken as a precursor to a PhD.

It is a common practice for students to be registered initially for the MPhil and to be considered for transfer to the PhD after the first year of study, subject to satisfactory progress and to a review of the proposed research. All research degree programmes involve an element of research training designed to ensure that students are equipped with the necessary skills and methodological knowledge to undertake original research in their chosen field of study. The training programme includes the development of generic skills relevant to the degree programme and a future career. Although the

training element is not a formal part of the assessment for the degree, it constitutes an important basis for research and may take up a significant part of the first year.

The start of a research degree involves a very extensive survey of all previous works undertaken in that area. At the same time, if a student is planning to carry out any practical experimentations, the necessary equipment must be obtained.

This preliminary part of the study can take up to six months, but it is important note that the process of keeping up to date with other work going on in the subject must continue throughout the entire period of the research.

The next stage of a research course usually involves collecting information in some way. This might be through experimentation, in the case of arts, social sciences or humanities degree. The important thing is that something new must be found.

This second part of the procedure takes about two years in the case of a PhD. The research is written up in the form of a thesis during the final six months of the three-year period. Typically, this will contain an introduction, methodology, results and discussion. As in the case with taught degrees, the research must then be examined orally. Occasionally, if the examiners are not completely happy with the work they may ask the candidate to rewrite parts of the thesis.

Hopefully, a good supervisor will make sure this does not happen!

TEXT 3 REASONS FOR CHOOSING POSTGRADUATE STUDY

What qualities does research demand from postgraduate students, those young people who make up their minds to devote themselves to scientific research? Some of these qualities are mentioned in the text below. Think of the other ones, for example, you may enjoy solving problems, you may have creative abilities or things like that. Are you patient enough, industrious and hard-working for this kind of activity?

Different types of study require similar qualities from the people who undertake them. Both demand an inquisitive mind that will maintain the motivation to learn and discover new information.

They also both demand a high level of intellectual ability in order to cope with the pressures of understanding the possible complex arguments, facts or theories. Both require a high degree of organizational ability and time management, as so many different things need to be attended to.

Why undertake postgraduate study?

There are various reasons for choosing postgraduate study but some reasons are more positive than others. Look through the texts below and get ready to discuss different motivating reasons to do a higher degree.

Tom Brown:
I Really Enjoy My Subject

This is a highly motivating reason to do a higher degree. It's worth considering the long-term implications of your choice. Does your choice of course fit in with your long-term career plans? That does not mean that you should only consider postgraduate programmes related to your area of work interest. All further study programmes will enable you to develop skills that you could market to an employer.

Emily Wright:
I Need It to Pursue My Chosen Career

This is an obvious positive reason for undertaking further study. Some career areas do require a professional qualification, for example law, teaching, social work, librarianship or clinical psychology. For other employment areas a postgraduate qualification, although not essential, will provide a distinct advantage to applicants, particularly when competition for places is fierce. In any case it will make you stand out from the crowd and get you a

better job. Research the area of work that interests you to identify whether a postgraduate course would be necessary or advantageous to you.22

Martin Scott:
I Don't Know What to Do – This Will Give Me More Time to Decide

Past experience suggests undertaking a further year or more of study is unlikely to lead to careers inspiration! If you choose a course for this reason, it is important to use the duration of the course to decide what options are open to you, what skills you have to offer, what you want out of a job or may be jobs, what jobs would suit you in general.

Pamela Bain

The idea of original research can conjure up thoughts of constant intellectual excitement and cries of 'eureka!' The reality may be rather different.

Studying for a research degree is very different to studying for an undergraduate degree. Consider carefully whether or not you would enjoy the basic research techniques you are going to use. Can you imagine counting black dots down a microscope for weeks on end? OK spending a year, or two, building equipment before generating a single result? Will you be happy working alone in a library for days on end? The breakthrough, when it happens, can be euphoric, but when results refuse to come it can by deeply disappointing.

Tom Sight

Doctorates don't count for much outside academia – and in fact they may count against you. If you can't find a directly relevant area for subsequent professional work, then many employers are likely to

look at you, a 25-30 year old person with three-six years of post-graduate work as being a strange and slightly worrying employment prospect – they're going to be too smart for their own good. Another thing you won't be told is how many people don't complete their doctorates. I've heard various figures mentioned, but I believe that around 50% of people who start doctorates don't get a PhD out of it. An enormous proportion of people simply never finish the things because it's not quite what they were expecting when they started.

TEXT 4 CAREER PROSPECTS FOR POSTGRADUATES CAREER

Research the area of work you wish to enter to identify how potential employers would view applicants with postgraduate qualifications.
What new experience and knowledge would you gain from the post-graduate course of study?
What is your motivation for taking a post-graduate course?
Is it only because of helps for future career making?

Sum up all pros and cons and make a presentation in class. The text below provides you with extensive information to think about and to help you find the right answer.

Just getting a university degree isn't enough nowadays. Employers are increasingly looking for graduates who can hit the ground running. Postgraduate courses are monitored to match the needs of employers and make you "work ready". Each degree has been developed in response to current market demands for specific skills. Employers look for graduates who can demonstrate both breadth and depth of subject knowledge. Combining subjects in a degree programme is a popular way of tailoring a course to reflect your career aspirations. Work experience plays a key role in making yourself employable. Some of the benefits are: the chance to put theory into practice; development of key skills; greater understanding of career choices; valuable career contacts for the future. Business is increasingly dependent on international trade, and employment

opportunities demand well developed language skills. The course of foreign language will provide a broad range of language training opportunities for all students whatever course they are taking. To find the right career for you, you need to think about the occupations and jobs available – the skills, qualifications, experience and aptitudes you need and whether they are right for you. A postgraduate qualification from the UdSU will be one that is recognized globally and will provide an excellent route to better career prospects. Major companies say they would rather employ students from the UdSU. The University's graduates benefit from our tradition of strong ties with business and industry.

We can say that our courses were more vocational, with students developing better jurisprudence, teamwork and communication skills.

The UdSU's high quality facilities and teaching and its interdisciplinary approach to research will enable you to make the most of research and learning opportunities available whilst studying for your scientific degree. It provides exceptional opportunities for research with commercial applications, drawing upon decades of working relationships with business and industry. All students here receive "appropriate and relevant preparation, training and support for their development, helping them both to complete a high-quality doctoral thesis and to develop a range of knowledge, understanding and skills necessary for their future employment".

There are undoubtedly scenarios in which a generic or interdisciplinary approach would yield interesting results: for example, one could imagine how networking, team working, and some communication skills could be enhanced through contact with others outside one's subject area. Such elements of training must, however, be carefully handled, because the current crop of PhD students are surely busier than their predecessors, and are being required to professionalize earlier. Not only are they working to finish their dissertations within the three-year period of their awards; but also often teaching, attending conferences, making research trips,

attending meetings, and engaging in other activities entirely appropriate to their stage of career.

It is clear that development of communication skills and participation in a research seminar are linked to an important professional activity: going to a conference and speaking about one's work. Students are explicitly prepared for this experience in a special session on 'conference culture', in which they are given pointers about how to propose and present a paper, and are taught the conventions of an oral text. They are encouraged to use the conference as a way of raising their individual profiles, and as a springboard for future publications.

The delicate issue of networking is also addressed. The session is also an appropriate opportunity to plant in their minds the idea of running a conference themselves, thus further enhancing their organizational skills. Conference activity forms an important part of the career of any academic; for postgraduates it is an important way of participating in academic debate, and 'showcasing' their own work.

By the end of the second year of the program it can be seen together: the postgraduates are taught to make practical progress in the number of key areas of academic endeavor, with a view to having a significant body of experience by the time they complete their degrees. Introducing this information in the second year also helps to focus students' minds on the key question of whether or not these postgraduates pursue academic careers, they will almost certainly be required to undergo an interview in order to obtain gainful employment.

It is therefore crucial to present them with opportunities to hone their skills in this area. By this stage of the programme they will have had experience of delivering their material in a public forum, and will have made an attempt to develop their presentation skills; they should also have had other opportunities to defend their ideas, making a substantial, original contribution to knowledge in a specific area.

RESEARCH SUPERVISION

VOCABULARY

supervision – руководство
research ~ – научное руководство
dual ~ – двойное руководство
supervisor – руководитель
research ~/adviser – научный руководитель
appropriate ~ – соответствующий руководитель
production of a thesis – написание диссертации
experienced (in) – имеющий опыт (в)
work closely – работать в тесном сотрудничестве
guide – направлять
offer advice and guidance – дать совет и направление
formulate one's research proposal – формулировать направление исследования
to define a programme of research/study – определить программу (область) исследования
research interests – научно-исследовательские интересы
throughout the period of study – во время всей учебы
to complete one's research – завершить исследование
responsibility – ответственность
retain the prime ~ – нести основную ответственность
to share ~ – разделить ответственность
completion of one's studies – завершение исследования
expert in the chosen area of research – специалист в избранной области исследования
to design work on the thesis – спланировать работу по диссертации
general research life – научно-исследовательская деятельность вообще
to be involved in research seminars, colloquia – принимать участие в научно-исследовательских семинарах, коллоквиумах
to gain success – добиться успеха
academic staff – преподавательский состав
expertise – специальные знания

to present one’s thesis for examination – представить диссертацию на обсуждение
to be acquainted with – знать, быть знакомым с
procedures and regulations – процедура и правила (защиты диссертации)
a stimulating research environment – благоприятные условия для исследования
to provide training in research – обеспечить обучение в области научных исследований
to monitor progress – следить за прогрессом
to provide feedback – обеспечить обратную связь
to remain aware of the student's situation and needs – быть в курсе проблем аспиранта
approach – подход
innovative ~ – новаторский подход
holistic ~ – целостный подход

TEXT 5 A SUPERVISOR FOR A POSTGRADUATE STUDENT

Any research conducted by a postgraduate student is supervised by a competent researcher with an advanced academic degree.

Dean of Guildford University speaks about supervision at his University. Compare it with what you have at UdSU.

When you are offered a place on any of our research degrees, you carefully match you with an appropriate supervisor who will be experienced in the field of your research interests. Your supervisor(s) will help you in formulating your research proposal and give you assistance towards successful and timely completion of your studies. Many Schools will offer dual supervision or a supervisory panel. In addition, students working in most of the Schools in the Sciences and Life Sciences will be part of a research group. We believe that this

provides the opportunity for you to gain access to wider expertise and support.

Your Supervisor is usually the most important academic person-resource in your postgraduate program. He is appointed from the School's academic staff. He is also your first point of contact for a range of questions, including professional development and administrative procedures.

The main activity is, of course, independent study and the production of a thesis based on it. As a research student, you will work closely with a supervisor who will guide and advise you throughout your period of study. The supervisor will also guide you in writing your thesis, but you retain the prime responsibility for your own work. Our University has approved policies on supervisory practice which set out how the responsibilities are shared between student and supervisor.

In addition to your own independent study, you will take part in the general research life of your department, and may be involved in research seminars, colloquia and other activities with your colleagues and with academic staff. At the end of your period of study, you will present your thesis for examination and be given an oral examination on it.

We regard the support of the supervisor as crucial in assisting you to complete your programme of study successfully and within the permitted length of time.

However, it is also important to remember that, whatever the discipline, a research degree is an opportunity to carry out an independent and original piece of work. Supervisors can offer advice and guidance, but they will not tell you exactly what to read or how to design and carry out work on your thesis.

Your supervisor should be acquainted with procedures and regulations of writing and defending your thesis. It is expected that supervisor and student meet at regular intervals so that the supervisor may advise and inform the development of the research project. He establishes a stimulating research environment, gives advice on the choice of project and planning, ensures that appropriate facilities are

available, provides training in research, consults the postgraduate, continuously monitors progress and provides structured feedback. Usually a supervisor remains aware of the student's situation and needs.

Below you will find different opinios of postgraduate students on supervision. Is research supervisor a boss, or a colleague, or a friend? What is your idea of an ideal supervisor? What do you prefer: to have a supervisor who is the name in his field, has plenty of ideas, which he is eager to share with you, or a supervisor who knows not much about your subject, but let you do the research independently?

A. I found that my supervisor's advice on reading particularly related to geographical theory and methodologies was extremely good. While researching he gave me plenty of encouragement which really boosted my confidence. Once I started to write I found that he read what I gave him fairly promptly and his comments were very pertinent, enabling me to work through my ideas more logically. He has always made time in a busy schedule to discuss any problems. More than this, he went out of his way to be helpful when I was unwell. I have greatly appreciated the time and effort he has put into helping me and also for his encouragement and support throughout the four years I have been in the School. Although I could have felt somewhat isolated because my topic has few connections with other postgraduate research being undertaken, this has been minimised by the good working relationship which has been established with my supervisor.

(final year PhD student)

B. My experience has been that this School is a good place to do research on economic geography, because of the high level of staff expertise and their reputation and influence, which extend far beyond the U.K. Both of my supervisors have been helpful, available to answer questions, and interested in my work. I have found a joint supervision arrangement to be especially beneficial to my work, given its holistic and innovative approach, and in my opinion the School’s openness to joint supervision is a real strength.

(PhD third year student)

Discuss with your groupmates the issue of a good supervisor.
You may use the expressions below.
Appropriate supervisor experienced in the field of your research interests to guide and advise you throughout your period of study the responsibilities are shared between student and supervisor crucial support of the supervisor to design and carry out work on your thesis procedures and regulations of writing and defending your thesis
to establishes a stimulating research environment
to provide training in research
to continuously monitor progress
to provide structured feedback
to remain aware of the student's situation and needs
to give plenty of encouragement
to boost one's confidence
pertinent comments
to appreciate the time and effort, encouragement and support
high level of staff expertise, reputation and influence
to be especially beneficial, holistic and innovative approach.

Usually your supervisor is a famous scholar and an expert in some field, he may have discovered an interesting phenomena or law. Try to find out about his scientific interests, his dissertation, and research. This will help you establish better working environment.

How to Write an Abstract for Your Research Paper

An abstract is a tightly written summary of a completed research paper or project. Abstracts help readers to focus on the most important points of a paper or project. Abstracts also function as a way to categorize your research by keywords for search engines. A well-written abstract entices your audience to continue reading or to attend your presentation.

• The first part of a well-written abstract should state the problem or issue being addressed by your research. It explains why you should care, why you should keep reading or why the research is relevant.

• The next part of an abstract lets readers know where you got your information. It is the method you used to reach the conclusions you

draw in your paper or project. Sharing the methods with your readers creates the credibility necessary to motivate them to keep reading.
• The third part of a well-written abstract presents the reader with the results of your study or project. The results should include the data you collected, what you learned about the topic that you did not know before and any surprising or unexpected findings.
• Since the goal of an abstract is to entice readers to continue reading or to attend your presentation, drawing a strong conclusion based on your research is the final -- and perhaps most important -- part of your abstract. A conclusion sentence compels readers to identify the parts of your research that support your findings. It also motivates them to come to their own conclusions about your subject matter.

WRITING SUMMARIES

Translators have to work with different types of literature, they often use originals in their everyday work. Sometimes they have to come across the secondary sources of information. The secondary sources are worked up according to the contents of scientific information and the aims of using the original literature.
The main secondary sources of foreign literature are:
1) Bibliographical descriptions;
2) Summaries;
3) Reports;
4) Surveys.

Each of the sources has a certain degree of information compression. The shortest source of the secondary documents is a bibliographical description. It contains the smallest quantity of information. A bibliographical description is a combination of pieces of information about the original work or its part which gives a general impression of the original.
It includes different parts.

The first one is a title of the original. It is written in your own language. The second one is some information about the author or a group of them. The next one is a date of publishing. It includes a

place of publishing and the name of publishing house given in a full form. The last one is a year of publication.
Sometimes there are some additional elements such as the number of figures and pages.
The main function of making bibliographical descriptions is to notify readers of a new source of information.
Translators of technical literature have to deal with summaries and reports all the time.

A summary (an annotation) is a brief characteristic of the contents of the original or the manuscript. The main purpose of such a simplification is to highlight the major points from the original (much longer) subject, e.g. a text, a film or an event. The target is to help the audience to get the main idea in a short period of time. We will take into consideration a summary on the content of scientific literature. There are different types of summaries. They are classified according to their aims of usage and their essence. The first type is a reference summary. Such summaries report the theme of the original, give some facts of it and don't express any opinion of the original work. The second type is a summary of recommendation. These summaries estimate the original and define a suitable class of readers.
E.g. It's recommended for scientists. It's of great interest to technicians.
There is another classification of summaries according to the quantity of the original contents.

The first kind is a general summary. They give some general characteristics of the original document. These summaries are written to a wide circle of readers. The second one is a specialized summary. They show some special aspects of the original. They are written to specialists in a variety of sciences. Summaries usually have a clearly arranged structure and they are written in a logical, chronological and traceable manner. In contrast to a résumé or a review, a summary contains neither interpretation nor rating. Only the opinion of the original writer is reflected – paraphrased with new words without

quotations from the text. Unlike a retelling, a summary has no dramatic structure and is written in present tense or historic present.
Because summaries should be significantly shorter than the original, minor facts have to be left out. However all major conclusions should remain. In summaries only indirect speech is used and depictions are avoided. Summaries of books or dissertations present the major facts in common scientific language and should be about from a half up to one page long.
A person has to do the following things to write s summary:
- To read the text attentively;
- To formulate the main statement;
- To reread the text and underline important ideas and arguments according to the main statement;
- To introduce the author and title of the work in the opening sentence;
- To mention the important facts in chronological order.
If a person is going to write a summary he has to know some requirements concerning writing them:
1) The volume of a summary is from 500 to 2000 symbols;
2) A logical structure should be kept.
It is also necessary to take the language peculiarities into consideration:
- To give the main ideas and facts of the original simply and in brief;
- To avoid repetitions;
- Not to repeat the title of the original;
- To use the same terms as in the original;
- To use the accepted abbreviations and shortenings;
- To avoid using adjectives, adverbs, introductive words a lot;
- To use word combinations helping to organize structure of summaries;
- To use key-patterns.
Each summary has a certain structure. It consists of several parts:
1. The introduction. It is the stage where a reader faces the problem.
2. The body. It expresses the main facts and problems of the original document.

3. The ending. It gives recommendations for a definite group of readers.

Usually a person begins to write a summary from the compression of information stated in the original. It's a difficult process which consists of three main steps:

1) It's necessary to express the main facts using the minimum of the original paper.

2) It's necessary to follow the main ideas of the original.

3) It's necessary to find some extra information about this problem.

The compression can be done in two ways.

The first one is a process of diminishing the quantity of the original information.

The second one is a process of keeping information completely.

The first type of compression is divided into two variants:

1) The omission of details;

2) The generalization of the rest.

The second type of compression is divided into two types as well.

The first one is a combination.

A combination is a way of organizing the text when two or more sentences are combined in one short construction where the same components are used once.

E.g. 1. It takes only one number to describe a scalar quantity. It takes several numbers to describe a scalar quantity. It takes several numbers to describe a vector quantity. It takes only one number to describe a scalar quantity and several – a vector one.

The second one is a substitution.

A substitution is a way of organizing the text when a part of the text is substituted by shorter one keeping the minimum of information of the original.

E.g. 1. He made up his mind to start the construction of another device. He decided to start…

2. The methods of multiplication of fractions in algebra are identical with those in arithmetic.

Compression of the original text is the first step of writing summaries.

The next one is making a logical plan of the text. A person looks through the text and finds the most important sentences. It's also necessary to pay attention to the language of writing summaries. A mention should be made about key-patterns usually used while writing them. They perform different functions. The key-patterns or speech models (stereotypes) make process of communication simpler, help not to waste translator's time and to organize his ideas better.

There is a classification of key-patterns according to their tasks. It's built on the basis

of notions. Usually there is a general notion and a lot of notions connected to them.

Key-patterns for writing summaries:

The article deals with . . .

As the title implies… the article describes …

The paper is concerned with…

It is known that…

It should be noted that…

The fact that… is stressed.

A mention should be made…

It is spoken in detail about…

It is reported that

The text gives valuable information on…

Much attention is given to…

It is shown that…

The following conclusions are drawn…

The paper looks at recent research dealing with…

The main idea of the article is…

It gives a detailed analysis of…

It draws our attention to…

Выражения для составления аннотации газетной статьи.

1. The article under review is taken from ….
2. It was published ...
3. It is headlined (entitled) as…
4. The title of the article is…

5. The author is ...
6. The article is a (an) report about (comment about)…
(review of)…
interview with …
7. The article touches upon…
deals with …
is devoted to…
is about …
gives information on …
(Some fact) is given much comment to.
8. The author starts by acquainting the reader with …
9. According to the introduction …
10. As far as I understood (know)…
11.The fact is …
12. It is pointed out that …
13. It should be noted …
14. It is quite obvious…
15. In my opinion …
16. From my (the author's) point of view…
17. I'd like to draw your attention to…
18. In conclusion the article says…
19. It comes to the following conclusion…
20. I found the article interesting (dull), valuable (of no value) , easy (hard) to understand.

REPORTS AND PRESENTATIONS

Scientific report writing requires the use of certain techniques and conventions that are detailed, strict and not always easy to master. The main purpose of a scientific report is to communicate. A typical structure and style have evolved to convey essential information and ideas as concisely and effectively as possible. The main aim of the report is to state your opinion on the issue or to provide precise information about a practical investigation.

Audience. Assume that your intended reader has a background similar to yours before you started the project. That is, a general understanding of the topic but no specific knowledge of the details. The reader should be able to reproduce whatever you did by following your report.
Clarity of Writing. Good scientific reports share many of the qualities found in other kinds of writing. To write is to think, so a paper that lays out ideas in a logical order will facilitate the same kind of thinking. Make each sentence follows from the previous one, building an argument piece by piece.

Group related sentences into paragraphs, and group paragraphs into sections.
Create a flow from beginning to end.

Style. It is customary for reports to be written in the third person or the 'scientific passive', for example, instead of writing 'I saw', one writes 'it was observed'; rather than, 'I think that ...' one writes 'it could be stated that ...' and so on. Avoid jargon, slang, or colloquial terms. Define acronyms and any abbreviations not used as standard measurement units. Most of the report describes what you did, and thus it should be in the past tense (e.g., "values were averaged"), but use present or future tense as appropriate (e.g., "x is bigger than y" or "that effect will happen"). Employ the active rather than passive voice to avoid boring writing and contorted phrases (e.g., "the software calculated average values" is better than "average values were calculated by the software").
Typical Sections. There are four major sections to a scientific report, sometimes known as IMRAD – Introduction, Methods, Results, And Discussion.

Respectively, these sections structure your report to say "here's the problem, here's how I studied it, here's what I found, and here's what it means." There are additional minor sections that precede or follow the major sections including the title, abstract, acknowledgements, references, and appendices. All sections are important, but at different stages to different readers. When flipping

through a journal, a reader might read the title first, and if interested further then the abstract, then conclusions, and then if he or she is truly fascinated perhaps the entire paper. You have to convince the reader that what you have done is interesting and important by communicating appeal and content in all sections.

Title of the report. Convey the essential point of the paper. Be precise, concise, and use key words. Avoid padding with phrases like "A study of ..." or headlines like "Global warming will fry Earth!" It is usual to write the title as one phrase or sentence. A good title is brief and informative. Titles should not exceed 10 or 12 words, and they should reveal the content of the study.

Many titles take one of these two forms: a simple nominal sentence (Asymmetric Information, Stock Returns and Monetary Policy) or beginning with The effect of (for example, The Effects of Financial Restrictions and Technological Diversity on Innovation). Sometimes it is impossible to make word-by-word translation from Russian into English, for example, Об оценке работы фирмы should be translated as Assessing the Firm Performance or К проблеме хеджевых фондов is translated as Hedge Funds. Sometimes the title contains two parts, the first one is the topic, while the second is its specific details (International Financial Contagion: Evidence from the Argentine Crisis of 2001- 2002). If the report is of a very problematic issue its title may be in the form of a question (Was There a Credit Crunch in Turkey?)

Introduction. This section should contain a brief history of the research problem with appropriate references to the relevant literature and the purpose of the study. Introduce the problem, moving from the broader issues to your specific problem, finishing the section with the precise aims of the paper (key questions). Craft this section carefully, setting up your argument in logical order.

Refer to relevant ideas/theories and related research by other authors. Answer the question "what is the problem and why is it important?" The introduction should also explain whether the study is an extension of a previous one, or whether a completely new hypothesis is to be tested. The final section of the introduction

generally includes a list of all the hypotheses being tested in the study. The results of the current study are not to be referred to in the introduction.
You may use the following expressions:
This paper
aims at
deals with
considers
describes
examines
presents
reports on

Examples of an Introduction

A. There has been a European Union foreign policy, confirmed in constitutional form in the Union Treaty, since 1993. The first decade, most commentators agree, has proved to be difficult: 'painful and problematic' according to one. As the twenty-first century progresses, replete with an array of new challenges, the need for a reassessment, and perhaps reinvigoration of Union 'foreign and security policy' is widely argued. The purpose of this article is to provide both a retrospective, of the evolution of the Union's foreign policy so far, and a prospective, of the challenges which it presently faces.
B. This paper examines companies incorporated under the Companies Act 1985. Its purpose is to consider the suitability of such companies for not-forprofit- organisations ('NFPOs').

Methods.

Explain how you studied the problem, which should follow logically from the aims. Depending on the kind of data, this section may contain subsections on experimental details, materials used, data collection/sources, analytical or statistical techniques employed,

study area, etc. Provide enough detail for the reader to reproduce what you did.
Include flowcharts, maps or tables if they aid clarity or brevity. Answer the question "what steps did I follow?" but do not include results yet. Here you may use such expressions as:
A method of …is proposed
Data on… are discussed
Present data encompass a period of …
The design of the experiments was to reveal…
The effect of… on… is discussed
The methods used for … are discussed
Results. Explain your actual findings, using subheadings to divide the section into logical parts, with the text addressing the study aims. Tables are an easy and neat way of summarizing the results. An alternative or additional way of presenting data is in the form of line graphs, bar-charts, pie-charts, etc.
Graphs, charts and illustrations are referred to as 'figures' (for example, Fig. 1) in the text of the report. All figures should be numbered in order of appearance in the text. For each table or graph, describe and interpret what you see (you do the thinking - do not leave this to the reader).
Expressions to describe results obtained may be:
The most important results are as follows
The results indicate the dominant role of…
The results of … are discussed
The results of observations are supported by…

Discussion.

This is the most difficult section of a report to write and requires considerable thought and care. Essentially it is a consideration of the results obtained in the study, guided by any statistical tests used, indicating whether the hypotheses tested are considered true or are to be rejected.

This is best thought of in three steps: the main results must be very briefly summarized; the procedure must be critically assessed and weaknesses noted; and a final evaluation of the results made in terms of the design, leading to afinal judgment concerning the hypotheses being tested. The discussion can only refer to results, which are presented in the results section. Any detailed results which only appear in the appendixes cannot be discussed.

Evaluation of the results should include reference to other research with indications as to whether or not the current findings are in agreement with other findings (that is, reference is made to the introduction). The main conclusions reached should be summarized at the end of the discussion. Suggestions for follow-up research can also be given.

Discuss the importance of what you found, in light of the overall study aims. Stand backs from the details and synthesize what has (and has not) been learned about the problem, and what it all means. Say what you actually found, not what you hoped to find. Begin with specific comments and expand to more general issues. Recommend any improvements for further study. Answer the question "what is the significance of the research?"

Important Note: this section is often combined with either the Results section or the Conclusions section. Decide whether understanding and clarity are improved if you include some discussion as you cover the results, or if discussion material is better as part of the broader summing up.

Conclusions. Restate the study aims or key questions and summarize your findings using clear, concise statements. Keep this section brief and to the point.

Acknowledgments. This is an optional section. Thank people who directly contributed to the paper, by providing data, assisting with some part of the analysis, proofreading, typing, etc. It is not a dedication; so don't thank Mom and Dad for bringing you into the world, or your roommate for making your coffee.

References. Within the text, cite references by author and year unless instructed otherwise, for example "Comrie (1999) stated that ..." or "several studies have found that x is greater than y (Comrie 1999; Smith 1999)." For two authors, list both names, and for three or more use the abbreviation "et al." (note the period) following the first name, for example "Comrie and Smith (1999)" or "Comrie et al. (1999)." Attribute every idea that is not your own to avoid plagiarism.

Oral Presentations

The material of your presentation should be concise, to the point and tell an interesting story. In addition to the obvious things like content and visual aids, the following are just as important as the audience will be subconsciously taking them in:

Your voice - how you say it is as important as what you say.

Body language – a subject in its own right and something about which much has been written and said. In essence, your body movements express what your attitudes and thoughts really are.

Appearance – first impressions influence the audience's attitudes to you. Dress appropriately for the occasion.

As with most personal skills oral communication cannot be taught. Instructors can only point the way. So as always, practice is essential, both to improve your skills generally and also to make the best of each individual presentation you make.

Preparation. Prepare the structure of the talk carefully and logically, just as you would for a written report. What are:

• the objectives of the talk?

• the main points you want to make?

Make a list of these two things as your starting point.

Write out the presentation in rough, just like a first draft of a written report.

Review the draft. You will find things that are irrelevant or superfluous – delete them. Check if the story is consistent and flows smoothly. If there are things you cannot easily express, possibly

because of doubt about your understanding, it is better to leave them unsaid.

Never read from a script. It is also unwise to have the talk written out in detail as a prompt sheet - the chances are you will not locate the thing you want to say amongst all the other text. You should know most of what you want to say – if you don't then you should not be giving the talk! So prepare cue cards which have key words and phrases (and possibly sketches) on them.

Postcards are ideal for this. Don't forget to number the cards in case you drop them.

Remember to mark on your cards the visual aids that go with them so that the right OHP or slide is shown at the right time.

Rehearse your presentation - to yourself at first and then in front of some colleagues. The initial rehearsal should consider how the words and the sequence

of visual aids go together. How will you make effective use of your visual aids?

Making the presentation

Greet the audience (for example, 'Good morning, ladies and gentlemen'), and tell them who you are. Good presentations then follow this formula:

• tell the audience what you are going to tell them,
• then tell them,
• at the end tell them what you have told them.

Keep to the time allowed. If you can, keep it short. It's better to under-run than over-run. As a rule of thumb, allow 2 minutes for each general overhead transparency or Powerpoint slide you use, but longer for any that you want to use for developing specific points. 35mm slides are generally used more sparingly and stay on the screen longer. However, the audience will get bored with something on the screen for more than 5 minutes, especially if you are not actively talking about it. So switch the display off, or replace the slide with some form of 'wallpaper' such as a company logo.

Stick to the plan for the presentation, don't be tempted to digress - you will eat up time and could end up in a dead-end with no escape!

Unless explicitly told not to, leave time for discussion - 5 minutes is sufficient to allow clarification of points. The session chairman may extend this if the questioning becomes interesting.

At the end of your presentation ask if there are any questions - avoid being terse when you do this as the audience may find it intimidating (ie it may come across as any questions? - if there are, it shows you were not paying attention).

If questions are slow in coming, you can start things off by asking a question of the audience - so have one prepared.

Delivery. Speak clearly. Don't shout or whisper - judge the acoustics of the room.

Don't rush, or talk deliberately slowly. Be natural - although not conversational.

Deliberately pause at key points - this has the effect of emphasising the importance of a particular point you are making.

Avoid jokes - always disastrous unless you are a natural expert.

To make the presentation interesting, change your delivery, but not to obviously, egg:

• speed;

• pitch of voice.

Use your hands to emphasize points but don't indulge in too much hand waving. People can, over time, develop irritating habits. Ask colleagues occasionally what they think of your style.

Look at the audience as much as possible, but don't fix on an individual – it can be intimidating. Pitch your presentation towards the back of the audience, especially in larger rooms.

Don't face the display screen behind you and talk to it.

Avoid moving about too much. Pacing up and down can unnerve the audience, although some animation is desirable.

Keep an eye on the audience's body language. Know when to stop and also when to cut out a piece of the presentation.

Visual Aids. Visual aids significantly improve the interest of a presentation.

However, they must be relevant to what you want to say. A careless design or use of a slide can simply get in the way of the

presentation. What you use depends on the type of talk you are giving. Here are some possibilities:

• Overhead projection transparencies (OHPs);
• 35mm slides;
• Computer projection: PowerPoint, applications such as Excel, etc.;
• Video, and film;
• Real objects - either handled from the speaker's bench or passed around;
• Flip-chart or blackboard - possibly used as a 'scratch-pad' to expand on a point.

Keep it simple though - a complex set of hardware can result in confusion for speaker and audience. Slides and OHPs should contain the minimum information necessary. To do otherwise risks making the slide unreadable or will divert your audience's attention so that they spend time reading the slide rather than listening to you.

Comprehension of Visual aids

Displaying data in research is the last step of the research process. It is important to display data accurately because it helps in presenting the findings of the research effectively to the reader. The purpose of displaying data in research is to make the findings more visible and make comparisons easy. When the researcher will present the research in front of the research committee, they will easily understand the findings of the research from displayed data. The readers of the research will also be able to understand it better. Without displayed data, the data looks too scattered and the reader cannot make inferences.

There are basically two ways to display data: tables and graphs. The tabulated data and the graphical representation both should be used to give more accurate picture of the research. In quantitative research it is very necessary to display data, on the other hand in qualitative data the researcher decides whether there is a need to display data or not. The researcher can use an appropriate software to help tabulate and display the data in the form of graphs. Microsoft

excel is one such example, it is a user-friendly program that you can use to help display the data.

Here we will consider tables and four different kinds of diagram: pie charts, bar charts, Gantt charts and graphs.

a. Tables

A collection of figures can often best be communicated by means of tables.

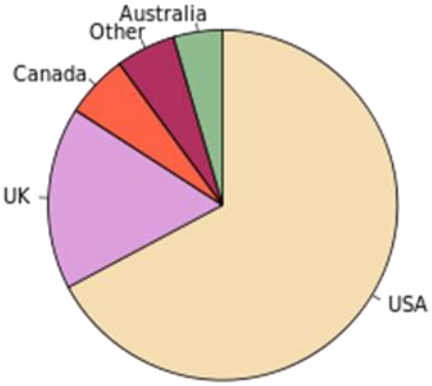
The use of tables to display data is very common in research. Tables are very effective in presenting a large amount of data. They organize data very well and makes the data very visible. A badly tabulated data also occurs, in case, you do not have knowledge of tables and tabulating data consult a statistician to do this step effectively.

Hours of leisure time per year in Someland							
	Teens	20s	30s	40s	50s	60s	70s +
Watching TV/videos	1,200	700	400	500	600	700	1,100
Socialising with 4 or less people	150	150	300	250	250	200	200
Socialising with 4 or more people	350	350	50	50	25	25	25
Individual exercise	150	100	200	200	50	75	150
Group exercise/sport	450	350	200	150	50	0	0
Cinema	100	75	50	25	25	50	75

b. pie charts

A pie chart is a circular chart divided into wedge-like sectors, illustrating proportion. Each wedge represents a proportionate part of the whole, and the total value of the pie is always 100 percent. Pie charts can make the size of portions easy to understand at a glance. They're widely used in business presentations and education to show

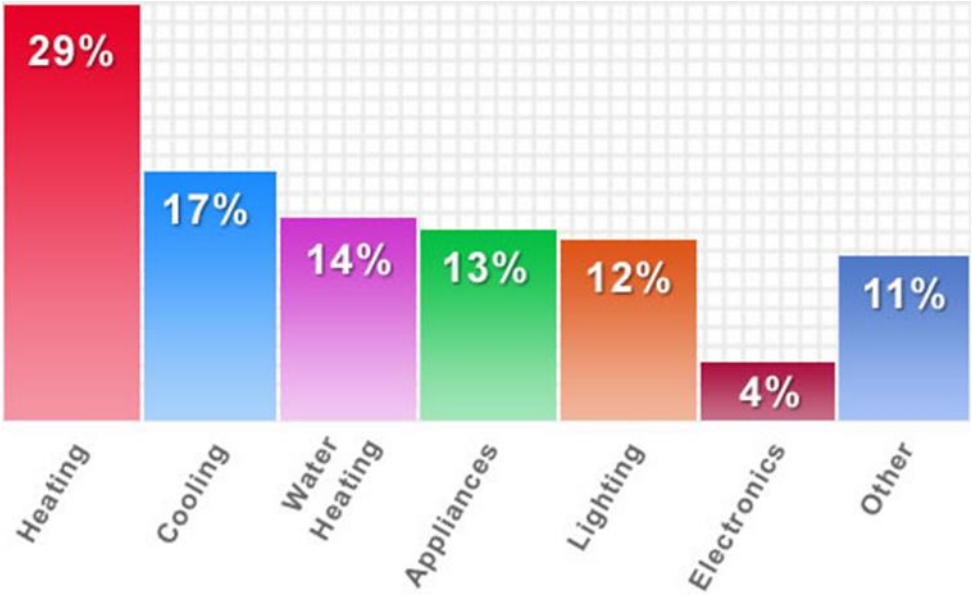
the proportions among a large variety of categories including expenses, segments of a population, or answers to a survey.



c. Bar charts

Another way of expressing data visually is by means of bar charts.

A bar chart is a graph with rectangular bars. Each bar's length or height is proportional to the bars' represented values. In other words, the length or height of the bar is equal to the quantity within that category. The graph usually shows a comparison between different categories. Although the graphs can technically be plotted vertically or horizontally, the most usual presentation for a bar graph is vertical. The x-axis represents the categories; the y-axis represents a value for those categories. In the graph below, the values are percentages.

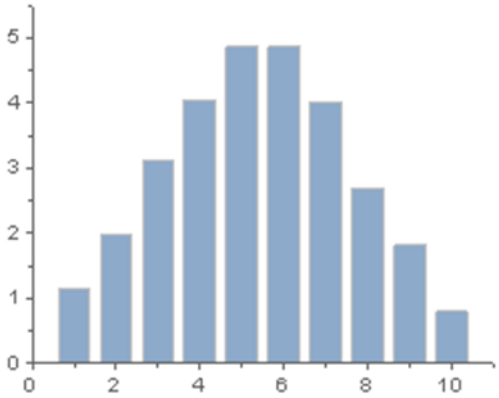


A bar graph is useful for looking at a set of data and making comparisons. For example, it's easier to see which items are taking the largest chunk of your budget by glancing at the above chart rather than looking at a set of numbers.

d. Graphs

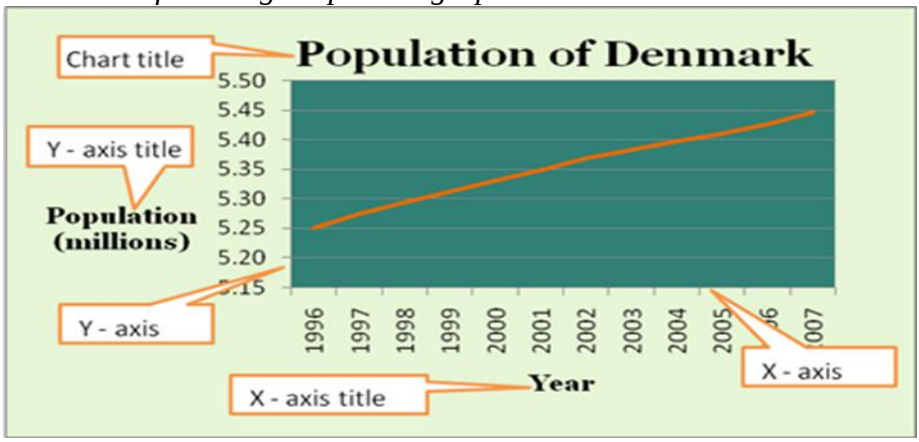
The most common form of visal presentation is the graph. Graphs are two dimensional.

The x-axis records one dimension, usually the time dimension. The y axis records another range of data which changes in relation to the time (or other) series.



Graphs are useful for understanding the meaning of data and for explaining that meaning to others. Graphs used to be so difficult to produce that they were used only for formal presentations, the main application discussed in this article. Fortunately, spreadsheet packages and graphing programs exist that so simplify the process of producing graphs that new uses for graphs have become practical.

Describing Line Graphs
Look at the following simple line graph:



It shows the population of Denmark from 1996 to 2007. You can see that in 1996 the population was 5.25 million and that by the year 2007 it had grown to 5.45 million.

When you write about a line chart it is important to look first at the Chart Title. This tells you what information the graph displays and you can use this information in your description.

Then look at the X and Y axes. The titles of these axes sometimes give you information you can use in your description. It is important also to look at the UNITS. On the Y-axis in this graph the units are millions. The population of Denmark in 1996 was not 5.25, but 5.25 million people.

Line graphs describe change. When describing these graphs you must answer the question, "What changed?". In this case we can see that the population of Denmark increased from 1996 to 2007. We can also ask the question, "How did the population change?". Because the line is fairly smooth, we can say that the population increased steadily.

Lastly, we can ask the question, "How much?". In this case, "How big was the change in population?" The population in 1996 was 5.25 million and in 2007 it was 2.45 million. So there was an increase of 0.2 million or 200,000 people.

To write a short description of this graph ask yourself (and answer!) the following questions:

1. What exactly does the graph show? (Use the chart title to help you answer this question)
2. What are the axes and what are the units?
3. What changed?
4. How much did it change?

Answering these questions will help you to write a short description of this simple graph.

Here is an example:

This graph shows population change in Denmark from 1996 to 2007. Denmark's population grew steadily from 5.25 million in...

Describing a Graph Over Time

This lesson explains how to describe a line graph or bar chart .This uses an example of a bar chart, but it will be the same for a line graph.

When you get a chart or graph to describe, it is always important to check whether there is a time frame or not. If there is, you will need to use the language of change.

However, it is not enough just to describe the changes of each element (ActiveX, Java and Net in this case) on their own and ignore how they relate to each other.

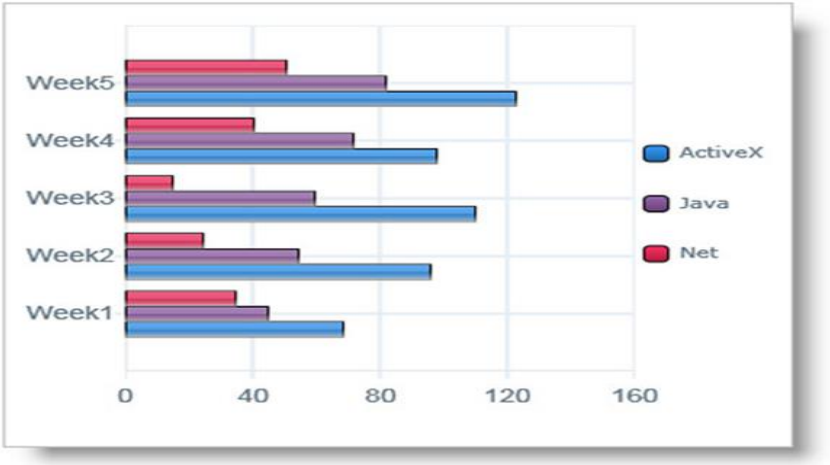
Look at the question – you are asked to compare the data as well. You must also group data together to make sure you have a well organized and coherent answer.

To do this, you need to look for similarities and differences when you first analyze the graph and decide what can be logically put together or not.

Now look at the bar chart below and read the model answer.

The bar chart shows the number of times per week (in 1000s), over five weeks, that three computer packages were downloaded from the internet.

Summarize the information by selecting and reporting the main features and make comparisons where relevant.



Model Answer

The bar chart illustrates the download rate per week of ActiveX, Java and Net computer packages over a period of five weeks. It can clearly be seen that ActiveX was the most popular computer package to download, whilst Net was the least popular of the three.

To begin, ActiveX and Java showed a similar pattern, with both gradually increasing from week 1 to week 5. However, the purchases of Active X remained significantly higher than for the other product over this time frame. In week 1, purchases of ActiveX stood at around 75,000, while those for Java were about 30,000 lower. With the exception of a slight fall in week 4, downloading of ActiveX kept increasing until it reached a peak in the final week of just over 120,000. Java also increased at a steady rate, finishing the period at 80,000.

The product that was downloaded the least was Net. This began at slightly under 40,000, and, in contrast to the other two products, fell over the next two weeks to reach a low of approximately 25,000. It then increased sharply over the following two weeks to finish at about 50,000, which was well below that of ActiveX.

Language of Change

As you can see, there are several examples of this in the graph, so it is important to learn how to use these correctly in order to successfully write a chart over time. Here are some examples:

gradually increasing, a slight fall, kept rising , reached a peak, increased at a steady rate, fell, increased sharply, a low of, finish at, stood at, finishing the period at

You will need to practice this type of language, and also make sure you know a variety of structures to get a better score – if you keep repeating the same kind of phrases this will show you have a more limited range of lexis and grammar.

Making Comparisons

You must also compare the data as you are asked to do in the rubric.

If you just write about what happened to ActiveX, what happened to Java, and what happened to Net, without showing any relationship between them, this won't be enough.

Here are some examples of where comparisons are made between the products and the language of comparison is highlighted in black:

It can clearly be seen that ActiveX was the most popular computer package to download, whilst Net was the least popular of the three ActiveX and Java showed a similar trend, with both gradually increasing from week 1 to week 5. However, the purchases of Active X remained significantly higher than for the other product over this time frame. In week 1, purchases of ActiveX stood at around 75,000,while those for Java were about 30,000 lower. Java also increased at a steady rate, finishing the period at 80,000. The product that was downloaded the least was Net. This began at slightly under 40,000, and, in contrast tothe other two products, fell over the next two weeks. It then increased sharply over the following two weeks to finish at about 50,000, which was well below that of ActiveX.

Grouping the Data

It is a good idea to divide your answer into paragraphs so it is well organized. To do this, you should group similar things together into paragraphs or sections. If you look at the chart, you will see that ActiveX and Java have a similar pattern, both steadily increasing over the period (apart from the slight fall of ActiveX in week 4), so these could be put together:

To begin, ActiveX and Java showed a similar trend, with both gradually increasing from week 1 to week 5. However, the purchases of Active X remained significantly higher than for the other product over this time frame. In week 1, purchases of ActiveX stood at around 75,000, while those for Java were about 30,000 lower. With the exception of a slight fall in week 4, downloading of ActiveX kept rising until it reached a peak in the final week of just over 120,000. Java also increased at a steady rate, finishing the period at 80,000.

On the other hand, Net is the lowest and it has a different pattern – falling and then rising again. So this could be described in another paragraph:

The product that was downloaded the least was Net. This began at slightly under 40,000, and, in contrast to the other two products, fell over the next two weeks to a low of approximately 25,000. It then increased sharply over the following two weeks to finish at about 50,000, which was well below that of ActiveX.

ATTENDING A CONFERENCE
VOCABULARY

conference – конференция
to hold a ~ – проводить конференцию
to organize ~ – организовать конференцию
to host ~ – быть принимающей стороной (устроителем) конференции
to sponsor ~ – спонсировать конференцию
annual ~ – ежегодная конференция
regular ~ – очередная конференция
forthcoming ~ – предстоящая конференция
to take part (participate) in ~ – принимать участие в конференции
participant – участник
to run under auspices – проходить под эгидой (при содействии)
organizing committee – организационный комитет
to set up an ~ – учредить организационный комитет
preliminary announcement – информационное письмо
paper(s) – научная работа(ы), доклад(ы)
contributed ~ – доклады по инициативе участников
invited ~ – доклады по приглашению
poster ~ – стендовые доклады
review ~ – обзорные доклады
abstract (s) of the ~ – тезисы доклада
~ style guidelines – требования к оформлению тезисов
agenda – повестка дня
tentative / provisional ~ – предварительная повестка дня
on the ~ – на повестке дня
~ items – пункты повестки

letter/notification of acceptance or rejection – уведомление о принятии
(доклада) или отказа
registration – регистрация участников конференции
~ fee – взнос участника
location and hours of – время и место регистрации
conference proceedings – сборник трудов конференции6
opening/welcoming address – вступительное слово
working language – рабочий язык
speaker – докладчик
to deliver/present a report – выступить с докладом
simultaneous translation – синхронный перевод
to take the floor – выступить, взять слово
plenary session – пленарное заседание
workshops – секционные заседания/мастерская/семинар
discussion – обсуждение
panel ~s – обсуждение докладов специалистами
round-table ~ – обсуждение за «круглым столом»
issue/problem under ~ – обсуждаемая проблема
to exchange opinions (on) – обменяться мнениями
to talk shop – говорить на профессиональные темы
social program(me) – культурная программа
to arrange a visit – организовать визит
to fix the date – установить дату
to close a conference – закрыть работу конференции
final sitting/session – заключительное заседание
closing speech – заключительное слово

As you know, before a conference the so-called “Preliminary Announcement” is sent to all the establishments concerned.

Here is one of them.

The International Management and Technology Conference will be held at the Doubletree at the entrance to University Studios, Orlando, Florida, USA, on December 8 – 10, 2004.

This conference will focus on all the major areas of business, management and technology. Submitted papers will be peer-

reviewed and carefully evaluated based on originality, technical soundness, significance and clarity of thought. Papers should not exceed 10 pages in length (letter size, 11 point type). A style guide can be found here.

Paper submission:

E-mail your abstract or paper to us at editors@triof.org. Please remove the names of all authors and institutions from the paper but include them separately in the same e-mail.

Papers should be submitted in RTF, Microsoft Word or Word Perfect Format. We will email you with a notification of acceptance or rejection within three weeks. If your manuscript is accepted, you will receive a letter of acceptance, registration form, and paper style guidelines by regular mail. If you wish to attend without submitting a paper only a registration form will be needed or you may register online here.

Authors will have approximately 20 minutes to present their papers. Registration at the conference will entitle the participant to admission to all presentations and, and workshops to receive a copy of the conference program and CD proceedings.

The conference fee is per person and must be received by October 30, 2004 to assure conference participation.

If your conference fee will be late please contact us in advance so we can make suitable arrangements. To register online click here.

All selected papers will be published in the conference proceedings and best papers presented will be eligible for inclusion in either the Management& Business Review or the Journal of the Internet and Information Technology.

Please direct all correspondence to the attention of:

The editors
IMT Conference
PO Box 973073
Miami, FL 33197
Tel (305)971-2312
Fax (305)971-8517

E-mail: editors@triof.org
Dr. Chris Rose. – Conference Chair

Being a conference attendee you are sure to fill in a registration form like that:

Conference Registration Form

(Please complete and e-mail or print & mail with check)
First Name:
Last name:
Institution:
Email:
Address:
City:
State:
Zip code:
Country:
Tel.:
Fax:
Preferred day and time for presentation: (Please circle):
Wed. Dec 8. am pm Thur. Dec. 9. am pm Fri. Dec 10 am pm

While taking part in the discussion the participants are supposed to make use of the following colloquial phrases:
I should (would) like to ask you…
I should (would) like to ask you a question…; I am going to ask you a question…
I have a question…
I have a question and a comment (a remark) to make.
I should (would) like to know…
I should (would) point out (emphasize) that …
I think (suppose, presume) that …
I believe that…
I must say that…

I have (every good) reason to believe that…
Do you consider that…
What is your opinion on..?
In my opinion…; as to me…; as for me…; to my mind…
What in your opinion is the reason for..?
I hold (am of) the same opinion.
I could comment on the question.
Would you tell us how…
That's right; exactly; quite so; quite right; quite true
If I understand you correctly…
If I am not mistaken…
Do I understand you correctly that..?
Do you agree to that?
I (quite, fully, entirely) agree with you; I think so, too.
I don't think so; I don't agree; I disagree.
I can't (very well) agree with you.
I can't but agree with you.
Do you agree to that ..?
I'm afraid, you are wrong there.
I doubt that…
It's unlikely that…
I'm (particularly) interested in this problem.
I wonder why…
The speakers are invited (welcome) to be brief (I invite the speakers to be brief).
Will you allow me to take the floor, please.
Could you clarify your point of view?
as a matter of fact
taking into consideration….

Here is the text contributed by one of the former postgraduates who wanted to share his experience in attending a conference:

You know, any scientific conference is an important event in the researcher's life, especially in post-graduate student's activity. It

provides an opportunity for exchanging opinions with more experienced colleagues and gives impetus to valuable discussions.

I've taken part in several conferences, both as an organizer and as a participant.

But now I'd like to dwell upon my first experience in attending an international conference of young researchers held under the auspices of the UdSU. The initiative to convene the conference belonged to the University Academic Council. Thus, an organizing committee was formed which sent the so-called "Preliminary Announcement" to all the establishments concerned with the view of supplying potential participants with general information about the conference.

From the announcement I learnt such important things as the main programme of the conference, orders of plenary sessions, rules for scientific contributions, requirements to submitted abstracts, information about registration fees, hotel reservations, etc. It was very important for me as a post-graduate student that the abstract would be published in Conference Proceedings.

I immediately filled in the preliminary application form and mailed it without delay. After that I was to submit a short abstract of my paper (one printed page) before the deadline.

Finally, my abstract was accepted and I started preparing my report.

I will never forget the first conference day. The conference started at 9 a. m. with the registration of attendees. Before the plenary session I had some time to get acquainted with other participants, to look through the latest information, to buy some booklets about the conference work. I was particularly interested in the workshop on criminalistics, since it is my specific field. There were more than twenty scientific contributions to our workshop, all of them being on topical problems of criminalistics and applied sciences. According to the workshop schedule I was the last to speak. All the reports were followed by discussions, mine wasn't an exception. I was asked several questions and did my best to answer

all of them. I spoke without even I spoke without even looking into my notesand tried to make my reasoning very clear.

I also attended a poster session and found it of particular interest because I managed to study numerous texts of the papers supplied with diagrams, drawings, schemes and photographs.

The final session with review papers was truly rewarding for it summarized all that had been going on not only at the conference but also in the field of law for the past twelve months.

In conclusion, I'd like to say that I liked a specific atmosphere of the conference characteristic of any scientific meeting: groups of delegates discussing something, the sight of prominent scholars surrounded by their followers, talks, smiles, greetings, exchange of opinions.

Check the knowledge of the topical vocabulary identifying English equivalents for the following Russian ones:

получить приглашение, участвовать в конференции, поделиться опытом, под эгидой, быть устроителем конференции, заинтересованные учреждения, информационное письмо, пленарное заседание, секционная работа, рабочий язык конференции, организационный взнос, тезисы доклада, сделать сообщение, обсуждение за «круглым столом», стендовые доклады, культурная программа, подводить итоги работы конференции, заключительная речь.

Speak on the latest conference you've attended according to the given plan:

– preliminary announcement;
– the conference status;
– who hosted the conference;
– who sponsored the conference;
– when was the conference held;
– number of participants;
– registration fee;
– accommodation provided;

– problem field of the conference;
– conference agenda;
– ways of presenting one's …;
– plenary session; workshops;
– conference proceedings.

Curriculum vitae

Date of Birth: 25 February 19
Name: Carol Brice
Present address: 25, Westbound Road, Borehamwood, Herts, WD6 1DX
Telephone number: 081 953 9914
Marital status: single / married
Education and qualifications:
1995-1997 Mayfield School, Henley Road, Borehamwood, Herts, WD6 1DX
GCE in English Language; French; History; Geography; and Art.
2000-2002 Hilltop Further Education College, Kenwood Road, London NW7 3TM
Diploma in Business Studies.
Work experience: Johnson Bros. Pic, 51-55 Baker Street, London W1A 1AA
Oct '02-Dec '03
Type of Company: Retail Chain Stores
Post: Junior Secretary
Responsibilities: Secretarial work including typing; shorthand; correspondence; copying reports and minutes from shorthand notes; tabulating data; answering customers' calls; mail distribution; and general office duties.
Jan '05-present National Auto Importers Ltd., Auto House, Sidmouth Street, London WC1H4GJ
Type of Company: Car importers
Post: Secretary to Assistant Director
Responsibilities: Dealing with all correspondence; taking minutes at meetings and writing up Assistant Director's reports; receiving customers and suppliers; dealing with home and overseas enquiries;

making decisions on behalf of A.D. in his absence; and representing the company at various business functions.
Other information:
While working I have attended various evening courses for Italian and French, and have also been on a special Information Technology course at The City College. My interests include tennis, badminton, swimming, and reading.
References: Mr. B. Norman, Assistant Director, National Auto Importers Ltd., Auto House, Sidmouth Street, London WC1H 4GJ.
Mrs T.R. Bradley, Senior Lecturer; Business Studies Dept, Hilltop Further Education College, Kenwood Road, London NW7 3TM.
Current salary: £14.OOO per annum

РАЗДЕЛ V НАУЧНЫЕ ТЕКСТЫ ДЛЯ ПИСЬМЕННОГО И УСТНОГО РЕФЕРИРОВАНИЯ (АННОТИРОВАНИЯ)

TEXTS ON MATHEMATICS, GEOMETRY AND IT

TEXT 1 BASIC GEOMETRIC CONCEPTS

1. Read and translate the text.
2. Segment it into paragraphs.
3. Express the main idea(s) of each paragraph. Write out the main ideas of the text.
4. Name all the geometric figures mentioned in the text and discuss their properties.

The practical value of geometry lies in the fact that we can abstract and illustrate physical objects by drawings and models. For example, a drawing of a circle is not a circle, it suggests the idea of a circle. In our study of geometry we separate all geometric figures into two groups: plane figures whose points lie in one plane and space figures or solids. A point is a primary and starting concept in geometry. Line segments, rays, triangles and circles are definite sets of points. A simple closed curve with line segments as its boundaries is a polygon. The line segments are sides of the polygon and the end points of the segments are vertices of the polygon. A polygon with four sides is a quadrilateral. We can name some important quadrilaterals. Remember, that in each case we name a specific set of points. A trapezoid is a quadrilateral with one pair of parallel sides. A rectangle is a parallelogram with four right angles. A square is a rectangle with all sides of the same length. The regular polyhedra are a part of geometric study chiefly in antiquity. They have a symmetrical beauty that fascinates men of all ages. The first question in connection with regular polyhedra is: How many different types are there? Thanks to the ancient Greeks we know that there are

exactly five types of polyhedra. All objects in their view are composed of four basic elements: earth, air, fire and water.

They believe that the fundamental particles of fire have the shape of tetrahedron, the air particles have the shape of octahedron, of water - the icosahedron, and the earth - the cube. The fifth shape, the dodecahedron, they reserve for the shape of the universe itself. Plane geometry is the science of the fundamental properties of the sizes and shapes of objects and treats geometric properties of figures. The first question is, under what conditions two objects are equal or congruent in size and shape. Next, if figures are not equal, what significant relationship may they possess to each other and what geometric properties can they have in common? The basic relationship is shape.

Figures of unequal size but of the same shape, that is, similar figures have many geometric properties in common. If figures have neither shape nor size in common, they may have the same area, or, in geometric terms, they may be equivalent, or may have endless other possible relationships. Geometry is the science of the properties, measurement and construction of lines, planes, surfaces and different geometric figures. What do we call "con¬structions" in our study of geometry? Ruler-compass constructions are sim¬ply the drawings which we can make when we use only a straightedge and a compass. A compass is a misleading word. It is not only «компас» in the maths, it is usually «циркуль». We call such misleading words «ложные друзья переводчика». For a ruler you ought to use an unmarked straightedge because measurement has no role in ruler-compass constructions. Of course, you can use a marked straightedge if you don't permit yourself to use these marks for measurement. Later you ought to do some measurement to "check" your constructions. We measure segments in terms of other segments and angles in terms of other angles. It seems only natural that we find areas indirectly as well. How does a person find the area of a floor? Does he take little squares one foot on a side, lay them out over the entire floor and thus decide that the area of a floor is 100 square feet, for this is indeed the meaning of area? Of course, he does not. He

measures the length and width, quantities usually quite simple, and then multiplies the two numbers to obtain the area. This is indirect measurement, for we find the area when we measure lengths. The dimensions we take in the case of volume are the area and the length or the height. Greek mathematicians are the founders of indirect measurement methods. Their contribution to this subject are formulae (-las) for areas and volumes of particular geometric shapes, that we use nowadays. Thus, thanks to the Greeks we can find the area of any one single triangle when we take the product of its base and half its height.

TEXT 2 MATHEMATICAL MODELING IN APPLIED MECHANICS AND CONTROL

1. Read and translate the text.
2. Write down all math terms and try to memorize them.
3. Underline all the sentences in Passive Voice.

A mathematical model in mechanics is a system of equations allowing to study a mechanical system with required accuracy. Mathematical modeling of a controlled mechanical systems has a number of specific features.

The controlled mechanical systems are of great variety. A car, a gyro stabilizer, a walking robot, a simulator of space flight, etc. consist of various rigid constructive elements, devices, gauges, engines. From the point of view of theoretical mechanics all these objects can be considered as systems consisting of a big number of rigid bodies. Attempting to construct a mathematical model of such an object by the means of classical theoretical mechanics, for example in the form of Lagrange equations, usually leads to unimaginably bulky equations with hundreds and thousand of terms. Thus an approach to modeling which describes the necessary phenomena with comprehensible accuracy for a precisely set class of motions.

For the systems in mechanics of controlled motion strong attenuations of high-frequency components are typical. The approximate modeling of such systems gravitates toward the Poincare decomposition and the Tikhonov and Vasilyeva boundary-layer methods.

The technique of fractional analysis (I.V. Novozhilov) was developed and introduced to practice. The technique is used for creating approximate mathematical models describing separate components of motion in various time or spatial scales. The fractional analysis of a concrete system is carried out in two stages. On the first stage methods of the dimension theory are applied to normalize the equations and to enter small parameters adequate to the studied class of motion. On the second stage asympthotic methods are applied to create an approximate mathematical model.

Estimates of the errors of asymptotic approximations for regularly and singularly perturbed systems with a small parameter and of the time intervals on which these errors are guaranteed were received (R.P. Kuzmina). These estimates were applied to concrete dynamic systems (A.V. Vlahova).

A technique of drawing up an approximate mathematical model of slow motion components for close to conservative mechanical systems with strongly different frequencies was suggested (A.V. Vlahova, I.V. Novozhilov).

A technique to study dynamic systems with non-continuous right parts was developed. Unlike known approaches, a mathematical model of sliding movements and conditions of their realization are determined with the singular perturbations methods (A.V. Vlahova, I.V. Novozhilov).

For regularly and singularly perturbed systems non-iterative methods of approximation in a small parameter were offered. With this approach the order of the approximate models does not surpass the order of the initial system (A.V. Vlahova, I.V. Novozhilov).

The staff of DAMC is one of leaders in Russia in the gyroscopic systems theory. B.V. Bulgakov's and A.Yu. Ishlinskiy's works became classic in gyroscopy. The research was continued by

Ya.N. Rojtenberg, I.V. Novozhilov, E.A. Devjanin, A.I. Kobrin, Y.G. Martynenko, V.I. Borzov, V.V. Tikhomirov, N.P. Stepanenko.

Fractional analysis was used to validate some of the classical mechanics models: precession gyroscopy model, absolutely rigid body, holonomic and non-holonomic constraints (I.V. Novozhilov).

Needs of practice have led A.Ju.Ishlinskiy to formulate a model new to classical mechanics - a rigid body rotating on a string. Unlike a rigid body rotating around a fixed point, here there are no integrable cases, as in the Euler, Lagrange and Kovalevskaya cases. A.Yu. Ishlinskiy together with his pupils investigated bifurcations of stationary movements and their stability.

Applying fractional analysis to the theory of winged aircrafts, V.I. Borzov and I.V. Novozhilov constructed approximate mathematical models of flight dynamics describing fast and slow movements, and estimated the approximation error.

A model of deformable wheel interacting with the road, generalizing Carter's, Rokar's, Fromm's and Keldysh models was suggested. Approximate mathematical models for different classes of motions of a car were constructed (I.V. Novozhilov, P.A. Kruchinin, M.H. Magomedov, I.S. Pavlov). Mathematical models of cross-section " kinematic waggings" for a railway car and a train, taking in mind interaction of the crest of a wheel pair with the head of a rail (I.V. Novozhilov, I.A. Kopylov, A.V. Vlahova, V.N. Phillipov) were proposed.

Among research done on vibrations in the suspension of a car we note results on parametrical excitation of driving wheels, modeling of active suspension dynamics, etc. (S.I. Zlochevsky, A.D. Derbaremdiker, P.A. Kruchinin). Conditions for parasitic fluctuations in anti blocking systems of cars and algorithms for their suppression were suggested (I.V. Novozhilov, P.A. Kruchinin, M.H. Magomedov). These results were used to develop an anti blocking system NPF SAUNO at the Korean Electrotechnical Institute (Pusan, South-Korea).

Mathematical modeling of multi link controlled systems, such as walking robots and multi-DOF dynamic stands was done. The

approximate models of such devices describing slow desired modes of motion and fast stabilization modes (E.A. Devjanin, A.M. Formalsky, I.V. Novozhilov, Yu.V. Bolotin, I.V. Bardushkina) were developed.

TEXT 3 MATH IN THE MOVIES

1. Read and translate the text.
2. Write the summary of the text.
3. Make up 10 questions that will help you to retell the text.

May 1, 2007 − 100 powerful supercomputers perform geometrical, algebraic and calculus-based calculations to animate Pixar's characters. The laws of physics that inform the dynamics of fabric movement are most used in the computations.

Most students in high school dread their math classes and wonder when they use the information in "real life." Now, with so much work being done on computers, the algebra and trigonometry learned in high school is actually being put to good use. The animation industry is one that can be a math teacher's best friend. It is high school math that can actually help bring animated movies to life. Tony De Rose, a computer scientist at Pixar Animation Studios, realized his love of mathematics could transfer into a real world, real interesting job by bringing the pretend world of animation to life. He told DBIS, "Without mathematics, we wouldn't have these visually rich environments, and visually rich characters."

Advances in math can lead to advances in animation. Earlier math techniques show simple, hard, plastic toys. Now, advances in math help make more human-like characters and special effects. De Rose explains the difference a few years can make, "You didn't see any water in Toy Story, whereas by the time we got to Finding Nemo, we had the computer techniques that were needed to create all the splash effects."

How exactly do the high school math classes help with the animation? Trigonometry helps rotate and move characters, algebra

creates the special effects that make images shine and sparkle and calculus helps light up a scene. De Rose encourages people to stick with their math classes. He says, "I remember as a mathematics student thinking, 'Well, where am I ever going to use simultaneous equations?' And I find myself using them every day, all the time now."

The American Mathematical Society and the Mathematical Association of America contributed to the information contained in the TV portion of this report.

BACKGROUND: Pixar Animation Studios is undergoing a digital revolution thanks to advances in areas such as computer technology, computational physics, and approximation theory. Tony De Rose provided a behind-the-scenes look at the role that geometry plays in the revolution using examples drawn from Pixar's feature films, such as Toy Story I and II. Upcoming movie characters will be animated using a new advancement in geometry recently developed at Pixar.

ABOUT ANIMATION: The term animation refers generally to graphical displays in which a sequence of images with gradual differences results in the same effect as a photographed movie. Computer generated animations are getting more and more common, replacing hand drawn images and other special techniques. There are several ways to generate dynamic changes in computer graphics. Geometry animation is the most complex, and requires changing the geometric elements of a scene dynamically. This is also what most people generally refer to when using the term "animation," evidenced by motion pictures like "Toy Story" and "A Bug's Life."

HOW PIXAR DOES IT: Perhaps the most difficult aspect of animation is making people and clothing look real. Pixar's software is based on complex studies of how cloth moves when draped on a character, based on the laws of physics. For instance, drape a bedsheet between two points, and the center will hang downward, adjusting itself until it comes to rest in a state of pure tension. The animators begin with drawings of the characters, which they use to build computer puppets, later adding digital "strings" that correspond to various geometric points on the puppet. These strings serve as

animation controls, ensuring that as each string is "pulled," the puppet's movements reflect what would occur in real life. Color and lighting effects are added last before the puppet is "animated." Pixar uses 100 powerful supercomputers that run 24 hours a day, seven days a week. It still takes the computers five to six hours to render a single frame lasting 1/24th of a second. For every second of film, it takes the computer six days.

TEXT 4 MATHEMATICAL MODEL

1. Read the text and get ready to answer the teacher's questions.
2. Find in the text all the collocations beginning with the word mathematical.
3. Give examples of mathematical models.

Note: The term "model" has a different meaning in model theory, a branch of mathematical logic. An artifact which is used to illustrate a mathematical idea is also called a "mathematical model" and this usage is the reverse of the sense explained below."

A mathematical model uses mathematical language to describe a system. Mathematical models are used not only in the natural sciences and engineering disciplines (such as physics, biology, earth science, meteorology, and electrical engineering) but also in the social sciences (such as economics, sociology and political science); physicists, engineers, computer scientists, and economists use mathematical models most extensively.

Eykhoff (1974) defined a "mathematical model" as 'a representation of the essential aspects of an existing system (or a system to be constructed) which presents knowledge of that system in usable form'.

Mathematical models can take many forms, including but not limited to dynamical systems, statistical models, differential equations, or game theoretic models. These and other types of models can overlap, with a given model involving a variety of abstract structures.

Examples of mathematical models

1."Population Growth". A simple (though approximate) model of population growth is the Malthusian growth model. The preferred population growth model is the logistic function.

2. "Model of a particle in a potential-field". In this model we consider a particle as being a point of mass "m" which describes a trajectory which is modeled by a function "x" : R → R3 given its coordinates in space as a function of time. The potential field is given by a function "V":R3 → R and the trajectory is a solution of the differential equation:: m frac{d^2}{dt^2} x(t) = -operatorname{grad} left(V ight) (x(t)). :Note this model assumes the particle is a point mass, which is certainly known to be false in many cases we use this model, for example, as a model of planetary motion.

3. "Model of rational behavior for a consumer". In this model we assume a consumer faces a choice of "n" commodities labeled 1,2,...,"n" each with a market price "p"1, "p"2,..., "p""n". The consumer is assumed to have a "cardinal" utility function "U" (cardinal in the sense that it assigns numerical values to utilities), depending on the amounts of commodities "x"1, "x"2,..., "x""n" consumed. The model further assumes that the consumer has a budget "M" which she uses to purchase a vector "x"1, "x"2,..., "x""n" in such a way as to maximize "U"("x"1, "x"2,..., "x""n"). The problem of rational behavior in this model then becomes an optimization problem, that is::: max U(x_1,x_2,ldots, x_n) :: subject to::: sum_{i=1}^n p_i x_i leq M.:: x_{i} geq 0 ; ; ; forall i in {1, 2, ldots, n } : This model has been used in general equilibrium theory, particularly to show existence and Pareto optimality of economic equilibria. However, the fact that this particular formulation assigns "numerical values" to levels of satisfaction is the source of criticism (and even ridicule). However, it is not an essential ingredient of the theory and again this is an idealization.

4. "Neighbour-sensing model" explains the mushroom formation from the initially chaotic fungal network.

Background

Often when engineers analyze a system to be controlled or optimized, they use a mathematical model. In analysis, engineers can build a descriptive model of the system as a hypothesis of how the system could work, or try to estimate how an unforeseeable event could affect the system. Similarly, in control of a system, engineers can try out different control approaches in simulations.

A mathematical model usually describes a system by a set of variables and a set of equations that establish relationships between the variables.The values of the variables can be practically anything; real or integer numbers, boolean values or strings, for example.The variables represent some properties of the system, for example, measured system outputs often in the form of signals, timing data, counters, and event occurrence (yes/no).The actual model is the set of functions that describe the relations between the different variables.

TEXT 5 BASIC FEATURES OF DATABASE PROGRAMS

1. Read and translate the text.
2. Put down the IT terms from the text.
3. Make up your own sentences with the terms.

With a database you can store, organize and retrieve a large collection of related information on computer. If you like, it is the electronic equivalent of an indexed filing cabinet. Let us look at some features and applications of a computer database:

Information is entered on a database via fields. Each field holds a separate piece of information, and the fields are collected together into records. For example, a record about an employee might consist of several fields, which give his/her name, address, telephone number, age, salary, and length of employment with the company. Records are grouped together into files, which hold large amounts of information. Files can easily be updated: you can always change fields, add new records or delete old ones. With the right database software, you are able to keep track of stock, sales, market trends,

orders, invoices and many more details that can make your company successful.

Another feature of database programs is that you can automatically look up and find records containing particular information. You can also search on than one field at a time. For example, if a managing director wanted to know all the customers that spend more than £7,000 per month, the program would search on the name field and the money field simultaneously.

If we had to summarize the most relevant advantages of a database program a card index system, we would say that it is much faster to consult and update, occupies a lot less space, and records can be automatically sorted into numerical or alphabetical order using any field.

The best packages also include networking facilities, which add a new of productivity to businesses. For example, managers of different can have direct access to a common database, which represents an enormous advantage. Thanks to security devices, you can share part of your files on a network and control who sees the information. Most aspects of the program can be protected by user-defined passwords. For example, if you wanted to share an employee's personal details, but not his commission, you could protect the commission field.

Other features like mail merging, layout design and the ability to import and export data are also very useful. In short, a database manager helps you control the data you have at home, in the library or in your business.

TEXT 6 COMPUTER GRAPHICS

1. *Read and translate the text.*
2. Write the summary of the text.
3. Make up 10 questions that will help you to retell the text.

Computer graphics are pictures and drawings produced by computer. A graphics program interprets the input provided by the user and

transforms it into images that can be displayed on the screen, printed on paper or transferred to microfilm. In the process the computer uses hundreds of mathematical formulas to convert the bits of data into precise shapes and colours. Graphics can be developed for a variety of uses including presentations, desktop publishing, illustrations, architectural designs and detailed engineering drawings.

Mechanical engineers use sophisticated programs for applications in computer-aided design and computer-aided manufacturing. Let us take, for example, the car industry. CAD software is used to develop, model and test car designs before the actual parts are made. This can save a lot of time and money

Computers are also used to present data in a more understandable form: electrical engineers use computer graphics to design circuits and people in business can present information visually to clients in graphs and diagrams. These are much more effective ways of communicating than lists of figures or long explanations.

Today, three-dimensional graphics, along with colour and animation are essential for such applications as fine art, graphic design, computer-aided engineering and academic research. Computer animation is the process of creating objects and pictures which move across the screen; it is used by scientists and engineers to analyse problems. With the appropriate software they can study the structure of objects and how it is affected by particular changes.

Basically, computer graphics help users to understand complex information quickly by presenting it in a clear visual form.

TEXT 7 PROGRAMMING LANGUAGES

1. Read and translate the text.
2. Write the summary of the text.
3. Make up 10 questions that will help you to retell the text.

Unfortunately, computers cannot understand ordinary spoken English or any other natural language. The only language they can understand directly is called machine code: central processors operate on codes, which consist of a series of binary digits (Is and Os). In this form, the instructions are said to be in machine code.

However, machine code as a means of communication is very difficult to write. For this reason, we use symbolic languages that are easier to understand. Then, by using a special program, these languages can be translated into machine code. For example, the so-called assembly languages use abbreviations such as ADD, SUB, MPY to represent instructions. These mnemonic codes are like labels easily associated with the items to which they refer.

Basic languages, where the program is similar to the machine code version, are known as low-level languages. In these languages, each instruction is equivalent to a single machine code instruction, and the program is converted into machine code by a special program called an assembler. These languages are still quite complex and restricted to particular machines.

To make the programs easier to write and to overcome the problem of intercommunication between different types of machines, higher-level languages were designed such as BASIC, COBOL, FORTRAN or PASCAL. These languages are all problem-oriented rather than machine-oriented and can all be converted into the machine codes of different types of computers. Programs written in one of these languages (known as source programs) are converted into a lower-level language by means of a compiler (generating the object program). On compilation, each statement in a high-level language is generally translated into many machine code instructions. People communicate instructions to the computer in symbolic languages and the easier this communication can be made the wider the application of computers will be. Scientists are already working on Artificial Intelligence and the next generation of computers may be able to understand human languages.

TEXT 8 HARDWARE AND SOFTWARE

1.Read and translate the text.
2. Write the summary of the text using the following verbs:
to consist of; to include; to perform; to manipulate; to process; to store; to include; to manipulate; to transform; to display; to save; to retrieve; to create.

All computers consist of hardware. This includes the computer itself and all other related physical devices. The other pieces of the computer system include software, the instructions that tell the computer what tasks to perform; data, the information the computer works on; and you, the user, who ultimately tell the computer what to do, and for whom the computer does all its work.

Computers use the same basic techniques for to perform the tasks we give them. The computer takes in data through input devices, it manipulates the data according to its instructions, it outputs the results of its processing, and it stores data for later use. These four processes together are known as the computing cycle.

Input is the process of entering data into the computer. The most common device used for input on microcomputers is the keyboard. Computer keyboards include many special command and function keys to perform specialized input tasks as well as the usual typewriter layout. Other input devices include a mouse, which manipulates a pointer on the computer screen for giving commands and entering data; a scanner, which reads graphic images and pages of text and sends them to the computer; a modem, which receives data over phone lines; and several other devices.

Once data is in a microcomputer, it is processed by the microprocessor and its associated integrated circuit chips. Microprocessors perform all calculations and manipulations necessary to transform data into meaningful information. Associated with the processor is the computer's memory, which is used for storing data and programs while they're being used by the processor.

Getting processed data out of the computer is the job of output devices. The computer can display the data on a monitor screen, of which there are several types: colour or monochrome, flat-panel or picture tube, desktop or portable. You can also send data to a printer or plotter to make a paper copy, use the modem to send the data over a phone line to another computer, or use any number of specialized output devices.

What do you do if you want to keep the data in a permanent form? That's what storage devices are for. Storage devices hold data permanently, so you can save it and retrieve it later. All microcomputers use disks to store data magnetically. Each type at disk is used by its corresponding disk drive to read and write information. Floppy disks are used for easy, portable storage, and built-in hard disks are used for more permanent storage of larger amounts of data and programs for fast access. Other common storage devices include optical discs (such as CD-ROM) and magnetic tape.

A program is a group of instructions that tells the processing devices what to do. Software can be a single program or a set of programs that work together. Because their meanings are very similar, the terms software (or a piece of software) and program are often used interchangeably.

Two types of software are necessary to make the computer capable of performing useful work. They are the operating system and application software. The operating system contains basic instructions that tell the CPU how to use other hardware devices, where to find programs, and how to load and keep track of programs in memory. Because it includes basic instructions that are vital to the internal functioning of the computer, the operating system is the first program to be processed after the computer is turned on, and it remains in memory until the computer is turned off.

For the computer to perform useful tasks, it needs application software in addition to the operating system. An application is a job that a computer can perform, such as creating text documents, manipulating sets of numbers, creating graphic images, and communicating with other computers. Application software is the

term used to describe programs that tell the computer how to perform such jobs. The six most common types of application software are
- Word processing software
- Graphics software
- Desktop publishing software
- Spreadsheet software
- Database management software

Communications software Application software is what makes a computer a tool for performing the tasks we most often need to complete at school, at home, or at office.

TEXT 9 PIRACY AND COUNTERFEITING

1. Read and translate the text.
2. Write the summary of the text.
3. Make up 10 questions that will help you to retell the text.

Not too many people would buy a book, photocopy it, and then return the book to the store. Yet many otherwise honest citizens buy a software program, copy it, and return the original to the computer store. Or they buy a program that is so useful they wish to share it with all their friends and classmates, passing out multiple free copies.

Sometimes illegal copies are sold as original work; this is electronic counterfeiting- a more sophisticated crime than sharing your new spreadsheet-and often involves a major criminal effort. It is a surprisingly big business. The package is hard to distinguish from the original, the disks may perform well, and the manual may be a direct copy of the book in the original box. But the users who couldn't resist the bargain of the century may find themselves with no backup-or recourse-when the program fails.

Given that software prices are often high, we must still remember that those prices include development costs, testing at several levels, and, usually, technical support. Like other authors and publishers, those who develop and publish software have a right to be compensated for their work; whether we call copying software

without paying for it piracy or theft, it is still a crime. And it is, in part, responsible for the high prices charged.

There are, of course, legitimate copies that can be made of software: shareware and public domain software. Shareware, which can be purchased inexpensively both in stores and through mail-order catalogs, ranges from games to databases. Some of these programs cost no more than the small purchase price, but the software usually includes a request for an additional small payment to the software writer. Public domain software is generally spread from friend to friend-no one quite remembers who originally wrote the neat little program that blanks the screen or lets you type with one hand, but there's rarely a charge (may be the cost of a disk), and it's all quite above-board and legal. A word of caution: check the disk immediately to make sure it carries no viruses.

It is also legal in certain situations to copy commercial software: to make backup disks, for example, or to make licensed copies for many users in an organization. In the latter case, the company gets a multi-user license or site license; the particular arrangement varies with the vendor, who receives a given percentage of the cost of a single package for each additional user.

TEXT 10 COMPUTER NETWORKS

1. Before reading the text, match these words and phrases with their definitions

1) protocol *a) analyze the syntax of a string of input symbols*

2) bulletin board *b) teleconferencing system allowing users to read messages left by other users*

3) user interface *c) agreement governing the procedures used to exchange information*

4) make a query *d) means of communication between a human user and a computer system*

5) parse *e) taking place at exactly the same time as something else.*

6) synchronous *f) request a search*

Computer networks link computers by communication lines and software protocols, allowing data to be exchanged rapidly and reliably. Traditionally, networks have been split between wide area networks (WANs) and local area networks (LANs). A WAN is a network connected over long-distance telephone lines, and a LAN is a localized network usually in one building close together. The distinction, however, is becoming blurred. It is now possible connect up LANs remotely over telephone links so that they look as though they are a single LAN.

Originally, networks were used to provide terminal access to another computer and to transfer files between computers. Today, networks carry e-mail, provide access to public databases and bulletin boards, and are beginning to be used for distributed systems. Networks also allow users in one locality to share expensive resources, such as printers and disk-systems.

Distributed computer systems are built using networked computers that co-operate to perform tasks. In this environment each part of the networked system does what it is best at. The high-quality bit-mapped graphics screen of a personal computer or workstation provides a good user interface. The mainframe, on the other hand, can handle large numbers of queries and return the results to the users.

In a distributed environment, a user might use his PC to make a query against a central database. The PC passes the query, written in a special language (e.g. Structured Query Language – SQL), to the mainframe, which then parses the query, returning to the user's PC only the specific information requested, network traffic is reduced. If the whole file was transmitted, the PC would then have to perform the query itself, reducing the efficiency of both network and PC.

In the 1980s, at least 100,000 LANs were set up in laboratories and offices around the world. During the early part of this decade, synchronous orbit satellites lowered the price of long-distance telephone calls, enabling computer data and television signals to be distributed more cheaply around the world. Since then, fibre-optic

cable has been installed on a large scale, enabling vast amounts of data to be transmitted at a very high speed using light signals.

The impact of fibre optics will be considerably to reduce the price of network access. Global communication and computer networks will become more and more a part of professional and personal lives as the price of microcomputers and network access drops. At the same time, distributed computer networks should improve our work environments and technical abilities.

TEXT 11 DIFFERENTIAL EQUATIONS

1. Read and translate the text.
2. Write the summary of the text.
3. Make up 10 questions that will help you to retell the text.

A differential equation is a mathematical equation that relates some function with its derivatives. In applications, the functions usually represent physical quantities, the derivatives represent their rates of change, and the equation defines a relationship between the two. Because such relations are extremely common, differential equations play a prominent role in many disciplines including engineering, physics, economics, and biology.

In pure mathematics, differential equations are studied from several different perspectives, mostly concerned with their solutions—the set of functions that satisfy the equation. Only the simplest differential equations are solvable by explicit formulas; however, some properties of solutions of a given differential equation may be determined without finding their exact form.

If a self-contained formula for the solution is not available, the solution may be numerically approximated using computers. The theory of dynamical systems puts emphasis on qualitative analysis of systems described by differential equations, while many numerical methods have been developed to determine solutions with a given degree of accuracy.

Applications

The study of differential equations is a wide field in pure and applied mathematics, physics, and engineering. All of these disciplines are concerned with the properties of differential equations of various types. Pure mathematics focuses on the existence and uniqueness of solutions, while applied mathematics emphasizes the rigorous justification of the methods for approximating solutions. Differential equations play an important role in modelling virtually every physical, technical, or biological process, from celestial motion, to bridge design, to interactions between neurons. Differential equations such as those used to solve real-life problems may not necessarily be directly solvable, i.e. do not have closed form solutions. Instead, solutions can be approximated using numerical methods.

Many fundamental laws of physics and chemistry can be formulated as differential equations. In biology and economics, differential equations are used to model the behavior of complex systems. The mathematical theory of differential equations first developed together with the sciences where the equations had originated and where the results found application. However, diverse problems, sometimes originating in quite distinct scientific fields, may give rise to identical differential equations. Whenever this happens, mathematical theory behind the equations can be viewed as a unifying principle behind diverse phenomena. As an example, consider propagation of light and sound in the atmosphere, and of waves on the surface of a pond. All of them may be described by the same second-order partial differential equation, the wave equation, which allows us to think of light and sound as forms of waves, much like familiar waves in the water. Conduction of heat, the theory of which was developed by Joseph Fourier, is governed by another second-order partial differential equation, the heat equation. It turns out that many diffusion processes, while seemingly different, are described by the same equation; the Black–Scholes equation in finance is, for instance, related to the heat equation.

TEXTS ON ART AND DESIGN

TEXT 1 WHAT'S IN A NAME?

1. Read and translate the text.
2. Write the summary of the text.
3. Make up 10 questions that will help you to retell the text.

In the days when Manfred Gotta was still on the staff of a Frankfurt advertising agency, he was asked to promote a new cat food called "Katzensmaus" (Kittys feast). To a German, the name might seem vaguely silly, for non Germans it is simply unpronounceable. The client insisted on keeping the name and Gotta handed in his notice. In future, he decided, he would devote himself full-time to devising names for new products. Friends and colleagues were convinced he'd snapped. But today, at 50, Gotta has his own firm in Frankfurt and makes a tidy living inventing original names. He came up with the curious word "Xedos" for a luxury limousine, labelled one sporty little car "Twingo" and hit on "Vectra" for a range model. Gotta produces names for cars, confectionary and telephones and has over 80 corporate clients in Europe, Japan and the United States. He charges around 100,000 marks for a name which is to be used nationally, more than twice that for one which will be suitable on a European scale. Compared to the development costs of a car or a chocolate bar, it is peanuts. But 54 the name is a vital part of the image, and often more important than the colour or shape of a product. A good name, says professional wordsmith Gotta, creates positive associations, can be used internationally and it is unique". That goes for Japanese cars hoping to find buyers in Europe and the US as well as for German beer, which is exported to countries throughout the world. "If you are a globally active company you need to think in terms of a global identity," says Manfred Gotta. A new product must stand out, at all costs. The more exotic and enigmatic the name, the more curiosity it generates. Seemingly awkward word like "Xedos" or "Kelts" are not necessarily a

handicap. “Better a clumsy name you’ll remember,” Gotta says, “than one that’s slick but does not stick”. It’s hoped that, with Gotta’s help, the mascot created for Expo 2000 in Hanover will become world famous. Gotta came up with the name Twipsy. He devises names like this simply by giving free rein to his imagination. He locks himself into a room with the nameless object for 15 to 30 minutes, examining it closely and trying to put its qualities into words. This kind of brainstorming session generally produces several alternatives, which Gotta then reviews with his staff. But there is more to word coining than just the creative element. An ideal brand name should carry no meaning anywhere in the world and match the product. Gotta’s staff spend weeks doing research to ensure that the world rights to the name are available and also to find out whether it’s unpronounceable in any language or might come across as being rude or offensive. Gotta was paid the nicest tribute ever for “Twingo”, when someone said the car was as original as its name. But deciding what to call his latest “product” proved a real headache for the great inventor of names. He was, he admits, “rather different” when it came to choosing a name for his son. The boy is now 55 called Julian. That may not be unique but it’s got a pleasant ring and is certainly international.

TEXT 2 FORM, SHAPE AND SPACE IN GRAPHIC DESIGN

1. Read and translate the text.
2. Answer the questions:
1. What is one of the keys to successful graphic design?
2. Why are soft, curved and rounded shapes perceived differently than sharp, angled shapes?
3. How has current graphics software transformed the way graphic designers can deal with shapes?
4. Why is it important for designers to master the shape tools within their favourite software?
5. What are the ways to categorize form and shape?

Shapes are at the root of graphic design. They are figures and forms that make up logos, illustrations and countless other elements in all types of designs. Using shapes properly is one of the keys to successful graphic design. The form, colour, size and other characteristics for the shapes in a layout can determine its mood and message. Soft, curved and rounded shapes are perceived differently than sharp, angled shapes. The "white space" or negative space left between shapes will also significantly impact a design. Experimentation and altering of shapes within a design can ultimately lead to the desired result. Current graphics software has transformed the way graphic designers can deal with shapes. Adobe Illustrator is the most useful tool for shape creation and manipulation. Simple shapes such as circles, squares and triangles can be created with a click and drag of the mouse. Adjusting lines and curves using the tools in Illustrator and similar programs can create more complex shapes, of limitless dimensions. Colours, patterns, opacity and other characteristics of shapes can easily be altered. It is important for designers to master the shape tools within their favourite software, as almost any shape that can be imagined can now be created. Form and shape are areas or masses which define objects in space. Form and shape imply space; indeed they cannot exist without space.

There are various ways to categorize form and shape. Form and shape can be thought of as either two dimensional or three dimensional. Two dimensional form has width and height. It can also create the illusion of three dimension objects. Three dimensional shape has depth as well as width and height. Form and shape can also be described as either organic or geometric. Organic forms such as these snow-covered boulders typically are irregular in outline, and often asymmetrical. Organic forms are most often thought of as naturally occurring. Shape is an area enclosed by a line. It visually describes an object. It is two-dimensional with height and width. Shapes can be geometric with straight edges and angels, such as squares, rectangles, or triangles or circles; or they can be organic with irregular and curvilinear lines. Organic shapes are found in

nature-seashells, flower petals, insects, animals, people! Form looks like a three-dimensional shape. The object looks as if it has height, width and depth.

Artists use shading to create the illusion of form. The shading indicates depth by creating shadows. Geometric forms are those which correspond to named regular shapes, such as squares, rectangles, circles, cubes, spheres, cones, and other regular forms. Architecture is usually composed of geometric forms. These forms are most often thought of as constructed or made. However, not all made objects are geometric; many designed forms have irregular contours. Nor are all naturally occurring objects organic; snowflakes and soap bubbles are among many geometric forms found in nature. There are some other terms commonly used to describe form and shape in composition; these have to do with what kind of representations the forms have. If we can recognize every day objects and environments, we refer to the images as being realistic, or naturalistic. However, if the images are difficult or impossible to identify in terms of our normal, daily visual experience, we may refer to the images as abstract. Our perception of shape and form are affected by several factors. The position or viewpoint from which we see an object will emphasize or obscure certain features, and therefore affect the impression it makes. The character and source of light also changes the perceived character of the object. Lighting in a photographic portrait, for example, can make the subject look older, younger, dramatic, or rather abstract. Value (the relative lightness or darkness of a colour) can also define form. Strong contrasts in value within a composition may define the boundaries of forms. Gradations of value, or shading, can also create the illusion of contour and volume. In the same way, hue contrasts and gradations can also define forms. Form may also be defined by change in texture, even when hue and value remain essentially consistent. However, most typically, form is defined by a combination of these factors. Forms and shapes can be thought of as positive or negative. In a two dimensional composition, the objects constitute the positive forms, while the background is the negative space. The effective placement

of objects in relation to the surrounding negative space is essential for success in composition. Some artists play with the reversal of positive and negative space to create complex illusions.

TEXT 3 WORK ENVIRONMENT AND PROFESIONAL TRAINING

1. Read and translate the text.
2. Give Russian equivalents to the following words:
well-lighted; self-employed; deadlines; schedules; frustration; frequent; software; familiarity; jobseekers; traits; portfolio; trends; pressure; self-discipline; freelance work; occupation; media; demand.

Working conditions and places of employment vary. Graphic designers employed by large advertising, publishing, or design firms generally work regular hours in well-lighted and comfortable settings. Designers in smaller design consulting firms and those who freelance generally work on a contract, or job, basis. They frequently adjust their workday to suit their clients' schedules and deadlines. Consultants and self-employed designers tend to work longer hours and in smaller, more congested, environments. Designers may work in their own offices or studios or in clients' offices. Designers who are paid by the assignment are under pressure to please existing clients and to find new ones to maintain a steady income. All designers sometimes face frustration when their designs are rejected or when their work is not as creative as they wish. Graphic designers may work evenings or weekends to meet production schedules, especially in the printing and publishing industries where deadlines are shorter and more frequent. Graphic designers must be familiar with computer graphics and design software. A bachelor's degree in graphic design is usually required. Creativity, communication, and problem solving skills are important, as are a familiarity with computer graphics and design software. Jobseekers are expected to face keen competition; individuals with Web site design and

animation experience will have the best opportunities. Graphic designers must keep up with new and updated computer graphics and design software, either on their own or through formal software training programs. Graphic designers must be creative and able to communicate their ideas visually, verbally, and in writing. They also must have an eye for details. Designers show employers these traits by putting together a portfolio - a collection of examples of a person's best work. A good portfolio often is the deciding factor in getting a job. Because consumer tastes can change fairly quickly, designers also need to be well read, open to new ideas and influences, and quick to react to changing trends. The abilities to work independently and under pressure are equally important traits. People in this field need self-discipline to start projects on their own, to budget their time, and to meet deadlines and production schedules.

Beginning graphic designers usually need 1 to 3 years of working experience before they can advance to higher positions. Experienced graphic designers in large firms may advance to chief designer, art or creative director, or other supervisory positions. Some experienced designers open their own firms or choose to specialize in one area of graphic design. Most graphic designers work in specialized design services; advertising and related services; printing and related support activities; or newspaper, periodical, book, and directory publishers. A small number of designers produced computer graphics for computer systems design firms. Some designers do freelance work - full time or part time - in addition to holding a salaried job in design or in another occupations. Graphic designers with Web site design and animation experience will especially be needed as demand increases for design projects for interactive media - Web sites, mobile phones, and other technology. Demand for graphic designers also will increase as advertising firms create print and Web marketing and promotional materials for a growing number of products and services. Growth in Internet advertising, in particular, is expected to increase the number of designers. However, growth may be tempered by reduced demand in the print publishing, where many graphic designers are employed.

TEXT 4 ART WALK AMERICA: GUIDE TO ART MUSEUMS IN THE USA

1. Read and translate the text.
2. When retelling the text use the following expressions:

To see great museums and art; to have much interest in art; to house the best collections of art; to have celebrity art pieces; to be stuffed with pilfered antiquities; to be spread throughout all the major cities; to be the most technologically advanced, cutting edge, and well-curated museum; to overlook America's art scene; to produce special exhibitions and retrospective; to draw art and visitors from around the worlds; to remain pioneers in art and art appreciation; to exhibiting great art.

When people want to see great art museums and great art, they head to Europe. And even if they don't have much interest in art or museums, they usually go anyway – that's what you do when in London, Italy, or France. And, let's face it, Europe does house some of the best collections of western art in the world as well as have the lion's share of celebrity art pieces (Mona Lisa, anyone?), so the reputation is entirely justified. But what about all the art museums in good old America? We don't have the centuries of [art] history or the same wealth of old palaces lying around stuffed with pilfered antiquities and conquest spoils. Nor do we have the concentration of world-class art museums in a small area – the US is a big place and the best museums are spread throughout all the major cities. It's easy to overlook America's art scene, but to do so would be to miss out on some of the most innovative, unique, and, well, best, museums in the world.

US museums have capitalized on the fact that they can't really compete with the old-school European greats (except for maybe the MET) and instead have focused on being the most technologically advanced, cutting edge, and well-curated museums out there. Also, the fact that they don't have centuries worth of masterpieces already

crowding the walls means they can constantly acquire new work as well as produce special exhibitions and retrospectives that draw art and visitors from around the world. Many US museums strive to stay consistently at the forefront of global contemporary art and are housed in buildings of modern architectural renown, reflecting the desire of most American museums to remain pioneers in art and art appreciation. Finally, we've got the most highly-developed online museum network in the world and children's education and programs are a top priority. US museums are committed not only to exhibiting great art, but to using every contemporary resource available to accomplish and augment that goal as well as constantly changing and re-establishing their position in both the art world and society at large.

Metropolitan Museum of Art (New York, NY): The grand-daddy of huge, European-style art museums in America, the MET is also one of the largest museums in the world, with an enormous holding of pieces from around the globe. Not content with being labeled the American Louvre or Prado, the Metropolitan prominently features important contemporary artists, traveling shows, and uniquely curated exhibits of forgotten artists and eras in their numerous special exhibition spaces. Wandering the halls feels almost like a trip through every great museum in the world, but you never forget you're in America – in place of the refurbished palace wings in European museums that reflect the buildings' origins, the MET has American period rooms, including a Frank Lloyd Wright living room. While undoubtedly overwhelming, the MET is not a museum to be missed-one good way of getting a handle on both its literal and conceptual size is to focus on some of the more obscure holdings, such as the extensive and fascinating arms and armory gallery. The museum is open from 9:30 a.m. to 5:30 p.m. Tuesday, Wednesday, and Thursday, and from 9:30 a.m.-9 p.m. on Friday and Saturday (closed Mondays). Admission is $15 recommended for adults and $10 recommended for students, although that "recommended" is more of a set price in practice.

TEXTS ON SCIENCE AND TECHNOLOGY

TEXT 1. SCIENCE AND TECHNOLOGY

I. Look through the text concentrating on the beginning of each paragraph and write down a plan, either in English or in Russian (time limit − 10 min.).

1. Science problems can be roughly classified as analytic and synthetic. In analytic problems we seek the principles of the most profound natural processes, the scientist working always at the edge of the unknown. This is the situation today, for instance, within the two extremes of research in physics − elementary particle physics and astrophysics − both concerned with the properties of matter, one on the smallest, the other on the grandest scale. Research objectives in these fields are determined by the internal logic of the development of the field itself. Revolutionary shocks to the foundations of scientific ideas can be anticipated from these very areas.
2. As to synthetic problems, they are more often studied because of (he possibilities which they hold for practical applications, immediate and distant, than because their solution is called for by the logic of science. This kind of motivation strongly influences the nature of scientific thinking and the methods employed in solving problems. Instead of the traditional scientific question: "How is this to be explained?" the question behind the research becomes "How is this to be done?" The doing involves the production of a new substance or a new process with certain predetermined characteristics. In many areas of science, the division between science and technology is being erased and the chain of research gradually becomes the sequence of technological and engineering stages involved in working out a problem.
3. In this sense, science is a Janus-headed figure. On the one hand, it is pure science, striving to reach the essence of the laws of the

material world. On the other hand, it is the basis of a new technology, the workshop of bold technical ideas, and the driving force behind continuous technical progress.

4. In popular books and journals we often read that science is making greater strides every year, that in various fields of science discovery is followed by discovery in at steady stream of increasing significance and that one daring theory opens the way to the next. Such may be the impression with research becoming a collective doing and scientific data exchange a much faster process. Every new idea should immediately be taken up and developed further, forming the initial point of an avalanche-like process.

5. Things are, in fact, much more complex than that. Every year scientists are faced with the problems of working through thicker and tougher material, phenomena at or near the surface having long been explored, researched, and understood. The new relations that we study, say, in the world of elementary particles at dimensions of the order of 10-13 cm or in the world of super stellar objects at distances of billions of light years from us, demand extremely intense efforts on the part of physicists and astrophysicists, the continuous modernization of laboratories with experimental facilities becoming more and more grandiose and costing enormous sums. Moreover, it should be stressed that scientific equipment rapidly becomes obsolete. Consequently, the pace of scientific development in the areas of greatest theoretical significance is drastically limited by the rate of building new research facilities, the latter depending on a number of economic and technological factors not directly linked to the aims of the research. It may take, for example, more than 10 years from the initial decision to build a 100—200 billion electron volt accelerator to its completion.

It should be borne in mind, too, that few measurements and readings given by these great facilities push science forward, results of any great significance being very rare. For instance, tens of thousands of pictures taken during the operation of an accelerator will have to be scrutinized in the hope of finding, among typically

trite processes, signs of a new interaction or of a new event whose presence or absence may confirm a theoretical idea.

II. Paragraph Study.

Read paragraph 1.

1. Identify the topic sentence and the illustrating sentences. Find the sentence containing the author's prognosis and the word indicating that it is a prognosis. 2. What is meant by the situation and these very areas?

Read paragraph 2.

1. Identify the topic sentence. Answer the questions: What are the two | motive forces behind synthetic and analytic research? What are the consequences J arising from the change in motivation for research? What is the present-day 1 relation between science and technology? What is meant by the doing? 2. Identify two sentences similar in meaning in paragraphs 1 and 2. 3. Identify the 52 words which reveal a comparison in the first sentence of paragraph 2. 4. Translate the last sentence of the paragraph into Russian.

Read paragraph 3.

1. Identify the topic sentence and the sentences developing its idea.

2. Give Russian equivalents of striving to reach the essence. . . and the workshop of bold technical ideas.

III. Look through the paragraphs again and indicate the words and word groups used to connect the paragraphs and the sentences within them.

(to be continued at home in written form)

1. Read the text again without consulting the dictionary. Identify 7 structures according to pattern 12 and give Russian equivalents of the relevant part of the sentence, paying special attention to the choice of Russian conjunctions.

II. Paragraph Study (consult the dictionary if necessary).

Read paragraph 4.

1. Follow the word science through the paragraph and copy out the words related to it in meaning. State the main idea of the paragraph (in English or in Russian). 2. Copy out the sentence summed up by

the word impression. 3. Copy out the words equivalent to: непрерывный поток, дерзкая теория, лавинообразный.
Read paragraph 5.
1. Divide the paragraph into three parts with the following titles: Subject of Research, Tools of Research and Results of Research. Indicate the beginning of each part. 2. Read the first sentence again and copy out the words indicating that the popular view on science is not adequate.
III. Translate paragraph 5 into Russian.

TEXT 2. WHAT SCIENCE IS

See if you remember: to meet human needs, to refer to, to distinguish, to encounter difficulties, to emerge, at great expense, search for truth, to point out.
Look through the text concentrating on the beginning and the end of each paragraph, and write an outline, either in Russian or in English (time limit − 10 min.).

1. It can be said that science is a cumulative body of knowledge about the natural world, obtained by the application of a peculiar method practised by the scientist. It is known that the word science itself is derived from the Latin "scire", to know, to have knowledge of, to experience. Fundamental and applied sciences are commonly distinguished, the former being concerned with fundamental laws of nature, the latter engaged in application of the knowledge obtained. Technology is the fruit of applied science, being the concrete practical expression of research done in the laboratory and applied to manufacturing commodities to meet human needs.
2. The word "scientist" was introduced only in 1840 by a Cambridge professor of philosophy who wrote: "We need a name for describing a cultivator of science in general. I should be inclined to call him a scientist". "The cultivators of science" before that time were known as "natural philosophers". They were curious, often eccentric, persons who poked inquiring fingers at nature. In the process of

doing so they started a technique of inquiry which is now referred to as the "scientific method".

3. Briefly, the following steps can be distinguished in this method. First comes the thought that initiates the inquiry. It is known, for example, that in 1896 the physicist Henri Becquerel, in his communication to the French Academy of Sciences, reported that he had discovered rays of an unknown nature emitted spontaneously by uranium salts. His discovery excited Marie Curie, and together with her husband Pierre Curie she tried to obtain more knowledge about the radiation. What was it exactly? Where did it come from?

4. Second comes the collecting of facts: the techniques of doing this will differ according to the problem which is to be solved. But it is based on the experiment in which anything may be used to gather the essential data − from a test-tube to an earth-satellite. It is known that the Curies encountered great difficulties in gathering their facts, as they investigated the mysterious uranium rays.

5.This leads to step three: organizing the facts and studying the relationships that emerge. It was already noted that the above rays were different from anything known. How to explain this? Did this radiation come from the atom itself? It might be expected that other materials also have the property of emitting radiation. Some investigations made by Mme Curie proved that this was so. The discovery was followed by further experiments with "active" radioelements only.

6. Step four consists in stating a hypothesis or theory: thai is, framing a general truth that has emerged, and that may be modified as new lads emerge. In July 1898, the Curies announced the probable presence in pitchblende ores of a new element possessing powerful radioactivity. This was the beginning of the discovery of radium.

7. Then follows the clearer statement of the theory. In December 1898, the Curies reported to the Academy of Sciences: "The various masons enumerated lead us to believe that the new radioactive substance contains a new element to which we propose to give the name of Radium. The new radioactive substance certainly contains a great amount of barium, and still its radioactivity is considerable. It

can be suggested therefore that the radioactivity of radium must be enormous".

8. And the final step is the practical test of the theory, i. e. the prediction of new facts. This is essential, because from this flows the possibility of control by man of the forces of nature that are newly revealed.

9. Note should be taken of how Marie Curie used deductive reasoning in order to proceed with her research, this kind of "detective work" being basic to the methodology of science. It should be stressed further that she dealt with probability — and not with certainty — in her investigation. Also, although the Curies were doing the basic research work at great expense to themselves in hard physical toil, they knew that they were part of an international group of people all concerned with their search for truth. Their reports were published and immediately examined by scientists all over the world. Any defects in their arguments would be pointed out to them immediately.

III. Paragraph Study.

Read paragraph 1.

1. Follow the dominant noun and the words related to it in meaning through the paragraph and state the main idea. 2. Give Russian equivalents of: a cumulative body of knowledge, a peculiar method practised by the scientist, manufacturing commodities to meet human needs.

Read paragraph 2.

1. Follow the dominant noun and its equivalents through the paragraph. Identify the sentence which repeats the idea expressed in the first sentence of the text, 2. Identify the words used by the author as equivalent to: направляли свой пытливый ум на. . . 3. Identify the words used by the author as equivalent to doing so, a technique of inquiry.

Read paragraph 3.

1. Identify the topic sentence and the illustrating sentences. Among the latter identify the dominant noun and follow it through its

transformations into its equivalents and pronouns. 2. Give a Russian equivalent of initiates.

Read paragraph 4

1. Identify the topic sentence. Follow the words the collecting of facts through their transformations into their equivalents and pronouns. 2. Identify the words equivalent to: столкнуться с трудностями, пробирка, в зависимости от проблемы.

Read paragraph 5.

1. Identify the topic sentence and the illustrating sentences. Find the sentence describing the first step on the way to a hypothesis (What modal verb is used to show that it is only the first step?). 2, Identify the words used by the author as equivalent to this was so. 3. Give a Russian equivalent of emerge. Translate the last sentence of the paragraph into Russian.

Read paragraph 6.

1. Identify the topic sentence and the illustrating sentences. Find the sentence describing the next step in the development of the hypothesis (What word shows that it is a hypothesis?). State the function of that is and give its Russian equivalent. 2. Translate the first sentence into Russian.

Read paragraphs 7 and 8.

1. Identify the topic sentence and the illustrating sentences. Find the sentence describing the final step in the development of the hypothesis. 2. Find the guide words to the author's thought equivalent to: несомненно, несмотря на это, на этом основании. 3. Try to explain the author's choice of the modal verbs. 4. Find the English equivalent of /. e. in paragraph 6.

Read paragraph 9.

1. State the role of deductive reasoning in science. Indicate the words characterizing the conditions under which the Curies worked. 2. Translate paragraph 9 into Russian.

IV. Read the whole text again and see if any corrections should be made in your original outline. Write an abstract of the text in three sentences.

TEXT 3 RESEARCH: FUNDAMENTAL AND APPLIED, AND THE PUBLIC

1. *Read the text without consulting the dictionary, pencil-mark the words that you do not understand. Divide the text into three parts, copy out the dominant noun in each part and suggest a title for each part, 2. Identify 19 structures according to Pattern 9 and give their Russian equivalents.*

I. People are always talking about fundamental research, implying (hereby the existence of a nameless opposite. A good definition of fundamental research will certainly be welcomed: let us see whether we can invent one. We have to begin, of course, by defining research. Unfortunately the concept of research contains a negative element. Research is д niching without knowing what you are going to find: if you know what you are going to find you have already found it, and your activity IK not research. Now, since the outcome of your research is unknown, how can you know whether it will be fundamental or not?

2. We may say for instance that fundamental research is that which you undertake without caring whether the results will be of practical value or not. It may not be reasonable to go further and say that fundamental research is that which will be abandoned as soon as it shows a sign of leading to results of practical value. By saying this you may limit your own achievement. It will be better to say that fundamental research is that which may have no immediate practical value, but can he counted upon as leading to practical value sooner or later. The extension of knowledge and understanding of the world around us will always be profitable in the long run, if not in the short.

3. This is a very powerful argument for fundamental research and it is a completely unassailable one, and yet there are people who will not like it. Let us seek a definition that will give fundamental research a value of its own, not dependent upon other uses appearing soon or late. We say for instance that fundamental research is that which extends the theory. Now we have to theorize upon theory.

4. There have been several viewpoints about theory. One is that theory discerns the underlying simplicity of the universe. The non-theorist sees a confused mass of phenomena; when he becomes a theorist they fuse into a simple and dignified structure. But some contemporary theories are so intricate that an increasing number of people prefer dealing with the confusion of the phenomena than with the confusion of theory.5.A different idea suggests that theory enables one to calculate the result of an experiment in a shorter time than it takes to perform the experiment. I do not think that the definition is very pleasing to the theorists, for some problems are obviously solved more quickly by experimenters than by theorists.

6. Another viewpoint is that theory serves to suggest new experiments. This is sound, but it makes the theorist the handman of the experimenter, and he may not like this auxiliary role. Still another viewpoint is that theory serves to discourage the waste of time on making useless experiments.

7. Let us try to flatter theory by giving it a definition that shall not describe it as a mere handmaid of experiment or a mere device for saving time. I suggest that theory is an intellectual instrument granting a deep and indescribable contentment to its designer and to its users.

This instrument is made up of units which can be compared, for instance, to different branches of physics: solid state physics, relativity, acoustics, elementary particles and others, which sometimes have only a remote relation with one another and may not even be interconnected at all.

8. The rest of my talk will be devoted to a different question which is: how are we going to communicate to the layman some of our passion for our science? This is a very important question, for everyone is a layman until he becomes a scientist. If we can solve the problem of interesting the layman we may succeed in attracting the potential Fermis, Slaters, Lands and Fletchers of future into the field of, say, physics. Nothing could be more desirable.

9. A frequent technique is that of surprise. The trouble with this is that one cannot be surprised if one is not accustomed to the situation

which is nullified by the surprise. Imagine, for example, a physicist trying to surprise an audience of laymen by telling them that there are a dozen elementary particles instead of two or three, or that the newest cyclotron imparts an energy of 500 mev to protons. It simply will not work, because the listeners will have no background to compare this information with.

10. It is also a mistake to think that we can excite an audience by solving a mystery for them. The trouble here is that practically no one is interested in the answer to a question which he never thought of asking.

11. Relativity had a wonderful build-up in the decade before 1905, for the physicists of that era were acquainted with the sequence of experiments which were designed to show that the earth moves relatively to the ether and which obstinately showed the opposite. Each stage in the unfolding of quantum mechanics was exciting to the physicists who knew the earlier stages, because they knew the problems which were left unsolved. The writer of a detective story creates the mystery before he solves it; but the mystery usually begins with the discovery of a murdered man, and this is considerably more exciting than a murdered theory. The corresponding technique in physics consists in trying to create a particular state of out-of-dateness in the mind of the public, in the expectation of bringing them up-to-date at the end of the lecture or paper. There is too much risk of leaving the audience in the out-of-date condition, and this technique cannot be recommended.

12. Another mistake, in my opinion at least, is that of stressing a Paradox. Try telling an audience that if you know the exact position of л particle you cannot know its momentum, and vice versa − the effect is unpredictable but obviously not what you wanted, Still another mistake is that of springing an isolated fact upon the audience. An isolated fact is not science and it is not interesting. Facts are of interest only as purls of a system. And we must strive to interest the layman in the system.

II. Paragraph Study (consult the dictionary if necessary).

Read paragraphs 1−3.

1. Follow the nouns research, definition and argument through their nansformations into pronouns and state the main idea of the paragraphs, either in English or in Russian. 2. Copy out the words equivalent to: весьма желательно иметь хорошее определение, предпринять, не задумываясь; ограничить возможные результаты своей деятельности; расширение знаний приносит пользу. 3. Give Russian equivalents of a nameless opposite; searching; nulcome of your research; immediate practical value; research can be counted upon as leading; in the long run, if not in the short; a very powerful argument for.

Read paragraphs 4−7.

1. Follow the dominant noun through the paragraphs and copy out the definitions of theory and the beginning of the sentences containing counter arguments. 2. Copy out the words equivalent to: образуют простую, но строгую систему; теории имеют настолько сложный и запутанный характер; вспомогательная функция; предотвращать потерю времени; приносящий глубокое удовлетворение. 3. Give Russian equivalents of the underlying simplicity; the handman of the experimenter; a device for saving time; a remote relation.

Read paragraphs 8−12.

1. Concentrate on the opening question and the possible answers considered by the author. Make up a summary of the paragraphs in three sentences in Russian.

III. Translate paragraphs 8−12 into Russian.

IV. Make up a list of words that you have looked up in the dictionary and give their contextual Russian equivalents.

TEXT 4 SCIENTIFIC INNOVATION: ITS IMPACT ON TECHNOLOGY

1. Mr. A. The impact of scientific activity on technology is often discussed today. But one thing is not clear. What is meant here: the impact of today's scientific activity on today's technology or the

impact of today's scientific developments on technology thirty years from now?
2. Mr. B. I think there is usually an interval of twenty years or so between the discovery of a new scientific principle and its impact on industry. In the case of the transistor, for example, it took about that long. Some things move a bit faster but it must be admitted that many are even slower.
3. For example, our computers are based on fundamental discoveries in physics that may be traced back thirty, forty, even fifty years.
What will come out of contemporary science, out of the research that is being done today − we just do not know.
4. Mr. A. Do you think the isolated inventor is still the usual source of innovation, or has the group inventor been put to the fore now?
Mr. B. It seems that the lone inventor in most fields has been replaced by the group. But more often than we realize the original brilliant idea is still the product of one man's genius. He may, however, live in a group environment and have the advantage of the scientific and technical competence and intellectual contacts that come from working with a large group of people.
5. Mr. A. You are probably right. But as soon as a new idea is put forward, it requires many people's efforts before it can be transformed into a product. And at this stage innovation becomes a group and not an individual activity, involving both a sophisticated body of information and a sophisticated technology.
1. scientific innovation − новое в науке; 2. impact − влияние; 3. what is meant − что имеется в виду.

1. What is often discussed to-day? (Key: the impact of scientific activity on technology.) 2. What words are equivalent to scientific innovation

IV. Listen to the passage, sentence by sentence, and repeat them after the speaker.

Tape 2.1. Listen to the following expressions:

1. It took about that long − потребовалось примерно столько же времени; 2. it must be admitted − нужно признать; 3. a bit faster − немного быстрее.

1.1 Answer the questions:

1. What is the usual interval between the discovery of a new scientific principle and its impact on industry? 2. What example is given to illustrate the above statement? 3. What period of time is meant by it took about that long?

TEXT 5 FLIGHTS OF FANCY: SCIENCE FACT AND SCIENCE FICTION

1. *Read the text without consulting the dictionary, pencil-mark the words that you do not understand. Copy out the sentences which describe the four imaginable ways of space travel. 2. Copy out sentences illustrating the usage of: must, to be, can, could, may, might, would, should and those whose predicates contain two modal verbs of different meaning. Translate them into Russian.*

1. A fascinating by-product of space exploration is the conversion of science fiction into science fact. Thirty or so years ago an imaginative author could have described an instrumental flight to Mars, and the subsequent radiocontrolled photography. He might have held the polite interest of a scientific audience by sticking to instrumentation, but he would have been ridiculed for bringing in the human element. Yet today, as we know, scientists and technicians engaged in space projects are actually working on problems that would sound fantastic in comparison with a mere Mars probe.

2. In fact it would be difficult to draw an accurate line of division between intelligent scientific forecasting and the best scientific fiction. It may be thought that the idea of a frozen man being thawed out and reintroduced to society was good science fiction reading about sixty years ago. But twenty years later it was noticed that little fish which had been caught up by icy wind and water, and frozen

solid, swam i way quite happily when it was subsequently thawed. Now, after another quarter of a century, the legend of the little frozen fishes is being adopted by scientists and considered as another tool for future space travel.

3. In the light of our present-day knowledge there can be only two alternative ways for man to leave this earth and arrive at some other habitable planet in some incredibly far distant solar system. First, a team of selected men and women could set out in a suitably large and plentifully equipped spacecraft, prepared to live, breed, and die in .pace, leaving their children to do the same, until at some unspecified date in the far future they would complete the journey. Second, a similar team might be put aboard a spacecraft in deep freeze. Again, at some far distant point in time, activated by automatic control as a result of electronic information, a thawing out process might recondition them so that they could step out and resume life on a new world. It is to be assumed that the first is a horrible idea in terms of loneliness and desolation. The second is comparatively more exciting. Both are quite fantastic, measured by today's standards.

4. There is another alternative for man to go off into space which was brought up once after a meeting on plasma physics during an after-dinner talk. This shows how far scientists can be carried away by flights of their fancy when they look at very distant horizons and treat their problems with humour. On that occasion an American physicist Darol Iroman suggested that, if would-be astronauts would not wish to go oIV into interstellar space where the quarters and food are likely to be miserable, the earth itself should be used as a man-controlled spaceship. I his is how he came to this idea.

TEXT 6 LANGUAGE AND LEARN

By Hilary Shuard

There are considerable language difficulties in the learning of mathematics, even in a country where children are fortunate enough to learn mathematics in their mother tongue throughout their schooldays and where the mother tongue is a Western language, well

adapted to the expression of mathematical ideas. When they first enter school, the linguistic skills of many children are insufficiently developed to enable them to join in conversations that have a mathematical content. The school must therefore work to build up Inc children's concepts and vocabulary. Talk in the classroom needs to stress such phrases as "the first in the family", "the oldest child" and Mthe heavy box", so that, as children's language develop they come to understand the mathematical ideas contained in it.

At a slightly later stage, a single mathematical idea will be expressed (if in English) in a variety of different spoken phrases such as: "count on 2 from 4"; "2 and 4 equal", "2 add 4", "the sum of 2 and 4", "2 more than 4". All these different speech patterns are expressed uniquely in mathematical symbols by 2 + 4, It is not surprising that, if children have insufficient experience of talking mathematics, they will later find it difficult to tackle work problems, which can be presented, as above, in a variety of different ways. Talking is, likewise, an essential prelude, if they are to relate their learning to the situation in which mathematics is used in their everyday life. The child's essential difficulty is a linguistic one. The mechanical working of 2 + 4 is not difficult. But if the concept and symbolism of addition have not attached themselves to the range of spoken phrases used by the teacher and the textbook the child will not be able to arrive at the symbolism 2+4.

In the teaching of reading, the first aim is to help a child to make a correspondence between the written symbols he sees and the sound and meanings of the oral language, which already makes sense to him. In the teaching of mathematics, and in its reading and writing, the difficulties are compounded. This is partly because the corresponding oral language is not always meaningful when the written language or the mathematical symbols are introduced and partly because a single set of mathematical symbols corresponds to such a variety of oral language.

In the United Kingdom, and to some extent in other developed countries, the use of individualized learning schemes for mathematics in the primary school has increased recently. Such

schemes make considerable demands on the child ability to follow written explanations and on his ability to learn mathematical concepts by abstraction and by generalization from activities communicated to him through written instructions. In classrooms where individualized work Is in progress, children may not have sufficient opportunity to discuss mathematics orally either with their classmates or with their teacher. In such cases, written language may hold an importance for which the children are not yet ready. The growth of this style of teaching has focused interest on the problems of using written materials in mathematics.

Attention has been drawn to the range of different purposes, which mathematical text can serve and the problems of vocabulary, syntax and symbolism the child may encounter in his reading. Text can be used for a variety of different purposes. They include the exposition of mathematical concepts and skills, giving the child instructions to write, calculate or undertake a practical activity, and supplying examples and exercises. In the traditional use of textbooks, when the mathematical ideas are expounded by the teacher in a class lesson, the child only needs to understand the last of these forms of writing. Even when text is used in this traditional way, many children are only able to cope with the reading of calculations expressed entirely in symbols. They seem unable to visualize the situation represented by a word problem. So they confine their reading largely to picking out the numbers in the text and they use "cue words" to help them to decide what operation to perform on the numbers they have picked out. When text is used as a major resource for individual learning, children have to tackle a greater variety of reading problems. But this additional experience of reading mathematics does not necessarily produce greater reading skill, unless the teaching is specifically directed to reading for learning.

The vocabulary of a mathematics textbook also contains pitfalls for the unwary. There are some words that are used only in mathematics-words, for example, like parallelogram and hypotenuse.

These words are encountered only in a mathematical context and their meanings must be learnt from the mathematics book or

teacher. Once a word has been forgotten it is not easy for the child to find out the meaning unaided. Furthermore, such technical words are often of key significance and failure to understand them can lead to total failure to read the passage.

There are also many words that carry different meaning m mathematics from those they have in ordinary usage. For example in English, the difficulty of teaching the concept of "difference "to young children is compounded by the fact that the word "difference" is used in mathematics to denote one aspect of the idea of subtraction, whereas the child will previously have used it in everyday life to denote one of a variety of dissimilarities, rather than only differences of number. The work has now started to study how writers may devise text that would be more readable by the pupils, together with ways in which the pupils1 reading ability in mathematics may be improved and methods of helping the teacher to use the text more effectively as a resource for learning.

The earliest and most important stages of a child's education begin with informal imitative play. This is the world's largest and best school system. It has more students and more teachers than any other, it enjoys a more favorable student-teacher ratio and has more class hours than any other and is by far more effective than any other school system known. When the first formal school is added to this informal instruction, it makes a profound difference whether or not its teaching is consistent with the informal or at variance with it. This becomes a matter of considerable importance where a foreign system of thought is to be taught by means of an imported school curriculum, as is the case with science in so much of the non-western world, and even in some parts of the United States.

When the language of schooling from the beginning of primary school is a second language, there is less possibility of developing mathematical ideas through informal oral language before the written language and mathematical symbols are introduced. It is vitally necessary that the language teaching should be designed in collaboration with the mathematics teaching,' so that language is available to express mathematical concepts as they are developed.

The linguistic concepts and structures have to be taught. And if they are to have meaning they must be taught in circumstances, which simulate the day to day situations which arise naturally in the home... This means that mathematics must not be taught by the teacher writing symbols on the blackboard, rearranging them, getting "answers", asking the class to copy the process and to learn it by heart. Instead the" teacher must be trained to involve the children in carefully structured activities, investigations and discussions, which will ensure understanding. In short, the teaching of mathematics in a second language must, in effect, adopt the principle which covers the methods of teaching a second language as a language.

The principles of developing meaning in the teaching of mathematics to young children are the same, whether the child learns; mathematics in his mother tongue or in a second language. They are very clearly expressed in the above quotation from" the report of the Nairobi symposium, and Mathematics would be more effectively learned if these, words were better understood by many teachers who work in more favorable conditions.

(From: "Studies in Mathematics;
Education". The United Nations
Educational, Scientific and
Cultural organization. Paris, 1984.)

TEXT 7 RUSSIAN POTENTIAL TO BE FULLY PAPPED YET

As he arrived in Stockholm to receive a Nobel Prize, Academician Alexei Abrikosov, who has long been living in the United States, said: This is probably the last prestigious prize to be awarded to Russian scientists because domestic science today • gets hardly any funding at all while the best brains have already fled abroad. The other Russian Nobel Prize winner, Academician Vitaly Ginzburg, is of a different opinion: The country still has: enough intellectual potential for scientific breakthroughs.

How long will it be before this potential runs out? And, is it only the financial crunch that is ruining Russian science? Boris Saltykov, president of the Russian House of International Science* and-Technology Cooperation association and, in 1991 - 96, RF science and technology policy minister, talks about these and., other problems in an interview with MN's Tatyana Skorobogatko. I So, what is the outlook for Russians winning more Nobel J Prizes in the foreseeable future?

I don’t know about prizes, but I believe that Russia's scientific potential in far from being exhausted. There are some scientific schools that are still up to the finest international research standards. Say, excellent results are being achieved in the field of thermonuclear energy and elementary particles physics. True, the number of such schools is shrinking: Their founders pass away while their talented students go to work in the West Students of science theory know very well that the golden age of Soviet science was in the 1960s and early 1970s, when the country was awash with petrodollars. That was the time when new laboratories, research centers, and entire branches of science were emerging with young people coming to work there. A 25-year-old lab chief or a 30-year-old deputy director or even director was a normal thing then. Almost all ideas that are winning prizes originated in those years.

The command economy is no more and the money is even but the old principle of financing is still in place?

Not only the principle of financing. The entire paternalistic command-and-administer structure of science is still alive. Say, the Academy still acts as a kind of fundamental science ministry. It manages vast state property and distributes enormous state -, between institutions under its jurisdiction, what the science infrastructure needs is not so much development In other words, the lion's share of should be given to the best. It is an open secret that the majority once densely populated research institute building today are half filled at best, while researchers go to work abroad. Russian scientists are in 40th position or thereabouts in the frequency of

quotation in the world's leading science journals. Should we still take pride in our fundamental science?

Clearly, Russian fundamental science is hard put to develop within the bounds of the old structure, which does not fit into a new economic system. .So why is the Academy not reforming itself?

The idea was aired in early 1990s. But academicians managed to persuade the political leadership at the time that reforming the Academy would be tantamount to destroying science, putting: forward an interesting thesis; In Russia, two things are not subject to reform, the Church and the Academy of Sciences.

Domestic fundamental science has indeed developed mainly: within the academic structure.

Mainly, yes (although the most successful research programs in nuclear physics, for example, have been conducted at institutes affiliated with the Ministry of Atomic Energy). But times have changed, Today, sad as this may be, our science has been "conquered" by the West without a single shot being fired: Ten of thousands of Russian scientists are successfully working abroad. One of them quipped: "They talked about the need for global expansion of Russian science, didn't they? So it has now come about". Should the brain drain be lamented in the first place? If fundamental science is beyond the state's means, perhaps it could develop elsewhere.

It should be lamented, although fundamental science, unlike applied science, indeed has no commercial value. The results are published openly, immediately becoming the property of the whole mankind, even when a theoretical discovery could in the future produce tangible practical benefits. Take, for example, the human genome deciphering project: It has given a powerful impetus to a fairly "commercial" sector − medicine.

Has Russia really lost an opportunity to tap its results because it did not invest in this international project?

It has not, in theory. Yet I recently talked to a biologist, a Moscow State University professor, who complained that Russia, had not taken part in the project, and many specialists had gone

abroad. So now we do not have a single genome textbook Russian - how are we supposed to teach students?

As a result, our undergraduate training establishments, including medical institutes, may fail to ensure effective training of specialists capable of developing genetic technology on a mass scale. Incidentally, it is not only in scientific research organization but also in formulating scientific research priorities that Russia is going its own unique way. It does not consult the taxpayer about the choice of priorities. Herein lies in feet a distinguishing feature of the paternalistic command system: The state knows better what the country and its citizens need. Elsewhere in the world, priority in the past few decades has been given to life science, designed to preserve human health and extend the human life span. For some reason, Russia continues to invest the bulk of resources in physics and earth sciences. When the Soviet Union was surrounded by enemies, the public agreed that building an atomic bomb was of paramount importance. What kind of science is society ready to pay for today? Say, U.S. Congress allocated the National Health Institute (a network of scientific organizations conducting I projects in biology, medicine, etc.) even more money than it had asked for.

True, it should be understood that gaining knowledge is far from the only function of fundamental science. Other functions – innovative, expert, social, and cultural - are just as important for society. The education function is one of the most important of these. It is being successfully performed in the United State where fundamental science is concentrated mainly at universities. There is a basic difference between American universities and ours: In America, they are not so much training establishments as powerful scientific and educational centers. Economically, they are structure - what with the dual use of the equipment and research personnel (both for research projects and for training new scientists by using the latest scientific achievements). I think that reform of our fundamental science should move in this direction.

Of course plenty of problems arise here. Say, research universities should not answer to the Ministry of Education (in the

West, their activity is directed by boards of guardians). Such centers should be headed up not simply by scientists but scientists/managers: There are very few such people among our scientific leading lights. There are many other problems. Yet if there is a policy decision to conduct this "velvet revolution" organizational problems could eventually be resolved.

So we should stop saying that fundamental science is a matter of national prestige?

It is indeed a matter of national prestige - a kind of a state emblem. Surely we cannot reduce everything to practical gain. Say, what benefit does the country derive from its great composers? None at first glance. But this is a matter of national pride. We should likewise we proud of our great scientists. It is important that they continue to appear here in Russia.

Moscow News №1, 2008

TEXT 8 WORK AND WAGES: IN WHOSE INTEREST?

One thing that distresses me very much when talking to my Russian friends is the belief of so many of them that the collapse of your economy is somehow the result of moral failure that you bear.

"I suppose we must all leam to work harder; we have been too lazy- that is what is wrong. "Our psychology is at fault: we haven't grown up to face the realities of the world." "In a market economy you can do so much more for people than we could do under communism..." "Your shops are so full. I envy you and yet I feel that you must deserve it. But could I be allowed to come and join you, please!" And when they have run out of other self-criticisms I hear, "The terrible thing about Russians is that instead of wishing that they were as rich as the successful man, they wish that the successful man was as poor as they are." (Incidentally, why is this such a terrible thing? It is, more or less, what Jesus spent his life teaching. It can be the attitude of a slave; it can be the attitude of a human being who does not worship false goods).

All these meditations assume that somehow in the West we are hard-working but are horrified if we find ourselves out of a job, and not just for financial reasons. Among us, as among you, are a minority who really enjoy hard work. They are commited "workacholics". The rest of us do the work as we are required to do, escape when we can, are very conscientious if the work seems humanly important, and try to get as many advantages out of the system as we can. But if we are not allowed to work at all, we feel that we have lost part of our dignity as human beings. We need to feel that we are contributing something to our society and our own lives. The Russians who say to me, "What have our people lived for when their work has had no meaning?" are echoing the grief of those in the West who say, "What have I lived for with no work to do?"

How best to describe the situation of the English empoyee in a market situation? One way is to ask the question, "In whose interest?"

Most of the working population in Britain - about 90% - are employees who work for a wage which is paid either weekly or monthly. Another 6 % are self employed, working on their own and paying themselves from the profits of their work. Another 3 % are employers who must first pay their employees and then pay themselves from the profits of their businesses. However, it is not simply true that the 3% of employers directly employ all the employees. About a third of the working population are employed by the State. And many of the biggest "employers" in Britain are not individuals but trusts, or financial organizations representing hundreds or thousands of shareholders. These big businesses are managed; it is in the interest of managers to make profits, part of which will be put back into the business in the hope that it will become even more profitable, and part of which will be distributed among shareholders. The management will be among the shareholders.

Employees have different interests. They want more wages, easier working conditions, and as many benefits (extra advantages) as they can get out of the system, all of which must be paid for either

out of the business before profits, or our of public money spent by the State. In private businesses, there is an inevitable conflict of interests between employers and employees, but usually specific examples of the conflict are resolved through negotiations, bargaining, compromise. This is because the interests of both sides partly coincide. If the business fails to make profits, the employees cannot be paid; if the conditions of work of the employees are unsatisfactory, they will not work well enough to produce profits. So workers have to calculate: "Do I insist on demanding more money and risk ruining the business? Or do I keep quiet and watch idle shareholders gathering in rich profits?" In a country where businesses fail regularly and where we have a high employment rate these are daily calculations.

State employees are in a different position. They include national and local government administration; almost all school teachers, doctors and medical staff, many research workers, the police, and all the service personnel (cleaners, caterers, technicians, etc.) required to make the state organizations function properly. Many other groups of workers are also included. (I am not distinguishing here between those employed directly or indirectly by central government and those employed by local government. The point is that they are paid out of public money.)

Ultimately, their wages come from taxation, both of individuals and businesses, and from taxation on goods and services (VAT - like your "President's tax", but currently 17 l/2%!). So it is in the interests of these employees that the State should raise plenty of money - but preferably from business taxes rather than personal taxes. Also, it would be better if other parts of the State economy were less well-paid, so that they could be better paid. However, from the point of view of employers and employees in private industry, the less taxation the better, because they will have more money for bigger wages and bigger investments.

But employees are not only employees, whether they are employed in the private or the state sector of the economy. They are also taxpayers, whose interest, naturally, is to pay as little tax as possible.

And they are also consumers of State services, like health and education, where they want the best service possible - one which is well-funded from public money».

All these conflicts of interest mean that no part of the economy and no services provided by the society for its members can operate independently. Businesses are not "free"; markets are not "free"; the State is not "free"; though private industry and the State can operate with some freedom. In the middle stands the citizen, who, like any human being anywhere, wants food, housing, warmth, education, medical care, and then opportunities to move about, to enjoy himself, to make his home comfortable, and to make the future secure for his children. In order to do this he has to work, in order both to produce and to acquire money so that he can buy.

TEXTS ON CHYMISTRY AND BIOLOGY
TEXT 1 THE BIOSPHERE: ITS DEFINITION, EVOLUTION AND POSSIBLE FUTURE

Look through the text concentrating on the words related to the word biosphere in meaning and write down a plan, either in English or in Russian (time limit — 10 min.).

1. The idea of the biosphere was introduced into science rather casually almost a century ago by the Austrian geologist Eduard Suess, who first used the term in a discussion of the various envelopes of the earth in the last and most general chapter of a short book on the genesis of the Alps published in 1875. The concept played little part in scientific thought, however, until the publication, first in Russian in 1926 and later in French in 1929 (under the title "La Biosphere"), of two lectures by the Russian mineralogist Vladimir Ivanovitch Vernadsky. It is essentially Vernadsky's concept of the biosphere, developed about 50 years after Suess wrote, that we accept today. Vernadsky considered that the idea ultimately was derived from the French naturalist Jean Baptiste Lamarck, whose

geochemistry, although archaically expressed, was often quite penetrating.

2. The biosphere is defined as that part of the earth in which life exists, but this definition immediately raises some problems and demands some qualifications. At considerable altitudes above the earth's surface the spores of bacteria and fungi can be obtained by passing air through filters. In general, however, such "aero-plankton" do not appear to be engaged in active metabolism. Even on the surface of the earth there are areas too dry, too cold or too hot to support metabolizing organisms, the only exception being technically equipped human explorers, but in such places also spores are commonly found. Thus, when viewed as a terrestrial envelope, the biosphere obviously has a somewhat irregular shape, inasmuch as it is surrounded by an indefinite "parabiospheric" region in which some dormant forms of life are present. Today, of course, life can exist in a space capsule or a space suit far outside the natural biosphere. Such artificial environments may best be regarded as small volumes of the biosphere nipped off and projected temporarily into space.

3. What is it that is so special about the biosphere as a terrestrial envelope? The answer seems to have three parts. First, it is a region in which liquid water can exist in substantial quantities. Second, it receives an ample supply of energy from an external source, ultimately from the sun. And third, within it are interfaces between the liquid, the solid and the gaseous states of matter. Important as these three conditions for the existence of a biosphere may be in terms of historical evolution it is not the history that we are concerned with at this point but rather what the future developments are likely to be..

4. Without taking too seriously any of the estimates that have been made of the expectation of the life of the sun and the solar system it is evident that the biosphere could remain habitable for a very long time, many times the estimated length of the history of the genus Homo, which might be two million years old. As inhabitants of the biosphere we should regard ourselves as being in our infancy. Many people, however, are concluding on the basis of mounting and

reasonably objective evidence that the length of life of the biosphere as an inhabitable region for organisms is to be measured in decades rather than in hundreds of millions of years, with the fault being entirely that of our own species. It would seem not unlikely that we are approaching a crisis that is comparable to the one that occurred when free oxygen began to accumulate in the atmosphere.

5. Admittedly there are differences. The first photosynthetic organisms that produced oxygen were probably already immune to the lethal effecls of the new poison gas we now breathe. On the other hand, our machines may be immune to carbon monoxide, lead and DDT. But we are not. Apart from a slight rise in agricultural productivity caused by an increase in the amount of carbon dioxide in the atmosphere, it is difficult to see how the various contaminants we are polluting the biosphere with could form the basis for a revolutionary step forward. Nonetheless, it is worth noting that when the eucaryotic cell* evolved in the middle Precambrian period**, the process very likely involved an unprecedented new kind of evolutionary development. Presumably if we do want to continue living in the biosphere we must also introduce unprecedented processes.

6. The necessity of quite a new approach to the biosphere was realized by Vernadsky as early as the mid-forties. For not only was he the founder of modern biogeochemistry but he was also a man of deep scientific penetration and insight who could foresee the unavoidable long-range impact of production activities of man on the biosphere. According to him man has become a geological and biological factor by far exceeding everything that proceeded him throughout evolution, the rate of his intervention in nature steadily increasing. Yet it was with optimism that he looked ahead when he wrote: "I think we undergo not only a historical but also a planetary change as well. We live in a transition to the noosphere." By "noosphere" Vernadsky meant the envelope of mind that was to supersede the biosphere, the envelope of life. Unfortunately the quarter-century since those words were written has shown how mindless most of the changes wrought by man on the biosphere have

been. Nevertheless Vernadsky's transition in its deepest sense is the only alternative to man's cutting his life-time short by millions of years.

II. Paragraph Study.
Read paragraph 1.
1. Follow the dominant noun through its transformations into its equivalents and state the main idea of the paragraph. Enumerate the contributors and their respective contributions to the concept of the biosphere chronologically.
** The eucaryotic cell — эукариотическая клетка, развитие которой считается одной из самых великих биологических революций, происшедших на Земле (организм способный к существованию в сильно окисленных условиях).*
*** The middle Precambrian period — середина докембрийского периода (1,2—1,4 миллиарда лет назад), период перехода к новым формам жизни, существующим на основе кислородного обмена.*
2. Translate the last sentence into Russian.
Read paragraph 2.
1. Identify the topic sentence. Follow the dominant nouns life and apart of the earth through their transformations into their equivalents and words of related meaning and see how the definition of the biosphere is elaborated. 2. Find the words which mean: споры грибов; активный обмен веществ; заторможенные формы жизни. 3. Give Russian equivalents of: it demands some qualification; at considerable altitudes; to be engaged in active metabolism; temporarily.
Read paragraph 3.
1. Follow the word biosphere through its transformations into pronouns and specify the concept of the biosphere concentrating on the logical predicates of sentences 3, 4, 5. 2. Give Russian equivalents of: ample supply; interfaces; in terms of historical evolution; but rather; what the future developments are likely to be.
(to be continued at home in written form)

I. Read the text again without consulting the dictionary. Identify the structures according to Patterns 12, 27—36 and give Russian equivalents of the relevant part of the sentence.
II. Paragraph Study (consult the dictionary if necessary).
Read paragraph 4.
1. Find the words indicating time and copy them out. Copy out the topic sentence of the paragraph. Explain the author's choice of modal verbs. 2. Copy out the words equivalent to: измеряется десятилетиями; который можно сравнить. 3. Give Russian equivalents of: the estimates of the expectation of the life. . .; many times the estimated length; as being in our infancy.
Read paragraph 5.
1. Copy out the words from the last sentence of paragraph 4, which are opposite in meaning to the word differences. Copy out the names of the substances the author refers to as the new poison gas and the various contaminants. State the difference between the two crises, either in English or in Russian.
Read paragraph 6.
Copy out the words from the last sentence of paragraph 5 to which the phrase the necessity of a new approach is related in meaning and which show the connection between the two paragraphs. Copy out the topic sentence of the paragraph.
IV. Translate into Russian the last part of the text beginning with the» words "It would seem not unlikely."

TEXT 2 THE ENVIRONMENT: PROBLEMS AND SOLUTIONS

I. See if you remember: to seek; to bring to; far ahead; to single out; to be at the root; an adverse impact; to bring to the brink of annihilation; in good shape; in running order.
II. Look through the text and write an outline of three sentences (a sentence per paragraph), either in English or in Russian (time limit − 10 minutes).

1. Should anyone attempt a brief characterization of present-day environmental problems, he would find it beyond the competence of an individual scientist. For the environmental situation has long become a subject of separate and joint research efforts of biologists, chemists, and biochemists who have to combine their knowledge with the information supplied by students of geology, oceanography and meteorology, with experts in sociology, psychology and philosophy hurriedly joining in. Yet, if stated briefly, one of the causes of the present-day environmental situation should be sought in the lack of a balanced development of particular fields of knowledge, and of an adequate picture of the intricately operating whole which is our planet. The rapid and ever-growing advances in certain highly specialized fields have brought mankind far ahead of our general fundamental knowledge of the long-range effect of some technological developments, spectacular though they may appear, especially of their interplay and interdependence. It is man's intervention in nature that has singled him out from the rest of the animal world since his early days. It is this very intervention that has landed him nowadays in this highly technological world of ours, with the rate of progress in particular applied fields being faster than that in our fundamental knowledge of the general operation of the Earth. It is precisely this discrepancy between the two rates which seems to be at the root of most of today's problems. This is by no means an exhaustive explanation, ignoring as it does, the social factor.

2. The threat to his environment is a second major problem man is faced with in the mid-20th century, the first being a menace of a nuclear catastrophe. What is so peculiar about the environmental problem when compared to the other one? Surely not its global character and everybody's involvement. A nuclear catastrophe, as seen nowadays by practically everybody everywhere, would inevitably involve every country, no matter how small or big it is, and would concern every individual, whatever secluded life he might be living. Should it happen, its inescapability is too obvious to be disputed, So is its explosive character, in contrast to this, the environmental crisis is of a cumulative nature. It is just the obscure

and intricate pattern of the interaction of all factors that makes it so dangerous. For no single action taken, or decision made, can bring about an immediate catastrophe, nor could there be i he last straw or the last step that would set in motion an avalanche of irreversible and immediate events leading to the ultimate gloomy end. It is only step by step that we approach the critical point, were there such a thing as "point" in this context.

3. Consequently, what is needed first and foremost is that we realize the possible adverse impact of the long-range effects of our actions, however noble the motives may seem to us at present, on the entire human race. Out of this realization may come an entirely new approach Io the problem, the new approach as proclaimed by Vernadsky of the biosphere governed and operated in accordance with the laws of the human mind. Next comes the urgent need for basic research to get more profound knowledge of the cause-effect relationship, the time factor necessarily taken into account, in the whole realm of human environment, both natural, man-disturbed and man-initiated. Fundamental and irreversible as they may often be, the changes in our environment are not likely to bring mankind to the brink of annihilation overnight. It would take us some time yet to reach there. So let us use the time for learning how to preserve our planet in good shape and in running order for an indefinitely long time.

III. Paragraph Study.

Read paragraph 1.

1. Identify the topic sentence. Try to identify the words which may be somehow associated with the idea expressed by "characterization". Identify four cases of contrast or comparison (use attributes as your guide), to be able to state one of the causes of the present-day environmental problems. 2. What is meant by "the intricately operating whole"? 3. Find the words equivalent to: недостаточно равномерное развитие конкретных областей знания и правильного представления о сложном взаимодействии процессов, происходящих внутри единого целого. 4. Give Russian

equivalents of: spectac-uiar though they may appear, it is this very intervention that has landed him. . .. ignoring as it does.
Read paragraph 2.
1. Follow the words a nuclear catastrophe and the environmental problem through their transformations into pronouns. Compare the characteristics of a nuclear catastrophe and of the environmental crisis to see their common and different features. State the main idea of the paragraph. 2. Find the words equiv alent to: невозможность скрыться от; характер постепенного нарастания; скрытый и сложный механизм взаимодействия. 3. Identify the words used by the author to express the idea of "danger"; "inescapability"; "cumulative nature"; "critical point". 4. Give Russian equivalents of: no matter how small or big it is; whatever secluded life he might be living; should it happen; for no single action taken, or decision made, can bring about. . .; an avalanche of irreversible and immediate events.
Read paragraph 3.
1. Identify the topic sentence. State the most urgent needs of the situation. 2. What is meant by "the new approach", "to reach there" and "the time?" 3. Give Russian equivalents of: first and foremost; however noble the motives may seem to us; to bring mankind to the brink of annihilation overnight; it would take us some time yet to reach there.
IV. Read the text again and suggest a title to each paragraph.

TEXT 3 THE BIOSPHERE: NATURAL, MAN−DISTURBED AND MAN−INITIATED CYCLES

I. 1. Read the text without consulting the dictionary, pencil-mark the words that you do not understand. Divide the text into three parts and a conclusion and suggest a title for each part. 2. Identify the structures according to Patterns 12 (9 strs), 27 (4 strs), 29 (3 strs), 30 (4 strs), 31 (2 strs), 32 (1 str.), 34 (5 strs), 36 (2 strs), 37 (2 strs) and give Russian equivalents of the relevant part of the sentence.

1. When considered dynamically, the biosphere appears an arena of complex interactions among the essential natural cycles of its major constituents, with continuous fluxes of these constituents entering the biosphere, or being released by it. Once brought into being by evolution from an inorganic environment, the living matter has profoundly altered the primitive lifeless earth, gradually changing the composition of the atmosphere, the sea, and the top layers of the solid crust both on land;md under the ocean, Since then, were one to ascribe a single objective lo evolution it would be the perpetuation of life. This is the single end (he entire strategy of evolution is focused on, with evolution dividing (he resources of any location, including its input of energy, among an ever increasing number of different kinds of users, which we recognize as plant and animal species.

2. What are the chemical elements that prove to be the essential constituents of the biosphere? The periodic table lists more than 100 chemical elements. Yet as defined by ecologists the biosphere is the locus of interaction of only four of them: hydrogen, carbon, nitrogen and oxygen, these four being numbered 1, 6, 7 and 8 in the periodic table. Although dealing handsomely with much of the chemistry of life, this definition turns out to be a little too restrictive, ignoring as it does, the biochemical role of sulfur and phosphorus. But when enlarged to include these two, it does not go any farther up the table than element No. 16. Thus, it is a fact that most problems, the environmental ones anyway, arise from the exceptional reactivity of six of the 16 lightest elements, with the first four actually forming protein molecules, sulfur being the "stiffening" in protein and phosphorus supplying the "high-energy bond", the universal fuel for all biochemical work within the cell.

3. If the biosphere is to continue in running order, the biologically important materials must undergo cyclic changes so that after utilization they are put back, at the expense of some solar energy, into a form in which they can be reused. So far it has been nature that saw to it that the whole arrangement went on smoothly, all cycles being governed by complex mechanisms that were fitted together and held the whole in balance. Yet during the few last decades the

intervention of man in the natural cycling of that unique compound we call living matter, has been going on an unprecedented scale and at an unprecedented rate. Never before has nature been tempered with in such a drastic and not infrequently, irreversible way, with both immediate consequences and ultimate implications not even vaguely foreseeable. For too little do we know for certain about the way nature has been self-regulating for millions of years since life began, and too many variables are involved, to be able to foresee the final impact of our rapid technological development on the biosphere as an abode of life.

4. Thus, what is now recognized as a threat to our environment is caused primarily by disturbances either in the natural cycles of the six essentials, or in the energy cycle of the biosphere, energy being the driving engine of all life processes.

5. To cite but a few examples of such man-disturbed cycles of tin biosphere let us consider very briefly the energy cycle. The energy that sustains all living systems is solar energy as fixed in photosynthesis and held briefly in the biosphere before being reradiated into space as heal. It is solar energy that moves every living thing on the earth. The total amount of solar energy fixed on the earth sets one limit on the total amount of life, with the patterns of flow of this energy through the earth's ecosystems setting additional limits on the kinds of life on the earth. Increasing at an unprecedented rate now is the fraction of the total energy required by expanding human activities, which, paradoxical as it may seem, make large segments of it less useful in support of man. Not only is man replacing the earth's major ecosystems with cities and land devoted to agriculture, but leakage of toxic substances from man-dominated provinces of the earth is reducing the structure and self-regulation of the remaining natural ecosystems. The trend is progressive. Easily available to man is a smaller and smaller fraction of the earth's fixed energy, and an unavoidable question arises as to how much of the energy that runs the biosphere can be diverted to the support of a single species: man.

6. Or take another example − the disturbance of the nitrogen cycle. Although man and other land animals live in an ocean of air that is 79 per cent nitrogen, their supply of food is limited more by the availability of fixed nitrogen than by that of any other plant nutrient. By fixed is meant nitrogen incorporated in a chemical compound that can be utilized by plants and animals. Naturally this is done by the comparatively few organisms that have the ability to convert the element to a combined form. Of all man's recent interventions in the cycles of nature it is the industrial fixation of nitrogen that far exceeds all the others in magnitude. Before the large-scale manufacture of synthetic fertilizers and the wide cultivation of the nitrogen-fixing legumes one could say with some confidence that the amount of nitrogen removed from the atmosphere by natural fixation processes was closely balanced by the amount returned to the atmosphere by organisms that convert organic nitrates to gaseous nitrogen. Now one cannot be sure that the denitrifying processes are keeping pace with the fixation processes. Nor can one predict all the consequences, were nitrogen fixation to exceed denitrification over an extended period. We do know that excessive run-off of nitrogen compounds in streams and rivers can result in "blooms" of algae and intensified biological activity that deplete the available oxygen and destroy fish and other oxygen-dependent organisms, the process known nowadays as eutrophication.

7. Added to the natural cycles of the biosphere are man-initiated processes which may also be regarded as cycles of the biosphere, namely the production of energy, food and materials on a commercial scale. For as soon as these commodities began to be produced in quantity their production, utilization and disposal have become comparable with the cycling of natural essentials, and a challenge to mankind. To take but one example of the problems involved, think of the urgent need to get rid of all steel in use after its utilization. If properly cycled, all metal, glass, paper, fabrics and the like could provide raw materials for different industries. From a purely technological point of view man could in principle live comfortably on a combination of his own trash and the leanest of

earth substances by processing tons of rock to obtain a gram of a useful mineral. Such a way of life would create new problems, because under those circumstances man would become a geological force transcending by orders of magnitude his present effect on the earth. Different as the world might become from the present one, there is no reason a priori why it would be necessarily unpleasant.

8. Man has it in his power technologically to maintain a high level of industrial civilization, to eliminate deprivation and hunger and to control his environment for many millenniums. His main danger is that he will not learn quickly enough and that he will not take adequate measures in time to forestall situations that will be very unpleasant indeed.

II. Paragraph Study (consult the dictionary if necessary).

Read paragraph 1.

1. Keeping in mind the definition of the biosphere, follow the dominant noun through the paragraph and state the main idea of the paragraph, either in English or in Russian. 2. Copy out the words equivalent to: возникнув в ходе эволюции; единая цель; виды растений и животных. 3. Give Russian equivalents of: major constituents; to enter the biosphere; to be released by; to alter profoundly; the solid crust; the perpetuation of life; different kinds of users.

Read paragraph 2.

1. Copy out the beginning of the topic sentence of the paragraph. 2. Give Russian equivalents of: although dealing handsomely with much of the chemistry of life; the environmental ones anyway; the universal fuel for all biochemical work within the cell.

Read paragraphs 3 and 4.

Copy out the beginning of the topic sentence of the paragraph. 2. Copy out the words equivalent to: об этом заботилась сама природа; вся система в целом; никогда раньше природа не подвергалась такому кардинальному и нередко необратимому преобразованию, 3. Give Russian equivalents of: in running order; to undergo cyclic changes; to put back; to fit together; on an

unprecedented scale; immediate consequences and ultimate implications; too many variables are involved.
Read paragraph 5.
1. Follow the dominant noun through its transformations into its equivalents and pronouns and state the main problem arising as a result of the disturbance of the energy cycle. 2. Give Russian equivalents of: the patterns of flow of this energy; large segments; leakage of toxic substances. . . is reducing the structure; the trend is progressive.
Read paragraph 6.
1. Follow the dominant noun through its transformations into its equivalents and pronouns and state the main problem arising as a result of the disturbance of the nitrogen cycle. 2. Find the words equivalent to: в природе; происходят с той же скоростью, что и. . .; слишком большой сток; уменьшает содержание кислорода в воде. 3. Give Russian equivalents of: the availability of; the ability to convert the element to a combined form; to exceed in magnitude; over an extended period.
Read paragraphs 7 and 8.
State one of the main problems arising in connection with man-initiated processes.
III. Translate paragraphs 7 and 8 into Russian.
IV. Make up a list of words that you have looked up in the dictionary and give their contextual Russian equivalents.

TEXT 4 WHAT ON EARTH DOES SHE SEE IN HIM?

By Rachel Sylvester

There was a time when the only May to September relationships were cynical ones between fortune-hunting Barbie lookalikes and old billionaires on their death beds. Yet, today, relationships between women and men who are 30 or 40 years their senior are becoming almost commonplace.

This month, Andre Previn, 73, married the 39-year-old violinist Anne-Sophie Mutter, while 72-year-old actor Gerald Harper has parted from his 29-year-old girlfriend, Sarah Alexander, star of the BBC comedy Coupling, after a year of living together. Journalist Emily Beam, 29, continues to have a seemingly happy relationship with our greatest living painter, Lucian Freud, 79; while in Hollywood, Michael Douglas and Catherine Zeta Jones seem to be thriving together. One might think that, in each of these relationships, the women are patronising the men but, in fact, it seems to be the old boys who have the upper hand. What is going on?

I asked myself this question when the relationship of a colleague, now aged 34, and her boyfriend of 65 came to an end. It was widely agreed that my colleague, aged 29 at the start of the relationship, was beautiful, kind, stylish, witty, intelligent and financially comfortable from the fruits of her creative talent. What more could any man want?

It was surprising, but rather moving, that she had chosen to bestow all these favours on an older man. What was even more surprising was that, five years on, the Beast had still failed to take up the opportunity of marrying Beauty.

In a case of constructive dismissal, she left him and he moved on to another girl. The new girl's age? Twenty-nine. Why, I asked myself, were these 29 year olds attracted to him in the fist place?

A pattern began to emerge when, three month ago, I met a heterosexual single man of 65.1 was delighted to find him. As a professional agony aunt for the Spectator, my asvice-giving spills over into private life, and I have a number of Bridget Joneses on my books. Gerald Laing had three grade A wives under his belt, so was clearly attractive to women. Plus, he was a sculptor of renown, living in his own Scottish castle.

OK, it would have been better had he been 45, but I have fiftysomethings on my books, as well as late thirtysomethings.

So my heart leapt when he told me, during a long walk, that men like him were wary of getting involved with 38-year-old single

woman. "The risk is they want to take two children off you, then throw you out," he said.
He then expressed an interest in a fiftysomelhing friend of mine. She was another goddess and I was delighted to put them together.
But, before it had a chance to take off, there was disappointment. "Gerald Laing came in today with his new girlfriend." a gallery owner friend told me. "She looked about 12."
I rang up Gerald in his Scottish castle. "I understand you have 12-year-old girlfriend."

"She's not 12," he replied. " She's 28. My daughter (aged 40) is very annoyed about it, but Emma's highly intelligent, she's a stone carver, she's perfect for me. The only thing wrong with her is that she is 28 ..."

I found this news frustrating. It seemed to me that young women who were prepared to go out with these old types were distorting the market for other, more appropriate women, in the way that City bonus money distorts the London housing market. Why can't you twentysomethings stick to men of your own age group, I asked 28-year-old Sarah Graham, another "gerontophile" friend of mine.

"But why should we?" she replied. Two years ago, Sarah split up with her boyfriend of six years. She had wanted to get married; at 26, he felt too young to settle down. She fled to her parental home in Wiltshire and began working for antiques dealer. Her friends remained in London. Faute de mieux, she started socialising with the friends of her 77-year-old father and those of her fiftysomething boss.

After a year, she was really glad she had not married. "Mixing with people up to 50 years older than myself has taught me so much. I've had some extraordinary conversations in the past two years. I began to realise that many men of my own generation don't seem to want to listen, just to jockey for a chance to make their own trivial quips. And at weekends, they become even more incoherent and incapable of developing a concept in conversation,

"A friend of mine is going out with a 55 year old and her parents put it in a nutshell when they described her former boyfriend as "rather slack jawed". I now see how intellectually impoverished some of my own age group can be, no matter how much money they may be making in the City."

Sarah's father, Euan Graham, a former clerk in the House of Lords, observes various deficiencies in the young. " No character-shaping wars or hardship, too much lying in front of videos since they were 18 months old, no family meals... all these things are cumulative and the upshot is that the young men of her generation are unable to prolong a conversation."

But what about the women? Haven't they, too, watched too many videos and missed out on family meals?

"There is a disparity between the maturity of the sexes," I was told by a senior educationalist who has worked at both St Paul's School for Girls and a leading boy's public school. "Men haven't changed, but women have. In the past, you had the Jane Austen thing, where girls were encouraged to suppress their intelligence, or disguise it, so as not to intimidate men.

"These twenty and thirtysomething women are the first generation who have been encouraged to express the full gamut of their intellectual prowess and they can be too clever for men of their own age. Young men feel alarmed by it and the protective instinct doesn't kick in."

"One of the reasons why you go out with me," says 57-year-old Simon Campbell to his 30-year-old girlfriend, Belinda, a doctor, "is that you cannot actually get a boyfriend of your own age group." Belinda nods, unoffended. She is beautiful and clever and has no reason to take the comment personally. "I agree," she tells me. "The thing is that women need to look up to the man they are with and I can look up to Simon. But men also want their partners to Jook up to them, which is why many of my male contemporaries in the medical world marry nurses rather than female doctors, who are obviously more their intellectual equals."

Angela, 63, whose daughter Bea, 26, is going out with a man of 47, puts forward another clue: "There is a whole generation of young women who have not seen enough of their fathers, either because their parents were divorced or because their fathers worked so hard. This is a chance for them to have that relationship with an older man with authority; a man who has had a life- shaping experience and hardship, rather than a bland and easy ride, anaesthetised by alcohol and the media; a man who can guide and lead them. It is a chance to have a relationship which, until recently, was always a given, a staple part of a girl's progress through life."

Michael Alexander, now 81, who went on with Emily Beam when she was 21 and he was 73, says: "Also, the relationship is not necessarily sex- driven. Just as girls often enjoy the company of gay men, the older man basically wants someone to sit and watch telly with him. And some girls are a bit mixed up. They secretly feel they are not going to have children for some time, but want to look after somebody."

(From "The Sunday Telegraph". October 37, 1999)

TEXT 5 CARBOHYDRATE – BASED MOLECULAR SCAFFOLDING

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The use of modified carbohydrates, such as sugar amino acids (SAA), iminosugars and policyclic derivatives, as scaffolds for the generation of bioactive compounds, and the use of carbohydrates as building blocks or ligands for the production of polymers for bio-medical applications, is reviewed.

Keywords: Scaffolds, Iminosugars, Sugar amino acids, Chemical libraries, Glycomimetics, Peptidomimetics, Biomaterials.

INTRODUCTION

Monosaccharides are one of the relevant classes of natural compounds that, like amino acids, constitute the building blocks for the generation of the polymers of life. It is well known that, through the variation of the anomeric configuration and the position of the hydroxyl group involved as acceptor in glycosidic linkages, carbohydrates exploit their great diversity potential, exerting an impressive role in biological recognition phenomena.

As a matter of fact, carbohydrates present unique features widely exploited by nature: (1) their cyclic structure guarantees an adequate conformational rigidity, (2) the presence of multiple hydroxyl groups provides different positions for linkages and (3) the chirality provides different orientations of the hydroxyl groups and therefore different directions for the substituents linked to them. In other words, nature exploits carbohydrates as "scaffolds" to build up natural molecular architectures.

Taking advantage of this concept, recently synthetic chemists started to exploit carbohydrates as scaffolds for the generation of a variety of non- natural potentially bioactive compounds.

Figure 1: Examples of how nature exploits carbohydrates as scaffolds that link other sugars, lipids, peptides, and phosphates in well-defined positions and orientations.

Using carbohydrates as scaffolds, nature is very: other sugars, but also lipids, peptides, phosphates, and sulphates, are linked to the different hydroxyl groups providing the required diversity as exemplified in Figure 1. In sialyl Lewis X, a monomer such as galactose, highlighted in the figure, links sugar residues in two different positions. In peptidoglycan, N-acetyl- muramic acid links a sugar (GlcNAc) and a peptide. In lipopolysaccharide (LPS), a glucosamine scaffold links in different positions not only another glucosamine and a complex saccharidic chain, but also lipidic chains and a phosphate.

Also, synthetic chemists exploited their fantasy, using natural and modified monosaccharides, oligosaccharides, and glycomimetics as scaffolds for the generation of libraries of compounds for pharmacological screening, as well as for the production of

biomaterials for tissue engineering and as molecular tools for the generation of nanostructures. This review will provide an overview of the products of this fantasy. It does not have the ambition to be exhaustive.

SCAFFOLDS DERIVED FROM NATURAL MONOSACCHARIDES AND THEIR USE FOR THE GENERATION OF LIBRARIES OF BIOACTIVE COMPOUNDS

The use of carbohydrates as building blocks for the generation of libraries of biologically active compounds is relatively recent, Hirschmann, et al. using for the first time in 1992 a b-D-glucoside scaffold as a peptidomimetic targeting the somatostatin receptors.[1] The field has known a rapid and diverse development, partially covered in some reviews.[2]

There are a number of factors that make sugars, monosaccharides in particular, attractive molecular scaffolds: availability, high functionalization, chirality, and structural rigidity. Schematically, in an hexopyranosidic scaffold (Fig. 2), diversity can be generated by the five functional groups present at carbon atoms C(l)-C(4) and C(6) as well as by the five contiguous stereocenters at carbon atoms C(l)-C(5).

These characteristics have been exploited in the construction of bioactive compounds following two different (we would say opposite) philosophies. For one side, well-defined mimics of known bioactive compounds have been built up, properly exploiting the structire of the sugar scaffold; from the other side, libraries of diverse compounds bearing various pharmacophores in a combinatorial approach have been produced, exploiting the points of diversity intrinsic in the sugar structure.

Target Oriented Synthesis of Bioactive Compounds using Natural Monosaccharide Scaffolds

Examples of application of the first "philosophy / 7 which can be defined as target oriented synthesis of bioactive compounds using carbohydrate scaffolds, have been described in the field of peptidomimetics. There are a large number of peptides with potential therapeutic interest that display limited biostability (due to proteases

hydrolysis) and poor oral activity, limiting thus the application of peptide drugs.[3] One solution to this problem is the design of peptidomimetics in which the amide backbone is substituted with a different skeleton while maintaining the proper orientation of the amino acidic substituents.[4] While the design of nonpeptide peptidomimetics using novel scaffolds was anticipated by Farmer in 1980 [5] when he proposed the attachment of side chains to a cyclohexane ring, the first to synthesize a non peptide peptidomimetic (1, Fig. 3) were Belanger and DuFresne.[6]

Compound 1 featured a bicyclooctane core with novel scaffolding, being recognized by the opiate receptor for which it was designed. Papageorgiou [7] and Hirschmann et al. [l,8] first introduced peptidomimetics that possessed a carbohydrate backbone. In both cases it was desired to create mimics of the hormone somatostatin (SRIF), a cyclic tetradecapeptide with a wide variety of biological activity, most of it inhibitory in nature, [9] but that displays a very short biological half-life. [10]

Papageorgiou et al. utilized the tetrasubstituted xylofuranose 2 (Fig. 4) as scaffold for mimicking somatostatin,[7] while Hirschmann et al. attached the amino acid side chains of somatostatin and its analogs to a glucose scaffold, compounds 3 and 4, that would maintain the functional groups in the bioactive conformation.[8]

Since these original exploitations of carbohydrates as templates for pepti-domimetics, the sugar skeleton, mostly in its pyranosidic form, has been largely utilized as scaffold for the design of various bioactive compounds. Glucose-based mimics of the depsipeptide hapalosin, such as 6 and 7, were also synthesized.[11] Glucose and allose scaffolds were used for the design and synthesis of mimics of the cyclic peptide endothelin antagonist BQ123 (5, Fig. 4).[12] Other examples are reported by Murphy et al.,[13] Locardi et al.,[14] Le Diguarher,[12] Wessel et al.,[15] and Hanessian et al., [16] who synthesized mimics of other pharmacologically relevant peptides, taking advantage of the multifunctionality of a sugar.

Another example of target oriented synthesis of bioactive molecules based on a carbohydrate scaffold is that reported by

Nicolaou et al.,[17] who designed carbohydrate mimics of the cyclic peptide cRGDFV (Fig. 5), an antagonist of vitronectins, avb3, natural ligands to integrins, which are a class of extracellular proteins that facilitate cell-cell recognition.

Target Oriented Synthesis of Bioactive Compounds using Sugar Amino Acids

A different approach to the generation of peptidomimetics emerged, in which various synthetic strategies were used to attach the amino acid functionalities directly to the carbohydrate skeleton and to generate thus synthetic sugar amino acids (SAAs).[18,19] SAAs are well spread in nature,[20] and a well-known example is the sialic acid family widely found peripherally on glycoproteins.

SAAs have been synthesized since the 1950s, [21] but were utilized as biopolymer building blocks to mimic oligo- and polysaccharide structures. A great variety of these examples have been reported [22] and reviewed [23], which take advantage of the fact that well-established peptide synthesis methodologies both in solid phase and in solution can be exploited for the synthesis of carbopeptoids oligomers. Furthermore, the folding properties of those oligomeric carbopeptoids have attracted interest. [24]

The first example of a sugar amino acid synthesized to be used as a peptidomimetic comes from the work of von Roedern and Kessler.[25] Glucosyluronic acid 9, (Fig. 6) was incorporated into a cyclic peptide with the b-turn motif of the somatostatin containing tetrapeptide Phe-D-Trp-Lys-Thr. Starting from sugar b-amino acids, in which the b-carbon is the anomeric center of a furanoid sugar,[26] Taillefumier et al. recently reported the first synthesis of anomeric spiroannelated glycodiazepines,[27] compounds discussed in "Diversity in spirocyclic systems/7 as potential new templates for biological tools and peptidomimetic scaffolds.

Libraries Generated from Carbohydrate Scaffolds The generation of a library of compounds can follow two different approaches: it can be constructed through a parallel synthesis of individual targets or adopt a combinatorial approach. Initial efforts in this area were dedicated mostly to designing and synthesizing

building blocks that would be then incorporated in cyclic peptides; the possibility of molecular scaffolding (i.e., construction of libraries from the structural variety present in the building block) being somewhat less explored. An example of the first type of approach is that reported by Nicolaou et al. [28] for the generation of carbohydrate mimetics of the cyclic peptide cRGDFV. Using molecular calculations (Insight-Discover, CV-Force Field), several structures of carbohydrate-based mimics were minimized, and as a result, a small library of nine compounds emerged. Each of the components of the library was then subjected to synthesis, and an example is outlined in Scheme 1. Starting with methyl a-D-mannopyranoside, compound 10 was prepared in a sequence of selective protection/deprotection reactions. Methyl mannoside 10 was selectively O-benzylated at C (3) and then exposed to diethylaminosulfur trifluoride (DAST), to provide 11 after treatment with HOCH2CO2Et. During the latter process, the C(l) methoxide migrated to C(2), with simultaneous inversion of configuration, and a 2:3 mixture of a- and b-anomeric fluorides was formed. When this mixture was subjected to excess of 2-hydroxyethyl acetate, in the presence of Cp2ZrCI and AgCIO4, glycosides 11 were obtained, precursors to the targeted mimetics. Further manipulations of the azide and ethyl ester moieties provided scaffolds 12, which contained on the side chains the necessary guanidine and carboxylic acid functionalities.

The previously described results open the way to the second "philosophy" concerning the use of carbohydrate scaffolds, which takes advantage of the sugar diversity and multifunctionality to generate libraries of compounds for high throughput screening in drug research. By manipulations of the diversity points present in a monosaccharide, through both a careful choice of orthogonal protecting groups and configurational interconversions, libraries of structurally related compounds (same molecular weight, same pharmacophoric groups, comparable solubility, different spacial orientation, hence different biological properties) can be achieved. [2c,29,30] Since the diversity at the chiral centers is readily available

from nature, most of the studies to date explored the diversity offered by the selective functional group of protection/deprotec-tion, at three,[31,32] four, and all five positions.[33,34]

Amino glucoside 13 (Sch. 2), containing three points of diversity, at C(2), C(4) and C(6), was prepared from glucose in seven steps and an overall 22% yield. Coupling of 13 with eight amino acid-functionalized trityl-Tentagel resins, using O-(7-azabenzotriazol-l-yl)-l,l,3,3-tetramethyluronium hexafluorophosphate (HATU) as coupling agent, in the presence of diisopropylethyl amine, generated new scaffolds of type 14, featuring two points of diversity, at C(2) and at C(4). Treatment of 14 with isopropyl isocyanate introduced the carbamate pharmacophore at C(4); subsequent deprotection of the fluorenylmethoxy carbonyl group using piperidine and condensation of the resulting free amine moiety with p-nitrobenzoic acid introduced the last pharmacophore at C(2). Final cleavage from the solid support generated compound 16. In this manner, a 1,648-member sublibrary of biologically active compounds was created.

A different perspective on creating molecular diversity is given by Emmerson et al.,[35] who rather than manipulating only the functional diversity present in monosaccharides, chose to exploit diversification through chirality interconversion as. well. They prepared 4,6-O-benzylidene derivative 18 from readily available N-acetyl-D-glucosamine 17 (Sch. 3). Manipulation of the stereochemistry at C(l)-C(3), and of the protecting groups at the amine moiety, generated 24 related compounds, out of which only three are depicted in Scheme 3. Compounds 19-21 were then used as chiral ligands for the asymmetric reduction of aldehydes with dialkyl zinc. From the combinatorial chemistry point of view, compound 18 is a molecular scaffold with diversification of three sites. Stereochemical manipulations of 18 generate new scaffolds 19, 20, and 21, containing now two points of diversity, at C(2), and C(3), which could be further exploited through selective protection/ deprotection strategies.

While linking one of the functionalities present in a sugar scaffold to a polymer support is a method mostly used when creating diversification at four sites of the scaffold,[9a,33] other approaches were also exploited, due to inconveniences of working in solid phase. Limitations in choice of the functional groups due to (a) sensitivity of linkers and pharmacophores to the deprotection conditions, (b) need of Williamson etherification as means of functionalization of free hydroxyl groups, and hence the stability to strong bases, are examples of such inconveniences, apart from the usual difficulties of solid phase (solubility, linker lability). In particular, orthogonality of protecting groups is particularly problematic when the points of diversity are expanded; acidic and/or basic conditions, oxidations, catalytic hydrogenations, use of fluoride ions to deprotect silyl ethers, isomerizations of double bonds, and photolysis can be exploited for deprotection, but very often protecting groups are labile to more than one of these treatments. Furthermore, after deprotection, a derivatization must be effected in experimental conditions, not interfering with the remaining protecting groups and with the linkages of the already introduced substituents. An approach coming from Wong et al.'s work[36] avoids the use of polymer support and exploits the different reactivity of the four hydroxyl groups of a thiol glycoside in the solution phase chemistry. For instance, orthogonally protected galactoside 23 (Sch. 4) was rapidly syn¬thesized by introducing the four orthogonal protecting groups, t-butyldiphenyl-' silyl at C(6), followed by p-methoxybenzyl at C(3), chloroacetyl at C(2), and finally, levulinyl at C(4). Final glycosylation with methyl 6-hydroxyhexanoate gave the desired scaffold, which upon selective deprotection and subsequent glycosylation with seven donors generated a library of 45 protected oligosaccharides.

TEXT 6 MOLECULAR DYNAMICS SIMULATION OF A MICELLAR SYSTEM

Tim Bast and Reinhard Hentschke

Abstract A numerical simulation of the relaxation process of surfactant micellar solution to a new equilibrium state is performed using model analytical representations for the main characteristics of micellar aggregates. Relaxation stages of molecular aggregate size distribution in the typical regions of aggregation number variations predicted by the analytical theory in two-flux approximation are revealed. Good agreement between the predicted values of the relaxation times of micellar solution and those obtained in numerical simulation is disclosed within the domain of applicability of two-flux approximation. Numerical algorithm proposed in this work makes it possible to study the relaxation process of micellar solution even in the case when two-flux approximation becomes inapplicable. The realization of numerical algorithm can be considered as a kind of experiment for studying the relaxation process of a model micellar solution.

INTRODUCTION

The idea of applicability of the formalism of nucleation theory for describing the relaxation process in micellar solutions going back to the publications of [1-5] was logically continued in a series of works [6-10], With the most general assumptions on the dependence of the work of the aggregate formation from the surfactant molecules in micellar solution, analytical expressions were derived for the main characteristics of the relaxation process in micellar solution [6-10].

The significant progress gained in [6-10] was the introduction of the concepts of direct and reverse fluxes of surfactant molecular aggregates in the space of their sizes. The direct flux specifies the intensity of fluctuation overcoming of the region of the local maximum of the formation work for molecular aggregates located at the aggregation number axis to the left of this region. Direct flux corresponds to the formation of new micelles from surfactant monomers. The micelle decomposition is also the barrier process. Decomposition is characterized by the reverse flux specifying the intensity of fluctuation overcoming of the region of local maximum of the formation work by the molecular aggregates in a micellar well

during the micelle decomposition. With the constraints on the parameters of the dependence of the work of molecular aggregate formation on the aggregation number formulated in [7, 8] and the fulfillment of required hierarchy of the kinetic times of micellization, the direct and reverse fluxes of molecular aggregates are calculated in the stationary approximation. The knowledge of the direct and reverse fluxes as the functions of the current concentrations of surfactant monomers (direct flux) and the current concentrations of surfactant monomers and micelles (reverse flux) made it possible, in the combination with the bimodal approximation of the law of surfactant conservation in micellar solution, to derive and study [9] the kinetic equation for surfactant monomers at the stage of slow relaxation of micellar solution.

Hereafter, we call the analytical approach developed in [6-10] to the description of relaxation in micellar solution as two-flux approximation. Being rather productive, the two-flux approximation left unsolved a number of important problems concerning its foundation. Such an evident, at first glance, representation of the resultant flux of surfactant molecular aggregates in the space of their sizes as the difference between the direct and reverse fluxes, in fact, is not based on any physical feature, which can be used to specify (in the ensemble of aggregates) those aggregates that build up the direct and reverse fluxes» The aforementioned constraints on the parameters of the dependence of the work of molecular aggregate formation on the aggregation number have the form of strong inequalities. The strength of these inequalities (not so strong in practice) determines the errors of analytical expressions used to calculate the direct and reverse fluxes of molecular aggregates, As the micellar solution approaches the state of equilibrium when the direct and reverse fluxes are balanced, the weight of errors increases and they can affect the time of slow relaxation of a solution. The necessity of rather exact determination of surfactant monomer concentration at the stage of slow relaxation rises also the problem of the quality of the bimodal approximation of the conservation law for surfactant in solution under the comparability of the amounts of

surfactant in micellar and monomer forms. This work does not exhaustively answer all the questions listed above. In essence, it deals with a peculiar numerical experiment with the model micellar solution.

Results of numerical simulation presented in this work using the formalism of nucleation theory confirm all conclusions drawn on the relaxation process on the basis of two-flux approximation. The existence of the stage of the relaxation of molecular aggregate size distribution in the characteristic regions of the variations of aggregation numbers predicted by the analytical theory and good agreement between the predicted and measured (in numerical simulation) relaxation times of micellar solution are demonstrated for typical conditions. It is also shown how the time of slow relaxation of micellar solution observed in numerical experiment deviates from the corresponding value predicted by two-flux approximation as we go beyond the domain of applicability of this approximation. Numerical algorithm proposed in this work allows us to study the relaxation process of micellar solution even in the case when the two-flux approximation becomes inapplicable.

1. BASIC ELEMENTS OF NUMERICAL MODEL

The study is based on the finite-difference equation of the Volmer-Doring-Zel'dovich-Frenkel' kinetic theory of nucleation [11]

$$\frac{dc_n}{dt} = -(1_{n+1} - 1_n) \quad (n=2,3,4\ldots) \quad (1.1)$$

where C_n is the concentration of molecular aggregates containing n surfactant molecules (correspondingly, c, is then monomer concentration); the flux h of aggregates in the space of sizes is determined by the expression

$$1_n = j^{+}_{n-1} C_{n-1} - j_n - C_n, \quad (1.2)$$

Where $j+_{n-1}$ is the average number of molecules absorbed (emitted) per unit time by the aggregate consisting of n molecules. Omitting argument / at concentrations en when writing equations, we remember that Cn=Cn(t)

For the equilibrium solution of Cn(0). (1.2) results in the relation of detailed balance

j +n-1c n-1(0)+0 (n=2,3,4…)
which gives
$j_{-n}=j_n-1+/c_n$ (n = 2,3,4, -). (1.3)
Let us take advantage of the representation for equilibrium distribution as
C n(0)=c1 (0) e -Wn (1.4)
where Wn is the formation work (minimal) for the aggregate consisting of n molecules expressed in kT units (k is Boltzmann's constant, Γ is the absolute temperature).Then, expression (1.3) can be written as
$J_n = j_{n-1} + e^{Wn-1}$ (n = 2,3,4,-.) . (1.5)
Yet one equation representing the law of matter conservation should be added to kinetic equation (1). In the closed
system considered below, this equation has the form $\sum_{n=1}^{\infty} nc_n=c$, (1.6)
where c is the total number of surfactant molecules per solution unit volume.

The application of the formalism of nucleation theory suggests the knowledge of the work Wn of molecular aggregate formation and the average number of molecules j +n added to the aggregate per unit time as a function of aggregation number n and monomer concentration c1 However, simplified model representations for the work Wn of molecular aggregate formation and the value are sufficient for the purposes of this paper. Their use allows us to retain the heart of the matter in performing study and do not aggravate it with details.

Derivation of work Wn is based on model asymptotic representation [12, 13] for the quasi-droplet model of molecular aggregate, modifying it so as to fulfill equality W1= Q needed by the meaning of the Wn value.
Then, we write,
$Wn = b/2(n^2-1)-2a/3(n2/3-1)+a^2/4b(n-1)-(n-1)1n \frac{c_1}{c_{10}}$

where c_{10}, is the monomer concentration at which the plot of the dependence of formation work Wn on n has the horizontal tangent in the inflection point (by its meaning, concentration c10 is close to the critical micellization concentration). Parameter b in Eq, (1.7) is related to the hydrophilic interaction, parameter a characterizes the value of hydrophobic effect. According to [12, 13], numerical values of parameters a and b for aqueous surfactant solutions satisfy relations

a ~ 1, b « 1. (1.8)

Work Wn given by Eq. (1.7) possesses all required properties [6] of the work of spherical molecular aggregate formation in a real surfactant solution. At $c_1 < c_{10}$, work Wn increases monotonically with n. At $c_1 > c_{10}$, the local maximum Wc (activation barrier) and local minimum Ws with coordinates nc and ns, respectively

n↓c = ((a - 2√ (b 1n [(c↓l /c↓l0]))/2b)↑2, n↓c = ((a +2 2√(b1n [(c↓l / c↓10]))/2b)↑2 (1.9)

appear in the plot for work Wn. The region of local minimum at the aggregation number axis is called a micellar well.

Molecular aggregates accumulated in the well are nothing other than micelles. Characteristic halfwidth Δ nc of the region of local maximum and halfwidth Δns of the micellar well are determined so that, upon deviation from point nc by Δnc, work Wn decreases by unity compared to its value in point Δnc ;upon deviation by Δns, work Wn increases by unity compared to its value in point ns. According to Eq. (1.7), it follows for Δnc and Δns:

Δnc = (4/anc -1/2-2b)1/2 , Δnc=(4/2b-anc -1/2)1/2

As is shown in [12], height difference ΔW between the values for the local maximum and minimum of work Wn

ΔW=4a/3b3/21n3/2 c1/c10

is determined in the analytical form from relation (1.7).

The AW value acts as the height of activation barrier for the process of micelle decomposition.

Concentration c_{10} in Eq. (1.7) depends on parameters a and b according to

1n c_{10}=1n c_0 Gn-a2/4b

where c_0 no longer explicitly depends on a and b.
Hence, expression (1.7) can be conveniently written in the following form:
$Wn=Gn-(n-1)1n\ c1/c_0$ (1.13)
where the first term Gn is independent of monomer concentration and determined only by parameters a and b
$Gn=b/2(n2-1)-2a/3(n3/2-1)$

In view of Eq. (1.13), it is advisable to use concentration c0 as a concentration unit for numerical calculations. When calculations are completed, all results can be represented in any convenient units, in particular, in units of concentration c_{10},that, as was already mentioned, is close by its meaning to the critical micellization concentration. As is seen from Eq. (1.12), the multiplier for the conversion of concentration in co units into the concentration in c10 units
is equal to exp (-a2/4b).

Let us consider now the jn + value. The average number of molecules in absorbed per unit time by the spherical aggregate consisting of n molecules is proportional to concentration c1. Because the theory of micellar solution contains no reliable approximations for the dependence of the value on aggregation number n, upon the modeling of the jn^+ relaxation process of micellar solution, this dependence can be excluded at all by setting
$J^{+n} = qc^1$ (1.15)
where q is the coefficient of proportionality. In this case, according to Eqs, (1.5), (1.7), and (1.15), the average number of molecules in emitted per unit time by the spherical aggregate consisting of/7 molecules will be a complex function of aggregation number n.
Note that the assumption of the independence of the jn + value on the aggregation number n within the micellar well and determination of the jn - value from relation (1.3) using the Gaussian approximation for the distribution of molecular aggregates over the aggregation numbers in the micellar well was used in [2] when deriving the time of "fast" relaxation of micellar solution.

2. KINETIC EQUATION IN DIMENSIONLESS VARIABLES. RELAXATION TIMES

The state of model micellar solution and the main characteristics of molecular aggregates in this solution are determined by the numerical values of several parameters: the a and b parameters of work Wn of the molecular aggregate formation, total number c of surfactant molecules per solution unit volume, concentration c0, and coefficient q in Eq. (1.15). The dependence of the last two parameters can be easily excluded from the consideration changing the units of concentration and time, respectively. Indeed, the measurement of all concentrations in the co units allows us to set C_0= 1 and the introduction of dimensionless time т := qt excludes coefficient q from kinetic equation (1.1).

Hereafter, we deal with dimensionless parameters, unless otherwise specified. Evidently, all results obtained are converted into customary units, if one sets c_0(or c10) and q.

On the contrary, parameters a, b, and c are the characteristic parameters. Their values determine not only the quantitative characteristic of the solution but also its qualitative behavior. The choice of representative values of parameters a, b, and c is significant for this study.

Substituting expressions (1.5) and (1.15) for coefficients j -+n into kinetic equation (1.1), using representation (1.13) for work Wn, and accounting for the introduction of new units, we arrive at the equation

(n=2,3,4,…) (2.1)

which forms, together with the law of matter conservation (1.6), the closed system of equations. Here, coefficients exp (G_{n+1}-Gn) are no longer dependent on the monomer concentration and, at fixed parameters a and b, are constant. Note the nonlinearity of this system of equations that significantly complicates its analysis.

To solve Eq. (2.1), one should set the initial condition. As was already mentioned in Introduction, we are interested in the relaxation of micellar solution whose initial state in characterized by the equilibrium distribution of molecular aggregates over the

aggregation numbers to the new relaxation state corresponding to realized external action. The upper bar denotes the values referred to the initial state. As an initial condition to Eq. (2.1), it is natural to take the relation

$C_n = \bar{c}_n^{(0)}$ (2.2)

The external action can be different. The simplest form is the addition of new surfactant monomers to solution that causes the natural disturbance of equilibrium.

However, we will concern about other disturbances when the thermodynamic state of micellar solution varies atconstant total number c of surfactant molecules per solution unit volume. Physically, this can correspond, for example, to the variation of the solution temperature or pressure. Real action of such type affects to smaller or larger extent all parameters entering into relation (1.7) for work Wn. However, upon the numerical simulation of relaxation process, it is sufficient to assume that the external action changed the value of only one parameter, e.g., parameter a.

The value of this parameter prior to action we denote by $\bar{a}$, after action, by a.

TEXT 7 HRT RAISES CANCER AND STROKE RISKS

By Celia Hall

Doctors have halted a hormone replacement therapy trial among older women after finding the risk of invasive breast cancer, heart attacks and strokes was too great.

US researchers said that the health risks for post-menopausal women taking a combined preparation of oestrogen and progestogen outweighed the benefits and stopped the trial after more than five years of its planned eight-year run.

Experts commenting on the findings urged doctors to stop prescribing the combined pill used in the study.

But British HRT specialists said those who had been using a combined pill for a long period should not panic and give up straight

away. They said combined pills used in Britain were slightly different.

Some women in both Britain and the US take an oestrogen-only pill. Part of the trial of this pill has not been stopped.

The study of more than 16,600 healthy women gave half the combined pill and half a placebo.

It found that HRT increased the risk of breast cancer by 26 per cent, of heart attacks and other heart events by 29 per cent and of strokes by 41 per cent. Overall, cardiovascular risk was increased by 22 per cent in the HRT group.

The researchers said that for individual women the treatment's risks were low.

The figures mean that for every 10,000 women taking HRT there would be eight extra breast cancers, eight strokes, eight blood clots and seven coronary "events" a year.

The trial involved women in an older age group than in most previous studies - 50 to 79 - when such health problems are more prevalent. But it was a large randomized study which should not be ignored « British experts said».

Dr. Val Godfree9 deputy director of the Amarant Trust, which advises menopausal women, said those who had been taking HRT for several years should "not panic39.

She added: "No harm is going to come to anyone in the next few weeks or months. Women should take time for reflection and discuss the matter with their doctors.

"It is hard to interpret the figures, but the breast cancer statistics seem similar to a study reported in 1997 which if anything found a slightly higher risk.

"What the reports does not do is look at the quality of life of women taking HRT. This has been completely overlooked". Prof David Purdie, consultant gynaecologist at Hull University, said that British women should not be stampeded into stopping their HRT on the basis of a study that had been prematurely terminated.

(From "The Weekly Telegraph. Issue No.476)

TEXT 8 THE CELLULAR RESPONSE IN NEUROINFLAMMATION: THE ROLE OF LEUKOCYTES, MICROGLIA AND ASTROCYTES IN NEURONAL DEATH AND SURVIVAL

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Abstract Neuroinflammation is a complex integration of the responses of all cells present within the CNS, including the neurons, macroglia, microglia and the infiltrating leukocytes. The initiating insult, environmental factors, genetic background and age/past experiences all combine to modulate the integrated response of this complex neuroinflammatory circuit. Here, we explore how these factors interact to lead to either neuroprotective versus neurotoxic inflammatory responses. We specifically focus on microglia and astrocytic regulation of autoreactive T cell responses.

Keywords Microglia; TREM; Antigen-presentation

1. Introduction: what is inflammation?

Throughout the body, direct injury to a tissue induces immediate local inflammatory responses followed by systemic recruitment of immune cells [1, 2]. The degree and extent of inflammation is a function of the interplay between (a) the initiating insult (pathogen and/or tissue trauma), (b) the local stromal cells and (c) the peripheral immune system [1, 2]. A successful inflammatory response not only eliminates any invading pathogens, but it actively promotes wound healing and angiogenesis [1]. By contrast, chronic and/or progressive inflammatory disease can result from a failure to remove or resolve the initiating insult or from the dysregulated injury response of either the affected tissue or the recruited immune system [1].

Although the CNS is an immune privileged site, (reviewed in [3]), inflammatory reactions can and do occur within the CNS [4]. Indeed, neuroinflammation is now recognized to be a prominent feature of many classic neurodegenerative diseases including

multiple sclerosis, Alzheimer's disease, Parkinson's disease, narcolepsy and even autism [5, 6]. However, in all of these disorders, the role that neuroinflammation may be playing in wound healing (i.e., in neurorepair/neuroprotection) has received less attention than the role it likely plays in cytodestruction (i.e., neurodegeneration) [4, 7]. Furthermore, in chronic or remitting/relapsing neurodegenerative disorders, inflammation is unlikely to be playing a purely beneficial versus detrimental function [3]. These distinctions are not of merely academic importance.

Several recent clinical trials have tested the efficacy of different types of immune therapies for treating Alzheimer's disease (AD) and multiple sclerosis (MS) [8-10]. In the AD clinical trial, the goal was to direct the immune system to targeted destruction of amyloid plaques [8]. In the multiple sclerosis trial, the goal was to prevent T cell infiltration into the CNS [11]. Surprisingly, both trials were halted for unexpected forms of CNS inflammation. In the Alzheimer's trial, approximately 6% of the patients developed encephalitis. As yet there is debate as to the efficacy of inducing an auto-amyloid responses and even whether the induction of encephalitis was in the final analysis detrimental or beneficial. In the MS trial, three patients succumbed to a usually benign viral infection (PML) in a manner previously associated with immune deficiency diseases such as AIDs.

In this review, we will discuss the consequences (neuroprotection versus neurodestruction) of the very different types of interactions that can occur between the resident cells of the CNS and the peripheral immune system following tissue injury or pathogen encounter. We will focus specifically on how astrogliosis and microgliosis affect neuronal survival. Lastly, we will review the often overlooked role of genetics in dramatically altering the ultimate consequences of gliosis and CNS inflammation.

2. Neuroinflammation: the players

When discussing inflammation, the immediate focus generally turns to the "professional" immune system, specifically macrophages, granulocytes and lymphocytes. However, most cells in the body can

and do contribute toward inflammatory responses following injury and/or pathogenic insults [1,2]. The initial responses of stromal cells throughout the body play a strong role in directing the subsequent responses of the "professional" immune system cells [1, 2].

TEXT 9 NEW STUDY SHOWS SMOKING TOBACCO DOUBLES RISK OF RECURRENT TUBERCULOSIS

Medical News Today

Research published today (24 March 2014) provides critical new insight on the harmful links between smoking tobacco and developing tuberculosis (TB). Regular tobacco smoking doubles the risk that people who have been successfully treated for TB will develop TB again - a condition known as "recurrent" TB. The study is the most robust ever conducted into how smoking tobacco increases the risk of recurrent TB. It appears in the April issue of the International Journal of Tuberculosis and Lung Disease.

"More than ever before, we understand how tobacco harms people who have already been successfully treated for TB," said Dr Chung-Yeh Deng of National Yang-Ming University in Taipei, an author of the study. "No one should undergo the long, complex treatment for TB only to unknowingly place themselves at heightened risk of getting the disease again. With this research we can inform national tobacco control policies and educate patients about the risks that smoking tobacco poses.

" The researchers followed a large sample of 5,567 TB patients in Taiwan, each of whom had TB confirmed through bacteriologic testing and went on to successfully complete TB treatment. Of those patients, 1.5 percent developed a recurrent case of TB, with regular tobacco smokers twice as likely to develop recurrent TB compared with former smokers and with individuals who had never smoked tobacco. Regular tobacco smokers were defined as individuals who smoked 10 or more cigarettes - equivalent to half a pack - per day.

"Until this study was published, we didn't have a clear sense of how smoking tobacco posed risks to TB patients who have put in the

hard work of completing their treatment. This is a robust study with important implications for patients, public health programs and policy-makers alike," said Dr. Paula Fujiwara, Scientific Director of the International Union Against Tuberculosis and Lung Disease (The Union), which publishes the journal.

The research was announced on 24 March to coincide with World TB Day, which marks the anniversary of Prof Robert Koch's discovery of the bacteria that cause tuberculosis in Berlin. More than a century later, Koch's discovery is still considered among the most revolutionary in the history of medicine, since it paved the way to finding a cure for the disease known in the 19th century as "The White Plague".

"You often see tuberculosis still referred to as an 'ancient' disease, but this study is further evidence that TB is a fully modern illness that is impacting people in new ways," said Jose Luis Castro, Interim Executive Director of The Union. "Unless we adapt our TB control strategies to respond to newly ascertained risks, such as smoking tobacco, the global rise in diabetes, and the overcrowding we see in cities as the world urbanises, we will always remain two steps behind the bacteria that cause this disease."

TEXT 10 GASEOUS IRON (II) and IRON (III) COMPLEXES WITH BINOLate LIGANDS

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Electrospray ionization (ESI) of dilute solutions of l/l/’-bi-2-naphthol (BINOL) and iron(II) or iron(III) sulfate in methanol/water

allows the generation of monocationic complexes of iron and deprotonated BINOL ligands with additional methanol molecules in the coordination sphere, and the types of complexes formed can be controlled by the valence of the iron precursors used in ESI. Thus, iron (II) sulfate leads to [(BINOLate) Fe(CH3OH)n]+ complexes (n = 0-3), whereas usage of iron(III) sulfate allows the generation of [(BIMOLdiate)-Fe(CH3OH)n]+ cations (n = 0-2); here, BINOLate and BINOLdiate stand for singly and doubly deprotonated BINOL, respectively. Upon collision-induced dissociation, the mass-selected ions with n > 0 first lose the methanol ligands and then undergo characteristic fragmentations. Bare [(BINOLdiate)Fe]+, a formal iron(III) species, undergoes decarbonylation, which is known as a typical fragmentation of ionized phenols and phenolates either as free species or as the corresponding metal complexes. The bare [(BINOLate)Fe]+ cation, on the other hand, preferentially loses neutral FeOH to afford an organic C2oH12O+ e cation radical, which most likely corresponds to ionized l,l'- dinaphthofurane. (J Am Soc Mass Spectrom 2008, 19, 121-125) © 2008 American Society for Mass Spectrometry.

BINOL (l,l'-bi-2-naphthol) is among the most important chiral ligands used in metal-mediated asymmetric synthesis [1]. Despite a huge base of knowledge, however, gas-phase models that would permit a detailed understanding of enantioselective reactions at a molecular level are still relatively scarce [2-4]. In the course of ongoing studies of possible systems that allow probing of chiral reactions with mass spectrometric means [3, 5, 6], we here report on the generation of BINOL complexes of iron(II) and iron(III) by electrospray ionization (ESI) and on the fragmentation behavior of the ions formed to provide a foundation for future studies about possible enantioselective effects in the ion/molecule reactions of these gaseous complexes.

Experimental

The experiments were performed using a VG B1O-Q mass spectrometer, which consists of an ESI source combined with a tandem mass spectrometer of QHQ configuration (Q stands for

quadrupole and H for hexapole) as described in detail elsewhere [7]. In the present experiments, millimolar solutions of BINOL and iron(II) or iron(III) sulfate, respectively, in methanol/water (1:1) were introduced through a fused-silica capillary to the ESI source by a syringe pump. Nitrogen was used as nebulizing and drying gas at a source temperature of about 100 °C. Maximal, yields of the desired ions (see following text) were achieved by adjusting the cone voltage to between 30 and 90 V, respectively. For collision-induced dissociation (CID) at low collision energies, the ions of interest were mass-selected using Ql, interacted with xenon as a collision gas in the hexapole H at variable collision energies (Eldb = 0-20 eV), while scanning Q2 to monitor the ionic products. In most cases, this pressure of xenon (typically 2 X 1Q~4 mbar) corresponds to single-collision conditions, but for some of the more weakly bound methanol complexes, the CID cross sections are very large, such that a considerable number of multiple collisions take place [8]. Given that the primary aim of the CID experiments reported here is the illustration of trends in-relative binding energies, this aspect is not pursued any further. The same holds true for the internal energy content of the ions, which somewhat depends on size of the complexes as well as the cone voltage used, but poses no particular obstacles for the purpose of this work.

As pointed out previously, the VG Bio-Q does not allow one to directly extract quantitative threshold information from CID experiments due to several limitations of the commercial instrument [7]. For weakly bound ions [8, 9], for example/ even at Elab = 0 eV a non-negligible amount of ion decay is observed, which is in part attributed to the presence of collision gas not only in the hexapole, but also in the focusing regions -between the mass analyzers. Note that this dissociation does not correspond to metastable ions because it does not occur in the absence of collision gas. To a first approximation, however, the energy dependence of the product distributions in the CID spectra can be approximated by a sigmoid function [10], which allows one to extract some semi-quantitative information about the energetics of the ions examined [11]. Thus, the

energy dependence of the CID fragments can be approximated by sigmoid functions of the type Ii (Ecm) = [BR^1 + e(E1/2-Ecm)b] using a least-square criterion; for the parent ion M, the relation is: Im(Ecm) = {1-∑[BR^(1 + e(E1/2,i-Ecm)bi)]} Here, BRi stands for the branching ratio of a particular product ion ∑BRi = 1); E1/2 is the energy at which the sigmoid function of ion intensities has reached half of its maximum; ECM is the collision energy in. the center-of-mass frame [ECM = mT/(mT + m1) x Elab, where mT and m1 stand for the masses of the collision gas and the ion, respectively]; and b describes the rise of the sigmoid curve. In consecutive dissociations, all secondary product ions are added to the intensity of the primary fragment. Further, non-negligible ion decay at Elab = 0 eV as well as some fraction of non-fragmenting parent ions at large collision energies are acknowledged by means of appropriate scaling and normalization procedures. This empirical, yet physically reasonable approach is able to reproduce the measured ion yields quite well; note, however, that this simplified formalism does not explicitly include a treatment of competitive branching ratios at elevated energies. It is also quite obvious that the term E1/2 used in the exponent does not correspond to the intrinsic appearance energies of the fragmentation of interest, not to speak of the corresponding thermochemical thresholds at 0 K. The phenomenological appearance energies given earlier are derived from linear extrapolations of the rise of the sigmoid curves at E1/2 to the baseline.

TEXT 11 LIPIDS, MEMBRANES AND CELL COAT

The boundary between a living cell and its surroundings is the incredibly thin (7-10 nm) plasma membrane. This vital partition, which controls the flow of materials into and out of a cell and which senses and controls the response of cells to hormones and other external signals, consists largely of phospholipids together with embedded proteins. The nonpolar chains of the phospholipids stick

together to form a double molecular layer or bilayer which provides the basic structure of almost all biological membranes.

Phospholipids, together with other natural materials that have a high solubility in apolar solvents or are structurally related to compounds with such solubility properties, are classified as lipids. The most abundant lipids are the fats, compounds that are stored by animals and by many plants as an energy reserve. Other lipids form the outer cuticle of plants and yet others serve as protective coatings on feathers and hair. Vitamins A, D, K, and E and ubiquinone are all lipids as are a variety of hormones and such lightabsorbing plant pigments as the chlorophylls and carotenoids. Many of these compounds are dissolved in or partially embedded in the plasma membrane of bacteria or in the mitochondrial and chloroplast membranes of higher organisms. Membranes serve many purposes. The most obvious is to divide space into compartments. Thus, the plasma membrane forms cell boundaries and mitochondrial membranes separate the enzymes and metabolites of mitochondria from those of the cytosoL Membranes are semipermeable and regulate the penetration into cells and organelles of both ionic and nonionic substances. Many of these materials are brought into the cell against a concentration gradient. Hence, osmotic work must be done in a process known as active transport. Many enzymes, including those responsible for most of the oxidative metabolism of cells, are found in membranes of bacteria and of mitochondria. Within the chloroplasts of green leaves, highly folded membranes containing chlorophyll absorb energy from the sunlight. Thin membranes contain the photoreceptor proteins that function in vision. Electrical impulses are transmitted along the membranes of nerve cells.

The outer surfaces of membranes are designed to interact with the cell's external world. Special receptors sense the presence of hormones. Binding proteins await the arrival of needed nutrients and help to bring them into cells. Highly individual arrangements of protein and of the carbohydrate called antibodies help to prevent attack by foreign bacteria, viruses, and toxins.

Notice that fatty acids have straight carbon chains and may contain one or more double bonds. Except for the smallest members of the series, which are soluble in water, fatty acids are strongly hydrophobic. However, they are all acids with pKa values in water of-4.8. To the extent that free fatty acids occur in nature, they are likely to be found in interfaces between lipid and water with the carboxyl groups dissociated and protruding into the water. However, most naturally occurring fatty acids are esterified or combined via amide linkages in complex lipids. For example, ordinary fats are largely the fatty acid esters of glycerol called triacylglycerols (triglycerides).

There is a seemingly endless variety of fatty acids, but only a few of them predominate in any single organism. Most fatty acid chains contain an even number of carbon atoms. In higher plants the C16 palmitic acid and the C18 unsaturated oleic and linoleic acids predominate. The C18 saturated stearic acid is almost absent from plants and C20 to C24 acids are rarely present except in the outer cuticle of leaves. Certain plants contain unusual fatty acids which may be characteristic of a taxonomic group. For example, the Compositae (daisy family) contain acetylenic fatty acids and the castor bean contains the hydroxy fatty acid ricinoleic acid.

Like plants, animals contain palmitic and oleic acids. In addition, large amounts of stearic acid and small amounts of the C20, C22, and C24 acids are also present. Phospholipids of photoreceptor membranes of the retina contain fatty acid chains as long as C36. The variety of fatty acids found in animals is greater than in a given plant species. A large fraction of the fatty acids present in most higher organisms are unsaturated and contain strictly cis double bonds.

Bacteria usually lack polyunsaturated fatty acids but often contain branched fatty acids, cyclopropanecontaining acids, hydroxy fatty acids, and unesterified fatty acids. Mycobacteria, including the human pathogen Mycobacterium tuberculosis, contain my colic acids. In these compounds the complex grouping R contains a variety of functional groups including -OH, -OCH3, C=O, -COOH,

cyclopropane rings, methyl branches, and C=C bonds. Each species of Mycobacterium contains about two dozen different mycolic acids as well as other complex C30 -C56 fatty acids.

Certain polyunsaturated fatty acids are essential in the human diet. One of these, arachidonic acid (which may be formed from dietary linoleic acid), serves as a precursor for the formation of the hormones known as prostaglandins and a series of related prostanoids. Lipids of animal origin also contain unusual unsaturated fatty acids. Among them, conjugated linoleic acids are receiving attention for their possible cancer-preventive action. The predominant form in meats, dairy products, and the human body is the C18 9-cis, 11-trans isomer whose two double bonds are conjugated.

Other lipid components include the fatty alcohols which are formed by reduction of the acids. These are esterified with fatty acids to form waxes. Both fatty alcohols and free fatty acids occur in waxes together with the esterified forms. These mixtures are found on exterior surfaces of plants and animals. Plants and, to a limited extent, animals are able to decarboxylate fatty acids in a multistep process to alkanes and these too are important constituents of some waxes. Small amounts of fatty acid amides such as cis-9,10-octadecenoamide are present in low concentrations in the cerebrospinal fluid of cats and rats as well as humans. This compound accumulates in cats that are deprived of sleep. When the synthetic compound was injected into rats they fell into apparently normal sleep.

Insects make unsaturated as well as saturated hydrocarbons. The former as well as long-chain alcohols and their esters often form the volatile pheromones with which insects communicate. Thus, the female pink bollworm attracts a male with a sex pheromone consisting of a mixture of the cis,cis and cis,trans isomers of 7,11-hexadecadienyl acetate, and European corn borer males are attracted across the cornfields of Iowa by cis-11-tetradecenyl acetate. Addition of a little of the trans isomer makes the latter sex attractant much more powerful. Since more than one species uses the same attractant,

it is possible that the males can distinguish between different ratios of isomers or of mixtures of closely related substances.

Acylglycerols, Ether Lipids, and Waxes

The components of complex lipids are linked in a variety of ways. Often, glycerol acts as the central unit, e.g., combining in ester linkage with three fatty acids to form triacylglycerols (triglycerides), the common fats of adipose tissues and plant oils. Diacyl- and monoacylglycerols (diglycerides, and monoglycerides) are present to a lesser extent. In addition, small amountsof alkyl ethers or alkenyl ethers are often present in isolated lipids. They are especially abundant in fish liver oils.

These ether lipids are all chiral molecules with an R configuration but are derivatives of the nonchiral glycerol. The carbon atoms of glycerol are numbered using the stereochemical system. Most phospholipids are derivatives of the sn-3 phosphate ester of glycerol.

Triacylglycerols and the ether lipids described in the previous section are classified as neutral lipids. Other neutral lipids are alcohols, waxes, aldehydes, and hydrocarbons derived from fatty acids. These sometimes have specific biological functions. For example, fatty aldehydes are important in the bioluminescence of bacteria.

Phospholipids

As major constituents of biological membranes, phospholipids play a key role in all living cells.

The two principal groups of phospholipids are the glycerophospholipids (glycerophosphatides) which contain the alcohol glycerol and the sphingophospholipids which contain the alcohol sphingosine. The glycerophospholipids can be thought of as arising from the building blocks glycerol, fatty acids, the dihydrogen phosphate ion H2PO4 -, and the appropriate alcohol by removal of four molecules of water. They are derivatives of sn-glycerol-3-

phosphate. Esterification of this alcohol with two fatty acids gives a phosphatidic acid. Formation of a phosphate diester linkage to one of the alcohols choline, serine, or ethanolamine yields a glycerophospholipid. The resulting three groups of phospholipids are called phosphatidylcholine (lecithin), phosphatidylserine, and phosphatidylethanolamine, respectively. The phosphate and choline, ethanolamine, or serine portions of the phosphatide are electrically charged and provide a polar "head" for the molecule. In all three cases the positively charged group is able to fold back and form an ion pair with the negatively charged phosphate group. However, the methyl groups surrounding the nitrogen in phosphatidylcholine prevent a very close approach and with phosphatidylserine the adjacent carboxylate group weakens this electrostatic interaction. Unlike the triacylglycerols, most of which are liquid at body temperature, phospholipids are solid at this temperature. This property, like the ionic properties of the phosphatides, is doubtless related to their suitability for functioning in biological membranes.

Lecithins and related phospholipids usually contain a saturated fatty acid in the C-1 position but an unsaturated acid, which may contain from one to four double bonds, at C-2. Arachidonic acid is often present here. Hydrolysis of the ester linkage at C-2 yields a l«acyl-3-phosphoglycerol, better known as a lysophosphatidylcholine. The name comes from the powerful detergent action of these substances which leads to lysis of cells. Some snake venoms contain phospholipases that form lysophosphatidylcholine. Lysophosphatidic acid (1-acyl-glycerol-3-phosphate) is both an intermediate in phospholipid biosynthesis and also a signaling molecule released into the bloodstream by activated platelets.

Another group of phosphatides contain the hexahydroxycyclohexane known as inositol. Phosphatidylinositol, as well as smaller amounts of phosphatides derived from phosphate esters of inositol are present in membranes of all eukaryotes and have a specific role in regulating responses of cells to hormones and other

external agents. Phosphatidylinositol also forms part of "anchors" used to hold certain proteins onto membrane surfaces.

Bacteria and plants often make the anionic phosphatidyglycerol in which the second glycerol is esterified at its sn-1 position with the phosphate. Bacteria, as well as mitochondria, contain diphosphatidylglycerol (cardiolipin) in which phosphatidyl groups are attached at both the 1 and 3 positions of glycerol. Ether phospholipids are also widely distributed. The alkenyl ether analogs of phosphatidylcholine are called plasmalogens. In neutrophils the 1-O-alkyl ethers contain the major share of the cell's arachidonic acid, which is esterified in the 2 position.

Many other phospholipids are present in small amounts or in a limited number of species. These include phosphonolipids, which contain a C-P bond and are abundant in ciliate protozoa such as Tetrahymena and in some other invertebrates. Phosphonoethylamine replaces phosphoethanolamine in these lipids. A consequence of this structural alteration is a high degree of resistance to the action of the enzyme phospholipase C The phosphonolipids of the external membrane of Tetrahymena are also ether lipids with an alkoxy group in the sn-1 position. This makes them resistant to phospholipase Al as well. These two properties appear to protect the naked cell membranes of the protozoa from their own phospholipases which may be secreted into the environment.

Glyeolipids

The polar heads of the glycoglycerolipids lack phospho groups but contain sugars in glycosidic linkage. Large amounts of the galactolipids shown in the following structure are found in chloroplasts. The monogalactosyl diacylglycerol is said to be the most abundant polar lipid in nature. Chloroplasts also contain the following sulfolipid, an anionic sulfonate. Marine algae as well as aquatic higher plants accumulate arsenophospholipids.

The plasma membrane of mammalian male germ cells contains the following sulfogalactosylglycerolipid. It is found only in spermatozoa and testes, in which It accounts for 5 - 8% of total lipid, and in the brain, in which it accounts for only 0.2% of total lipid.

A variety of acylated glucolipids and phosphoglucolipids, including monoglucosyl and diglucosyl diacylglycerols, have been identified in membranes of the cell-wall-less bacterium Acholeplasma laidlawii. The following glycolipid from the methanogen Methanosarcina is identical to the core structure of eukaryotic glycosylphosphatidylinositol membrane protein anchors.

Sphingolipids

The backbone of the sphingolipids is the basic alcohol sphingosine (sphingenine) or a related long chain base. At least 60 such bases have been identified. They vary in chain length from C14 to C22 and include members of the branched iso and anteiso series. Up to two double bonds may be present. Sphingosine contains 18 carbon atoms and is formed from palmitic acid and serine. An intermediate in the formation of sphingosine is the saturated sphinganine (dihydrosphingosine), which is also a common component of animal sphingolipids. Hydroxylation of sphinganine to phytosphingosine occurs in both plants and animals, especially within glycolipids. The name comes from the fact that phytosphingosine was first discovered in plants.

Sphingosine-containing lipids are classified as sphingophospholipids (sphingomyelins) and sphingoglycolipids. In both cases the sphingosine is combined in amide linkage with a fatty acid to form a ceramide which still contains a free hydroxyl group able to combine with another component. In the sphingomyelins, which were first isolated from human brain by Thudicum in 1884, the additional component is usually phosphocholine. Ceramide aminoethylphosphonates and related glycolipids occur in some invertebrates.

The cerebrosides are glycosides of ceramide containing galactose or glucose.

They are found in relatively large amounts in the brain where monogalactosylceramide predominates. Cerebrosides also occur in other animal tissues and to a lesser extent in plants. Many glycosphingolipids contain.

TEXT 12 POLYACRYLAMIDE BASED HYDROGELS: SYNTHESIS, CHARACTERIZATION AND APPLICATIONS

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Abstract Hydrogels are polymeric networks those imbible large quantity of water without dissolving themselves, Hydrogeis contain water solubility groups
Research article
Such as -OH, -COOH, -NH2, -CONH2, and-S03H. Polyacrylamide hydrogel is widely used in ophthalmic operations, drug treatment, food packaging products, and water purification. This review describes the various methods of synthesis of polyacrylamide based hydrogel; characterization of polyacrylamide based hydrogel by D.S.C ,S.E.M, I.R; various properties of polyacrylamide based hydrogels like swelling, mechanical, rheological; and various application of polyacrylamide based hydrogel in drug delivery, heavy metal removal, medical fields and agricultural fields.
Keywords: Polyacrylamide, Water absorbent
1. INTRODUCTION

Hydrogels are water-swellable, three-dimensional polymeric networks. The capacity of hydrogels to absorb water is enormous and can be as much as 1000 times the mass of polymer (Huglin and Zakaria (1986); Peppas and Mikos (1986); Given and Sen (1991); Kulicke and Noltelman (1989). Hydrogels find application in food industry (as thickening agents, etc.), in pharmaceuticals (as controlled release preparations etc.), agriculture and related fields (in controlled release of moisture, fertilizers, pesticides, etc.), technical and electronic instruments (as a protector from corrosion, and short circuits, etc.), biomedicine (as artificial organs etc.), bioengineering (in biomolecular immobilization), veterinary medicine, photographic technology and as an adsorbent for removal of some unwanted agent in environmental application(Kulicke and Noltelman (1989); Roorda et al, (1986); Kost and Langer (1987).

Keywords: Polyacrylamide, Water absorbent

Acrylamide based hydrogel are the most common hydrogel. These hydrogel undergo large volume transition on swelling but they lack hydrolytic stability. Their hydrolytic stability can be increased if substituted acrylamides have alkyl or hydroxy alkyl groups (Ghanshyam et al., (2000). Polyacrylamide hydrogel is an atoxic, stable, nonresorbable sterile watery gel consisting of approximately 2.5% cross-linked polyacrylamide and nonpyrogenic water. Polyacrylamide hydrogel is widely used in ophthalmic operations, drug treatment, food packaging products, and water purification

2. Various methods of synthesis of polyacrylamide based hydrogels

2.1 Overview

Polyacrylamide is synthetic polymer derived from acrylamide monomer. Polyacrylamide is crosslinked polymer of acrylamide. In the cross-linked form, it is highly water-absorbent, forming a soft gel. Generally, polyacrylamide hydrogels results from polymerization of acrylamide with a suitable bifunctional Crosslinking agent, most commonly, N,N'-methylenebisacrylamide (bisacrylamide).

2.2 Structural features and chemistry of Polyacrylamide

Polyacrylamide (IUPAC poly (2-propenamide) or poly (1-carbamoylethylene) is a polymer (-CH2CHCONH2-) formed from acrylamide subunits that can also be readily cross-linked.

Polyacrylamide is a cross-linked polymer of acrylamide. In the cross-linked form, it is highly water-absorbent, forming a soft gel used in such applications as polyacrylamide gel electrophoresis and in manufacturing soft contact lenses. In the straight-chain form, it is also used as a thickener and suspending agent. (Note.l)

2.3 Synthesis of Polyacrylamide based Hydrogel

2.3.1 Radiation Method

A radiation technique is a widely used technique for preparation of hydrogels because a polymer in aqueous solution or water-swollen state readily undergoes crosslinking on irradiation to yield a gel-like material (Rosiak et al., (1983). Radiation technique

offers unique advantages for preparing polymer and hydrogels from vinyl monomer without the addition of any chemical substances (Rosiak etal., (1988). Dilek et al., (2002) prepared Acrylamide (AAm)/acrylic acid (AAc) hydrogels in the cylindirical by Y-irradiating binary systems of AAm/AAc with 2.6-20.0 kGy Y-rays. . Alam et al., (2004) described that hydrogels have been synthesized from 10%, 20%, 30%, 40%, 50% and 60% aqueous solutions of acrylamide monomer by gamma radiation employing doses in the range of 0.2-30 kGy from a Co-60 source

Tuncer et al., (2007) prepared macroporous poly (acrylamide) [poly (AAm)] hydrogels by using poly (ethylene glycol) (PEG) with three different molecular weight as the pore-forming agent during the radiation induced polymerization reaction..

2.3.2 Crosslinking Method synthetic polymers for the preparation of crosslinked structures is polyacrylamide (PAAm) (Thomas WM., (1964). Highly crosslinked polymers are generally chemically prepared from their monomers or polymers in the presence of cross-linking agents.(Note 2) Marcos et al., (2005) prepared novel superabsorbent hydrogels were manufactured using chemically modified cashew gum (CGMA) and acrylamide (AAm) as reactants.

Zolfaghari et al., (2006) prepared nanocomposite type of hydrogels (NC gels) by crosslinking the polyacrylamide/montmorillonite (Na-MMT) clay aqueous solutions with chromium (III).

Camelia et al., (2007) synthesized a polyacrylamide-based hydrogels by simultaneous polymerization/crosslinking method.

2.3.3 Free radical Polymerization Method

Hydrogels are usually prepared by freeradical copolymerization of acrylamide (AAm)-based monomers with a chemical cross-linker such as N,N -methylenebis (acrylamide) (BAAm) in an aqueous solution (Oguz and Wilhelm, (2007). Bajpayi and Dubey, (2004), developed a pH sensitive terepolymeric hydrogel system based on acrylamide, methacrylamide, and acrylic acid by free radical polymerization.

3.1 Fourier transform-Infrared Spectroscopy

(FT-I.R) of Polyacrylamide based Hydrogel

In view of the increasing importance, the structure and conformation of polyacrylamide (PAAm) based hydrogels have received considerable attention in thel last two decades; Vibrational spectroscopy is potentially useful tool for structural analysis and deriving conformational variations for polyacrylamide (PAAm) based hydrogelsThe FTIR spectra of PAAm hydrogel (Figure 8), shows significantly lesser amount of hydroxyl groups as compared to hydrolyzed PAAm, and the amide band has also shifted in the lower side possibly due to hydrogen bonding. The bands at 3080 and 2975cm1 corresponding to =CH2 and =CH-disappear.(Note.3)

3.2 Thermal studies of Polyacrylamide based hydrogel

Differential scanning calorimeter (DSC) is an effective tool for studying the cure kinetics and it also helps in establishing cure mechanism (Kudela et al., (1985). In the initial phase of cross-linking reaction and at lower temperature rapid hydrolysis occurred which was endothermic in nature, but at higher temperature curing reaction was favoured. Isothermal cure kinetics revealed that curing reaction was n ' 'order type and followed third order kinetics. The study also indicates that with the degree of conversion 0 .25-0.26. both curing and hydrolysis occurs simultaneously but at higher conversions curing reaction proceeds alone. (Singhal et al., (2002). (Note. 4)

3.3 Morphological studies of Polyacrylamide based hydrogel by Scanning Electron Microscopy (S.E.M).

Tuncer et al., (2007) prepared macro porous poly (acrylamide) [poly (AAm)] hydrogels by using poly (ethylene glycol) (PEG) with three different molecular weight as the pore-forming agent during the radiation induced polymerization reaction, n. The cross-sectional SEM micro pictures of the freeze dried traditional and PEG-modified hydrogels are exhibited in Fig.. (Note.5)

Scanning electron microscopy experiments, together with swelling ratio studies, reveal that the PEG-modified hydrogels are characterized by an open structure with more pores and higher swelling ratio, but lower mechanical strength, compared the conventional hydrogel (Tuncer et al., (2006). Figure. Shows the SEM

photos of the surface structure of the conventional and PEG modified hydrogels. (Note.6)

3.4 Fluorescence Monitoring of Polyacrylamide based Hydrogel

Among the various types of hydrogels polyacrylamide (PAAm) gel is most suitable for optical studies because it remains optically transparent for a wide range of concentrations of the monomer and the cross-linker. While in such a gel most of the molecules move freely and hence a fluorescent probe molecule experiences a solution-like environment, movement of a minute fraction of the probe molecules is markedly restricted (Dickson, et al., (1996). (Note.7)

Figure 13 depicts the absorption spectrum of 4-AP in 5% PAA gel. It is readily seen that the absorption spectrum is remarkably similar to that of 4-AP in water20 with the characteristic peaks at around 255, 302, and 362nm except for the slight blue shift by 8nmingel compared to water.

4. Properties of polyacrylamide based hydrogel

4.1 Swelling Properties

The most important property of hydrogels based on acrylamide is its ability to imbibe water while elasticity of stretched network opposes osmotic swelling. Swelling of hydrogel can be expressed in weight, volume and length units and weight fraction of water (Wf) in a hydrogel is given as:

$$Wf = \frac{\text{(Weight of wet hydrogel - Weight of dry hydrogel)}}{\text{Weight of Wethydrogel}}$$

$$Dsw = \frac{\text{(Weight of wet hydregel)}}{\text{(Weigt of dry hydrogel)}}$$

For practical purposes, volume swelling unit is swelling ratio (Rsw) defined as:

$$Rsw = \frac{Dsw \times do \times \text{Volume of wet hydrogel}}{dsw \qquad \text{Volume of wet hydrogel}}$$

Where d_0 and dsw are densities of dry gel and swollen gels, respectively. Eylem and Tuncer, (2007) synthesized poly(acrylamide-co-acrylic acid) [P(AAm-co-AAc)] hydrogels

by free-radical crosslinking copolymerization of acrylamide (AAm) monomer at fixed amount.

4.2 Mechanical Properties

Valles et al., (2003) investigated the equilibrium swelling and the plateau elastic modulus of a family of hydrogels made by the polymerization of acrylamide with itaconic acid or method. Lin et al., (2004) studied the mechanical properties of a polyacrylamide gel with reversible DNA crosslink's.

4.3 Rheological Properties

Shevchenko et al., (2003) studied the rheological properties of hydrogels of polyacrylamide-based polyelectrolytes.

Kundu et al., (2008) described a cavitation rheology technique to characterize the network mechanics of polyacrylamide hydrogel materials, a common material used in many biological applications

4.4 Equilibrium Properties

Equilibrium properties of polyacrylamide hydrogels are studied a function of volume change transition by water absorption or desorption. It was observed that under certain condition hydrogel undergo a discontinuous volume phase transition (Tanaka et al., (1981). Henmei and Haruma, (2007) studied the forming process and characteristics of monodispersed hydrogel microspheres of poly(acrylamide-methacrylic acid) with sharp pH-volume transition.

5. Application of polyacrylamide based hydrogel

5.1 Drug delivery

Controlled drug delivery is gaining importance over the conventional methods of drug administration because of its inherent benefits. Self-regulated release from the delivery vehicle may enhance drug potency with a sustained action. Makarand et al., (2000) describes a novel hydrogel blend of polyacrylamide with chitosan for controlled delivery of antibiotics. Anionic hydrogels are used in the design of intelligent controlled release devices for site-specific drug delivery of therapeutic proteins to the large intestine.(Satish et al., 2006) Rosangela et al., (2008) reported that the blends formed by electrochemical polymerization of polypyrrole (PPy) into

polyacrylamide (PAAm) hydrogels were used as devices for controlled drug release.

5.2 Heavy Metal Removal

Hydrogels of two important biopolymers (dextrin and starch) with different acrylamide monomers viz., acrylamide, N-isopropyl acrylamide and 2-acrylamido-2-methylpropanesulfonic acid and crosslinked with N,N-methylene bisacrylamide were used as sorbents for three transition metal ions. Effect of functionalization of hydrogels by partial hydrolysis with 0.5 M NaOH on metal ion uptake has also been studied, and it results in appreciable uptake of Cu2+ ions and Fe2+ ions but in total rejection of Cr6+ ions These results are of interest for the development of hydrogel-based technologies for water purification and metal ions separation and enrichment (Chauhanetal., (2006).

5.3 Medical Fields

A hydrogel for use as a prosthetic device for supplementing, augmenting or replacing cartilage in the intra-articular cavity of a joint and for treatment or prevention of arthritis. The hydrogel may be a polyacrylamide hydrogel obtained by combining acrylamide and methyl ene bis-acrylamide (Petersen, Jens. (2007).

Jens Petersen., (2007) described a bio-stable hydrogel for use in the treatment and prevention of incontinence and vesicouretal reflux.

6. CONCLUSION

Polyacrylamide based hydrogel are the most common hydrogel. Polyacrylamide hydrogel is an atoxic, stable, nonresorbable sterile waterygel consisting of approximately 2.5% cross-linked polyacrylamide and nonpyrogenic water.

From this review it is concluded. Among the various method used for synthesis of acrylamide based hydrogel the radiation method has advantages over others, especially with respect to a clean environment and higher production rate It is also concluded from this review that Hydrogels based on Polyacrylamide are widely used hydrogels which have variety of applications in drug delivery devices artificial muscles, seperation of chemical system, sensors, artificial corneas, eye capillary drains, plastic surgery an biomaterials.

Hydrogels based polyacrylamide played an important role in environmental management. Hydrogels based on polyacrylamide has widely used for removal of heavy metal ions from water system and protect the environment from harmful effect caused by heavy metal. Hydrogels based on polacrylamide have wide potential for used as superadsorbent, sanitary materials as specific sorbents separation and enrichment technologies. Graft copolymer of hydroxyethylcellulose and hydroxypropylcellulose with AAm have been reported as strong flocculants against effluents of tannery, electroplating, spinning mils and brewries. Graft copolymers of starch and cellulosics like carboxymethylcellulose with AAm are efficient flocculants and these combine both efficiency of AAm and shear stability of polyaccharides.

Finally it is concluded that hydrogels based on Polyacrylamide is very useful hydrogel which have variety of application in drug delivery, heavy metal removal, medical fields, agricultural fields and industrial fields.

РАЗДЕЛ V TEXTS FROM PERISCOPE - REVIEW

TEXT 1 THE MOST URGENT TASK FOR HUMANITY

International organised crime has become a $2 trillion behemoth that threatens to pervert democracy around the world and fuel already dangerous levels of global inequality, a new study warns. While the world is getting richer, the relentless rise of organised crime has emerged as one of the most potent threats to the planet's future, alongside global warming and the scarcity of drinkable water, according to the State of the Future survey by the World Federation of United Nations Associations.

The annual takings of criminal gangs around the world are roughly equivalent to Britain's GDP, or twice the world's combined defence budgets. Half of that amount is paid as bribes, which tend to make the rich and powerful even wealthier. The 225 richest people on the planet now earn the same as the poorest 2.7bn, equivalent to 40% of humankind, the report finds. And although democracy is on the rise, with nearly half the world's population now living in democratic systems, it is in danger of being demolished by a culture of bribery.

"The implications the world has to understand is that government decisions can be bought and sold," Jerome Glenn, head of the association's millennium project and one of the report's authors said. "What happens if organised crime decides that instead of buying and selling cocaine or heroin, it's going to buy and sell government decisions? That's a threat to democracy." Contrary to the stereotype of the banana republic, only a minority of the political bribes paid each year goes to public officials in the developing world. The report published this week finds "billions of dollars worth of bribes paid each year go in the pockets of public officials in rich countries" where decision taking is "vulnerable to vast amounts of money".

Much of the income, more than $520bn, that flows through the world's black economy comes from counterfeiting and piracy. The

drug trade is the second biggest earner, with an estimated $320bn in takings. Human trafficking is a small industry by comparison, worth under $44bn but arguably the most pernicious. According to the UN, up to 27 million people are now held in slavery, far more than at the peak of the African slave trade. The majority of the victims this time are Asian women. The report says: "Violence against women by men continues to cause more casualties than wars do today." One in five women around the world will be a victim of rape or attempted rape in her lifetime. The situation is so bad schools should teach girls martial arts for selfdefence, it says.

The survey, however, does find that for most people the world is becoming "a better place", and should continue to improve over the next decade, with generally rising incomes, life expectancy and access to health and education. The global economy grew by 5.4% in 2006, far outstripping population growth of just over 1%. "At this rate, world poverty will be cut by more than half between 2000 and 2015, meeting the UN millennium development goal for poverty reduction, except in sub-Saharan Africa," it predicts. According to the WHO, the world's average life expectancy is expected to increase, from 48 years for those born in 1955, to 73 years for those born in 2025.

And despite the continuing atrocities in Iraq, Afghanistan and Darfur, the world is overall becoming a more peaceful place, according to the report. In Africa the number of conflicts fell from 16 in 2002 to just five in 2005. By crunching all this data into an overall measure of wellbeing, the report's authors have derived an index for the future. It slopes reassuringly upwards over the next 10 years but the principal threats to this optimism appear to come from such effects as poverty levels, global warming, water shortages and organised crime. The last may be the most dangerous because of its capacity to subvert decision making and because there is little conceited international action to combat the threat.

"It is time for an international campaign by all sectors of society to develop a global consensus for action against transnational

organised crime which has grown to the point where it is increasingly interfering with the ability of governments to act," the report says.

It points out that the global estimate of 13 to 15 million children made orphans through Aids represents a gigantic pool of potential foot-soldiers for criminal gangs. "There is nothing stopping it," Mr. Glenn said. "There is no global strategy."

TEXT 2 THE WORLD'S RUBBISH DUMP

CNN NEWS, 12.04.08: A "plastic soup" of waste floating in the Pacific Ocean is growing at an alarming rate and now covers an area twice the size of the continental United States, scientists have said. The vast expanse of debris - in effect the world's largest rubbish dump - is held in place by swirling underwater currents. This drifting "soup" stretches from about 500 nautical miles off the Californian coast, across the northern Pacific, past Hawaii and almost as far as Japan. Charles Moore, an American oceanographer who discovered the "Great Pacific Garbage Patch" or "trash vortex", believes that about 100 million tons of flotsam are circulating in the region: "The original idea that people had was that it was an island of plastic garbage that you could almost walk on. It is not quite like that. It is almost like a plastic soup. It is endless. Marine detritus includes plastic bottles, golf balls, plates, knives, forks, toothbrushes, helmets, tubes, beach toys, syringes and fishing tackle."

Curtis Ebbesmeyer, an oceanographer and leading authority on flotsam, has tracked the build-up of plastics in the seas for more than 15 years and compares the trash vortex to a living entity: "It moves around like a big animal without a leash. When that animal comes close to land, as it does at the Hawaiian archipelago, the results are dramatic. The garbage patch comes up, and you get a beach covered with this confetti of plastic," he added.

The Mediterranean suffers more pollution from discarded plastics than any other sea, especially the north-west sector that washes up on holiday resorts in Spain, France and Italy, an ecological study has found. Around 6.5 million tons of rubbish lie

below the surface of the world's oceans. The highest concentration by far - including almost 2,000 pieces of plastic per square kilometre - is in the Mediterranean. A separate Spanish study also predicts global warming will bring hurricanes to the Mediterranean, whipping usually tranquil waters into cyclones. This means the garbage may not remain on the seabed for long. Most of the human rubbish in the seas consists of plastic containers and bags. These present a serious environmental problem if you bear in mind that their average life, before they disintegrate, is around 450 years. The non-biodegradable pieces of rubbish that wash on to the beaches of southern Europe form only 15 per cent of the total. "Most of it we never see, since 70 per cent sits on the sea bed. And another 15 per cent floats suspended in the water," said Mario Rodriguez, Greenpeace's campaigns director. "Our perception that the Mediterranean is clean is false. During the holiday season the beaches are cleaned constantly. But, if you stroll along a beach between September and May, you find plastic rubbish all over the place."

Greenpeace's report Plastics Debris in the World's Oceans, produced last year, compiles all current data on the matter. Yesterday was the first time they focused on the Mediterranean. "It's clear we are drowning in a sea of plastics," Mr Rodriguez said. The pollution is due to the sea being enclosed, surrounded by industrialised countries, and with high levels of tourism and commercial traffic. A recent study of the endangered loggerhead turtle off Spain's Mediterranean coast found that 75 per cent of them had swallowed plastic bags. Mr Rodriguez said: "We have to understand the sea is not a tip; it will constantly return to us what we throw in." Plastic debris compounds an already serious pollution situation in the Mediterranean.

TEXT 3 WHO WANTS TO LIVE FOR EVER ?

By tweaking our DNA, we could soon survive for hundreds of years - if we want to. Steve Connor reports on a breakthrough that has the science world divided. If this work could ever be translated into humans, it would mean that we might one day see people living for 800 years. But is this ever going to be a realistic possibility?

Valter Longo is one of the small but influential group of specialists in this area who believes that an 800-year life isn't just possible, it is inevitable. It was his work at the University of Southern California that led to the creation of a strain of yeast fungus that can live for 10 weeks or more, instead of dying at its usual maximum age of just one week. By deleting two genes within the yeast's genome and putting it on a calorie-restricted diet, Longo was able to extend tenfold the lifespan of the same common yeast cells used by bakers and brewers.

There is, of course, a huge difference between yeast cells and people, but that hasn't stopped Longo and his colleagues suggesting that the work is directly relevant to human ageing and longevity. "We're setting the foundation for reprogramming healthy life. If we can find out how the longevity mechanism works, it can be applied to every cell in every living organism," Longo says. "We're very, very far from making a person live to 800 years of age. I don't think it's going to be very complicated to get to 120 and remain healthy, but at a certain point I think it will be possible to get people to live to 800. I don't think there is an upper limit to the life of any organism." For most gerontologists - people who study the science of ageing - such statements are almost heretical. There is a general view in this field that there is a maximum human lifespan of not more than about 125 years. Jeanne Calment, the oldest documented person, died at the age of 122 years and 164 days. According to the orthodox view of ageing, she was one of the few lucky enough to have reached that maximum, upper limit of human lifespan.

The attitude of most mainstream gerontologists towards the idea that people may one day live for many centuries - or even 1,000

years, as one scientific maverick has suggested - is best summed up by Robin Holliday, a distinguished British gerontologist, in his recent book Aging: The Paradox of Life. "How is it possible to make these claims?" Holliday asks. "The first requirement is to ignore the huge literature on ageing research... The second is to ignore the enormous amount of information that has been obtained by the study of human age-associated disease; in other words, to ignore the many well-documented textbooks on human pathology. The third is to propose that in the future, stem-cell technology, and other technologies, will allow vulnerable parts of the body to be replaced and/or repaired. The new 'bionic' man will therefore escape from ageing," Holliday says.

Like many experts on the science of ageing, Holliday is deeply sceptical about the idea that the ageing process can somehow be circumvented, allowing people to extend their lives by decades or even centuries. "The whole anti-ageing movement not only becomes science fiction; it is also breathtakingly arrogant," Holliday says. An immense hinterland of biomedicine suggests that death at a maximum age of about 125 is inevitable, he says. But that is precisely what Valter Longo is suggesting with his work on the yeast that can live longer than 10 weeks. "We got a tenfold life-span extension, which is, I think, the longest that has ever been achieved in any organism," he says. By knocking out two genes, known as RAS2 and SCH9, which promote ageing in yeast and cancer in humans, and putting the microbes on a diet low in calories, Longo achieved the sort of life extension that should in theory be impossible. As Anna McCormick, head of genetics and cell biology at the US National Institute on Aging, remarked: "I would say tenfold is pretty significant." Calorie restriction is now a well-established route to extending the lives of many organisms, from yeast and nematode worms to fruit flies and mice.

Why one species of animal lives longer than another of comparable size, and why some animals appear to age faster and die younger, have been the subject of extensive scrutiny for decades. As bats and mice show, it is possible for genes to extend lifespan - so the

question is: why do they not do it more often, or even all the time? And the logical extension of this question is: why do we age at all? Why don't we live for ever? Longo says that the disposable soma theory, invented by Professor Tom Kirkwood of Newcastle University in the late 1970s, is one of the strongest ideas around to explain the nature of ageing. However, Longo has another theory that is causing a second group of scientists to tear their hair out. He believes that ageing may not simply be a side-effect of the wear and tear of life, but is also a genetically programmed condition designed to rid the population of aged individuals to make way for younger ones.

It is an alluring idea, albeit one thought to have been discredited by the evolutionary biologists George Williams and John Maynard Smith 40 years ago. It is a common assumption among non-scientists that ageing and death occur in order to make way for the next generation, but this suggests that ageing is a genetic programme honed by natural selection. It also assumes that it is an altruistic act brought about for the benefit of the future population. But Longo is convinced that his experiments on manipulating the genes of yeast show that ageing is not a mere side-effect of life, but a deliberate, genetically programmed process honed by natural selection. "Basically, it is the first demonstration to our knowledge, that ageing is programmed and altruistic," Longo says. "The organisms we have studied die long before they have to in order to provide nutrients for 'mutants' generated within their own population. Thus, billions of organisms die early so that a few better-adapted individuals can grow."

This raises the possibility that the same process happens in humans, and that, as a result, many people are dying earlier than they need to. "Programmed human ageing is just a possibility. We don't know whether it's true yet or not. But if ageing is programmed in yeast, and the metabolic pathway is very similar, then isn't it possible that humans also die earlier than they have to?" Valter Longo says that no one has so far proved him to be wrong on his programmed-death idea. But this may be one heresy too far for the rest of science.

TEXT 4 CATWALK STARS FACE RANDOM DRUG TESTS

THE SUNDAY TIMES, 20.01.08: Models face random drug tests before they are allowed on the catwalk in a crackdown on abuse in the British fashion industry. Those who fail could face fines and bans from shows. Girls under 16 will also be prevented from taking part in the twice-yearly London Fashion Week, the latest of which starts this weekend. Model agencies may have to prove that they are arranging medical checks, including screening for eating disorders, before being granted a license. These are among the recommendations of a six-month inquiry for the British Fashion Council into the health and safety of the industry. It was set up following the death of three "size zero" models in South America. All had eating disorders and were so thin that they had a body mass index (BMI) below 14.5, which the World Health Organization (WHO) rates as beyond starvation. One had survived for the last three months of her life on lettuce leaves and Diet Coke.

The debate over size zero models — equivalent to size four in Britain — has led to seriously underweight models being banned from catwalks in Madrid and girls in Milan being asked to carry a health certificate. There will be no recommendation for an outright ban on girls with a low BMI in the report to be unveiled on Friday. It has been written by Baroness Kingsmill and her panel, which includes Erin O'Connor, the model, and Giles Deacon and Betty Jackson, the designers.

The inquiry team believes boxing-type weigh-ins for models would be demeaning. Instead it wants a mentoring scheme under which older models would look after new recruits. It also proposes setting up workshops where designers and agents can identify and advise models with eating disorders. Another plan is for a union or trade association to help to protect models from being exploited by agents or harassed by fashion photographers. There are also fears that a ban on under-16s would hamper the discovery of stars. The supermodels Kate Moss and Naomi Campbell were spotted by scouts

before they were 16. Georgia Frost, who was 17 in July, was first approached when she was 13 and again when a scout saw her at the Qothes Show Live exhibition at the age of 15. Photographs of Moss allegedly taking cocaine with Pete Doherty, her on-off pop star boyfriend, have crystallized fears about the use of drugs in the fashion industry. An inquiry insider said: "There is no reason random drug tests wouldn't work. But... we are suggesting it to help the girls, not to be a heavy-handed police officer."

TEXT 5 DEBATES IF SHAKESPEARE'S WORK IS GENUINE OR NOT

Some of Britain's most distinguished Shakespearean actors have reopened the debate over whether William Shakespeare, a 16th century commoner raised in an illiterate household in Stratford-upon-Avon, wrote the plays that bear his name.

Acclaimed actor Derek Jacobi and Mark Rylance, the former artistic director of Shakespeare's Globe Theater in London, unveiled a "Declaration of Reasonable Doubt" on the authorship of Shakespeare's work on Saturday after the final matinee of "I am Shakespeare," a play investigating the bard's identity, in Chichester, southern England. A small academic industry has developed around the effort to prove that Shakespeare, a provincial lad, could not have written the much-loved plays, with their expertise on law, ancient and modern history and mathematics. The "real" author has been identified by various writers in the past as Christopher Marlowe, Fracis Bacon, or the Earl of Oxford, Edward de Vere. "I subscribe to the group theory. I don't think anybody could do it on their own," Jacobi said. "I think the leading light was probably de Vere, as I agree that an author writes about his own experiences, his own life and personalities."

The declaration put forward by the Shakespeare Authorship Coalition aims to provoke new research into who was responsible for the plays, sonnets and poems attributed to the bard. Jacobi and Rylance presented a copy of the document to William Leahy, head of

English at Brunei University in west London and head of the first graduate program in Shakespeare Authorship Studies, which begins this month. The document says there are no records that any William Shakespeare received payment or secured patronage for writing. And it adds that although documents exist for Shakespeare, all are nonliterary. It also points to his detailed will, in which Shakespeare famously left his wife "my second best bed with the furniture," as containing no clearly Shakespearean turn of phrase and mentioning no books, plays or poems.

The declaration names 20 prominent doubters of the past, including Mark Twain, Orson Welles and Charlie Chaplin. It argues there are few connections between Shakespeare's life and his alleged works, but they do show a strong familiarity with the lives of the upper classes and a confident grasp of obscure details from places like Italy.

Shakespeare's reputation as dramatist and poet actor is unique and he is considered by many to be the greatest playwright of all time, although many of the facts of his life remain mysterious. William Shakespeare was born in Stratford-upon-Avon in Warwickshire and was baptised on 26 April 1564. His father was a glovemaker and wool merchant and his mother, Mary Arden, the daughter of a well-to-do local landowner. Shakespeare was probably educated in Stratford's grammar school. The next documented event in Shakespeare's life is his marriage in 1582 to Anne Hathaway, daughter of a farmer. The couple had a daughter the following year and twins in 1585. There is now another gap, referred to by some scholars as 'the lost years', with Shakespeare only reappearing in London in 1592, when he was already working in the theatre. Shakespeare's acting career was spent with the Lord Chamberlain's Company, which was renamed the King's Company in 1603 when James succeeded to the throne. Among the actors in the group was the famous Richard Burbage. The partnership acquired interests in two theatres in the Southwark area of London, near the banks of the Thames - the Globe and the Blackfriars.

Shakespeare's poetry was published before his plays, with two poems appearing in 1593 and 1594, dedicated to his patron Henry Wriothesley, Earl of Southampton. Most of Shakespeare's sonnets were probably written at this time as well. Records of Shakespeare's plays begin to appear in 1594, and he produced roughly two a year until around 1611. His earliest plays include 'Henry VI' and 'Titus Andronicus'. 'A Midsummer Night's Dream', 'The Merchant of Venice' and 'Richard II' all date from the mid to late 1590s. Some of his most famous tragedies were written in the early 1600s including 'Hamlet', 'Othello', 'King Lear' and 'Macbeth'. His late plays, often known as the Romances, date from 1608 onwards and include 'The Tempest'. Shakespeare spent the last five years of his life in Stratford, by now a wealthy man. He died on 23 April 1616 and was buried in Holy Trinity Church in Stratford. The first collected edition of his works was published in 1623 and is known as 'the First Folio'.

РАЗДЕЛ VI ПРИЛОЖЕНИЕ. READING NUMERALS AND FORMULAS

PECULIARITIES IN USE AND READING NUMERALS

There are some peculiarities of reading English numerals in comparison with Russian: while reading and spelling cardinal and ordinal numerals pay attention to the underlined numers:

Количественное числительное	Порядковое числительное			
one один	the first первый	first сначала		
two два	the second второй	secondly во-вторых	twice дважды	the twentieth двадцатый
three три	the third третий	thirdly в-третьих	thrice трижды	the thirtieth тридцатый
four четыре	the fourth четвертый	fourteen четырна-дцать	forty сорок	the fortieth сороковой
five пять	the fifth пятый	fifteen пятнадцать	fifty пятьдесят	the fiftieth пятидесятый
six шесть	the sixth шестой	sixteen шестнадцатый	sixty шестьдесят	the sixtieth шестидесятый
seven семь	the seventh седьмой	seventeen семнадцать	seventy семьдесят	the seventieth семидесятый

eight восемь	the eighth восьмой	eighteen восемнадцать	eighty восемьдесят	the eightieth восьми- десятый
nine девять	the ninth девятый	nineteen девятнадцать	ninety девяносто	the ninetieth девяностый
ten десять	the tenth десятый			

Hundreds with other numerals are read with and.
155 – a (one) hundred and fifty five.
203 – two hundred and three.
1,451 – a (one) thousand four hundred and fifty one.
2,050,180 – two million fifty thousand one hundred and eighty.
15,500,250 – fifteen million five hundred thousand two hundred and fifty.

You have noticed that every three numbers from right to left are separated by a comma (,). (In Russian comma is not used in this case, it is used in decimal fractions).
In scientific and technical texts the authors prefer writing large numbers not with commas, but leaving a space after every three figures beginning from the end: 21 000 254; 3 560 021.

Since commas are used to separate thousands in figures do not put figures next to each other – it may be taken as part of the same number: "The hall can hold 700,150 of whom have to sit on folding chairs". Rephrase as: "The hall can hold 700, of whom 150…".
In greater numbers[1] there does not exist strict quantitative unification concerning different countries. So, dealing with this or that greater number it is to be kept in mind that:

[1] 1 The data are taken from English-Russian Polytechnical Dictionary. – V., 1971; Orlov V.B. et al. Russian-English-German-French Dictionary. – M., 1987.

Numbers	the USA	Great Britain	English units	Russian units
billon	10^9	10^{12}	milliard	миллиард
trillion	10^{12}	10^{18}	quintillion	триллион
quadrillion	10^{15}	10^{24}	septillion	квадриллион
quintillion	10^{18}	10^{30}	nonillion	квинтиллион
sextillion	10^{21}	10^{21}	sextillion	секстиллион
octillion	10^{27}	10^{27}	octillion	октиллион
nonillion	10^{30}	-	-	ниллион

NUMBERS IN FIGURES OR WORDS

In scientific, technical, statistical material numbers are written as figures. In other types of texts the general rule is to write small numbers as words and large numbers as figures: Seven students were present. During the earthquake 4 653 people perished. Do not mix figures and words in one phrase: “from 10 to 30” but not: “from ten to 30”.

If large numbers are used at the beginning of the sentence they are written as words: “Four hundred animals died in the flood last year”. In case the number is long it must be used in the end of the sentence: “The floods killed 400 animals”.

The word number is translated as несколько, некоторые if it is used with the indefinite article and the verb after it is in the plural form: “There are (not is) a number of reasons against this project”. “A number of them prefer tea”.

The word number is translated as количество when it is used with the definite article and takes a singular verb: “The number of books increases every year”. “The number of boxes is not very great”.

Notes:

a half dozen or half a dozen – полдюжины

12 –a (one) dozen – одна дюжина

24 – two dozen (not two dozens) – две дюжины

20 – a (one) score – два десятка, двадцать

70 – three score years and ten – 70 лет

ENGLISH SIGNS AND SYMBOLS

Signs and symbols in Mathematics are international in majority, but there are some signs peculiar to the English language of mathematics, physics and technology which should be learnt:

+, / - the signs of division corresponding to the Russian signs /, - , :, ∟ __, :

•, - the signs of multiplication.

The sign (x) can also have the meaning "from … to", "up to" (от и до) – 1 x 1.1; 1.2 is read – from one to one point one, one point two (от одной до 1.1; 1,2); ½ x ¼ inch – from one half up to one fourth inch (от ½ до ¼ дюйма). Sometimes this sign (x) is substituted by the sign @

. (point) - the sign is used in decimal fractions and corre-sponds to the Russian sign , - comma.

2.2 is read two point two (2,2 – две целых две десятых). The sign is used in writing dates, hours and minutes (see above). In this case . (point) is not pronounced

, (comma) - is used to denote the position of every three numbers: 15,000,000 – fifteen million; 1,000 books – a thousand books

: - the sign of ratio and proportion. In this case it is read: "is to". A : B = C : D A is to B as C is to D

:: - the sign denotes the equality of two ratios (proportions) and can be substituted by the sign of equality = 2 : 4 :: 3 : 6 – two is to four equals (as) three is to six

* - a star, an asterisk

∴ - the sign means "therefore" – следовательно, поэтому, отсюда

! - this sign in mathematics means "factorial" 5! Or five factorial

- the sign means: to vary proportionally

+ - the sign of addition – plus
- - the sign of subtraction – minus or negative
± - plus or minus – плюс-минус
- minus or plus – минус-плюс
= - the sign of equality, it is read: is, is equal to…, equals, makes - равно
≠ - is read: is not equal to…, is not – не равно
– - a dash – тире
/ - a slash – наклонная черта
≈, - the signs means: approximately equals, is approximately equal to… - приблизительно, почти равен…
> - is greater than, includes – более чем, больше; включает
≤ - is not greater than… - не более чем
< - is less than, is included – менее чем, меньше; включено
≥ - is not less than … - не менее чем
≥ - is equal to… or greater than … - равно или бо-лее
≤ - is equal to … or less than … - равно или менее
- the sign denotes infinity – бесконечность
→ - the signs mean: approaches, tends to – достигает, стремится к…
|| - it means parallel to – параллельно к
Δ - triangle – треугольник
ϵ - element of (a set) – элемент (множества)
Ø - is an empty set – пустое множество
⋂ - intersection – пересечение
⋃ - union – соединение
⊆ - subset of – подмножество (чего-то)
⇒- implies; see – подразумевается, предпо-лагается; смотри, см.
B - pi [paI] – B – окружность
r - [Rr] – radius of circle – радиус круга
Br^2 - pi r squared – Br2 – формула площади круга
ϵ - belongs to – принадлежит к

∉ - doesn't belong to – не принадлежит к

⊃ - is contained – содержится;

(a ⊃ b) a is contained in b

⊄ - doesn't contain – не содержит (a ⊄b)

a is not contained in b

∧ - the intersection - пересечение; ( ) – the intersection of A and A prime)

∨- the union (the union of A and A prime) – связь, союз

⊥ - perpendicular to – перпендикулярно к

' - the sign denotes:

1) minutes - минуты ;

2) foot, feet – фут, футы;

3) with numerals expressed by letters a'-prime ['eI 'praIm] - прим

" - the sign denotes:

1) second(s) – секунды(ы);

2) inches – дюймы;

3) double prime – два прим, два штриха

''' - third prime, triple-prime – три штриха

a''' - a third prime or a triple prime – а три штриха

∫ - the sign of integral of – знак: интеграл от

≅ - конгруэнтный

AB - length of line from A to B – длина линии AB

< > - broken brackets – скобки угловые

( ) - parentheses, round brackets (opening and closing) – круглые скобки

[ ] - brackets, square brackets – квадратные скобки

{ } - braces – фигурные скобки

/ / - slash brackets – наклонные скобки

° - degree(s), grade(s) – градус(ы)

0 - null, nought, zero, o [ou] – нуль, ноль, часто читается как алфавитная буква O [ou]

% - per cent – процент

Σ - the sum, summation of – сумма, знак суммирования
√, ∛ - is called the sign of the root or the radical sign. It is read: square root, cube root – корень квадратный, кубический
Ø - diameter – диаметр
", & - and – и
& c - etc (et cetera) – и т.д.; и проч.
O - circle, circumference – круг, окружность
dy - differential of y – дифференциал от y
$\frac{dy}{dx}$ - derivative of y with respect to x – обычная производная y по x
$\frac{\partial y}{\partial x}$ - partial derivative of y with respect to x – частная производная y по x
|x| - absolute value of (x) – абсолютная величина x
F(x), f(x) - function of x – функция от x
Єx - increment of x – приращение x
t° - temperature – температура
⊄ - centre line – центральная линия, линия центров
μ - micron – микрон = 0,001 mm (10-3 мм)
mμ - millimicron – миллимикрон = 0,001 μ (10-7 мм)
~ - similar to – подобный
- equivalent to – эквивалентно (чему-то)
∠ - angle – угол
∟ - right angle – прямой угол
k, c - constant – константа
- varies (directly, inversely) – изменяется прямо,
∝ - пропорционально
a1 - a sub one, a first – a первое
an - a sub n, a n-th – a n-oe – (a-энное)
… - and so on – и так далее
O - round – круглый
□- square – квадрат

$\bar{a}$ “barred” – a с черточкой
$\tilde{a}$ tilted – a с тильдой

a* - a star, asterisk – a со звездочкой
@ - about – около: @ $75.00. & up – около 75 долларов и выше

OPERATIONS IN MATHEMATICS

Addition (Сложение)

a + b + c is read:

a plus b equals c;
a and b is equal to c;
a added to b makes c;
a plus b is c.

a, b are called “addends” or “summands” (слагаемые);
c is the “sum”.

Subtraction (Вычитание)

4 – 3 = 1 is read:
three from four is one;
four minus three is one;
four minus three is equal to one;
four minus three makes one;
the difference between four and three is one;
three from four leave(s) one.
4 is called “a minuend” (уменьшаемое);
3 is “a subtrahend” (вычитаемое);
1 is “a difference” (разность).

Multiplication (Умножение)

2 x 3 = 6; 2 · 3 = 6 is read:

two multiplied by three is six;
twice three is six;
three times two is six;
two times three make(s) six.
5 · 3 = 15 is read:
five threes is (are) fifteen.

2, 5 are “multiplicands” (множимое);
3 is “a multiplier” or “factor” (множитель);
6, 15 are “products” (результат).

Division (Деление)

35 ÷ 5 - 7 is read:

thirty five divided by five is 7;

five into thirty five goes seven times;

35 divided by 5 equals 7.

35 is “a dividend” (делимое);

5 is “a divisor (делитель);

7 is “a quotient” (частное).

Involution or Raise to power (Возведение в степень)

3^2 is read:

three to the second power;

3 squared.

5^3 is read:

five cubed;

5 to the third power;

5 to power three.

x^2 – x is called the “base of the power”;

2 is called “an exponent or index of the power”.

Evolution (Извлечение из корня)

$\sqrt{9} = 3$ is read:

the square root of nine is three.

$\sqrt[3]{27} = 3$ is read:

the cube root of twenty seven is three.

$\sqrt{\ }$ is called “the radical sign” or “the sign of the root”.

To extract the root of … - извлекать корень из…

FRACTIONS (ДРОБИ)

Common Fractions (Простые дроби)

Common (simple, vulgar) fractions nowadays more often than not are written on one line: 1/2, 3/5, 4/7, 1/3 in printing. But there are printed works where traditional writing is used:

$\frac{5}{7}, \frac{4}{8}, 3\frac{5}{8}$ etc.

Common fractions are read in the same way as we, Russians do, i.e.: the numerator is read as a cardinal number and the denominator as an ordinal number. If the numerator is greater than one the nominator takes the plural ending –s:

1/9 - a ninth, one ninth
3/7 – three sevenths
5/8 – five eighths,
- two one hundred and twenty-thirds
- three quarters, three fourths
- thirty-four seventy-eighths
- two-thirds, etc.

In mixed numbers the integer is read as a cardinal number and fraction must be added with "and". E.g.:

3 2/5 – three and two fifths
10 2/7 – ten and two sevenths
5 1/2 - five and a half
7 1/3 - seven and a third
247 86/93 - two hundred and forty-seven and eighty-six ninety-thirds
347/1000 - three hundred and forty-seven thousandths

The reading of small fractions is often simplified:

1/2 - a half, one half
1/3 - a third, one third
1/4 - a quarter, one quarter, a fourth, one fourth
instead of : one the second, one the third, one the fourth.

Decimal Fractions

In decimal fractions the ;point (.) is used after the whole number in distinction from Russian, where comma (,) is used and where this sign is not read. But in Russian we must always say – десятых, сотых, тысячных и т.д., in English it is suffice to write (.) and to say "point". After the point (.) all numbers are read separately. Nought,

O may often be omitted but the point (.) is never omitted because it shows that the number is a decimal fraction. In the USA "O" is preferred to be read as "zero".

The point may be written in the upper, middle or down part of the decimal fraction: 2.5; 2·5; 2˙5.

0.5 1) o [ou] point five
2) nought point five
3) zero point five

.5 point five

0.05 1) o [ou] point o [ou] five
2) nought point nought five
3) zero point zero five

.05 1) point o [ou] five
2) point nought five
3) point zero five

0.005 1) o [ou] point o [ou] o [ou] five
2) o [ou] point two oes [ouz] five
3) nought point nought nought five
4) zero point two zeros five
5) point 00 five
6) point nought nought five
7) point two noughts five
8) point two Oes five

.005 1) point nought nought five
2) point zero zero five
3) point two oes [ouz] five

0.75 1) nought (o [ou], zero) seventy-five (seven five)
2) point seventy-five (seven five)

1.3 one point three

4.7 four point seven

10.35 ten point three five

247.864 two hundred and forty-seven point eight hundred and sixty-four

Ratio (Отношение)

a : b is read:

the ratio of a to b;

10 : 5 is read:

the ratio of ten to five

4 : 2 = 2 is read:

the ratio of four to two is two

is read:

the ratio of twenty to five equals the ratio of sixteen to twenty four; twenty is to five as sixteen is to four.

Proportion (Пропорция)

In proportion we have two equal ratios. The equality is ex-pressed by the sign :: which may be substituted by the international sign of equality =.

a : b :: c : d or a : b = c : d is read

a is to b as c is to d

2 : 3 :: 4 : 6 or 2 : 3 = 4 : 6 is read

two is to three as four is to six.

The extreme terms of proportion are called “extremes”, the mean terms are called “means”. The proportion can vary directly (изменяться прямо пропорционально) and it can vary inversely (изменяться обратно пропорционально):

x y : x varies directly as y; x is directly proportional to y;

x = k/y : x varies inversely as y; x is inversely proportional to y.

Equations and Identities (Уравнения и тождества)

There are different kinds of equations. In general the equation is an equality with one or several unknown variable(s). The reading of equations is the same as in Russian:

$30 + 15 + x^2 + x^3 = 90$ is read:

thirty plus fifteen plus x squared plus x cubed is equal to ninety.

$2 + b + + b^4 = 160$ is read:

two plus b plus the square root of six plus b to the fourth power is equal one hundred and sixty.

The identity is an equality, valid at all admissible values of its variables.

The identities are read:

$a + b = b + a$ - a plus b equals b plus a:
$\sin^2 x + \cos^2 x = 1$ - sine squared x plus cosine squared x is equal to one.

Arithmetical and Geometrical Progressions

Арифметическая и геометрическая прогрессии

An arithmetical progression is a sequence much as 3, 5, 7, 9 … in which each member differs from the one in front of it by the same amount.

A geometrical progression is a sequence such as 3, 6, 12, 24 … in which each member differs from the one in the same ratio. "The number of families holidaying abroad grew now in geometrical progression".

Mathematicians more often use now the expressions arithmetic sequence and geometric sequence.

READING FORMULAS

(Чтение формул)

$a \div b = c$ a divided by b is equal to c

$2 \times 2 = 4$ twice two is four

$c \times d = b$ c multiplied by d equals b

dx differential of x

$=$ a plus b over a minus b is equal to c plus d over c minus b

$ya-b \cdot xb-c = 0$ y sub a minus b multiplied by x sub b minus c is equal to zero

$+ [1 + b(s)] y = 0$ the second derivative of y with respect to s plus y times open bracket one plus b of s in parentheses, close bracket is equal to zero

$\int f(x)dx$ the integral of f(x) with respect to x the definite integral of f(x) with respect to x from a to b (between limits a and b)

$c(s) = K_{ab}$ c of s is equal to K sub ab

$xa-b = c$ x sub a minus b is equal to c

$a \; b$ a varies directly as b

$a : b :: c : d;$ a is to b as (equals) c is to d

$a : b = c : d$

x 6 + 42
1) x times six is forty two;
2) x multiplied by six is forty two

$10 \div 2 = 5$ 1) ten divided by two is equal to five;
2) ten over two is five

a squared over c equals b
1) a raised to the fifth power is c;
2) a to the fifth degree is equal to c

$a^3 = \log_c b$ a cubed is equal to the logarithm of b to the base c
the logarithm of b to the base a is equal to c
x sub a minus b is equal to c

$= 0$ the second partial derivative of u w with respect to t equals zero

$c : d = e : 1$ c is to d as e is to 1

$15 : 3 = 45 : 9$ 1) fifteen is to three as forty five is to nine;
2) the ratio of fifteen to three is equal to the ratio of forty five to nine

$\sum_{i=0}^{n-1} f(xi)\Delta X$

p T p is approximately equal to the sum of x sub i delta x sub i and it changes from zero to n minus one

$\left|\sqrt{a^2} + b^2 - \sqrt{a^2} + b_1{}^2\right| \# |b - b_1|$ the square root of a squared plus b squared minus the square root of a squared plus b sub one squared by absolute value is less or equal to b minus b sub one by absolute value (by modulus) a to the power z sub n is less or equal to the limit

$a^{Z_n} \#_{n\to\infty}^{\lim a^{Z_n}}$ a to the power z sub n where n tends (approaches) the infinity the sum of n terms a sub j, where j runs from l to n

$\sqrt[4]{81} = 3$ the fourth root of 81 is equal to three

c $\propto$ d c varies directly as d
sin = a sine angle is equal to a
$\int \frac{dx}{\sqrt{a^2 - x^2}}$ integral of dx divided by (over) the square root out of a square minus x square
$\frac{d}{dx} \int_{x_{0-}}^{x} x_{dx}$ d over dx of the integral from x sub 0 to x of capital x_{dx}

2 : 5 1) two is to five;
2) the ratio of two to five
5:4::20:16 1) five is to four as twenty is to sixteen;
2) the ratio of five to four equals the ratio of twenty to sixteen;
3) five has the same ratio to four as twenty has to sixteen
a b 1) a is not equal to b;
2) a differs from b;
3) a is different from b
1) a approximately equals b;
2) a is approximately equal to b
p plus (or) minus q
m > n m is greater than n
m < n m is less than n
1) a is greater than or equal to b;
2) a is greater than or equals to b
1) a is less than or equals to b;
2) a is less than or is equal to b
$y \rightarrow r$ y approaches r
y r y approaches r
Note: Some authors use the notation .
The symbol signifies an approach to a limit. Thus
may be read “x approaches 2” (as a

limit). If the words “as a limit” are not expressed, they must be always understood.

$\frac{3^2}{n^{th}} \geq 500$ two times thee to the n-th (power) minus 2 is not less than five hundred

Note: Just the symbol means “not equal to”, so the symbol means “not less than”.

B = ∞ capital B is equal to infinity

1) the modulus of a;
2) the absolute value of a;
3) the numerical value of a

the modulus of the quantity x minus b is greater than zero and less than or equal to capital C

the interval a to b

28^o 28 degrees (angular measure and temperature measure)

56' 1) 56 minutes (angular measure);
2) 56 feet (linear measure)

45" 1) 45 seconds (angular measure);
2) 45 inches (linear measure)

$\sqrt{7}$ the square root (out) of 7

5% 5 per cent

2/9 % 1) two ninths per cent;
2) two ninths of one per cent

½ % 1) a half per cent;
2) a half of one per cent

0.47% 1) point four seven per cent;
2) zero point forty-seven per cent;
3) nought point forty-seven per cent;
4) o point four seven of one per cent

7 %0 7%0 seven per mille

c is equal to (dash, line of division) a

over (divided by, by) b
Note: The words dash and line of division
are often omitted.

C (a+b) 1) c parenthesis a plus b close parenthesis;
2) c round brackets opened a plus b round brackets closed;
3) c times (multiplied by) the quantity a plus b

3[(4+5)6-20] 1) three, square brackets, parenthesis, four plus five, close parenthesis, times (multiplied by) six minus twenty, close square brackets
2) three, square and round brackets opened, four plus five, round brackets closed, six, minus twenty, square brackets closed;
3) three times (multiplied by) the whole quantity: the quantity four plus five, times six, minus twenty

2{70-3[(4+5)6-20]} 1) two, braces, seventy minus… close braces
2) two, braces opened, seventy minus … braces closed

ABC $\cong$ EDF the triangle ABC is congruent to the triangle EDF

BD AC BD is perpendicular to AC

AB is parallel to CD

the angle A is equal to the angle B

3! = 1 x 2 x 3 = 6 factorial three is equal to one times two times three is equal to six

${}_nC_2, {}_nC_3, {}_nC_4$ the fourth binomial coefficient the number of combinations of seven things taken two at a time is equal to seven times six over factorial two is equal to twenty-one

${}_7C_2 = \frac{7 \cdot 6}{2} = 21$ the number of combinations of seven things taken two at a time is equal to seven times six over factorial two is equal to twenty-one

${}_7P_5$ the number of permutations of seven things taken five at a time

$\frac{dy}{dx}$ 1) the derivative of y with respect to x;
2) d over (by) dx of y

$\frac{d}{dx}(2x^2+5)$ the derivative of the quantity two x square plus five with respect to x

1) second derivative of y with respect to x;
2) d two over (by) dx of y

d over (by) dx of the integral from a to b of f of x dx

x is equal to the logarithm of capital N to the base q

arc sin a

1) the angle whose sine is a;
2) the inverse sine of a;
3) the anti-sine of a;
4) the arc sine of a

Note: The symbol arc sin a is sometimes written sin-1a.

sin (arc sin a) the sine of the angle whose sine is a

sin 23º the sine of 23º

cos 47º the cosine of 47º

sec 80º the secant of 80º

the tangent of a (one) half (of) A

sin α the sine of (the angle) α

the cosine of the angle of one half A minus B (the difference of A and B)

sin(α-β) the sine of (the angle) α minus β

cot(α+β) the cotangent of (the angle) alpha plus β

sin ABC the sine of the angle ABC

cos ABC the cosine of the angle ABC

tan β the tangent of (the angle) β

Exponents

a^2 1) a square;
2) a squared;
3) a to the second;
4) a to the second power;
5) a raised to the second power;
6) the square of x;
7) the second power of x

b^3 1) b cube;
2) b cubed;
3) b to the third;
4) b to the third power;
5) b raised to the third power;
6) the cube of b;
7) the third power of b

c^6 c to the sixth

Note: The variants given below are possible with all the expo-nents.

d^y 1) d to the y-th;
2) d to the y-th power;
3) d raised to the y-th power;
4) the y-th power of d

m^{-1} m to the minus first

n^{-7} n to the minus seventh

c^m c to the m-th

2^{π} two to the pi-th

x^{-q} x to the minus q-th

c^{m-n} c to the power m minus n

$z^{\frac{m}{n}}$ 1) z to the power m over (divided by, by) n;
2) z to the m by n-th power;
3) z to by (power)

$k^{\frac{m}{n-q}}$ k to the power m over n minus q

$-B^{n-1}$ minus capital B to the n minus one

$(5-\frac{a}{b})^4$ 1) the quantity five minus a over b to the fourth…;
2) parenthesis five minus a over b close parenthesis to the fourth;

3) round brackets opened, five minus a over b round brackets closed to the fourth

EXAMPLES OF READING FORMULAS

Algebraic Formulas

$(a+b)^2 = a^2 + 2ab + b^2$

The square of the sum of two numbers (a binomial) is equal to the square of the first term, plus twice the product of the first and last terms, plus the square of the last term.

$(a-b)^2 = a^2 - 2ab + b^2$

The square of the difference of two numbers (of a binomial) is equal to the square of the first term, minus twice the product of the first and last terms, plus the square of the last term.

$(a+b)(a-b) = a^2 - b^2$

The product of the sum and difference of two numbers is equal to the difference of the squares of the numbers.

$(x+m)(x+n) = x^2 + (m+n)x + mn$

The product of two binomials having a common term is equal to the product of the first two terms, plus the sum of the last terms multiplied by the common term, plus the product of the last terms.

$(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$

The square of the sum of three numbers (a trinomial) is equal to the sum of the squares of each term of the trinomial and twice the product of each term by each of the other terms.

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

The sum of two cubes is factored into the sum of the cube roots and the incomplete square of the difference.

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

The difference of two cubes is factored into the difference of the cube roots and the incomplete square of the sum.

$\frac{dy}{dx} = \lim \frac{\Delta y}{\Delta x}$ $\Delta x \to 0$ The derivative of a function is the limit of the ratio of the increment of the function to the increment of the

independent variable, when the latter varies and approaches zero as a limit.

SOME GEOMETRICAL FORMULAS

Notation Used in Formulas

A	area
a	apothem
a, b, c	sides of a triangle
b and b'	bases or areas of bases
C	circumference
d	diameter
h	height, altitude
l	length
w	width
p	perimeter
r	radius
s	slant height
s	π half the perimeter of a triangle = $\frac{1}{2}(a+b+c)$
π	3.1416
V	volume

Formulas for lines

Right triangle $a^2 + b^2 + c^2$

The square of the hypotenuse of a right triangle is equal to the sum of the squares of the other two sides

The square on the hypotenuse of a right triangle is equal to the sum of the squares on the other two sides (the Pythagorean theorem).

Circle

The circumference of a circle is equal to times the diameter.

Triangle

The altitude drawn to one side of a triangle is equal to the product of either one of the two other sides and the sine of the angle adjacent to it.

Areas

Square

$$A = b^2$$

The area of a square equals the length of the side of the square multiplied by itself, that is, the side squared.

Rectangle $A = bh$

The area of a rectangle is equal to the product of its base and altitude.

Parallelogram $A = bH$

The area of a parallelogram is equal to the product of the base and altitude.

$$A = ab \sin A$$

The area of a parallelogram is equal to the product of the two sides and the sine of the included angle.

Triangle

$$A = \frac{1}{2}bh$$

The area of a triangle is equal to one-half the product of the base and altitude.

$$A = \frac{1}{2}ab\sin C$$

The area of a triangle is equal to one-half the product of two sides and the sine of the included acute angle.

Circle

$$A = \frac{1}{2}Cr = \pi r^2$$

The area of a circle is equal to one-half the product of the circumference and the radius.

The area of a circle is equal to times the square of the radius.

Trapezoid

$$A = \frac{1}{2}h(b + b')$$

The area of a trapezoid is equal to one-half the sum of the parallel bases times the altitude.

Zone $A = 2\pi rh$

The area of a zone is equal to its altitude multiplied by the circumference of a great circle.

$$A = \frac{1}{2}sC$$

Lateral area of a cone

The lateral area of a right cone is equal to one-half the product of the circumference of the base and the slant height.

$$A = \frac{1}{2}ps$$

Lateral area of a pyramid

The lateral surface of a right pyramid is equal to one-half the product of the perimeter of the base and the slant height.

Lateral area of a cylinder $A = 2\pi rh$

The lateral area of a cylinder is equal to the circumference of the base times the height.

Lateral area of a prism $A = ph$

The lateral area of a right prism is equal to the product of the perimeter of the base and the height.

$$A = \frac{1}{2}l_{arc}r$$

Sector

The area of a sector is equal to one-half the product of the radius and the length of the arc.

$$A = \frac{1}{2}ap$$

Regular polygon

The area of a polygon is equal to one-half the product of the perimeter and apothem.

Rhombus

The area of a rhombus is equal to one-half the product of the two diagonals.

$$A = \frac{1}{2}DD'$$

Circumscribed polygon

The area of a circumscribed polygon is equal to one-half the perimeter times the radius of the inscribed circle. $A = \frac{1}{2}pr$

Ellipse $A = \pi d_1 d_2 / 4 = \pi r_1 r_2$

The area of an ellipse equals times the product of the long and short diameters, or times the product of the long and short radii.

Surface of a sphere $A = 4\pi r^2$

The surface of a sphere is four times the area of a circle of the same diameter.

Volumes

Rectangular solid $V = lwh$

The volume of a rectangular solid is equal to the product of its length, width and height.

$$V = Bh$$

The volume of a rectangular solid is equal to the area of the base times the height.

Prism or cylinder $V = bh$

The volume of any right prism is equal to the product of the base and altitude.

The volume of any right cylinder is equal to the product of the base and altitude.

The volume of any parallelepiped is equal to the product of the base times the altitude.

Oblique prism or cylinder $V = bh$

The volume of any oblique prism is equal to the product of a right section and the slant height.

Pyramid or cone $V = \frac{1}{3}bh$

The volume of a pyramid (cone) is equal to one-third the product of the base and altitude.

Frustum of a pyramid or a cone $V = \frac{1}{3}h\left(b + b' + \sqrt{bb'}\right)$

The volume of a frustum of a pyramid is equal to one-third the altitude multiplied by the sum of the area of the lower base, the area of the upper base and the square root of the product of the two bases.

Spherical sector

The volume of a spherical sector is equal to one-third the product of the area of the zone and the radius of the sphere. $V = \frac{1}{3}br$

TRIGONOMETRIC FORMULAS

$a_2 = b^2 + c^2 - 2bc\cos\alpha$

In any oblique triangle the square of any side is equal to the sum of the squares of the other two sides diminished by (minus) twice their product times the cosine of the included angle (The law of cosines).

$$\frac{a-b}{a+b} = \frac{\tan\frac{1}{2}(A-B)}{\tan\frac{1}{2}(A+B)}$$

In any triangle the difference of any two sides is to their sum as the tangent of one half the difference of their respective opposite angles is to the tangent of one half of the sum of these angles (The law of tangents).

$$\frac{a+b}{a-b} = \frac{c+d}{c-d}$$

a plus b over a minus b is equal to c plus d over c minus d.

$a^3 = \log_c d$

a cubed is equal to the logarithm of d to the base c.

$$\varphi(z) = b\left[\left(2 + \frac{z}{c_m}\right)^{ml(m-1)} - 1\right]$$

1) of z is equal to b, square brackets, parenthesis, z divided by c sub m plus 2, close parenthesis, to the power m over m minus 1, close square brackets;

2) of z is equal to b multiplied by the whole quantity: the quantity two plus z over c sub m, to the power m over m minus 1, minus 1.

$$\left|\varphi_j(t_1) - \varphi_j(t_2)\right| \le \left|M\left(t_1 - \frac{\beta}{j}\right) - M\left(t_2 - \frac{\beta}{j}\right)\right|$$

The absolute value of the quantity sub j of t one, minus sub j of t two, is less than or equal to the absolute value of the quantity M of t1 minus over j, minus M of t2 minus over j.

$$k = \max_{j} \sum_{i=1}^{n} \left| a_{ij}(t) \right| \quad (t \in |a, b|; \quad j = 1, 2, \ldots n)$$

k is equal to the maximum over j of the sum from i equals one to i equals n of the modulus of of t, where t lies in the closed interval a b and where j runs from one to n.

$$\lim_{n \to \infty} \int_{\tau}^{t} \{f[s, \varphi_n(s)] + \Delta_n(s)\} ds = \int_{\tau}^{t} [s, \varphi(s)] ds$$

The limit as n becomes infinite of the integral of f of s and of s plus delta n of s, with respect to s, from to t, is equal to the integral of f of s and of s, with respect to s, from to t.

$$\psi_{т-к_ы+1}(t) = e^{t\hat{\lambda}_{q+s}} p_{n-r_s+1}$$

sub n minus r sub s plus 1 of t is equal to p sub n minus r sub s plus 1, times e to the power t times sub plus s.

$$L_n^{+} g = (-1)^n \left(\bar{a}_0 g \right)^{(n)} + (-1)^{n-1} \left(\bar{a}, g \right)^{(n-1)} + \ldots \bar{a}_n g$$

L sub n adjoint of g is equal to minus 1 to the n, times the n-th derivative of a sub zero conjugate times g, plus, minus one to the n minus 1, times the n minus first derivative of a sub one conjugate times g, plus … a sub n conjugate times g.

$$\frac{\partial F[\lambda_i(t), t]}{\partial \lambda} \lambda_i'(t) + \frac{\partial F[\lambda_i(t), t]}{\partial t} = 0$$

The partial derivative of F of lambda sub i of t, with respect to lambda, multiplied by lambda sub i prime of t, plus the partial derivative of F with arguments lambda sub i of t and t, with respect to t, is equal to 0.

$$\frac{d^2 y}{ds^2} + |1 + b(s)| y = 0$$

The second derivative of y with respect to s, plus y, times the quantity 1 plus b of s, is equal to zero.

$$f(z) = \bar{\varphi}_{mk} + O\left(|z|^{-1} \right) \quad (\quad \arg z = \gamma \;)$$

f of z is equal to sub mk hat, plus big O of one over the absolute value of z, as absolute z becomes infinite, with the argument of z equal to gamma.

$$D'_{n-1}(x)=\prod_{s=0}^{n}\left(1-x_s^2\right)^{\varepsilon-1}$$

D sub n minus 1 prime of x is equal to the product from s equal to zero to n of, parenthesis, 1 minus x sub s squared, close parenthesis, to the power epsilon minus 1.

$$K(t,s)=\frac{1}{2\pi i}\int\frac{K(t,s)}{w-w(x)}dw\ \left|w-\frac{1}{2}\right|=p$$

K of t and x is equal to one over two , times the integral of K of t and z, over w minus w of x, with respect to w along curve of the modulus of w minus one half, is equal to rho.

$$\frac{\partial^2 u}{\partial t^2}+a^4\Delta\Delta u=0 \qquad (a>0)$$

The second partial (derivative) of u with respect to t, plus a to the fourth power, times the Laplacian of the Laplacian of u, is equal to zero, where a is positive.

$$D_k(x)=\frac{1}{2\pi i}\int_{c-i\infty}^{c+i\infty}\zeta^k(w)\frac{x^w}{w}dw \qquad (c>1)$$

D sub k of x is equal to one over two , times integral from c minus i infinity to c plus i infinity of dzeta to the k of w, x to the w divided by w, with respect to w, where c is greater than 1.

$$4c-W_3-2m_1a'-R_a=33\frac{1}{3}$$

4 c plus W third plus 2 m first a prime plus R a-th equals thirty-three and one-third.

$$A=\frac{1\mu}{2r_p}x-\frac{\omega L_2\omega L_1}{\sqrt{R_2}\left(R_1+\dfrac{\omega^2 L_1^2}{r_p}\right)}$$

A is equal to one half mu by r p-th omega L second omega L first over (by) the square root out of R second round brackets opened R first plus omega square L first square by r p-th round brackets closed.

$$M = R_1 x - P_1(x - a_1) - P_2(x - a_2)$$

Capital M is equal to R sub one multiplied by x minus capital P sub one, round brackets opened, x minus a sub one, round brackets closed, minus capital P sub two, round brackets opened, x minus a sub two, round brackets closed.

$$\varepsilon = \frac{B}{6{,}45} x 2{,}54$$

is equal to B divided by six point four five multiplied by two point five four.

Capital F is equal to capital C sub s, A, I L sine theta

$$F = C_a AIL \sin 0$$

Tangent r is equal to, dash (line of division), tangent i over (by) e.

$$\tan r = \frac{\tan i}{e}$$

A v-th is equal to mu omega m omega square L square (di-vided) by r p-th square brackets opened omega square m square plus R second round brackets opened R first plus omega square L square (divided) by r p-th round and square brackets closed.

$$A_v = \frac{\mu\omega m\omega^2 L^2}{r_p\left[\omega^2 m^2 + R_2\left(R_1 + \frac{\omega^2 L^2}{r_p}\right)\right]}$$

Therefore cotangent r is equal to e cotangent i.

Therefore M sub t is equal to G theta, dash d to the fourth power divided by thirty-two.

P critical is equal to square E I divided by four 1 square.

AXIOMS

$$\forall x, y(\forall z(z \in x \to z \in y) \to x = y)$$

Axiom of extensionality

Two sets are equal if and only if they have the same members.

Axiom of the null set $\exists\forall y(\approx y\in x)$

There exists a set with no members (the empty set).

Axiom of unordered pairs

$\forall x,y\exists z\forall w(w\in z\leftrightarrow w=xVw=y)$

If x and y are sets, then the (unordered) pair is a set.

Axioms of the sum set or union

$\forall x\exists y\forall z(z\in y\leftrightarrow\exists t(z\in t\ \&\ t\in x))$

If x is a set of sets, the union of all its members is a set. For example, if $x=\left\{\begin{matrix}\{a,b,c\}\\ \\ a,c,d,e\end{matrix}\right\}$, then the union of the (two) elements of x is the set $\{a,b,c,d,e\}$).

Axiom of infinity $\exists x(\phi\in x\ \&\ \forall y(y\in x\rightarrow yU\{y\}\in x))$

There exists a set x that contains the empty set, and that is such that if y belongs to x, then the union of y and is also in x. The distinction between the element y and the singleton set is basic. This axiom guarantees the existence of infinite sets.

Axiom of replacement $\forall t_1....t_k(\forall x\exists!yA_n(x,y:t_1...t_k)\rightarrow\forall_U\exists_vB(u,v))$

This axiom is difficult to restate in English. It is called 6nrather than 6 because it is really a whole family of axioms. We suppose that all the formulas expressible in our system have been enumerated; the n-th is called An. Then the axiom of replacement says that if for fixed t1… tk. An(x,y:t.) defines y uniquely as a function of x, say y = (x), then for each u the range of on u is a set.This means, roughly, that any ("reasonable") property that can be stated in the formal language of the theory can be used to define a set (the set of things having the stated property).

Axiom of the power set $\forall x\exists y\forall z(z\in y\leftrightarrow z\subseteq x)$

This axiom says that there exists for each x the set y of all subsets of x. Although y is thus defined by a property, it is not covered by the replacement axiom because it is not given as the range of any

function. Indeed, the cardinality of y will be greater than that of x, so that this axiom allows us to construct higher cardinals.

Axiom of choice

If $\alpha \to A_0 \neq \phi$ is a function defined for all $\alpha \in x$, then there exists another function for $\alpha \in x$, and $f(a) \in A_0$. This is the well-known axiom of choice, which allows us to do an infinite amount of choosing" even though we have no property that would define the choice function and thus enable us to use 6n instead.

Axiom of regularity $\forall x \exists y(x = \phi \vee (y \in x \,\&\, \forall z(z \in x \to \approx z \in y)))$

This axiom explicitly prohibits , for example.

ADDENDA
STRANGE NUMBERS
(expressions with numerals)

ENGLISH AND AMERICAN ABBREVIATIONS IN METRIC SYSTEM OF MEASURES*

	English			Russian		
T	tera	10^{12}	units	Т	тера	10^{12} доль, единиц
G	giga	10^{9}		Г	гига	10^{9}
M	mega	10^{6}		М	мега	10^{6}
K	kilo…	10^{3}		К	кило…	10^{3}
h	hecto…	10^{2}		г	гекто…	10^{2}
dk	deka…	10		дк	дека…	10
d	deci…	10^{-1}		д	деци…	10^{-1}
c	centi…	10^{-2}		с	сенти	10^{-2}
m	milli…	10^{-3}		мм	милли…	10^{-3}
μ	micro	10^{-6}		мк	микро	10^{-6}
n	nano…	10^{-9}		н	нано…	10^{-9}
p	pico…	10^{-12}		п	пико…	10^{-12}
f	fento	10^{-15}		ф	фемто	10^{-15}
a	atto…	10^{-18}		а	атто…	10^{-18}

Linear Measures – Линейные меры

Дюйм (inch) = 25,4 мм (2,54 см)
Фут (foot) = 0,3048 м (или 12 дюймов)
Ярд (yard) = 0,9144 м (или 3 фута)
Миля (mile) = 1,609 км (или 1,760 ярда)
Хэнд (hand) = 10,16 см (или 4 дюйма)

Square measures – Меры площади

a., ac. acre(s) акр(ы) (0,4 га)
Sq., cm square centimetre(s) кв. См(0,0001 $м^2$)
Sq. f. square foot кв. Фут (9,29 $дм^{2)}$
Sq. i. square inch кв. Дюйм (6,45 $см^{2)}$
Sq. mi. square mile кв. Миля (2,59 $км^{2)}$
Sq. km square kilometer кв. Км(1000000 $м^2$)
Sq. yd. square yard кв. ярд (0,836 $м^2$)

Cubic measures of liquids and dry substances – Меры объема жидкостей и сыпучих тел

Батт (butt) = 490,97 л
Баррель (barrel) = 163,65 л (GB)/119,2 л (US)
Баррель (нефть) = 158,988 л (GB)/158,97 л (US)
Галлон (gallon) = 4,546 л (GB)/3,784 л (US)
Пинта (pint) = 0,57 л (GB)/0,473 л (US)
Жидкая унция (fluid ounce) = 28,4 м

Cubic measures – Меры объема
c.c., cu. c cubic centimetre кубический сантиметр см3
c.f. cubic foot кубический фут 28,32 дм3
c.m., cu. M cubic metre кубический метр м3

ABBREVIATIONS IN MATHEMATICS

A, a, abs – absolute - абсолютный
a. – 1. area – площадь
2. acre – акр
3. axis, axes, axial – ось, оси, осевой, аксиальный
4. angle – угол
abv, above – выше, более
a/c, acc. – account - счет
AD – Anno Domini – нашей эры

a.f., as follows – как следует далее
A.M., AM, a.m., am – ante meridiem – до полудня
a.m. above mentioned – вышеупомянутый
amt – amount – число, количество, подсчет
An, an – above named - вышеупомянутый
a.q. – any quantity – любое количество
ax – axis, axes – ось, оси
az – azimuth(al) – азимут(альный)
B., b - 1. base – база, основа, основание
2. before – до, перед
3. breadth – ширина
bal – balance – равновесие, остаток, баланс
BC – Before Crist – до нашей эры
BC, bc, b/c – between centres - расстояние между осями
BE – bell end – конец конуса
BW – body weight – вес тела
C., Cent – centigrade – Цельсий, по Цельсию
Cm – centimetre – сантиметр
c., cb., cu., cub. – cubic, cube – куб(ический)
cb – control button – кнопка управления
ccw – counterclock wise – против часовой стрелки
cd – centre distance – расстояние между центрами
cf – confer - сравни
CL, cl – centre line – осевая линия, центральная ось
cos-1 – anticosine – арккосинус
cos – cosine – косинус
csc, cosec – cosecant – косеканс
cot, ctn – cotangent – котангенс
c to c – centre to centre – расстояние между осями
cw – clockwise – по часовой стрелке
D – пятьсот (римская цифра)
D – differential – знак «дифференциал»
D, d – derivative – знак «обычная производная в символе dy/dx
∂ - partial derivative – знак «частная производная»

обычно в едином символе dy/dx
d. – 1. difference – разность
2. deci- - деци-…
3. distance – расстояние
d., deg. – degree – градус, степень
d., dia. – diameter – диаметр
dbl – double – двойной; удвоить
DC – digital computer – цифровой компьютер
D.C., d.c., d-c – direct current – постоянный ток
dim – dimension – размер, - мерный
dist – distance – расстояние
doz., dz – dozen – дюжина
dx – duplex – двойной
E.g. – for example - например
et al. – et alii – и другие (авторы)
eq. – equal – равный
eqn – equation – уравнение
esp. – especially – особенно
ep – end point – конечная точка
F° - Fahrenheit – фаренгейт (t° шкала)
F, f(x) – function (of x) – функция (от x)
ft – foot, feet – фут(ы)
fig. – figure – рисунок, схема, цифра, чертеж
Gl. – gill – джилл (брит. – 0,14 литра; США – 0,12 литра)
GCD, gcd – greatest common divisor – наибольший общий делитель
G.M.T. – Greenwich Mean Time – среднее время по Гринвичу
GZ – ground zero – эпицентр
H, h, ht, hth – height – высота
H – hyper- - гипер-
HCF, hcf – highest common factor – наибольший общий множитель
h., hr(s) – hour(s) – час (ы)
i.e. – that is – то есть

ind – index – показатель
inf – infinity – бесконечность
iv – independent variable – независимая переменная
J – joule – джоуль; знак мнимой величины
K – Kelvin - кельвин (t° шкала)
L - 1. left – левый
2. length – длина
3. leaque – лига (мера длины)
lb – libra [laIbrq] – фунт (вес – 454 грамма)
LCM, lcm – least common multiple - наименьшее общее краткое
l – leg – катет
lg – long – длинный
lge, lg – large – большой
lim – limit – предел
lin – linear– линейный
log, ln – logarithm, natural l. - логарифм, натуральный л.
log10 – common logarithm - десятичный логарифм
Ltd – limited - ограниченный
M, m - 1. mass - масса
2. mega- - мега-
3. metre - метр
4. micro- - микро-
5. mile - миля
6. milli- - милли-
7. minute - минута
8. module – модуль
Math., maths – mathematics – математика
max – maximum – максимум
Mech – mechanics – механика
min – minimum – минимум
mm – millimetre – миллиметр
mod – module, modulus – модуль
M.T.L. – mass, time, length – масса, время, длина
(система единиц)
N, No, no – number (#) – номер, №

Nat – natural – натуральное
n.c., nc – no change – без изменений, не изменяя
n.d. – no date – без даты
neg – negative – отрицательный, минусовой
Nos, nos – numbers – номера, №№
nr – near – близ, около, близко
o.c., i.c. – on centres, in centres – между осями, центрами
o.d. – outer diametre – внешний диаметр
opp – opposite – противоположный
oz – ounce [auns] – унция (28,3 грамма)
P., p. – power – степень; мощность, сила
p. - 1. page – страница
2. part – часть, доля
3. proton – протон
p.c. – 1. per cent – процент
2. point of curve - точка, начало кривой
per. – period – период
PH, ph – per hour – на час, в час, за час
ph – phase – фаза
P.M., p.m. – post meridiem – после полудня
pm – per minute – в, за минуту
P of O – point of origin – начало, исходная точка координат
pos., p. – positive – положительный, плюсовой
ps, p.s. – per second – за, в секунду
PT, pt, p – point – точка
pp – pages – страницы
pr - 1. pair – пара
2. primary – первичный, начальный
pt – pint [paInt] – пинта (0,57 литра)
qr – quarter – четверть
qt., q. – quantity – количество
R – Reamur – Реомюр (t° шкала)
R., r. – 1. radius, radii – радиус(ы)
2. right – правый; прямой угол
rad. – radical – радикал

Rto, r. – ratio – отношение
rect – rectangular – прямоугольник
rev. – reverse – обратный, противоположный
S. – second, secondary – секунда, вторичный
s – see – смотри
sec. – secant – секанс
seg. – segment – сегмент
sin – sine – синус
s. l. – straight line – прямая линия
sq., s. – square – квадрат(ный)
sz – size – размер
T, t - 1. time – время
2. temperature (t°) – температура
tan, tg – tangent - тангенс
ths – thousand – тысяча
tn, t – ton – тонна
TO – turn over – см. на обороте
TV – 1. television – телевидение
2. terminal velocity – предельная скорость
U.m. – undermentioned – нижеупомянутый
UFO – unidentified flying object – НЛО, неопознанный летающий объект
Val – value – величина, значение
var – variable – переменная
v.v. - vice versa – наоборот
v., vec. – vector - вектор
vers – versine, versed sine – синус-верзус
vs – versus – против, в зависимости от…
Wt – weight – вес
w/o – without – без, не
Z., z – zero – ноль
Zzz – zigzag - зигзаг

THE LIST OF CHEMICAL ELEMENTS WITH TRANSCRIPTION

Ag − argentum [a:'dʒentəm] = silver [silvə] серебро
Al − aluminium [,ælju'miniəm] алюминий
Ar − argon ['a:gɔn] аргон
As − arsenic ['a:s(ə)nık] мышьяк
Au − aurum ['ɔ:rəm] = gold [gould] золото
B − boron ['bɔ:rɔn] бор
Ba − barium ['bɛ(ə)rıəm] барий
Be − beryllium [bə'rılıəm] бериллий
Bi − bismuth ['bızməθ] висмут
Br −- bromine ['broumi:n] бром
C − carbon ['ka:bən] углерод
Ca — calcium ['kælsıəm] кальций
Ce −- cerium ['sı(ə)rıəm] церий
Cd − cadmium ['kædmıəm] кадмий
Cl − chlorine ['klɔ:ri:n] хлор
Co − kobalt ['koubɔ:lt] кобальт
Cr − chromium ['kroumıəm] хром
Cs − caesium ['si:zıəm] цезий
Cu − copper ['kɔpə] медь
F − fluorine ['flu(ə)ri:n] фтор
Fe − ferrum ['ferəm] = iron ['aıən] железо
Ga − gallium ['gælıəm] галлий
Ge − germanium [dʒə:'meınıəm] германий
H − hydrogen ['haıdrədʒən] водород
He — helium ['hi:lıəm] гелий
Hg − hydrargyrum [haıdra:dʒırəm] = mercury ['mə'kjurı] ртуть
I − iodine ['aıdi:n] йод
Ir− iridium [ı'rıdıəm] иридий
K − kalium ['keilıəm] калий = potassium [pə'tæsıəm] калий
Li − lithium ['lıθıəm] литий
Mg − magnesium [mæg'ni:zıəm] магний
Mn − manganese [,mæŋgə'ni:z] марганец
Mo − molybdenum [mə'bdənəm] молибден
N − nitrogen ['naıtrədʒ(ə)n] азот
Na − natrium ['neitrıəm] = sodium ['soudıəm] натрий

Ne − neon ['ni:ɔn] неон
Ni − nickel ['nɪk(ə)l] никель
O − oxygen ['ɔksɪdʒ(ə)n] кислород
P − phosphorus ['fɔsf(ə)rəs] фосфор
Pb − plumbum ['plʌmbəmJ = lead [led] свинец
Pt − platinum f 'plætinəm] платина
Pu − plutonium [plu:'tounɪəm] плутоний
Ra − radium ['reɪdɪəm] радий
Rb − rubidium [ru:'bɪdɪəm] рубидий
S − sulphur ['sʌlfə] сера
Sb − antimony ['æntɪmənɪ] сурьма
Sc − scandium ['skændɪəm] скандий
Se − selenium [sɪ'li:nɪəm] селен
Si − silicone ['sɪlɪkoun] кремний
Sn −- stannum ['stænəm] = tin [tɪn] олово
Sr − strontium ['strɔntɪəm] стронций
Te − tellurium [tə'l (j)u(ə)rɪəm] теллур
Th − thorium ['θɔ:rɪəm] торий
Ti − titanium [t(a)ɪ'teɪnɪəm] титан
U −uranium [ju'reɪnɪəm] уран
W− wolfram ['wulfrəm] = tungsten ['tʌŋsten] вольфрам
Zn − zinc [zɪŋk] цинк
Zr − zirconium [zə'kounɪəm] цирконий

USEFUL VOCABULARY ON RESEARCH WORK

Structure of Research
Topic / Theme – Тема исследования
Relevance of the Topic (Motivation for the Study) – Актуальность темы исследования
Object of Research – Объект исследования
Subject of Research – Предмет исследования
Aims of Research – Цели исследования
Research Questions – Задачи исследования
Hypotheses of Research – Гипотезы исследования
Methods of Investigation – Методы исследования
Original Contribution – Новизна

Significance – Значимость
Implementations – Внедрения
Conclusions – Выводы

Useful Language

Topic / Theme of Research The theme of our investigation is …Темой нашего исследования является …
The theme of our exploration is devoted to … Тема нашего исследования посвящена …
Relevance of the Topic (Motivation for the Study) The problem of … is one of the most important. Проблема … одна из самых важных.
The actual range of problems is much wider. Реальный круг проблем гораздо шире.
The problem of … has not lost its topical significance. Проблема не потеряла своей актуальности …
The problem became more acute, it took a new form. Проблема стала более острой, она приобрела новую форму.
The problem requires a detailed study. Эта проблема требует детального изучения.
The question of … has become acute. Вопрос … стал особенно актуальным.
The study of … is of primary importance. Изучение … имеет первостепенное значение.
Much has been said and written about … Много было сказано и написано о …
Much (little) has been done on … Много (мало) было сделано в …
Much has been done in the field of … but undoubtedly much remains to be done in it. Много было сделано в области …, однако, несомненно, многое еще предстоит сделать.
Although a number of issues have been analyzed and discussed much remains to be done in the field of … Несмотря на то, что ряд вопросов был проанализирован и обсужден, многое еще предстоит сделать в этой области …

The problem has not received all the attention it deserves. Проблема не получила должного внимания.
It was this … which first attracted the notice of … Именно это впервые привлекло внимание …
At present there is a growing interest in … В настоящее время наблюдается повышенный интерес к …
The question still remains open. Вопрос еще остается открытым.
No one has made a careful inquiry into … Никто не провел тщательного исследования в …
Now the research focus has shifted towards … Сейчас исследовательский интерес направлен на …
We possess a vague and general idea of … Мы имеем нечеткое и общее представление о …
We are totally ignorant of … Мы совершенно ничего не знаем о…
We know little (much) about … Мы мало (много) знаем о …
The problem arises (is / was raised) in connection with … Эта проблема встает (ставится/ставилась) в связи с
Object of Research
We will make a thorough study of … Мы подвергнем тщательному изучению …
The object of our exploration is … Объектом исследования является
The following study is concerned with … Настоящее исследование посвящено …
At the heart of the discussion is … В центре обсуждения находится
The study of … raises several interesting problems of a general nature. Изучение … поднимает несколько интересных проблем общего характера.
It requires a detailed study of … Это требует детального изучения …
It requires a direct study of … Это требует непосредственного изучения …

In the connection with the study of various phenomena it is necessary to В связи с изучением различных явлений необходимо …
Therefore, in studying … one must take into account … Следовательно, при изучении … необходимо принять во внимание
This is achieved by a comprehensive study of … Это достигается путем всестороннего изучения …
We will deal with … Мы рассмотрим …
We will examine the (relations between …) Мы изучим (взаимосвязь … с …)
It would be instructive to examine in … detail … from the point of view of Было бы полезно детально изучить … с точки зрения …
We will explore … Мы исследуем …
We are occupied with the problem of Мы занимаемся проблемой …
Subject of Research
The topic of our investigation (exploration, work) is … Предметом нашего исследования является …
It is one of the key problems of … Это одна из основных проблем…
The problem of … is very complex. Проблема … является очень сложной.
The question is not free from difficulties… Вопрос не лишен сложности.
The topic of my dissertation is significant in interpreting … Тема моей диссертации существенна для понимания …
The problem of … is in the focus of attention of … Проблема … находится в центре внимания…
The problem arises (is / was raised) in connection with … Эта проблема встает (ставится/ ставилась) в связи с тем, что …
The problem of studying … demands special care in using methods and a methodological concept. Проблема изучения … требует особого внимания к использованию методов и методологической концепции.

Here we need to consider the problem of … Здесь нам необходимо рассмотреть проблему
Thus the core of the problem is … Таким образом, суть проблемы заключается в …
We turn our attention to a new and more urgent problem. Мы обращаем наше внимание на новую и более насущную проблему.
In this light we must face the problem … С этой точки зрения мы должны рассмотреть проблему …
Though many aspects of this problem are debated, it is sure that … Хотя многие аспекты проблемы остаются спорными, несомненно, что …
To bring further light on various aspects it is necessary to … Для того, чтобы более глубоко осветить различные аспекты, необходимо …
I will touch upon a question of … Я коснусь вопроса …
The question is usually regarded as… Вопрос обычно рассматривается как …
Not long ago the question was raised in … Недавно вопрос был поднят в …
The question raises all sorts of problems. Этот вопрос поднимает разнообразные проблемы.

Aims of Research

The (main) aim of the paper is … (Основная) цель данной работы заключается в …
To attain our aim we must consider … Для достижения цели мы должны рассмотреть …
One of the chief aims was to test hypothesis … Одной из основных целей … являлась проверка гипотезы …
It is the main aim of this chapter to examine some of the main causes of … Задачей данной главы является изучение некоторых основных причин …
At present we do not set the aim of… В настоящее время мы не ставим цели …

The overall goals of … require a prior concern with the general problem of … Глобальные цели … требуют предварительного рассмотрения основных проблем …
In the framework of … the first objective to achieve is … В рамках … основной целью является …
Our objective is the investigation of Нашей целью является изучение …
Our objective is to explain … Нашей задачей является объяснение …
The purpose of our work is to examine and investigate and consequently to determine more precisely … Цель нашей работы состоит в том, чтобы изучить и исследовать и в результате более точно определить …
For this purpose we may examine an example from … Для этой цели можно проанализировать пример из …
It is our purpose on this occasion to analyze some of the basic issues … Нашей целью в данном случае является анализ основных вопросов …
It is the purpose of this investigation to explain the principles of this viewpoint … Целью данного исследования является объяснение основных положений данной концепции …
We are confined to immediate aims to … Наши непосредственные цели заключаются в …
What we are aiming at is … То, к чему мы стремимся, заключается в …
Research Questions
It has been no part of our aim to make a comprehensive survey of … В наши задачи не входило проведение глобального исследования …
We are fully aware of the nature of the objective … Мы в полной мере понимаем специфику данной задачи …
Our objective is the investigation of… Задачей нашего исследования является …
It is not the business of … Это не входит в задачи …

It is not our purpose to describe … В нашу задачу не входит описание …
It is beyond our present purpose to … В наши задачи не входит …
Our task consists in … Наша задача состоит в том, чтобы …
Our task is to show … Наша задача состоит в том, чтобы показать …
Our task is to study … В нашу задачу входит изучение …
The main task is as follows … Основная задача заключается в следующем …
For carrying out this task it is necessary … Для осуществления этой задачи необходимо …
We are confronted with a complicated task. Перед нами стоит сложная задача.
The primary task is to study … Первоочередной задачей является изучение …
The task requires considerable rethinking and revision … Эта задача требует переосмысления и пересмотра …
The detailed (comprehensive, thorough, careful, profound) study of … is of great importance. Детальное (всестороннее, тщательное, глубокое) изучение … имеет большое значение.
Nevertheless, it is important to observe … Тем не менее, важно изучить …
Comprehensive study of … is the key to solving our problems. Всестороннее исследование … имеет особое значение для решения поставленных проблем.
Within the framework of the paper it is impossible to … В рамках этой работы невозможно …
One of the first tasks was to verify and if possible to amplify knowledge of … Одной из первостепенных задач являлась проверка и, по возможности расширение знаний о
Hypotheses of Research
It is necessary to accept the hypothesis …
Необходимо принять гипотезу …

One may put forward a working hypothesis for explaining this phenomenon … Можно выдвинуть рабочую гипотезу для объяснения этого явления …
To take all possibilities into account, we are compelled to rule out the hypothesis that … Принимая во внимание все возможности, мы вынуждены выдвинуть гипотезу …
We are to form a working hypothesis about … Мы должны сформулировать рабочую гипотезу о …
It may be assumed like a working hypothesis. Это можно принять в качестве рабочей гипотезы.
For confirmation of the hypothesis we need but turn to a brief consideration of … Для подтверждения гипотезы необходимо обратиться к краткому рассмотрению …
These data confirm our hypothesis. Эти данные подтверждают нашу гипотезу.

Methods of Investigation

There are different approaches to the solution of the problem.
Существуют разные подходы к решению этой проблемы.
This approach is aimed at … Этот метод направлен на …
The usual approach was followed in … Традиционный метод использовался в …
The most promising approach is … Наиболее перспективный метод состоит в том, чтобы …
The approach used here is … Метод, используемый здесь, заключается в …
An important way of approaching the matter is … Важный метод в разработке проблемы заключается в …
This is a reasonable and practical approach … Это целесообразный и практический метод.
A modern approach to this problem of … is based on (consists in …) Современный подход к проблеме … основан (состоит в …) …
At the present time this research approach rests on … В настоящее время этот метод исследования основывается на …
Such an approach to … involves … Такой подход к … требует …

The subjective approach to the study of … is … Субъективный подход к изучению… заключается …
The main difference in the approaches is that … Главное различие в подходах заключается в том, что …
The approach taken by … in … is quite similar to … Метод исследования, принятый …, идентичен …
A different approach was taken by … Иной метод был использован …
These approaches are different but … Эти подходы различны, но …
The most common method for … is … Самый распространенный метод … состоит в …
The method of research depends on … Метод исследования зависит от …
A method of analogy will help to distinguish a few common features. Сравнительный метод позволяет выделить общие черты …
Before we can begin to use this method of analysis we have to deal with … Прежде чем мы начнем применять данный метод анализа, мы должны рассмотреть …
Our work is being carried out in the following directions … Наша работа ведется в следующем направлении …
These are a number of trends in studying … Существует ряд направлений в изучении …
The simplest way of solving this problem lies in … Самый простой путь решения этой проблемы заключается в …
This is one of the ways … Это один из способов …
The methods of analysis are … Методами анализа являются …
The analysis of … is based on … Анализ … основывается на …
With regard to the old analysis we can state … Учитывая данные предыдущего анализа, можно утверждать, что …
It requires a thorough analysis. Это требует тщательного анализа.

At this level of analysis everything is seen as … На этом уровне анализа все рассматривается как …
To analyze with precision we must turn to … Для того, чтобы провести точный анализ, мы должны обратиться к …
Before we proceed with our analysis of … it is essential to go over the Прежде чем перейти к анализу … необходимо изучить проблему …

Original Contribution

It is the first attempt of the scientific approach to the problem of …

Это является первой попыткой использования научного подхода к проблеме …
The main features of our approach are … Основными направлениями нашего подхода являются …
We have developed a new approach to the phenomena under consideration. Мы разработали новый подход к рассматриваемым явлениям.
Our approach will make it possible to clear … up. Наш подход позволит разобраться в …
We have succeeded in finding a convenient approach to … Нам удалось найти удобный подход к …
We must approach the problem from viewpoint… Мы должны подойти к проблеме с точки зрения …
Such an approach has made it possible to understand the reasons for … Такой подход позволил понять причины …
Our approach may be summarized in the words of … Наш подход можно изложить следующим образом …
The method proposed in this article (investigation) is … Метод, предложенный в этой статье (исследовании) состоит в …
The method of research provides a reasonably objective criterion … Такой метод исследования обеспечивает нас достаточно объективным критерием …
It is in keeping with the methods adopted to solve the problems of … Это непосредственно связано с методами, разработанными для решения данной проблемы …

The method is based on the idea that … Данный метод основывается на том, что …
The method provides an answer to this problem … Этот метод дает возможность найти ответ на вопрос
The advantage of this method lies in the fact that … Преимущество этого метода состоит в том, что ...
This method has thrown light upon … Данный метод пролил свет на …
We may adopt the method to … Мы можем применять данный метод к …
The method is applicable to … Метод используется для …
The application of the new method allows us to … Применение нового метода позволяет нам …
This method can be applied to the study of … Этот метод можно применить для изучения …
I am not suggesting that it is the only way … Я не считаю, что это единственный способ …
There is nothing with which the analysis can be compared …
Этот анализ не имеет аналогов …
Significance
The question of great practical importance deals with …
Вопрос, имеющий большое практическое значение, заключается в …
A special significance attaches to … Особое значение придается …
What is significant is … Значительным является то, что …
In fact it is the first work of general synthesis in which complex problems of … are posed and given new answers … Действительно, это первая обобщающая работа, в которой поставлены сложные проблемы … и даны новые ответы …
The problem raised by … assumed a place of first importance … Проблема поднятая … приобрела первоочередное значение …
What is important is … Важным является то, что …

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