TOMSK POLYTECHNIC UNIVERSITY

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READING SCIENTIFIC TEXTS

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МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ
Федеральное государственное автономное образовательное учреждение высшего образования
«**НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТОМСКИЙ ПОЛИТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ**»

»

В.В. Голубева, Т.В. Казарина

ЧТЕНИЕ НАУЧНЫХ ТЕКСТОВ

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Пособие нацелено на развитие навыков и выработку стратегий чтения текстов научной тематики на английском языке. Содержит следующие разделы: «Stylistic and Genre Peculiarities of Scientific Texts», «Strategies for Reading and Understanding. Searching Information in the Text», «Strategies for Reading and Understanding. Commenting the Events», «Modern Problems in Science and Engineering», «Anthropogenic Problems in the Society», «Discoveries, Modern Technologies», «Information Technologies», «Strategies for Reading and Understanding. Summarizing Data and Facts, Describing Phenomena», и «Strategies for Reading and Understanding. Searching Expressing the Opinion», каждый из которых имеет определенное методическое назначение. В каждом разделе предлагаются задания, направленные на развитие коммуникативной компетенции.

Адресовано преподавателям нелингвистических специальностей, обучающимся в системе послевузовской подготовки по специальности «Английский язык в научных и инженерных целях», но также может быть использовано студентами и слушателями языковых курсов.

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UNIT I: Stylistic and Genre Peculiarities of Scientific Texts

Warm-Up Activities:

1. What peculiarities of scientific texts do you know?
2. What types of scientific texts do you know?

Task 1: Read the information about the peculiarities of the scientific style of speech.

The Peculiarities of the Scientific Style of Speech

A.

1. Sentences may range from 7 to 52 words.
2. Sentences should be well-formed, their structure should be simple.
3. Sentences should be non-elliptical, i.e. each sentence should have a subject and a predicate.
4. Do not use contractions in scientific papers.
5. Extended complex and compound sentences should be used without the omission of conjunctions. In oral speech conjunctions are often omitted, e.g. He claimed, the equipment had been received, while in written speech they should be used, e.g. He claimed that the equipment had been received.

B.

1. The characteristic feature of scientific prose style is the use of typically bookish syntactic structures for example, the compound type of the predicate. E.g. These pumps are known to offer high quality and reliability and incur low maintenance costs.
2. The use of bookish syntactic constructions with non-finite forms of the verb (infinitive, participles and gerund). E.g. These gases are easy to control but they are persistent once omitted.

C.

1. The Past Tenses are used to report results; the Present Tenses are used for discussions and conclusions. E.g. Smith (1989) reported a similar result. The characteristics of the voltammetric wave indicate that electron transfer and breaking of the carbon-iodine bond are concerted.

Task 2: Put the headings into the correct place. There is one extra heading which you do not need to use.

Tense Peculiarities
Lexical Peculiarities
Syntactical Peculiarities
Grammatical Peculiarities

Task 3: Match the text fragments with types of scientific texts
scientific article
patent
scientific presentation
book
technical report
abstract

1.

4.4.1. Comparison of BACnet, KNX and Lonworks
4.4.2. BACnet
Strengths:
- scalable: a complete communication protocol for the management, automation, and field levels;
- completely open: manufacturers can implement the protocol without any licensing fees;
- specifically designed to meet the needs of the building industry;
- being established as a world standard through ISO and other bodies. No other protocol is under consideration;
- constantly evolving: Built-in mechanism for updating and enhancing the standard through industry consensus (although this may also be a disadvantage);
- there is no vested interest controlling the development of BACnet.

Weaknesses:
- no standardized programming language: proprietary programming tools must be bought from each manufacturer;
- no standard configuration tools: proprietary configuration tools must be bought from each manufacturer;
- expensive for manufacturers to develop;
- BACnet is a written standard that is subject to interpretation by manufacturers: the manufacturer has to write his own operating system to comply with the standard and this is both expensive and liable to need debugging, giving rise to many of the disadvantages associated with “closed” systems.

2.

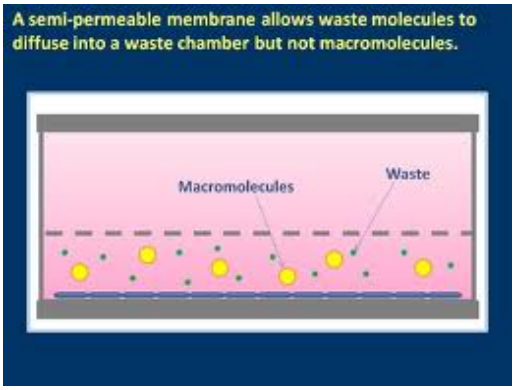
ENDOSCOPIC BITE BLOCK SYSTEM
(76) Inventor: Wayne J. Manishen, 225 Grenfell
Boulevard, Winnipeg (CA) MB R3P OB8
(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35
U.S.c. 154(b) by 979 days.
(21) Appl. No.: 11/536,253
(22) Filed: Sep.28,2006
(65) Prior Publication Data
US 2007/0225570 Al Sep.27,2007
Related U.S. Application Data
(60) Provisional application No. 601785,925, filed on Mar.
27,2006.
(51) Int. Cl.
A61M 16/00 (2006.01)
A61M 5/00 (2006.01)
A61M 5/32 (2006.01)
A61M 25/00 (2006.01)
A61M 31/00 (2006.01)
A61B 1/32 (2006.01)
A61F 11/00 (2006.01)

3.

Frustration, or the competition between interacting components of a network, is often responsible for the emergent complexity of many-body systems. For instance, frustrated magnetism is a hallmark of poorly understood systems such as quantum spin liquids, spin glasses, and spin ices, whose ground states can be massively degenerate and carry high degrees of quantum entanglement. Here, we engineer frustrated antiferromagnetic interactions between spins stored in a crystal of up to 16 trapped 171Yb+ atoms. We control the amount of frustration by continuously tuning the range of interaction and directly measure spin correlation functions and their coherent dynamics. This prototypical quantum simulation points the way toward a new probe of frustrated quantum magnetism and perhaps the design of new quantum materials.

4.

Picture 1



5.

Foreword

The Waldorf Journal Project, sponsored by the Waldorf Curriculum Fund, brings to English-speaking audiences translations of essays, magazines, and specialized studies from around the world. This sixth edition of translations is comprised of articles intended for personal, faculty, and parent study. The focus here is shaping life. The first article examines a deep look into social conflict and how sub-natural forces in the earth relate to social interaction. The theme continues in three articles by Dr. Thomas Weiss and his wife Anke on the themes of crafts and morality and the cultivation of empathy. Wolfgang Schad guides us through the scientific basis of early child development and Arthur Auer leads us into his research on evolution and what it means to be a human being. We take a pause with a delightful tale from Switzerland from Conrad Englert-Faye. Englert was the founder of the Zürich Waldorf School and introduced Waldorf education to Norway. Available only in German his book of old Swiss tales that he collected while tramping about the Alps is a masterpiece.

6.

8.0 In Lieu of a Conclusion

Obviously I have used this article as a platform from which to do some preaching and to vent some of my frustrations (as I understand it, this is part of the task of writing a position piece). However, I would like to step away from all that for a bit and remind both myself and everyone else that all theoretical frameworks, cognitive linguistics included, are built upon metaphorical models, and all metaphorical models reveal some truths and

suggest some questions while suppressing other truths and other questions that might be asked. In other words, neither cognitive linguistics nor any other framework is entirely comprehensive; no one framework is THE answer to all our problems. Some frameworks are more apt than others, particularly at addressing given issues.

Strategies for matching the passages with the headings:
Before reading the text:

1. Look through the headings.
2. Underline the key words.
3. Think about the general topic for all the headings.
4. Think about the synonyms for the underlined words.
5. Think about the type of information which each heading may match with.

While reading the text:

1. Look through each passage.
2. Underline the key words.
3. Read all headings.
4. Write down the letters of all headings which may match with the passage.

After reading the text:

1. Pay special attention to those text fragments where you have chosen more than one heading.
2. Choose the heading which bests corresponds to the subject-matter of the fragment.

Task 4: Read the text "World's Largest Computer and Internet Companies" and choose the best heading for each passage.

World's Largest Computer and Internet Companies

1.

YouTube is a video-sharing website, created by three former PayPal employees in February 2005, on which users can upload, view and share videos. The company is based in San Bruno, California, and uses Adobe Flash Video and HTML5 technology to display a wide variety of user-generated video content, including movie clips, TV clips, and music videos, as well as amateur content such as video blogging, short original videos, and educational videos.

2.

PayPal is a global e-commerce business allowing payments and money transfers to be made through the Internet. Online money transfers serve as electronic alternatives to paying with traditional paper methods, such as checks and money orders.

3.

Facebook is a social networking service launched in February 2004, owned and operated by Facebook, Inc. As of September 2012, Facebook has over one billion active users, more than half of whom use Facebook on a mobile device. Users must register before using the site, after which they may create a personal profile, add other users as friends, and exchange messages, including automatic notifications when they update their profile. Additionally, users may join common-interest user groups, organized by workplace, school or college, or other characteristics, and categorize their friends into lists such as "People From Work" or "Close Friends".

4.

Google Inc. is an American multinational corporation that provides Internet-related products and services, including internet search, cloud computing, software and advertising technologies. Advertising revenues from AdWords generate almost all of the company's profits.

5.

Instagram is an online photo-sharing and social networking service that enables its users to take pictures, apply digital filters to them, and share them on a variety of social networking services, such as media sites including Facebook or Twitter. A distinctive feature is that it confines photos to a square shape, similar to Kodak Instamatic and Polaroid images, in contrast to the 4:3 aspect ratio typically used by mobile device cameras.

6.

Hotmail (officially Microsoft Hotmail, previously Windows Live Hotmail and MSN Hotmail) was a free web-based email service operated by Microsoft as part of Windows Live, which was recently replaced by the newer Outlook.com service by Microsoft. Hotmail was one of the first web-

based email services, it was founded by Sabeer Bhatia and Jack Smith and launched in July 1996 as “HoTMaiL”. It was acquired by Microsoft in 1997 for an estimated $400 million, and shortly after, it was rebranded as “MSN Hotmail”. The current version was released in 2011.

7.

Apple Inc., formerly Apple Computer, Inc., is an American multinational corporation headquartered in Cupertino, California that designs, develops, and sells consumer electronics, computer software and personal computers. Its best-known hardware products are the Mac line of computers, the iPod music player, the iPhone smartphone, and the iPad tablet computer. Its software includes the OS X and iOS operating systems, the iTunes media browser, the Safari web browser, and the iLife and iWork creativity and production suites. The company was founded on April 1, 1976, and incorporated as Apple Computer, Inc. on January 3, 1977. The word “Computer” was removed from its name on January 9, 2007, reflecting its shifted focus towards consumer electronics after the introduction of the iPhone.

8.

Microsoft Corporation is an American multinational software corporation headquartered in Redmond, Washington that develops, manufactures, licenses, and supports a wide range of products and services related to computing. The company was founded by Bill Gates and Paul Allen on April 4, 1975. Microsoft is the world’s largest software maker measured by revenues. It is also one of the world’s most valuable companies.

A. Specializing in Computers
B. Dealing with Hackers
C. Payments without Problems
D. Making Profit from Advertising
E. The First of its Kind
F. Changing Priorities
G. Sharing Videos
H. Finding Friends
I. Images with Peculiar Size

UNIT II: Strategies for Reading and Understanding. Searching Information in the Text

Task 1: Study the following strategies for the task "Reading. Multiple Choice Questions"

Before reading the text:

1. Read the questions to the text in order to understand the information which you need to find.
2. Read the answers to the questions only if you don't understand the question.

While reading the text:

1. Do the tasks successively because the order of the questions is loosely connected with the plot development.
2. Divide the texts in fragments according to the questions.
3. While answering the question find the part of the fragment (a word, a phrase, a sentence, a passage or the whole text) which will help you to choose the right variant
4. Consider the differences between the possible answers to the questions.
5. Eliminate all the answers which are evidently not true and try to identify the most possible answer. In order to do it you shall pay special attention to the main idea and secondary information.
6. If it's difficult to find the right answer to the question, choose any answer intuitively; don't leave the question without any answer.

After reading the text:

1. Make sure that you have answered each question correctly.

Warm-Up Activities:

1. What do you know about downshifting?
2. What are the reasons for downshifting?
3. Have you ever wanted to change your profession?

Task 2: Read the text about downshifting.

Downshifting: Quitting the rat race

Many individuals are taking a step back from work in their lives, preferring a life of balance rather than overwork. Franco Gandolfi examines this trend and details how some organisations are taking flexibility and balance to the next level.

There is a new trend on the horizon. In a society filled with conflicting responsibilities and commitments, work/life balance has become a predominant issue in the workplace. An increasing number of professionals around the world are opting to pursue a more balanced lifestyle. Work/life balance initiatives per se are not new. In fact, it was Rosabeth Moss Kanter's seminal book *Work and Family in the United States: A critical review and agenda for research and policy* in 1977 that brought the issue of work/life balance to the forefront of research and organisations. In the 1980s and 1990s, companies slowly began to introduce work/life programs. More recently, the global quest for a more balanced lifestyle and the pursuit of quality of life has intensified. Not surprisingly, a new management buzzword has emerged – downshifting.

What is downshifting?

The term downshifting is widely attributed to the work of John Drake, co-founder of HR consulting firm, Drake Beam Morin, who defines it as "changing voluntarily to a less demanding work schedule in order to enjoy life more". Downshifters want to slow down at work in order to 'upshift' in other areas of their lives. Studies in Australia and overseas have uncovered a number of primary motivations. Downshifters, also called 'sea changers', may be pursuing a more balanced and fulfilling life. For instance, they may want to spend more time with their families, they may want to invest more time in their hobbies, or they may be motivated by a desire to live a less materialistic and more sustainable life. There is an increasing number of both males and females who want to bring the whole 'rat race' at work down to a slower speed, so they do not have to 'get a life'. Many Australians dream of escaping the rate race and agree with the epigram: "The trouble with the rat race is, even if you win, you are still a rat." At the same time, downshifters insist that they are not dropouts but are in pursuit of a more balanced lifestyle.

In Australia, the phenomenon of downshifting has been examined by Clive Hamilton, who refers to downshifters as "those people who make voluntary, long-term lifestyle changes that involve accepting significantly less income and consuming less". He asserts that "Australians are working longer and harder than they have for decades and are neglecting their families and their health as a result". The preoccupation with money and consumption has also come at an increasing cost, including consumer debt, personal bankruptcies and poor health. Hamilton's study in 2003 revealed that, contrary to widely held beliefs, downshifters were as likely to be blue collar as white collar workers, and confirmed that there was an increasing trend to downshift in more recent years.

What drives downshifting? At the core of the downshifting phenomenon are values. Downshifters tend to place less value on money and individual possessions and instead focus more on time, health, and peace of mind. A number of key drivers of downshifting have been identified by the Australian Institute in 2003. They include a desire for a more balanced life, a clash of personal values in the workplace, a more fulfilled lifestyle, and poor health as a result of excessive stress at work.

A recent survey conducted in the United States showed that 19 per cent of adult Americans had voluntarily decided to reduce their income and consumption levels in the past five years. Similarly, the Australian Institute reported in 2003 that 23 per cent of adult Australians have chosen to downshift to a simpler lifestyle on less income over the past ten years. Similar findings have been reported in New Zealand and Canada. A survey in the UK in 2004 has revealed that four out of ten people under the age of 35 are planning to leave their high-powered, high-stress jobs and downshift at some point during their careers. A November 2004 poll conducted by the US News and World Report found that 48 per cent of Americans have done at least one of the following in the past five years: cut back their hours at work, declined or did not seek a promotion, lowered their expectations for what they need out of life, reduced their work commitments, or moved to a community with a less hectic way of life.

Anecdotal evidence of prominent downshifters abounds. Australian Gabriela Mouson, 41, is a downshifter. A former HR director of a large bank, Mouson recently downshifted from a secure corporate job, to being a work-at-home mother. “I always found HR to be a meaningful career, but, like any job, I would spend half my day doing what I loved to do and the other half of my day doing what my job description required me to do,” says Mouson. Increasingly, what she found was that she loved the coaching and mentoring parts of HR, but not everything else that went with it. A little more than six months ago, she left to pursue her passions and went on to establish a coaching and consulting firm that helps individuals reach personal and business successes.

American Jordon Scott (name changed), 35, a senior mortgage lender working in a small-town branch for a major US bank, rejected an offer for promotion as a mortgage education trainer along with a significantly higher salary, so that he could spend more time with his family. He said: “Rejecting the offer was a sacrifice in terms of money and position, but I look at it like this: spending more time with my kids is worth gold to me – I want to be able to have the flexibility to drop my kids off to school in the morning, or even go home for lunch.”

A corporate view of downshifting

The emergence of downshifting is causing organisations to rethink the very nature of work and work arrangements: What is a full-time job? What is a part-time job? Who defines when and where a job is to be performed? What are the measurements by which companies remunerate for work? From a HR perspective, downshifting can be interpreted as the next level beyond work-life balancing. It requires companies to be even more creative in their understanding of what jobs are, the time it takes to do them, and what it means to integrate business needs with employee motivation, talent, and the pursuit of individual happiness.

Clearly, if employees are overworked, they are not able to balance the rest of their lives, irrespective of how attractive their remuneration is and no matter how many perks they receive. Downshifters may not necessarily be cynical, angry, or overly critical. They simply do not fit into the traditional fast-track mold anymore. They are also measuring 'success' by their own standards. In response, downshifters are expecting companies to be more flexible and accommodating in their endeavours.

So, how do modern companies support the ways of downshifters? Eric Lane (name changed), HR director of a large Australian insurer, states: "We're definitely seeing people who are not only interested in their careers, but also interested in being a whole person – having their work lives, their family lives, and their community lives." John Scaali (name changed), a senior HR manager, adds: "A lot of people are involved in their communities. They may have a family or family life, or they may take care of an ageing parent. In any case, they want to make a meaningful contribution to people around them – this is a very important aspect".

Bob Smith (name changed), a HR executive with an Australian retailer, says: "We provide our managers with a lot of flexibility in creating an environment that works for people rather than trying to fit people into a preset mold. It's a talent focus. The company optimises the talent focus by not having rigid policies. Rather, we allow managers to work with individuals on helping them succeed. The key issue is access to great talent and the flexibility around how to best access and retain that talent. I am certainly not convinced that firm and inflexible policies would be the trigger for that."

Chicago-based Morningstar Inc. has become a self-acclaimed employer of choice, attracting people to a workplace that provides growth opportunities, a dynamic work environment and a relaxed work-lifestyle. According to employee Bevin Lemond (name changed), "People want to be seen as adults, capable of managing their own careers, and their own lives" and "People want the freedom to manage their work and their careers as they see fit". Indeed, Lemond has observed a gradual shift away from the big, bureaucratic and highly stressful

environments to companies whose corporate culture empowers people to find greater balance in the pursuit of professional and non-professional activities.

Admittedly, corporate Australia already has made some concessions toward work-life balancing by providing telecommuting, job-sharing, part-time work, flextime, and sabbaticals. However, downshifters are increasingly expecting more innovative solutions to modern life's dilemmas. As a consequence, companies are progressively more compelled to accommodate downshifters and to respond with even more creative ideas.

Is HR ready for downshifting?

Flexibility obviously creates staffing challenges for management. In some companies and departments, flexibility is clearly limited. Blue-collar plant workers, for instance, will not be able to telecommute, so there are certain functions and environments that are more inclined toward certain formats of flexibility. A Sydney-based media agency, for example, offers its employees flextime arrangements in the form of job sharing and condensed workweek. Campbell (name changed), a senior HR consultant, remarks: "In a job-share arrangement, we have agreed that a review would be performed after a six-month-interval". Campbell adds: "What I would say to other HR professionals is to be open to the flexibility concept and give it a try. There are many rewards in it for all parties involved – some benefits may not be visible up front".

Where do you draw the line? Campbell recommends thinking ahead about what the business needs to accomplish. "If you get away from why you are in the business in the first place and focus too much on the needs of the individuals, then you don't balance what's really important [for the business]," he says, and "it's a delicate balance between the business and what needs to get done to remain competitive and successful and the people you have behind to make it all happen".

The future of downshifting

There are emerging signs that the downshifting trend is part of a bigger shift in values, attitudes and the notion of what constitutes success. Are contemporary organisations willing and able to accommodate downshifters? Prior to establishing work/life initiatives, it is important to ascertain whether the organisation's culture is open and ready to support such programs. "The support from executive management is absolutely critical," states John Alonso (name changed), a HR consultant. Bob Alan (name changed), a former CEO of a large Australian mining company adds: "Work/life programs should not be seen as an additional HR expense, but as a part of a corporate quest to achieve and maintain an image of an employer of choice and a means of achieving sustainable competitive advantage". Alan says "it's ultimately the employees themselves that bring success to a company".

(from *www.humanresourcesmagazine.com.au*)

Task 3: Choose the correct answer:

1. **Downshifting at work implies**

A. getting a higher position
B. upshifting in other areas of life
C. getting less money while doing the same job
D. doing a lot of paperwork

2. **The term "downshifting" was introduced in a work by**

A. John Drake
B. Rosabeth Moss Kanter
C. Clive Hamilton
D. Franco Gandolfi

3. **Which of the following is <u>not</u> a result of overworking?**

A. poor health
B. consumer debt
C. socializing
D. personal bankruptcy

4. **Gabriella Mouson**

A. is not a downshifter
B. established her own firm
C. quit her job and devoted herself entirely to the family
D. was a former PR director

5. **Downshifting requires companies**

A. to hire more people
B. to sack a lot of people
C. to adjust business needs with those of employees
D. to allow employees to work at home

6. **In response to downshifting, organizations in Australia**

A. are providing flexi-time
B. are doing nothing
C. are paying more money to their employees
D. are hiring psychologists for working with people inclined to downshifting

7. **Downshifters**

A. are always cynical
B. always criticize the policy of the company they work for
C. are angry
D. measure success by their own standards

8. **Clive Hamilton thinks that**

A. there are becoming less and less downshifters in Australia
B. Australians are working less

C. downshifters try to change something in their lives
D. there are more downshifters in Australia than in the USA

9. Downshifters

A. try to pursue a more balanced life
B. do not want to work at all
C. want to get more money
D. want promotion

10. The reason for downshifting is

A. a desire for working less and getting more money
B. a shift in values
C. an increase in consumption
D. a desire to work at home

Warm-up Activities:

1. How do you usually get articles from scientific journals?
2. Do you usually pay for reading papers in Russian scientific journals?
3. Do you usually pay for reading papers in international scientific journals?

Task 4: Read the text "Academic Publishing. Open Sesame"

Academic Publishing
Open Sesame

When research is funded by the taxpayer or by charities, the results should be available to all without charge

Publishing obscure academic journals is that rare thing in the media industry: a licence to print money. An annual subscription to Tetrahedron, a chemistry journal, will cost your university library $20,269; a year of the Journal of Mathematical Sciences will set you back $20,100. In 2011 Elsevier, the biggest academic-journal publisher, made a profit of £768m ($1.2 billion) on revenues of £2.1 billion. Such margins (37%, up from 36% in 2010) are possible because the journals' content is largely provided free by researchers, and the academics who peer-review their papers are usually unpaid volunteers. The journals are then sold to the very universities that provide the free content and labour. For publicly funded research, the result is that the academics and taxpayers who were responsible for its creation have to pay to read it. This is not merely absurd and unjust; it also hampers education and research.

Publishers insist that high prices are necessary to ensure quality and cover the costs of managing the peer-review process, editing and distribution. High margins, they say, are evidence of their efficiency. Clearly the cost of

producing a journal is not zero. But the internet means it should be going down, not up. Over the past decade many online journals and article repositories have emerged that are run on a shoestring. Some have been set up by academics who are unhappy with the way academic publishing works. (Since January some 9,500 researchers have joined a boycott of Elsevier.) In several cases the entire editorial boards of existing journals have resigned to start new ones with lower prices and less restricted access.

But the incumbent journals are hard to dislodge. Researchers want their work to appear in the most renowned journals to advance their careers. Those journals therefore have the pick of the best papers, remain required reading in their fields and have strong pricing power as a result. What is to be done?

There is a simple way both to increase access to publicly funded research and to level the playing field for new journals. Government bodies that fund academic research should require that the results be made available free to the public. So should charities that fund research. This would both broaden access to research and strengthen the hand of "open access" journals, since many researchers would then be unable to publish results in closed ones.

Publish or perish

There are some hopeful signs. The British government plans to mandate open access to state-funded research. The Wellcome Trust, a medical charity that pumps more than £600m ($950m) a year into research, already requires open access within six months of publication, but the compliance rate is only 55 %. The charity says it will "get tough" on scientists who publish in journals that restrict access, for example by withholding future grants, and is also launching its own open-access journal. In America, a recent attempt (backed by journal publishers) to strike down the existing requirement that research funded by the National Institutes of Health should be made available to all online has failed. That is good news, but the same requirement should now be extended to all federally funded research.

Open access to research funded by taxpayers or charities need not mean Armageddon for journal publishers. Some have started to embrace open access in limited ways, such as letting academics post their papers on their own websites or putting time limits on their pay barriers. But a strongly enforced open-access mandate for state- and charity-funded research would spur them to do more. The aim of academic journals is to make the best research widely available. Many have ended up doing the opposite. It is time that changed.

(*from www.economist.com*)

Task 5: Answer the questions to the text:

1. **What does the author of the text think about paying for reading scientific journals?**
   A. It's inevitable.
   B. It's absurd.
   C. It's not common.
   D. It's fair.
2. **Why have many researchers joined a boycott of Elsevier?**
   A. Because they didn't like their works being published online.
   B. Because Elsevier didn't want to publish their works.
   C. Because they disagreed with the publishing policy of the company.
   D. Because the Elsevier wasn't the biggest academic-journal publisher any more.
3. **What should government bodies that fund academic research require?**
   A. to make the research results transparent to the public
   B. to fund the journals
   C. to control the policy of the journals
   D. nothing.
4. **What is <u>not</u> true about the Welcome Trust?**
   A. It launched its own journal.
   B. It gives grants only to scientists who don't publish their works in journals that restrict access.
   C. It tries to solve the problem with the high prices of the journals.
   D. It gives money to all scientists who apply for a grant.
5. **What is the aim of academic journals?**
   A. to make the best research widely available
   B. to make a lot of money
   C. to publish as many scientific works as possible
   D. to restrict access to scientific works

UNIT III: Strategies for Reading and Understanding. Commenting the Events

Warm-Up Activities:

1. Do you think it is important to search for other planets?
2. If other planets would be found, what would it mean for us?

Task 1: Read the text "Kepler Mission May Be Over" and arrange the passages in the correct order.

Kepler Mission May Be Over

(*http://www.sciencenews.org/*)

1 For now, Kepler will enter a fuel-saving mode that keeps the spacecraft in constant communication with Earth. Charles Sobeck, Kepler's deputy project manager, said the mission team will take the next few weeks to put together a plan of action for trying to restore one of the failed reaction wheels. "We're not ready to call the mission over," Grunsfeld said. "I wouldn't call Kepler down and out just yet."

2 The telescope that has discovered thousands of exotic, quirky worlds – and a few tantalizingly Earthlike ones – orbiting distant stars is no longer capable of finding planets, at least temporarily and probably for good. Officials with NASA's $600-million Kepler space telescope announced May 15 that an essential piece of hardware on the spacecraft has failed.

3 Unlike NASA's Hubble Space Telescope, which was repaired in space in 1993, Kepler is too far away from Earth for astronauts to visit and fix it. If engineers cannot restore the wheels from the ground, then Kepler officials will determine what kind of science can be done with the telescope's limited capabilities.

4 Since May 2009, Kepler has been staring at 170,000 stars and looking for tiny shadows cast by planets crossing in front of them. To enable Kepler to make such precise measurements, engineers installed four pointing devices, called reaction wheels, that turn the telescope and keep it dialed in on its stellar targets. One of the wheels stopped working last July, but the telescope requires only three.

5 While the telescope's search for planets may be over, researchers' analysis of the data it collected is not. Kepler data has yielded more than 2,700 likely planets and 132 confirmed ones, with more yet to come. In

all, Kepler collected almost exactly four years' worth of data, and the last year or so of that has barely been analyzed. That means there is still a chance that astronomers will find the signal of an Earth-sized planet orbiting at a life-friendly distance from a sunlike star. "I'm optimistic the data we have will allow us to accomplish that," said William Borucki, Kepler's principal investigator.

6 Further complicating matters is that the brightness of stars naturally fluctuates over time, making the process of picking out planets extra difficult. Last year NASA extended the Kepler mission to 2016 so that researchers could overcome that natural variability and pick out more planets.

7 The announcement comes not even a month after Kepler astronomers announced the discovery of the most Earthlike worlds found to date: a pair of rocky planets orbiting the star Kepler-62 that have a good chance for harboring liquid water.

8 Still, Kepler's original mission was scheduled for four years, and that's exactly how long it did its job. Early last year, when Kepler was still at full health, Borucki commented on the importance of the mission: "There is no mission that's comparable," he said. "Kepler is the greatest mission NASA has ever flown."

9 On May 14 Kepler scientists learned that the spacecraft had entered safe mode, which occurs when something is awry. When they tried to restore the telescope to normal operations, another reaction wheel failed to activate. That wheel had been behaving erratically for months, so its failure was not a total surprise. "This is something we've been anticipating for a while," said John Grunsfeld, NASA's associate administrator of the science mission directorate.

10 Still, the news comes as a major disappointment to astronomers. The primary goal of the Kepler mission was to determine how common planets similar to Earth are in the galaxy. Even if Kepler's existing data yields a handful of Earth analogs, that big question may not be answerable.

Warm-Up Activities:

1. What do you know about body's clock?
2. In what way does the disruption of bodily rhythms influence us?

Task 2: Read the text "Body's Clock Linked to Depression" and arrange the passages in the correct order.

Body's Clock Linked to Depression

(*http://www.sciencenews.org/*)

1 In mammals, daily rhythms such as sleep, hormone cycles and eating patterns are guided by a master clock in the brain whose rhythms are maintained in part by genes and patterns of light and darkness. The master clock can get out of sync with clocks elsewhere in the brain and body. This discord, for example, produces the out-of-sorts feeling of jet lag, says Jun Li, a statistical geneticist at the University of Michigan in Ann Arbor.

2 The research doesn't demonstrate whether depression causes the circadian disruption or vice versa, but it confirms a link and might lead to investigations of the physiological processes that are affected, says Ying-Hui Fu a molecular biologist and geneticist at the University of California, San Francisco.

3 The disruption of sleep and other bodily rhythms that often accompanies clinical depression may leave a mark on the brain. A study of gene activity in the brains of people who suffered from depression reveals that their daily clocks were probably out of whack. The results appear May 13 in the Proceedings of the National Academy of Sciences.

4 "The data set is very solid," Fu says. "And to collect 30 to 50 brains? Just getting blood or cheek cells is hard enough."

5 "This is really important work, amazing work," says Noga Kronfeld-Schor, a physiologist who specializes in circadian rhythms at Tel Aviv University. "There's been indirect evidence, but this clearly shows a connection between disrupted circadian cycles and depression."

6 After determining how long after sunrise each person's death was, the team looked at what genes were turned on in six brain regions, gathering a total of 12,000 records of gene activity. Among nondepressed people, patterns were pretty predictable. One gene's activity, for example, consistently peaked at sunrise, another's at midday, Li says. But in the depressed brains, gene activity seemed uncoupled from time of day. Their patterns of activity also weren't as predictable.

7 Each brain analyzed in the study shows gene activity at only one point, the time of death. Circadian rhythm researchers typically take measurements from a person over the course of 24 hours. That strategy works for sampling blood cells, for example, but not brains. The brain data, which were collected with the help of collaborators at several universities including the brain bank at the University of California, Irvine, isn't perfect but is impressive, Fu says.

Warm-Up Activities:

1. What do you know about identical twins?
2. Why do you think the identical twins may have different behaviour?

Task 3: Read the text "Exploration Forges Differences in Identical Twins" and arrange the passages in the correct order.

Exploration Forges Differences in Identical Twins

(http://www.sciencenews.org/)

Distinctive personalities in mice related to brain development

1 After three months, the researchers removed and cross-sectioned the animals' brains, counting how many neurons were spawned in the hippocampus, a brain region important in navigation and memory. Neuron generation – which helps the hippocampus adapt to complex environments and experiences – is relatively easy to observe and quantify, Kempermann says.

2 Kempermann and colleagues say a whole host of factors could produce these differences, but they don't know which ones are the main culprits. Among the possibilities are gene mutations arising after conception, differences in feeding, position in the uterus and epigenetic effects – the environment's influence on gene activity through chemical modifications that don't change the genes themselves.

3 Identical twin mice sharing the same mazelike environment develop distinct personalities based on how much they explore their surroundings, researchers report in the May 10 Science. After death, those differences were reflected in the animals' brains.

4 Researchers led by Kempermann put 40 genetically identical female mice in an elaborate cage and observed their behavior. The cage had

multiple levels linked together by tubes and contained toys and other features that the animals could explore. The researchers equipped each mouse with a microchip that tracked its location, using the animals' movements as a measure of exploratory behavior. Initially, the mice differed only slightly in their tendency to roam. As they grew older, all tended to explore more often, but the differences among the mice grew more pronounced.

5 Some character and biological differences between identical twins may originate as early as pregnancy. But twins become more and more different as life goes on, even when they grow up together. Scientists have recognized that having distinct experiences within the same environment might boost such personality differences, but that's difficult to test in humans.

6 Despite being genetically identical, the mice weren't behaviorally identical to begin with: They almost certainly had subtle brain differences that made some want to explore more than others, Gage notes. "What's interesting for me is, what is that initiating event that contributes to the differences?"

7 The study "highlights something for which we had some intuition before, but actually quantifies it," says Fred Gage, a neuroscientist at the Salk Institute for Biological Studies in La Jolla, Calif.

8 Studying it in animals has multiple benefits. "You can keep the genes constant and also keep the environment constant," says Gerd Kempermann of the Center for Regenerative Therapies Dresden in Germany. "It's much more controlled than in a human situation."

9 Within the test group, some of the mice explored a wider area than others did. The more the mice explored, the more new neurons they generated on average, the researchers found. While it's not clear that the exploring was what caused the boost in neurons, Kempermann says, further experiments in which researchers manipulate mice's behavior and observe neuron generation, or vice versa, could demonstrate cause-and-effect.

Unit IV: Modern Problems in Science and Engineering

Warm-Up Activities

Task 1: Answer the following questions:

1. Why did man live in harmony with nature many years ago?
2. What is the main problem of modern power engineering?
3. What is the way of reaching balanced progress between energy consumption and technological development?

Task 2: Read the text "Our Tanks are on Full".

Our Tanks are on Full

by Newt Gingrich

For the past 30 years, America has grown increasingly dependent upon foreign sources of energy, sending American dollars to countries that are hostile to American interests and leaving us vulnerable to wild fluctuations in energy prices.

This energy crisis has not gone unnoticed in Washington. Every U.S. president since Richard Nixon has spoken about the need to make America more energy-independent. Despite their strong words, no rational strategy has been implemented for achieving that goal. In fact, where government has acted, it has usually made the problem worse.

Let's be clear: our energy crisis is not due to a lack of American energy resources. We have more coal than any other country in the world. There are 86 billion barrels of oil and 420 trillion cubic feet of natural gas lying undeveloped offshore. Shale-oil reservoirs in parts of Colorado and Utah could hold upwards of 1 trillion barrels of oil – more than three times the proven reserves in Saudi Arabia. Nuclear power is a clean source of energy that produces zero carbon emissions. It generates 20 percent of America's electric power today, and with the right investment could generate far more.

Instead, America is suffering from an artificial energy crisis, one that is the product of our government's policies, not despite them. For example, until September 2008, Congress had made it illegal to drill for oil and natural gas in most areas off our coasts. Congress still forbids the development of the vast shale-oil reserves in the Rocky Mountains even though there are promising technologies that could make extracting oil from shale economically competitive. In addition, laws passed in the 1970s banning the recycling of spent nuclear fuel forced nuclear-power plants to invest in techniques to dispose of the fuel; the long-running feud over where to store the spent fuel has helped prevent the construction of more plants.

And now instead of making energy cheaper – which would help create jobs and save Americans money – President Obama wants to impose a cap-and-trade regime. Such a plan would have the effect of an across-the-board energy tax on every American, mat will make our artificial energy crisis even worse – and raising taxes during a deep economic recession will only accelerate American job losses.

The Obama administration's own budget director is on record predicting an increase of about $1,300 in the price of energy for the average American from this type of energy tax. As a candidate, Obama himself recognized the pain this would cause every American: "Under my plan ... electricity rates would necessarily skyrocket."

What America needs is a rational energy policy that utilizes all our homegrown energy resources while protecting the environment. For instance, in addition to opening up the Arctic National Wildlife Reserve and the shale-oil deposits in Colorado and Utah for drilling, we should change our federal law to give all states with offshore oil and gas the same share of federal royalties that other states get for land-based resources. Revenue generated from these royalties could help many cash-strapped states address their budget problems, in addition to funding alternative- and renewable- energy research. In addition, we should allow companies to write off 100 percent of their expenses in the first year if their refineries considerably expand America's oil-refining capacity.

The federal government should also develop a package of incentives to encourage clean-energy innovation. This should include a series of tax-free prizes to accelerate innovation in developing clean-coal technologies, as well as a $1 billion tax-free prize for the first hydrogen car that can be mass-produced at a reasonable price. We should make the wind- and solar-power tax credits permanent to provide long-term stability to these growing industries and develop long-distance transmission lines to move the massive amounts of wind power in the Great Plains to urban areas. We should also pass an open-fiiel standard for 95 percent of the new cars sold in the United States, allowing the construction of flex-fuel vehicles (FFVs) that can run on a variety of fuels, including ethanol. Finally, America should implement a loser-pays rule for lawsuits against any energy company. This would guarantee that any lawsuit brought against an energy developer was not done solely to slow down the process through the courts.

These are the beginning steps of a rational strategy that fully utilizes our vast energy reserves to lower the cost of energy for every American and help create cleaner and renewable energy sources. It's time for America to end its artificial energy crisis.

(*from NEWSWEEK, April 13, 2009*)

Task 4. Answer the following questions to the text:

1. America has grown dependent upon
a) foreign countries
b) energy crisis
c) energy sources abroad
d) energy prices
2. Nuclear power source of energy generates
a) half of America's elecric power
b) 50 %
c) a quater
d) one fifth
3. What does "forbid mean"?
a) to refuse
b) to follow
c) to produce
d) to ban
4. What do laws passed in the 1970s ban?
a) recycling of used nuclear fuel
b) recycling of spent oil
c) using nuclear fuel
d) using recycled fuel
5. What should be tax-free prize for the first hydrogen car?
a) one milliard dollars
b) one billion pounds
c) one million dollars
d) one million pounds
6. The author thinks that the energy crisis in America is
a) a global problem
b) the result of bad policies
c) created by fluctuations in energy prices
d) unnoticed in Washington
7. The author recommends to
a) make energy clearer
b) raise taxes
c) follow Obama's cap-and-trade regime
d) recycle spent nuclear fuel

Warm-Up Activities

Task 5: Answer the following questions:

1. Would you like the chlimate where you live to be warmer or colder?
2. What might happen globally as a result of the temperature change?
3. What processes could cause climate change?

Task 6: Read the text "It's Too Late to Stop Global Warming".

IT'S TOO LATE TO STOP GLOBAL WARMING

(*by Fred Guterl*)

The last time world leaders talked about halting global warming, in Kyoto in 1997, they lacked a consensus. The U.S. Senate had spurned the talks by a vote of 95-o, eliminating any chance that the United States, then the world's biggest emitter of carbon dioxide, would take a leadership role. And China, soon to become the biggest emitter, was exempt from having to make painful cuts. As we move toward new talks in December in Copenhagen, the key players seem to be engaged for the first time. In the United States, the Waxman-Markey bill, which aims to aggressively cap and reduce greenhouse-gas emissions, has passed the House and is awaiting action in the Senate. The big worry now is that the planet may not adhere to the diplomatic timetable.

When it comes to climate, what counts is not only what humans do to reduce the buildup of greenhouse gases, but also how the earth responds. Currently half the carbon we release into the atmosphere gets absorbed by land and sea – much of it by plants, which take in carbon dioxide in the process of photosynthesis. This cycle has the potential to change at any time, and the consequences could dwarf any measures agreed to at Copenhagen to halt the temperature rise. At issue is the balance between two natural phenomena. One is beneficial: as carbon-dioxide levels in the air rise, plants grow more quickly, absorbing more carbon in return. Scientists can measure this in the lab, but they don't know how much more fertile the new, carbon-enhanced environment will be for plants. The other is "a monster in the dark," says Stephen Pacala, an environmental scientist at Princeton. As temperatures rise, permafrost, which holds an enormous amount of carbon from long-dead plants, tends to dry out, allowing decay and a release of carbon into the atmosphere. If this phenomenon, called "outgassing," were to kick in, it could inundate the atmosphere with carbon dioxide, perhaps doubling or tripling the effect of the past century of human industry.

Outgassing is one of the "dangerous anthropogenic warming" effects that the Copenhagen summit is trying to head off. Nobody knows for sure

what might trigger it, but preventing a global temperature increase of more than 2 degrees Celsius is considered essential. To stay below that limit, the consensus is that we should establish a maximum leve] of carbon in the atmosphere and dc whatever is necessary to stay below it. A few years ago, scientists thought that a doubling of carbon concentrations over preindustrial times, to 550 parts per million, was a reasonable line in the sand; in recent years they've revised that figure downward, to 450 ppm, which is what Copenhagen (and the Waxman-Markey bill) aim for. But reaching that would require a drastic 80 percent cut in emissions by midcentury. And a minority of scientists, led by NASA's outspoken expert, James Hansen, say even that's not enough: they think the concentration limit is 350 ppm – and we're already at 387 ppm. Meanwhile, observations, though not conclusive, have been pointing in the wrong direction: temperatures are rising quickly at the poles, the north polar ice cap is in retreat, permafrost is showing troubling signs of change, and ocean currents may be weakening the uptake of carbon. As politicians negotiate and the rest of us feel good about driving hybrids and using fluorescent bulbs, our fate may be riding on an obscure contest between plants and permafrost.

(*from NEWSWEEK, August 24 & 31, 2009*)

Task 7: Answer the questions to the text:

1. What was the reaction of the U.S. Senate to the talks about global warming?

a) it had eliminated them
b) it had refused them
c) it had banned them
d) it had postponed them

2. What part of carbon we release into the atmosphere is absorbed by land and plants?

a) 50 %
b) 100 %
c) 25 %
d) 75 %

3. What does "one" in the second passage refer to?

a) issue
b) balance
c) phenomenon
d) benefit

4. What helps to hold an enormous amount of carbon from long-dead plants?
a) temperature rise
b) permafrost
c) atmosphere
d) sea
5. What is Copenhagen summit trying to head for?
a) global cooling
b) global warming
c) energy crisis
d) outgassing
6. What carbon concentration limit is Copenhagen summit aim for?
a) 450 ppm
b) 550 ppm
c) three times more than a few years ago
d) 350 ppm
7. Where are temperatures rising quickly?
a) in permafrost
b) in the ocean
c) at the poles
d) in Arctic region
8. What does the author think about global warming problem?
a) it's too overdue to stop it
b) it's difficult to stop it
c) it's necessary to stop it
d) it's impossible to stop it

Unit V: Anthropogenic Problems in the Society

Warm-Up Activities

Task 1: Discuss the prediction about technology. Decide which ones are most likely to happen and when.

1. Tiny robots will be injected into our bodies.
2. You will be able to interact with characters in a TV programme.
3. Planes will be controlled by computers.
4. Cars will automatically drive at speeds.
5. You will be able to download your brain to a computer.
6. We will be able to "grow" plastics and fabrics from molecules.

Task 2: Read the text "What is Scientific Progress".

What is Scientific Progress?

Introduction

What is scientific progress? The answer is simple. Science (or some particular scientific field or theory) makes progress precisely when it shows the accumulation of scientific knowledge; an episode in science is progressive when at the end of the episode there is more knowledge than at the beginning. This simple, cumulative conception of scientific progress is not original; indeed it has a venerable history. Yet philosophers of science have almost entirely ignored this conception, at least since it was condemned by Kuhn and others in the 1960s. Even in the realist reaction against positivism and relativism the cumulative conception has not been rehabilitated. Realists have typically sought an account of progress in terms of increasing verisimilitude (truth-likeness, approximate truth) rather than increasing knowledge.

There are three approaches to characterise scientific progress: (i) the epistemic approach, (ii) the semantic approach, and (iii) the functional-internalist approach. The epistemic approach takes knowledge to be the concept we need in order to understand what progress is. The semantic approach takes truth (or verisimilitude) to be the central concept of defining progress. And the functional-internalist holds that progress is made when a scientific development succeeds in fulfilling a certain function (such as solving a scientific problem), where that function is understood in such a way that the scientific practitioners are themselves in a position to judge whether the function has been fulfilled.

(*http://eis.bris.ac.uk/~plajb/research/papers/Scientific_Progress.pdf*)

Task 3: Do the following statements agree with the view of the author (Yes, No, Not Given)?

1. Science makes progress when gives good results.
2. Some philosophers of science have almost disregarded this conception.
3. The epistemic approach considers knowledge as a concept we need to understand what progress is.
4. The semantic approach considers knowledge to be the central concept of defining progress.
5. The functional-internalist approach holds that progress is made when a scientific development succeeds in fulfilling some research.

Task 4: Warm-Up Activities:

1. Can you define the word "nanotechnology"?
2. In what areas of our life do we use the achievements of nanotech?
3. Is your scientific research connected with nanotechnology?

Task 5: Read the text "The Meaning of Nanotechnology" (Part I).

The Meaning of Nanotechnology (Part I)

What is Nanotechnology? A basic definition: Nanotechnology is the engineering of functional systems at the molecular scale. This covers both current work and concepts that are more advanced.

In its original sense, 'nanotechnology' refers to the projected ability to construct items from the bottom up, using techniques and tools being developed today to make complete, high performance products.

When K. Eric Drexler popularized the word 'nanotechnology' in the 1980's, he was talking about building machines on the scale of molecules, a few nanometers wide – motors, robot arms, and even whole computers, far smaller than a cell. Drexler spent the next ten years describing and analyzing these incredible devices, and responding to accusations of science fiction. Meanwhile, mundane technology was developing the ability to build simple structures on a molecular scale. As nanotechnology became an accepted concept, the meaning of the word shifted to encompass the simpler kinds of nanometer-scale technology. The U.S. National Nanotechnology Initiative was created to fund this kind of nanotech: their definition includes anything smaller than 100 nanometers with novel properties.

Much of the work being done today that carries the name 'nanotechnology' is not nanotechnology in the original meaning of the word. Nanotechnology, in its traditional sense, means building things from the bottom up, with atomic precision. This theoretical capability was envisioned as early as 1959 by the renowned physicist Richard Feynman.

Based on Feynman's vision of miniature factories using nanomachines to build complex products, advanced nanotechnology (sometimes referred to as molecular manufacturing) will make use of positionally-controlled mechanochemistry guided by molecular machine systems. Formulating a roadmap for development of this kind of nanotechnology is now an objective of a broadly based technology roadmap project led by Battelle (the manager of several U.S. National Laboratories) and the Foresight Nanotech Institute.

Shortly after this envisioned molecular machinery is created, it will result in a manufacturing revolution, probably causing severe disruption. It also has serious economic, social, environmental, and military implications.

(http://crnano.org/whatis.htm)

Task 6: Do the following statements agree with the reading passage (Yes, No, Not Given)?

1. According to the basic definition nanotechnology is the engineering at atomic scale.
2. In its original sense, nanotechnology refers to the ability to construct materials using advanced mechanochemistry.
3. K. Eric Drexler used the word "nanotechnology" in the meaning "building machines on the scale of nanometers".
4. Nanotechnology as an accepted concept means nanometer-scale technology.
5. The U.S. National Nanotechnology Initiative defines it as a very promising technology.

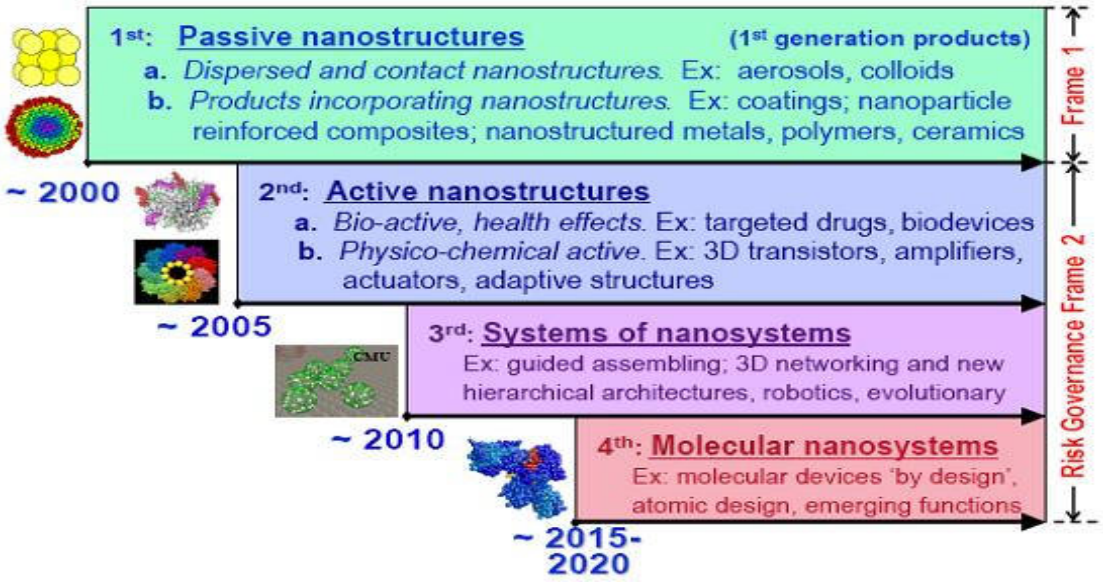
Task 7: Read the text "The Meaning of Nanotechnology" (Part II).

The Meaning of Nanotechnology (Part II).

Four Generations

Mihail Roco of the U.S. National Nanotechnology Initiative has described four generations of nanotechnology development (see chart below). The current era, as Roco depicts it, is that of passive nanostructures, materials designed to perform one task. The second phase, which we are just entering, introduces active nanostructures for multitasking; for example, actuators, drug delivery devices, and sensors. The third generation is expected to begin emerging around 2010 and will feature nanosystems with thousands of interacting components. A few years after that, the first integrated nanosystems, functioning (according to Roco) much like a mammalian cell with hierarchical systems within systems, are expected to be developed.

Picture 2



Some experts may still insist that nanotechnology can refer to measurement or visualization at the scale of 1-100 nanometers, but a consensus seems to be forming around the idea that control and restructuring of matter at the nanoscale is a necessary element. CRN's definition is a bit more precise than that, but as work progresses through the four generations of nanotechnology leading up to molecular nanosystems, which will include molecular manufacturing, we think it will become increasingly obvious that "engineering of functional systems at the molecular scale" is what nanotech is really all about.

(*http://crnano.org/whatis.htm*)

Task 8: Decide whether the following statements are true or false:

1. Mr. Roco has described 4 generations of nanotechnology achievement.
2. The present area is that of passive nanomaterials.
3. The next area is the phase of multitasking active nanostructure.
4. The third generation will include thousands of components.
5. Molecular nanosystems are expected to be developed later.

Task 9: Warm-Up Activities.

1. What is a potential of nanotech?
2. Is scientific progress an inevitable process?

Task 10: Read the text "The Meaning of Nanotechnology" (Part III).

The Meaning of Nanotechnology (Part III).

General Purpose Technology

Nanotechnology is sometimes referred to as a general-purpose technology. That's because in its advanced form it will have significant impact on almost all industries and all areas of society. It will offer better built, longer lasting, cleaner, safer, and smarter products for the home, for communications, for medicine, for transportation, for agriculture, and for industry in general.

Imagine a medical device that travels through the human body to seek out and destroy small clusters of cancerous cells before they can spread. Or a box no larger than a sugar cube that contains the entire contents of the Library of Congress. Or materials much lighter than steel that possess ten times as much strength. – U.S. National Science Foundation

Dual-Use Technology

Like electricity or computers before it, nanotech will offer greatly improved efficiency in almost every facet of life. But as a general-purpose technology, it will be dual-use, meaning it will have many commercial uses and it also will have many military uses – making far more powerful weapons and tools of surveillance. Thus it represents not only wonderful benefits for humanity, but also grave risks.

A key understanding of nanotechnology is that it offers not just better products, but a vastly improved manufacturing process. A computer can make copies of data files – essentially as many copies as you want at little or no cost. It may be only a matter of time until the building of products becomes as cheap as the copying of files. That's the real meaning of nanotechnology, and why it is sometimes seen as "the next industrial revolution."

The power of nanotechnology can be encapsulated in an apparently simple device called a personal nanofactory that may sit on your countertop or desktop. Packed with miniature chemical processors, computing, and robotics, it will produce a wide-range of items quickly, cleanly, and inexpensively, building products directly from blueprints.

Expotential Proliferation

Nanotechnology not only will allow making many high-quality products at very low cost, but it will allow making new nanofactories at the same low cost and at the same rapid speed. This unique (outside of biology, that is) ability to reproduce its own means of production is why nanotech is said to be an exponential technology. It represents a manufacturing system that will

be able to make more manufacturing systems – factories that can build factories–rapidly, cheaply, and cleanly. The means of production will be able to reproduce exponentially, so in just a few weeks a few nanofactories conceivably could become billions. It is a revolutionary, transformative, powerful, and potentially verydangerous – or beneficial – technology.

How soon will all this come about? Conservative estimates usually say 20 to 30 years from now, or even much later than that. However, CRN is concerned that it may occur sooner, quite possibly within the next decade. This is because of the rapid progress being made in enabling technologies, such as optics, nanolithography, mechanochemistry and 3D prototyping. If it does arrive that soon, we may not be adequatelyprepared, and the consequences could be severe.

It is difficult to say for sure how soon this technology will mature, partly because it's possible (especially in countries that do not have open societies) that clandestine military or industrial development programs have been going on for years without our knowledge.

We cannot say with certainty that full-scale nanotechnology will not be developed with the next ten years, or even five years. It may take longer than that, but prudence – and possibly our survival – demands that we prepare now for the earliest plausible development scenario.

(*http://crnano.org/whatis.htm*)

Task 11: Decide whether the following statements are true or false:

1. General-purpose technology will have great influence on the majority of industries.
2. Nanotech will have only commercial uses.
3. Nanotechnology offers not only better products but modernized production process.
4. In future manufacturing systems will be able to reproduce themselves, but it will be rather expensive.
5. Nanotech is potentially very safe technology.

Unit VI: Discoveries, Modern Technologies

Warm-Up Activities

Task 1: Discuss the following questions:

1. How can DNA be used at present?
2. What information might a DNA sample be able to provide in the future?
3. What is a potential of genetic engineering?
4. What are the advantages of biotechnology?
5. What are the disadvantages of biotechnology?
6. Should the concerns of ordinary people about biotechnology be dismissed?

Task 2: Read the text "It's in Our Genes. So What? DNA takes you only so far".

It's in Our Genes. So What?
DNA takes you only so far.

by Sharon Begley

THE PIONEERING genetics company deCODE and the child-development lab at the University of California, Davis, would seem to have little in common, given that the latter is full of adorable moppets who can barely walk and the former is run by a towering geneticist, Kari Stefansson, who built the company into a powerhouse, discovering scores of DNA variants linked to important human diseases.

Coincidentally, the week that deCODE Genetics, Inc., filed for bankruptcy in November, a fascinating study of those UC children appeared. The company's troubles raise questions about the value of linking complex diseases to genes. The study makes me wonder if we have been attributing to DNA a power in determining intelligence and other complex traits that it doesn't deserve.

Over the past decade, deCODE has discovered genes linked to type 2 diabetes, atrial fibrillation, heart attack, prostate cancer, glaucoma, breast cancer ... seemingly every ill ever visited upon humanity short of boils. But that wasn't good enough. The gene variants, it turns out, account for only a small fraction of the risk of developing these diseases. Plus, many genes affect that risk. As a result, tests for disease-risk genes, and even drugs that target the pathways the genes affect, aren't all that informative or useful, limiting the market for both diagnostics and treatments based on disease geiles. Based in Reykjavik, deCODE is trying to sell the scientific arm of the company; maybe future discoveries will prove of greater medical benefit.

A more pointed rebuke to DNA centrism comes from research on how children's behavior affects how adults treat them. That kids (through their behavior) create their own environment, so to speak, has been known to science since the 1960s (and to parents forever). But scientists have hardly studied it, notes psychologist Claire Vallotton of Michigan State University, in part because they have been loath to look too hard into something that implies a baby is to blame for how she is treated.

The few studies that have been done find that parents respond less, and less quickly, to fussy, crying babies. They're less affectionate to homely babies. They don't read and speak as much to fidgety, difficult babies. They respond more to infants who make complex pairings of gestures and words than to those who simply point ("Daddy's chair" vs. just "chair"). How much babies gesture, smile, make eye contact, and babble affects how adults respond to them, including responses that shape how verbal a child will be, how emotionally secure she will feel, and thus what kind of adult relationships she will have. It isn't just parents. "Children's temperament also influences how teachers treat them at least as early as first grade," says Vallotton. "That has ramifications foi later academic success."

To investigate how babies' behavior elicits certain adult behavior, she filmed at the UC child lab, where caregivers use "baby signing," gestures that reinforce babies' babbling. What she found, as she reports in *Infant Behavior & Development*, is that the more children (ages 4 to 19 months) respond to caregivers' signs and gestures with signs of their own or by pointing or waving, the more engaged and responsive caregivers were, responding by getting down on the floor, making more eye contact, or talking more with the child.

This is a small study, and we shouldn't make too much of it. But one has to wonder. Research has linked genes to intelligence, social skills, neuroticism, risk taking, impulsivity, and more. In most cases, "linked" means determining that the behavior is partly inherited, but not how the gene brings about the behavior. What if the gene affects a trait known to be strongly heritable, such as appearance or temperament, and what if that trait in turn elicits particular behaviors from parents and teachers: behaviors such as responsiveness, paying attention to, interacting with, speaking to – things that affect how a child turns out academically and socially?

If so, we are mistakenly attributing these outcomes to genes "for" intelligence and the rest, when in fact all the genes do is give a child looks or temperament that elicits, for instance, IQ-boosting responses from adults. That's important for the obvious reason that adults, armed with this knowledge, can learn to treat all children – not just the cuties who so easily bring out the best in us – in a way that nurtures their hearts and minds to develop to their fullest.

(*from NEWSWEEK, December 7, 2009*)

Task 3: Use the information in the text to match one organization (A or B) with each area of study listed below:

A. de CODE

B. Michigan State University

1. parents response to crying babies
2. how much babies gesture affects adults
3. DNA variants linked to human diseases
4. how babies' behavior elicits adult behavior
5. linking genes to social skills, intelligence
6. tests for disease-risk genes

The Secrets in Lincoln's DNA

Come along with me, past all the bicentennial hoopla, to a quiet place north of the White House. Here, at the National Museum of Health and Medicine, you'll find a glass case housing the most incredible Lincoln memorabilia on the planet: the man himself. His blood on the cuff of a surgeon's shirt. Snippets of his chocolate brown hair. A handful of bone fragments removed from his skull.

Yes, Lincoln! Guess what that might mean? Lincoln's DNA! Scientists have been speculating about the president's health for decades. It's believed he had malaria, smallpox and depression. Syphilis has been debated. And there are hypotheses about three rare genetic disorders – Marfan syndrome, spinocerebellar ataxia 5 and multiple endocrine neoplasia 2B (MEN 2B). If scientists had access to Lincoln's DNA, might they be able to clarify the medical history of one of the world's greatest historical figures? Could they also sequence his entire genome, and perhaps trace his genealogical roots back to their origins? Should the 16th president's mortal remains be put to the test?

I'm not the first person to ask this question nor am I the first to think it's a very intriguing idea. As far back as 1991, a panel of experts gave scientists a "qualified green light" to test Lincoln's DNA for Marfan syndrome – decades after a physician proposed that the president might have had it. At the time, researchers decided it wasn't technically feasible to move forward, but genetic testing is far more sophisticated today.

Experts say it might be possible to extract chopped-up bits of DNA from these museum remnants, assemble them into the gene they're looking for, then make a diagnosis. There are, of course, considerable challenges: nobody knows whether there's enough DNA in good enough condition to do a gene test, or to do one conclusively. As for sequencing Lincoln's entire genome, "I don't think it's doable," says Dr. Philip Reilly, author of "Abraham Lincoln's DNA," because there are such small pieces left and there would likely be large gaps.

If Lincoln had ataxia 5, a neurological disorder, he'd have something in common with 90 relatives descended from his paternal aunt and uncle. University

of Minnesota genetics professor Laura Ranum says there's a 25 percent chance. If so, the president would be a great example of somebody overcoming physical challenges to achieve greatness, she says. She'd love to see a test. So would Josephine Grima, of the National Marfan Foundation. "It would help raise awareness exponentially," she says. "Like what Roosevelt did for polio."

If Lincoln had Marfan syndrome, characterized by a tall lanky body, long face and deep-set eyes, he would have outlived most patients – and probably wouldn't have survived much past 56 anyway. Same with MEN 2B. Dr. John Sotos, author of "The Physical Lincoln," thinks Lincoln may have had pheochromocytoma, a cancer caused by MEN 2B, even before he was shot. If he hadn't been assassinated but died in office anyway, would he have been so highly regarded? Reilly, a member of the 1991 panel, thinks Lincoln would have said yes to testing if it could have helped others: "He was a very empathetic person."

Another issue: the remnants could be damaged along the way. Would a greater good be served? "There may not be any other place in this country where an average citizen can observe the mortal remains of an American president," says the National Museum's Timothy Clarke. Preserving those artifacts is a public trust, Clarke says, and one the museum takes very seriously. After Lincoln died, Secretary of War Edwin Stanton reportedly said, "Now, he belongs to the ages." Time to think about exactly what that means.

(*from NEWSWEEK, February 23, 2009*)

Task 4: Match the following phrases from the text

1. to speculate	a) along the way
2. to have access	b) left
3. to sequence	c) his entire genome
4. there are such small pieces	d) to Lincoln's DNA
5. he had something	e) in common with 90 relatives
6. it would help	f) raise awareness
7. he was a very	g) empathetic person
8. the remnants could be damaged	h) to the ages
9. he belongs	i) about the president's health

Task 5: Complete the summary below. Choose no more than three words from the text.

Experts …(1)… about Lincoln's diagnosis. They gave "qualified green light" to test his DNA for Marfan syndrome. At that time, researches decided it wasn't technically feasible to move forward, but …(2)… is far more …(3)… today. It might be possible …(4)… of DNA from museum remnants. Dr. Philip Reilly didn't think it could be …(5)… . If Lincoln had Marfan syndrome he …(6)… most patients.

UNIT VII: Information Technologies

Warm-Up Activities:

1. Is the use of the technology limited to individuals?
2. Can information be kept secure and private by individual users?
3. Do we need a change in the legal system to regulate data security?
4. Do the disadvantages of using IT outweigh the advantages?

Task 1. Read the text "Flicking the Vs".

Flicking the Vs

Simply put, big data is data that's too large or complex to be effectively handled by standard database technologies currently found in most organisations.

For data to be regarded as "big", it should possess three key attributes – volume, velocity and variety:

- Volume is just what it sounds like: lots of data. To put this in context, YouTube users upload 48 hours of new video every minute of every day.
- Velocity occurs where the data is time-sensitive and needs to be processed and stored quickly. One example is the real-time profiling of internet display adverts that are customised according to your usage pattern.
- Variety covers the various forms that data can take, from neatly-structured tabular data, to unstructured data containing items such as images, emails, spreadsheets, social media conversations and streaming media. Currently, there is no universally accepted "one-size-fits-all" approach to handling this data variety.

(*from http://the conversationcom*)

Task 2: Complete the following chart below. Choose no more than four words from the text.

Big data is data that's too …(1)… to be …(2)….

↓

To be regarded as "big", data should possess …(3)… or volume, velocity, variety.

↓

Volume means …(4)….

↓

Velocity means needs to be …(5)… possessed and …(6)… quickly.

↓

Variety covers different …(7)… that data …(8)….

↓

At present there is no fully accepted …(9)… approach.

Task 3: Read the text "Who's Afraid of the Bad, Big Data?"

Who's Afraid of the Bad, Big Data?

Privacy and technology go together like music and dance: it's only when both work well together that the magic happens. But what about privacy in the age of big data, an era in which your every move has been recorded somewhere in the digital world through your electronic transactions?

Does the fact we're churning out ever greater volumes of data mean we are safe, by virtue of pack anonymity, or are we at risk of serious violations of the individual's privacy rights?

Your personal digital footprint – that indelible record of your every interaction in the electronic world – is just a tiny drop in the ever increasing sea of global data.

Your email traffic, internet search history, the geotagged images you take on your smartphone and share through social media sites, your retail purchases, loyalty program transactions, payments, road toll payments and medical records – to name but a few – are all part of the unique tread that makes up that footprint.

In addition to personally generated data, business systems' transactions, social media sites, healthcare, research, government and scientific agencies, together with myriad other sources, generate rivers of data that eventually flow into the various data centres dotted around the globe.

Many are owned by internet giants such as Google, Microsoft and Amazon, with others owned by multinational corporations and governments.

And that's just the start. Consider for a moment just one of the latest major scientific endeavours, the Square Kilometre Array (SKA) Telescope – a state-of-the-art radio telescope currently in development in Australia and South Africa.

(*from http://the conversationcom*)

Task 4: Match the following synonyms from the text.

1. magic	a) to divide
2. transaction	b) file
3. digital	c) a great number
4. to share	d) deal
5. record	e) large
6. myriad	f) strange power
7. giant	g) numerical

Task 5: Read the text "Big Data and Privacy".

Big Data and Privacy

To comply with relevant privacy legislation, data that is to be externally released for purposes such as marketing, analysis and reporting should have the individual's personal information removed – a process known as anonymising, or deidentifying.

But when disparate data from a range of anonymised, independent data sources can be matched using specialised algorithms to geotagged information, it may be possible to reidentify data that was previously anonymised.

A number of researchers have already shown reidentification to be possible by using specially crafted matching algorithms.

The risks associated with the possible reidentification of personal information should be a topic high on the agenda for industry regulators, legislators and those concerned about information security and privacy.

On the bright side, the reidentification of big data is a distinct advantage for anti-terrorism and law enforcement agencies. The ability to pinpoint individuals who are a likely threat to society or involved in criminal activities would be largely seen as a positive use of big data.

But the possibility of misidentification is real, which may have serious consequences for the individuals concerned. Factors such as the provenance and accuracy of source data, together with the validity of the analytical techniques used, needs to be meticulously verified to minimise the occurrence of misidentification in such instances.

(*from http://the conversationcom*)

Task 6: Match the following antonyms from the text.

1. relevant	a) to disaccord
2. anonymise	b) incorrectness
3. to disparate	c) unimportant
4. to match	d) unskillfullness
5. accuracy	e) equal
6. validity	f) numerical
7. technique	g) unreliability

Task 7: Read the text "Data Legislation" and choose from the passages A-G the one which fits each gap. There is one extra passage which you do not need to use.

Data Legislation

Using overseas cloud computing providers such as Google or Microsoft to store and manage large data sets introduces the additional complexity of international data residency legislation.

1.

Data governance is a crucial consideration. The process of managing, analysing and interpreting big data involves the merging of the disparate data sources to newly created, consolidated data sets.

2.

Who decides what access controls should be applied to the new data sets, and in which legal jurisdiction?

Globally, cybercrime is a multi-billion dollar business with some of the smartest brains employed to crack security systems. Put simply, there is an ongoing arms race between the cloud providers and the cybercriminals, and sometimes the latter win.

3.

Big data is currently the "hot topic" in the IT world, and as is the case with all preceding technology innovations and fads, has whipped up its fair share of emotions.

4.

The five-phase cycle begins with a "technology trigger" (the breakthrough of a product or technology) and ends with a "plateau of productivity" (the point at which the technology or concept becomes an accepted and stable part of the landscape).

5.

Big data, some argue, may have already passed its peak of expectations and be heading for the trough.

6.

The question when that buzzing stops is whether you will be better off in the volatile, globalised world of big data.

A. The concept of the technology hype cycle – coined by the American IT firm Gartner, Inc in the 1990s – is frequently used to describe and map the typical phases in the evolution and adoption of new technologies.

B. The laws of the country in which the data is located (as opposed to where it is generated) apply. Managing the array of privacy and related data-residency legislation across multiple international legal jurisdictions is not a trivial exercise.

C. Business and government agencies are, understandably, looking to maximise the potential value inherent in big data; but while mitigating the numerous data integrity, privacy and security risks, they should not be deafened by the current buzz around big data.

D. We should never ignore the fact big data presents a rich target of opportunity for cybercriminals.

E. A number of questions arise over the governance and security of these new data sets, such as: who owns, or has title to, these newly created, aggregated data sets?

F. Between those bookends are a couple of stages with self-explanatory titles: the "peak of inflated expectations" and the "trough of disillusionment".

G. Once operational, the SKA is expected to produce data equivalent to between ten and one hundred times the traffic of the entire internet, and will require the equivalent processing power of about a hundred million PCs! That's the shape of things to come …

UNIT VIII: Strategies for Reading and Understanding. Summarizing Data and Facts, Describing Phenomena

Warm-Up Activities:

1. Do you use any visual aids in you work? Which ones?
2. What types of graphs do you know?

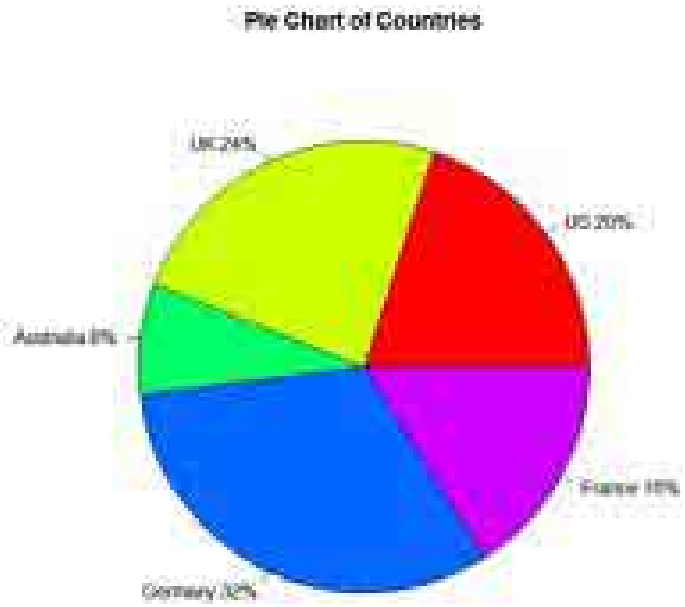
Task 1: Match the words or phrases with pictures:

line graph
bar graph
pie chart
table

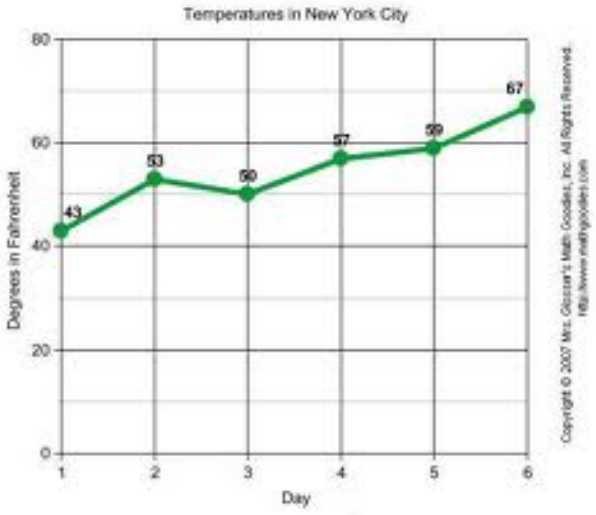
Picture 3

Features	Other Products (Software)	Internet	Mortgage Mantra
Financial Calculators	×	✓	✓
Loan Balance Table	×	✓	✓
Save - Print Features	×	×	✓
Report Builder	×	×	✓
Sample Docs	×	×	✓
Customization	×	×	✓
All In One *	×	×	✓

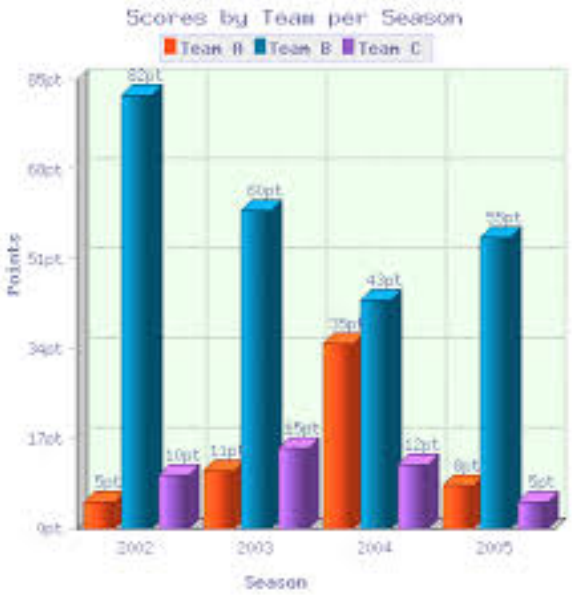
Picture 4



Picture 5



Picture 6

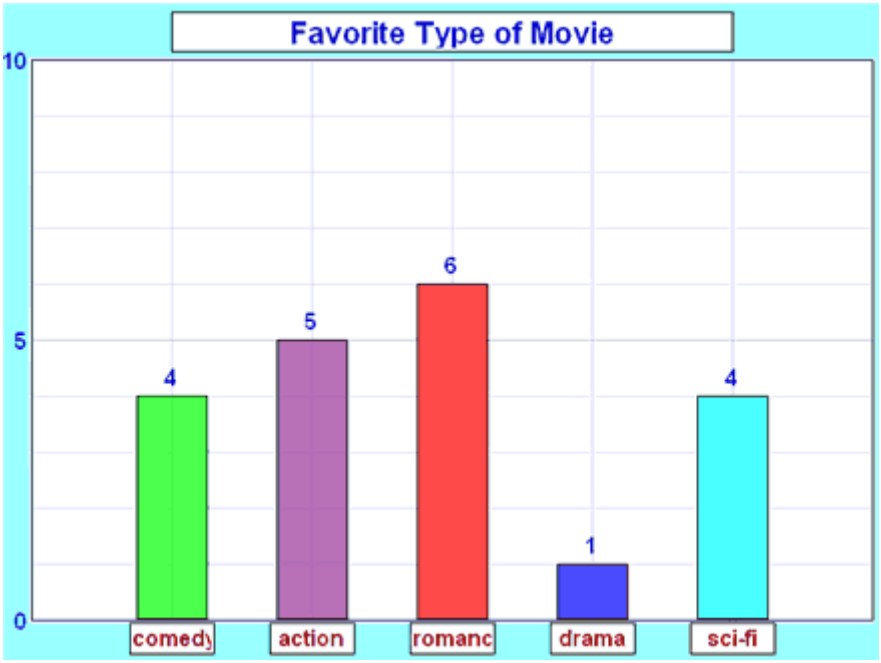


Task 2: Answer the following questions:

1. What is the difference between a bar graph and a histogram?
2. Which graph would we use to determine how many textbooks have less than 600 pages?
3. Which graph would we use to compare the size of a science book and a history book?

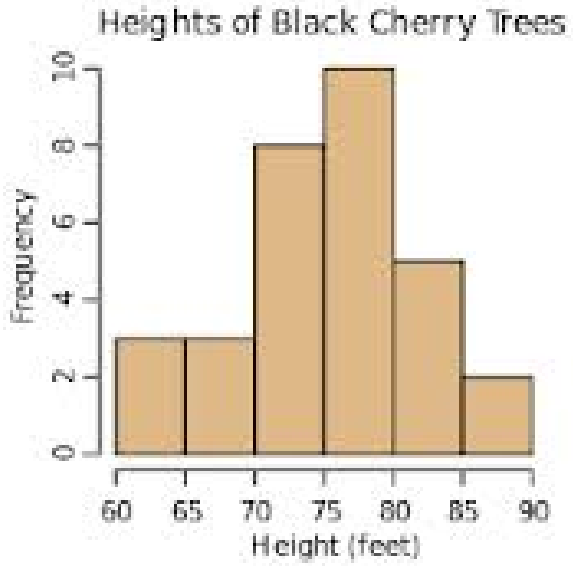
A.

Picture 7



B.

Picture 8



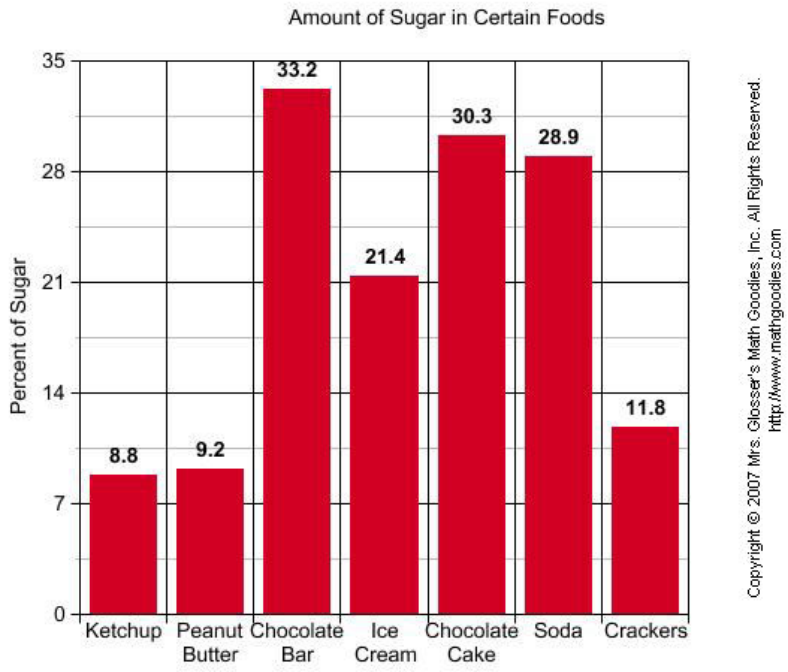
Task 3: Which of the following adjectives can we use with the noun FALL and which ones – with the noun INCREASE:

Marked
Steady
Sharp
Dramatic

Gradual
Significant
Rapid
Steep
Moderate
Slight
Sudden

Task 4: Study a bar chart:

Picture 9



Task 5: Answer the following questions to the bar chart:

1. Which foods are rich in sugar?
2. Which ones are poor in sugar?
3. How many groups of foods can we distinguish according to the graph?

Task 6: Study a model for describing the bar chart:

The bar chart illustrates the amount of sugar in such foods as ketchup, peanut butter, chocolate bar, ice cream, chocolate cake, soda and crackers. Here we can distinguish 3 groups: foods with the highest amount of sugar; foods with the medium percentage of sugar and foods which are relatively poor in sugar.

The group with the highest amount of sugar is comprised of a chocolate bar, a chocolate cake and a soda. A chocolate bar contains the largest

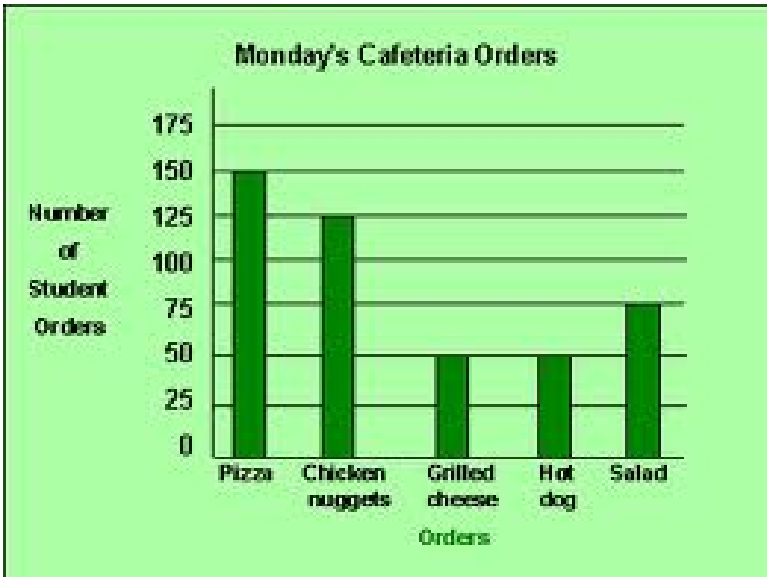
percentage of sugar – just over 33 percent. This can be compared to a chocolate cake which has approximately 30 percent of sugar in it and a soda in which there are about 29 percent of sugar.

The second group includes ices cream which contains just over 21 percent of sugar.

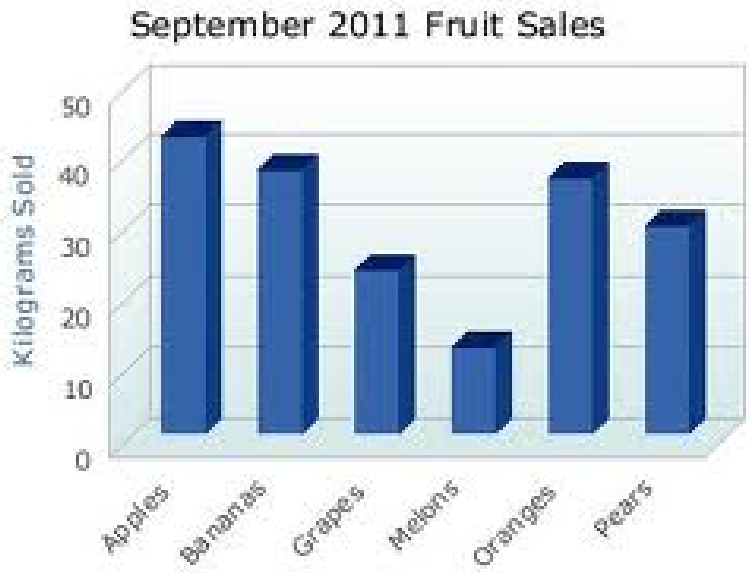
Crackers, peanut butter and ketchup are among the foods with the smallest amount of sugar – about 11.8, 9.2 and 8.8 percent respectively.

Task 7: Describe the following graphs:

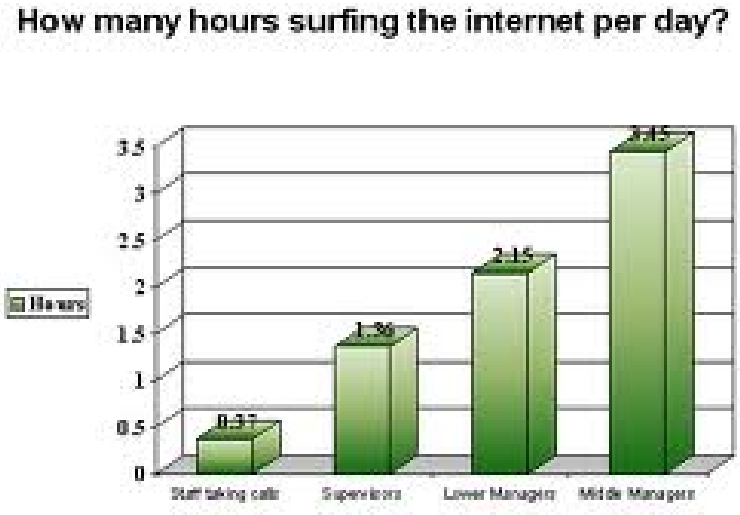
Picture 10



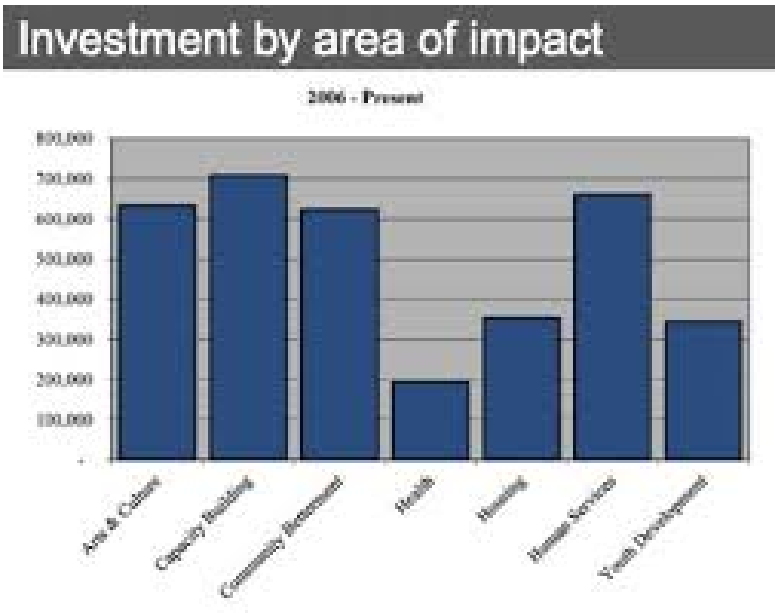
Picture 11



Picture 12



Picture 13



Task 8: Read the text and present the data in any type of a graph.

Open Text (TSX:OTC) announced plans Wednesday to start paying a quarterly dividend to common shareholders even as the software services company reported lower profits in its third quarter.

The first dividend will be payable on June 21 to shareholders of record on May 31, the company said Wednesday.

Based on the issue's closing price on the Toronto Stock Exchange of $57.74, up 30 cents, the stock would produce a yield of about two per cent.

Meanwhile, Open Text reported lower net profit of US$25.8 million in its third quarter compared with US$34.7 million in the same period last year.

Earnings per share diluted were 44 cents compared with 59 cents year-over-year.

Revenue was $337.7 million, up 16 per cent from $292.3 million in the same quarter last year.

Licensing revenue was $69 million, up 13 per cent year-over year.

“We are committed to delivering value to our stockholders through technology innovation, strategic acquisitions and now through a dividend,” CEO Mark Barrenechea said in a news release.

“We generated $333.1 million in operating cash flow over the last 12 months and we are running our business at record operating margins,” Barrenechea added.

“We have always been committed to rewarding our stockholders' investments in Open Text and the board has decided that it is the right time to declare a dividend for our stockholders.”

The company has approximately 100 employees in Ottawa.

http://www.obj.ca/Technology/2013-04-25/article-3227187/Open-Text-reports-lower-Q3-profit-of-258M/1

UNIT IX: Strategies for Reading and Understanding. Expressing the Opinion.

Warm-Up Activities:

1. What do you think about cloning?
2. Do you think embryonic stem cells will treat human deceases?

Task 1: Read the text "Cloning Produces Human Embryonic Stem Cells" and choose the fragment which best fits each gap

Cloning Produces Human Embryonic Stem Cells

Fine-tuning of technique used in other animals could enable personalized medicine

For the first time, scientists have created human embryonic stem cells by transferring the nucleus of a mature cell into an egg. The cloning technique could nudge the dream _____ **(1)** _____.

"It's a huge, landmark achievement," says stem cell biologist George Daley at Children's Hospital Boston and Harvard University. Creating embryonic stem cells by nuclear transfer in humans, he says, is "the next major technological advance since Dolly."

The famous sheep Dolly was _____ **(2)** _____ . Since the animal's birth in 1996, scientists around the world have tried to duplicate the technique in human cells.

Unlike adult cells, which have already followed a path to become, say, heart cells, neurons or skin cells, embryonic stem cells are uniquely poised to become any cell in the body. And if scientists could make these stem cells _____ **(3)** _____.

But creating embryonic stem cells in humans has proven tricky, says Kathrin Plath, a stem cell biologist at the University of California, Los Angeles. No one knew why the technique worked in other mammals but not humans. Researchers had to _____ **(4)** _____. In 2011, scientists came close, but the egg stalled out after three divisions, producing just eight cells.

In 2007, a new way to make stem cells dazzled scientists in the field (SN: 11/24/07, p. 323). By dosing human cells with a small cocktail of molecules, researchers pushed a reset button that turned adult cells back into embryonic-like ones called induced pluripotent stem cells, or iPS cells.

"For the last six or seven years, virtually all of us have ended our nuclear transfer efforts and switched over to iPS cells," Daley says.

But a team led by Shoukhrat Mitalipov of the Oregon National Primate Research Center in Beaverton kept plugging away at nuclear transfer, first using rhesus macaques, and then with human cells.

One key change was adding caffeine to the eggs before DNA transfer, says stem cell biologist James Byrne of UCLA, who was not involved in the new work. Caffeine acts like a set of chemical reins, holding back the egg's development until researchers inject a new nucleus. The new protocol also _____ **(5)** _____.

_____ **(6)** _____, researchers made embryonic stem cells from an egg and the nucleus of a young boy's skin cell. The new cells can grow and divide to form a mass of embryonic stem cells just like those derived from fertilized embryos, Mitalipov said in a press briefing May 14.

And when researchers ground the cells up and compared the genetic bits to those in embryonic stem cells, _____ **(7)** _____. Virtually all of the new cells' genes were reset to their embryonic states.

What's more, Byrne says, the approach boasts "dramatically improved efficiency." Instead of burning through thousands of eggs to make a single embryonic stem cell line, Mitalipov's group could use just two eggs.

The new cells may have advantages over iPS cells in treating some genetic flaws that lurk in mitochondria, little cellular power plants _____ **(8)** _____. By putting the nucleus of a patient's skin cell into a fresh egg with healthy mitochondria, scientists could potentially make a customized therapy that erases the defects, Mitalipov said.

The work "is certainly impressive," says developmental biologist John Gurdon, who shared the 2012 Nobel Prize in physiology or medicine for pioneering the nuclear transfer technique to clone a frog.

Next, Gurdon says, researchers ought to compare the new embryonic stem cells with iPS cells. A side-by-side look might provide clues to how resetting adult cells actually works. If they can _____ **(9)** _____.

Embryonic stem cells made using this method have the potential to treat spinal cord injuries and diseases such as diabetes or Parkinson's, says Dietrich Egli, a stem cell biologist at the New York Stem Cell Foundation. "I'm very confident that such cells will be used for therapies in humans in the future."

(*www.sciencenews.org*)

A. features other tweaks such as examining the eggs under polarized instead of ultraviolet light, which can damage the egg

B. from a patient's own tissues, once-untreatable conditions could perhaps be cured by replacing damaged cells with healthy ones.

C. of personalized medicine closer to reality, researchers suggest May 15 in Cell
D. Using the new method
E. the first mammal cloned by the nuclear transfer technique, injecting the nucleus of a cell from one adult sheep into the egg of another
F. they didn't see much of a difference
G. figure out why Mitalipov's nuclear transfer method is so successful, researchers might be able to improve the technique to make iPS cells and avoid having to retrieve eggs from volunteers
H. figure out the best way to ease out an egg's DNA, slip in a new nucleus and then cue the egg to divide and grow
I. that carry their own DNA

Warm-Up Activities:

1. Do you think global warming is real?
2. Can we take any measures to prevent the process?

Task 2: Read the text "A Cheap and Easy Plan to Stop Global Warming" and choose the fragment which best fits each gap

A Cheap and Easy Plan to Stop Global Warming

Here is the plan. Customize several Gulfstream business jets with military engines and with equipment to produce and disperse fine droplets of sulfuric acid. Fly the jets up around 20 kilometers – _____**(1)** _____ but still well within their range. At that altitude in the tropics, the aircraft are in the lower stratosphere. The planes spray the sulfuric acid, carefully controlling the rate of its release. The sulfur _____ **(2)** _____. These get swept upward by natural wind patterns and are dispersed over the globe, including the poles. _____ **(3)** _____ the aerosols will reflect about 1 percent of the sunlight hitting Earth back into space. Increasing what scientists call the planet's albedo, or reflective power, will _____ **(4)** _____.

The author of this so-called geoengineering scheme, David Keith, _____ **(5)** _____. Much more research is needed to determine whether injecting sulfur into the stratosphere would have dangerous consequences_____ **(6)** _____. Even thornier, in some ways, are the ethical and governance issues that surround geoengineering – _____ **(7)** _____. Still, Keith, a professor of applied physics at Harvard University and a leading expert on energy technology, has done enough analysis to suspect it could be a cheap and easy way to head off some of the worst effects of climate change.

_____ **(8)** _____, if operations were begun in 2020, it would take 25,000 metric tons of sulfuric acid to cut global warming in half after one year. Once under way, the injection of sulfuric acid would proceed continuously. By 2040, 11 or so jets delivering roughly 250,000 metric tons of it each year, at an annual cost of $700 million, would be required to compensate for the increased warming caused by rising levels of carbon dioxide. By 2070, he estimates, _____ **(9)** _____**.**

One of the startling things about Keith's proposal is just how little sulfur would be required. A few grams of it in the stratosphere will offset the warming caused by a ton of carbon dioxide, according to his estimate. And even the amount that would be needed by 2070 is dwarfed by the roughly 50 million metric tons of sulfur emitted by the burning of fossil fuels every year. Most of that pollution _____ **(10)** _____**.** In contrast, sulfate particles remain in the stratosphere for a few years, making them more effective at reflecting sunlight.

(*an abstract from MIT Technology Review, March/ April 2013*)

A. combines with water vapor to form sulfate aerosols, fine particles less than a micrometer in diameter

B. questions about who should be allowed to do what and when

C. combines with water vapor to form sulfate aerosols, fine particles less than a micrometer in diameter

D. significantly higher than the cruising altitude for a commercial jetliner

E. such as disrupting precipitation patterns or further eating away the ozone layer that protects us from damaging ultraviolet radiation

F. the program would need to be injecting a bit more than a million tons per year using a fleet of a hundred aircraft

G. stays in the lower atmosphere, and the sulfur molecules are washed out in a matter of days

H. According to Keith's calculations

I. doesn't want to implement it anytime soon, if ever

J. combines with water vapor to form sulfate aerosols, fine particles less than a micrometer in diameter

Warm-Up Activities:

1. Do you think global warming is real?
2. Can we take any measures to prevent the process?

Task 3: Read the text "Fossils Point to Ancient Ape-Monkey Split" and choose the fragment which best fits each gap

Fossils Point to Ancient Ape-Monkey Split

African finds offer peek at a pivotal moment in primate evolution

The oldest known fossils of an ape and a monkey have been uncovered, providing an intriguing glimpse of a crucial time in primate evolution.

The discoveries suggest that by 25 million years ago, two major groups of primates were distinct: **one that today includes apes and humans and another that encompasses Old World monkeys such as baboons and macaques**. Previous studies using living primates' DNA suggested that ancient apes and Old World monkeys parted from a common ancestor between 25 million and 30 million years ago.

The new ape and monkey fossils, from Tanzania's Rukwa Rift Basin, **suggest that the evolutionary split between these primate lines must have occurred close to 30 million years ago, or perhaps even earlier**, anthropologist Nancy Stevens of Ohio University in Athens and her colleagues conclude in the May 15 Nature.

Fossil finds since the 1800s have **revealed that dozens of ape species inhabited Africa, Asia and Europe between 22 million and 5.5 million years ago**. Fewer fossils of Old World monkeys have been found, but a handful of monkey species are known to have inhabited Africa around 20 million years ago.

Using new fossils and previously recovered remains of related creatures, an artist created portraits of an ape (left) and a monkey (right) that inhabited East Africa 25 million years ago.

"The period from 25 million to 30 million years ago is **the least sampled interval in primate evolutionary history, with only three fossil primates known before our discoveries and five known now**," Stevens says.

Her team assigns a tooth-bearing lower right jaw to a new ape genus and species, Rukwapithecus fleaglei. The scientists **classify a second find, a jaw fragment containing a tooth, as a new monkey genus and species, Nsungwepithecus gunnelli**.

These animals lived 25.2 million years ago, based on age estimates of volcanic ash layers that sandwiched the Tanzanian fossils.

Rukwapithecus may not be a new ape genus, though. **The newly discovered jaw appears to belong to Rangwapithecus, an ape genus previously known from East African fossils dating to around 17 million years ago**, says anthropologist K. Christopher Beard of the Carnegie Museum of Natural History in Pittsburgh.

Even so, Beard says, the new report "makes a strong case that Old World monkeys and apes had already diverged 25 million years ago."

But New York University anthropologist Terry Harrison isn't so sure. The new Rukwapithecus jaw joins a cluster of fossils, **including those categorized as Rangwapithecus, from ancient African primates that probably did not evolve into apes despite having some apelike jaw and tooth traits**, Harrison says.

The tooth-and-jaw piece that Stevens' group attributes to a monkey may instead come from an ancient form of pig or peccary, Harrison adds. In his view, the researchers need more fossils from the animal to tell whether it's a primate.

KEYS

UNIT I

Task 2.
A. syntactical peculiarities
B. grammatical peculiarities
C. tense peculiarities

Task 3.
1. technical report
2. patent
3. abstract
4. scientific presentation
5. book
6. scientific article

Task 4:
1. G
2. C
3. H
4. D
5. I
6. E
7. F
8. A

UNIT II

Task 3.
1. B
2. A
3. C
4. B
5. C
6. A
7. D
8. C
9. A
10. B

Task 5.
1. B
2. C
3. A
4. B
5. A

UNIT III

Task 1.
2, 4, 9, 1, 3, 7, 5, 10, 6, 8

Task 2.
3, 5, 1, 6, 2, 7, 4

Task 3.
3, 7, 5, 8, 4, 1, 9, 6, 2

UNIT IV

Task 4:
1. c
2. d
3. d
4. a
5. a
6. b
7. a

Task 7:
1. c
2. d
3. a
4. a
5. a
6. b
7. a

UNIT V

Task 3:

1. Not Given
2. Yes
3. Yes
4. No
5. Yes

Task 6:

1. No
2. Not Given
3. No
4. Yes
5. Not Given

Task 8:

1. True
2. False
3. True
4. True
5. True

Task 11:

1. True
2. False
3. True
4. False
5. False

UNIT VI

Task 3:

1. B
2. B
3. A
4. B
5. B
6. A

Task 4:

1. i)
2. d)
3. c)
4. b)
5. e)
6. f)
7. g)
8. a)
9. h)

Task 5:

1. have been speculating
2. genetic testing
3. sophisticated
4. to extract bits
5. doable
6. would have outlived

UNIT VII

Task 2:

1. large/ complex
2. handled
3. three key attributed
4. lots of data
5. processed
6. stored
7. forms
8. can take
9. one-size-fits-all

Task 4:

1. f)
2. d)
3. g)
4. a)
5. b)
6. c)
7. e)

Task 6:

1. c)
2. g)
3. e)

4. a)
5. b)
6. g)
7. d)

Task 7:
1. B
2. E
3. D
4. A
5. F
6. C

UNIT VIII

Task 1:
Picture 1 – table
Picture 2 – pie chart
Picture 3 – line graph
Picture 4 – bar graph

UNIT IX

Task 1:
1. C
2. E
3. B
4. H
5. A
6. D
7. F
8. I
9. G

Task 2:
1. D
2. J
3. A
4. C
5. I
6. E
7. B
8. H
9. F
10. G

Учебное издание

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