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Кафедра иностранных языков №2

ПРАКТИЧЕСКИЙ КУРС АНГЛИЙСКОГО ЯЗЫКА ДЛЯ СТУДЕНТОВ ВТОРОЙ СТУПЕНИ ВЫСШЕГО ОБРАЗОВАНИЯ

*Рекомендовано УМО по образованию
в области информатики и радиоэлектроники
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Пособие состоит из четырех циклов: Technological Progress, Inventions and Innovations, Global Challenges, Science and Scientific Research. Цель пособия – развитие умений осуществлять иноязычную коммуникативную деятельность для решения задач информационного обеспечения профессиональной и научно-исследовательской деятельности. Разработка содержит единый комплекс упражнений и заданий, представленный в трех частях каждого цикла.

CONTENTS

ПРЕДИСЛОВИЕ

Пособие предназначено для студентов технических и экономических специальностей II ступени высшего образования. Учебное издание рассчитано на 30 аудиторных часов и включает в себя четыре цикла (Technological Progress, Inventions and Innovations, Global Challenges, Science and Scientific Research), содержащих аутентичный материал, сформированный по проблемно-тематическому принципу. Каждый цикл начинается с введения Lead-in и завершается итоговым разделом Consolidation. Три подраздела цикла в зависимости от назначения каждого из них включают этапы Data Mining, Analyzing and Evaluating и Summarizing. Представленный авторами комплекс упражнений и заданий позволяет развивать следующие умения: комбинировать стратегии аналитического и синтетического чтения; извлекать и структурировать необходимую информацию в ходе устно-речевого и письменного иноязычного взаимодействия (готовить сообщения и выступать с докладами с представлением информации в графическом виде (схемы, таблицы), принимать участие в дискуссии, вести электронную переписку и др.). Развитие умений реферирования и аннотирования осуществляется путём выполнения студентами заданий, направленных на компрессию текста с опорой на блок-схемы и ментальные карты. Таким образом, данное пособие позволяет подготовить студентов к решению задач профессиональной и научно-исследовательской деятельности средствами иностранного языка.

Пособие может быть рекомендовано широкому кругу лиц, изучающих английский язык самостоятельно.

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UNIT 1: TECHNOLOGICAL PROGRESS

Lead-in

Technological progress is an absolute need we cannot escape from, it has a very big role in most aspects of our lives, answers most of Mankind's questions. Thus, technological progress affects the economy and politics, improves medicine and influences our culture. Across centuries technological progress evolves. The importance of this progress is aiming at comfort of use in whichever form it is. But this has always been a point of debate. While technological progress has paved the way for a better life its downside cannot be overlooked. The continual use of it has led to a drastic rise in different problems.

Part I

Data mining

1. What associations do you have with the word «progress»? Complete the word web.

Progress

2. Work in a group. Share your ideas and knowledge on the four aspects of the table. Add some more elements to complete it.

Technological progress			
Types of progress	The main direction of progress	The features of progress	Consequences of progress
Revolutionary progress (Stream engine, …)	Electronization, …	Speed up the development of technology, …	Environmental consequences, …
Evolutionary progress (Telephone, …)	Use of new materials, …	A new stage in the division of labor, …	Changes in human activity, …

3. Make a list of issues you think mentioned in the article, then read the article and check if you were right.

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4. Scan the article and spot the key words and collocations that make its thematic frame.

5. Look through the article and find the paragraphs which mention the following:

1) virtual storage banks (виртуальные банки хранения);
2) raw labor (примитивный труд);
3) human capital (человеческие ресурсы);
4) long run rise (долгосрочная перспектива);
5) human effort (человеческие усилия).

6. Read paragraph 4 and try to understand it without the dictionary. Render the idea of the paragraph.

7. Arrange the following questions to reflect the content of the text. What questions won't be answered after a close reading of the text.

1. Has virtual currency got positive sides? 2. Can medicine benefit because of new technology? 3. Can new technology interfere with one's freedom? 4. How can we know the term «technology» better? 5. What is technological progress made up of? 6. What ways does technology influence on children?

Technological progress: advantages and disadvantages

Technological progress is the fundamental force underlying the long run rise in real income per person. It is the change in the production process which results in an increased output per unit of labor. Technological progress reflects the growth of human knowledge, from advances in basic science such as the discovery of the laws of thermodynamics to highly practical and applicable ideas regarding production, like the design of an airplane wing or the mechanization of repeated actions or management and workplace organization, like double-entry accounting, just-in-time production, and the techniques of modern inventory management. Technological progress or change refers to the discovery of the new and improved methods of producing goods. In production, technological progress has been the primary force underlying the shifts from manual to mechanized production methods, from natural to synthetic materials, from human and animal to mineral sources of power, and from raw labor to highly educated and specialized workers. The adoption of new technologies often drives the expansion of markets. Larger markets are required to allow workers and firms to concentrate on highly specialized activities and increase the return to innovations that involve investments in specialized knowledge or machinery.

Today, technology is very important because it is used for almost everything and like everything, technology has advantages and disadvantages. In the world today, people cannot live without technologies such as television, mobile phones, computers

and others. These technologies have slowly taken an essential part in people's day-to-day lives and being without them would be unimaginable for some of us. To understand technology, one must know what it provides in terms of advantages, but also disadvantages.

First, the evolution of technology is beneficial to humans for several reasons. At the medical level, technology can help treat more sick people and consequently save many lives and combat very harmful viruses and bacteria.

The invention of the computer was a very important point. Computers have played and still continue to play a critical function in the field of medicine, science, research, engineering, business, defense, industry, music, painting and almost anything that a person does. Almost every business is hooked to computers for its various applications that are programmed to help in the smooth and accurate operations of the business. This is what defines computers in today's world –computers that are networked, regularly connected to the Internet for communication and information exchange. And with wireless networking becoming ubiquitous, computers have evolved from its simple form into a necessity that they are today for millions of people across the globe.

Technology has also increased the productivity of almost every industry in the world. Thanks to technology, we can even pay with bitcoins instead of using banks. The digital coin has been such a game changing factor, that many realized that this is the right time to open a bitcoin demo account. Technology improves daily lives; allowing to move physical storage units to virtual storage banks and more.

In the modern industrial world, machines carry out most of the agricultural and industrial work and as a result, workers produce much more goods than a century ago and work less. They have more time to exercise and work in safe environments.

On the other hand, the evolution of modern technology has disadvantages, for example, dependence on new technology. In some areas, devices can replace the human mind. Man no longer needs to think. Even if the calculator is a good invention, man no longer makes mental calculation and no longer works his memory. The decline of human capital implies an increase in unemployment.

The negative impact of the influence of technology on children should not be underestimated as well.

The use of technology certainly needs rule and new laws. For example the internet use is an individual freedom. However, the invention of the atomic bomb cannot be an individual freedom. In fact, regulations are difficult to implement when these technologies are introduced – such as regulation surrounding the impending arrival of autonomous vehicles. Finally, as most technological discoveries aim to reduce human effort, it would imply that more work is done by machines. This equates to less work for people: the human is becoming ever so obsolete by the day, as processes become automated and jobs are made redundant.

Analyzing and Evaluating

8. Read the statements and define whether they correspond to the facts given in the text. Mark these statements as true (T), false (F) or not mentioned (NM). Correct the false statements.

1. Technological advancement has led to improved communication through such things as the internet technology.
2. Technology has made travelling from one place to another quite easy.
3. Technology has also led to regulations in an intellectual property where people can now steal and use your idea or invention.
4. Technological advancement has led to the creation of such things as robots that can literally perform most of the functions that were previously performed by man.
5. Technological failure is fatal and may lead to loss of human life at a much greater scale.
6. Technology of the Internet has created an individual freedom.
7. Technology creates the development in the production process.
8. New technologies have created platforms where freelancers can make more on their own than if they worked for at traditional employer.
9. New technologies are always cheap because they create more profits.
10. Every time there is a technology improvement and we are able to treat more illnesses today.

9. Have a look at the following facts. Can any of them be added to the text? Which paragraphs of the text can they supplement?

1. Overuse of mobile phones and computers can put a strain on the neck and back.
2. Children sometimes overuse technology in the classroom which obviously affects the learning process in a negative way. Plagiarism and cheating have increased while analysis and critical thinking have declined. Various studies claim that the more children use entertainment technologies like games and media, the less they perform academically.
3. What you really have when you own a bitcoin is the collective agreement of every other computer on the bitcoin network that your bitcoin was legitimately created by a bitcoin «miner», and then passed on to you through a series of legitimate transactions.
4. You can google any information you need rather than spend time in the library or attend the course online without leaving home.
5. Social media and the internet strip one's privacy. You can try your best but can't keep your information safe from prying eyes. The use of phishing technologies and hacking gives those with menacing intensions easy access all your privy information.

Summarizing

10. What facts presented in the article do you consider the most interesting ones?

11. Sum up the information given in the article and make short presentations about benefits and challenges of technological progress to participate in the discussion.

12. Address the mental map at the beginning of the unit again and try to fill it in using the information you have already gathered.

Part II

Data mining

1. Here are some quotes about technological progress. What ideas do they emphasize? Discuss your answer with a partner.

1. «Maybe the preoccupation with technological progress has overshadowed our concern with human progress» (Wynton Marsalis).

2. «We adapt to technological progress by raising our minimum standards of living and working to stay above this rising threshold» (Joe Lonsdale).

3. «Technological change is never an isolated phenomenon. This revolution takes place inside a complex ecosystem which comprises business, governmental and societal dimensions. To make a country fit for the new type of innovation-driven competition, the whole ecosystem has to be considered» (Klaus Schwab).

4. «Technological innovation is indeed important to economic growth and the enhancement of human possibilities» (Leon Kass).

5. «Changing professional expectations and technological tools have created an impossibility of balancing work and life» (Rebecca Traister).

2. Read the title of the article given below and say what ideas will be discussed in it.

3. Read correctly the following words:

Automatic	[ˌɔːtəˈmætɪk]	Turbulence	[ˈtɜːbjələns]
Trivial	[ˈtrɪviəl]	Disparity	[dɪˈspærəti]
Regulatory	[ˈreɡjələtəri]	Deliberate	[dɪˈlɪbərət]
Stagnate	[stæɡˈneɪt]	Transfer	[trænsˈfɜːʳ]

*4. Read the article given below and find out the words which mean:*

1. An organization of workers formed for the purpose of advancing its member's interest.

2. A device or piece of equipment designed to perform a specific task, such as cooking or cleaning in the home.

3. Women ages of 15 and older who are economically active: all women who supply labor for the production of goods and services during a specific period.

4. Income.

5. The action of using someone or something as a model.

5. Examine the underlined words and use the context clues to define their meaning. Consult the dictionary.

6. Work in pairs. Discuss the role of technology in our life. Examine the following scheme and fill in the blanks on the basis of information given in the article, search for information and use your own ideas to complete the remaining ones.
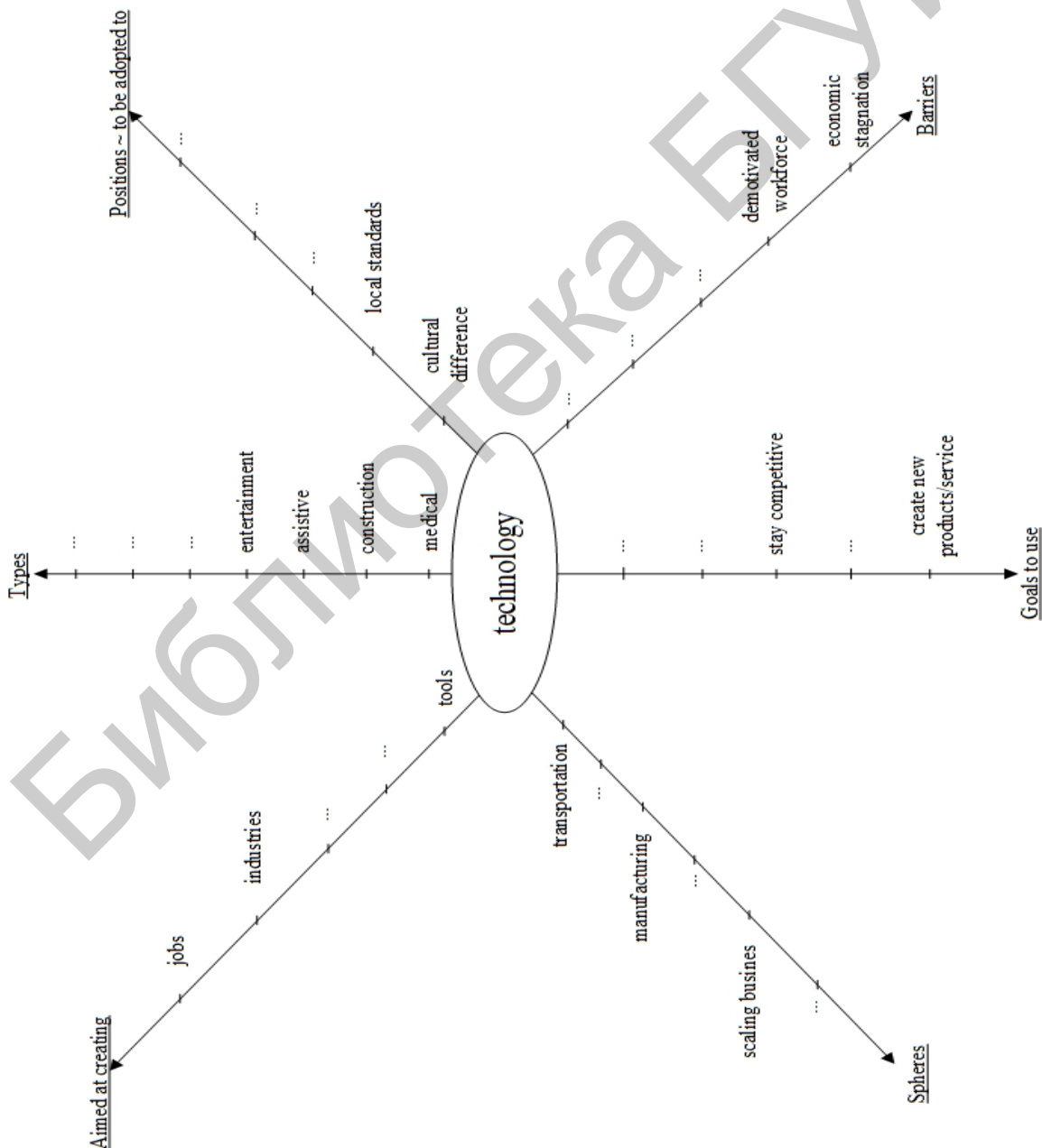
International Technological Transfers and Economic Development

For countries that are not on the technological frontier, technological progress owes more to imitation than innovation. Late industrializers – from the United States in the nineteenth century to China and India in the twenty-first – have always borrowed from the technological leaders of their day. The persistence of dramatic international disparities in income levels, however, testifies to the fact that successfully adopting existing technologies is neither easy nor automatic. Many technologies need to be adopted to fit local conditions including labor force skills, regulatory environment, availability of vital resources, and cultural differences.

Openness to international markets and an efficient legal system that protects the rights of foreign investors play important roles in attracting multinational companies that employ advanced technologies. Many developing countries, including China and India, have been seen a marked increase in their growth rates directly following opening to international trade and foreign investment. On the other hand, international trade may lead developing countries to specialization in less technologically dynamic economic activities, such as agriculture and mining, and foreign investment in these areas may do little to promote ongoing technological transfers.

Because the introduction of a new technology generally creates both winners and losers, international technology transfers may also face deliberate and well-organized opposition. New technologies are often opposed b preindustrial elites that fear the loss of leadership to a new industrial class, by existing industries that are invested in older technologies, and by labor unions who fear the loss of jobs.

While technological progress raises average incomes over the long run, the costs and benefits of new technology are generally unevenly spread, creating a number of challenges for countries experiencing rapid technological progress. The introduction of new goods and processes often competes directly with established economic firms, causing them to adapt or be driven out of business, a process termed creative destruction by economist Joseph Schumpeter. The rise of the personal computer in the 1980s provoked a serious crisis at IBM, the leading maker of mainframe computers.

Because the costs and gains from technical progress are unevenly shared, periods of rapid technical progress often see dramatic increases in income inequality such as characterized the European countries during their Industrial Revolutions. Because they were better able to adapt to the challenges of the computer revolution, educated workers have seen their wages rise quickly while other workers' wages have stagnated.

In addition to managing the labor market turbulence and larger sectoral shifts brought about by technological progress, technologically dynamic economies may face a host of unanticipated challenges that call for innovative economic, legal, and regulatory responses. The spread of the automobile gave rise to the suburbs and fundamentally altered American cities. The development of household appliances reduced the time required for routine housework, contributing to the rise in female labor force participation and changes in family structure. Advances in information technology may require new regulatory and legal responses to protect intellectual

property rights in media, deter identity theft, and cope with the challenges of increased global competition.

These are nontrivial challenges, but technological progress has also provided the world with a greater capacity to meet them. Industrialization has provided both industrial pollution and the means to manage it, and the economic surplus created by increasing output per person has provided management with the ability to support and retrain workers who lose their jobs to technical progress. As in the realm of technology itself the ability to meet the challenges raised by ongoing technological progress is limited ultimately by human creativity itself.

Analyzing and Evaluating

7. Divide the article into parts. Give each a title.

8. Read the condensed version of the article. Fulfill the gaps with words or phrases needed.

Many technologies need to be 1) _____ (**shifted/adopted**) to fit local conditions for countries that are not on the technological 2) _____ (**frontier/decrease**). Many 3) _____ (**developing/developed**) countries have been seen a marked increase in their growth 4) _____ (**rates/strategies**) directly following opening to international 5) _____ (**trade/mode**) and foreign 6) _____ (**dynamic/investment**). Because of the labor market 7) _____ (**service/turbulence**) and larger sectorial shifts brought 8) _____ (**about/with**) by technological progress, technologically dynamic economies may face a host of unanticipated challenges that call for 9) _____ (**innovative/secret**) economic, legal, and regulatory 10) _____ (**queries/responses**).

9. Look at the following list of facts. Put them in order, what linking words (if any) help you?

A. While educated workers have seen their wages rise quickly other workers' wages have stagnated.

B. As a result, all these actions and openness to international markets will play important roles in attracting multinational companies that just employ advanced technologies.

C. And finally, the cost and benefits of new technology are generally unevenly spread.

D. The developing countries are obsessed by the desire to make rapid progress.

E. Firstly, many technologies need to be adopted to fit local conditions.

F. So they have to solve some challenges that may be faced.

G. But the introduction of new technologies can create both winners and losses.

H. Secondly, an efficient legal system should protect the rights of foreign investors.

10. Identify linking words of consequence and restore the abstract.

The Internet is a treasure trove of information. (1) … anything you need to know can be found online. (2) … there is a question of the credibility of the source and the data provided, it can still serve (3) … an educational resource for students. (4) … assistance from parents and teachers, students can just look up their lessons online.

(5) … regular textbooks, electronic books and web-based content are updated in real time, feeding students with the most current information they can get their hands on, helping them become more knowledgeable even outside the classroom setting.
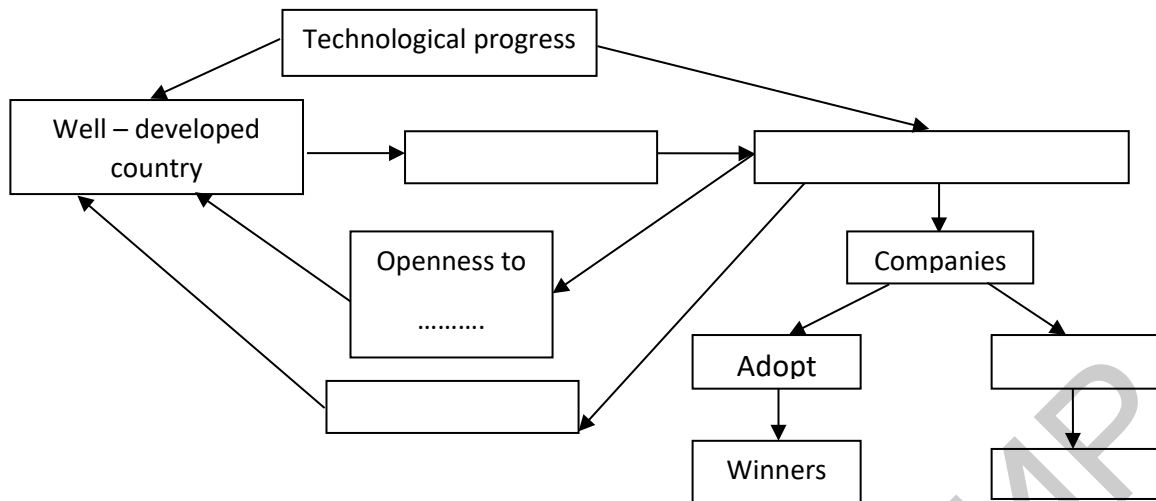
(6) … from the way technological advancements are going, it is obvious that the future will be digital and technology-focused. If students are well-versed on using technology to collaborate and communicate (7) … now, they will not have trouble fitting in, competing and finding jobs in the future. Being familiar with using (8) … one form of technology at an early age will help them because comfortable using it, and (9) … develop other skills necessary to handle other innovative devices and processes.

1	A Next	B Practically	C However	D More over
2	A To sum up	B For	C Although	D Thus
3	A as	B first of all	C personally	D owing
4	A Such as	B For	C Secondly	D Even without
5	A Unlike	B However	C Next	D In my view
6	A Such as	B Personally	C Next	D Practically
7	A however	B as early as	C moreover	D for
8	A as well as	B nevertheless	C owing to	D at least
9	A personally	B secondly	C eventually	D to sum up

11. Write no more than three words for each answer:

1. What words help you to understand what «local conditions» are?
2. What words are used to describe a definition of «opposition»?
3. What defining words are used to explain what «creative destruction» is?
4. What words describe responses to unanticipated challenges?
5. What linking words introduce a contrasting idea of opening to international trade?

12. Fill in the following flow-chart with information from the article and precise how technological diffusion is occurred in different countries.

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A diagram with boxes connected by arrows: "Technological progress" at top connects to "Well – developed country" and to another box. "Well – developed country", "Openness to ....", "Companies", "Adopt", "Winners", and several empty boxes are connected.

13. Do the following statements agree with the claims of the author (Yes, No, Not Given):

1. Technological progress in industry has led to greater pollution all over the world.

2. People only win in terms of new technologies.

3. With new technologies companies don't need any legal or regulatory system.

4. Only educated workers have seen their wages rise quickly.

5. The workers who have lost their jobs face difficulties in retraining and finding other working places.

14. List the data which you consider to the most important to be mentioned in the further report.

Summarizing

15. Write an annotation on the text International Technological Transfers and Economic Development. Use the following prompts.

The article introduces/presents/gives/describes …
The study/paper presents/discusses …
The author considers/outlines/concludes/points out …
The author analyses/compares/determines/states …
The author summarizes the results of …
Much attention is given to …
… are examined …
… is described in detail
It is pointed out that …
Attempts are made to analyze, formulate …
The author arrives at the conclusion that …
Recommendations on … are given

Part III

Data mining

1. Look through the title and say what the article is about.

2. Skim paragraphs 3 and 4. Find the words that denote the following?

1. Someone or something that has the power to make things happen.
2. A theory of radical transformation of society through technological development.
3. The capacity for logic, understanding, creativity and problem solving related to or done by all people or things in the world.
4. Special sign in the form of numbers and a pattern of parallel lines of varying width, printed on a commodity and used especially for stock control.
5. Very great and intense process or an act through which something become different.

3. Read the first lines of the paragraphs and say what facts are discussed in each paragraph.

The 21st century technologies: a future of promise

The interaction between the evolution of technology and the development of economy and society has always been an important dimension of human history. This applies to the Iron and Bronze Ages as well as to modern times. The transition from the agricultural society towards the industrial society provides the most pertinent illustration of the profound implications which the full diffusion of new technologies can have on family structures, work relations, settlement patterns, economic and political power configurations, and also on behavior patterns and value systems. The relationship between technology on the one hand and economy and society on the other is not uni-directional. Not only does technological progress result in the continuous change of economic and social structures, but the latter, including the evolution of attitudes and values, has at the same time a major impact on the direction and the speed of technology development. The industrial society of today, characterized by mass production, mass consumption and mass government, is in many ways a complex incarnation of the technologies of the 20th century. But there is no doubt that the profound change in political, economic and social structures has provided the conditions to enable the transition to a new paradigm.

Looking at technology developments at the turn of the 21st century, there seems to be once again a broad range of new technical breakthroughs in reach. Further rapid progress is expected in information technology, new materials, genetics technology, environment protection and energy technologies, to name just a few. New possible combinations and interactions of the various technologies will also be of major

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importance. Prominent examples include information technology and telecommunications as well as energy and environment technologies. However, only a few of these technologies appear to be pervasive enough or to provide mankind with new basic capacities for them to have a major impact on society.

In a thirty-year perspective, genetics technology as well as energy and environment technologies could hold this potential. But looking ahead towards the next ten years or so, the main driving force for economic and social change will be information technology. After a quarter of a century of gradual development and diffusion, many believe that information technology is on the verge of a new take-off. This is a partly due to genuine technology evolution; it is also partly the result of changing economic and social structures. These are increasingly adapting to the new organisational and institutional patterns required for the full and most effective use of the new technology, thereby contributing now to the push for further technological progress.

Beyond the convergence of computers, television and telephones, tomorrow's powerful desktop computers will be characterized by the use of sensory input and output devices, by the use of intelligent agent software and , most importantly, an all pervasive network connectivity. In particular, the latter will lead to another important feature of tomorrow's information technology, notably universal «smartness». In the longer term, people will be used to having networks connecting everything. They will experience smart furniture, kitchens and offices, they will live and work in smart buildings, and they will drive sensor-conducted smart cars on smart highways. A further highly promising application is imaging, which will be used for highly sophisticated bar codes, video marketing and virtual goods. Complex technical products, such as automobiles, skyscrapers or aircrafts, will as a routine matter be designed, planned, built, tested and evaluated in cyberspace before being manufactured for real. A decade from now, information technology will in all probability have penetrated every aspect of human activity. Once again, the interaction between the evolution of technology and the development of economy and society will have led to profound changes with regard to when, where and how people work, play and rest; to how, where and what people consume and produce; and to when, where and how they interact with other people, with business, social organizations or government.

Computer-enabled electronic commerce is likely to modify significantly current ways of doing business. Anyone with a computer and Internet access can benefit from the enlarged choice and the competitive supply on the global market place. Performance is difficult to measure in this context, but it is interesting to know that Amazon.com, a well-known Internet bookseller, holds 13 million titles, whereas the biggest bookshops in New York arrive at no more than 180,000. Estimates of world-wide electronic commerce revenues vary sharply, but there is no doubt that they will rise dramatically – certainly by about 1000 % over the next four to five years. Electronic commerce will also lead to modifications in value chains: some will be dismantled, and others re-assembled. Most importantly, there will be a process of dis-intermediatisation. Many intermediate agents between producers and consumers will

have to change their role or disappear. Examples include travel agencies, insurance brokers, local bank offices and many sectors of retailing.

There will also be major implications for social organization – in private life, business and government. The advanced power of computing, coupled with low cost telecommunications, may lead to new kinds of communities – both real and virtual. The possibility of teleworking, teleshopping and telelearning may result in a move away from the big urban agglomerations and give rise to new developments in settlement patterns. Easy access to interactive global networks together with further simplification of computer use, will enhance the spread of today's embryonic «cyber» communities. In business, there may be a strong tendency towards bi-polarisation of company structures – a trend towards very big global players on the side, and very small, highly specialized companies on the other. In business and government, many foresee the end of the traditional hierarchical command and the control structures. These may be increasingly replaced by horizontal networks and co-operative teams, providing members with greater freedom and responsibility in decision-making. All this will increase efficiency further, but at the same time, will provide scope for growing diversity, for greater individual choice and for many new opportunities for people's self-determination and self-fulfilment.
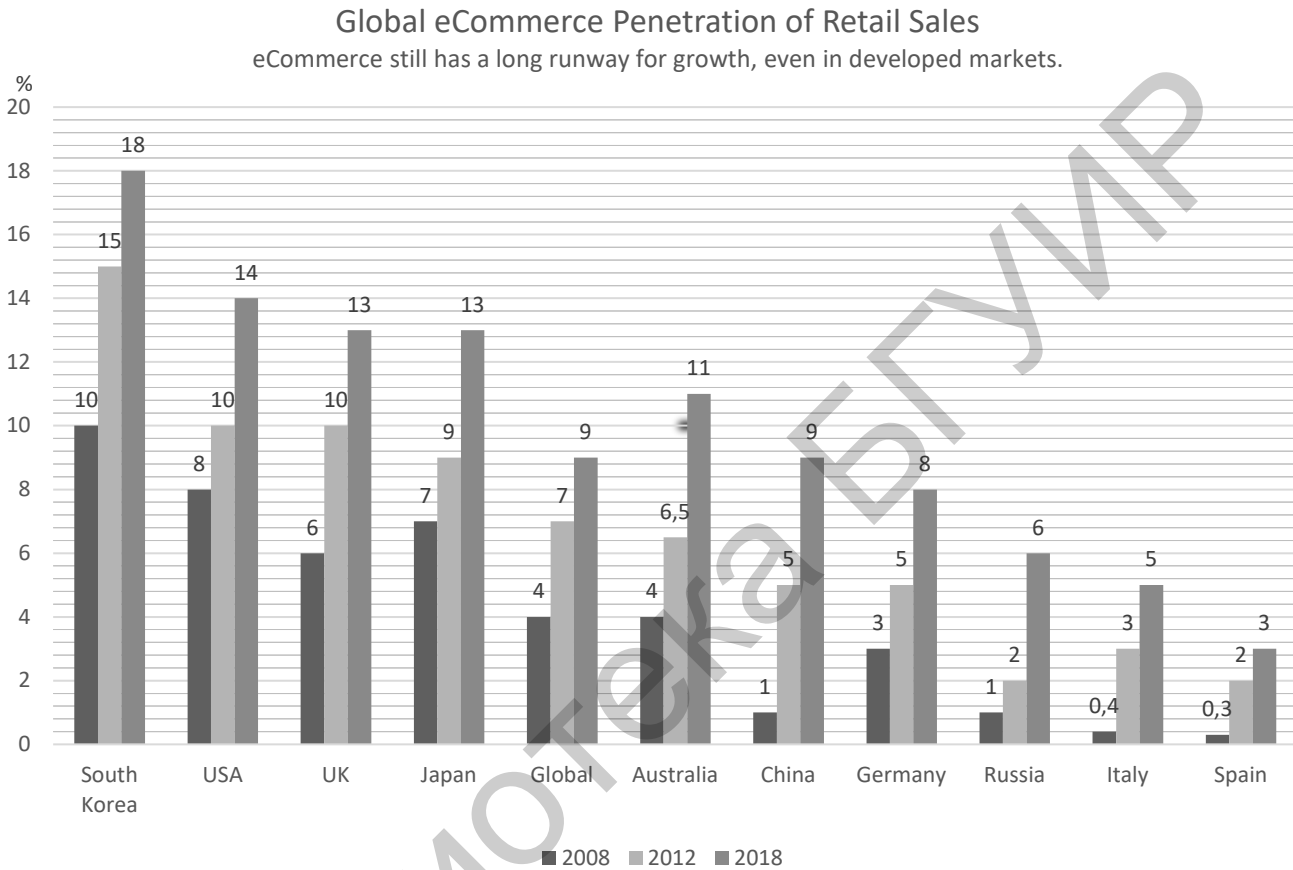
Nonetheless, technological advances in themselves provide no foregone conclusion as to the extent and manner in which they will be used. In order to realise the promises of 21ˢᵗ century technologies – in particular information technology – individuals, business and governments need to embrace a culture of creativity, experimentation and openness to change. Policy at national and international levels has to ensure that the benefits are shared by society as a whole. It should also see to it that, wherever possible, potential risks associated with the new technologies are controlled and undesirable side-effects contained without unduly impairing technological, economic and social dynamism.

4. Scan the annotation and say if it renders the content of the article.

This article examines the definition of the term «technology evolution» particularly in terms of changing economic and social structures. It argues that there is no current clear definition and that in order for technological progress to be made there is a need of political, economic and social stability. However their development is not uni-directional. After examining the information about today's industrial society, the article explores technology developments of the 21ˢᵗ century. The author foresees rapid progress in information, new materials, genetics, environment protection, and energy technologies. The author agrees that technology is just on the verge of a new take-off. He forecasts that all new organizational and industrial patterns will have to adopt with further technological progress. The article gives a comprehensive idea of future possible changes in every aspect of human activity. The possible major implications will affect social organization – in private life, business and government, that may lead to new kinds of communities – both real and virtual. This article will be

useful for studying technological advances in terms of guessing no foregone conclusions as well as the extent and manner in which they will be used.

5. *Study the bar chart and identify the rate of e-commerce growth for retail sales. In order to get a great level on this section you should review and practice the vocabulary below.*

Global eCommerce Penetration of Retail Sales
eCommerce still has a long runway for growth, even in developed markets.

Bar chart values by country (2008, 2012, 2018):
- South Korea: 10, 15, 18
- USA: 8, 10, 14
- UK: 6, 10, 13
- Japan: 7, 9, 13
- Global: 4, 7, 9
- Australia: 4, 6,5, 11
- China: 1, 5, 9
- Germany: 3, 5, 8
- Russia: 1, 2, 6
- Italy: 0,4, 3, 5
- Spain: 0,3, 2, 3

■ 2008 ■ 2012 ■ 2018

Trends	**Verb form**	**Noun form**
Increase	Rise, increase, go up, uplift, rocket, climb, upsurge, soar, shot up, improve, jump, leap, move upward, skyrocket, surge	A rise, an increase, an upward trend, a growth, a leap, a jump, an improvement, a climb
Decrease	Fall, decrease, decline, plummet, plunge, drop, reduce, collapse, deteriorate, dip, dive, go down, take a nosedive, slum, slide, go into free-fall	A fall, a decrease, a reduction, a downward trend, a downward tendency, a decline, a drop, a slide, a collapse, a downfall

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Trends	Verb form	Noun form
Steadiness	Unchanged, level out, remain constant, remain steady, plateau, remain the same, remain stable, remain static	A steadiness, a plateau, a stability, a static
Gradual Increase	–	An upward trend, an upward tendency, a ceiling trend
Gradual Decrease	–	A downward trend, a downward tendency, a descending trend
Stand ability Flat	Level(ed)off, remain(ed) constant, remain(ed) unchanged, remain(ed) stable, prevail(ed) consistency, plateau(ed), reach(ed) a plateau, stay(ed) uniform, immutable, level(ed) out, stabilize, remain(ed) the same	No changed, a flat, a plateau

Useful phrases

1. As is presented in the diagram(s), graph(s), pie chart(s), table …	12. The graph gives figure …
2. As (is) shown in the illustration …	13. It is interesting to note that …
3. As can be seen in the …	14. It is apparently seen that …
4. As the diagrams suggest …	15. It is conspicuous that …
5. According to the …	16. It is explicitly observed that …
6. Categorically speaking …	17. It is obvious …
7. Getting back to the details …	18. It is clear from the data …
8. Now, turning to the details …	19. It is worth noticing that …
9. The table data clearly shows that …	20. It is crystal clear/lucid that …
10. The diagram reveals that …	21. It can be clearly observed that …
11. The data suggest that …	22. It could be noticed that …
	23. It could be plainly viewed that …
	24. We can see that …

Top Tips for writing

1. Start by saying exactly what the chart shows, and the time period.

2. Describe the changes as precisely as you can. Use data and numbers from the bar chart.

3. Compare the information. Talk about differences or similarities between the countries (groups) shown.

4. Conclude by saying what the main trends or changes are …

Example:

The bar chart illustrates the growth of e-Commerce among different countries. It gives figures between the years 2008 and 2018 at 10-year intervals. It can be seen that e-Commerce lifted seriously during this period. But it moved upward differently in various countries. The levels of e-Commerce in Russia and China were quite the same in 2008. However, while Russian e-Commerce started its slow growth in 2012, the Chinese level rocketed up at the same period. Overall, we can see a clear upward trend in e-Commerce in all observed countries.

6. The writer's approach to results of studies a) critical, b) cautious, c) optimistic, d) confirming. Prove your point.

7. Is there a distinct convergence of views on the many issues addressed in the negotiating articles?

Is New Technology Hurting Our Productivity?

In recent years, productivity growth in developed economies has been stagnating. The most prominent explanations of this trend involve technology. Technological progress is supposed to increase economies' productivity and potential growth. So what's going on?

Harvard's Martin Feldstein has argued persuasively that productivity growth is actually higher than we realize, because government statistics «grossly understate the value of improvements in the quality of existing goods and services» and «don't even try to measure the full contribution» of new goods and services. Over the time, he assets, these measurement errors are probably becoming more important.

Northwestern University's Robert Gordon is less optimistic. He has argued – also persuasively – that today's innovations in areas like information and communications technology (ICT) cannot to have as big economic payoff as those of the past, such as electricity and the automobile.

But it's possible that ICT and other new technologies are not just doing less to boost productivity than past innovations; they may actually have some negative side effects that undermine productivity and DGP growth. One need not to be a modern-day Luddite to acknowledge the potential productivity pitfalls of technological innovation.

The first might seem obvious: technological disruption is, well, disruptive. It demands that people learn new skills, adapt to new systems, and change their behavior. While a new iteration of computer software or hardware may offer more capacity, efficiency, or performance, those advantages are at least partly offset by the time users have to spend learning to use it. And glitches often bedevil the transition.

The fast changing nature of today's digital technologies also raises security challenges. Spam, viruses, cyberattacks, and other kinds of security breaches can impose major costs on business and households.

Then there is the impact that connectivity has on our daily lives, including our ability to work and learn. Non-work emails, social media, Internet videos, and videogames can easily distract employees, offsetting at least some of the productivity-raising potential of that same connectivity. Such disadvantages may become even more pronounced when workers telecommute.

Similarly, the smart phones has shaped the minds of young people, who barely remember what it was like before addictive activities – from video games to social media – were constantly at the fingertips. According to one recent study, recreational computer activities partly explain a decline in labor supply among men ages 21 to 30. Moreover, research shows that laptops in the classroom slow students learning, even when used to take notes, rather than surf the web.

Moreover, smart phones undermine physical safety in some contexts. In the United States, the National Highway Traffic Safety Administration reports that 3,477 people were killed and 391,000 were injured in motor vehicle crashes involving distracted drivers in 2015, with texting being the biggest culprit, particularly among young people.

Digital currencies like Bitcoin have also so far failed to live up to the hype surrounding them. Far from being more efficient as a means of payment or store of value than conventional money, cryptocurrences seem to encourage the diversion of resources away from productive uses. They also harm the environment, owing to the energy-intensive «mining» process, while the total anonymity they offer undermines law enforcement.

Beyond new technologies' direct and indirect negative effects on productivity, there is a risk that they are undermining people's quality of life. Few people have positive feelings about, say, the automatic phone calls that have come to plague many of our lives.

Then there is the ever-present «fake news» problem. The advent of digital «new media» was once heralded as a democratizing trend that would give ordinary people a measure of control over the «air waves», at the expense of big companies or established institutions. But it has lately become apparent that «democratizing» information may not actually be good for democracy. For example, fake news has been found to spread faster on Twitter than true news. This has not only made citizens less informed in many cases; it has also enabled public figures to dismiss the truth as «fake».

To be clear, I am not suggesting that the effects of recent technological advances are negative. On the contrary, many have delivered huge benefits, and that will probably continue to be the case.

8. Write an e-mail to your friend telling him about new appliances in your house describing their capacities.

9. Prepare a report (about 300 words) dealing with the influence of technological progress on a) educational processes, b) methods of investigations, c) modes of shopping, d) better cultural understanding.
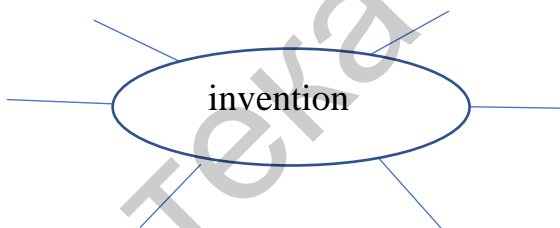
UNIT 2: INVENTIONS AND INNOVATIONS

Lead-in

We live in a world of inventions and innovation. They open our eyes and show us new opportunities. The overwhelming share of innovation effort globally continues to be undertaken in developed countries but much innovation aims to make a real difference in the lives of ordinary people throughout the world. Technological changes are advancing so fast that the elders need to turn to their grandchildren when using new gadgets. We believe that inventions and innovation will make us closer, our lives longer and safer, our work easier and more productive. We are full of optimism. Wait and see!

Part I

Data mining

1. What associations do you have with the word «invention»? Complete the word web.

2. Work in a group. Share your ideas and knowledge on the question about distinction between «invention» and «innovation». Fill in the Comparison Chart.

<u>Basis for comparison</u>: meaning, what is it?, concept, skills required, occurs when, concerned with, activities, examples.

Basis for comparison	Invention	Innovation
Meaning		
What is it?		
…		

3. Work in groups. Make the list of issues that might be mentioned in the article and find out if you were right.

4. Let your eyes skim over the article below, taking in key words and collocations that make its thematic frame.

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5. Skim the first sentence of each paragraph. What do you think the article is about?

6. Determine the main idea of the article.

7. Look through the article and find the paragraphs which mention the following:

1) sensory input; 2) prototype; 3) endeavour; 4) functionality; 5) patent.

8. Read paragraph 2 and derive the features of the term «invention».

9. *Look at the list of questions. What questions won't be answered after a close reading of the article?*

      A. How can you prove that your idea works perfectly?
      B. What are the most famous artworks by Leonardo da Vinci?
      C. What psychological processes are the bases of our perception?
      D. A local uniqueness is a distinctive feature of … (creation, invention, innovation)?
      E. When was the first CAD system designed?
      F. What people bring innovative ideas into something real?
      G. What elements does innovation include?
      H. Who invented the plane?

10. Now read the whole article and check if you are right.

Invention vs Innovation

1. Great artists Michaelangelo and Leonardo da Vinci made masterpieces that mesmerize people till today. But the work of art made by them as well as all other artists of repute is categorized as creation and not invention as it was something that could not be repeated by others. Something totally new and useful for the mankind, on the other hand is referred to as invention such as a steam engine or a telephone or television or a computer. People who brought these products into existence can be termed as inventors as they transformed an innovative idea into something tangible and useful for others.

2. «Innovation», «design», and «invention» are directly related concepts; an invention is also a novel product that has been intentionally developed to achieve some purposes. As opposed to innovation the term invention was regarded in the early 19th century as a positive attribute of an endeavour or a product. Law protected inventions and patents were issues on the name of the inventor. But an invention is the first innovation within a class of objects. In other words, a new member of an already existing category of objects is an innovation, but the first of the objects within that category is an invention. The invention process covers all efforts aimed at creating new ideas and getting them to work. The cognitive, conative, and affective processes of the mind are

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the bases for our perception and for sorting, synthesizing, categorizing, ignoring, discarding and recombining all our sensory inputs into new configurations.

So, for example, it seems sensible to say the following about the Wright brothers: they invented the airplane, they designed the first airplane, and they designed an airplane.

3. The individuals who successfully followed the Wrights only succeeded in designing airplanes. Those individuals may have invented things in their work-components of their successful airplanes but they did not invent the airplane. The airplane – or any artifact – can only be invented once. Thus, the processes of invention and innovation might be the same, excepting the fact that the former results in production of the first item of the class of objects (i. e., the first airplane) while the latter results in additional members of the previously populated category (i. e., other airplanes). It is an empirical question as to whether the process of invention is the same as the process of innovation. Experience provides the qualities of the prototypes we employ for interpreting the present. That is, is the same process (or processes) involved in producing the first member and subsequent members of a class of objects?

4. Invention is not a random process but is the result of research, studies or repeated attempts. Invention must be distinguished from Discovery. The latter involves finding or highlighting conditions or facts still unknown. The model of the invention system and the downstream commercialization system make it possible to provide some clear answers to important questions. An invention has to be unique worldwide where as an innovation has to be unique locally, in a certain region or area.

5. Innovation is an improvement or a refinement while invention is a completely new entity. Society is interested in both innovation and invention as innovation is an economically viable invention that can be exploited in order to generate benefit or to obtain profit.

6. Innovation is a generic term, whose meaning includes both having a new idea and putting it into action. The definition of innovation used here is appropriate when discussing research in science and engineering. It includes both process and product innovations, in both the goods and services sectors.

7. Tamara Monosoff underlines that «one of the essential early steps in the inventing process is creating a prototype – which, simply defined, is a three-dimensional version of your vision. Creating a prototype can also be one of the most fun and rewarding steps you'll take. That's because developing a prototype gives you the opportunity to really tap into your creativity, using those skills that inspired your invention idea in the first place. And whether you're making your prototype at home or hiring the services of an engineer, seamstress or machinist, it's truly exciting to see your idea transformed into something tangible and real. A prototype provides other advantages, as well:

1) It enables you to test and refine the functionality of your design. Sure, your idea works perfectly in theory. It's not until you start physically creating it that you'll encounter flaws in your thinking. That's why another great reason to develop a prototype is to test the functionality of your idea. You'll never know the design issues and challenges until you begin actually taking your idea from theory to reality.

2) It makes it possible to test the performance of various materials. For example, your heart may be set on using metal – until you test it and realize that, say, plastic performs better at a lower cost for your particular application. The prototype stage will help you determine the best materials.

3) It'll help you describe your product more effectively with your team, including your attorney, packaging or marketing expert, engineers and potential business partners.

4) It will encourage others to take you more seriously. When you arrive with a prototype in hand to meet any professional – from your own attorney to a potential licensing company – you separate yourself from the dozens of others who've approached them with only vague ideas in mind. Instead, you'll be viewed as a professional with a purpose, as opposed to just an inventor with a potentially good idea».

Analyzing and Evaluating

11. Read the statements and define whether they correspond to the facts given in the text (Yes, No, Not Given). Correct the false statements.

1. Creativity is the capability or act of conceiving something original or unusual.
2. You can innovate with a new process, method, business model, etc.
3. Invention is the creation of something that has never been made before and is recognized as the product of some unique insight.
4. Innovation happens when someone improves on or makes a significant contribution to something that has already been invented.
5. Design is the process whereby innovation is brought about.
6. The products or persons that one generation classifies as creative might not be so classified by the next.
7. Invention involves a product that meets some benchmarks beyond those of innovation and novelty.
8. Innovation differs from improvement in that innovation refers to the notion of doing something different rather than doing the same thing better.

12. Have a look at the following facts. Can any of them be added to the article? Which paragraphs of the article can they supplement?

1. «Some of the most significant inventions in the last few centuries include the invention of the electric battery by Alessandro Volta, the invention of the printing press by Johannes Gutenberg, the invention of the electric light bulb by Thomas Alva Edison and the invention of the telephone by Alexander Graham Bell».
2. «A patent protects the inventor's intellectual property rights by law».
3. «Innovation is the application of new solutions that meet new requirements, inarticulate needs, or existing market needs. This is accomplished through more

effective products, processes, services, technologies, or ideas that are readily available in markets, governments and society».

4. «Invention requires scientific skills».

5. «Innovation requires a set of marketing, technical and strategic skills».

6. «Research and development is an indicator of investment in technology and future capabilities, and therefore plays a critical role in the innovation process and the creation of new products, processes and services. There are three other key measures of innovation and technological advances: the number of students studying science and technology, patents which show the number of inventions; and venture capital which provides the financial backing to turn those inventions into products».

13. What facts or details from the article do you consider the most interesting ones?

Summarizing

14. Share your ideas and opinions on the following questions. Use the prompts:

Definitely ↕ **Doubtly**	I'm positive that …; I really feel that …; I'm confident that it's …; I believe it's …; I'm absolutely certain it's …; I know for a fact that it's …; I suppose it could be …; I think it's … but I can't be sure; I'm not sure, but it may be …

1. How would our lives be without inventions (innovations)?
2. What is the best invention of all time (we couldn't live without)?
3. How do inventions (innovations) change our lives generally?

15. Review the information given in the article and add more information to the Comparison Chart. Discuss the points with the class.

16. Work in groups of 3-4. Choose a century (XVII, XIX, XX) and make a list of the most significant inventions and innovations of the century. Explain your choice. Prepare Google presentations and share the links with the groupmates.

17. Write an annotation on the article. Use the following prompts:

1. The subject of the article is …
2. The article begins with the analysis of …
3. The author examines …
4. It is specially noted …
5. Details are given of …
6. To finish with, the author describes …

Part II

Data mining

1. Here are some quotes about inventions and innovation. What ideas do they emphasize? Do you agree with the authors? Discuss your ideas with a partner.

1. «For good ideas and true innovation, you need human interaction, conflict, argument, debate» (Margaret Heffernan).

2. «The only way you survive is you continuously transform into something else. It's this idea of continuous transformation that makes you an innovation company» (Ginni Rometty).

3. «Innovation comes from, one, acknowledging yourself; two, studying and understanding the problem; and three, finding a solution» (Marley Dias).

4. «Nature is the source of all true knowledge. She has her own logic, her own laws, she has no effect without cause nor invention without necessity» (Leonardo da Vinci).

5. «I invented nothing new. I simply combined the inventions of others into a car. Had I worked fifty or ten or even five years before, I would have failed» (Henry Ford).

6. «A good scientist is a person with original ideas. A good engineer is a person who makes a design that works with as few original ideas as possible. There are no prima donnas in engineering» (Freeman Dyson).

2. Work in pairs. Skim the title of the article given below and say what ideas or solutions might be mentioned in it.

3. Is the article a useful and trustworthy source?

4. Scan the article and find the words which mean the following:

1) a machine or device that is used to force a liquid or gas to flow in a particular direction;

2) a device that cools gas in order to change it into a liquid;

3) a machine that presses air or other gases;

4) a technology that removes ions, molecules and other larger particles from drinking water using a semipermeable membrane;

5) a device that converts the energy in a stream of fluid into mechanical energy;

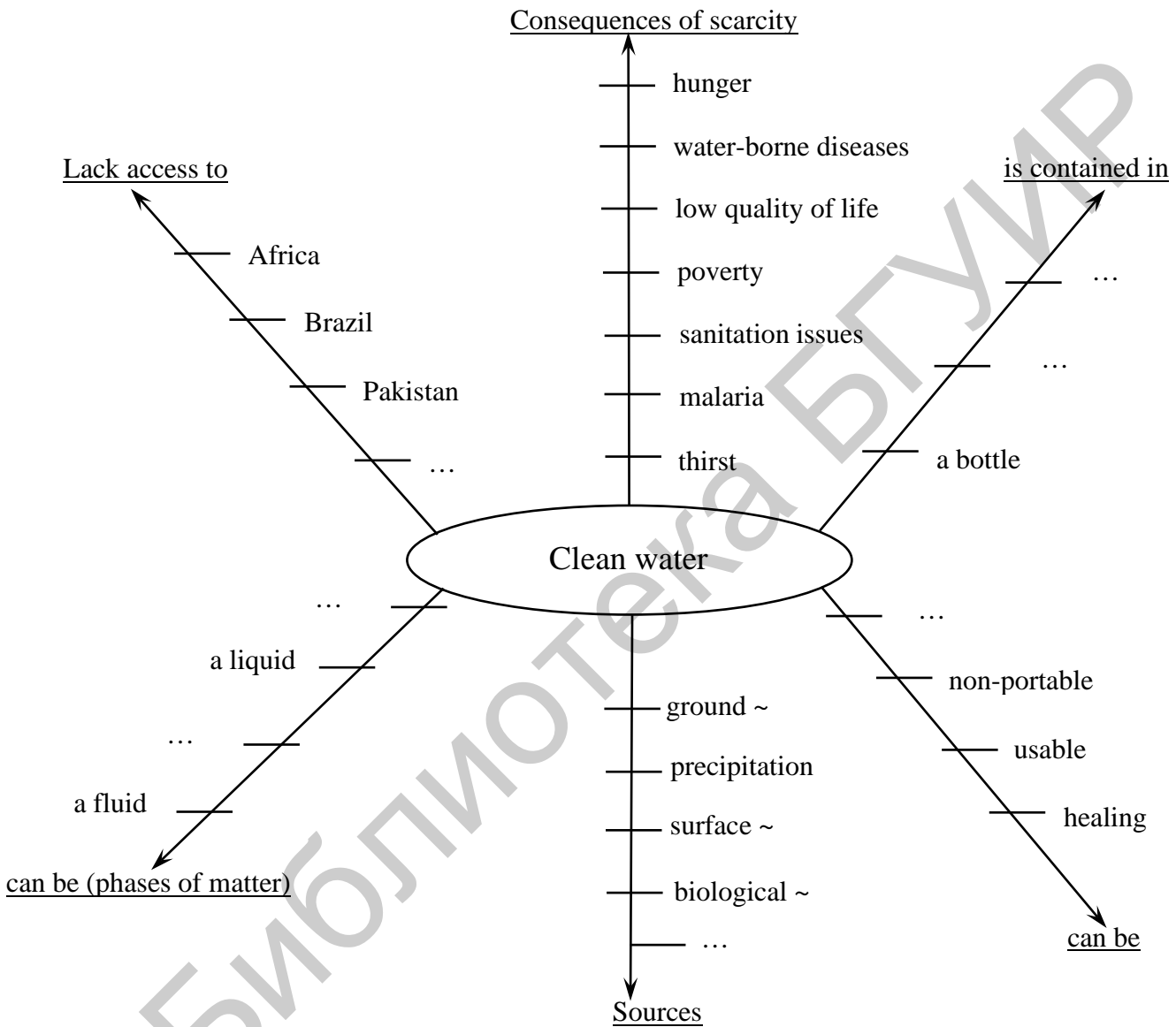6) a marketing tactic involving paying for space to promote a product, service, or cause.

5. Read correctly the following words:

| Cistern | [ˈsɪstən] | Moisture | [ˈmɔɪstʃəʳ] |
| Reverse-osmosis | [rɪˈvɜːs - ɒzˈməʊsɪs] | Turbine | [ˈtɜː.baɪn] |

| Fahrenheit | [ˈfærənhaɪt] | Advertising | [ˈædvətaɪzɪŋ] |
| Advertisement | [ədˈvɜːtɪsmənt] | | |

6. Work in pairs. Discuss the role of clean water in our life. Examine the following scheme and fill in the blanks on the basis of the information given in the article. Search for some extra information to reach the goal.

Consequences of scarcity
- hunger
- water-borne diseases
- low quality of life
- poverty
- sanitation issues
- malaria
- thirst

Lack access to
- Africa
- Brazil
- Pakistan
- …

is contained in
- …
- …
- a bottle

Clean water

… a liquid
… a fluid
can be (phases of matter)

Sources
- ground ~
- precipitation
- surface ~
- biological ~
- …

- …
- non-portable
- usable
- healing
can be

Water From Humidity

Peru's University of Engineering and Technology

By Kiona Smith-Strickland

At the edge of the Atacama Desert, one of the driest places on earth, Lima, Peru, receives almost no rainfall. About 700,000 people have no access to clean water for drinking or bathing. Another 600,000 of the city's 7.5 million residents

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rely on cisterns for their water, which must be filled by pumps or by hand and cleaned regularly.

But Lima's Pacific Coast location experiences humidity of more than 90 percent on summer days, from December to February. So engineers from Peru's University of Engineering and Technology (UTEC) have devised a way to turn that humid air into usable water. Last December, they erected a billboard in the Bujama District of Lima that by early March had produced 9450 liters (about 2500 gallons) of water.

The idea came about because UTEC was facing a slump in enrollment as the new semester approached; the engineering department wanted a way to attract more engineering students to the university. They went to Peruvian ad agency Mayo Publicidad, and the partnership of engineers and marketers crafted an advertisement that would provide a very visible demonstration of the university's engineering projects. The water-collecting billboard was born.

Electricity from the city's power lines runs the five condensers inside the billboard. Like the condenser in your home air conditioner, the ones in the UTEC billboard are cooler than the air outside. When air contacts the cooled surfaces of the condensers, the air also cools, and the water vapor in the air condenses into liquid water. After reverse-osmosis purification, the water flows down into a 20-liter storage tank at the base of the billboard. The billboard generates about 96 liters of water each day, and a simple faucet gives local residents access to the water. UTEC has not yet announced whether the water will be available for free, but the billboard reportedly cost only about $1200 to install.

This is not the first attempt to pull clean water out of thin air. In 2011, French company Eole installed a wind turbine in Abu Dhabi, which the company claims generates more than 1400 liters of water each day. The WMS1000 is 24 meters (about 78 feet) tall, and its 13-meter rotor turns at up to 100 rpm to run a 30-kilowatt generator. This in turn powers a cooling compressor inside the turbine. An intake pulls air into the compressor, and moisture condenses out as the air cools. The water runs down into a purification and storage tank at the base of the turbine.

The turbine needs winds of at least 15 mph to generate enough power for the compressor. In a desert climate with an average temperature of 95 degrees Fahrenheit and average relative humidity of about 30 percent, the WMS1000 generates about 350 liters of water a day. In humid coastal climates, production increases to about 1200 liters a day. Adding a solar power unit to the turbine could increase output by a few hundred liters more.

Eole designed the turbine for remote communities of fewer than 5000 people, but when it launched the WMS1000 commercially, in 2012, the price tag for a single turbine was about $660,000, well beyond the budget of most small communities in developing countries.

Back in Lima, the UTEC engineering department and Mayo Publicidad may have found a way to offset the cost barrier: advertising.

Since the billboard's installation, UTEC reports a 28 percent increase in enrollment. Results like that may attract the attention of private companies looking

for new ways to advertise. The city of Lima and other urban areas, such as Cairo, Egypt, suffer the same lack of potable water as remote villages, and an advertising-funded solution that taps into an existing electrical infrastructure may work well there. UTEC has not yet announced plans to install more billboards in Lima or to make the technology commercially available elsewhere, but the project has started new discussions about how to provide access to clean water.

The World Health Organization estimates about a billion people lack access to safe drinking water. Lack of clean water is a leading cause of cholera and other diseases. Perhaps UTEC's idea can make the situation a little better, one sign at a time.

Analyzing and Evaluating

7. How many parts can the article be divided into? Give each a title.

8. Restore the algorithm of processes taken place in the water-collecting billboard. The linking words (in bold type) will help you. Your time limit is 3 minutes.

Finally the water flows down into a 20-liter storage tank at the base of the billboard.

Then the water vapour in the air condenses into liquid water.

When air contacts the cooled surfaces of the condensers, the air also cools.

First electricity from the city's power lines runs the five condensers inside the billboard.

After that, the water is pressed against the semipermeable membrane to be removed from ions, molecules and other larger particles.

9. Fill the gaps of the condensed version of the article with the right words to precise the facts given in the article.
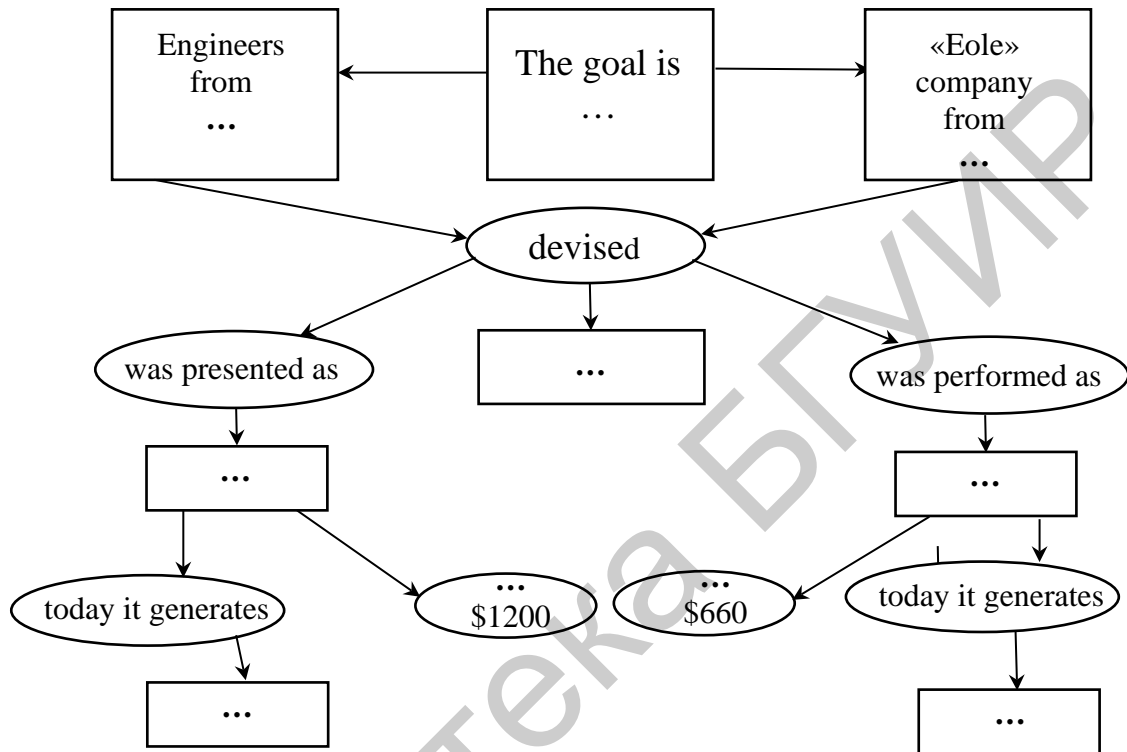
In order to attract 1) _____ (**researchers/students**) to the university, the marketers and the engineers from UTEC 2) ___ (**crafted/read**) an ad to demonstrate a new project. The purpose was to turn humid air into 3) ___ (**non-portable/drinkable**) water. A modernized billboard was erected 4) ___ (**at/on**) the edge of the Atacama Desert.

Once air contacts the board that covers 5) ___ (**evaporators/condensers**) the water vapour transforms into liquid water. After 6) (**fortification/purification**), it is collected in a 7) ___ (**network system/storage tank**) at the base of the billboard. The system creates about 96 liters each day and provides to 8) ___ (**buyers/local people**) an approach to the usable water supply.

Another system aimed at 9) ___ (**desalinating/generating**) water was installed in 10) ___ (**Dubai/Abu Dhabi**) for small communities in developing countries. The system is about 78 feet tall. Being powered by a 11) ___ (**heat station/generator**) a cooling compressor makes moisture condensed out of the air. Then the water is 13) ___

(**distilled/purified**) and accumulated at the base of the turbine. With a solar power unit the turbine could increase 14) ___ (**power consumption/output**) by a few hundred liters more.

10. Fill in the flow-chart with the data from the article to compare the two systems and choose the most efficient one.

```
  ┌──────────────┐      ┌──────────────┐      ┌──────────────┐
  │  Engineers   │ ◄─── │  The goal is │ ───► │   «Eole»     │
  │    from      │      │      …       │      │   company    │
  │     …        │      │              │      │    from      │
  └──────────────┘      └──────────────┘      │      …       │
          │                                   └──────────────┘
          │                                          │
          └─────────►  ┌──────────┐  ◄──────────────┘
                       │ devised  │
                       └──────────┘
          ┌────────────────┼────────────────┐
          ▼                ▼                 ▼
  ┌──────────────┐   ┌──────────┐   ┌──────────────┐
  │was presented │   │    …     │   │was performed │
  │     as       │   └──────────┘   │     as       │
  └──────────────┘                  └──────────────┘
          │                                 │
          ▼                                 ▼
    ┌──────────┐                      ┌──────────┐
    │    …     │                      │    …     │
    └──────────┘                      └──────────┘
       │     └────────┐          ┌───────┘    │
       ▼              ▼          ▼            ▼
┌──────────────┐  ┌────────┐ ┌────────┐ ┌──────────────┐
│ today it     │  │  …     │ │  …     │ │ today it     │
│ generates    │  │ $1200  │ │ $660   │ │ generates    │
└──────────────┘  └────────┘ └────────┘ └──────────────┘
       │                                      │
       ▼                                      ▼
 ┌──────────┐                           ┌──────────┐
 │    …     │                           │    …     │
 └──────────┘                           └──────────┘
```

11. Write no more than three words for each answer:

1. What are the key features of areas that lack access to clean water?
2. What elements make the described systems similar to each other?
3. What consequences of water stress are engineers trying to prevent?
4. What factors prove that «water poverty» is a social issue?

12. Do the following statements agree with the data given in the article (YES, NO, NOT GIVEN). Correct the wrong information.

1. The described systems are able to create water in remote areas.
2. Some communities in developing countries have failing infrastructures.
3. Each system can document how much water it generates, its purity, and what the local weather conditions are.
4. All systems come complete with a simple faucet set up for the public to bring bottles to fill.
5. A marketing activity cuts production costs.

6. All systems are operated by energy from the sun with solar power units mounted on the construction.

Summarizing

13. Are the systems presented in the article inventions or innovations? Prove your point.

14. Work in groups of 3-4. Brainstorm some ideas on innovative approaches to provide people with clean water in the Republic of Belarus. The following points are to be considered: natural available resources, water savings measures, modern technical developments. Run a workshop, examine the possible solutions and choose the most effective and efficient ones.

Part III

Data mining

1. Look through the title of the article given below and guess what inventions are discussed in the article. Scan the article and check if you were right.

2. Look through the paragraphs indicated in brackets. What words denote the following?

1) the process of burning in a closed space (1);
2) the force that drives smth forward (4);
3) aptitude in grasping truths, relationships, facts, meaning, etc. (7);
4) thinking characterized by the ability to use concepts and to make and understand generalizations (7);
5) actions that make you stop what you are doing (8).

3. Find the synonyms to the underlined words in the article.

Top 10 Inventions of the 21ˢᵗ century

The modern world that we live in is literally made up of the technological discoveries and the inventions done by our scientists and inventors. In the past the event that took hours to happen is done in minutes in the present times. We do not have to wait for hours and days to achieve something rather minutes are more often than not enough for the deed. This is basically due to the fact that the manpower has been completely replaced by the machines. The dependency has decreased and <u>efficiency</u> has increased to a greater level. This is basically due to the inventions made in the first part of the 21ˢᵗ century. Here is a list of the top 10 inventions of the 21ˢᵗ century that have changed the way we live in the modern world.

1. Most of the cars and vehicles you see on the road have one thing in common – they all burn some type of fossil fuel-derived power. Fossil fuel plays a huge role in people's lives and it is easy to see why people get so distraught over supply and demand and fuel prices. Wars have been fought over fuel yet the arrival of hydrogen-powered vehicles may change all that and wean people from their dependence on gasoline-powered cars and free them from fossil fuel slavery. The hydrogen powered cars have the ability to use hydrogen in the combustion chamber and leave just a puff of water vapour. This is something that the humans have designed which if brought into considerable use can completely change the statistics of pollution of the planet Earth. But the main <u>disadvantage</u> of the hydrogen powered cars is the fact that they might just be a lot costly for normal use.

2. There was a time when functional robots were just figments of the imagination but that is not so. Today, technology has progressed to a point that people can enjoy the benefits of robotics in their everyday lives. From robot pets to robot vacuum cleaners and even robotic limbs these inventions are going to change the way people live for sure. Performing everything from fire-fighting to carpentry, by the end of the century every house will have at least one robot programmed to perform any number of <u>tedious</u> or dangerous chores humans would rather not deal with, and they will be perfect to leave at home to walk the dog and keep an eye on the house when you're away. This invention is very promising especially in the military field because pretty soon, soldiers will no longer need to be sacrificed in the front lines.

3. Automation is also a type of robotics in different factories that is especially used for assembling purposes. With the development in robotics, automation is also expected to be developed. This in turn will simply work in the favour of development of industries.

4. Antigravity is technically not possible because of the creation of monopoles (magnets that have only one pole). Once it is possible, wheels will be a thing of the past as everything will ride on a cushion of magnetic fields, with propulsion being afforded by merely pointing your <u>craft</u> the direction you want to go and letting the magnetic forces of the Earth itself do all the work.

5. Actually, cloning has been known since the twentieth century, so it's nothing really new. You can grow a new organ in a flask in a few weeks and then have the old one replaced. Life spans of two or even three hundred years might be within reach through this method, making it a virtual fountain of youth or at least, a fountain of longevity. This can completely change the position of the medical system making an age of 200 a genuine possibility.

6. Arguably nanotechnology is the most fascinating advent in the field of technologies. The subject deals with the extremely small microscopic particles which are so fine that they can be injected into the system and repairs can be done to the human organs. This feat is still far away from becoming a reality but the prospects are great.

7. Artificial Intelligence (AI), the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is applied to the project of developing systems endowed with the ability to reason,

discover meaning, generalize, or learn from past experience. Artificial intelligence will make machines and robots actually to be capable of learning, planning, deciding, considering, comparing, aligning and even abstract thinking. By the dawn of the twenty-first century your car, your home, or even your artificial mechanical pet (AMP) might be smarter than your brother-in-law.

8. Energy is literally the main cause that puts up a lot of disturbances. In the past we only knew of the fossil fuels. But the scientists of the 21st century have made it possible enough for extraction of energy from various other sources like wind, water, geothermal heat, etc. With proper guidance, these things can turn out to be an extremely efficient form of energy (free energy).

9. The way we travel by aircraft has completely changed in this century. This is more due to the fact that there has been a prime development in the area of hypersonic transportation. Now you have planes and a train that travels very much equal to the speed of light. With proper development of the technology it is not far away when we will seriously be able to travel all the countries of the world in just 80 days.

10. Genetic engineering is the one of the greatest revolution of the human race. With the help of DNA you can choose a better life partner for you. By the end of the century, parents will be able to determine the sex, intelligence, and even hair and eye colour of their child while turning off any possibly dangerous genetic defects their offspring might have been in line to inherit.

4. What words or word combinations are used to characterize the following?

a) dependence on gasoline-powered cars – as: 1) eternal; 2) painful; 3) fuel slavery;
b) disadvantage of the hydrogen powered cars – as: 1) volatile; 2) costly; 3) superhighspeed;
c) artificial intelligence – as: 1) computer-controlled; 2) stupid; 3) useless;
d) chores humans would rather not deal with – as: 1) expensive; 2) dangerous; 3) multitasking.

5. Look through the article and find the definitions of the terms: «artificial intelligence», «nanotechnology».

6. Work in pairs. Tell your partner about inventions that have changed the modes of transportation at the beginning of the current century.

7. Mark the goals of the article. You may choose more than one point.

A. To tell an interesting story.
B. To inform about the latest inventions.
C. To prevent people from using new technologies.
D. To prove that inventions help us in day-to-day activities.

8. Read the annotation and say if it highlights the key pieces of information given in the article.

   The article informs the readers of some significant inventions of the 21st century. A list of items is viewed as the most representative one and includes hydrogen-powered vehicles, robotics, automation, nanotechnology, cloning, genetic engineering and others. The examined inventions have us extending the limits of knowledge and possibilities. It is pointed out that mankind is entering a new era of manufacturing. Much attention is given to the idea of challenging the model of labour intensive industries and greater efficiency achieved due to automation and robots. Genetic engineering and cloning are reported as the revolution of human race that is probably the most dangerous one.

9. Find the passage that contains the data you are interested in.

10. Make up your 10 top list of inventions of the 21st century. What inventions would you include in: a) GPS; b) the Internet; c) Social Media; d) Touchscreens; e) E- readers, f) YouTube, others?

Summarizing

11. Study the table and explain what transformative impacts the listed technologies could drive by 2025. Prepare a written report (about 500 words) on the question. To reach the goal use the following prompts and word combinations:

Firstly, secondly, next, as for, as to, in this connection, in spite of, however, as well as, considering that, in fact, certainly, to be likely to, to be sure to, etc.
Both in manufacturing and knowledge work; to provide the opportunities and the tools; *to compete on a meaningful scale*; to advance into new markets rapidly; *to have real potential*; to drive tangible improvements in quality of …; *to improve and extend many lives*; to clean up the environment, *lessen the deleterious health effects of …*; to bring new meaning to the anytime/anywhere work style; *to augment the powers of skilled workers (stand to do well)*; to power the growth of …; *to foster increased productivity*; to help develop and exploit unique resources and capabilities in new ways; *to alter overall consumption of certain resources*

Source: Mckinsey Global institute analysis ◊ primary * secondary □ other potential impact	Mobile Internet	Automation of knowledge work	The Internet of Things	Cloud technology	Advanced robotics	Autonomous and near-autonomous vehicles	Next generation genomics	Energy storage	3D printing	Advanced materials	Advanced oil and gas exploration and recovery	Renewable energy
1	2	3	4	5	6	7	8	9	10	11	12	13
Implications for Individuals and societies												
Ch-s quality of life, health and environment	□	□	◊	□	◊	◊	◊	◊	□	◊	□	◊
Ch-s patterns of consumption	◊	□	*	◊	□	□	*	*	◊	□	*	□
Changes nature of work	*	◊	□	□	◊	*	□	□	□	*	□	□
Creates opportunities for entrepreneurs	◊	*	*	◊	*	*	◊	*	◊	*	□	*
Creates new products and services	◊	*	◊	◊	◊	◊	◊	*	◊	◊	□	*
Implications for established businesses and other organizations												
Shifts surplus between producers or industries	□	□	*	□	□	*	*	◊	□	*	◊	◊
Shifts surplus from producers to consumers	*	□	□	*	□	□	□	□	*	□	□	□
Changes organizational structures	*	◊	□	□	*	□	□	□	□	□	□	□
Drives economic growth or productivity	◊	◊	◊	◊	◊	*	*	*	◊	*	◊	□

	1	2	3	4	5	6	7	8	9	10	11	12	13
Implications for economies and governments	Changes comparative advantage for nations	□	*	□	□	*	□	□	□	*	*	◊	*
	Affects employment	□	*	□	□	*	*	□	□	*	□	□	□
	Poses new regulatory and legal challenges	□	*	*	*	□	◊	◊	□	□	*	*	*

12. Turn to the comparison chart in Part I and add some data to extend it.

Consolidation

Arrange a Round-table meeting, select the Panel Moderator and the secretary of the meeting. The topic for discussion: the possibilities for developing youth innovation activities in our republic. Examine the forms of students' participation, motivating factors, state support and weak points in using youth innovative potential. Speak about your innovative activities (if any). Release the recommendations and conclusions in the form of a written report.

UNIT 3: GLOBAL CHALLENGES

Lead-in

We are finding today that not only are we mutually dependent on one another for our survival, subsistence and success, but we also share problems that inevitably penetrate national borders and require our common responsibility for solving them. They demand the pooling and sharing of knowledge across institutions, across disciplines and across continents. Among these issues of global concern are the social trends and the changes in the natural world which will impact our planet and its many populations in the near future.

Consider the main global problems and fill in the table using your own ideas.

Problem	Causes	Effects	Solutions
Economic crisis			
Overpopulation			
Shortage of energy resources			
Terrorism			
Rich-poor gap			
Global warming			
Endangered species			
Deforestation			

Part I

Data mining

1. Work with the partner and discuss the biggest issues being faced by humanity which are the most urgent today in your opinion?

2. Make the list of issues that might be mentioned in the text below.

3. Look through the text given below and spot the key words and collocations that make the thematic frame of the text.

4. Skim the text and find the paragraphs which mention the following:

1) poverty line (черта бедности);
2) energy efficiency (энергоэффективность);
3) terrorism prevention methods (методы предотвращения терроризма);
4) global issues (глобальные проблемы);

5) financial crisis (финансовый кризис).

5. Read paragraph 5 of the text and try to understand it without a dictionary. Choose the sentence which contains the main idea.

6. Arrange the following questions to reflect the content of the text. What questions won't be answered after the reading of the text.

1. Can global issues be defined as sustained?
2. What ecological problems are the most urgent today?
3. When can local economies experience a sudden downturn?
4. What are the harbingers of a global economic collapse?
5. How can transnational organized crime networks be stopped?
6. How can growing energy demands be met safely and efficiently?
7. What countries today require most efforts to help reduce the gap between rich and poor?

7. Read the whole text and make its plan.

Global Issues

The idea of issues that are truly global in scale is relatively new to us. Regardless of its novelty, global issues are so important that they may literally determine the future of the human species.

But still there is no internationally agreed definition of global issues. We will define them as follows. Global issues are those that have, or hold the potential for, far-reaching impacts on large numbers of people. Global issues are transnational, or transboundary, in that they are beyond the capability of any one nation to resolve. Global issues are persistent or long acting in that they may take years, decades, or even generations to be fully felt, and may require similar time frames to be resolved. Finally, global issues are interconnected, which means that a change in one – whether for better or worse – exerts pressure for change in others.

The most crucial global issues confronting us at the beginning of the 21st century include but not limited to: ecological problems, overpopulation, economic crisis, shortage of energy resources, terrorism, rich-poor gap. Whereas first two issues will be discussed in detail further let's consider the rest of the problems listed above.

Global integration of national and regional economies and expanding interconnectedness of financial markets offer greater opportunities but, at the same time, however, poses serious inherent risks of a financial crisis, a situation in which the economy of a country experiences a sudden downturn. Besides, concerns about the fairness of recent international trade agreements and the effects of freer trade on jobs and working conditions led to violent protests against globalization. So anti-globalization groups tend to assume that the costs associated with globalization outweigh the benefits. Globalization leads to the interdependence between nations,

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which could cause regional or global instabilities if local economic fluctuations end up impacting a large number of countries relying on them. Some see the rise of nation-states, multinational or global firms and other international organizations as a threat to sovereignty. The benefits of globalization can be unfairly skewed towards rich nations or individuals, creating greater inequalities.

Pressures to supply enough fossil fuel, biomass, and electricity to meet world demand are getting worse and worse annually. The world economy of 2035 will be three to four times its present size, thanks largely to rising incomes in developing countries. Even if dramatic improvements in energy efficiency are achieved, this vastly expanded activity will consume much more energy than the world uses today. World economic activity must become radically less carbon intensive, to avoid not only environmental disaster through climate change, but also health disasters on an epic scale. A shift to renewable energy and low- or no-carbon fuels is essential, as are the development and adoption of energy efficient technologies.

Terrorism like the bombing incidents of the last few years continues to claim the lives of innocents. It is a threat to the peace, security and stability of the world, so terrorism prevention methods have been implemented to illustrate what is wrong and could be done to uphold justice. However, the basis of the threats, mindsets and the successes/failures of response efforts still need to be evaluated.

Today the International Poverty Line is set to $1.90 per capita a day. Substantial progress has been made in recent decades in reducing poverty – the proportion of people living in extreme poverty worldwide has halved since 1980. Yet poverty remains deep and widespread: more than a billion people still subsist on less than one dollar a day having difficulties obtaining food and shelter, and income per capita in the world's high-income countries (Qatar, Luxembourg, Singapore), on average, is 65 times that in the low-income ones (Congo, Mozambique, Uganda).

The good news is that we have the knowledge and tools today to help create a sustainable world. There are both personal and structural solutions that people can identify and act on.

Analyzing and Evaluating

8. Have a look at the following facts. Can any of them be added to the text? Which paragraphs of the text can they supplement?

A. Based on its current rate of decrease, poverty is expected to continue dropping.

B. Technology-driven efficiency gains may be undermined by increased consumption.

C. Global challenges provide a framework to access global and local prospects for humanity.

D. Scientists are struggling to reduce the threat of new and reemerging diseases.

E. Fossil fuel use has declined by 19 % recently.

F. Population growth can be brought into balance.

G. In its turn globalization accelerates scientific and technological breakthroughs.

9. *Decide whether the following statements are True (T), False (F) or Not Given (NG) according to the facts presented in the text. Correct the false statements.**

1. Global issues are interdependent by nature adversely affecting each other.
2. Recent population explosion is unprecedented in human history.
3. It is crucial to come up with sustainable solutions that can minimize our carbon footprint and greenhouse emissions.
4. Today on a global scale there is a significant division between economic classes around the world.
5. The prime aim of nation is to improve visibility, advocacy and resource mobilization for counter-terrorism efforts.
6. The majority of poverty is concentrated in South America, whereas the wealthiest countries are located in the Asia-Pacific region.

10. *List the most shocking facts for you represented in this part and prepare a shot written report about them.**

Summarizing

11. *Sum up the information given in the text and make an oral presentation on one of the issues listed below (see the figure). Use the following prompts to organize your speech.**

Stage	Useful phrases
Introduction	My aim for today's presentation is to give you information about …
	I have been asked to comment on …
	Please feel free to interrupt me if there are any questions
	If you have any questions, please ask me at the end
Outline of a presentation	At the outset …/First of all, …/Above all, …
	I'd like to start by saying …/Before discussing …
	Describing this issue, it is necessary to start with …
	I am going to divide my report into 3 parts …
	I will begin with a definition of …, then go on to a brief review …
	Lastly we are going to discuss …
Main part	Let's now turn to …/Let's move on to …
	Before moving to the next point, I need to …
	That will bring us to our next point …
	Let us now proceed to consider how …
	Let's switch to another topic …/I'd like to describe in detail …
	Firstly …/Secondly …/Thirdly …

Stage	Useful phrases
Conclusion	So, in conclusion …/Finally let me sum up today's main topics …
	Concluding what has been said above, I want to stress that …
	As a summary I would like to say that …
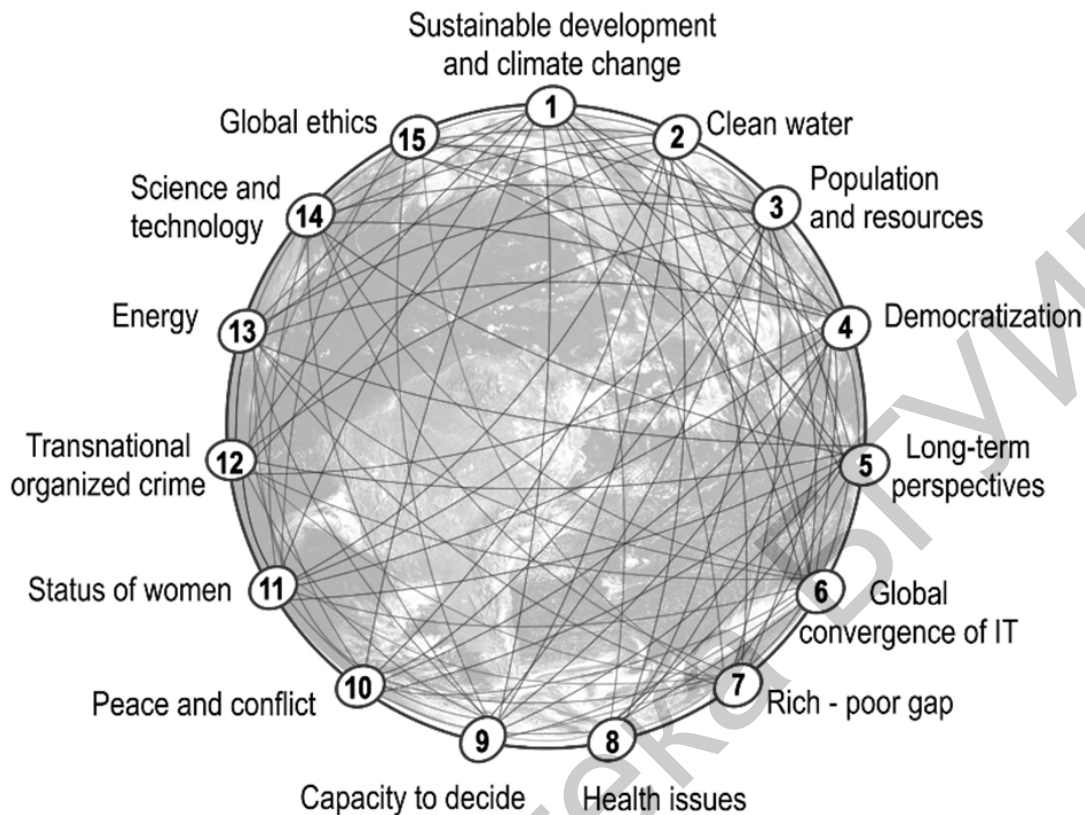
12. Address the mental map at the beginning of the unit again and try to fill it in using the information you have already gathered.

Part II

Data mining

1. Here are some quotes about our environment. What ideas do they emphasize? Discuss your answer with a partner.

1. «I only feel angry when I see waste. When I see people throwing away things we could use» (Mother Teresa).

2. «The Earth is what we all have in common» (Wendell Berry).

3. «Progress is impossible without change, and those who cannot change their minds cannot change anything» (George Bernard Shaw).

4. «One of the first conditions of happiness is that the link between man and nature shall not be broken» (Leo Tolstoy).

5. «The Earth will not continue to offer its harvest, except with faithful stewardship. We cannot say we love the land and then take steps to destroy it for use by future generations» (John Paul II).

6. «Environmentally friendly cars will soon cease to be an option … they will become a necessity» (Fujio Cho, Honorary Chairman of Toyota Motors).

2. Read the text and find the words which mean the following.

1. The state or process of coming to an end or dying out.
2. The action or state of making or being made impure by polluting or poisoning.
3. Economic development that is conducted without depletion of natural resources.
4. The variety of plant and animal life in the world or in a particular habitat.
5. The conditions and influences of the place in which an organism lives.
6. The protection and preservation of the Earth's resources or historical objects for future.

3. Examine the underlined words in the sentences below. Then find them in the text and check their meanings in the dictionary.

1. Being transboundary in nature, global ecological issues generate international concern.
2. Pressure on natural resources and environment today remains overwhelming.
3. Policies to minimize hazardous wastes should be pursued.
4. Another serious obstacle is a lack of adequate national budget allocation for natural protection.
5. Faced with these threads, the responses can only emerge collectively.
6. We must join forces for achieving multilateral environmental agreements.
7. In some African regions there is increasing freshwater scarcity causing water conflicts between people.
8. Alternative sources of energy can substitute other natural assets which are on the brink of depletion.
9. The success with which countries adapt to a situation with higher energy prices will depend on their natural resource endowments.
10. Exploiting synergies with other international organizations is particularly important given the limited resources generally available.

4. Read the title of the text and say what ecological issues will be discussed there. Then scan the whole text to check your ideas.

Environmental Concerns

One of the most prominent problems is the impact of people's activity on the environment. Because of human transboundary negative influence and overwhelming

careless management of natural resources plenty of environmental issues are considered as being of international not just national interest now. The most hazardous of them at a global level are: air/water pollution and soil contamination, climate change, depletion of the ozone layer, extinction of species of flora and fauna, nuclear wastes, exploitation of natural resources. Besides cross-border effects of the problems listed above revel the difficulty of finding universal solutions to them. These are just several obstacles on this way: the number of countries involved, problem recognition, wealth inequalities between countries, monitoring problems.

The concept of the 'green economy' has emerged in recent years as a strategic priority for governments and intergovernmental organizations to reach multilateral environmental agreements and find the way to sustainable development. Green economy is an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. It can be seen as a means to link the economic, environmental and social considerations of sustainable development in such a manner that economic resilience and long-term development are achieved by investing in environmentally friendly and socially equitable solutions.

The transition to green economy can be achieved through stimulating green investments that should help to use natural capital and ecosystems in a more efficient way or to substitute them by other assets, in particular when there is a risk of depletion or degradation. It requires different mixes of instruments that must be tailored to the individual characteristics of different economies and may depend, for example, on natural resource endowments, socioeconomic development, environmental conditions, state of health, strengths of institutions, etc. Furthermore, the choice must be adapted to national priorities and strategies and take into account various costs, risks, benefits and opportunities.
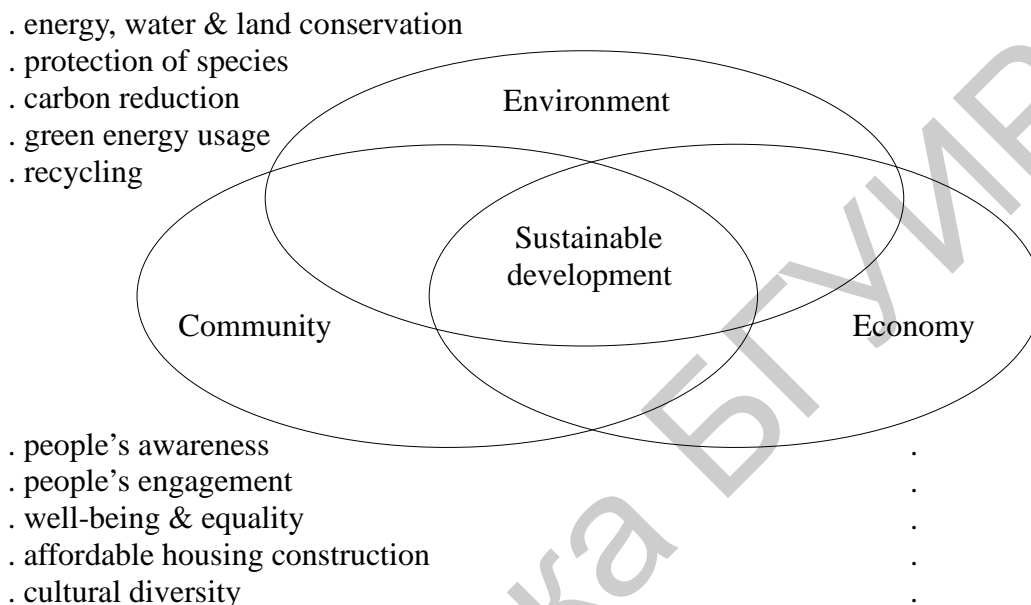
The Republic of Belarus is an active participant of multilateral international conventions within green economy approach. The main areas of cooperation within the framework of provided technical assistance are issues of biodiversity conservation and sustainable functioning of the protected wetland system in the Belarusian Polesie, handling of persistent organic pollutants, prevention of environmental pollution by oil products, development of pollutant release and transfer registry, water resources management, including resources of the Neman River Basin and the implementation of the Strategic Action Program for the Dnieper Basin and evaluation of ecological condition of lake ecosystems, as well as provision of a permanent exchange of radar data with partner countries of the Baltic Sea region, implementation of comprehensive measures to reduce agricultural pollution sources in the region and others.

Today we still remain a long way from achieving the transition to green economy but four key pillars for it have been set: implementation, integration, information and investments. The focus is on identifying synergies that enable economic, environmental and social objectives to be advanced concurrently. Designing actionable, credible and feasible green economy pathways can put the world at the frontier of science and technology without compromising environmental wellbeing.

Analyzing and Evaluating

5. Divide the text into parts and give each a title.

6. The following figure shows different components of sustainable development. Work with a partner and find information about green economy in the text below to complete the map.

. energy, water & land conservation
. protection of species
. carbon reduction
. green energy usage
. recycling

Environment

Sustainable
development

Community

Economy

. people's awareness
. people's engagement
. well-being & equality
. affordable housing construction
. cultural diversity

.
.
.
.
.

7. Complete the condensed version of the text below. Choose no more than TWO words from the text for each gap.

«Global 1_____» is a phrase that refers to the effect of human actions on the environment. In particular these concerns are connected with burning fossil fuels, large-scale deforestation, spreading of 2_____ pollutants and nuclear 3_____, emission of huge amounts of «greenhouse gases».

But reaching 4_____ over international eco-problems faces same serious 5_____. So some effects on the environment can't be easily measured and cause particular ambiguity among scientists. Besides, it's extremely difficult to get over plenty of 6_____ to agree on a common action plan to tackle such problems. Moreover, poor countries can hardly afford green technologies.

The 7_____ lays in the mechanisms to deliver the green 8_____. Investing in renewable energy, green business and technologies, education will enhance the chances on nature flourishing, social 9_____ and business growth leading to 10_____ development.

8. Choose appropriate linking words from the table below and complete the passage about air pollution in big cities.

Paragraph 1	Paragraph 2	Paragraph 3
since, moreover, not only, although, but also, and	first, furthermore, despite, then, because, whereas, for instance	Meanwhile, otherwise, therefore

The main ecological concern in big cities is connected with air pollution. 1_____ do factories and industrial enterprises located within city borders produce harmful emissions into the atmosphere, 2_____ the urban environment is seriously affected by traffic congestion 3_____ exhaust fumes. 4_____, constant traffic jams cause frustration 5_____ they increase the length of each journey.

6_____ all these problems people continue to drive in cities. 7_____ 8_____ as a rule it is less time-consuming to travel door to door. 9_____ using public transport city dwellers have to change buses, 10_____, or wait at the bus stop. 11_____ a private car makes a journey more convenient in terms of privacy, security and facilities.

People can 12_____ only be encouraged to change their driving habits by making alternatives better. 13_____ the problem with pollution in big cities will remain.

9. Look at the following steps of recycling e-wastes. Put them in order. What linking words (if any) helped you?

A. Not only copper, gold, palladium, silver and tin are sold to smelters for recycling.

B. It is made either by hand or with the help of automated shredding equipment.

C. First it is dismantled into various parts (metal frames, power supplies, circuit boards, plastics).

D. Electronic waste or e-waste (cell phones, laptops, computers, batteries, etc.) can't be simply thrown away as trash because of their eco-damaging potential.

E. Therefore recycling can benefit our community and the environment.

F. These recovered components are then collected and sent to various facilities for future recycling processing.

G. But leaded glass from CRTs is reused in car batteries, ammunition and lead wheel weights.

H. Moreover hazardous smoke and gases captured from the recycling of e-waste are treated to mitigate environmental threat.

10. Do the following statements agree with the claims of the author of the text (Yes, No, Not Given)?

1. Plenty of environmental issues today are gaining concerns among governments of different countries.

2. The obstacles on the way of solving international eco-problems can be easily overcome.

3. Sustainable development can be achieved only through mutual environmental agreements.

4. The participation of poor and developing countries in transition to green economy should correspond to their natural resource endowments.

5. The goal of Belarus in green economy approach is to reach local environmental well-being without any trade-offs.

11. Fill out the following flow chart with information from the text.
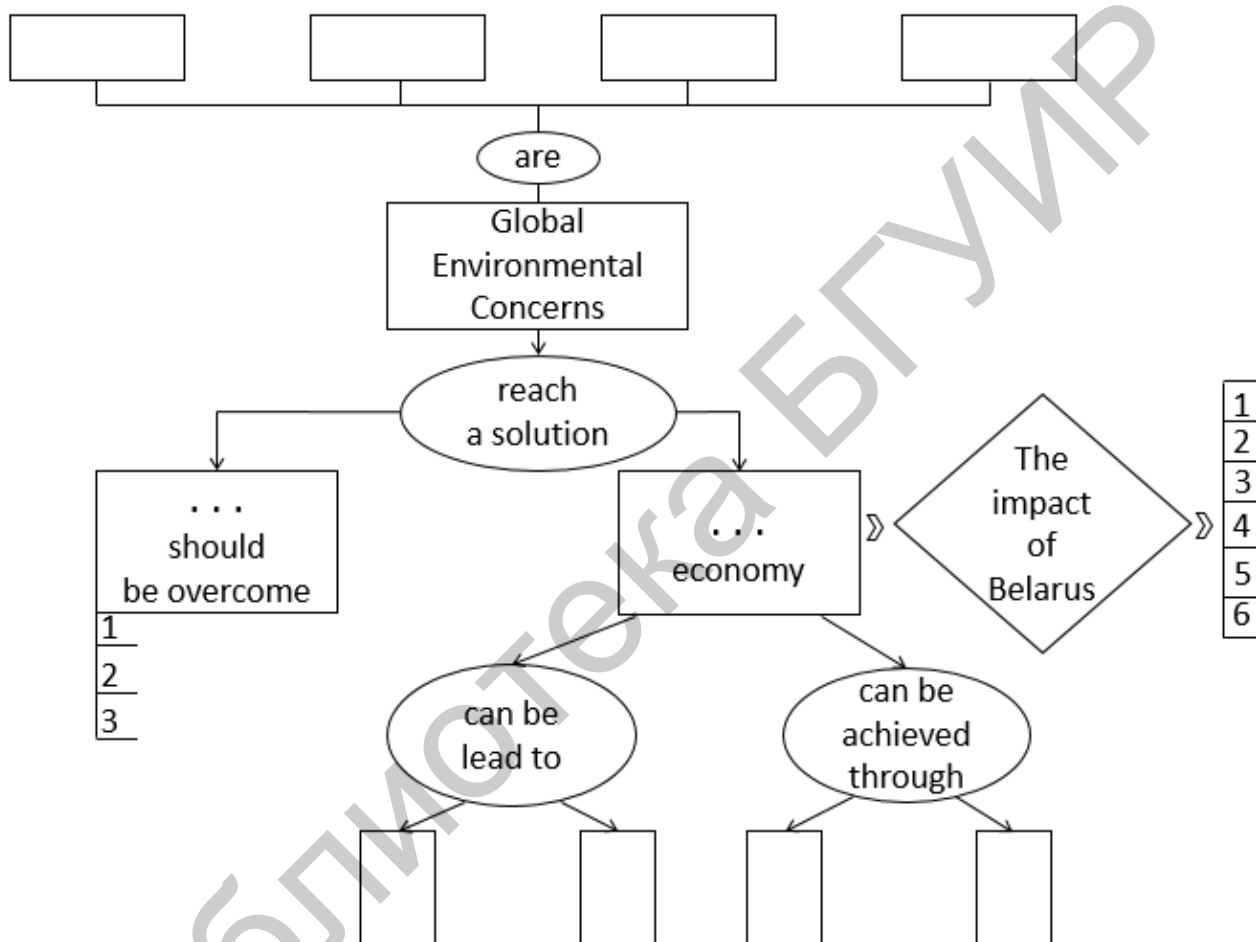
12. Write no more than three words for each answer.

1. What words tell you that modern ecological problems are global?

2. What key words are used to introduce a definition of «green economy»?

3. What defining words are used to explain how green economy can be achieved?

4. What words are used to characterize the instruments for transition to green economy?

5. What linking words introduce additional information about instruments of stimulating green investments?

Summarizing

13. List the data that you consider the most important ones. Why?

14. Brainstorm how you personally can contribute to the solution of environmental problems. Remember that making small steps and adjustments in your daily routine will give you a sense of success and a yearning to attempt more. Here are 5 simple ways you can help the environment and spark others to become more environmentally aware. Explain how they can be fulfilled.

1. Replace disposable items with reusable.
2. Conserve water and electricity.
3. Recycle.
4. Support local and environmentally friendly companies.
5. Take part in green movement.

15. Write an e-mail to your foreign friend telling about the present state of the issue in Belarus.

16. Address the mental map at the beginning of the unit again and try to fill it in using the information you have already gathered.

Part III

Data mining

1. Look through the title and say what the article is about.

2. What concerns (if any) does overpopulation arouse in you? Use the following prompts to help you express your thoughts.

1. For me, living in an overpopulated area means facing _____
2. If I can _____ , then I will choose to stay _____ .
3. In my humble opinion, even overpopulation can be considered as a chance to _____ in life.

3. Look through paragraphs indicated in brackets. What words denote the following?

1. Enough for a particular purpose (3).
2. A situation in which there is not enough of something (5).
3. A force that stretches something to an extreme or damaging degree (7).
4. Something that is allowed or given up, often to finish a disagreement (10).
5. To control or limit something that is not wanted (11).

4. Read the first lines of the paragraphs in the article and say what issues are discussed in each of them.

Overpopulation

Overpopulation is an undesirable condition where the number of existing human population exceeds the carrying capacity of Earth. It is possible for a sparsely populated area to become densely populated if it is not able to sustain life. In the past fifty or so years, the growth of population has boomed and has turned into overpopulation. Developing nations face the problem of overpopulation more than developed countries, but it affects most of the Earth now.

Overpopulation is caused by number of factors. At the root of it is the difference between the overall birth rate and death rate in populations. If the number of children born each year equals the number of adults that die, then the population will stabilize. Talking about overpopulation shows that while there are many factors that can increase the death rate for short periods of time, the ones that increase the birth rate do so over a long period of time. The discovery of agriculture by our ancestors was one factor that provided them with the ability to sustain their nutrition without hunting. This created the first imbalance between the two rates.

However, when talking about overpopulation we should understand that there is a psychological component as well. For thousands of years, a very small part of the population had enough money to live in comfort. The rest faced poverty and would give birth to large families to make up for the high infant mortality rate. Families that have been through poverty, natural disasters or are simply in need of more hands to work are a major factor for overpopulation. As compared to earlier times, most of these extra children survive and consume resources that are not sufficient in nature.

Medical science made many discoveries thanks to which they were able to defeat a whole range of diseases. Illnesses that had claimed thousands of lives till then were cured because of the invention of vaccines. Growing advances in medical technology have enabled to save more lives and create better medical treatment for all. Besides, recently it has become possible for couples who are unable to conceive to undergo fertility treatment methods and have their own babies. Today there are effective medicines which can increases the chance of conception and lead to rise in birth rate. Also, due to modern techniques pregnancies today are far safer.

Moreover, many people prefer to immigrate to developed countries like US, UK, Canada and Australia where best facilities are available in terms of medicine, education, security and employment. The end result is that those people settle over there and those places become overcrowded. The difference between the number of people who are leaving the country and the number of people who enter narrows down which leads to more demand for food, clothes, energy and homes. This gives rise to shortage of resources. Though the overall population remains the same, it just affects the density of population making that place simply overcrowded.

The effects of overpopulation are quite severe. The first of these is the depletion of resources. The Earth can only produce a limited amount of water and food, which is

falling short of the current needs. Most of the environmental damage being seen in the last fifty years is because of the growing number of people on the planet. With the overuse of coal, oil and natural gas, it has started producing some serious effects on our environment. Rise in the number of vehicles and industries have badly affected the quality of air. Rise in amount of CO_2 emissions leads to global warming. Melting of polar ice caps, changing climate patterns, rise in sea level are few of the consequences that we might we have to face due to environment pollution.

Overpopulation in developing countries puts a major strain on nature causing conflicts between people. Acts of violence and aggression have increased tremendously while competing for resources. So, arguments over water are becoming a source of tension between countries, which could result in wars.

When a country becomes overpopulated, it gives rise to unemployment as there are fewer jobs to support large number of people. Rise in unemployment gives rise to crime as people will steal various items to feed their family and provide them basic amenities of life.

Poverty is the biggest hallmark we see when talking about overpopulation. As difference between demand and supply continues to expand due to overpopulation, it raises the prices of various commodities including food, shelter and healthcare. This means that people have to pay more to survive and feed their families. It causes more diseases to spread and makes them harder to control. Starvation is also a huge issue facing the world and the mortality rate for children is being fueled by it.

Solutions to the problem of overpopulation can be obtained through education and concessions.

Educating the masses helps them understand the need to have one or two children at the most. Family planning and efficient birth control can help in women making their own reproductive choices. Raising awareness among people on the problem can help curb population growth. Imparting sex education to young kids at elementary level should be a must.

Governments of various countries might have to come with various policies related to prevention of overpopulation. One of them might be to waive of certain part of income tax or lowering rates of income tax for those married couples who have single or two children. The other is to state migration policies to regulate the international movement of people. Many countries maintain extensive legal barriers to prevent foreigners seeking work or residency from entering their national borders. In fact, immigration policies across the world are becoming stricter as governments attempt to minimize the economic, cultural, and security impacts of large movements of people between nations.

5. Skim the whole article and check whether your ideas about the issues discussed in it were correct.

6. Continue the following phrases according to the information in the article.

1. Overpopulation can be characterized as … .

2. The reasons causing overpopulation are … .
3. Psychologically people used to have big families because … .
4. Advances in medical science have led to … .
5. Immigrants are mainly attracted by … .

7. Imagine you are going to make a word cloud of this article. What key words should be used for it.

8. In your opinion is the author's approach to the problem of overpopulation a) critical, b) cautious, c) optimistic, d) confirming?

9. Read one more article on the same issue. Is there a distinct convergence of views with the article negotiated above?

World Isn't Facing Overpopulation Problem

Many people believe that overpopulation is the greatest threat to the world's security and prosperity. It was probably Malthus who first pointed out that population growth is exponential, while agricultural growth is arithmetic. He reasoned that every population must inevitably outgrow its food source. Political instability and border insecurity naturally follow, when growing populations seek to nervously protect their shrinking resource base.

Critics of Malthus pointed out that human populations, unlike bacteria, do not grow exponentially; fertility rates vary geographically and over time. New economic models, including those that factor labour as capital, valued large populations as assets rather than detriments, allowing industrializing nations to convert population to production and therefore to wealth, allowing them to purchase needed resources.

The predicted Malthusian collapse did not occur, due largely to improvements in agricultural sciences and something called the Demographic Transition. It's this latter thing that gives many demographers hope that the world's population growth might be slowing, soon to be plateauing, and eventually reversing. According to this theory societies evolve through five stages of demographic development.

In Stage 1, we live pre-industrial lives when diseases are plenty, lifespan is short. Both death rates and birth rates are high, and the population is neither growing nor shrinking. In Stage 2, with the arrival of public health and hygiene measures, infectious diseases recede, and mortality declines, particularly among children. Overall population size increases dramatically. In Stage 3, social factors intervene to lower the birth rate. When infants survive and women are socially empowered, fertility rates drop. Thus, in this stage population size is still increasing, but more slowly. In Stage 4, we transit to services and information economy. Birth and death rates are balanced, and there is minimal population growth. Some recognize the fifth stage in which birth rate drops below death rate, the population shrinks and governments begin to experiment with strategies for encouraging larger families.

Human population growth is expected to drop to one per cent by 2020, though we are still on schedule to reach the 9 billion mark by 2050. Total world population should plateau at about 13 billion by 2100, and actually decline thereafter. So, draconian measures driven by xenophobia are not necessary to slow the expansion of our numbers. Nor do we need pandemics, famines or wars to cull our numbers. So long as we continue to invest in education, public health, access to contraception and global trade, our numbers are likely to decline naturally and painlessly.

10. Which of the following inferences can you logically make from the first article and which are derived from the second one or from both of them? Are there any ideas that have no connection at all with the articles presented above?

1. Poverty is one of the main causes of overpopulation.

2. That is why the efficient resolution of global issues requires the active involvement of civil society and the private sector.

3. Some equitable, realistic and cost-effective solutions how to cope with overpopulation can be found.

4. The vast depletion of natural resources increases global warming, which cannot be considered as human development in sustaining gains.

5. In densely populated areas the level of crime is higher than in less inhabited parts of the world.

6. Technological progress is a key factor to conquer overpopulation as a problem.

7. We expect to face the reduction of population growth in the near future.

11. Express your attitude to the facts listed in the articles above. Illustrate your thoughts with extra information and examples.

Summarizing

12. Study the line graph and explain world population growth over years. To reach the goal use the following prompts for describing trends. A sample answer below illustrates the structure of this writing task and the usage of the given expressions.

Trend	Verbs	Nouns
Upwards	rise (to) increase (to) go up (to) climb (to) boom	a rise an increase growth an upward trend a boom (a dramatic rise)
Downwards	fall (to) decline (to) decrease (to) drop (to) reduce (to)	a fall a decline a decrease a drop a reduction

Trend	Verbs	Nouns
Plateau	level out (at) plateau (at) remain stable (at) stay constant	a leveling out reached a plateau (at) no change
Various	fluctuate (around) peak (at)	a fluctuation reached a peak (of)

Describing the degree of change: dramatic/dramatically; sharp/sharply; enormous/enormously; steep/steeply; substantial/substantially; moderate/moderately; slight/slightly; minimal/minimally.

Describing the speed of change: rapid/rapidly; sudden/suddenly; steady/steadily; gradual/gradually; slow/slowly.

Sample answer:

The graph shows the number of immigrants arrived in the USA from Europe between the years 1998 and 2018. As an overall trend, it is clear that the amount of immigrants increased fairly rapidly to 80 thousand in 2001, dropped suddenly to 50 thousand in 2003 and then boomed to 85 thousand in 2005 dropping slightly in the late 2000s.

In 2010, the number of immigrants stood at 50 thousand and remained approximately constant for almost a decade up to 2018.

In conclusion, the graph indicates that the amount of immigrants fluctuated until 2010 when it leveled out.

World population growth, 1750–2100
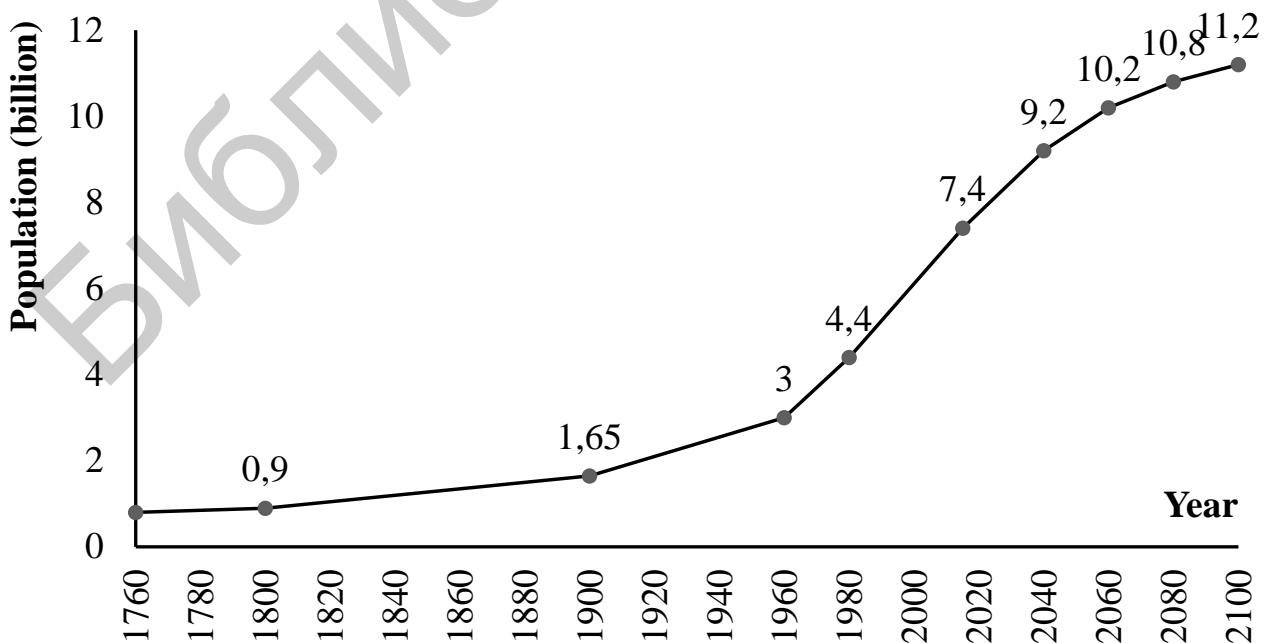
13. Write an annotation to any text or article in this unit. Use the following prompts and an example below:

    1. As you can see from the title the article is devoted to …;
    2. The article begins with a review of …;
    3. Then the author gives a detailed analysis of …;
    4. Much attention is given to …;
    5. It is pointed out that …;
    6. At the end the author sums it all up by saying …;
    7. I think that …;
    8. The article is of great help to … .

As the title implies the article describes the problem of overpopulation. It is especially noted that it is a serious issue for many countries today. The number of factors causing such undesirable condition is discussed by the author including the discovery of agriculture, achievements in medical science, immigration, and psychological aspects. It is also reported about the effects of overpopulation such as the depletion of resources, the rise of conflicts between people, and poverty. In conclusion some solutions to this issue are offered.

14. Address the mental map at the beginning of the unit again and try to fill it in using the information you have already gathered.

Consolidation

Reconsider everything you have learned about Global challenges. Work in small groups and prepare presentations covering the most serious issues related to Belarus. Try to make them interesting, informative and illustrative using various graphs, examples, visual aids and so on.
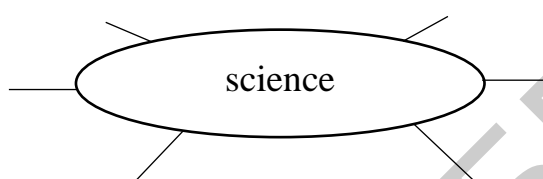
UNIT 4: SCIENCE AND SCIENTIFIC RESEARCH

Lead-in

Today different branches of science investigate almost everything that can be observed or detected, and science as a whole shapes the way we understand the universe, our planet, ourselves and other living things.

Part I

Data mining

1. What associations do you have with the word «science»? Complete the word web.

2. Work in pairs. What is science? The notion «Science» has been redefined several times. Discuss with a partner which definition specifies the term most comprehensively?

1. «Science is a systematic and formulated knowledge, branch of knowledge, organized body of the knowledge that has been accumulated on a subject» (Oxford dictionary).

2. «Science is the field of study concerned with discovering and describing the world around us by observing and experimenting» (https://www.vocabulary.com/dictionary/science).

3. «Science is defined as the observation, identification, description, experimental investigation, and theoretical explanation of natural phenomena» (Explorable.com, Lyndsay T Wilson).

3. Read paragraph 1 of the text given below and try to understand it without the dictionary. Formulate the definition of "science".

4. Skim the text and define the key words and collocations that make a thematic frame of the text.

5. Scan the text and find the paragraphs which mention the following:

1. Interconnected parts forming a complex whole.
2. Main properties of science.

3. Scientific theories.
4. Main idea of science.
5. Representation of real life phenomena.

6. Make the list of issues mentioned in the text.

7. Make the plan of the text.

1. Science is a systematic and logical approach to discovering how things in the universe work. It is also the body of knowledge accumulated through the discoveries about all the things in the universe. The word «science» is derived from the Latin word «Scientia», which is knowledge based on demonstrable and reproducible data. True to this definition, science aims for measurable results through testing and analysis. Science is based on fact, not opinion or preferences. The process of science is designed to challenge ideas through research. One important aspect of the scientific process is that it focuses only on the natural world. Anything that is considered supernatural does not fit into the definition of science.

2. When conducting research, scientists use the scientific method to collect measurable, empirical evidence in an experiment related to a hypothesis (often in the form of an «if/then» statement), the results aiming to support or contradict a theory. The idea of science is that you can only learn about a phenomenon in a reliable and accurate way through collecting empirical data. The scientific process is designed to reduce human bias as much as possible, and make our conclusions as accurate as they can be.

3. Systems are sets of interconnected parts forming a complex whole. In science, systems are a way of separating the world into sets of parts to be studied. For example, you may study the oil inside an engine and how it is affected by heat. If your system is the oil itself, you might not concern yourself with any effects on the engine. On the other hand, you may study the variation in temperature across the entire engine including the oil, meaning that the whole engine and its contents is your system. The way you define your system has an impact on how you conduct your research.

4. Models involve representing real life phenomena in a way that makes it easier to understand or study. For example, you might create a physical clay model of a landscape, or you might create a 3-D computer model of a skyscraper, or you may come up a set of equations that describe the motion of clouds in the sky (a mathematical model).

5. Part of the scientific process concerns what you do after data has been collected. Once you've collected the data, it is analyzed, often using statistics and calculations, and then conclusions are made from those results. But how do we know that those conclusions are accurate? One way is through a process called peer review, which is where research is scrutinized and critiqued by fellow scientists. This process has to be completed before any scientific paper is published and it weeds out a lot of flawed research. It's a big part of why science has been so successful in explaining the world.

6. For a hypothesis to become a theory, rigorous testing must occur, typically across multiple disciplines by separate groups of scientists. The more we do new

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experiments the more new data comes along. This data is used in current theories. At some point, if overwhelming evidence from an experiment can't support current theory, scientists abandon the old ideas. In science, a theory is the framework for observations and facts. The scientific method and science in general can be frustrating. A theory is almost never proven, though a few theories do become scientific laws.

7. A law just describes an observed phenomenon, but it doesn't explain why the phenomenon exists or what causes it. Laws are generally considered to be without exception, though some laws have been modified over time after further testing found discrepancies. This does not mean theories are not meaningful. For a hypothesis to become a theory, rigorous testing must occur, typically across multiple disciplines by separate groups of scientists. That means that current amount of data to study is not enough to produce a profound and deep theory.

Analyzing and Evaluating

8. Mark these statements as true (T), false (F) or not mentioned (NM).

1. The scientific method and science in general cannot be frustrating.
2. One important aspect of the scientific process is that it focuses only on the natural world.
3. At the same time, science itself is undergoing rapid change, with development of new fields, concepts, methodologies and potential applications.
4. Models involve representing unreal life phenomena in a way that makes it easier to understand or study.
5. Systems are sets of interconnected parts forming a complex whole.
6. Scientific knowledge has led to remarkable innovations that have been of great benefit to humankind.
7. The idea of science is that you can only learn about a phenomenon in a reliable and accurate way through collecting empirical data.
8. Anything that is considered supernatural fits into the definition of science.
9. For a hypothesis to become a theory, rigorous testing must occur.
10. When conducting research, scientists use the scientific method to collect measurable, empirical evidence in an experiment related to a hypothesis.

9. Arrange the following questions to reflect the content of the text. What questions won't be answered after a close reading of the text.

1. Which language is the word «science» derived from?
2. Does the result of each research work provide the basis for future research activities?
3. What is science based on?
4. What is the scientific process designed for?
5. What is the way of separating the world into sets of parts to be studied?
6. What should be completed before any scientific paper is published?

7. What can become scientific laws?

8. All research activities benefit from a global collective approach, don't they?

9. What has an impact on how you conduct your research?

10. What is one of the important aspects of scientific process?

10. Have a look at the following facts. Can any of them be added to the text? Which paragraphs of the text can they supplement?

A. « Being open-minded is what science is all about. The best science operates by letting our observations about nature determine what our theories of the world should be. Theories are tested by making verifiable predictions that can then be demonstrated through experiment».

B. « Science is a systematic study of anything that can be examined, tested and verified. From its early beginning, science has developed into one of the greatest fields of human endeavor».

C. «Scientific research refers to the actual gathering of information. This can be by observation, and can mean even gathering information on the Internet. The aim of any research is to increase the possibilities offered by modern science and to make nature serve the people».

D. «On the one hand , science is striving to reach the essence of the laws of the material world. On the other hand, it is the basis of a new technology, the workshop of bold technical ideas, and the driving force behind continuous technical progress».

11. List the most interesting issues for you represented in the article.

12. Create a word cloud of this article. What key words should be used to perform the task?

Summarizing

13. Sum up the information given in the text and make a presentation. Use the following prompts to organize your speech:

The main idea (aim) of my presentation is to give you information about …; First of all …; I'd like to start with …; it's necessary to start with …; I'll begin with the definition of …; let's now proceed to …; I'd like to describe in detail …; firstly …; secondly …; so, in conclusion …; as a summary I'd like to say … .

Part II

Data mining

1. Examine the following quotes and say what factors motivate people to continue their studies and conduct research work? What motivates you?

1. «Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time» (Thomas A. Edison).

2. «Some people dream of great accomplishments, while others stay awake and do them» (*Anonymous*).

3. «If you don't have a competitive advantage, don't compete» (Jack Welch).

4. «There is always room at the top» (Daniel Webster).

5. «Successful and unsuccessful people do not vary greatly in their abilities. They vary in their desires to reach their potential» (John C. Maxwell).

6. «The aim of education is the knowledge, not of facts, but of values» (William S. Burroughs).

2. Read the title of the text given below and say what data about the objectives of postgraduate education will be discussed in the text. Look through the text and say if you were right.
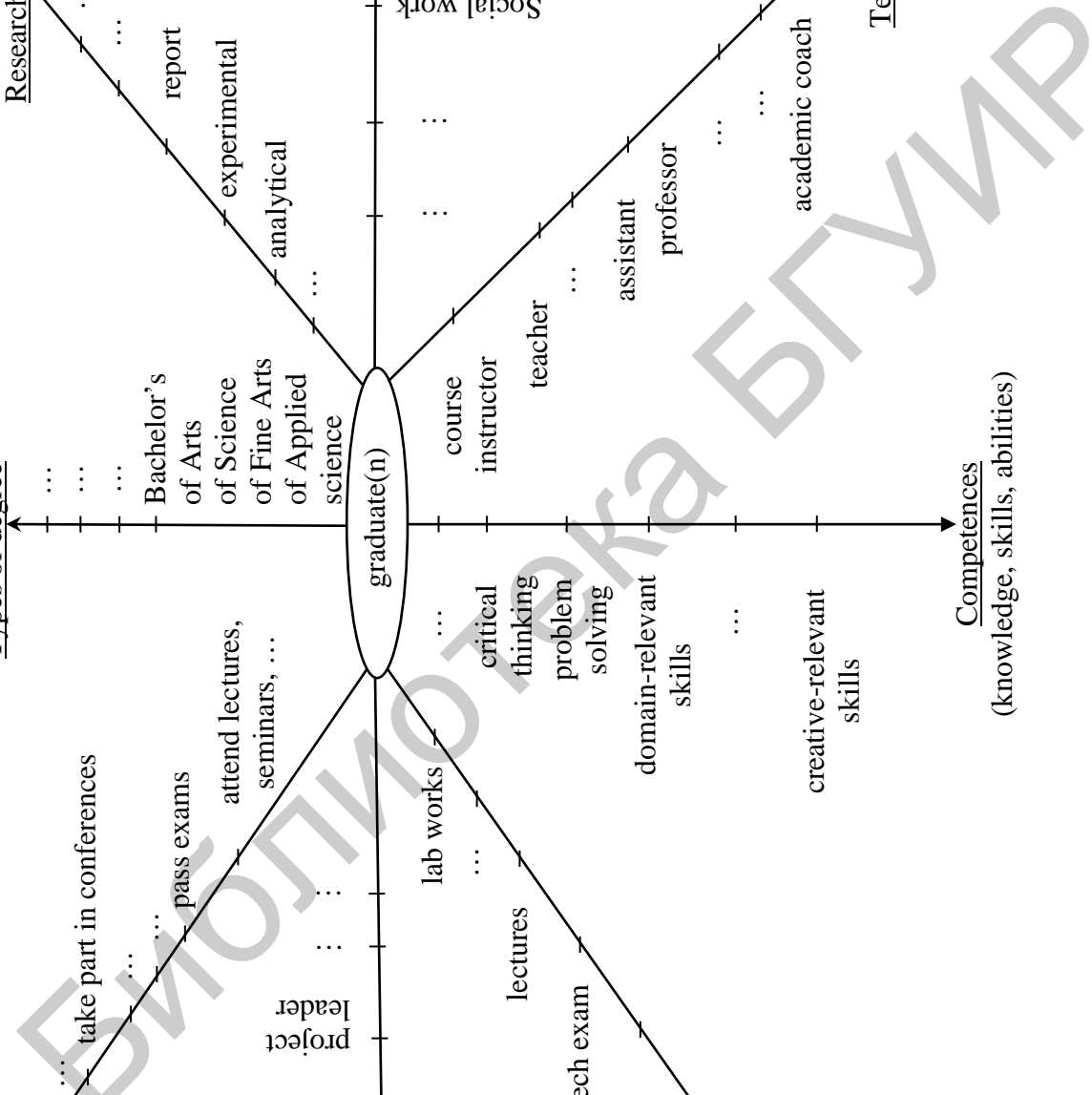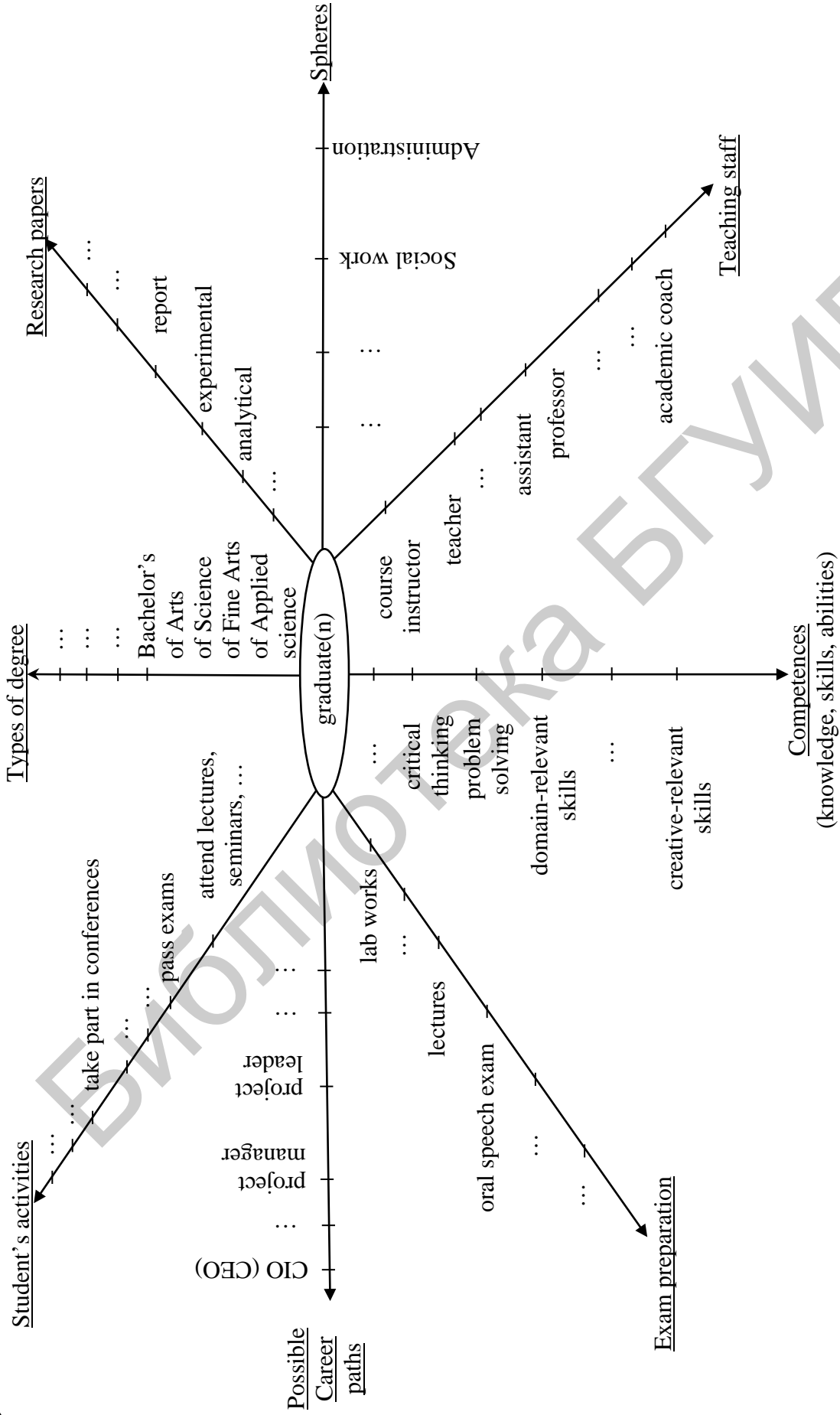
3. Match the definitions with the words:

1) Hypothesis	a) investigation undertaken in order to discover new fact, get additional information, etc.
2) Reference	b) proposition laid down or stated, esp. as theme to be discussed and proved
3) Thesis	c) thing, esp. sum of money
4) Experiment	d) note, direction, etc. telling where certain information may be found
5) Grant	e) action or operation undertaken in order to discover something unknown, test hypothesis, illustrate known fact, etc.
6) Research	f) supposition made as basis for reasoning without reference to its truth

4. Read correctly the following words:

graduate	[ˈgrædʒuət]	baccalaureate	[ˌbækəˈlɔːriət]
bachelor	[ˈbætʃələʳ]	hypothesis	[haɪˈpɒθəsɪs]
variable	[ˈveəriəbl]	academic	[ˌækəˈdemɪk]
thesis	[ˈθiːsɪs]	expertise	[ˌekspɜːˈtiːz]

5. Work in pairs. Discuss the role of postgraduate education in your life. Examine the following scheme and fill in the blanks on the basis of information given in the article. Search for some extra information to reach the goal.

Spheres

Administration

Social work

Teaching staff

academic coach

professor

assistant

teacher

course instructor

... ...

Research papers

report

experimental

analytical

... ...

Types of degree

Bachelor's
of Arts
of Science
of Fine Arts
of Applied science

... ...

graduate(n)

Competences
(knowledge, skills, abilities)

critical thinking

problem solving

domain-relevant skills

creative-relevant skills

... ...

Student's activities

take part in conferences

pass exams

attend lectures, seminars, ...

... ...

lab works

lectures

...

oral speech exam

...

Exam preparation

Possible Career paths

CIO (CEO)

...

project manager

project leader

...

Postgraduate education

1. Specialists with a diploma of higher education obtain a bachelor's degree. It usually represents completion of a four-year course of study at a higher educational establishment and is the oldest and the best-known academic degree.

After graduation specialists may enter the post-graduate course and receive a higher scientific degree. With it they have good career prospects and these prospects are connected with professional, research and creative activities. Postgraduate education involves learning and studying for degrees or other qualifications for which a first Bachelor's degree generally is required, and is normally considered to be part of higher education. Admission to postgraduate education usually requires a bachelor's degree.

2. In most countries, the post-graduate degrees are Master's degrees and Doctorates. Master's degree in general represents one year of work beyond the baccalaureate, but in some institutions or in some fields of science it requires two years of graduate work. Master's degree is sometimes placed in a further hierarchy, starting with degrees such as the Master of Arts and Master of Science, then Master of Philosophy, and finally Master of Letters. The Doctor's degree represents the most advanced earned degree conferred by institutions and is often further divided into academic and professional doctorates.

3. During the sciences studying and doing some research practices, elaborating of the thesis theme is the most important part of the intended research student's activity. Most graduate students perform teaching duties, often serving as graders and tutors. Before finishing postgraduate education students must go strong preparation for the defense procedure and the defense provides evidence.

4. Research students are normally associated with a group of scientists and engineers engaged in work in the same general area. This team includes the scientific supervisor, members of the academic staff, members of the research staff, technicians and other research students. The wide expertise within these teams enables industrial problems to be tackled by people with different backgrounds, which gives a flexible basis for research and development work.

5. Each student is assigned a scientific supervisor who is responsible for the student's progress. Progress is monitored continually by meetings and discussions.

A scientific supervisor is a person who must combine at least two qualities of almost equal importance: being a scientist and being a supervisor. The student is required to submit written reports, give presentations, participate in different conferences and also attend any lectures and short courses that may be considered to be beneficial during his or her course of study. A formal review of progress of students is undertaken during each year of study.

6. Postgraduate studying offers a unique chance to get acquainted with a scientific method for data analysis.

The steps of the scientific method go something like this:
1. Make an observation or observations.

2. Ask questions about the observations and gather information.

3. Form a hypothesis a tentative description of what's been observed, and make predictions based on that hypothesis.

4. Test the hypothesis and predictions in an experiment that can be reproduced.

5. Analyze the data and draw conclusions; accept or reject the hypothesis or modify the hypothesis if necessary.

6. Reproduce the experiment until there are no discrepancies between observations and theory.

Some key underpinnings to the scientific method:

1. The hypothesis must be testable and falsifiable. Falsifiable means that there must be a possible negative answer to the hypothesis.

2. Research must involve deductive reasoning and inductive reasoning. Deductive reasoning is the process of using true premises to reach a logical true conclusion while inductive reasoning takes the opposite approach.

3. An experiment should include two main variables: an independent and a dependent variable. An independent variable is the variable that is changed or controlled in a scientific experiment to test the effects on the dependent variables, which are tested and measured.

4. An experiment should include an experimental group and a control group. The control group is what the experimental group is compared against.

Analyzing and Evaluating

6. Divide the article into parts. Give each a title.

7. Match the words to make some collocations:

1		Scientific	a)	Theme
2		Thesis	b)	Education
3		Postgraduate	c)	Supervisor
4		Master	d)	Procedure
5		Defense	e)	Analysis
6		Data	f)	Degree

8. Look at the following list of steps of the scientific method. Put them in order using the linking words that can help you?

First of all, then, after that, the following step is, finally

A. Analyze the data and draw conclusions.
B. Ask questions about the observations and gather information.
C. Test the hypothesis

D. Reproduce the experiment until there are no discrepancies between observations and theory.

E. Make an observation

F. Form a hypothesis

9. Do the following statements agree with the claims of the author (YES, NO, NOT GIVEN). Correct the false statements.

1. Postgraduate education involves learning and studying for degrees for which a first Bachelor's degree generally is not required.

2. Elaborating of the thesis theme is the most important part of the intended research student's activity.

3. Inductive reasoning is the process of using true premises to reach a logical true conclusion.

4. Progress is monitored continually by meetings and discussions.

5. Higher education is becoming an extremely important element in the organization of modern society.

6. A formal review of progress of students is undertaken during each year of study.

7. The hypothesis mustn't be testable and falsifiable.

8. Research students are normally associated with a group of scientists and engineers engaged on work in the same general area.

10. Write no more than three words for each answer:

1. Who is responsible for student's progress?

2. What are the most known postgraduate degrees?

3. What does postgraduate education involve?

4. What defining words are used to determine what a hypothesis is?

5. What group are research students normally associated with?

11. Read this passage. Fill in the gaps with proper words given in the table below:

I'm a master course student now and wok in close contact with my scientific 1) _____. He's a Doctor of technical sciences and 2) _____ at our University at the department of Artificial Intelligence. He's interested in image recognition systems 3) _____. My scientific supervisor 4) _____ scientific papers every year and takes part in scientific conferences and symposia both in our country and abroad. He's in good 5) _____with many well-known scientists in different countries. As a scientific supervisor he 6) _____ me with necessary literature, helps me organize my research and encourages me to examine the subject of study from a 7) _____ fresh approach. We often meet at our department and 8) _____ all the problems that I 9) _____ in my research. He informs me about all forthcoming conferences and seminars. I think our 10) _____ is very fruitful and useful for me.

1. A. supervisor B. guide C. professor D. teacher
2. A. studies B. learns C. teaches D. takes
3. A. design B. development C. invention D. supervision
4. A. provides B. includes C. publishes D. promotes
5. A. relationships B. relatives C. relative D. reliable
6. A. provide B. produce C. participate D. publish
7. A. old B. new C. young D. interesting
8. A. discuss B. develop C. design D. divide
9. A. count B. encounter C. accountant D. account
10. A. constitution B. composition C. collaboration D. confirmation

12. Go back to passage 10 and tell your groupmates about your collaboration with your scientific supervisor.

13. Imagine you are a post graduate or a master student engaged in research work. Complete the following sentences to tell your groupmates about research activities.

1. My major interest is in the field of … .
2. My scientific research deals with the problem of … .
3. The title of my future thesis is … .
4. The main goal(aim) of my research is … .
5. The object of the research is … .
6. The subject of the research … .
7. To reach the goal of my research I should fulfill the following stages … .
8. We began to work by collecting material in the field of … and we had two problems before us … .
9. While carrying on my research I used the following methods of investigation … .
10. I work under the guidance of professor … .
11. My supervisor is … .
12. The research I am doing now is a part of a bigger work within the framework of the academic research conducted by professor … or a group of scientists … .
13. This work is devoted to an important problem into which too few scientists have researched until now … .
14. I take part in different scientific … and symposia.
15. I'm planning to finish writing of my … and … it at the Scientific Council of the BSUIR.

14. List the data from the text which you consider to be the most important ones. Why?

Summarizing

15. Imagine you are looking for a job. Fill in this Profile Form to apply for a desired position.

Profile Form

Name: Last, First, Middle   _____

Date of Birth   _____

Educational background (in reverse chronological order)

Dates	University/Institute	Field of Study	Degree

Employment History (in reverse chronological order)

Dates	Employer	Address	Position

Other Professional Activities, Membership in Professional Associations_____

Fields of Interests_____

Academic Degrees and awards, Professional Recognition_____

Grants, Scholarships_____

Participation in Conferences and Seminars_____

Major Publications (in chronological order) _____

Language Proficiency_____

Native Language

Foreign Languages. Rate your skills as:

Signature_____

16. Write the essay on the basis of the text about your research, the sphere of your scientific interests, the field which you major in and the title of your future thesis.

You can use the following prompts:

Research work topic, relevance of the topic, research questions, hypothesis of research, original contribution, significance, implementations, conclusions. Critical analysis, advanced research, basic research, to be engaged in research, researches cover a wide field, after the study of the matter …, pilot study, desk study, through examination, the scientific method of inquiry, data for study, laboratory data, adequacy of data, acceptance of a theory, application of a theory in actual practice, to back up

a theory with facts, to construct a theory, the result of the experiment contradicted this theory/agreed with the theory.

Part III

Data mining

1. Skim the title and say what the text is about.

2. Match the definitions below with the words in the list (look through paragraphs 1–8).

1) Evolution	a) importance, assigned to fact, idea, etc.; prominence
2) Support	b) completion, fulfillment
3) Emphasis	c) income, esp. of large amount, from any source
4) Innovation	d) lending assistance or countenance to
5) Research	e) beginning of an action
6) Revenue	f) development, detailed working out of what is implicitly or potentially contained in an idea or principle
7) Incentive	g) bringing in novelties, making changes
8) Implementation	h) careful or patient study of subject in order to discover or revise facts, theories, principles

3. Find synonyms to the underlined words in the text.

Science in Belarus

1. Belarus has a relatively well developed system of public institutions supporting innovation activity which form the backbone of the National Innovation System (NIS). There were no radical changes in the composition of such public bodies compared to the situation in 2010, however, there was some evolution in their functional responsibilities. Many of the essential NIS building blocks are already in place, especially <u>as regards</u> the role of the public sector.

2. The State Committee for Science and Technology (SCST) is a public body under the Council of Ministers of the Republic of Belarus which is tasked with a range of important responsibilities in the area of innovation policy and governance including (but not limited to):

• implementation of the State Innovation and S&T Policy and the protection of intellectual property rights;

• coordination of the activities of other public bodies in the areas of the S&T innovation activity and intellectual property rights;

• development of innovation support infrastructure;

- support to innovative entrepreneurship;
- technical support for the commercialization of R&D results; and
- monitoring of the implementation of public R&D programmes.

3. SCST was mandated with additional responsibilities including those related to the implementation of the SPID[*] and the coordination of the «unified system of State scientific and State science and technology expertise». The system is administratively <u>managed</u> by the State Committee for Science and Technology while the National Academy of Sciences provides expert support. The SCST coordinates the applications from sector ministries and the NAS of Belarus that act as thematic S&T programmes or research programme owners. Since 2017, the SCST administrates the funds of the Centralised Innovation Fund. The SCST has a right to stop any research or innovation project funded or co-funded from the Republican budget in case of non-targeted use of funds. In addition to its core functions, SCST also controls several subordinate bodies with related responsibilities.

4. The National Academy of Sciences of Belarus (NAS) is a complex hierarchical structure which brings together the most important R&D organizations in the country. The organizational structure of the NAS <u>includes</u> different institutes, departments, some 70 research organizations as well as a number of laboratories, design bureaus, production facilities, experimental stations and other support bodies. Formally, the NAS has a very high administrative status, equivalent to that of a ministry: it reports directly to the President of the Republic of Belarus and the Council of Ministers An important recent <u>trend</u> in the overall activity of the NAS has been the increasing emphasis on the commercialization of some of its R&D results. This matches a similar change in the general orientation of Belarus S&T and innovation policy as reflected in some of the recent legislative and regulatory changes. The National Academy of Sciences, as well as Belarusian universities and research centers have diversified the sources of R&D funding by setting-up new organizational units to generate revenues by facilitating the commercialization of research results, be it internally (e.g. enterprises subordinated to the NAS) or through improving linkages to external organizations to establish new support infrastructures like technoparks, incubators or start-up centres.

5. For the National Academy of Sciences of Belarus (NAS), innovation is at the top of the agenda. The main changes since 2010 relate to the implementation of new legislation and regulation. In this regard, the adoption of the law on innovation activities and the Presidential Edict on commercialization of scientific <u>research</u> resulted in a significant impact on innovation activities in the country. For instance, as the institution still <u>carrying out</u> the bulk of R&D in Belarus, a gradual shift has been made since 2010 from scientific research activities (basic research) to scientific- technical research projects, which are more applied-oriented and pursue the goal to provide services for innovation. Due to the existence of commercial enterprises within the NAS sphere (in total, there are 122 different organizations subordinated to the NAS

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[*] SPID – Statistically Planned Incremental Deliveries

institutions and enterprises), NAS seeks to encourage own production and to facilitate access to external support for the export of science-based production.

6. Within the context of a gradual change of NAS from being a purely scientific organization to a more applied organization, 72 innovation centres have been considered to link scientists and consumers with the participation of NAS R&D organisations. Many of the NAS research institutes have initiated the formation of their own «clusters» with the participation of businesses with which they have been cooperating traditionally. These shifts in NAS activity have also associated with changes in the structure and sources of NAS funding, with growing emphasis on NAS's self-funding. The approach is that research results are transferred to industry as soon as the results <u>meet the demand</u>.

7. The entire system of education in Belarus, including higher education, falls under the functional responsibilities of the Ministry of Education. Within the Ministry of Education there is a Department of Science and Innovation, whose main functional responsibility is the practical implementation of public S&T and innovation policy within the Belarus education system as well as the establishment of specific incentives promoting innovative activity in educational institutions.

8. <u>What concerns</u> higher education institutions, universities and facilities, recent legislative and operative changes put emphasis on strengthening industry-science linkages, for instance by supporting internships, affiliates of university chairs in companies or the creation of joint laboratories with several companies. Furthermore, researchers and students can <u>participate</u> in innovation competitions and create start-up centres. Four of the seven technoparks are based at universities.

4. Read the first lines of the paragraphs and say what issues are discussed in each paragraph.

5. Examine the network and tell your groupmates about the main scientific bodies in our Republic, their structure and functions.
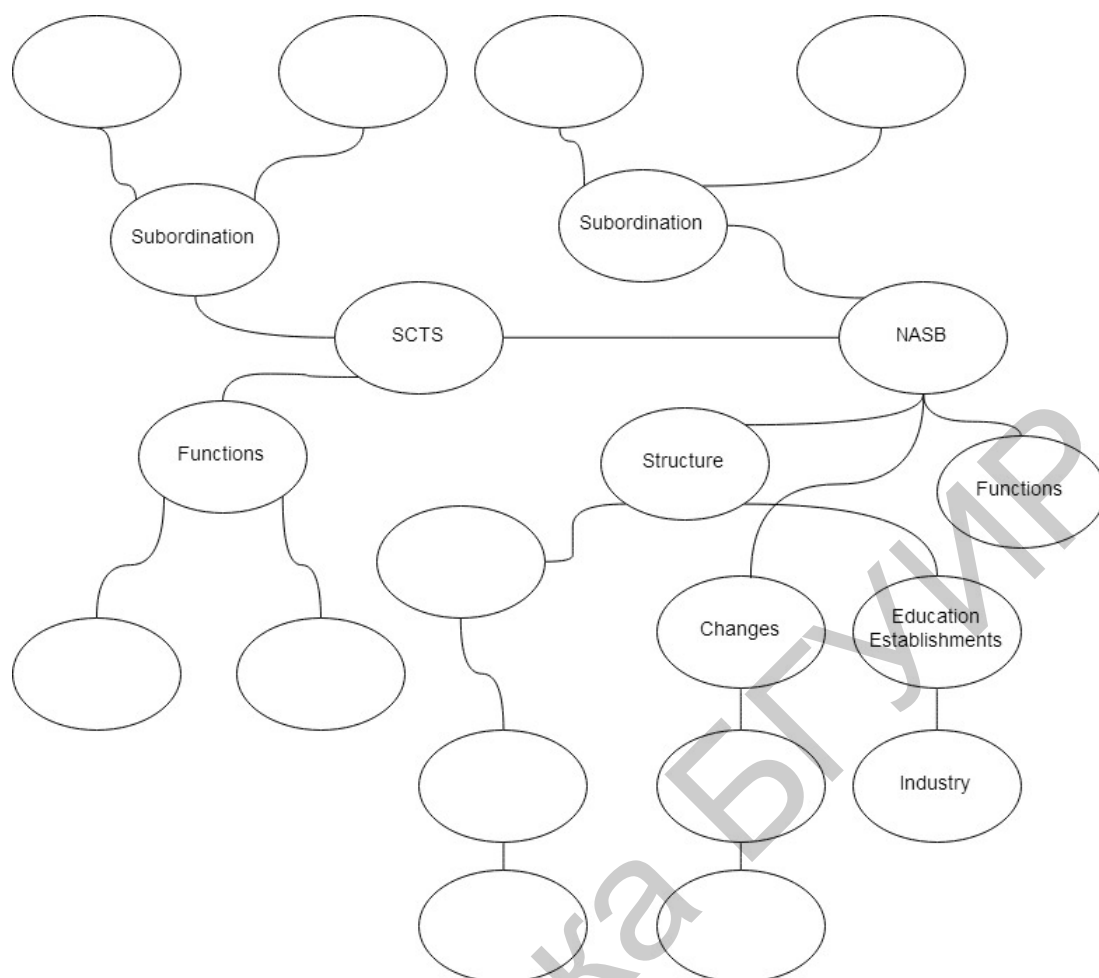
6. Scan paragraph 1 of the article given below and make a pie-chart describing the attracted investments.

7. Look through paragraph 2. Using the information it contains and your own experience say whether you agree or disagree with the author that HTP has distinctive features compared with other technoparks.

8. Skim paragraph 3 and tell about the most successful start-ups.

9. Skim paragraph 4. Speak about the main objectives of Polytechnic, what the major differences between Polytechnic and HTP are.

Hi-Tech Parks

1. One key success story concerns the development of the high-tech industry, Among the technoparks established in Belarus, the Hi-Tech Park (HTP) has continued to grow quite strongly over the past 5 years. Already successful for some time, a number of technology-based enterprises have recorded growth more recently on the international market. According to the origin of investments attracted the structure is as follows: 41 per cent of HTP residents were set up by Belarusian investors; 24 per

cent of HTP residents are joint ventures; and 35 per cent of HTP residents are enterprises with 100 per cent foreign investments.

2. The HTP is characterized by distinct features compared to other Technoparks, Science Parks and Industrial Parks in Belarus. The HTP has attracted major international software and hardware companies like IBM, SAP, Oracle and Microsoft, among others, and now constitutes a knowledge and innovation hub with international linkages. These international companies offer employment and training opportunities to young programmers and support around 80 joint research labs in Belarusian technical universities, helping the HTP and its residents establish strong linkages with the public research sector. This extends to developing specialized educational courses integrated into university curricula, free training courses for faculty members, and engagement of over 30 university research departments of computer science by IT companies. This form of cooperation is intended to link the academic and business world by exchanging both academic and practical knowledge, by bringing together educational production, and improving the training of Belarusian IT specialists.

3. A newly founded incubator within the Hi-Tech Park offers services support for companies. There have been several significant deals with Belarus – based start-ups over the last four years, e.g. Viber, Maps.me, MSQRD and Juno. Successful Belarusian start-ups are usually taken over by foreign companies but carry on with their development projects in Belarus, thus becoming their captive centres.

4. The *Technopark at the Technical University (Polytechnic)* is explicitly mentioned in the State Programme on Innovation Development 2016–2020. Polytechnic is not a classic technopark (like the Hi-Tech Park), rather, it is a scientific research organization with different locations. It was founded to commercialize the results of the scientific and technical activities of the Belarussian National Technical University (BNTU). The establishment of new innovative enterprises as well as the generation of innovations are the main objectives of the Polytechnic. The benefits for the companies in the park are lower corporate taxes, lower rental rates and direct benefits in terms of funding from the national budget. The activities of the technopark are strongly connected with complementary priorities of BNTU, which for instance established eight centres with foreign countries under the principle of one centre at BNTU matching one institution abroad, 12 science and innovation support centres and seven new R&D and manufacturing departments.

5. In addition to the park described so far, the Minsk City Industrial Park was founded in 2011 and has around 30 companies. It includes shared labs to facilitate the collective use of equipment. The park offers a submarket rental rate, a lower corporate tax rate (10 per cent) and exemptions from local taxation. The resident companies are among others engaged in applied electro-optical technologies, data protection systems, aircraft industry and navigation technologies, and nanotechnologies. The park is currently expanding with the construction of a manufacturing building.

10. Finally address to paragraph 5. Using the information given in the passage and your own experience speak about the areas the resident companies are engaged in.

Summarizing

11. Study the table and explain the dynamics of the development of technoparks in our Republic. While describing the table you can use the following patterns:

The table	shows	the number of …
	illustrates	the amount of …
	depicts	the quantity of …
	gives	the quantity of …
	represents	the speed of …

Describing the degree of change you can use the following words: dramatic/dramatically; sharp/sharply; enormous/enormously; steep/steeply; substantial/substantially; moderate/moderately; slight/slightly; minimal/minimally.

Describing the speed of change you can use these words: rapid/rapidly; sudden/suddenly; steady/steadily; gradual/gradually; slow/slowly.

Development of scientific-technological park of Belarus

Indicators	2012	2013	2014	2015
Number of resident entities	65	91	84	101
Number of resident workers	697	1,146	1,034	1,137
Number of jobs created by technopark residents	126	272	125	189
Total volume of goods, works and services (BYR mn.)	286.4	292.2	290.0	336.5
Innovation products of own production (BYR mn.)	177.9	178.3	197.4	266.8
Proportion of innovative products in total output (per cent)	62.1	61.0	68.0	79.3

Consolidation

Attending scientific conferences you usually meet people from different countries who can discuss the ways how science and scientific research are organized in their countries. You also want to tell your colleagues about your country. Prepare a presentation about the main scientific bodies in the Republic of Belarus and the ways you can be engaged in scientific research.

VOCABULARY

Abandon отказываться от чего-либо

Admission прием (в учебное заведение, клуб, общество); допущение, принятие

Adoption принятие, заимствование, усвоение

Amenity удобства, благоустройство

Asset актив, ресурс, преимущество, благо

Augment увеличивать, прибавлять

Baccalaureate степень бакалавра

Backbone главная опора, основа, суть

Beneficial выгодный, полезный, прибыльный

Bias предвзятость; уклон, наклон

Captive взятый в плен

Clay земля; глина, грязь

Combat бороться, сражаться, вести бой

Commodity продукт, сырье, товар; удобство

Concession уступка

Concurrently одновременно, параллельно, наряду с этим

Confer жаловать, даровать, давать (кому-либо)

Deleterious вредный, вредоносный, ядовитый

Deliberate преднамеренный, умышленный; совещаться, обдумывать

Discrepancy различие, несходство, разногласие, несовместимость

Dismantle демонтировать, разбирать, лишать оборудования

Diversify разнообразить, изменять, модифицировать

Embryonic эмбриональный, не успевший развиться, незрелый

Emerge появляться, возникать; выясняться; выходить, выбираться

Endowment дар, вклад, пожертвование

Entrepreneurship предпринимательство

Equate приравнивать, соответствовать, быть эквивалентным

Equity равенство, справедливость, беспристрастность; капитал

Exempt свободный, независимый, не подлежащий контролю

Exert вызывать, влиять, прилагать усилия

Feasible осуществимый, выполнимый

Flaw делать недействительным, лишать законной силы

Forgo поступаться, отказываться, воздерживаться

Hallmark отличительный признак, критерий, проба; ставить пробу

Hazardous опасный

Hook ловушка, зацепка; поймать, застегивать, пристегивать

Impend надвигаться, приближаться, угрожать

Implication причастность, подтекст, смысл, вовлечение, соучастие

Imply подразумевать, предполагать, значить

Incarnation воплощение, олицетворение, грануляция

Inevitably неизбежно

Inherent присущий, свойственный

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Innovation инновация, новаторство, нововведение; инновационная деятельность
Invention изобретение, изобретательность, изобретательство, выдумка
Literally буквально; без преувеличения
Multilateral многосторонний
Nontrivial нетривиальный
Nutrition питание, пища
Obsolete вышедший из употребления, устарелый, рудиментарный
Obstacle препятствие, помеха
Overwhelming подавляющий, ошеломляющий, непреодолимый
Penetrate проникать, постигать, понимать
Per capita на душу населения, на человека
Persistence упорство, выносливость, продолжительность, постоянство
Persistent постоянный, устойчивый, стойкий, упорный, устойчивый
Pertinent уместный, подходящий
Pervasive распространяющийся, всеобъемлющий, проникающий
Premise исходное условие, предположение, допущение, предпосылка
Pursue преследовать (цель), следовать намеченному курсу, добиваться, рассматривать
Realm область, сфера, государство
Redundant лишний, чрезмерный, резервный элемент
Resilience устойчивость, сопротивляемость, гибкость, выносливость, упорство
Scarcity дефицит, нехватка, недостаток
Scrutinize тщательно исследовать; внимательно вглядываться
Skew косой, смещенный; наклон, скос; искажать, откланяться, сдвигать
Sparsely скудно, редко
Strain напряжение, нагрузка, растяжение; напрягать, растягиваться
Subsist существовать, жить, кормиться
Substitute заместитель, замена; заменять
Sustainable устойчивый
Synergy взаимодействие, согласованность
Tailor портной; шить, адаптировать, приспособить
Testify свидетельствовать, давать показания, торжественно заявлять
Ubiquitous вездесущий, повсеместный, встречающийся повсюду
Unanticipated непредвиденные
Unduly чрезмерно, незаконно, неправильно
Unevenly неровно, неодинаково, неравномерно
Uphold поддерживать, придерживаться, защищать
Weed сорная трава; избавляться, очищать

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ПРАКТИЧЕСКИЙ КУРС АНГЛИЙСКОГО ЯЗЫКА ДЛЯ СТУДЕНТОВ ВТОРОЙ СТУПЕНИ ВЫСШЕГО ОБРАЗОВАНИЯ

ПОСОБИЕ