TOMSK POLYTECHNIC UNIVERSITY

ENGLISH FOR ENGINEERING STUDENTS

Full-time course
for undergraduates

Part II

Recommended for publishing as a study aid
by the Editorial Board of Tomsk Polytechnic University

Tomsk Polytechnic University Publishing House
2020

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

АНГЛИЙСКИЙ ЯЗЫК: ПОСОБИЕ ДЛЯ СТУДЕНТОВ ТЕХНИЧЕСКИХ ВУЗОВ

Для студентов 2 курса очной формы обучения
всех профилей и направлений подготовки НИ ТПУ
(бакалавр/специалист)

Часть 2

Рекомендовано в качестве учебного пособия
Редакционно-издательским советом
Томского политехнического университета

Издательство
Томского политехнического университета
2020

УДК 811.111 (075.8)
ББК Ш143.21-923
А64

Авторы
А.В. Диденко, Л.В. Надеина, С.Н. Степура,
А.Н. Уткина, З.В. Федоринова, И.А. Чеснокова

А64 **Английский язык : пособие для студентов технических вузов :** учебное пособие. Часть 2 / А.В. Диденко, Л.В. Надеина, С.Н. Степура и др. ; Томский политехнический университет. – Томск : Изд-во Томского политехнического университета, 2020. – 110 с.

Целью пособия является развитие иноязычной коммуникативной компетенции в сфере профессионального общения. Система упражнений разработана с учетом современных тенденций в теории и практике преподавания иностранных языков и направлена на овладение студентами необходимым языковым материалом, основанном на мировых тенденциях развития в сфере образования и инженерии, в том числе на региональном компоненте ТПУ. Материал учебного пособия способствует подготовке к рубежному и итоговому контролю по дисциплине, а также к сдаче международного экзамена с учётом уровня владения английским языком.

Предназначено для студентов 2 курса очной формы обучения Школы базовой инженерной подготовки, изучающих дисциплину «иностранный язык» (английский), предусмотренную государственным образовательным стандартом высшего профессионального образования и учебным планом для всех профилей и направлений подготовки НИ ТПУ (бакалавр/специалист).

УДК 811.111(075.8)
ББК Ш143.21-923

Рецензенты

Кандидат филологических наук,
доцент кафедры славянской филологии
и межкультурной коммуникации ФИЯ ТГПУ
Н.В. Дубровская

Кандидат педагогических наук
заведующая кафедрой иностранных языков ТГАСУ
Т.А. Рахимова

TO THE STUDENT

Welcome to “English for Engineering Students. Part 2”! This coursebook is written for second-year full-time engineering students who study English as one of the disciplines – Foreign Language – that constitute the core courses at Tomsk Polytechnic University (TPU). The pre-requisite level for this course is A2-B1, and it aims to develop a range of communicative skills required for undertaking higher education courses, further studies in the field or starting a professional career.

The coursebook consists of two books – Students’ and Teacher’s, and is primarily intended for classroom use, but we believe you might also find it useful for self-study. Each of 3 modules – “Sciences” (Didenko A.V., Stepura S.N.), “Technologies” (Nadeina L.V., Utkina A.N.), “Engineering” (Fedorinova Z.V., Chesnokova I.A.), – contains authentic texts, practice tasks and activities that reflect the specific educational and professional needs of engineering students of TPU. These are the real-life language skills that you will need either in or outside the university campus such as writing an incident report as well as an abstract or an acceptance letter to speak at a Technology Conference, participating in discussions and making presentations, etc. Also, every module includes the tasks which are designed to train the exam taking skills, necessary to succeed in FCE level and Pearson format tests.

All modules in the Students’ book have the same basic structure and consist of the following sections Lead-In, Reading, Use of English, Listening, Grammar, Writing, Speaking, Project Work and Wordlist. The Teacher’s book provides the keys for the tasks as well as recommendations and Progress Tests for each module. You may study the modules in any order, and you are free to select the material that you find necessary to learn within every section of the modules. Though you can work individually, some of the tasks, for example Project Work assignments, are much more efficient when completed in groups or teams which is essential for developing teamwork skills.

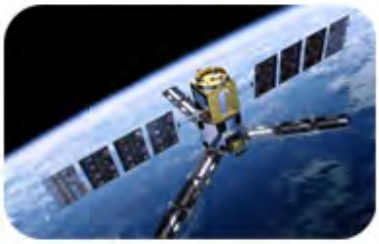
We also recommend exploring the links provided for further reference or practice as there you may find a lot of useful guidelines and a treasure-trove of the up-to-date language material that will keep supporting you long after this course ends. This will boost your confidence as an independent language user as well as equip you with hands-on experience of using your language skills for practical purposes and in the authentic environment.

We hope that you will find the materials and activities both challenging and enjoyable. This book is created to enable you to express yourself successfully and freely both in speaking and writing in either educational or professional contexts, and we believe this course will provide you with lots of opportunities to develop your own efficient learning style and strategies as well as to contribute in shared discussions and projects in and outside classroom. We wish that every effort you invest in learning English eventually pays off.

Good luck with your studies and your future job!

Unit IV

SCIENCES



http://news.tpu.ru/en/news

LEAD-IN

Activating background knowledge

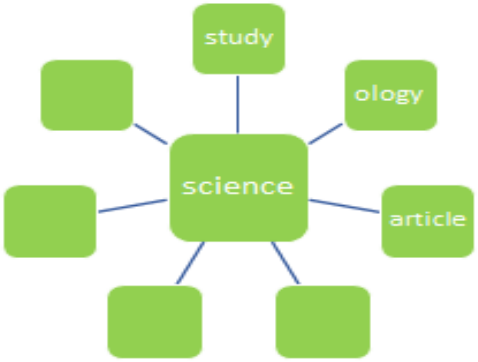
A **Look at the words and say what topic they belong to.**

work and career *education* *science* *employment*

1) advertisement, shortlist, applicant, references, interview
2) degree, research, post-graduate, academic, bachelor
3) physicist, experience, opportunity, skills, duties
4) progress, knowledge, physics, laboratory, experiment

https://www.ntw.nhs.uk

B **Think of as many words related to** *science* **as possible and fill in the spidergram.**



C **Look at the words and decide which one is the odd word out.**

1) information, fiction, observation, investigation, explanation
2) impact, effect, conflict, knock, contact
3) scientific, desirable, good, perfect, flawless
4) technology, archeology, ecology, terminology, vocabulary

http://news.tpu.ru/en/news

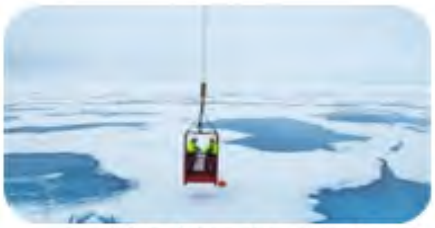
READING

Vocabulary for reading

A Activating ideas

Look at the title of the text you are going to read and say what it might be about. You may use the following questions.

- What do you know about science?
- What sections of science do you know?
- What is science according to you?
- What has science done for you lately?



https://news.tpu.ru/en/news

B Practicing new vocabulary

Complete the definitions with a word or phrase from the box on the right.

1) human effort to understand better
e.g. how the natural world works
2) to change or influence something
3) a force that attracts objects
4) discontinuous data or events
5) not produced naturally or organically
6) a supposition intended to explain something
7) a device to let the water flow
8) the application of scientific knowledge
9) highly productive

asphalt (*n*)
digital (*adj*)
electricity (*n*)
pesticides (*n*)
faucet (*n*)
science (*n*)
technology (*n*)
affect (*v*)
high-yield (*adj*)
theory (*n*)
magnetism (*n*)
synthetic (*adj*)
germs (*n*)

C Practicing pronunciation

Guess the meaning of the words and memorize their pronunciation. Use free online talking dictionaries of English pronunciation.

- ***https://en.oxforddictionaries.com***

digital	courtesy	bullets	trigger
asphalt	lightning	high-yield	vaccination
antibiotics	synthetic	fertilizer	nutritional
faucet	chemistry	pesticide	deficiency

Real-time reading

Exam task

A **Read the article given below. For questions (1–7), choose the correct answer** A, B, C **or** D.

What has science done for you lately?

http://portal.tpu.ru

Plenty. If you think science doesn't **matter** much to you, think again. Science affects us all, every day of the year, from the moment we wake up, all day long, and through the night. Your digital alarm clock, the weather report, the asphalt you drive on, the bus you ride in, your decision to eat a baked potato instead of fries, your **cell phone**, the antibiotics that treat your sore throat, the clean water that comes from your faucet, and the light that you **turn off** at the end of the day have all been brought to you **courtesy** of science. The modern world would not be modern at all without the understandings and technology enabled by science. To make it clear how deeply science is interwoven with our lives, just try imagining a day without **scientific** progress. Just for starters, without modern science, there would be:

- *no way to use electricity.* From Ben Franklin's studies of **static** and lightning in the 1700s, to Alessandro Volta's first battery, to the key discovery of the relationship between electricity and magnetism, science has steadily **built up** our understanding of electricity, which today carries our voices over telephone lines, brings entertainment to our televisions, and **keeps** the lights **on**.
- *no plastic.* The first completely synthetic plastic was made by a chemist in the early 1900s, and since then, chemistry has developed a wide variety of plastics suited for all sorts of jobs, from blocking to making slicker dental floss.
- *no modern* bullets *agriculture.* Science has transformed the way we eat today. In the 1940s, biologists began developing high-yield varieties of corn, wheat, and rice, which, when paired with new fertilizers and pesticides developed by chemists, dramatically increased the amount of food that could be harvested from a single field, ushering in the Green Revolution. These **science-based** technologies **triggered** striking changes in agriculture, massively increasing the amount of food available to feed the world and **simultaneously** transforming the economic structure of agricultural practices.
- *no modern medicine.* In the late 1700s, Edward Jenner first convincingly showed that vaccination worked. In the 1800s, scientists and doctors established the theory that many diseases are **caused** by germs. And in the 1920s, a biologist discovered the first antibiotic. From the **eradication** of smallpox, to the prevention of nutritional deficiencies, to successful treatments for once deadly infections, the impact of modern medicine on global health has been powerful. In fact, without science, many people alive today would have instead died of diseases that are now easily treated.

Scientific knowledge can improve the quality of life at many different levels – from the routine workings of our everyday lives to global issues. Science informs public policy and personal decisions on energy, conservation, agriculture, health, transportation, communication, defense, economics, leisure, and exploration. It's almost impossible to **overstate** how many aspects of modern life are impacted by scientific knowledge. But you can investigate.

(Adapted from https://undsci.berkeley.edu/article/whathassciencedone_01)

1. How does science affect us all?

A Many things around us are related to science.
B It only partially influences our lives.
C We live without any influence of scientific research.
D Only some things have an impact on us.

2. You need to fancy a day without scientific advancement

A to understand something you don't know.
B to think of the way we should go to.
C to understand how deeply it is rooted in our lives.
D to guess where to stop our race.

3. Our understanding of what electricity is

A never touches the relationship between electricity and magnetism.
B starts from the beginning of 1700s.
C refers to Alessandro Volta's first battery only.
D never comes to comprehension of what keeps the lights on.

4. Chemistry has developed a wide variety of plastics

A which match the tasks of only a few jobs.
B back in the 1900s.
C since the very beginning of the 20th century.
D excluding blocking bullets.

5. The Green Revolution dates back to 1940s when

A scientists came up with the idea to improve the properties of plants.
B biologists developed new kinds of pesticides.
C scientists started to think only of soil fertility.
D science-based technologies pushed insignificant changes in agriculture.

6. Diseases that are now easily treated

A weren't thought to be caused by microbes.
B showed that vaccination worked.
C were not considered to be a problem in the 1920s.
D were a threat to the lives of most people.

7. Many aspects of our life are powered by scientific knowledge and this fact

A cannot be taken for granted.
B can be easily challenged.
C cannot be investigated.
D can hardly be overemphasized.

Applying new skills

A Collocating vocabulary

1. Match the words or phrases in bold given in the text above with the following definitions.

1. _____ gallantry; the showing of politeness in one's attitude towards others
2. _____ relating to or exhibiting the methods or principles of science
3. _____ state too strongly; exaggerate
4. _____ be important or significant
5. _____ scientifically sound or proven
6. _____ caused by particular action, process or situation
7. _____ lacking movement, development or vitality; showing no change

8. ___ when something makes something happen; generated; triggered
9. ___ a phone with access to a cellular radio system so it can be used over a wide area
10. ___ the complete destruction of something
11. ___ increased in height by the addition of parts
12. ___ disconnect; stop a device by switching it off
13. ___ continue to do something; persist in doing something
14. ___ when actions occur at the same time

2. Fill in the correct prepositions.

1) turn … the light at the end of the day
2) carry people's voices … telephone lines
3) built … our understanding … electricity
4) bring entertainment … our televisions
5) keep the lights …
6) paired … new fertilizers
7) striking changes … agriculture
8) the impact … modern medicine …
9) quality … life … many different levels
10) impacted … scientific knowledge

B Practicing new vocabulary

1. Look at the parts of the sentences from the text and try to recall the situations they were used in.

1) … your decision to eat a baked potato instead of fries …
2) … science is interwoven with our lives …
3) … the relationship between electricity and magnetism …
4) … since then, chemistry has developed …
5) … varieties of corn, wheat, and rice …
6) … the prevention of nutritional deficiencies …
7) … the routine workings of our everyday lives …

2. Watch the video about ethical, societal and economic issues brought by science. Watch again and discuss the questions given below.

- ***https://www.youtube.com/watch?v=potiS9_lsuk***

1. What kinds of issues are brought today by advances in science and technology?
2. How can people guarantee positive impact on their daily lives?
3. What can help solve real-world problems?

C Developing speaking skills

Express your agreement or disagreement with the statements given below. Use the following video link to help you: *https://www.youtube.com/watch?v=lusJS850Hgw*. You also may use the following word combinations while speaking.

https://im0-tub-ru.yandex.net

1. Modern science is flawed.
2. Scientists only use their best understanding of things until they have more information, and when they have the information they may change their minds.

USE OF ENGLISH

1. Read the text and fill in the missing words.

discovery experiment engineering search matter trial
draw modeling elementary scientific mass opening

TPU scientists look for dark matter with colleagues in CERN

Scientists of Tomsk Polytechnic University together with experts from the European Organization for Nuclear Research (CERN) are engaged in searches of a dark boson – a hypothetical intermediary particle which can be a potential candidate for a role of dark **(1)** ….. . It is noted that after **(2)** ….. of Higgs boson on the Large Hadron Collider in 2012 the central problem in physics of elementary particles is research of the origin and nature of dark matter making the significant contribution (about 23%) to the **(3)** ….. of our Universe. The new particle is similar to a usual photon – a light quantum transferring electromagnetic interactions between **(4)** ….. particles, but, unlike photon, it has a weight. In May 2015 scientists of Tomsk Polytechnic University together with colleagues from the leading institutes, universities and **(5)** ….. centers of Russia, Chile, Switzerland and Germany within the **(6)** ….. which received the name P348 began research of a dark boson on SPS in the European Organisation for Nuclear Research.

In 2014 the Russian scientists suggested making an experiment on **(7)** ….. of easy dark matter on the proton supersynchrotron (accelerator) of SPS. The polytechnicians together with their colleagues carried out assembly, and then started a hadron calorimeter for the experimental P348 installation. At the same time the group was engaged in **(8)** ….. of the expected experimental data for reliable record of data from the detectors. The **(9)** ….. session on the accelerator in which TPU scientists participated, took place from September 23 to October 7. After the experiment they started processing and analysing the obtained data.

After the first session on SPS the scientists will **(10)** ….. conclusions on the degree of readiness and compliance of the detector component to the experiment purposes, receive the first physical result on the basis of real assessment. If the trial experiment runs successfully, the scientists will transfer the submission of the further **(11)** ….. design to SPSC committee and will continue work on the project.

Note: CERN (Conseil Européen pour la Recherche Nucléaire) is the largest international scientific organization of Europe in the field of nuclear physics. It is located in Switzerland. A large number of **(12)** ….. was made here, in particular, Higgs boson is discovered. It operates the Large Hadron Collider.

(Adapted from https://www.riatomsk.ru/article/20151021/tpu-scientists-look-for-dark-matter-with-colleagues-in-cern/)

2. A. Read the text given above again and say what countries Tomsk Polytechnic University cooperates with. Look through the information on TPU website to name Partner Universities or Joint Projects.

- ***https://tpu.ru/en/cooperation#menu-102***

B. Suggest the verb form for the noun *project* and synonyms for *joint,* adj.

3. Read the text on Honorary Polytechnic Professors of TPU. Choose the word which fits best.

Nobel Laureate, Academician and Scientist from CERN Became Honorary Polytechnic Professors

The inauguration ceremony of Honorary Member, Honorary Alumnus and Honorary Professor of TPU **(1)** ….. *(be, was, been)* held on Wednesday. The rector of Tomsk Polytechnic University gave medals to staff, alumni and partners who **(2)** ….. *(have, had, were)* made a significant contribution to the development of the university. The festive event was **(3)** ….. *(dedicated, dedicate, dedicating)* to the 120th anniversary of the university. The 2011 Nobel Prize winner, Technion (Israel Institute of Technology) professor, Chairman of the International Scientific Committee of Tomsk Polytechnic University **Dan Shechtman** was elected **(4)** ….. *(since, as, by)* a TPU Honorary Member. The first Honorary Member of Tomsk Technological Institute was **Dmitri Mendeleev**. He received this title in 1904 as a sign of gratitude **(5)** ….. *(of, to, for)* the help in the construction of the university and the development of higher education in Siberia.

(6) ….. *(By, Because, For)* the decision of the Academic Council the title of TPU Honorary Alumnus was awarded to **Gennady Mesyats**, professor of the Department of High-voltage Electrophysics and High-current Electronics of the TPU Institute of High Technology Physics, Department Head at the P.N. Lebedev Institute of Physics of the Russian Academy of Sciences. Professor Mesyats **(7)** ….. *(was, are, is)* the only person awarded with all three TPU honorary titles: Honorary Member, Honorary Professor and Honorary Alumnus. He was also awarded a TPU Honorary Professor diploma by the rector of Tomsk Polytechnic University. **Maxim Titov** **(8)** ….. *(became, becomes, become)* a member of the French Atomic Energy Commission, scientific secretary of the RD51collaboration in CERN. He **(9)** ….. *(says, say, said)* that he was pleasantly surprised and proud of the fact, as TPU Honorary Professors have been leading scientists for many years.

https://news.tpu.ru

In addition, 120th anniversary was commemorated by the issue of a medal which was awarded yesterday to all those **(10)** ….. *(that, who, which)* had committed to the development of the university.

(Adapted from https://tpu.ru/en/about/tpu_today/news/view?id=814?)

4. Read the following passage and fill in the correct word derived from the words in bold.

Understanding Science: An Overview

To understand what science is, just look around you. What do you see? Perhaps, your hand on the mouse, a computer screen, papers, ballpoint pens, the family cat, the sun **(1)** ….. ***(shine)*** through the window …. Science is, in one sense, our knowledge of all that – all the *stuff* that is in the universe: from the tiniest subatomic particles in a single atom of the metal in your computer's circuits, to the nuclear **(2)** ….. ***(react)*** that formed the immense ball of gas that is our sun, to the complex chemical interactions and electrical

(3) ….. ***(fluctuate)*** within your own body that allow you to read and understand these words. But just as importantly, science is also a **(4)** ….. ***(rely)*** process by which we *learn* about all that stuff in the universe. However, science is different from many other ways of **(5)** ….. ***(learn)*** because of the way it is done. Science relies on testing ideas with evidence gathered from the natural world.

Science helps satisfy the natural **(6)** ….. ***(curious)*** with which we are all born: why is the sky blue, how did the leopard get its spots, what is a solar eclipse? With science, we can answer such questions without resorting to **(7)** ….. ***(magic)*** explanations. And science can lead to technological advances, as well as helping us learn about **(8)** ….. ***(enormous)*** important and useful topics, such as our health, the environment, and natural hazards. Without science, the modern world would not be modern at all, and we still have much to learn. Millions of scientists all over the world are working to solve different parts of the puzzle of how the universe works, peering into its nooks and crannies, deploying their microscopes, telescopes, and other tools to **(9)** ….. ***(ravel)*** its secrets.

5. Read one more passage about science and underline the correct item in each sentence.

Science is **(1)** *(complex, multiple, difficult, complicated)* and multi-faceted, but the most important characteristics of science are straightforward:

- Science focuses **(2)** *(all, entirely, exclusively, alone)* on the natural world, and does not deal with supernatural explanations.
- Science is a way of learning about what is in the natural **(3)** *(system, universe, outlook, world)*, how the natural world works, and how the natural world got to be the way it is. It is not simply a collection of facts; rather it is a **(4)** *(path, route, track, way)* to understanding.
- Scientists work in many different ways, but all science relies on testing ideas by figuring out what **(5)** *(hopes, prospects, expectations, waiting)* are generated by an idea and making observations to find out whether those expectations hold true.
  Accepted scientific ideas are reliable because they have been **(6)** *(subjected, presented, exhibited, treated)* to rigorous testing, but as new evidence is acquired and new perspectives emerge these ideas can be revised.
- Science is a **(7)** *(network, fellowship, community, locality)* endeavor. It relies on a system of checks and balances, which helps **(8)** *(ensure, protect, keep, provide)* that science moves in the direction of greater accuracy and understanding. This system is facilitated by **(9)** *(variety, diversity, change, difference)* within the scientific community, which offers a broad range of perspectives on scientific ideas.

To many, science may seem like an arcane, ivory-towered institution – but that impression is based on a misunderstanding of science. In fact:

- Science affects your life everyday in all sorts of different ways.
- Science can be fun and is **(10)** *(capable, adaptable, accessible, achievable)* to everyone.
- You can apply an understanding of how science works to your everyday life.
- Anyone can become a scientist – of the amateur or professional variety.

(Adapted from https://undsci.berkeley.edu/article/intro_01)

6. Find the synonyms for the following in the passages above (Activities 4, 5).

1) science	**7)** elementary
2) material	**8)** data
3) interplay	**9)** dependable
4) records	**10)** accurate
5) progress	**11)** mistake
6) mind-breaker	**12)** non-professional

7. Fill in the gaps using the words from the list.

hand-washing local reduce consumption dictate reproduce commonplace seafood spread knowledge

Getting Personal


http://mirfactov.com

You may not be an expert on microbiology, geology, or climatology, but even so, scientific **(1)** ….. may factor into your everyday decision-making. Science has implications for issues we face everyday – and while science doesn't **(2)** ….. which choice is the right one, it does give us important background knowledge to inform our decisions. Here are just a few examples of everyday decisions informed by science:

To wash or not to wash. One hundred and seventy years ago, **(3)** ….. wasn't an everyday ritual – even for doctors working in both the morgue and the maternity ward! However, since then, biologists have developed the germ theory of disease, and research has shown that hand-washing prevents the **(4)** ….. of infection. A 2005 study found that promoting hand-washing among children in low-income areas could **(5)** ….. the incidence of diseases like pneumonia by fifty percent! Though washing one's hands might seem like a simple habit today, it is so **(6)** ….. only because scientific knowledge has emphasized its benefits.

Which fish? Will you have the **(7)** ….. tilapia or the orange roughy? Taste certainly factors into this decision, as does cost. But what about science? Conservation biology tells us that the orange roughy's population has been decimated by the **(8)** ….. industry. Even more worrisome, biologists have figured out that the fish lives to be 100 years old and doesn't begin to **(9)** ….. until it's 20 years old, making it difficult for the population to recover from over-fishing. Tilapia, on the other hand, is farmed specifically for human **(10)** ….. and is not threatened. Which will you choose?

8. Read the second part of *Getting Personal* and think of the word which best fits each gap. Use only *one* word in each gap. There is an example at the beginning (0).

Example:

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
well											

Am I better yet? You're over your strep throat and feeling **(0)** ….. again, so is it time to ditch the antibiotics? Well, you could, but evolutionary biology suggests that stopping a course **(1)** ….. antibiotics early encourages the evolution of antibiotic resistant bacteria, **(2)** ….. allowing those bacteria not quite killed off by the incomplete dose of antibiotics to preferentially survive and reproduce. Those mildly resistant bacteria could come back to haunt **(3)** ….. or infect someone else, and if they do, your original antibiotic may not work **(4)** ….. the new strain.

Petroleum preferences. You're in the market for a new car – but which **(5)** ….. ? There are many considerations, including mileage. A car that gets **(6)** ….. mileage means that you'll pay less for gas. But geology can shed even more light on the issue. The petroleum necessary to make gas is a limited **(7)** ….. . The Earth only has so much oil and geologists estimate that we **(8)** ….. already tapped much of that. The more petroleum we use, the harder it becomes **(9)** ….. find. The harder petroleum is to find, the more expensive each barrel of oil becomes, and the more you'll **(10)** ….. paying at the gas pump! A car that conserves gas might be more expensive now, but could end **(11)** ……. paying off in the long run.

9. Match the synonyms (use activity 7).

1) expert	**a)** challenge
2) issue	**b)** ology
3) knowledge	**c)** accentuated
4) study	**d)** destroy
5) incidence	**e)** troublesome
6) emphasized	**f)** specialist
7) decimate	**g)** information
8) worrisome	**h)** decline

10. Match each verb on the left with a noun on the right to form common collocations (based on the texts above – activities 7–8). Use each word only once.

1) inform	**a)** the antibiotics
2) develop	**b)** a course
3) prevent	**c)** our decisions
4) ditch	**d)** the evolution
5) stop	**e)** gas
6) encourage	**f)** someone
7) infect	**g)** the spread of something
8) conserve	**h)** a theory

Exam task

A **Use of English (Part 2)**

For questions 1–10, read the text below and think of the word which best fits each gap. Use only one word in each gap. There is an example at the beginning (0).

Example:

0	1	2	3	4	5	6	7	8	9	10
up										

Tip Strip

- Some of the missing words are parts of set phrases.
- **Pay close attention to** the words before and after each gap.
- **Remember** that all four options are similar in meaning but only one should be used in this context.
- Even if you are not completely sure about an answer, **do not leave** anything unanswered - rather than leave a gap, make an educated guess.

http://news.tpu.ru

The Importance of Science: Ten Reasons

One of my old, fairly innocuous posts has been climbing **(0)** ……. the popularity lists: The Importance of Science in Our Lives. It's just a link to an article online with a little commentary. I see on my statistics pages that a lot of people arrive using google searches of "Importance of Science." I wonder if this is a common school assignment **(1)** ……. students, e.g., "Write about the importance of science in the modern world" or some other similar variation, and then off they go to google to **(2)** ……. their answers rather than thinking for themselves. Maybe that's too cynical. Anyway, I have been intending to follow up with some more specific and simply worded reasons that science **(3)** ……. important to not just me (e.g., my income), but to our civilization today.

Science is important because…

1. …we don't have to take someone's word for something, we can **(4)** ……. their claims.
2. …horrible diseases can be cured, or prevented entirely, and it can still provide hope for those with as-yet-incurable diseases.
3. …people who love each other can talk to each **(5)** ……. whenever they want no matter how far apart they are in the world, and can be together the next day.
4. …science can show us what **(6)** ……. caused mass extinctions and point the way to preventing similar catastrophes in the future.
5. …science can make us feel big and special for understanding the age of the Earth, the nature of stars, and the size of the universe, **(7)** ……. if those things dwarf us.
6. …science saves lives.
7. …it has helped us to no longer need to worry about personal survival as our top priority, giving us more time for love, laughter, singing, and dancing.
8. …whenever one **(8)** …. is solved another two rear up to take its place, so the need for science will never go obsolete.
9. … science gives us superpowers, like looking across the universe, seeing atoms, flying across the Earth or to the moon, moving mountains, and harnessing the energy of the sun.
10. … science, in the long run, is the only reliable way **(9)** ….. figure things out in a world that is so seldom fair and impartial.

Well, those are ten of mine. I could elaborate or further justify each of these, but for now I will leave these here to ferment some **(10)** …. . There's a darker version of this list that would talk about guns, nuclear bombs, and more, but I'll pass on that for now. Violence isn't nice, but it surely is important. Why is science important to you?

Exam task

B **Use of English (Part 5)**

For questions 11–18, read the text below. Use the word given in capitals at the end of each line to form a word that fits in the space in the same line. There is an example at the beginning (0).

Example:

0	11	12	13	14	15	16	17	18
published								

The Importance of Science in Our Lives

Brian Green has *published* an article in New York Times. He spoke about the **(11)** _____ importance of science in our lives. It is a good paper, and **(12)** _____, in my opinion. Science has enabled you to read this post, but it has also done so much more. Reflect on that. Sometimes I feel like I'm a **(13)** _____ person who gets paid to play full time. But that's not true. The value of science isn't in the dollars or the results. It's in the quest, and the **(14)** _____. I've spent hundreds of thousands of dollars of **(15)** _____ money making **(16)** _____ advances in understanding quasars. To what end?

PUBLISH
PERSON
MEANING
LUCK
UNDERSTAND
GOVERN
INCREMENT

To every end. This is the quest, to understand the universe, for the word. Someone should be **(17)** _____ this stuff out, and it costs what it costs. It's about more than making a living or the **(18)** _____ Dream. It's about understanding who we are and our place in the universe. I care about this. It is important. It does matter. And it costs what it costs. We need to know in a meaningful way, true things, and this is the way. Let's all enjoy it.

FIGURE
AMERICA

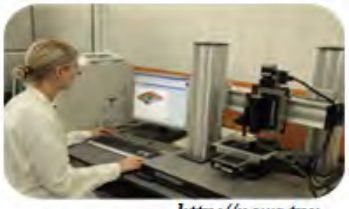
LISTENING

Vocabulary for listening

A **Activating ideas**

1. **Look at the following list of nominations. What sort of research would any of these prizes involve? What things would scientists look at to win one of these prizes?**

reproduction psychology medicine
perception chemistry economics biology



http://news.tpu.

Real-time listening

2. **Listen to the text about unusual science prizes and mark these statements as either TRUE, FALSE or NOT GIVEN.**

N	STATEMENTS	
1	Mr Shafik made his experiments on a type of rodents.	TRUE FALSE NOT GIVEN
2	Wearing certain human clothes may have positive effects on the reproduction of some species of animals.	TRUE FALSE NOT GIVEN
3	The Economics Prize was awarded for researching the financial potential of geological objects.	TRUE FALSE NOT GIVEN

4	The winners of the Psychology Prize tested the human ability to resist deception.	**TRUE** **FALSE** **NOT GIVEN**
5	The most difficult part of the psychological research was to verify the results.	**TRUE** **FALSE** **NOT GIVEN**
6	The Perception Prize winners investigated how everything looked bigger when you had to look at the world upside down.	**TRUE** **FALSE** **NOT GIVEN**
7	The Medicine Prize team looked for ways to get rid of anxiety by looking into a mirror.	**TRUE** **FALSE** **NOT GIVEN**
8	The Chemistry Prize was given to the car-producing company.	**TRUE** **FALSE** **NOT GIVEN**
9	The Biology Prize winners aimed to make friends with the animals they studied.	**TRUE** **FALSE** **NOT GIVEN**
10	As part of the research one scientist had to put on special costume to fully imitate the lifestyle of the animal under study.	**TRUE** **FALSE** **NOT GIVEN**

The Unusual Science Prizes: The IG Nobels!

What's it like to live like a goat? Do cotton trousers affect the sex lives of rats? Can rocks have personalities? The scientists who did **research** into all these questions were awarded Ig Nobel prizes. Ig Nobels are **awards** for unusual scientific research – the kind of research that makes you laugh, then makes you think. The ceremony for the prizes is organized by science magazine The Annals of **Improbable** Research, and takes place every year at Harvard University. Here are some of this year's winners.

The Reproduction Prize went to the late Ahmed Shafik for testing the **effect** of polyester, cotton or wool trousers on the sex life of rats.

Mark Avis and colleagues were awarded the Economics Prize for **assessing** the personalities of rocks, from a sales and marketing **perspective**.

The Psychology Prize went to Evelyne Debey and colleagues for asking a thousand liars how often they lie, and then deciding whether to believe these answers or not.

This year's Perception Prize was awarded to Atsuki Higashiyama and Kohei Adachi for investigating whether things look different when you **bend over** and **view** them between your legs.

Christoph Helmchen and colleagues were given the Medicine Prize for **discovering** that if you have an **itch** on the left side of your body, you can **relieve** it by looking into a mirror and scratching the right side of your body (and vice versa).

This year's Chemistry Prize was given to Volkswagen. They solved the problem of excessive automobile pollution emissions. They did this by electromechanically producing fewer emissions whenever the cars were being tested.

And finally, the Biology Prize was awarded **jointly** to Charles Foster and Thomas Thwaites for trying to **experience** life from an animal's perspective. Charles has lived in the wild as a variety of animals including a deer, a fox and a bird; Thomas spent three days in the Alps as a mountain goat, complete with a special set of goat legs. In an interview with the BBC, he said that he'd developed a strong **bond** with one animal in particular – a "goat buddy", but also very nearly got into a fight. "I was just sort of walking around, you know chewing grass, and just looked up and then suddenly realised that everyone else had stopped chewing and there was this **tension** which I hadn't kind of noticed before, and then one or two of the goats started **tossing** their horns around and I think I was about to get in a fight." How unusual!

(Adapted from Hot English magazine 174, page 15)

B Practicing new vocabulary

1. Complete the definitions with the words in bold from the text.

1) to move one's body over and down
2) a particular way of looking at things
3) an unpleasant feeling on the skin
4) to make something go away or become less intensive
5) a special connection between individuals or objects
6) to throw something in the air
7) a state of latent hostility or opposition between individuals or groups
8) in a way that involves two or more people or groups sharing or doing something together

2. Match the highlighted words from the text with their synonyms given below. Paraphrase the sentence with the highlighted word, using the synonyms.

1) decoration / distinction / honour / premium / prize
2) doubtful / dubious / far-fetched / questionable / unlikely
3) consequence / development / outcome / product / result;
4) examination / exploration / inquiry / investigation / study
5) estimate / appraise / evaluate / value / rate
6) detection / finding / spotting / unearthing
7) check out / examine / inspect / observe / scrutinize / see / watch
8) endure / feel / know / see / taste / undergo / witness

3. Use the information below to discuss with your partner the following questions.

1. How does the name of the prize reflect the nature of research, being awarded?
2. Are there any more nominations that can be suggested for the Ig Nobel prize?
3. Do people need this kind of research? Why / Why not?
4. Which of the following research would you call the most weird? Why?

The name of the competition (The Ig Nobels) forms an expression that sounds like the English word "ignoble", which is basically the opposite of "noble" (a "noble" person has a good character and is honest, generous and selfless (they don't just care about themselves). For more information on Ig Nobels, visit: *www.improbable.com/ig*.
With your partner (or individually) explore the link above and make your own list of craziest scientific discoveries, then compare it with your groupmates' lists.

4. Look at the picture and answer the questions. Do you know this scientist and what kind of research was awarded the Ig Nobel Prize in 2012?

(Adapted from Annals of Improbable Research. Special issue: the 2012 Ig Nobel Prizes. November/December 2012, Vol.18, Iss.6)

5. How many Russian scientists have been awarded this weird prize and what kind of research they did to receive this award? Are there scientists who have been awarded both real and comic Nobel Prizes? Check this link to learn more: *https://www.rbth.com/arts/2013/09/13/six_ig_nobel_prize_awards_received_by_russians_29823.html*

6. Can this prize be awarded to businesses and organisations? Do you know any Russian company who has been awarded this prize?

C Spelling

1. Write the correct vowels in each word and pronounce it.

a) r - s - - rch	**c)** sc - - nt - st	**e)** c - ll - - g - -	**g)** q - -st - - n
b) b - - l-g -	**d)** r - l - - v -	f) - w - rd	**h)** l - - gh.

2. Write the correct consonants in each word and pronounce it.

a) psy - - ology	**c)** - - emistry	**e)** - - ience	**g)** electrome - - anical
b) a - - ess	**d)** e - - ect	**f)** e - - essive	**h)** di - - overy

Exam task

A Listening (Part 1)

Listen to the extracts about curious things on science and research and choose the best answer (A, B, C or **D).**

1. In this extract from a popular programme the presenter talks about history of research on lightning. At that stage of research what did scientists need to establish?

A Politicians could work as scientists to introduce experiments.
B Scientists always have to start with a hypothesis in their research.
C The nature of lightning is similar to static electricity.
D Electricity may exist outside laboratory conditions.

2. In this extract what is an expert trying to explain?

A How air changes its property to conduct electrical charge.
B How the mechanism of electrical circuit works.
C How south and north poles of magnets attract.
D How the electrical charges behave to form the lightning.

3. You will hear two presenters of the programme – a human and a machine one. What is her attitude towards her artificial partner?

A She is apprehensive as it might potentially replace people.
B She is amazed as it has unlimited access to various data and many other functions.
C She is relieved as today it is going to assist running the programme.
D She is concerned as, unlike machines, she might make mistakes.

4. You will hear a staged conversation. What is the purpose of this exchange?

A To prove that robots can make phone conversations.
B To check that customer service is good in a hair salon.
C To see if a machine can make an appointment with a hair-stylist.
D To test if a machine can imitate human behaviour.

5. You will hear a presenter introducing the topic of living underwater and a speaker who is an enthusiast of living under the sea. What is her attitude towards the idea?

A She is slightly skeptical as no one has lived long enough under water.
B She is really enthusiastic as she goes to the beautiful aquarium in Paris.
C She is very passionate as she would love to see the exotic sea creatures.
D She is a little doubtful as there are no special structures to live under the sea

6. You will hear people discussing the problems of living in an underwater station. Why is it difficult to live underwater?

A The quality of voice changes dramatically because of dampness.
B There are high health risks and financial costs when being under the sea.
C The atmospheric conditions may cause severe damage to the body.
D It is technologically challenging to support the necessary environment.

7. You will hear the introduction to the programme on space travel. What was the first ever message sent and received from space?

A It contained some scientific data related to the speed and height of the flight.
B It informed the world of the name and date of this endeavor.
C It confirmed the establishment of contact with the Mission Control.
D It updated on the progress of mission and state of the cosmonaut.

8. You will hear an expert answering the question about anti-gravity in spaceships. What does she say about microgravity?

A Researching microgravity is helpful for developing treatment for the elderly.
B Microgravity effects on health make astronauts look and feel older.
C Spaceships must be faster and bigger to achieve normal gravity on board.
D There are no technological solutions to get rid of microgravity in space stations.

Exam task

B **Listening (Part 2)**

Listen to Chris – an expert on space-mining and complete the sentences filling the gaps with words and numbers. Fill in no more than THREE WORDS OR NUMBERS.

Chris is interested in **(1)** ….., because it is relatively easier than mining on **(2)** ….. or building bases on planets.
It might be really profitable to explore space as some believe space-mining can be worth **(3)** ….. , and it might provide humanity with necessary materials for **(4)** ….. or even millennia.
In space one can find three main types of materials: firstly, the metallic meteorites which are made of **(5)** ….. and ….. which is similar to the Earth's **(6)** ….. .
Secondly, there are meteorites that are **(7)** ….. , and, finally, those that are carbonaceous.
The carbonaceous meteorites contain carbon, hydrogen, oxygen, **(8)** ….. , nitrogen – the elements and materials that one can easily find on **(9)** ….. .
However, people want to mine more precious materials in space, those that are valuable, because they are **(10)** ….. .
It is proved that asteroids might contain really rare materials in large amounts, for example such valuable metal as **(11)** ….. can be found in quantities **(12)** ….. larger than in best mines on our planet.

GRAMMAR

- **PASSIVE VOICE**
- **WORD FORMATION**
- **LINKING WORDS (TRANSITION)**

ACTIVE *vs* PASSIVE

TENSE	ACTIVE	PASSIVE
Present Simple	I do it.	It is done.
Past Simple	I did it.	It was done.
Future Simple	I will do it.	It will be done.
Present Continuous	I am doing it.	It is being done.
Past Continuous	I was doing it.	It was being done.
Present Perfect	I have done it.	It has been done.
Past Perfect	I had done it.	It had been done.
Future Perfect	I will have done it.	It will have been done

1. Listen and say whether these statements are correct.

1. We form the present perfect with the verb "to have" in the present tense and a present participle.
2. We use the present perfect to talk about completed actions from the present without saying exactly when they happened.
3. We use the active voice when the subject of the verb is somebody or something that does the action.
4. We use the passive voice when the subject is not known or important.
5. We form the present perfect passive with the verb "to have" in the present tense and a past participle.

2. Turn these sentences in the present perfect passive and listen to check.

1. John has destroyed the car.
2. Shirley has finished the project.
3. Paul has bought the game.
4. Patricia has fired the gun.
5. Pete has spent the money.
6. Michael has broken the computer.
7. Sarah has made the phone call.
8. Mary has written the book.

(Adapted from Hot English Magazine 146, page 48)

3. Listen to Jennifer Givens, a minister from the Department of Culture, who is talking to Frank Jones, the director of Natural History museum. She wants an update on the current situation. Listen and fill the gaps with missing participles.

Jennifer: So, I see the Tyrannosaurus Rex has been **(1)** …….. from the entrance.
Frank: Yes, it's been **(2)** …….. .
Jennifer: (3) ……?
Frank: Yes, we had some expenses that we needed to cover.
Jennifer: Expenses?
Frank: Well, some of the staff hadn't been **(4)** ……. for a while. The money from the sale of the dinosaur has been **(5)**……for that.
Jennifer: Oh, right. And the replica blue whale that was such a popular attraction?
Frank: It's been **(6)** ……to another museum. We couldn't afford to keep the room open any longer – the heating and lighting bills were really high.
Jennifer: Right, so, why has the "Romans in Britain" exhibition been **(7)** ……..?
Frank: Cleaning work.
Jennifer: Hopefully it won't take too long. Now, on a positive note, I see that sales from the museum shop have **(8)** …… .
Frank: Yes, well, we're offering a lot more products now.
Jennifer: That's great. And I also see that the museum restaurant is doing quite well.
Frank: Yes, it's now the most popular part of the museum. We're offering a three-course meal for just £6.
Jennifer: Can we make a profit on that?
Frank: Not really, but it gets the visitors in – and as they have to pay £8 for the entrance fee, it works out quite well.
Jennifer: Ah, I see. Very clever. Now, where's that exhibition on Early Man?
Frank: It's been **(9)** ……. down for repairs. The Neanderthal man's arms fell off, and the sabre-toothed tiger has been **(10)**…….. .
Jennifer: (11) …….?
Frank: Yes.
Jennifer: Where was the security guard at the time?
Frank: We don't know, but he's been **(12)** …….
Jennifer: (13) ……..? Why?
Frank: Well, police think that he might have **(14)** ……. it.
Jennifer: What on earth would he want that for?
Frank: We also noticed that a stuffed lion has **(15)** ……missing. The two thefts might be **(16)**…….. . The police are looking into it. Apparently the guard is really into hunting.
Jennifer: Oh, right. Now what's happened to…. (fades out).

(Adapted from Hot English Magazine 162, page 8)

4. What improvements you might suggest to this museum management? Make up a similar dialogue a month after your suggested improvements were introduced.

5. Listen and fill in the gaps.

1. We form the ….. perfect with "had" + a ….. participle.
2. We use the ….. perfect to talk about an action that happened ….. another action in the …… .
3. We form the …….. perfect passive with "……. ……." and a ……. participle.
4. In the passive voice, the object of the verb becomes the ……. .
5. It is not …… to mention who "did" the action, but it is possible to introduce person/people with the word "…..".

6. Turn these sentences in the past perfect passive and listen to check.

1. They had finished the game by 6 pm.
2. She had scored the first goal by 3 pm.
3. They had played the tennis match by 4 pm.
4. They had won the game by 9 pm.
5. They had lost the game by 2 pm.
6. They had signed the contract by March.

7. Say what the function of "by" in the above sentences was?

8. Read the story about Skype creation and fill in the gaps with correct forms of the verbs in brackets, using Active and Passive Voice in different tenses.

SKYPE: how to make a billion from a free service?

http://vcs.su/wrb/skype-for-business-online-is-to-retire

Skype **(1)** ….. *(set up)* by entrepreneurs Niklas Zennström (from Estonia) and Janus Friis (from Denmark). Friis was a high school drop-out who never **(2)** ….. *(make)* it to college. Zennström was a university graduate with two degrees: one in business administration and another in engineering. Friis **(3)** ….. *(meet)* Zennström in Denmark where they were both working for the European telecommunications company Tele 2.

At the time, Zennström was head of Tele 2. Before long, the two went into business, founding Skype in 2003. The first Skype software, which **(4)** ….. *(write)* by Estonian programmers, **(5)** ….. *(release)* in April of the same year. And very soon, Skype **(6)** ….. *(become)* the global leader in internet voice communications with more than 309 million registered users within five years of its launch.

Skype **(7)** ….. *(create)* using a peer-to-peer computer system that allows computers to share files with each other. In fact, the name Skype comes from "Sky peer-to-peer". In 2006, video conferencing **(8)** ….. *(introduce)*, which made the system attractive to the business community.

Over the years, Skype has made Zennström and Friis very rich men. In October 2005, the company **(9)** ….. *(acquire)* by eBay for €2.1 billion, with both men remaining to run the company, as well as retaining a financial interest in it. In 2011, Skype **(10)** ….. *(sell)* again. This time it **(11))** ….. *(purchase)* by Microsoft in a cash deal worth a supposed $8.5 billion. It **(12)** ….. *(believe)* that Zennström and Friis received approximately $1 billion between them from the sale – which is a lot of money for a company that provides a free service! So, how does Skype come to be worth so much?

Zennström and Friis were idealists in some ways. They believed that telephone calls should be free. Traditionally, phone companies **(13)** ….. *(operate)* a system where the longer the distance of the call, the higher the price. This philosophy **(14)** ….. *(turn)* on its head by Skype, where all calls can be free regardless of the distance.

However, while believing that calls should be free, Zennström and Friis still **(15)** ….. *(want)* to make money. So, they sold add-on features such as customized ringtones and voice-mail subscriptions. Calls from Skype accounts to land lines or mobiles **(16)** ….. *(also charge)*, with users buying Skype credit before making calls. And there are features such as group phone calls which can include up to 15 people. The Skype site itself

answers the question “How does Skype make money?”: “By having great value features that people want to pay for.”
And it works. The company’s share of the international call market **(17)** ….. *(rise)* from 2.9% in 2005 to 13% in 2010, and it’s still rising.

(Adapted from Hot English Magazine 125, page 39)

9. How do we form Past Continuous forms in the Active Voice? And what about the Passive Voice? Put the sentences below in the Past Continuous, then change them into the Passive Voice. Listen and check the results.

1. They ……. (count) the money.
2. We …… (fix) the computer.
3. She …… (walk) the dog.
4. Suzy …….. (clean) the car.
5. Shelly …..…. (drive) the bus.
6. They …….. (take) a photo.
7. We ……. (film) the game.
8. He …….. (answer) the phone.
9. They …….. (buy) the tickets.
10. He …… (hang up) the clothes.
11. She ……... (finish) the report.

(Adapted from Hot English Magazine 67, page 48)

10. Look at the pictures. Use the Past Continuous Passive to describe what was happening during the scientific laboratory experiment.

https://encrypted-tbn0.gstatic.com

Prompts to be used: *data, experiment results, report, notes, comparison*

https://www.google.com

Prompts to be used: *mixture, reaction, chemical processes, observation, toxin, pathogen, biological culture*

https://encrypted-tbn0.gstatic.com

Prompts to be used: *equations, measurements, calculations, equipment adjustment, specimen, glassware, liquids*

Talk about the most important safety rules when working in a laboratory with your partner or in groups. You can read more on the laboratory safety rules following this link *https://www.thoughtco.com/important-lab-safety-rules-608156*

11. Watch the video on word formation (changing verbs into nouns) using the link below. Fill in the gaps in the following sentences.

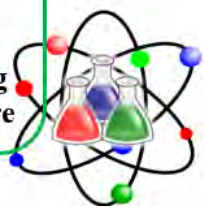
- ***http://www.engvid.com/change-verbs-into-nouns***

1. You will hear the ……. to the programme on space travel. (INTRODUCE)
2. It confirmed the ……. of contact with the Mission Control. (ESTABLISH)
3. Researching microgravity is helpful for developing ……. for the elderly. (TREAT)
4. The water-fuelled car was his greatest ……. . (ACHIEVE)
5. The final ……. took eight hours to reach. (AGREE)
6. Thanks to mobile phones, the emergency services come to people's ……. much faster these days. (ASSIST)
7. …… now is more than 20% in Spain, which is catastrophic. (EMPLOY)
8. Helping companies to create jobs is the best way to stimulate ……. in an economy. (GROW)
9. Electric cars have been showing remarkable ……. in recent years. (IMPROVE)
10. People need to increase their ……. of nutrition, especially about the dangers of sugar, red meat and refined flour. (KNOW)
11. For the first time, there is ……. that using baby formula has a negative effect on babies' health. (PROVE)
12. The ……. to the energy crisis is not nuclear, because of the enormous hidden costs, the toxic waste and simply because it is not renewable. (SOLVE)

12. Use the table to form adjectives from nouns given below.

Common Adjective Suffixes (Noun-Adjective)

- AL	relating to	- ISH	origin, nature
- ARY	relating to	- LESS	without
- IC	having the nature of, caused by	- LIKE	like
		- FUL	full of, having
- ICAL	having the nature of	- OUS	quality, nature



1) *universe – universal*	**7)** base – …
2) region – …	**8)** self – …
3) life – …	**9)** honour – …
4) power – …	**10)** moment – …
5) alphabet – …	**11)** practice – …
6) victory – …	**12)** poison – …

13. Watch the video on linking words and phrases. Use the information to write one or two sentences with a similar meaning to the sentences below, introducing the words in brackets and any other words you need.

- ***http://7esl.com/linking-words***

1. Despite the technological advances in space industry, space tourism is limited to travelling within the Earth atmosphere. (***although***)
2. My scientific advisor called an emergency meeting so I had to cancel all of my afternoon appointments. (***because***)
3. It is now cheaper to purchase the online subscription so fewer people are watching TV or going to the cinema these days. (***due to***)
4. The total cost of experiments has risen because the electricity price went up last month. (***as a result***)

5. Although there are over 45 girls working in the laboratory, the boys still outnumber the girls on science-related courses by two to one. (***but***)
6. Although there are some advantages to the pace of modern technology development, it also has its disadvantages. (***however***)
7. The numbers of certain species, such as red deer, for instance, increased slightly in the recent years, although the increase was not sufficient to take them off the endangered wildlife list. (***in spite of***)

14. Underline the correct linking expressions.

Science and technology have come a long way in the last 50 years of the previous century and at the beginning of this century, and our lives have become better as a result. Do you agree with this statement?

In scientific and technological terms, the twentieth and, **(1) alternatively / especially**, twenty-first century saw more changes than in the previous five hundred years. Penicillin was discovered and used to treat infections that would have **(2) once / then** been fatal, and there were many other remarkable advances in medicine that helped to increase our average life expectancy way beyond that of our ancestors. Incredible innovations **(3) so that** / **such as** television or mobile telephone changed the way we now spend our leisure hours. **(4) Consequently**, / **Perhaps** the most important breakthrough, **(5) however / although**, was the microchip. Nobody could have imagined, **(6) despite** / **when** it was first invented, that within a matter of years, this tiny piece of silicon and circuitry would be found in almost every household object from the kettle to the camcorder.
(7) And / **Nevertheless** nobody could have predicted the sudden proliferation of computers and social networks that would completely change our lives, allowing us to access information from the other side of the world via the Internet or send messages around the globe at the touch of a button or swipe on a screen. **(8) Therefore** / **Meanwhile**, research into other aspects of information technology made it easier and cheaper for us to find employment or friends around the world. Good news for technophiles who love modern technology, bad news for the technophobes who would have preferred to hide from these modern miracles. **(9) But / Furthermore,** everything has a price. The development of cybernetics led to mass automation in factories, which in turn led to millions losing their jobs. The genius of Einstein led to the horrors of the atomic bomb and the dangerous uncertainties of nuclear engineering (we often hear of accidents and mishaps at nuclear power stations around the world, where safeguards to prevent accidents were inadequate). The relatively new science of genetic engineering has been seen as a major step forward, **(10) similarly** / **but** putting modified foods onto the market before scientists had properly analyzed them was perhaps one of the most irresponsible decisions of the late twentieth and early twenty-first century. **(11) Meanwhile / As a result**, pharmaceutical and cosmetic companies continue experiment on animals, a move that many consider to be cruel and unnecessary.
(12) Of course / **Because** we rely on modern science and technology to improve our lives. **(13) Moreover** / **However**, we need to make sure that we control it rather than the other way around.

(Adapted from Check Your English Vocabulary for TOEFL by Rawdon Wyatt)

In academic writing it is essential to create texts that are easy to use. Following the strict conventions can make these texts monotonous and, as a result, difficult to read. To avoid this, writers must diversify their vocabulary. There are two cases of repetition in this essay. Find them and suggest alternative linking expressions to avoid repetition.

WRITING

A Activating ideas

AN ABSTRACT

1. An abstract is a 150- to 250-word paragraph that provides readers with a quick overview of your essay or report and its organization. It should express your thesis (or central idea) and your key points; it should also suggest any implications or applications of the research you discuss in the paper.

2. According to Carole Slade, an abstract is "a concise summary of the entire paper."

- The function of an abstract is to describe, not to evaluate or defend, the paper.
- The abstract should begin with a brief but precise statement of the problem or issue, followed by a description of the research method and design, the major findings, and the conclusions reached.
- The abstract should contain the most important key words referring to method and content: these facilitate access to the abstract by computer search and enable a reader to decide whether to read the entire paper.

3. Your abstract should read like an overview of your paper, not a proposal for what you intended to study or accomplish. Avoid beginning your sentences with phrases like, "This essay will examine..." or "In this research paper I will attempt to prove..."

Answer the following questions.

- What do you think an abstract is?
- How many words should it contain?
- What is it supposed to declare?
- What is the main purpose or function of the abstract?
- What does it usually begin with?
- What are key words for?

B Building knowledge

1. Read two abstracts given below and decide which one is "good" and which one is "bad". Give reasons for your choice.

A. Begun in 1988, the human genome project intends to map the 23 chromosomes that provide the blueprint for the human species. The project has both scientific and ethical goals.

The scientific goals underscore the advantages of the genome project, including identifying and curing diseases and enabling people to select the traits of their offspring, among other opportunities.

Ethically, however, the project raises serious questions about the morality of genetic engineering. To handle both the medical opportunities and ethical dilemmas posed by the genome project, scientists need to develop a clear set of principles for genetic engineering and to continue educating the public about the genome project.

B. This paper will look at the human genome project and its goals. I will prove that scientists have ethical and moral questions about genetic engineering because of this project.

2. Read the following statements and decide which ones are appropriate when writing an abstract and which are not (considered to be a common problem). What those common problems can be?

A

1. The study draws conclusions about which variables are most important in choosing a movie theater. (What, specifically, are these variables?)

2. The study concludes that the most important variables in choosing a movie theater are comfortable seats and high-quality popcorn.

B

1. Individuals oversleep because they go to bed too late, forget to set their alarms, and keep their rooms dark.

2. This report examines the causes of oversleeping. (What did it find out about these causes?)

C Learning new skills

Read the information given below and fill in the gaps using the words from the box:
When is it necessary to write abstracts?

Abstracts are usually required for:

- submission of articles for journals;
- application for **(1)** ….. grants;
- completion and submission of theses;
- submission of proposals for **(2)** ….. papers.

research	abstracts
conference	approaches
reader	findings
scope	evidence
argument	implications

What to include in an abstract?

The format of your abstract will depend on the discipline in which you are working. However, all **(3)** ….. generally cover the following five sections:

1. Reason for writing:

What is the importance of the research? Why would a **(4)** ….. be interested in the larger work?

2. Problem:

What problem does this work attempt to solve? What is the **(5)** ….. of the project? What is the main **(6)** ….. , thesis or claim?

3. Methodology:

An abstract of a scientific work may include specific models of **(7)** ….. used in a larger study. Other abstracts may describe the types of **(8)** ….. used in the research.

4. Results:

An abstract of a scientific work may include specific data that indicates the results of the project. Other abstracts may discuss the **(9)** ….. in a more general way.

5. Implications:
How does this work add to the body of knowledge on the topic? Are there any practical or theoretical applications from your findings or **(10)** ….. for future research?

D Using new skills in a real-world task

1. **Read an abstract example and define the reason for writing it (mark the goal, problem, methodology, results and implications).**
   Example abstract 2: Engineering

Quantifying the Mechanics of a Laryngoscopy

Laryngoscopy is a medical procedure that provides a secure airway by passing a breathing tube through the mouth and into the lungs of a patient. The ability to successfully perform laryngoscopy is highly dependent on operator skill; experienced physicians have failure rates of 0.1% or less, while less experienced paramedics may have failure rates of 10-33%, which can lead to death or brain injury. Accordingly, there is a need for improved training methods, and virtual reality technology holds promise for this application. The immediate objective of this research project is to measure the mechanics of laryngoscopy, so that an advanced training mannequin can be developed. This summer an instrumented laryngoscope has been developed which uses a 6-axis force/torque sensor and a magnetic position/orientation sensor to quantify the interactions between the laryngoscope and the patient. Experienced physicians as well as residents in training have used this device on an existing mannequin, and the force and motion trajectories have been visualized in 3D. One objective is to use comparisons between expert and novice users to identify the critical skill components necessary for patients, to identify the mechanical properties of the human anatomy that effect laryngoscopy, and thus enable the development of a realistic training simulator. In the future an advanced training mannequin will be developed whose physical properties will be based on our sensor measurements, and where virtual reality tools will be used to provide training feedback for novice users.

2. **Watch the video using the following link:** *http://www.youtube.com/watch?v=x-9RTuYKeTE* **and list the tips on how to write an abstract.**
   For more information, visit the following websites:

- ***http://www.youtube.com/watch?v=C7YhazRhtA***
- ***https://www.youtube.com/watch?v=szwkBea4qv0***

SPEAKING

Exam task

PART 1

1. Answer the following questions.

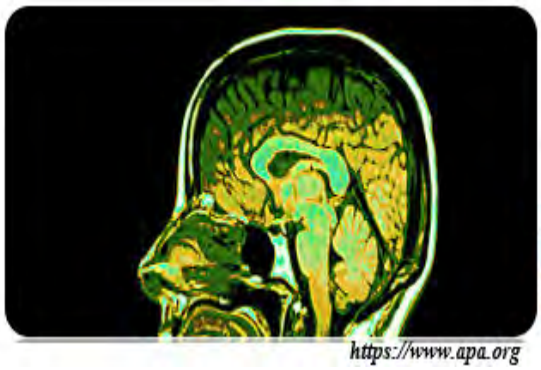
1. Would you like to be a scientist? Why (not)?
2. How does science influence your everyday life?
3. What qualities and skills are necessary to be a good scientist?
4. In your opinion, what is the most outstanding scientific achievement of this century? Why?

2. Additional (alternative) questions to expand.

1. What breakthrough do you expect in the not-so-distant-future?
2. If you were a scientist, what discovery would you like to make?

PART 2

Compare and contrast these pictures. Answer the question. Which area of scientific study is more influential for further development.

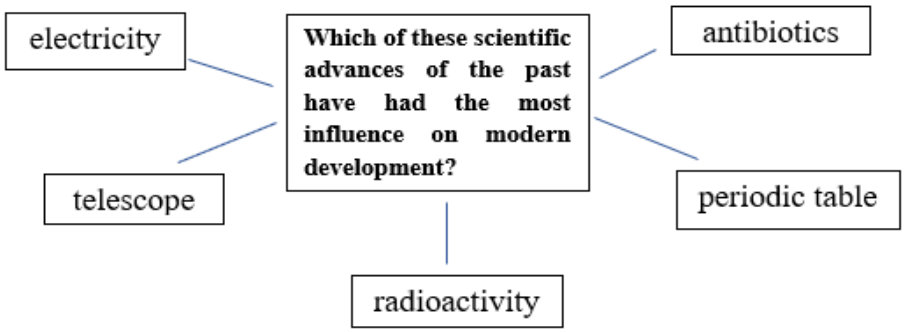


https://www.apa.org

https://aboutspacejornal.net

PART 3

Talk with your partner about the question and the prompts in the diagram for two minutes.



Discuss the additional question.

Which of these advances have had the most positive and the most negative impact on further development?

PROJECT WORK

LET'S GIVE A TED TALK

I. PREPARATION FOR PROJECT WORK

A Activating ideas

There are many ways to make your talk exciting from the very beginning. Look at the ideas below and tick those that you find suitable to start a presentation. Discuss your choices with your partner.

- *telling a joke*
- *quoting someone famous*
- *telling a story from your personal experience or describing a familiar situation*
- *demonstrating a catching and / or powerful image*
- *using a loud sound effect*
- *asking a rhetorical question*;
- *telling an anecdote (a story based on some factual data from real life)*
- *giving (alarming) statistics*
- *demonstrating an unusual object*;
- *asking for a show of hands (running mini-voting)*
- *retelling a recent conversation*
- *using some common knowledge with a twist in it*;
- *doing something completely unexpected (a somersault or a backflip)*
- *describing a situation with negative future consequences*

(Adapted from Hot English Magazine 187, p. 27)

B Listening

You are going to listen to seven different examples of how to make your presentation opening more effective. Listen and match them with the ways given in the activity above.

Presentation 1	
Presentation 2	
Presentation 3	
Presentation 4	
Presentation 5	
Presentation 6	
Presentation 7	

(Adapted from Hot English Magazine 187, p. 27)

In your opinion, which way of starting a presentation makes the most impact on the audience? Give your reasons.

C Vocabulary practice

Work in groups. Use a dictionary to say whether the words given below are positive, negative, formal, informal or neutral. Some of them may fit two or more categories. The examples for every category are given in the table.

Nouns: *misconception, integrity, trait, pile, bias, hypothesis, perspective, payoff, edge, remnant, tug, bunch, ovation, podium, floodgates, bucketload, statement*
Adjectives: *ultimate, flawed, decent, contradictory, superstitious, tribal, faint, messy, gravitational, subtle, formidable, profound*
Verbs: *to boil down, to reflect, to predict, to hone, to admit, to dig right into, to figure out, to face up to, to jam, to let go of, to plague, to detect, to blast out, to comment on, to account for, to chastise, to praise, to outnumber, to dare*

positive	negative	formal	informal	neutral
integrity	*misconception*	*hypothesis*	*payoff*	*trait*

D Watch the TED talk where Phil Plait argues the necessity of making mistakes and admitting them in science. It is typical for texts in English either oral or written to follow the logical structure. Put the topics below in the order they appear in the talk. There is an example at the beginning.

- ***https://www.ted.com/talks/phil_plait_the_secret_to_scientific_discoveries_making_mistakes***

	EXPLANATION HOW SCIENCE WORKS
	CONCLUSION
	THE BEST PART OF SCIENCE
1.	**INTRODUCTION**
	THE WEAKNESS OF SCIENCE

Within every part it is possible to find the ways that make the presentation more memorable. Using the list from the task A, fill in the table with the methods that are used in those parts. The examples are given at the beginning.

INTRODUCTION	THE MAIN BODY	CONCLUSION
using some common knowledge with a twist in it	…… …… ……	***demonstrating a catching and / or powerful image***

For further reading on the topic of exoplanetary science, follow the link:

- ***https://blog.oup.com/2019/02/birth-exoplanetary-science/***

II. PROJECT WORK

A With the help of the criteria from the table below evaluate the following TED talks:

- ***https://www.ted.com/talks/boaz_almog_levitates_a_superconductor?referrer=playlist-tech_breakthrough***
- ***https://www.ted.com/talks/regina_dugan_from_mach_20_glider_to_humming_bird_drone?referrer=playlist-tech_breakthrough&language=en***

or any other talks on TED.com. Add 1 point for every feature present in the talk, 0,5 point if there are mistakes (1-3) or the feature is only occasionally present, and 0 – in case the feature is absent or there are too many mistakes (over 5). The overall maximum number of points is 25. The task can be done in groups, individually or as a whole class. The resulting tables can be compared and discussed in class.

PRESENTATION EVALUATION FORM		
CRITERIA	**NOTES AND COMMENTS**	**TOTAL**
ORGANISATION AND STRUCTURE *outline, references, contact details, concluding slide (thank you for your attention), visual effects* **MAX 5 points**		
CONTENTS *fit the topic, original, interesting, text vs visual (20 to 80), good readability of slides* **MAX 5 points**		
LANGUAGE COMPETENCE *correct pronunciation, appropriate intonation, no grammar mistakes, no vocabulary mistakes, no style mistakes* **MAX 5 points**		
PERFORMANCE *reading vs telling (20 to 80), good timing, no hesitation pauses, appropriate response to questions, positive impression* **MAX 5 points**		
BODY LANGUAGE *eye contact, appropriate body posture, no fidgeting, smile, clear voice* **MAX 5 points**		

B Using the information from the PREPARATION FOR PROJECT WORK, make your own TED talk on the scientific topic related with your specialty. With the help of the criteria from the table above evaluate the talks by your classmates: add 1 point for every feature present in the talk, 0,5 point if there are mistakes (1-3) or the feature is only occasionally present, and 0 – in case the feature is absent or there are too many mistakes (over 5). The overall maximum number of points is 25. This task can be done individually or in groups.

WORD LIST

abstract, *n*
achievement, *n*
advances in science and technology, *phr*
alternative, *adj*, *n*
application, *n*
artificial, *adj*
breakthrough, *n*
calculations, *n*
challenge, *n*
components, *n*
consequences, *n*
contradictory, *adj*
criterion, *n*
curious, *adj*
data, *n*
detection, *n*
discovery, *n*
doubtful, *adj*
dubious, *adj*
equipment adjustment, *phr*
equation, *n*
estimate, *v*
ethical dilemma, *phr*
evaluation, *n*
evolution, *n*
experiment, *n*
expert, *n*
explore, *v*
exploration, *n*
genetic engineering, *phr*
global, *adj*
hypothesis, *n*
impact, *n*
integrity, *n*
investigation, *n*
issue, *n*
laboratory, *n*
law, *n*
measurements, *n*
misconception, *n*
observation, *n*
ology, *n*
outstanding, *adj*
perception, *n*
peer-to-peer computer system, *phr*
precise, *adj*
project, *n*
reproduce, *v*
research, *n*
sceptical, *adj*
scientific, *adj*
science-based, *adj*
solve real-word problem, *phr*
specimen, *n*
scrutinize, *v*
structure, *n*
technology, *n*
theory, *n*
treatment, *n*
underscore, *v*
unlimited access, *phr*
variables, *n*

Unit V

TECHNOLOGIES

LEAD-IN

Activating background knowledge

A **Look at the pictures taken from unusual angles. Can you identify the objects?**

nicholastudios.info

1

influenster.com

2

sferamagazine.ru

3

blog.avast.com

4

visanutv.com

5

B **Which of the things from the box you can't live without? Why?**

• vacuum cleaner • cooker • MP3 player • game console • electric cooker
• food additive • washing powder • personal computer • fan heater • laptop
• dark glasses • batteries • mobile phone • washing machine • car radio
• waterproof watch • kitchen machine

C **Work in small groups. Discuss the questions.**

- Who are the people in the pictures (A-E)?
- Where do they work?
- What do you know about their inventions/innovations?

A

B

C

D

E

Timothy M. Swager *Vladimir Vavilov* *Todd Rider* *Pavel Strizhak* *Aleksey Pestryakov*

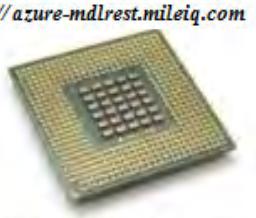
READING

Vocabulary for reading

A **Activating ideas**

- **Look at the pictures and describe them.**
- **What does the title of the text mean?**

NEW DEVICE CAN SMELL BOMBS AND DISEASES



B **Practicing new vocabulary**

Complete the definitions with a word from the list on the right.

artificial intelligence *(n)*
biotechnology *(n)*
cell *(n)*
technology *(n)*
brain *(n)*
giant *(n)*
device *(n)*
security *(n)*
chip *(n)*
drone *(n)*
science fiction *(n)*
explosive *(n)*

1. The application of practical sciences to industry or commerce is …
2. A substance that decomposes rapidly under certain conditions with the production of gases, which expand by the heat of the reaction is …
3. The study of modelling of human mental functions by computer programs is …
4. A tiny wafer of semiconductor material, such as silicon, processed to form a type of integrated circuit or component such as a transistor is …
5. The basic structural and functional unit of living organisms is …
6. A person or thing of exceptional size or reputation is …
7. A pilotless radio-controlled aircraft is ……
8. The soft convoluted mass of nervous tissue within the skull of vertebrates that is the controlling and coordinating centre of the nervous system and the seat of thought, memory and emotion is …

9. The state of being secure is …
10. A machine or tool used for a specific task is …
11. A literary genre that makes imaginative use of scientific knowledge is …
12. The technique of using microorganisms, such as bacteria, to perform chemical processing such as waste recycling or to produce other materials, such as beer or wine, cheese, antibiotics, hormones, vaccines is …

C **Make the verbs into nouns by adding one of the suffixes in the table. Use some verbs more than once. Then choose three of the nouns and make sentences.**

engineer	*secure*	*add*	*recognize*	*inform*	*create*
learn	*copy*	*fund*	*build*	*adapt*	*keep*

-ing	-tion	-ity
engineering	*information*	*creativity*

Real-time reading

1. Listen and check your predictions.
2. Read the text, look at the words in bold in the text and explain them.

NEW DEVICE CAN SMELL BOMBS AND DISEASES

https:// Cameroondailyjournal.com


https://Adis2019.com

A Nigerian engineer and **neuroscientist** has created a revolutionary new computer that has **artificial** intelligence (AI). Dr Oshi Agabi has spent many years trying to make a computer that can smell. He launched his start-up project last year and called it Koniku. He has raised over $1 million in funding.
Dr Agabi said his project is already making profits of $10 million. Technology **giants** like Google and Microsoft are very interested in it. The security industry is also keeping a close watch. Koniku could be put in **drones** and smell bombs and explosives. It could also be used in airport security systems to smell explosives. An additional use could be in hospitals to smell **diseases** in humans. Dr Agabi did not base Koniku on **silicon** chips. Agabi said computers have used silicon for decades, but it is not powerful enough to deal with the maths needed to recognize smells. Instead, he based his device on neurons from the **brain** of a mouse.
Neurons are **cells** in the brain that share information. They use **electricity** and chemical signals to process and send information.
Using neurons in computers is called **biotechnology**. Agabi said biotechnology can make devices that can smell. He said: “Biology is technology. Bio is tech. Our deep learning networks are all copying the brain.” Agabi added: “We want to build a system that has **intelligenc**e. We do not want to build a human brain. It's not science fiction."

3. Answer the questions.

1. What is Dr Oshi Agabi's occupation?
2. When did he launch his start-up project?
3. How much profit has a Nigerian engineer and neuroscientist made?
4. What kind of industry is interested in his device?
5. Where could Dr Agabi's new device be used to smell diseases in humans?
6. The brain neurons of what animals are used by device?
7. What signals do neurons use to send information?
8. What brain didn't he want to build?
9. What is biotechnology?

Applying new skills

A Collocating new vocabulary

1. Match the words on the right to the words on the left to make up collocations.

1) security	**a)** project
2) artificial	**b)** network
3) start-up	**c)** bomb
4) technology	**d)** chip
5) smell	**e)** fiction
6) silicon	**f)** brain
7) science	**g)** signal
8) human	**h)** giant
9) electricity	**i)** intelligence
10) learning	**j)** industry

2. Fill in the correct prepositions.

1) to be very interested …. it
2) to be put … drones and smell bombs
3) to smell diseases … humans
4) to base …. silicon chips
5) to have used silicon … decades
6) to deal …. the maths
7) the brain … a mouse.
8) to be used … airport security systems

B Practicing new vocabulary

1. Match the following synonyms.

1) device	**a)** to start
2) to base	**b)** brain power
3) to launch	**c)** to deal with
4) additional	**d)** illness
5) intelligence	**e)** to make
6) to raise	**f)** gadget
7) process	**g)** extra
8) industry	**h)** strong
9) powerful	**i)** form
10) to create	**j)** business
11) disease	**k)** to get
12) artificial	**l)** synthetic

2. Complete the sentences from the text.

1. A Nigerian engineer and neuroscientist has created a …
2. He has spent many years trying to…
3. Technology giants like Google and Microsoft are …
4. Koniku could be put in drones and …
5. Koniku could also be used in airport security systems to …
6. Dr Agabi based his device on …
7. They use electricity and chemical signals to …
8. Dr Agabi said biotechnology can …

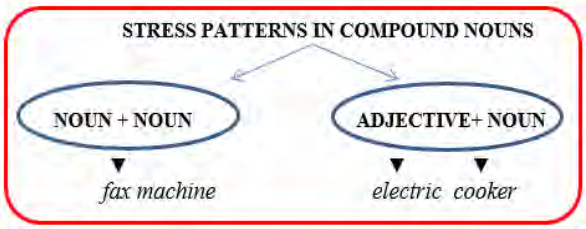
USE OF ENGLISH

1. Match the phrases from the list on the right (a–t) to definitions (1–20).

1) a machine that records messages from people who telephone you when you are not there
2) a system of broadcasting television by using cables under the ground
3) a machine that you get money from using a plastic card, especially in a wall outside a bank or supermarket
4) a system of heating buildings in which heat is produced in one place and taken to the rest of the building by pipes
5) a small plastic card that you use to buy goods or services and pay for them later
6) a short pin with a wide flat top, used for fastening paper to a board
7) a piece of equipment for playing records
8) a telephone that you can carry with you and use anywhere
9) a light in the shape of a tube filled with a gas, used in electric lights and signs
10) a large ship used for carrying oil
11) a very small computer that you can hold in your hand
12) a machine at the side of a road which you put money into when you park your car beside it
13) television programmes that are broadcast using satellites in space
14) a machine that you put coins into to play a game and try to win money
15) a new part for a vehicle or machine, that is used to replace a part that is damaged or broken
16) pictures and sounds that are made for a film or television programme to make it seem as if something exciting or impossible is really happening
17) a system of providing electricity
18) television programmes that are broadcast from the earth, not through space using a satellite
19) a machine that cleans floors by sucking up the dirt from them
20) a machine that washes clothes

a) vacuum cleaner
b) washing machine
c) terrestrial television
d) electricity supply
e) spare part
f) satellite television
g) parking meter
h) slot machine
i) special effect
j) answering machine
k) cable television
l) central heating
m) cash point
n) drawing pin
o) credit card
p) mobile phone
q) gramophone player
r) neon light
s) palm top
t) oil tanker

2. Practicing pronunciation



3. Complete the table using compound nouns from ex.1.

▼	▼ ▼
oil tanker	*mobile phone*

4. Practice saying compound nouns in the box, paying attention to the stress.

1) car radio
2) laptop computer
3) instruction manual
4) phone message
5) digital camera
6) call centre
7) video recorder
8) desktop computer
9) wireless connection
10) microwave oven
11) alarm clock
12) virtual world
13) telephone keypad
14) domestic technology
15) automatic pilot
16) cyber space
17) silicon chip
18) communication device
19) technological era
20) remote control

5. Put the words into the gaps in the sentences.

a) the inventor	**e)** awarded	**i)** ultrasound	**m)** an engineer	**q)** brightness
b) gun-shaped	**f)** infrared	**j)** handy	**n)** natural	
c) commonly	**g)** light	**k)** granted	**o)** a part	
d) button	**h)** knowing	**l)** fellow	**p)** technology	

In May, 2012 it was reported by the Associated Press news agency that **1)** ..... of the television remote control Eugene J. Polley died of **2)** ..... causes at the age of 96. His creation is considered to be one of today's most **3)** ..... used devices. It was known that Mr Polley worked as **4)** ..... for a company called Zenith. Now everybody knows that this company is **5)** ..... of Korea's LG Electronics. It was informed that Eugene J. Polley introduced his **6)** ..... remote control, which was called the Flash-Matic, in 1955.

https:// recombu.com

The remote control was one of his 18 patents. The Flash-Matic used **7)** …….. to turn the TV on and off, adjust the volume and change channels. His invention was followed up five years later by **8)** …… Zenith engineer Robert Adler. It was known Robert Adler used **9)** ……. instead of light. As for today's remote controls, they use **10)** …… light. Eugene Polley worked for Zenith for a long period of time (47 years) and held some top **11)** ……. posts. In 1997 Eugene J. Polley was **12)** …… by the USA's National Academy of Television Arts and Sciences for "Pioneering Development of Wireless Remote Controls for Consumer Television". In fact, this invention is something we all take for **13)** …… nowadays. Some generations of people have grown up not **14)** ……. that before remote controls, people had to leave their places (a sofa or an arm-chair) and push a **15)** …… or turn a dial to change their TV settings.

https:// bloomberg.com

Today people use remotes for everything from adjusting the **16)** ……..of lights to changing songs on our iPods or to opening the garage door from 20–30 metres. Now we know that life would be quite different without this **17)** …… gadget.

6. Complete the sentences with the verbs from the box. Pay attention to the tense of the verbs.

invent	experiment	combine	patent	discover	analyze	conclude	rotate	dissect

https://inhousecommunity.com

1. A young scientist …… with a lot of different materials before finding the right one.
2. They must ……their inventions as quickly as possible.
3. It is known that Alexander Fleming ……. penicillin.
4. Another Scot, James Watt, …….. the steam engine.
5. The zoologist is known …….. the animals.
6. This great problem …… by many scientists from different countries.
7. The young physicists ……. that there was a flaw in their initial hypothesis.
8. The chemist …….. two chemicals.
9. Two chemicals used in the experiment ……. violently with each other.

7. Form the nouns from the verbs in the box (ex. 6).

8. Read the passage on first computer game-platformer in Tomsk and fill in the correct word derived from the words in bold.

Students-polytechnics have created the first in Tomsk computer game using leap motion

One of the developers says that in Tomsk there is a great situation for developers, there are a lot of **(1)** ….. **(talent)** people in various fields. But, unfortunately, in the gaming industry only a few companies involved who are developing their own games. Their game is **(2)** ….. **(state)** about a new game studio that **(3)** ….. **(development)** games not just for mobile devices, but also for consoles and computers. They have big plans for this segment, and they are confident that they will get a place in the gaming industry.

The computer game developed by the polytechnics is called “CyberQuest!”. It is intended more for **(4)** ….. **(entertain)** purposes, but also the authors included in it philosophical implications – may we allow independent decision making to artificial intelligence, what will the development of robotics and **(5)** ….. **(technology)** progress cause. These are the questions, a player will find answers across the game.


https://tpu.ru

The developer says that the story and the opportunity to make **(6)** ….. **(decide)** that change the world around is one of the features of their game. The game is made in sci-fi style – **(7)** ….. **(scientific)** fiction: the distant future, there is **(8)** ….. **(colonize)** of a new planet for people with machines, but the program fails and the robots begin **(9)** ….. **(destruction)** already established ecosystem. The player will have to correct system errors, solve puzzles and destroy enemies, finding reasons for what happened.

The developers will release the game on a big market – in the AppStore and Windows Marketplace. Also, they are working on a version for PC, which is planned **(10)** ….. **(distribution)** through a network Steam, a console version for Xbox.

One of the developers of the game Vitaly Korovkin says that computer games is one of the most complex areas in software development. Games are at the intersection of technology, **(11)** ….. **(innovate)** and art.

He adds that today the gaming industry is growing very rapidly. New devices, mechanics and game genres **(12)** ….. **(appearance)** almost every day. When developing games you need to consider not only technical capabilities, but also psychology of players, their behavior model. The main thing is **(13)** ….. **(immersion)** themselves in the game world. Unlike software development in the gaming **(14)** ….. **(industrial)** there is no right for error, you cannot release a new version with radical changes. If users do not like the game, you should not talk about **(15)** ….. **(continue)** of a series.

The developers believe that they have a good chance to find their niche in the market due to their project was greatly appreciated by Microsoft. Recently the developers have taken with the game the second place at regional round of the Global student technology **(16)** ….. **(compete)** “Imagine Cup 2014”.

(Adapted from https://tpu.ru/en/about/tpu_today/news/view?id=351)

9. Fill in the words from the list below. Use the words only once.

niche radical development version reasons system established independent industry mobile

1) to develop games not just for _____ devices
2) to find their _____ in the market
3) to get a place in the gaming _____
4) to release a new version with _____ changes
5) to allow _____ decision
6) software _____ in the gaming industry

7) to work on a _____ for PC
8) to destroy already _____ ecosystem
9) to find _____ for what happened
10) to correct _____ errors

Exam task **Use of English (Part 1)**

A

1. Read the text and decide which answer (A, B, C or D) best fits each gap. Use only one word in each gap. There is an example at the beginning (0).


https:// flipboard.com

Professor Stephen Hawking, one of the world's most renowned scientists, has warned that robots and machines with **(0)** ***artificial*** intelligence could one day mean the end of us all. Professor Hawking recently **(1)** …… the BBC in an interview that: "The development of full artificial intelligence (AI) could spell the end of the human race". The famous cosmologist made his warning in **(2)** …… to a question about an update to the app he uses to allow him to communicate. Hawking suffers **(3)** …… motor neuron **(4)** …… (also known as ALS) and needs a special voice synthesizer **(5)** ……. . The update will be able to predict words he might want to use based **(6)** …… his previous communication. Hawking said that AI has given many **(7)** …… to many people. He said it is still in its early **(8)** …… of development, but when it becomes more **(9)** …… , it could prove a threat to our existence. He **(10)** …… : "It would take off on its own, and re-design itself at an ever increasing rate. Humans, who are limited by slow **(11)** …… evolution, couldn't compete, and would be superseded". This is not the first time he has issued such a warning. He gave a more chilling warning, saying: "One can imagine such **(12)** …… outsmarting financial markets, out-inventing human researchers, out-manipulating human leaders, and developing weapons we cannot even understand".

0	**A**	artificial	**B**	natural	**C**	desired	**D**	false
1	**A**	talked	**B**	told	**C**	said	**D**	spoke
2	**A**	answer	**B**	reply	**C**	response	**D**	reaction
3	**A**	at	**B**	of	**C**	to	**D**	from
4	**A**	disease	**B**	deviation	**C**	pathology	**D**	abnormality
5	**A**	to say	**B**	to talk	**C**	to chat	**D**	to speak
6	**A**	to	**B**	on	**C**	at	**D**	of
7	**A**	bonus	**B**	profit	**C**	benefits	**D**	advantage
8	**A**	phases	**B**	stages	**C**	periods	**D**	levels
9	**A**	experienced	**B**	advanced	**C**	great	**D**	sophisticated
10	**A**	told	**B**	said	**C**	talked	**D**	spoke
11	**A**	biological	**B**	chemical	**C**	ecological	**D**	technological
12	**A**	technic	**B**	method	**C**	technology	**D**	way

2. Put professor Stephen Hawking's warnings (ex. 2) in a more sensible order.

The development of full artificial intelligence could spell the end of the human race.	
When artificial intelligence becomes more sophisticated, it could prove a threat to our existence.	
Such technology develops weapons we cannot even understand.	
Robots and machines with artificial intelligence could one day mean the end of us all.	**1**
Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded.	

Exam task

B **Use of English (Part 2)**

For questions 1–10, read the text below and think of the word which best fits each gap. Use only one word in each gap. There is an example at the beginning (0).

Tip Strip

- Some of the missing words are parts of set phrases.
- **Pay close attention to** the words before and after each gap.
- **Remember** that all four options are similar in meaning but only one should be used in this context.
- Even if you are not completely sure about an answer, **do not leave** anything unanswered - rather than leave a gap, make an educated guess.

Example:

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
to														

Scientists at the Canadian company Carbon Engineering have said they are close **(0)** …… making carbon capture work. Carbon capture is the process of capturing waste **(1)** …. dioxide (CO_2) from places like power plants and then storing it so it does not harm the environment.

https://dnvgl.com

https://carbonbrief.org

Carbon Engineering say **(2)** … scientists are close to capturing CO2 **(3)** …… the atmosphere and turning it into carbon-neutral fuel. This **(4)** …… be a big step forward in the fight against **(5)** ……. warming. The scientists also said they have greatly reduced the cost of carbon **(6)** …..…, to as low **(7)** …… $94 per ton of CO2 captured. Many scientists believed carbon capture would cost about $1,000 **(8)** …….. ton captured.

The technology works by sucking air **(9)** …… special industrial towers. The CO_2 is mixed **(10)** …… an alkaline liquid and frozen. It is then heated and combined with hydrogen. This produces liquid fuels **(11)** ……. gasoline and jet fuel.

The founder of Carbon Engineering, Professor David Keith, was optimistic **(12)** …… the future of this process. He believes his company could help to combat climate change. He said: **(13)** "……. 100 years of practical engineering and cost analysis, we can confidently say that while air capture is not some magical cheap solution, it is **(14)** …….. viable and buildable technology for producing carbon-neutral fuels in the immediate future, and for removing carbon in the long run".

LISTENING

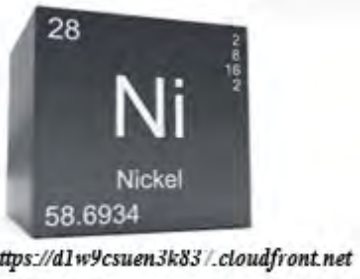
A Activating ideas

1. Answer the questions.

- Do you know such substances as: carbon dioxide, nickel, oxygen, hydrogen?
- Do you know any materials?
- Can you explain the difference between substances and materials?
- Is knowledge about substances and materials necessary in your future profession?


https://en.wikipedia.org

https://store.vaisala.com



https://d1w9csuen3k83.cloudfront.net

B Practicing new vocabulary

1. Match the words and word combinations with the definitions

1) Dandelion	**a)** the lightest material
2) Microlattice	**b)** the material which consists of air
3) Styrofoam	**c)** strong and corrosion-resistant metallic element
4) Aerogels	**d)** a flower
5) Metal nickel	**e)** preventing the passage of heat
6) Thermal insulation	**f)** the material which is used for insulating packaging

Real-time listening

You will hear the text about invention of the lightest material. For questions 1–8, choose the best answer (A, B, C).

1. What is the world's lightest material called?

A an ultralight aerogel
B an ultralight metallic microlattice
C a carbon foam

2. Who created the material?

A several American Laboratories
B the California Institute of Technology and HRL Laboratories
C researchers from the University of California

3. What is the percentage of air contained in the material?

A 99 %
B 100 %
C 89 %

4. Why is the material so light?

A A wall thickness is 1,000 times thinner than a human hair.
B It has been made of the metal nickel.
C It consists of hollow tubes.

5. Could UMM be made out of other materials?

A It could be made out of the metal nickel.
B It is unknown.
C It could be made out of other materials.

6. Are there any uses for UMM?

A to create new computer
B dozens of uses
C researchers don't know how to use UMM

7. Does the material rebound back to its original form?

A Yes, it does.
B No, it doesn't.
C Scientists don't know yet.

8. Could UMM be used in sound dampening and thermal insulation?

A Scientists are investigating the uses.
B It could be used.
C There is no information.

Lightest materials

Scientists have invented the world's lightest material. It is so light that it can rest on top of a dandelion. Researchers from the University of California, the California Institute of Technology, and HRL Laboratories created the material they call "ultralight metallic microlattice" (UMM).

It is 100 times lighter than styrofoam – the material commonly used in packaging goods – and 10,000 times lighter than ultralight aerogels and carbon foams (also used for packing).

Lead researcher Tobias Shandler of HRL explained why the material is so light. He said: "The trick is to fabricate a lattice of interconnected hollow tubes with a wall thickness 1,000 times thinner than a human hair". It is so hollow that it is 99 per cent air.

The new material has been made largely of the metal nickel, but Bill Carter, a manager at HRL, said it could be made out of other materials. He said UMM is so light that: "It takes more than 10 seconds for the lightest material we've made to fall if you drop it from shoulder height". The developers believe there are dozens of uses for UMM and that it will be in many everyday objects within the next decade. Computer experts say UMM will help create lighter and faster computers. Another use is impact protection – researchers say that when it is squashed to half its height, the material almost rebounds back to its original form. Other uses include sound dampening and thermal insulation.

B Spelling

1. Write the correct vowels in each word and pronounce it.

1) mat-rial	**3)** met - llic	**5)** m - crolattice	**7)** ultr - light	**9)** ins - lation
2) st-rofoam	**4)** a - rogel	**6)** carb - n	**8)** reb - - nd	**10)** imp - ct

2. Write the correct consonants in each word and pronounce it.

1) ni - - el	**3)** - - ermal	**5)** li - - test	**7.** pa - - aging	**9)** aero - el
2) prote - - ion	**4)** s - uash	**6)** microlatti - e	**8.** do - ens	**10)** e - pert

C Listening (Part 2)

Exam task

1. Listen about Cloud services and fill in the gaps.

https://yandex.ru

https://yandex.ru

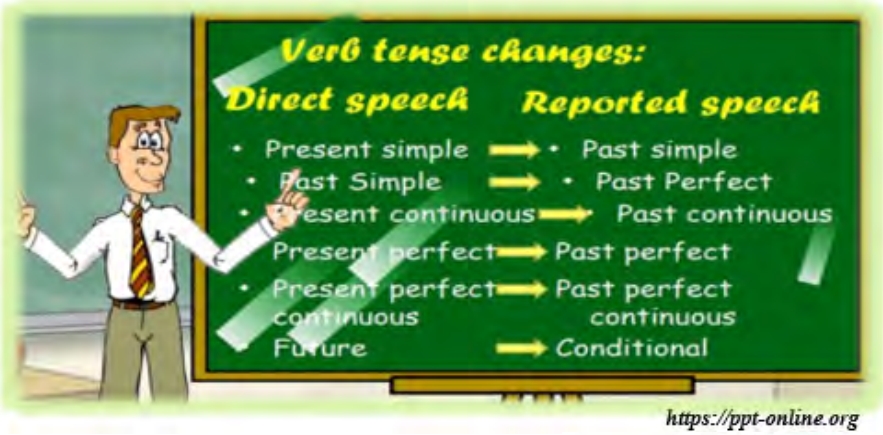
Cloud services

International Business Machines (IBM) plans to invest $. **(0)** ***1.2*** billion to expand its cloud services. The computing and technology **(1)** ….. wants to bolster its presence in the next generation of cloud **(2)** ….. and other services. The project includes building 15 state-of-the-art **(3)** …. centres across the world **(4)** ….. is having to adapt quickly to move from a predominantly hardware-based company into one **(5)** ….. online services. It has experienced **(6)** ….. revenues for the past six **(7)** …… and urgently needs to reverse this trend.

An IBM spokesman told reporters: “This is fundamental because this allows us global **(8)** …..”. He added: "We are continuing to invest in where we think the **(9)** …… areas are going to be." Wikipedia says: “Cloud **(10)** ….. is a phrase used to describe a **(11)** ….. of computing concepts that involves a large number of computers **(12)** ….. through a real-time communication network **(13)** ….. the Internet.”

In reality, "the cloud" is a metaphor for the Internet. **(14)** ….. marketing has created the concept of the cloud to create more **(15)** ….. services. Users of cloud services keep their data and **(16)** ….. on a **(17)** …… (a huge computer) of the company offering the cloud service. There is no need to **(18)** ….. anything or **(19)** ……. information on a home or work computer. Wikipedia outlines several deterrents to the **(20)** ….. adoption of cloud computing, including security, **(21)** ….. and issues surrounding privacy.

GRAMMAR



https://ppt-online.org

TENSE CHANGE

Direct Speech	Reported Speech
will	would
can	could
must/have to	must or had to
may/might	might
should	should
ought to	ought to

PLACE & TIME

Direct Speech	Reported Speech
today	that day
now	then/at the moment
yesterday	the day before
… days ago	… days before
last week	the week before
next year	the following year
tomorrow	the next day the following day
here	there
this	that
these	those
ago	previously/before/earlier
tonight	that night

1. Rewrite the sentences in reported speech.

1. *He said: "They are working on a version for PC".*
   He said that they were working on a version for PC.
2. The developers said: "We have a good chance to find their niche in the market".
3. An IBM spokesman told reporters: "This is fundamental because this allows us global coverage".
4. The scientist said: "It is so hollow that it is 99 per cent air".
5. Bill Carter said: "It could be made out of other materials".
6. He said: "UMM is the world's lightest material".
7. Computer experts said: "UMM will help create lighter and faster computers.".

Say can be used both in direct and reported speech. It is used with or without a personal object. When it is used with a personal object, it is followed by the preposition ***to:*** **e.g.** *said to her*

Say

Tell can be used both in direct and reported speech. It is followed by a personal object: **e.g.** *tell him*

Tell

2. Fill in the gaps with *say* or *tell* in the correct form.

1. He *said* to us: “Biology is technology. Bio is tech”.
2. Dr Agabi ……. to him: “Our deep learning networks are all copying the brain”.
3. The scientist …… us: “They use electricity and chemical signals to process and send information”.
4. Dr Agabi …. to the reporter: “Biotechnology can make devices that can smell”.
5. He …….: “We want to build a … system that has intelligence. We do not want to build a human brain”.

3. Turn the questions from direct speech into reported speech.

1. We asked him: “Is the computer powerful enough to deal with the maths needed to recognize smells?”
   We asked him if the computer was powerful enough to deal with the maths needed to recognize smells?
2. I asked Dr Agabi: “Is your project making profits of $10 million?”
3. They asked the investigator: “Can biotechnology make devices that can smell?
4. He asked the scientist: “Will the player have to correct system errors and solve puzzles?”
5. He asked me: “Do you know anything about software development?”
6. The journalists asked him: “Are you continuing to invest in the growth areas?”
7. We asked Vitaly Korovkin: “What is one of the most complex areas in software development?”

4. Correct mistakes.

1. He said that Dr Agabi does not base Koniku on silicon chips.
2. The scientist tells to us that a Nigerian engineer and neuroscientist has created a revolutionary new computer.
3. He said that Google and Microsoft are very interested in this project 2 years before.
4. They asked him did he take part in the conference?
5. We asked the researcher why is the material so light?

There are some occasions when there is no change in the verb forms of the reported speech:

when the tense of the main reporting verb is in the present tense,
e.g. *He says he is arriving at Heathrow*.
when the statement is a general truth or statement of fact,
e.g. *The teacher said (that) water boils at 100 C°.*
If modals *could, should, ought to, might* or *used to* are being used,
e.g. “I used to live in Argentina.” = He told us he used to live in Argentina.

5. Choose the correct item.

1. The graduates said that they ……. games for consoles and computers in future.
   A would develop **B** will develop **C** developed
2. He adds that today the gaming industry ……. very rapidly
   A will grow **B** is growing **C** grows
3. They told us that a player usually ……answers across the game.
   A will find **B** would find **C** found
4. He said that the development of full artificial intelligence ….. the end of the human race.
   A can spell **B** would spell **C** could spell
5. The investigator told us how many fictions …….. ordinary parts of our life.
   A have become **B** had become **C** will have become
6. The scientists say that another use of the new material ….. impact protection.
   A is **B** was **C** would be

6. Read the text. Find the reported questions in it. And answer the following questions: a) What is the difference in the word order of reported and direct questions? b) In what type of questions do you use *if* and *whether?*


https://newspunch.com

Everybody knows that the World Wide Web is 30 years old now. Sir Tim Berners-Lee, its inventor, told the interviewer about his creation on its 30th anniversary. He said that he was worried about how people are using the Internet and its two billion websites today. He also added that he was concerned about the future of the Web. He told that he had written a letter in which he confessed that he knew many people who were not sure about whether the Web was "a force for good". But he considered it could be a force for good and it could empower millions and millions of people. He told the interviewer that in his opinion governments and companies must work together to build a better Internet. Sir Tim Berners-Lee tried to explain it saying "If we give up on building a better Web now, then the Web will not have failed us. We will have failed the Web."

The interviewer asked him about main concerns, and Sir Tim said he had three main concerns about the World Wide Web. He told that the first was criminal behavior, like state-sponsored hacking and online harassment. He added that he can describe it as a "mirror of humanity" where "you will see good and bad". He said that governments must pass laws to keep people safe. As for a second thing that worried him, was how social media was used to spread misinformation. He told he was shocked that the past few years had seen a rise in fake news. In particular, how people were tricked during the 2016 US presidential election and the UK Brexit vote. Berners-Lee was also worried about people's privacy and personal information. He stressed the importance of fighting for a better and safer Web and keeping it free for everyone to use.

https://newspunch.com

7. The inventor of the World Wide Web Tim Berners-Lee was interviewed by the journalist about his creation on its 30th anniversary. Using ex. 6, write what the journalist asked him about (use direct speech). There is an example (0).

1) ……
2) ……
3) ……
4) ……
5) ……
6) ……

8. Use reported speech instead of direct speech. There are examples (A, B, C, D).

A)

He said: "I think it is a nice time to seed the field of artificial intelligence.
I think we can accelerate two decades of progress into three years".
He said (that) he thought it was a nice time to seed the field of artificial intelligence.
And he added (that) he thought they could accelerate two decades of progress into three years.

He said:

1) "Tissue engineering has struggled with this for a generation".
2) "I hope this method will help millions and millions of people waiting for an organ transplant".
3) "This technological breakthrough was so important five years ago".
4) "People tried to develop the new modern technology to solve this problem".
5) "I think the scientists from different countries are interested in this technology".
6) "They suppose these tests could let people see different things in the dark."
7) "We believe this technology will not require people to wear night-vision goggles".
8) "We are not going to connect many people who are currently connected".
9) "We think that using a star or the Sun's vibrations allows us to see inside of it".
10) "I was very proud of the great achievement made by our country in modernizing the national defense".

B)

She asked: "Can they print tissues that look and breathe more like the healthy tissues in our bodies?"
She asked if they could print tissues that looked and breathed more like the healthy tissues in our bodies.

She asked

1) "Do you believe the new breakthrough will allow medical practices to change in the nearest future?"
2) "Have they had a good microscope to zoom inside the Sun yet?"
3) "Will the aircraft carrier help to strengthen China's ability to protect itself ?"
4) "Did the students addicted to the Internet have a lot of problems with day-to-day activities?"
5) "Will the robots replace humans in future?"
6) "Can the air in our homes be more polluted than the air outside?"
7) "Does a 35-inch television screen offer quality you can't get from a smartphone?"
8) "Did their safest helmet look so fashionable that people will be happy to wear it?"
9) "Will his invention make him a millionaire?"
10) "Do they want to find out how to make the safest helmet?"

C)

He asked: "When did the inventors start research and development on the Hövding?"
He asked when the inventors had started research and development on the Hövding.

He asked

1) "What can your eyes actually see if they are sensitive enough?"
2) "Why does he think the air inside can be far worse?"
3) "Who has invented a totally new kind of bicycle helmet?"
4) "What changes in biotechnology will we see in 30 years?"
5) "Why do older people struggle with new technology?"
6) "When did they find out how to make the safest helmet?"
7) "Who invented a lift?"
8) "How was social media used to spread misinformation?"
9) "Why do they think that they will get a place in the gaming industry?"
10) "Why is Silicon Valley the greatest place for technology companies?"

D)

She asked them: "Use the autonomous system that can independently select and attack targets".
She asked them to use the autonomous system that could independently select and attack targets.
He asked us: "Don't focus on design."
He asked us not to focus on design.

He asked

1)"Introduce your new device, please."
2)"Could you explain why many people are spending more time online."
3)"Find out how big the problem of Internet addiction is."
4)"Describe the technology you use."
5)"Arrange carbon atoms another way and you get graphite."
6)"Don't try to find out how to make the most modern helmet."
7)"Don't think that it is a very pretty innovation."
8)"Don't call your new invention "Mushroom."
9)"Don't buy the Hövding helmet online in Asia."
10)"Don't save it in a new file."

SPEAKING

Exam task

Tips

- **Speak continuously.**
- **Give reasons.**

Talking about general topics (Part 1)
In this section you will speak on your own for about 3 minutes.
Listen to what your teacher asks. He/she will ask one of the main questions below and use the follow-up questions if necessary.

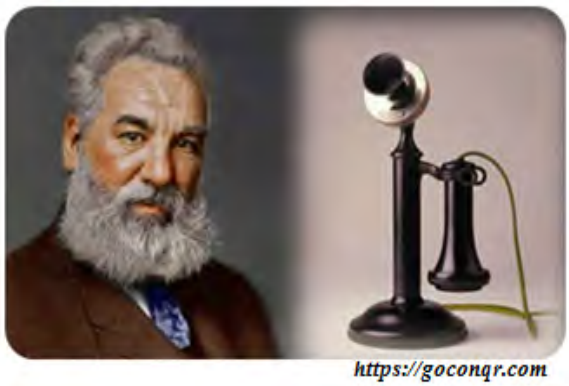
Main prompt 1:	*Have scientific and technological developments changed our life?*
Follow-up prompts:	• Do you think science and technology are closely related? • Do many modern technologies depend on science and the application of scientific principles? • Can you say that you live in an age of science and technology? • How do modern technologies make people's life easier?
Main prompt 2:	*How do modern technologies affect our lives?*
Follow-up prompts:	• Do modern technologies turn you into "couch potatoes"? • Do you think books will be replaced by the net? • How have modern technologies influenced your leisure time? • Do you have any reasons to hate these technologies?
Main prompt 3:	*Has the advance of technology brought only benefits?*
Follow-up prompts:	• Do you think technology allows you to become lazier? • Are you afraid of being replaced by robots at work? • Can you live without solar power? • Do the body scans and lasers help doctors to diagnose accurately?

Monologue (Part 2)

A **Talk for up to 4 minutes. Compare the pictures and say a few words about the difference between inventions and innovations.**

1. Inventions and innovations

A



https://goconqr.com

B

https://ivanovo-news.net

Your teacher will now put this secondary prompt.

- Can you live without it? Is this thing really making your life better?

B **Talk for up to 4 minutes. Compare and contrast the pictures and say what changes this invention has brought to engineers.**

2. Changes brought to engineers

A

https:// indiedb.com

B

https:// 1shop.lv

Your teacher will now put this secondary prompt.

- Why are laptops considered to become very popular today?

Discussing in pairs (Part 3)

A **Discuss which of these technologies will continue to dominate at the end of the 21-st century?**

A

https://sharaevans.com

B

https:// dronomania.ru

C

https:// uyrga.bezformata.com

https:// news.vtomske.ru

https:// tomsk.ru

WRITING

A WHITE PAPER

A Activating ideas

1. You will hear an expert trying to answer the question what a white paper is. For questions 1–10, complete the sentences.

WHAT IS A WHITE PAPER?

https://occeye.com

You were wondering what in the heck is [ ] 1

I researched everything and I had [ ] 2 of what a white paper is.

The author of the white paper [ ] 3 himself.

I went scouring the web every day looking for examples of [ ] 4

It is considered the first white paper was [ ] 5

It was addressing the problem of [ ] 6 coming to Palestine and the Arabs.

It is basically long [ ] 7 and it is a report.

They believed it was going to be [ ] 8 for the problem.

It's really going to help us [ ] 9

Finally, Winston Churchill put [ ] 10 to it.

2. Answer the questions.

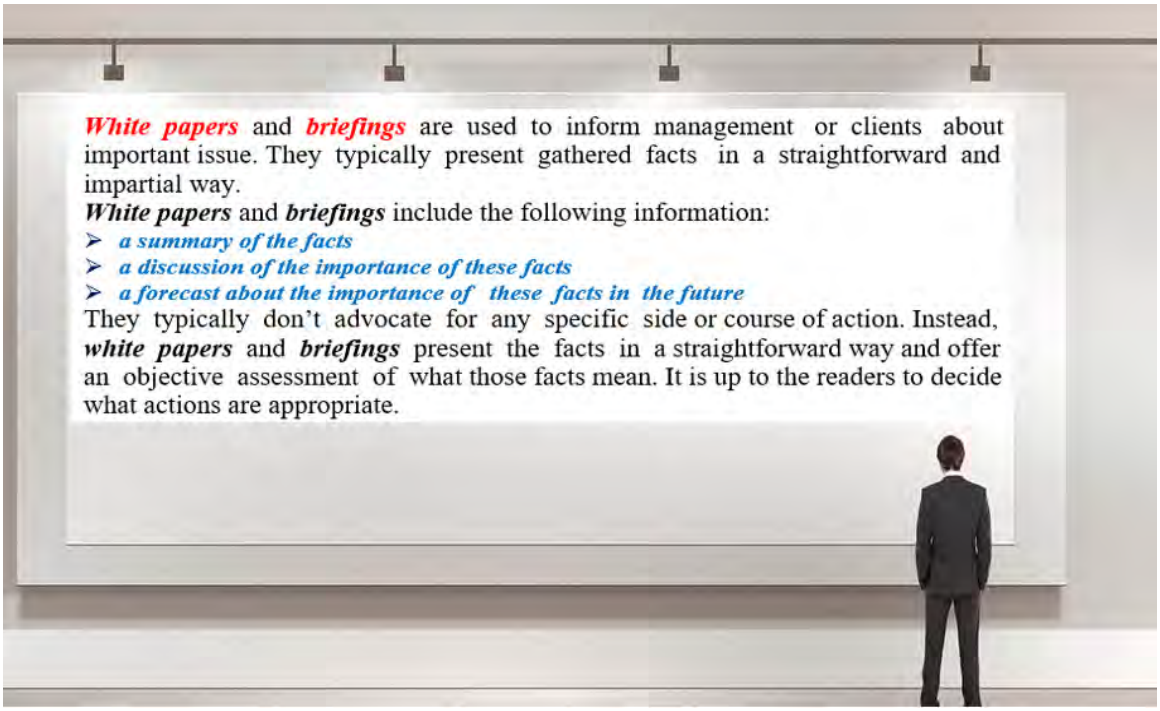
1. Do you have an idea of what a white paper is?
2. What does the term "*white paper*" mean?
3. What is a famous white paper example? What was it addressed to?
4. How long should it be?
5. How does a white paper present information? Does it allow readers to make decisions?

B Building knowledge

http://news.tpu.ru

https://gettyimages.com

White papers vs briefings?
Both are similar in terms of structure but ***briefings*** are presented verbally, and w***hite papers*** are provided in print.



1. Read the text and answer the questions given below.


https:// parmanuacademy.com

Tom Weber, an electrical engineer, works in Washington, D.C., as a technical advisor for two government agencies within the U.S. Department of Defense, says that in Washington, D.C., engineers and scientists often act as advisors to the executive and legislative branches and play an important role in briefing policymakers and congressional staff on technical issues. Because time for meetings is limited, these briefings are usually accompanied by a short technical document, or *white paper*, that explains the issue in question.

Although meant to be an objective technical appraisal, white papers will often influence a policy decision or promote a specific program or research agenda. These papers are short, usually four pages or fewer, and cover the technical goals and benefits of a new policy or program. For example, a white paper on power system reliability, with a technical explanation of recent problems and proposed solutions, might be given to administrators at the Department of Energy considering new regulatory policies for the electric power industry. A white paper on the benefits of nanotechnology might be given to congressional staff working on next year's budget priorities for federally funded research and development programs.

In a white paper, the writer must clearly explain, to a mostly nontechnical audience, the relevant technical issues, and come to a logical conclusion as to the best decision and path forward within current political realities. All this must be accomplished in just a few pages. With the incredible information flow in our nation's capital, most government decision makers will have only a few minutes to review any one document.

(Adapted from Technical Communication Today by R. Johnson-Sheehan)

- Who are writers and readers of white papers?
- What are the contents and language of white papers?
- Why are white papers written?

C Learning new skills

A white paper is one of the most common types of activity reports. And activity reports share one goal – to objectively inform readers about:

1) what happened
2) what is happening
3) what will happen in the near future


https://imnr.ro

Basic Pattern for an Activity Report

Writing the introduction

Readers of your white paper are mostly interested in the facts. So, the introduction should give them only a brief framework for understanding those facts. To provide this framework, you should briefly:

- define your subject
- state your purpose
- state your main point

Writing the main body

In the main body you should include some or all of the following:

- **Summary of activities**

(*Tell your readers briefly what you did and highlight any advances or setbacks in the report.*)

- **Results of activities**

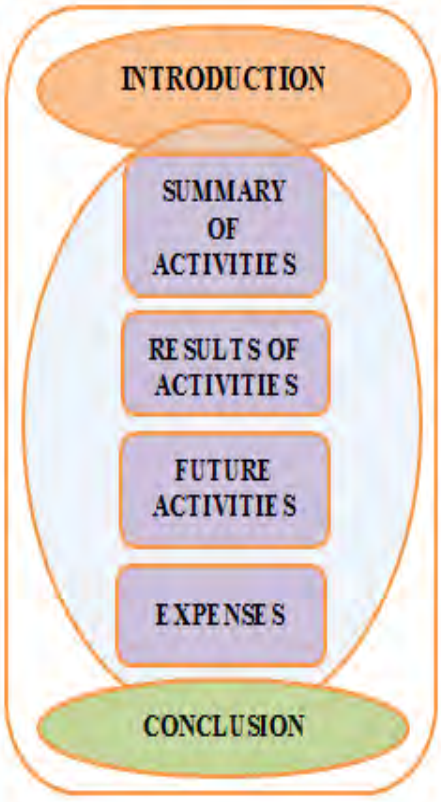
(*In order of importance, list from two to five most significant results or outcomes of your project.*)

- **Future activities**

(*Tell readers what you will be doing during the next work period.*)

- **Expenses**

(*If asked, you should state the costs incurred over the previous week or month.*)



Writing the conclusion

The conclusion should be as brief as possible. You should

- restate your main point
- restate your purpose
- make any recommendations
- look to the future

The conclusion should be made in a maximum of two to four sentences. Most readers will not read the conclusion closely, if they read it at all. So, the conclusion should not bring up any new information that they might miss.

https://news.tpu.ru

1. Read the model of the white paper and check if all the information required by the instruction has been included.

MERCURY WHITE PAPER

The Utility Hazardous Air Pollutants Regulatory Determination

To reduce the risk mercury poses to people's health, EPA Administrator Carol M. Browner announced that the Environmental Protection Agency will regulate emissions of mercury and other air toxics from coal- and oil-fired electric utility steam generating units (power plants). EPA plans to propose a regulation to control air toxics emissions, including mercury from coal- and oil-fired power plants by the end of 2008. This regulation will be one more important piece of an Agency-wide effort to protect people and wildlife from exposure to the toxic pollutant mercury.

Subject and main point are identified up front.

Sources and Fate of Mercury in the Environment

Like all elements, the same amount of mercury has existed on the planet since the Earth was formed. However, the amount of mercury mobilized and released into the environment has increased since the beginning of the industrial age. Mercury moves through the environment as a result of both natural and human activities. The human activities that are most responsible for causing mercury to enter the environment are burning materials (such as batteries), fuels (such as coal) that contain mercury, and certain industrial processes. These activities produce air pollution containing mercury.

Background on the subject is offered.

Based on EPA's National Toxics Inventory, the highest emitters of mercury to the air include coal-burning power plants, municipal waste combustors, medical waste incinerators and hazardous waste combustors. Mercury emissions from these and other sources are transported through the air and eventually deposit to water and land, where humans and wildlife are exposed.

Facts are presented objectively

Most of mercury entering the environment is the result of air emissions; however, mercury also can directly contaminate land and water as a result of the release of industrial wastewater or from the disposal of waste-containing batteries and other sources of mercury. Once mercury enters waters, either directly or through air deposition, it can bioaccumulate in fish and animal tissue in its most toxic form, methylmercury. Bioaccumulation means that the concentration of mercury in predators at the top of the food web (for example, predatory fish and fish-eating birds and mammals) can be thousands or even millions of times greater than the concentrations of mercury found in the water.

Shows that more information is available elsewhere.

Mercury depositions can occur very close to the source or, depending on the chemical form in which it is emitted, it can be transported great distances – even crossing international borders. The highest deposition rates in the U.S. occur in the southern Great Lakes, the Ohio Valley, the Northeast and scattered areas in the Southeast. Approximately 60 % of the mercury deposition that occurs in the U.S. comes from domestic human-made sources of pollution. The remaining 40 % comes from human-made sources located outside of the U.S., re-emitted mercury from historic U.S. sources, and natural sources. While the U.S. contributes only about 3 % of the global atmospheric pool of mercury, it still contributes more than it receives. Approximately two-thirds of U.S. emissions are transported outside our borders.

More information on the sources, fate, and risks of mercury in the environment can be found in EPA's 1997 Mercury Report to Congress and 1998 Utility Air Toxics Report to Congress.

(Adapted from Technical Communication Today by R. Johnson-Sheehan)

2. Find a white paper using the Internet. Analyze and discuss it with your partner.

AN INCIDENT REPORT

An incident report describes an event, usually an accident or irregular occurrence. It identifies what corrective actions have been taken. This kind of activity report provides the following information:

- a summary of what happened;
- a discussion why it happened;
- a description of how the situation was handled;
- a description of how the problem will be avoided in the future.

Note:

You should concentrate on the facts.
You should describe what happened as clearly and honestly as possible.
You can make excuses and apologize later.

3. Read the model of the incident report in which management is notified of an accident in the lab and answer the questions:

1. Who might read or use this report?
2. What information does the incident report include?
3. What is the purpose of the report?
4. Where will this report be used?

Red Hills Health Sciences Center

Testing and Research Division
202 Hospital Drive, Suite B93
Red Hills, CA 93675
April 12, 2014
To: John Brown, Safety Assurance Officer
From: Bill Wilson, Testing Laboratory Supervisor
Subject: Incident Report: Fire in Laboratory

I am reporting a fire in Testing Laboratory 6, which occurred yesterday, April 11, 2014, at 2:27 p.m.

The fire began when a sample was being warmed with a Bunsen burner. A lab notebook was too close to the burner, and it caught fire. One of our lab assistant, Ann Smith, grabbed the notebook and threw it into a medical waste container. The contents of the waste container then lit on fire, filling the room with black smoke. Another lab assistant, Tom Norman, grabbed the fire extinguisher and emptied its contents into the waste container, putting out the fire. The overhead sprinklers went off, dousing the entire room.

Even though everyone seemed fine, we made up our mind to send all laboratory personnel down to the emergency room for an examination. While we were in the waiting room, Ann Smith developed a cough and her eyes became red. She was held for observation and released that evening when her condition was stable. As for the rest of us, we were looked over by the emergency room doctors, and they suggested that we stay out of the lab until it was thoroughly cleaned.

I asked the hospital's HazMat team to clean up the mess that resulted from fire. We had been working with samples of *Borrelia burgdorferi* bacteria, which causes Lyme disease. I wasn't sure if the waste container held any of our discarded samples. Even if samples were in the waste container, it would be unlikely that the bacteria survived the fire, but I asked the HazMat team to do a Type 2 cleaning anyway.

The HazMat team will be charging us $3,204 for the cleaning. The water damage to the lab was $4,342. We will pay these costs out of our operating budget for now. We will file a claim with the Center's insurance company.

In the future, we will be more careful about fire hazards in the laboratory. We are currently developing policies to avoid these kinds of situations in the future. We will also develop an action and evacuation plan to handle these sorts of situations if they occur again.

Thank you for your attention. If you have any questions or would like to talk further about this incident, please call me at 3-8142.

Subject and main point are identified up front.

What happened is described objectively.

What was done about it is noted.

The costs are specified.

What will happen in the future is described.

Facts are presented objectively.

(Adapted from Technical Communication Today by R. Johnson-Sheehan)

4. Write an incident report to explain a recent accident in your laboratory.

PROJECT WORK

https://yandex.ru¶

IMPORTANT TECHNOLOGIES IN THE WORLD

I. PREPARATION FOR PROJECT WORK

A. Where can these technologies be used?

a) Manufacturing technology can be used ….....
b) Nanotechnology can be used …….
c) Artificial intelligence can be used …….
d) Biotechnology can be used ……

Example: *Manufacturing technology can be used in plants and factories.*

https://yandex.ru

B. Why do scientists use new technologies?

These words and word combinations will help you to answer:

1) engineering
2) animal farming
3) medicine
4) artificial human organs
5) pharmaceutical industry
6) plant
7) factory
8) food industry
9) construction industry
10) agriculture
11) create
12) operate
13) produce

Example: *Biotechnologies can be used in medicine to create artificial human organs.*
Also, we can use biotechnologies in pharmaceutical industry to produce new drugs.

a) Before you start, explain the meanings of these verbs:

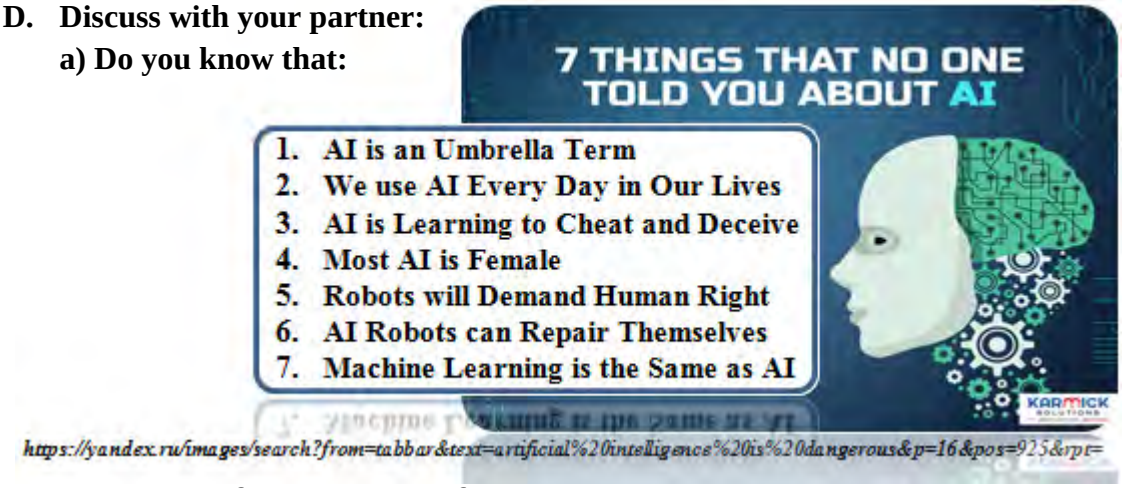
to create	to produce	to do
to operate	to make	to apply

b) Which of these verbs are usually confused?

C. Read what some famous people say about AI. Do you agree with them?

D. Discuss with your partner:

a) Do you know that:



b) Are these facts dangerous for humanity? Why?
How could AI destroy humanity or it is impossible?
Is AI modern magic or dangerous future?

E. a) If you agree with the statement, explain how you plan to use AI in your future work. If you do not agree, explain why.

https://yandex.ru

b) Who should control a technology?

https: //yandex.ru

F. Work in a small group.

The most important technology in the world (your opinion).

a) Search the Internet and find the information about it.

b) Make a presentation about the technology according to the plan:

1. Tell about the technology.
2. Give your arguments why this technology is the most important.
3. What opportunity does it give to humanity?
4. How could scientists develop the technology?
5. Could you use this technology in your future profession?

The most dangerous technology in the world (your opinion).

a) Search the Internet and find the information about it.

b) Make a presentation about the technology according to the plan:

1. Tell about the technology.
2. Why do some people insist on using and developing the technology? What are their arguments?
3. Give your arguments why this technology is the most dangerous.
4. Could we control this technology or it should be forbidden?
5. This technology solves the definite problems, suggest the alternative solution.

WORD LIST

additive, *n*
aerogel, *n*
artificial, *adj*
biotechnology, *n*
brain, *n*
carbon dioxide, *n*
cell, *n*
chemical, *adj*
chip, *n*
dandelion, *n*
developer, *n*
destroy, *v*
distribution, *n*
drone, *n*
electricity, *n*
evolution, *n*
existence, *n*
explosive, *n*
fabricate, *v*
fundamental, *adj*
generation, *n*
good, *n*
hydrogen, *n*
industry, *n*
innovation, *n*
insulation, *n*
interconnect, *v*
invention, *n*
laptop, *n*
lattice, *n*
machine, *n*
nanotechnology, *n*
neuron, *n*
neuroscientist, *n*
nickel, *n*
oxygen, *n*
powerful, *adj*
protect, *v*
protection, *n*
reason, *n*
rebound, *v*
silicon, *n*
squash, *v*
substance, *n*
synthetic, *adj*
technology, *n)*
thermal, *adj*
threat, *n*
trick, *n*
rebound, *v*

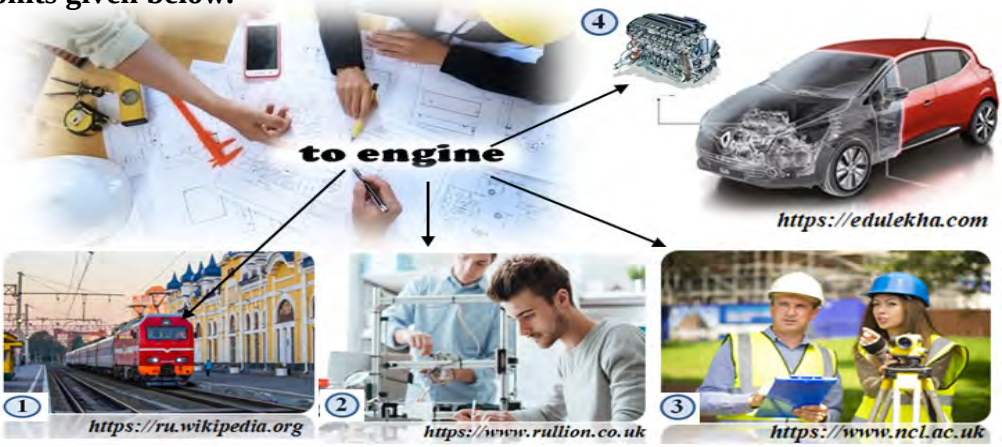
Unit VI

ENGINEERING

LEAD-IN

Activating background knowledge

A **Think of as many words derived from the verb** *to engine* **as possible. Use the promts given below.**



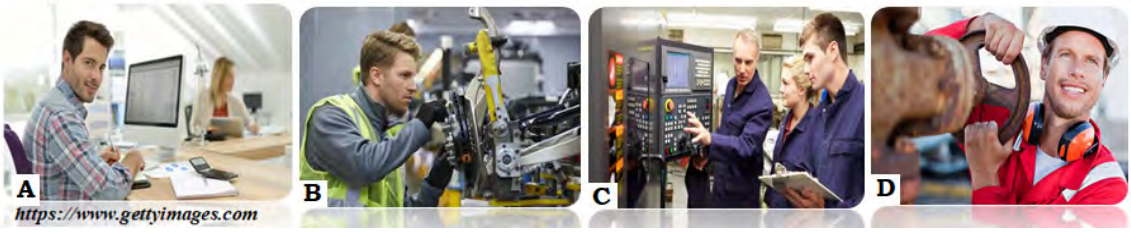
B **Watch the video and answer the questions.**

- ***https://www.youtube.com/watch?v=I11y_FLlEp8***

1. What is engineering about?
2. How are engineers shaping the future?
3. What is the origin of the word *"engineer"?*
4. How has the number of engineering branches changed and why?
5. How do engineers address society's needs and problems?
6. What are the typical work environments of an engineer?
7. Is educational background enough to be an engineer?
8. Why does engineering dominate the best college degrees lists?
9. What are the drawbacks of engineering?
10. Why does studying never stop for an engineer?
11. What sort of people are sure to enjoy being an engineer?

C **Pictures A–D represent different branches of engineering. Match each picture to sentences 1–4.**

1. Electrical engineering *is about* generating and distributing electricity.
2. Petroleum engineering *is concerned with* applying scientific principles to detect, drill and extract crude oil and natural gas.
3. Information technology *deals with* the use of computers for collecting, storing, and sending information.
4. Mechanical engineering *deals with* anything that moves, from various parts of machines to the human body.



- **Work in groups. Make a list of as many other branches of engineering as you can. Try to explain them in English.**

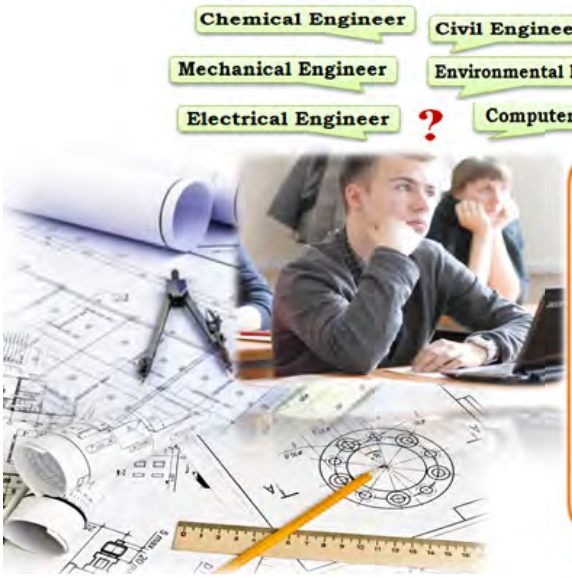
D **Match the names of TPU engineering schools with their logos (a–g). Justify your choice.**

1. School of Earth Sciences & Engineering
2. School of Energy & Power Engineering
3. School of Nuclear Science & Engineering
4. School of Computer Science & Robotics
5. School of Core Engineering Education
6. Research School of High-Energy Physics
7. Research School of Chemistry & Applied Biomedical Sciences

- **What is your branch of engineering?**
- **Which engineering school do you study at?**

E **Do the online quiz on** *«What kind of engineer should you be?»***. Share your results with your groupmates using the following expressions while speaking.**

- ***http://spacefem.com/quizzes/engineer/.***



I could make a better X than a Y.
I could be a good … engineer since ..
I have all necessary qualities to be ..
A career of a X engineer suits my abilities perfectly.
I am best / ideally / perfectly suited for…
I am better prepared to be a X engineer than a Y engineer.
I am less likely to be a X engineer.
I am more likely to work as a X engineer.

READING

Vocabulary for reading

A **Activating ideas**

Engineers of Flight

1. **You are going to read an article about four pioneers of early flying machines. Look at the pictures. Which machine would you most/least like to try out?**

2. **Read the texts on pages 72–73 quickly and match them to the pictures given above. Are your ideas still the same?**

B **Practicing new vocabulary**

1. **Complete the definitions with a word or phrase from the list on the right.**

altitude *(n)*
attach *(v)*
cover *(v)*
device *(n)*
descend *(v)*
emulate *(v)*
escape *(v)*
framework *(n)*
fit *(v)*
fuel *(n)*
obtain *(v)*
launch *(n)*
lever *(n)*
sacrifice *(v)*
steer *(v)*
trial *(n)*
wing *(n)*

1) a piece of equipment used for a particular purpose
2) to control the direction of a vehicle
3) to join or fix one thing to another
4) a structure that forms a support for something
5) a handle that you push or pull to make a machine work
6) a substance that is burned to provide heat or power
7) to include the things that are needed for a particular purpose
8) to go down
9) height above sea level
10) one of the flat, horizontal structures that stick out from the side of an aircraft and support it when it is flying

C Practicing pronunciation

Guess the meaning of the words and memorize their pronunciation. Use free online talking dictionaries of English pronunciation.

- ***https://howjsay.com***
- ***https://dictionary.cambridge.org/pronunciation/english/oxford***

apparatus	model	collapse	structure
aviation	motor	tube	diameter
construction	mile	boiler	device
laboratory	machine	electric	balloon

D Practicing word formation

Fill in the gaps in the table with correct forms of the words. Sometimes more than one word can be formed.

Verb	Noun	Adjective
invent	…..	…..
…..	…..	failed
…..	creation/creature/creator	…..
explore	…..	…..
…..	equipment	…..
fly	…..	…..
…..	…..	constructive
…..	technology	….
…..	…..	developed
achieve	…..	…..
…..	mechanism/mechanics/mechanic	…..

Real-time reading

A Exam practice (Multiple matching)

For questions 1–10, choose from the people (A–D). The people may be chosen more than once.

Tip Strip

It may help to look at one text at a time and to go through all the questions to find the answers you want. There will be at least one answer for every text - often two or three.

Which person …

was also an author?	**1**	
got bored with his invention?	**2**	
spent a long time on his invention?	**3**	
almost **caused** the death of another person?	**4**	
accepted his death?	**5**	
was not let down by his apparatus?	**6**	
jumped from a building?	**7**	
had more success with a different invention?	**8**	
did trials before he flew in his invention?	**9**	
flew with more than one other person?	**10**	

Engineers of Flight

A The Belgian ***de Groof*** worked for years on an apparatus intended to emulate the flight of birds. For this purpose, he constructed a device with bat-like wings. The framework was made of wood and rattan; the huge wings were covered with strong, waterproof silk, as was the long tail. The machine was controlled by levers. De Groof's first trial, which consisted of jumping from a great height to the Grand Place in Brussels, ended in failure, and he was lucky to escape unhurt. His second attempt was successful, but his third, on 9 July 1894, was not. Having planned to descend into the River Thames, de Groof was taken up by balloon and then released from a height of 1,000 feet. For some unknown reason the wing frame collapsed and he fell to his death. There was almost a second accident when the balloonist, having lost control of the balloon, landed in front of an approaching train, which just managed to stop in time.

B On 8 October 1883 ***Gaston Tissandier*** and his brother, ***Albert***, became the first to fit an electric motor to an airship, thus creating the first electric-powered flight and enabling airships to be steered. In order to form some idea of the results which could be obtained, the brothers first performed tests on a small-scale model in their own laboratory near Paris. The airship they finally constructed was huge – ninety-two feet long with a diameter of thirty feet. The bamboo pannier, which was attached by twenty ropes to the envelope, contained the Siemens electric motor. The test was a relative success. The flight lasted just over an hour and the brothers landed safely. They had been able to steer the airship at will but said that they would have had problems had the weather not been fair.

C ***Otto Lilienthal*** studied the science of aviation and published two books on the subject. He constructed a machine in which he threw himself from a height remained in the air for a time and then gradually descended to earth. His machine consisted of a framework of thin wooden rods covered with linen fixed securely to his shoulders. It took the shape of two slightly concave wings, with a raised tailpiece at the rear. A pair of rudders was fitted to help him steer. Mr Lilienthal first launched himself in his machine from a tower on a hilltop near Berlin. On 9 August 1896, Otto Lilienthal crashed to earth from a height of fifty feet while testing a new type of steering device. He died the following day. His last words were reported to be: "*Sacrifices must be made*".

D On 31 July 1894, for the first time in history, a flying machine actually left the ground, fully equipped with engines, a boiler, fuel, water and a crew of three. Its inventor was ***Hiram Maxim***, who had invested £20,000 in its construction. The machine was a large steam-driven structure formed of steel tubes and wires with five wings. Maxim began tests in 1894. On the third try the plane, which was powered up to forty miles per hour, left its track and continued on its way cutting a path through the grass for some 200 yards. At times it reached an altitude of two to three feet above the ground before it finally crashed. After this Maxim lost interest in flying and went on to other inventions, making his fortune with the invention of the Maxim machine gun.


https://www.britannica.com

(Adapted from « First Masterclass» by Simon Haines. Student's Book. Oxford University Press, 2014)

Applying new skills

A **Look through the questions given above again and fill in the table with the key words which helped you find the correct answers.**

1	**Otto Lilienthal (C)**	*published two books on …,*
2		
3		
4		
5		
6		
7		
8		
9		
10		

B **Collocating new vocabulary**

1. Fill in the correct words from the box. Some verbs must be put in the correct tense form.

attach	**steer**	**altitude**	**fix**	**waterproof**
descend	**launch**	**perform**	**emulate**	**framework**

1. The designs of kites often ….. flying insects, birds, and other beasts, both real and mythical.

2. When the airplane ….. for landing, I can look through the window and see the ground below getting closer over time.

3. Before installing the window, weatherproof paper is tacked over the ….. to prevent any water that may get by from damaging the frame.

4. The police officer told me to ….. the car toward a checkpoint on the side of the road.

5. Various solutions are provided for you to ….. USB flash drive and recover data from the inaccessible flash drive.

6. At higher …, there is the same amount of oxygen, as at sea level, but the air is thin and the pressure is low.

7. A test engineer is an engineer that ….. quality assurance testing on devices.

8. SpacelL's Beresheet will become the first privately funded mission to ….. from Earth and land on the moon.

9. To charge your iPhone ….. a USB cable to the portable battery pack.

10. ….. smartphones allow you to use your new phone without worrying about getting it wet and can allow you to take photos underwater.

2. Match the words on the right to the words on the left to make up collocations, then give Russian equivalents to them.

1) electric	**a)** reasons
2) small-scale	**b)** motor
3) machine	**c)** rods
4) steam-driven	**d)** silk
5) steel	**e)** device
6) waterproof	**f)** machine
7) unknown	**g)** tubes and wires
8) flying	**h)** gun
9) steering	**i)** structure
10) thin wooden	**j)** model

3. Fill in the correct prepositions.

1) to perform tests … something
2) to be made … something
3) to be covered … something
4) to work … years
5) to fit something … something
6) to take the shape … something
7) to make one's fortune … something
8) to be equipped … something
9) to lose control … something
10) to consist … something

4. Fill in the correct forms of the irregular verbs from the text, then answer the questions.

Infinitive	**Past simple**	**Past participle**
be	… / …	
…	became	…
…	…	begun
fall	…	…
…	flew	…
		had
lose	…	…
…	…	left
…	spent	…
throw	…	…
…	made	…

1. Who **became** the first to fit an electric motor to an airship?
2. What **was** de Groof's machine **made of**?
3. Why did de Groof **fall** to his death?
4. Who **did** the words "*Sacrifices must be made*" belong to?
5. Why did H. Maxim **lose** his interest in flying?
6. How did H. Maxim **make** his fortune?
7. Who **threw** himself from a height and remained in the air for a time before?

B **Using new skills in a real-world task**

- **Read the text about Engineers of Flight again and make notes under the following headings, then talk about any person you like.**

  WHO/WHEN/WHERE/WHAT/RESULTS

- **How important was the invention of the aeroplane?**
- **Give your example of a famous engineer who made significant changes to the world. What is his/her field of engineering?**

USE OF ENGLISH

1. Match each label to the correct warning.

a) Highly flammable
b) Explosive
c) Corrosive
d) Caution
e) Toxic

2. Look at the labels in ex.1 again and complete the sentences with the words from the box below.

caution	**attack**	**toxic**	**care**	**explosive**
blistered	**corrosive**	**bone**	**death**	**flammable**

1. The first symbol is for ….. . This symbol is used for chemicals which are poisonous and can cause ….. if they enter the body.
2. The second symbol means ….. . Chemicals with this symbol ….. and destroy living tissue, such as skin and ….. .
3. The third symbol is for ….. . Chemicals with this symbol ….. or ignite easily. They must be stored safely and used with care.
4. The fourth symbol means ….. . Chemicals with this symbol are unstable and can detonate under the right conditions. Therefore they must be stored safely and handled with ….. .
5. The fifth symbol means ….. . Chemicals with this symbol can cause red or ….. skin or rashes.

3. Match the hazard with the possible result.

1) a live wire	**a)** you might be hit
2) a loose piece of flooring	**b)** you might slip over
3) a sharp blade	**c)** you might damage your hearing
4) steam	**d)** you might burn yourself
5) a careless truck driver	**e)** you might electrocute yourself
6) a greasy floor	**f)** you might cut yourself
7) a very loud noise	**g)** you might trip over

4. Read the texts about safety equipment and match the words in the box with the correct description.

safety glasses	**overall**	**hard hats**
hearing protection	**respirator**	**face shield**

(1) _____ are the most important piece of safety equipment. There are many styles of these, but all share the same features, that is to say impact resistant **lenses** and side screens to protect against dust.

(2) _____ should be worn when working with **loud** power tools and machinery, in order to protect you from long-term hearing loss.

(3) _____ are predominantly used in workplace environments such as **building sites**. They protect the head from injury by falling objects, impact with other objects, **debris**, bad weather and electric shock.

SAFETY EQUIPMENT

When working with chemicals or machinery which makes dust, it is advisable to wear a face mask, to keep these fine particles away from the face. When spraying **varnish** or paint, a (4) _____ is a better choice, to protect you from any **harmful** effects of using these **chemicals**.

(5) A _____ must be worn When using machinery which gives off **sparks** or little parts. It is comfortable, can be **flipped up** when not needed, and will keep most of the flying chips away from your face.

When working, you should always wear proper clothing, like an (6) _____. Comfortable, **long-sleeved** shirts and long trousers combined with good safety boots will each provide a layer of protection.

5. Listen to the recording and complete the table with the equipment and the hazard mentioned.

Dialogue	Equipment	Hazard
1		
2		
3		
4		

6. Listen to a conversation between a supervisor and an engineer. Mark the following statements as true (T) or false (F).

1. …… The woman accidentally started a fire.
2. …… Charles was not wearing safety gear.
3. …… The man put out the fire.

7. Listen to the conversation from ex. 6 again and complete it.

Supervisor: James, can I talk to you about the **1** _____ today?
Engineer: The **2** _____? Yes, of course.
Supervisor: So, **3** _____ _____ happened?
Engineer: Well, Charles was using the blowtorch.
Supervisor: Was he wearing **4** _____ _____ _____?
Engineer: He was. But his hand slipped and something on the table started burning. He was trying to put it out when his shirt caught on fire.
Supervisor: Ok, and then he **5** _____ _____ _____?
Engineer: Right. I got a fire extinguisher and **6** _____ _____ the fire.

8. Working in pairs, act out the roles below, based on ex. 7. Use the sentences from the box. Then switch roles.

I want to talk about the accident.
And then he slipped.
They're a hazard.

Student A:
You are *a supervisor*.
Ask Student B questions to find out about:
- an accident
- events
- safety precautions

Make up a name for your colleague.

Student B:
You are *an employee*.
Imagine an accident to answer Student A's questions.
Make up a name for your supervisor.

9. Use the conversation from ex. 8 to complete the supervisor's accident report (100–120 words). Talk about:

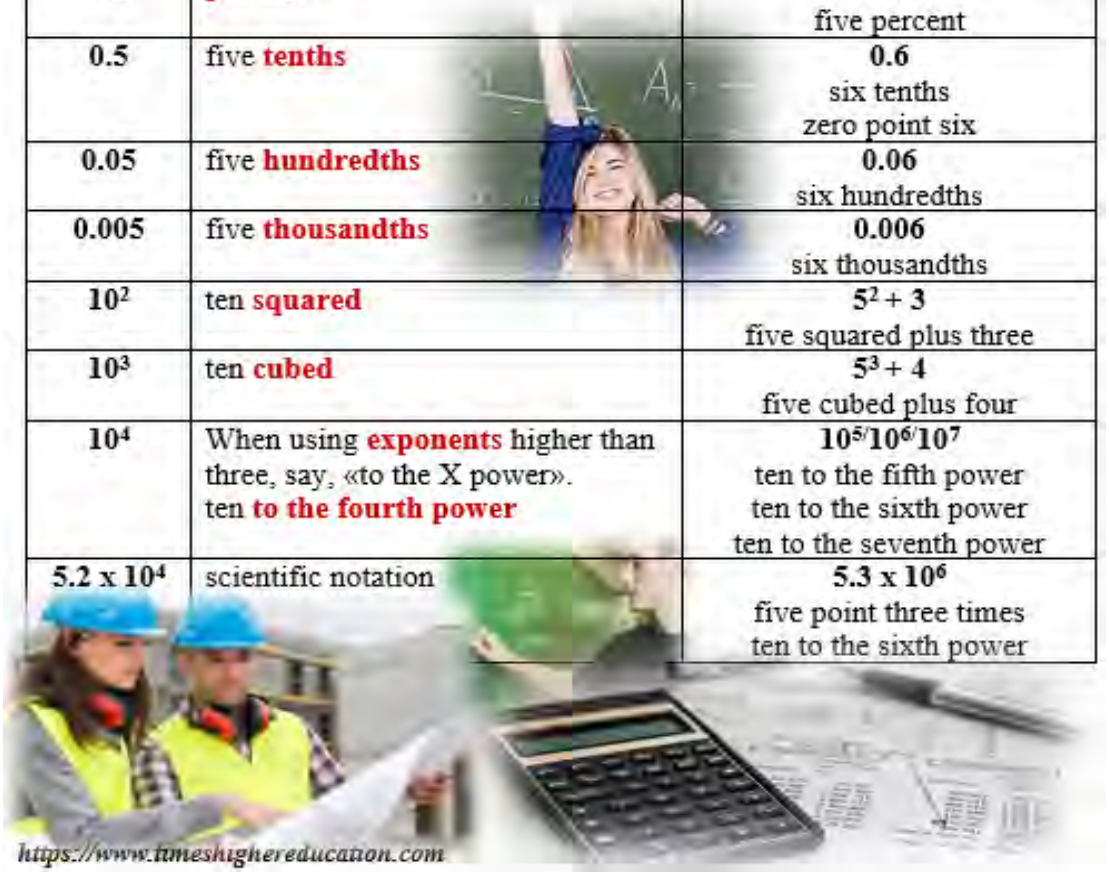
- what accident happened
- how it happened
- what happened to the people involved

WORKING WITH NUMBERS

10. Read the guide given below to talk about numbers. Then, complete the table.

How do they say it in English?

Symbol	Interpretation	Example
=	**equals**	**5+2=7** five plus two equals/is seven
%	**percent**	**5%** five percent
0.5	five **tenths**	**0.6** six tenths zero point six
0.05	five **hundredths**	**0.06** six hundredths
0.005	five **thousandths**	**0.006** six thousandths
10^2	ten **squared**	**$5^2 + 3$** five squared plus three
10^3	ten **cubed**	**$5^3 + 4$** five cubed plus four
10^4	When using **exponents** higher than three, say, «to the X power». ten **to the fourth power**	**$10^5/10^6/10^7$** ten to the fifth power ten to the sixth power ten to the seventh power
5.2×10^4	scientific notation	**5.3×10^6** five point three times ten to the sixth power



Symbol	How it is said
0.09	**1.** _____
2. _____	ten to the fifth power
32%	**3.** _____
0.1	**4.** _____
3^3	**5.** _____
6. _____	eleven squared

11. Match the words with the definitions.

1) times	**a)** multiplied twice by itself
2) percent	**b)** an amount out of 100
3) equals	**c)** a number showing powers of multiplication
4) cubed	**d)** multiplied three times by itself
5) squared	**e)** multiplied by
6) exponent	**f)** is the same as

12. Write the word that is closest in meaning to the underlined part.

1. The sample weighs **<u>0.8</u>** of a gram.
   e - g - - t - - t - -
2. The answer is 1.12 x **<u>10^6</u>**.
   t - - t - - - - s - - - - p - - e r
3. The amount is off by just **<u>0.004</u>**.
   f - - r t - - u - - n - - - s
4. The design must be accurate to **<u>0.01</u>** of an inch.
   o - - - u - - r - - t -

13. Listen to the recording and answer the question:
"How do you say five tenths as a percentage?"

14. Listen to a conversation between two engineers.
Mark the following statements as true (T) or false (F).

1. **……** The woman found an error in the man's work.
2. **……** The woman reviewed the calculations twice.
3. **……** The error was caused by an incorrect exponent.

15. Listen to the conversation from ex. 14 again and complete it.

Engineer 1: Kevin, could you **1** ____ ____ ____ at these numbers?
Engineer 2: Sure. Is there a problem?
Engineer 1: Yes. I've checked the calculations twice but something is **2** ___ .
Engineer 2: OK. Let's see …um, right here you multiplied by ten to the **3** ____ ____ .
Engineer 1: Uh, yes, I did. Is that wrong?
Engineer 2: Well, look at the formula. That's the wrong **4** ____ . You need to multiply by **5** ____ ____ ____ ninth power.
Engineer 1: Oh, I see. You're right. Thank you. I don't know how I missed that.
Engineer 2: 6 ____ ____ . Hopefully that fixes it.

16. Study the phrasal verbs related to computer and technology and complete the sentences with the verbs in the correct form.

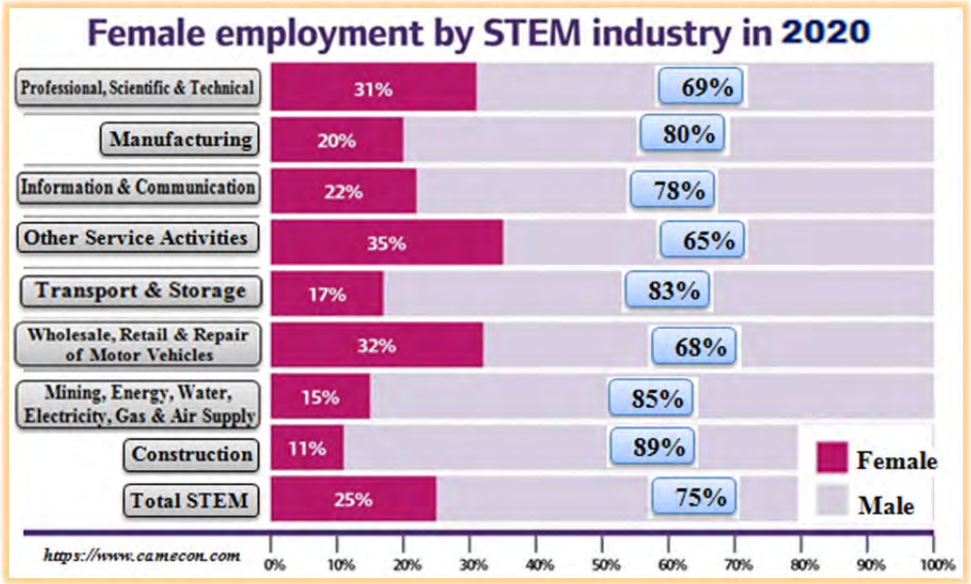
1. I'm tired, so I'm going to **…… …** the computer for today.
2. Be sure you **…… …** your files before you change system.
3. Someone **…… …** my bank account and stole millions of dollars.
4. Recently, Paula **…… …** for an online dating service.
5. I forgot my password, so I couldn't _____ __ to my computer.
6. To send the message, simply **…… …** 'send' button.
7. He was nice to me, and he helped me **…… …** my computer.
8. **……** your USB stick into some free USB connector and reboot the computer.
9. Wait a second, my computer **…… … …**

Exam task

A **Activating ideas**

Study the diagram given below and answer the questions.

1. Is engineering a good career for women?
2. Has the proportion of women studying engineering increased or decreased since the last century?
3. What is the main reason for the low number of women in engineering?
4. What challenges might women engineers face?



B Use of English (Part 1)

1. Read the text below and decide which answer (A, B, C or D) best fits each gap. There is an example at the beginning (0).

Tip Strip

- Some of the missing words are parts of set phrases.
- **Pay close attention to** the words before and after each gap.
- **Remember** that all four options are similar in meaning but only one should be used in this context.
- Even if you are not completely sure about an answer, **do not leave** anything unanswered - rather than leave a gap, make an educated guess.

Example:

0	1	2	3	4	5	6	7	8	9	10	11
C figure											

Gender gap in Engineering

A new report says less than ten per cent of Britain's engineers are women. This is the lowest **(0)** ***figure*** of all European countries. Vince Cable, the UK Business Secretary, told reporters that this would be an "**(1)** …… problem for years to come". He said one of the biggest areas that **(2)** ….. more women were in computer science. Many women graduate from university with degrees **(3)** ….. computer science, so Mr. Cable did not understand why there were so **(4)** ….. female computer engineers. He suggested that many companies had a "psychological barrier" against women becoming engineers. He said: "Half of all state schools don't have a **(5)** ….. girl doing physics. We are only tapping half the population."

The British government has started a new campaign to **(6)** ….. more women into engineering. It is called "Tomorrow's Engineers Week" and started on November the 4th. Mr. Cable said at the **(7)** ….. : "Engineering has a vital role to play in the future of UK industry. It is important that we act now to **(8)** ….. businesses have access to the skills they require to **(9)** ….. them to grow." A spokesman for Siemens UK said Britain needed to "help young people understand how an engineering (training program) can lead to a **(10)** ….. career". The campaign website said it would "showcase all the exciting businesses and industries that rely **(11)** ….. the work of creative engineers".

(Adapted from https://breakingnewsenglish.com)

0	**A** numeral	**B** per cent	**C** figure	**D** statistics
1	**A** enormous	**B** huge	**C** largest	**D** seriously
2	**A** needed	**B** necessary	**C** requiring	**D** must
3	**A** in	**B** on	**C** to	**D** at
4	**A** much	**B** few	**C** small	**D** little
5	**A** married	**B** lone	**C** solitary	**D** single
6	**A** make	**B** do	**C** get	**D** work
7	**A** orbit	**B** liftoff	**C** pitch	**D** launch
8	**A** ensure	**B** sure	**C** surety	**D** sureness
9	**A** enable	**B** disable	**C** able	**D** ability
10	**A** bounty	**B** rewarding	**C** prize	**D** pay
11	**A** at	**B** in	**C** on	**D** to

2. Mark the statements as true (T) or false (F).

1)…… Just over 10 % of UK engineers are women.
2)…… Britain has the lowest percentage of female engineers in Europe.
3)…… Many women graduate from university with computer science degrees.
4)…… Half of the girls in state schools study physics.
5)…… The UK launched a new campaign called "New Week's Engineers".
6)…… The UK Business Secretary thinks that his country must take action now.
7)…… A spokesman said a career in engineering wasn't that rewarding.
8)…… A website will have information on the work of creative engineers.

3. Match the synonyms.

1)	report	**a)**	fields
2)	figure	**b)**	study
3)	enormous	**c)**	essential
4)	areas	**d)**	huge
5)	tapping	**e)**	start
6)	campaign	**f)**	number
7)	launch	**g)**	fruitful
8)	vital	**h)**	drive
9)	rewarding	**i)**	depend on
10)	rely on	**j)**	using

4. Unscramble the underlined words and translate the phrases.

1) an eonrusmo problem for years to come
2) many women gtardeau from university
3) egeders in computer science
4) a "psychological reirbra"
5) schools don't have a single girl doing chspisy
6) started a new panamigc
7) at the nuchal
8) lead to a iadwrnreg
9) rely on the work of reteiavc engineers
10) exciting businesses and rsiditsnue

5. Put the words in the correct order.

1) all / the / of / countries / is / figure / European / This / lowest
2) for / years / to / come / This / would / be / an / enormous / problem
3) psychological / A / engineers / becoming / women / against / barrier
4) a / single / Schools / girl / don't / doing / have / physics
5) half / tapping / only / are / We / population / the
6) campaign / more / engineering / new / get / into / A / to / women
7) has / a/ vital / role / to / play / in / the / future / Engineering
8) now / act / we / that / important / is/ It
9) understand / people / young / help / to / needed / Britain
10) on / of / rely / work / engineers / that / the / creative / Industries

6. Answer the questions.

1. What percentage of UK engineers are women?
2. What area did the Business Secretary say needed more women?
3. What kind of barrier might companies have against women engineers?
4. What is the name of the UK's new campaign?
5. What has a vital role to play in the future of UK industry?
6. What do businesses need to grow?
7. What kind of career did Siemens say engineering is?
8. What do businesses and industries rely on?

7. Use a computer with Internet access or mobile phone to visit the websites for getting information on the famous women at TPU. Fill in the table and share what you discover with your groupmates.

- ***https://special.tpu.ru/en/about/women_at_tpu?mode=print***
- ***https://en.wikipedia.org/wiki/Antonina_Pirozhkova***

name	is known/famous for
Izabell Kartashova	
Anna Vanyukova	
Genia Orman	
Anastasia Stebleva	
Antonina Pirozhkova	

Exam task **Use of English (Part 2)**

A **Activating ideas**

Answer the questions.

- Are you fond of playing computer games?
- Have you ever heard anything of the computer game *Medieval Engineers* or played it?
- What do you think this game is about?

1. For questions 11–20, read the text below and think of the word which best fits each gap. Use only one word in each gap. There is an example at the beginning (0).

Tip Strip

- **Read** the text for general understanding.
- The word must make sense in the context of the text as a whole.
- **Decide** which type of word each gap needs:
  e.g. preposition, relative, conjunction, verb, adverb, etc.
- **Look out** for fixed expressions, dependent prepositions after certain verbs and linking words and phrases.
- **Read** through the text and check that your answers make sense.

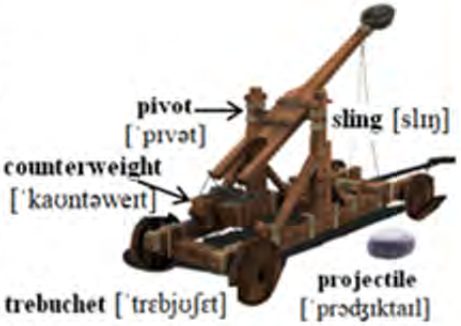
https://store.steampowered.com

Example:

0	11	12	13	14	15	16	17	18	19	20
most										

History of Engineering

One of the **(0)** ….. significant engineering achievements of the Middle Ages was the **trebuchet**, a type of **catapult**. A common **siege engine**, the trebuchet **(11)** ….. used to launch **projectiles** into an enemy's **fortifications** during a siege. This method of breaking **(12)** ….. an enemy's defenses was oftentimes **(13)** ….. successful. The trebuchet was a common weapon of warfare for **(14)** ….. 2,000 years. In fact, **(15)** ….. was used well into the 16th century, long after the invention of gunpowder.




fortifications [fɔːtɪfɪ'keɪʃns]

The trebuchet launched projectiles **(16)** ….. high speeds by utilizing some important engineering principles. One such principle was the **mechanical advantage** principle of leverage. Trebuchets **(17)** ….. able to multiply the **torque** **(18)** ….. was applied to a simple lever built into their design. This allowed **a counterweight** to provide **(19)** ….. force to launch the **payload** that was in the **sling** on the **(20)** ….. side of the pivot. The **mass** of the object being launched could therefore be very large and cause great destruction.

2. Read the sentence pairs. Choose where the words best fit in the blanks.

1) **trebuchets/projectiles**
   Catapults can throw _____ very fast.
   Cannons eventually replaced _____.
2) **pivot/torque**
   Applying _____ causes levers to move.
   Levers rotate around a _____.
3) **payload/mechanical advantage**
   A heavy _____ requires great force to move.
   _____ is created by using a lever.

3. Match the words (1-6) with the definitions (a-f).

1) ….. siege engine	**a)** the quality that makes objects have weight
2) ….. mass	**b)** a period in history from the 5th to the 15th century
3) ….. catapult	**c)** a device used to throw objects
4) ….. Middle Ages	**d)** a heavy item used to balance a load
5) ….. sling	**e)** a device designed to destroy castle walls
6) ….. counterweight	**f)** a device that holds an object

4. Listen to the recording about the trebuchet again and answer the question:
"Why could a trebuchet cause so much damage?"

LISTENING

Vocabulary for listening

A **Activating ideas**

Answer the questions.

- What does a sound engineer do?
- What education do you need to be a sound engineer?

B **Practicing new vocabulary**

Complete the definitions with the words from the list on the right.

a) to practise a piece of music
b) performance
c) to arrange
d) the place where a public event happens
e) stop working
f) a group of musicians who play music together
g) a test of the musical instruments and recording equipment
h) to be friendly to people

set up *(v)*
band *(n)*
gig *(n)*
rehearse *(v)*
book *(v)*
earn *(v)*
equipment *(n)*
environment *(n)*
portable *(adj)*
break down *(v)*
enormously *(adv)*
available *(adj)*
sound check *(n)*
get on with *(phr)*
be out of tune *(phr)*
be on the move *(phr)*
crucial *(adj)*
venue *(n)*
appeal (to) *(v)*

Real-time listening

A **You will hear an interview with a man called Martin Holloway who is a sound engineer. For questions 1–7, choose the best answer (A, B or C).**

1. The mistake people make about sound engineers is to think that
A they spend most of the time working indoors.
B their job is the same as that of a disc jockey.
C they are responsible for the quality of the music.

2. What does Martin say helped him to begin earning money?
A the course he did
B some of the bands he played in
C some people he met

3. Martin first gets involved in a project
A as soon as the band is booked.
B when he visits the venue.
C while the band is rehearsing.

4. What does Martin often find during a show?
A There are problems with the equipment.
B Very little goes wrong for him.
C The performers don't communicate with him.

5. What change in equipment has Martin appreciated the most over the years?
A It is more portable.
B The sound quality is better.
C It is less expensive.

6. According to Martin, what is the most important quality in a sound engineer?
A some musical ability
B good communication skills
C practical technical knowledge

7. What does Martin find most difficult about his job?

A working in a difficult environment
B being away for periods of time
C waiting for things to happen

(Adapted from «Grammar and Vocabulary for First and First for Schools» by Barbara Thomas, Louise Hashemi and Laura Matthews. Cambridge University Press, 2015)

B Spelling

1. Write the correct consonants in each word and pronounce it.

1) reco - ding	**3)** enviro - ment	**5)** bu - ine - -	**7)** te - - nical
2) profe - - ional	**4)** pe - fo - mance	**6)** eno - mously	**8)** di - - erence

2. Write the correct vowels in each word and pronounce it.

1) ch - ck	**3)** st - ff	**5)** ven - -	**7)** eq - - pment
2) exper - - nce	**4)** degr - -	**6)** reh - - rs -	**8)** br - - k d - wn

TPU Megaprojects

A Watching the video

1. Watch the video and fill in the key information in the tables.

- ***https://www.youtube.com/watch?v=wbkstSneFPo***

OCEAN

Resource base	TPU development	Application

ARCTIC

Resource base	TPU scientific project	New materials/advantages

SPACE

TPU development	Application	New materials

MEDICINE

TPU innovation	Application

2. Watch the video again and fill in the gaps with the words and expressions you hear.

Ocean

1. Nearly three quarters of the planet are covered by oceans and they represent **a)** _____ of natural resources which are difficult to **b)** _____.
2. Half of the raw petroleum **a**) _____are concentrated in the ocean.
3. The complex performs seabed patrol, i.e. **a**) _____ of seabed topography.

Arctic

4. This is where ninety-one percent of total natural gas **a)** _____ is concentrated.
5. **a)** _____ is necessary to evaluate the real methane potential.
6. One cannot **a)** _____ the Arctic without new materials capable of withstanding extreme conditions.
7. This is an advanced super hard and **a)** _____ material made of a carbon fiber and polymers.

Space

8. The unique tomograph will make it possible to use radiation, ultrasound, electromagnetic and thermal methods of **a)** _____ _____ in many industries and primarily the space industry.
9. These are unique plates and films that protect **a)** _____ _____ in the detrimental effects of solar radiation.

Medicine

10. TPU nuclear physicists were the first in the world to invent a **a)** _____ _____ production technology with the most highly demanded diagnostic products.

3. **Read the attributive groups, give their Russian equivalents. Make up sentences with the given expressions**.

   ore deposit, petroleum reserve, seabed patrol, ocean area, priority task, gas recovery, construction materials, spacecraft construction, fault detection, space industry, space agency, satellite protection materials, life expectancy, zero waste production technology

4. **Speak on TPU developments and innovations in different fields using the key information from ex. 1. Use the following expressions while speaking.**

   Research of the … has become one of the top priority tasks of the state.
   The ocean is a source of ….
   Tomsk Polytechnic University scientists are developing …
   TPU scientists are working on technology of …
   TPU staff has created …
   The complex is (widely-used) used for …
   The complex performs …
   Such equipment includes …
   The device is suitable for …
   The equipment will make it possible to…
   This would help …
   These products enable to …

GRAMMAR

- **CAUSATION**
- **CONTRASTING IDEAS**
- **ADJECTIVES AND ADVERBS REVISION**
- **PASSIVE VOICE REVISION**

CAUSATION

• result in • bring about • give rise to • be responsible for
• arise from • be attributable to • stem from • lead to • account for cause

We can express the relationship between *a cause* and *an effect* in a number of ways.

1. Verbs and verb phrases

Modern civil engineering techniques ***have led to*** the use of better construction methods.

the cause — the verb linking the cause to the effect — the effect

Alternatively we can reverse the elements in the sentence:

The use of better construction methods ***results from*** modern civil engineering techniques.

the cause — the verb linking the cause to the effect — the effect

2. Clauses of cause

We can use *a subordinating conjunction* to link *the effect* and *the cause*.

• because • as • since

We have moved over to water turbines ***because*** they offer significant cost saving.

3. Phrases of cause

We can use *an adverb phrase* to introduce *the cause*.

• due to • as a consequence of • because of • on account of • owing to

Many accidents in mining happen ***due to*** poor security procedures.

1. Choose the correct phrase in each of the following.

1. The machine broke down **and resulted in/because of** poor maintenance.
2. Steel was used in the construction **caused by/on account of** its strength.
3. Data was damaged **as a result of/giving rise** to a virus in the system.
4. Transport costs have increased **accounting for/due to** a rise in oil prices.
5. Most British coal mines have been closed **because/on account of** they have become uneconomic.
6. The reject rate has fallen **as a result of/giving rise to** quality control.
7. Just-in-time manufacturing methods **result from/result in** a saving on storage costs.
8. There has been a large increase in the number of people who want to buy organic food products **since/as a consequence of** fears about chemicals in food.

2. Rewrite the following sentences using the verb or phrase in brackets.

Example: More and more people working from home is a consequence of modern telecommunication systems. (*have resulted in*)
Modern telecommunication systems **have resulted in** more and more people working from home.

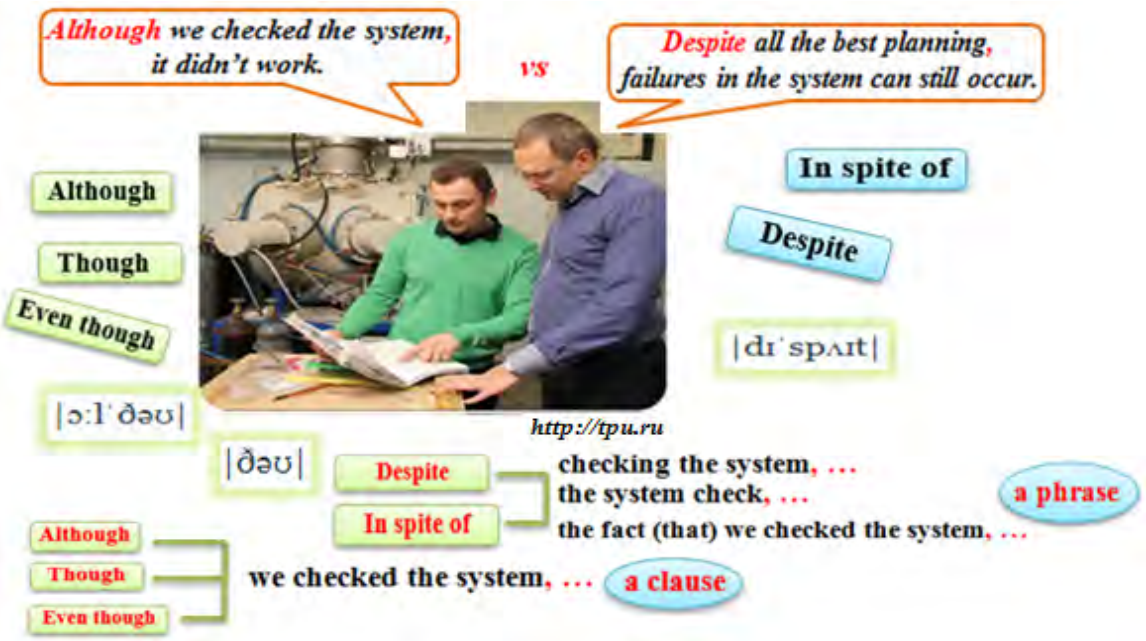
1. Cold weather leads to a rise in the volume of electricity required by consumers. (*is caused by*)
2. Reduced transportation costs stem from the use of more lightweight parts. (*brings about*)
3. Increased energy efficiency accounts for an annual saving of electricity. (*is attributable to*)
4. Friction during drilling causes the production of heat. (*results from*)
5. Car and planes are partly responsible for air pollution. (*partly stems from*)
6. Water flowing through the turbines causes them to spin. (*due to*)

3. Place the preposition *in*, *on*, *of*, *to*, *against* or *no preposition* in each space below to complete the following description of combustion.

Combustion is a reaction in which the oxidization of an element or compound leads **a)** ….. the release of energy. If the combustion results **b)** ….. a flame, it is called burning. Since combustion can be dangerous, it is important to take precautions **c)** ….. injury. However, not all combustions result **d)** ….. flames. For example, the combustion of carbon in oxygen causes **e)** ….. an intense red-white light but no flame. Petroleum, on the other hand, requires special handling **f)** ….. account **g)** ….. its volatility.

(Adapted from «Technical English» by Nick Brieger, Alison Pohl. Vocabulary and Grammar. Oxford University Press, 2014)

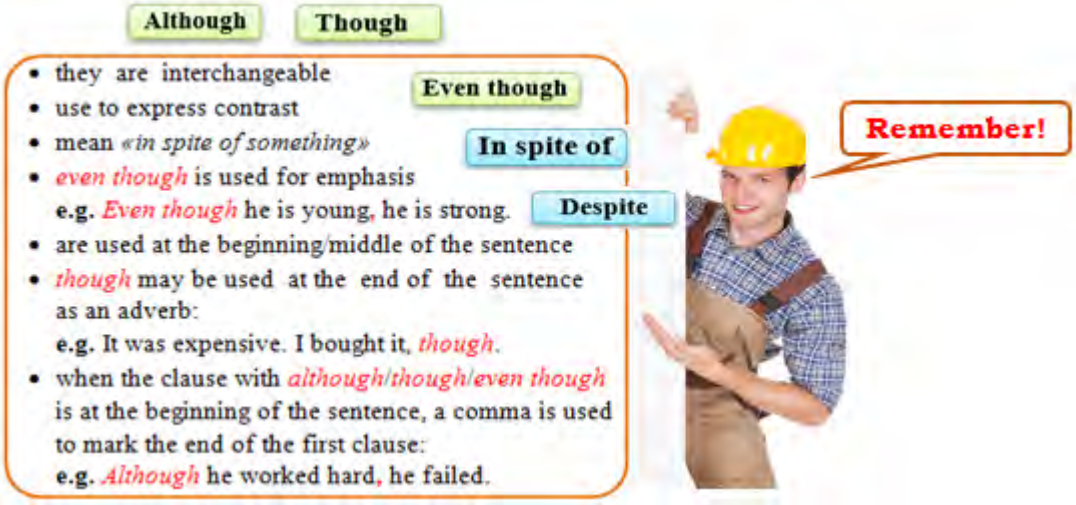
CONTRASTING IDEAS



4. Watch the video and answer the questions.

- ***https://www.youtube.com/watch?v=nX8N9RiGCZg***

1. What are *al(though)/even though/despite/in spite of* used for?
2. What **structure** is used after *al(though)/even though*?
3. What **structure** is used after *despite/in spite of*?
4. What's the **difference** between *despite* and *in spite of*?
5. What punctuation mistake was made by the teacher in the video?



5. Complete the following sentences by choosing a suitable ending from the box.

• accidents sometimes occur.	• careful packing.
• he washed it.	• people often have to drink polluted water.
• there are places where it doesn't work.	• those are a mixture of polyester and wool

1. The contents of the **crate** were broken *despite* …
2. *Although* the **care label** said the coat should be dry-cleaned, …
3. These carpets are 100% wool *though* …
4. Mobile phone coverage is fairly extensive *even though* …
5. *In spite of* strict safety regulations, …
6. *Though* we enjoy clean **piped drinking water**, …

6. Make one sentence from two. Use the word(s) in brackets in your sentences.

Example: I couldn't sleep. I was very tired. (*despite*)
I couldn't sleep despite being very tired.

1. They have very little money. They are happy. (*in spite of*)
2. My foot was injured. I managed to walk to the nearest village. (*although*)
3. I enjoyed the film. The story was silly. (*in spite of*)
4. We live in the same street. We hardly ever see each other. (*despite*)
5. I got very wet in the rain. I was only out for five minutes. (*even though*)

7. Use the words in brackets to make a sentence with *though* at the end.

Example: The house isn't very nice. (like/garden) *I like the garden, though.*

1. It's a difficult job. (very interesting)
2. We didn't like the project. (completed)
3. Kate is a well-qualified engineer. (don't like/character)
4. The hotel I staved in wasn't so great. (location/good)

However / ***nevertheless*** are adverbs used to express *contrast*.

- ***Nevertheless*** is a little more *formal* and *emphatic* than ***however***.
- They are always followed by a comma (,).
- When they connect two independent clauses in one sentence, they are preceded by a semicolon (;) and followed by a comma.

Note the examples below:

The engineers claimed that the bridge was safe. ***However***, they were still not prepared to risk crossing.

The engineers claimed that the bridge was safe; ***however***, they were still not prepared to risk crossing.

The engineers claimed that the bridge was safe. They were still not prepared to risk crossing, ***however.***

8. A small engineering company is looking for a new site to build a new factory. The Director is discussing three possible sites. Join the sentences in A and B using the connector in C to form part of his speech.

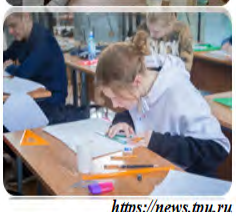
Example: *Site 1 provides a suitable amount of space* ***in spite of being*** *the most expensive.*

A	B	C
Site 1 provides a suitable amount of space.	It's the most expensive.	**in spite of**
It could be difficult.	It's worth considering.	**although**
Road and rail connections are not far away.	It will be necessary to build a bridge across the river.	**although**
It's surrounded by trees and close to mountains.	It's only four kilometers from the nearest town.	**however**
There is a large labor market.	Workers in this area are unskilled.	**even though**
Site 1 is close to road and rail connections.	Site 2 is close to the airport.	**although**
Government finance is available for companies moving into the area.		**nevertheless**
Site 3 is not expensive.	It's in the center of town.	**despite**
It may be difficult to get planning permission for new buildings.		**however**

https://ru.depositphotos.com

ADJECTIVES AND ADVERBS REVISION





https://news.tmu.ru

9. Look at the pictures and answer the questions.

1. What do you think the engineering students might be studying?
2. Did you study these disciplines when you were a first year student?
3. What was your final score in these disciplines?
4. Are these disciplines important for the engineers in your field? Justify your answer.

ADJECTIVES vs ADVERBS
Adjectives describe the noun.
Adverbs describe the verb.
e.g. She is *hardworking*.
She works *hard*.

10. Listen to the recording and fill in the gaps. State whether the missing words are adjectives or adverbs.

What is a must for any engineer?

Engineering is one of today's **(1)** ….. growing careers. That's because engineers work in so many areas. Some engineers design roadways. Others inspect very **(2)** ….. machines. But no matter where they work, they all have two things in common: math and science. Disciplines like mathematics and physics are a must for any engineer. And so becoming an engineer requires **(3)** ….. study.

Engineers develop **(4)** ….. new ideas. These new ideas change the world in big ways. Engineers also create the technologies that make our lives **(5)** ….. . The field of engineering truly is **(6)** ….. in today's modern world. It is expanding every day, and is a **(7)** ….. field to go into.

11. Give the comparative and superlative of the following adjectives.

cheap, fast, good, narrow, simple, expensive, cosy, useful, significant, old, little, large, stylish, smart, colourful, practical, fascinating, innovative, reliable, complicated, easy

12. Work in pairs. Choose two of the products from the photographs below and write down three adjectives to describe each one. Use adjectives from ex. 11 and any other you can think of. Then, make sentences using the following expressions at least once as in the examples:

more … than, not as …as, less … than, as …as, the most/least …

Example: Having the traditional watch is ***less prestigious than*** the Smartwatch.
The EarPods are ***not as expensive as*** the Smartwatch.
The EarPods are the least popular of all gadgets.
The Smartwatch is ***more useful than*** the EearPods and ***the most convenient*** to use.


Smartphone


EarPods


iPad


Smartwatch

We can use ***less*** with adjectives and adverbs of two or more syllables to mean the opposite of ***more***. We can add ***much*** before comparative adjectives and adverbs to suggest a stronger comparison.
e.g. This computer works less ***efficiently***.
The results are ***much worse*** than I expect.

https://news.tpu.ru

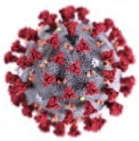
13. Fill in the gaps to compare computers *now* **and** *ten years ago***. Use the adjectives and adverbs in brackets.**

Computers today are **(1)** ***more powerful*** (*powerful*). They operate **(2)** ….. (*fast*) and they have much **(3)** ….. (*large*) memories. Because they contain more electronics, the cases have become **(4)** ….. (*big*) but the flat-screen monitors are **(5)** ….. (*heavy*) and fit into a **(6)** ….. (*small*) space on your desk. Computers are also **(7)** ….. (*cheap*). The price is **(8)** ….. (*low*) now than in the past. The programs too are **(9)** ….. (*good*). They are **(10)** ….. (*sophisticated*) and you can work much **(11)** ….. (*efficiently*).

COMPOUND ADJECTIVES

14. Match a word in A with a word in B to make the compound adjectives. Give their Russian equivalents.

1) air	**a)** controlled
2) remote	**b)** breaking
3) long	**c)** going
4) ocean	**d)** conditioned
5) record	**e)** like
6) crown	**f)** distance



Two words can be joined together to make ***a compound adjective*** which is usually written with ***a hyphen***.

Noun + Past Participle
e.g. water-cooled/wind-powered

Adjective + Noun
e.g. full-length/high-quality

Adjective + Past Participle
e.g. ready-made/short-lived

Noun + Present Participle
e.g. time-saving/English-speaking

Noun + Adjective
e.g. wave-like/star-like

15. Use the compound adjectives from ex. 14 to make up collocations with the nouns given below.

a goal, a room, a drone, a call, a vessel, a car, a system, a wind, speed, a helicopter, a spike, an education, jackpot

16. Look through the text «Engineers of Flight» on pages 72-73 again and find compound adjectives. Write down the nouns they describe.

1) steam-driven _____
2) small-scale _____
3) electric-powered _____
4) bat-like _____

PASSIVE VOICE REVISION

17. Watch the videos and answer the questions.

- ***https://www.youtube.com/watch?v=nqSD7LB8HVY***
- ***https://www.kursoteka.ru/course/1429/lesson/4800/unit/13522***

1. What is the Passive Voice?
2. What is the *'formula'* of the Passive Voice?
3. Why do we use the Passive Voice?

18. Arrange the verbs given below into two columns: *regular* **and** *irregular***. Give three forms of irregular verbs.**

encourage, write, take, submit, hold, book, put, undergo, invite, host, publish, be, have, co-sponsor, locate, give, present, become, form, make, arrange

regular verbs	*irregular verbs*

19. Read the sentences about the International Forum on Strategic Technology (IFOST) and put the verbs in the correct passive form.

1. The 14th International Forum on Strategic Technology (IFOST 2019) **…… *(host)*** by National Research Tomsk Polytechnic University, Russia on October 14-17, 2019.
2. Researchers and policy-makers **…… *(encourage)*** to exchange their ideas and experiences on strategic technologies.
3. All papers should **…… *(write)*** in English.
4. Thirteen conferences in the area of innovation technologies and advanced engineering solutions **…… *(arrange)*** so far.
5. Prospective authors **…… *(invite)*** to submit original technical papers for publication in the IFOST Conference Proceedings.
6. The forum opening ceremony **…… *(hold)*** last week.
7. My paper already **…… *(undergo)*** peer review and cross check for plagiarism.
8. Forum proceedings on new materials, nanotechnologies, robotics, automation and power engineering **…… *(publish)*** next month.

9. The papers must **……** ***(not submit)*** to another journal or conference.

10. Projects aimed at inventive solutions just **……** ***(present)*** by young research teams from Korea and Russia.

11. A variety of topics in academics, technology and regional policies **……** (***discuss***) annually.

12. IFOST **……** ***(form)*** in 2006 to promote multi-level collaboration among its member institutes from Korea, Russia, China, Mongolia, Bangladesh, and Indonesia.

13. The IFOST headquarters **……** ***(locate)*** at University of Ulsan (Korea).

14. The hotel can **……** ***(book)*** by phone, through the hotel website or through booking.com.

15. The IFOST events **……** ***(co-sponsor)*** by the Institute of Electrical and Electronics Engineers.

SPEAKING

Exam task

Tips
- Speak continuously.
- Give reasons.

Talking about general topics (Part 1)

Speak on your own for about 3 minutes. Listen to what your teacher asks.

Main prompt 1: *Is an Engineering degree popular with young people in your country?*

Follow-up prompts:
- Are engineers in high demand?
- What are the top 5 reasons to study engineering?
- Why did you choose engineering as your future career?
- Did you follow your parents'/ relatives' footsteps?

Main prompt 2: *Is studying engineering challenging?*

Follow-up prompts:
- What do you major in?
- Does the university prepare you well for your future engineering career?
- Is Bachelor's degree in engineering enough to make a successful career?
- Why do students apply for Master's degree?

Main prompt 3: *What are the employment prospects for TPU graduates?*

Follow-up prompts:
- Is engineering job market tight?
- Is a Russian engineering degree competitive on the world market?
- What national and international companies would you apply to after graduation? What qualities should you have to be successfully employed?
- What are the most promising engineering fields/careers?

Monologue (Part 2)

A **Talk for up to 4 minutes. Compare the photographs and say a few words about different types of engineering activity.**

1. Different types of engineering activity.

A

B

Your teacher will now put this secondary prompt.

- What is more interesting and challenging: a career of a field engineer or a scientist?

B **Talk for up to 4 minutes. Compare the photographs and say a few words about different skills required to be a successful engineer.**

2. Different types of skills required for success in engineering.

A

B

Tips

- **Listen** carefully to the questions.
- **Discuss** an issue.

Your teacher will now put this secondary prompt.

- Which skills are the most important for an engineer?

Linking Words of Giving and Supporting Opinions

I think/believe/feel/would argue that.../suggest ...
because
if ..., then ...
whereas/on the other hand ...
for example/in fact/such as ...

Language of Comparison and Contrast

... also...
...as well as...
... alike.../... in common ... /...similar to ...
... both ...
...yet ... /...but...
However... / Nevertheless.../ Although ...
In spite of the fact that... / Despite the fact that...
While...
Even if / even though...
At the same time...

A **Discussing in pairs (Part 3)**
Discuss the slogan on the T-shirt with your partner.

Introductory Phrases

I think / believe / feel that ...
I am convinced that / sure that ...
It seems to me that ...
As I see it ...
From my point of view ...

B **Suggest your own catchy slogan for your T-shirt to promote your engineering field and justify your choice. See the examples given below.**

WRITING

A TRANSACTIONAL LETTER

Acceptance letter to speak at a Technology Conference

A Activating ideas

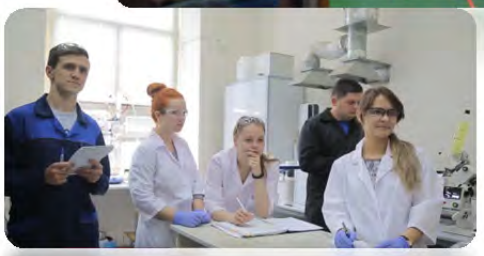
1. Look at the pictures and answer the questions.

- Does this event look familiar to you?
- What words come to your mind related to the pictures?
- What do you think happens at this event?
- Where does this event take place?
- What does ***IFOST*** stand for?
- How is this event important for the engineers?
- Do you want to take part in this event?

2. Fill in the table. Use a computer with Internet access or mobile phone to visit the websites for getting information. Share your information with your groupmates.

- ***http://ifost2019.tpu.ru/about***
- ***https://en.wikipedia.org/wiki/International_Forum_on_Strategic_Technology***

	Date	Country	University
IFOST headquarters **is located**		✓	✓
IFOST members		✓	✓
The 1st forum **was held**	✓	✓	✓
The 7st and the 14st forums **were hosted**	✓	✓	✓



B Building knowledge

Transactional letters/emails are letters/emails which **respond to written information**. This information may be in the form of invitations, advertisements, notes, etc., as well as visual prompts such as maps, drawings, etc.

- It is important to include **all** the factual information given in the rubric. You must give this information in full sentences, using your **own words** as much as possible.
  e.g. **early registration needed?**
  a) *Is early registration necessary?* **c)** *Do I need to register early?*
  b) *Would you recommend that I register early?* **d)** *Is it necessary to register early?*
- The information included should be clearly and logically arranged, with each point presented in a separate paragraph containing a clear topic sentence.
- Transactional letters/emails should use:
  - appropriate greetings and endings;
  - standard expressions of suggestion, complaint, apology etc.

Useful Language

- **Greeting**

Dear Sir/Madam,
Dear Mr. Johnson,

- **Opening remarks:**

Thank you for your kind invitation to…
I am happy to accept your invitation to…
Thank you for inviting us to be part of…
Thanks for inviting me … / for the invitation to…
I am pleased / grateful / honored to accept your invitation to join…
I'm writing to thank you for the kind invitation…
Thank you for the kind invitation which I would be honored to accept.

- **Requesting:**

However, before applying I would like to learn/ know more about...
I would like to ask whether/ if...
I would be grateful if you could...
The first thing I would like to know is …
I wonder if you would mind telling me first of all ….?
Could you also tell me / inform me ….?
Do you know ….?
I hope you might also let me know about …

- **Closing remarks:**

I look forward to seeing you...
We wait the event with great anticipation.
I will be happy to attend and look forward to …
It will be my pleasure to come to…
I gladly accept the invitation.
We are looking forward to being a part of this beautiful celebration.

Introduction
Paragraph 1
opening remarks
Main Body
Paragraph 1-2-3*
- *clarifying details of an event,*
- *specify directions, anything needed to be prepared prior to the event, etc.*

Conclusion
Final Paragraph
closing remarks

* *The number of main body paragraphs may vary depending on the rubric.*

C Using new skills in a real-world task

You have received a letter of invitation from the Organizing Committee to participate in 14th International Forum on Strategic Technology held on October 14–17, 2019 in Tomsk, Russia. Read the information and the notes you have made. Then write a letter in 120–150 words to the Organizing Committee using all your notes. You must use grammatically correct sentences with accurate spelling and punctuation in a style appropriate for the situation.

Key words & expressions

conference proceedings *(phr)*
host *(v)* **a conference/forum**
hold *(v)* **a conference/forum**
international speakers *(phr)*
key topics *(phr)*
panel discussions *(phr)*
provide *(v)* **visa support**
poster sessions *(phr)*
peer-review *(v)*
peer-reviewed *(adj.)*
participate *(v)*
participation *(n)*
participant *(n)*
publish *(v)*
publication *(n)*
registration fee *(phr)*
welcome *(v)* **smb.**

Call for Papers
IFOST 2019
14th International Forum
on Strategic Technology
October 14-17, 2019
Tomsk, Russia

DEAR COLLEAGUES,

We welcome you to join the 14th International Forum on Strategic Technology (IFOST 2019) which will be hosted by National Research Tomsk Polytechnic University, Tomsk on October 14-17, 2019. Our program covers three days of intensive professional discussions with colleagues actively engaged in or interested in learning more about Strategic Technologies in various fields of scientific knowledge and features international speakers, panel discussions and poster sessions.

Peer-reviewed conference proceedings will be published in IEEE Xplore® Digital Library with further indexing in WOS/SCOPUS

Key Topics:

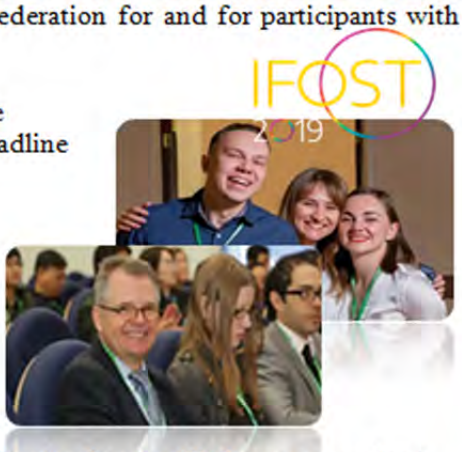
New Materials and Nanotechnologies/Information and Communication Technologies/Mechanical Engineering, Power Engineering and Renewable Energy/Ecology/ Environmental Engineering, and Civil Engineering/ Applied Engineering and Management/High Energy Physics/Chemistry and Biotechnologies/Aerospace Engineering

Key Dates:

June 15, 2019 - Full Paper Submission Deadline
July 31, 2019 - Full Paper Submission Deadline for countries which citizens are exempt from the visa requirements to enter the Russian Federation for and for participants with "Publication only (no visit)" type of participation
August 15, 2019 - Notification of Acceptance
August 31, 2019 - Final Paper Submission Deadline
September 25, 2019 - Registration Fee Payment Deadline

Registration Fee:

Regular author (IFOST member) USD 350
Regular author (Non-member) USD 400
Regular student author (IFOST member) USD 250
Regular student author (Non-member) USD 300
Publication only (No visit) USD 170
Participation without IEEE indexing USD 170
Extra presentation (per paper) USD 120



Registration Fee includes:

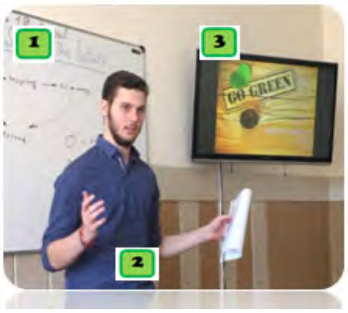
Forum bag and accessories/Daily meals: tea/coffee breaks, lunches/Welcome reception/ Farewell dinner

D **Fill in the gaps in the sentences with the following words and expressions.**

submission deadline	**advance**	**invite**	**forward**	**participants**
registration fees	**speaker**	**publications**	**accommodation**	**requirements**

1. I would like to thank you in **……** for the information on poster presentation.
2. We are looking **……** to being a part of this scientific community.
3. **……** cover participation in all sessions of the conference, a copy of the proceedings, lunches, refreshments and conference dinner.
4. Please note that we do encourage **……** to submit an abstract and actively take part in the program.
5. If a **……** is missed, the Examinations Office WILL NOT accept articles without recommendations.
6. An official booking portal offers a selection of affordable **……** options, ranging from five-star hotels to apartments and hostels.
7. We cordially **……** visitors to work on various short, simple experiments set up in our laboratory during the exhibition.
8. Your guest **……** will always be delighted to hear how much the audience enjoyed his presentation or workshop.
9. Please read these **……** carefully and follow them when preparing your paper.
10. The other accepted **……** will be on-line only.

PROJECT WORK



A Activating ideas

1. Answer the questions.

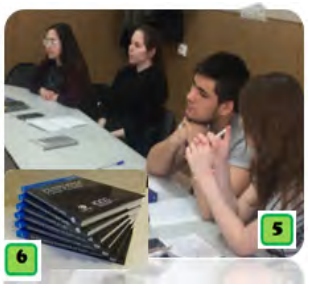
1. Have you ever participated in any conference? Did you enjoy it?
2. Where was the conference held? And when?
3. What was the conference status?
4. Who were the participants of the conference?

2. Match these words to the numbers (1-8) in the picture.

laptop ☐ whiteboard ☐ USB flash drive ☐ conference participant ☐
speaker ☐ monitor screen ☐ conference badge ☐ conference proceedings ☐

3. Match the words (1-4) to the definitions (a-d).

1) accommodation
2) location
3) venue
4) facility



a) a place or position
b) a place to stay
c) a place where people agree to meet for an event
d) a piece of conference equipment, a building, a service, etc.

4. Put each word in the box next to the appropriate group of adjectives to make word partnerships about *conference venue* and *facilities*.

atmosphere	**location**	**prices**	**hotel**
facilities	**restaurant**	**accommodation**	**distance**

restaurant
1. an elegant
a stylish
a popular
an exclusive

2. reasonable
discounted
all-inclusive
extra

3. nearby
short
far
a 5 minute-walk

4. luxurious
4-star
noisy
grand

5. furnished
expensive
suitable
cheap

6. convenient
ideal
seaside
city

7. a cosy
a friendly
a welcoming

8. sports
postal
shopping

B

Organizing an Engineering Conference

CASE STUDY

Background

IDGC of URALS, a united operating company of the Urals region which has dominating position in energy transmission in the region, is based in Ekaterinburg, Russia. The company consisting of 3 subsidiaries (Sverdlovenergo, Chelyabenergo and Permenergo), is holding its first interregional conference later this year. The Chief Executive, senior managers at the head office and about fifty managers from its subsidiaries will attend. The aims of the conference, in order of priority, are to:

- discuss how the company can improve its services;
- thank managers for their hard work;
- give managers the opportunity to get to know each other better.

The conference will take place in July. Participants arrive on Friday evening and leave on Monday morning.
The budget is $2,000 per participant.
This is an important event and the Marketing Department must plan it carefully.

Listening

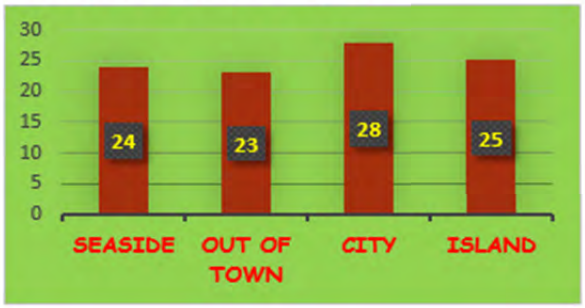
Listen to two colleagues in the Marketing Department discussing the planning of the conference. Make notes about the four features the conference venue must have.

Conference venue specifications:

- .....
- .....
- .....
- .....

The marketing team sent out a questionnaire to find out what type of venue the participants preferred. They have selected four to choose from. All prices include the cost of flights.

Preferred location



Task

You are members of IDGC of URALS's Marketing Department.

1. Work in small groups. Discuss which hotel best meets the requirements of the conference.
2. Meet as one group and listen to each other's ideas.

Useful language

Asking for opinions	Agreeing	Making suggestions
How do you feel about …?	That's true.	I think we should …
What do you think?	I agree.	How about …?
What's your opinion?	Absolutely/Exactly	Why don't we …?
What's your view?	I think so too.	Perhaps we could …

Disagreeing

I see/know what you mean, but …
I'm afraid I can't agree. / Maybe, but …

Hotels

1 Long Beach Hotel, Casablanca, Morocco

- Seaside location
- 5-star hotel
- Two large conference rooms but no seminar rooms
- Large swimming pool, sauna, tropical garden, shops and nightclub
- Price: $1.500 per participant, including meals and all entertainment at the hotel (it is a one-hour drive to the town)
- Advantage: Very attractive beach
- Disadvantage: Few cultural attractions

2 Hotel Moda, Prague, Czech Republic

- 4-star hotel
- One conference room and two seminar rooms
- Spacious bedrooms. Large swimming pool (open to the public), sauna, Jacuzzi, hairdressing salon, satellite TV
- Price: $950 per participant, including meals and two guided tours
- Advantage: Low cost means more money for cultural tours, sightseeing, the opera, etc.
- Disadvantage: Half an hour by underground to the city center. Heavily booked in summer.

3 Hotel Matong, Tioman, Malaysia (an island off the east coast)

- 5-star hotel
- Wide choice of large and small conference rooms
- Spacious grounds with tropical gardens
- Golf course, tennis courts and football pitch
- Price: $1,350 per participant, including meals
- Advantages: Beautiful island setting - peaceful and quiet
- Disadvantage: Not very accessible

4 Hotel Colossus, Las Vegas, USA

- 5-star hotel
- Magnificent architecture in the Greek style
- Huge rooms, with spacious balconies. Own casino
- Outstanding conference facilities. Seminar rooms available at extra cost
- Price $1,950, including meals and one tour $50 spending money for the casino
- Advantages: Easy access from airport. Many extras such as free use of the car included in the price
- Disadvantages: Many tourists visit the hotel day and night

Writing

As Chief Executive of IDGC of URALS, write an e-mail inviting managers from subsidiaries to attend this conference. Inform them of the dates, the purpose of the conference and the details of the location.

CASE STUDY EVALUATION FORM

Date _____

Name _____

Group number _____

Title of case-study _____

Parameters	Poor	Satisfactory	Good	Excellent
Language competence *grammar / vocabulary appropriancy / pronunciation*				
Group work skills *contributed the ideas / listened to and respected the ideas of others/positively encouraged others in the group / compromised and co-operated/ flexible and willing to follow others/helped to solve problems / took initiative when needed*				
Total				

Overall Comment (if any)

_____

_____

_____

_____

WORD LIST

accident, *n*
account for, *v*
activate, *v*
altitude, *n*
amplify, *v*
amplification, *n*
branch, *n*
break down, *phr*
bring about, *v*
burn, *v*
cause, *v/n*
chemical, *adj*
click on, *phr*
civil, *n*
corrosive, *adj*
combustion, *n*
collapse, *v*
construct, *v*
construction site, *n*
damage, *v/n*
debris, *n*
design, *v/n*
device, *n*
develop, *v*
diameter, *n*
download, *v*
drilling, *n*
emit, *v*
emulate, *v*
enable, *v*
engine, *n*
engineering, *n*
equip, *v*
equipment, *n*
explosive, *adj*
face shield, *n*
fire extinguisher, *n*
fit, *v*
fix, *v*
flammable, *adj*
framework, *n*
generate, *v*
give rise to, *phr*
hack into, *phr*
harmful, *adj*
hazard, *n*
hearing protection, *n*
implement, *v*
implementation, *n*
keep up with, *phr*
lever, *n*
load, *n*
maintain, *v*
maintenance, *n*
mechanical, *adj*
multiply, *v*
nuclear, *adj*
precaution, *n*
receive, *v*
release, *v*
reliable, *adj*
resistant, *adj*
respirator, *n*
spin, *v*
store, *v*
storage, *n*
submit, *v*
supply, *v*
technician, *n*
technology, *n*
transfer, *v*
transmission, *n*
transmit, *v*
tube, *n*
turbine, *n*
turn off, *v*
unstable, *adj*
upload, *v*
weigh, *v*
weight, *n*
wire, *n*

REFERENCES

Unit IV

Oxford Practice Grammar Intermediate. John Eastwood. Oxford University Press. 2006.

Wyatt, R. Check Your English Vocabulary for TOEFL, 4-th edition. London: Bloomsbury Publishing, 2012.

Form and Style (10th ed.), by Carole Slade; The Scott, Foresman Handbook for Writers (5th ed.); and the Publication Manual of the American Psychological Association (5th ed.)

Hot English Magazine 67, page 48.

Hot English Magazine 146, page 48.

Hot English Magazine 147, page 44.

https://services.unimelb.edu.au/__data/assets/pdf_file/0007/471274/Writing_an_Abstract_Update_051112.pdf

https://www.mikebrotherton.com/2010/09/02/the-importance-of-science-ten-reasons/comment-page-1/

https://writingcenter.gmu.edu/guides/writing-an-abstract

https://englishmix.ru/grammatika/glagoly/izmenenie-active-v-passive-voice

http://www.autoenglish.org/FCEUse/verbs2nouns.htm

http://www.grammar-quizzes.com/adj-forms.html

https://www.thoughtco.com/sputnik-1-first-artificial-satellite-3071226

Unit V

Guy Brook-Hart. Complete First Certificate. Student`s Book. Cambridge University Press, 2010.

Richard Johnson-Sheehan. Technical Communication Today. Pearson Longman. 2007

Sarah Cunningham &Peter Moor. New Cutting Edge. Intermediate. Students' book. Pearson Longman.2005

White Paper on Science & Technology. Department of Arts, Culture and Technology. 1996

https://news.tpu.ru

https://tpu.ru/en/about/tpu_today/news/view?id=351

Unit VI

Simon F.E. Heines, Barbara Stewart, Anna Cowper. First Masterclass. Student's book. Oxford University Press, 2014.

Charles Lloyd, James A. Frazier. Career Paths. Express Publishing, 2014.

Alison Poohl, Nick Brieger. Technical English, Vocabulary and Grammar. Summertown Publishing, 2002.

Mark Ibbotson. Professional English in Use. Engineering with answers. Technical English for Professionals. Cambridge University Press, 2009.

Eric H. Glendinning. Oxford English for Careers: Technology1. Student's book. Oxford University Press, 2007.

Sabrina Sopranzi. Flash on English for Mechanics, Electronics and Technical Assistance. 2012.

https://www.youtube.com/watch?v=I11y_FLlEp8

https://breakingnewsenglish.com

https://special.tpu.ru/en/about/women_at_tpu?mode=print

https://en.wikipedia.org/wiki/Antonina_Pirozhkova

CONTENTS

Учебное издание

ДИДЕНКО Анастасия Владимировна
НАДЕИНА Луиза Васильевна
СТЕПУРА Светлана Николаевна
УТКИНА Анна Николаевна
ФЕДОРИНОВА Зоя Владимировна
ЧЕСНОКОВА Ирина Анатольевна

АНГЛИЙСКИЙ ЯЗЫК: ПОСОБИЕ ДЛЯ СТУДЕНТОВ ТЕХНИЧЕСКИХ ВУЗОВ

Учебное пособие

Издано в авторской редакции

Компьютерная верстка *О.Ю. Аршинова*
Дизайн обложки *А.И. Сидоренко*

Подписано к печати 06.10.2020. Формат 60x84/8. Бумага «Снегурочка».
Печать CANON. Усл. печ. л. 12,80. Уч.-изд. л. 11,57.
Заказ 128-20. Тираж 100 экз.

Издательство
ТОМСКИЙ ПОЛИТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ