МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РФ
НОВОСИБИРСКИЙ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ
ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ
ФИЗИЧЕСКИЙ ФАКУЛЬТЕТ
Кафедра английского языка

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POPULAR SCIENCE

НАУЧНО–ПОПУЛЯРНЫЙ АНГЛИЙСКИЙ

Учебное пособие

Новосибирск
2013

УДК 811.111 (075.8)
ББК Ш13 (Ан)-923
З 868

Зорькина Н. И., Касьянова И. Р., Маликова О. Ю. POPULAR SCIENCE (Научно–популярный английский): учеб. пособие / Новосиб. гос. ун-т. Новосибирск, 2013. 125 с.

Данное учебное пособие предназначено для студентов второго курса физического факультета. Цель пособия – развитие навыков и умений чтения, аудирования и обсуждения аутентичного материала на актуальные научно-популярные темы.

Основу данного пособия составляют современные оригинальные тексты и аудио-записи из научно-популярных журналов, радиопередач и интернет-сайтов. Лексико-грамматический материал подобран с учётом его актуальности для дальнейшей работы с научными текстами. В пособие включены грамматические комментарии и упражнения, направленные на повторение и закрепление знаний на базовом уровне. Каждая тема усилена аутентичным аудио- и видеоматериалом, даются ссылки на интернет-источники для самостоятельной работы. Учебное пособие состоит из введения и восьми глав.

Учебное пособие может быть также использовано на всех факультетах в качестве вводного курса для работы с научной литературой, а также для расширения общего кругозора студентов.

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Издание подготовлено в рамках реализации *Программы развития государственного образовательного учреждения высшего профессионального образования «Новосибирский государственный университет»* на 2009–2018 годы.

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Grammar Focus:
Basic tenses
Questions
Auxiliary verbs

Part I Your Holidays / Vacations

A vacation is what you take when you can no longer take what you've been taking.
(Earl Wilson)

No man needs a vacation so much as the man who has just had one.
(Elbert Hubbard)

Grammar (1)

Make questions about holiday time using auxiliary verbs.

Questions about summer holidays:

Hint!

Auxiliary verbs:
do, have, will, be, can, would, …

1. How … you usually (spend) your summer holidays?
2. What … you (do) if you stay at home in summer?
3. …. you often (go) away during your holidays?
4. ….. you ever (be) abroad?
5. … you (use) English on your vacations?
6. What countries/cities/interesting places … you (visit)?
7. …. you (enjoy) your holidays this summer?
8. What ….. you (do) this summer?
9. Some people take advantage of the vacation to do things around the house (e.g. home repair, changing furniture, painting). … you (do) anything like that this summer?
10. How different (be) this holiday to others you had before?
11. What places …. you recommend for tourists who come to our country?
12. What (be) the best holidays you …. ever (have)?
13. What … you probably (do) next summer?
14. What places …. you (like) to visit?
15. What (be) your idea of an ideal holiday?
16. If you … (need) money on holidays, what … you (do)?
17. How much vacation time … you (like) to have per year?
18. If you could choose any destination, where … you go on holiday?
19. If you had been in London in August 2012, what … you (do)?
20. If you had to describe your vacation with three adjectives, what … they be?

Speaking (1)

1. Talk to your partner about his/her holidays. Make use of some of the questions above.

2. Report some interesting points of your conversation to other students.

Listening (1)

1. Before you listen, discuss the following words and phrases with your partner.
package holiday, genuine, exhausted, blend, ancestors, trivial, follow the herd, species shots, chalet, ankle, pastime

2. Listen to six people speaking about their holidays. Below there are the main ideas of their talks. Match the speakers (1 -6) with the statements below (A –G). <u>There is one extra statement</u>.

A. Package holidays won't give you a lot of genuine experience.
B. You can really relax during beach holidays.
C. Holidays give a great chance to discover more about oneself
D. New places are the best places to go to.
E. Holidays are perfect for hobbies and pastimes.
F. Restful holidays involve family and friends.
G. Extreme sports can ruin your holiday.

Writing (1)

Write 6-8 sentences about your preferable pastime on holidays and whether you enjoyed these summer holidays or not.

Part II Your Language Learning Skills and Habits

Speaking (2)

Discuss with your partner or in a group:
How many foreign languages do you speak? What is your proficiency level in them?
What are your favorite language-learning activities?
What are your strong and weak points as a language learner?
What are your expectations of this particular English course?
Do you have your own strategies or methods of learning languages?

Listening (2)

Listen to Steve Kaufman, a successful businessman and a polyglot, who has founded a site for language learners called Lingq.com. He will be talking about his personal experience and secrets of learning languages. Listen to the first and the most important secret.
What is the main point of this talk? Discuss it with your partner or in a group.

Writing (2)

Write 6-7 sentences about your needs and expectations of this English course.

Module 1 BACK TO SCHOOL

Grammar focus:
Present tenses
Auxiliary verbs

Discuss these sayings with your partner.

What grows bigger and bigger if you share it? (a riddle)

Learning without thinking is a labor lost, and thinking without learning is dangerous.
(Chinese proverb)

…education at the university mostly worked by the age-old method of putting a lot of young people in the vicinity of a lot of books and hoping that something would pass from one to the other, while the actual young people put themselves in the vicinity of inns and taverns for exactly the same reason.
(from "Interesting times" by Terry Pratchett)

Part I It is Never Too Late to Learn

Warm-up (1)
Is there an age limit to get admission into a university in your country, in the USA and in the UK?
At what age do students go to university in your country?
Do you think it is more difficult or less difficult to study at an older age?

Vocabulary (1)
Match these words from the text with the definitions:

(1) commencement	humanities (grammar, poesy, rhetoric, Greek, Latin, literature)
(2) liberal arts	graduation ceremony
(3) to achieve	to complete your education at high school, university or college
(4) to graduate (from)	long life
(5) to attend	qualification you get when you graduate from university or college
(6) amazed	to stop hoping
(7) degree	extremely surprised
(8) longevity	to successfully complete smh
(9) to give up	to go regularly to a school or a class
(10) to postpone	to put back, to delay

Reading (1)
Read the text about an extraordinary university graduate and answer the comprehension questions after the text.

It's never too late to learn!
College diploma at the age of 94

It's never too late to learn. Just ask 94-year-old Hazel Soares. She is one of about 500 students to get their diplomas during a commencement ceremony at Mills College, in Oakland liberal arts college.

"It's taken me quite a long time because I've had a busy life," said Soares. "Finally, I've achieved it, and it makes me feel really good." Soares, who has six children and 40 grandchildren and great-grandchildren, is the world's second oldest person to graduate from college.

Another old lady, Nola Ochs from Kansas became the oldest when she graduated from Fort Hays State University at the age of 95, according to the Guinness Book of World Records.

Soares graduated from Roosevelt High School in Oakland in 1932. That was during the Great Depression and she couldn't afford college. She married twice and she raised six children and worked as a nurse. After her retirement she decided to continue her college education.

"We are really amazed and very proud of my mum," said Soares's youngest daughter. "The biggest thing that we can all learn is that we're never too old. She's really an amazing person. She doesn't plan to relax now that she finally has got her degree. She has been looking for a job for half a year. And finally next week she is having an interview in the San Francisco Bay area museum. She is taking this interview really seriously and getting ready for it. Hopefully, she'll get the job!"

Hazel Soares doesn't know the source of her longevity. No one in her family has ever lived as long as she has, but she believes it has something to do with eating lots of fresh vegetables. She has been driving for 70 years and she still drives, and she visits her doctor only once every three years to make sure she's OK.

"It is never too late to get a college education. There's no reason why you could not go to college," Soares said. "Some people give up the idea or postpone the idea. It isn't easy to go to school after 75 years interval, isn't it? But once you try it it's so exciting."

Comprehension (1)

1. What is so special about Hazel Soares?
2. Who is the oldest record holder to graduate from college?
3. Why did not Hazel attend college after she graduated from high school?
4. What are her job perspectives?
5. What is her health condition? What may be the source of her longevity?

Grammar 1 Present Tenses (auxiliary verbs)

1. What Present Tenses do you know?

2. Fill in the table with some more examples of Present Tenses from the text (Reading 1).

Present Simple	Present Continuous	Present Perfect Simple	Present Perfect Continuous
It <u>makes</u> me feel really good.	*She <u>is taking</u> this interview seriously.*	*It <u>has taken</u> me quite a long time.*	*She <u>has been looking</u> for a job for half a year.*

3. What are the auxiliary verbs in the Present Tenses? Why are auxiliary verbs used?

4. Read the following sentences. Comment on the university related words (underlined). Make questions to these sentences according to the model.

Model: Where do you study? (I study experimental physics at Duke University.)

1. Where …….? (I study at NSU in physics department.)
2. Where……...? (I'm now doing my <u>PhD</u> at the University of Michigan.)
3. How long……...? (I've been studying general physics for three years.)

4. What ……in? (I major in biomedical physics.)
5. ……. ……...? (No, I haven't got my Master yet.)
6. What ……...? (My major is biophysics and my minor is the German language.)
7. How many……? (You need to take 180 credits for Bachelor in Physics.)
8. What……..? (I've registered for a dance class this semester.)
9. Who…….? (His name is William Brown and he is your academic adviser.)
10. ……...? (Yes, they call me to the Dean's office rather often.)
11. ……. ……? (Yes, I always cram for my exams.)
12. How many …….? (I've been living in the dormitory for two years.)
13. Who……? (This year I have a new roommate called Sam.)

5. Make negative statements to the sentences in ex.4.

6. Write 5-6 sentences about your education using Present Tenses.
example: I'm a second year student at Novosibirsk State (University). (I'm in my second year …)
I've been interested in physics since …

Speaking (1)

In pairs, use some questions from ex.4 to talk about *you*. Tell the class three interesting things you have learnt about your partner.

Listening (1)

1. Before listening make sure you understand the following words and phrases:
exchange (students), compulsory education, academic / vocational learning, 6-th form college, A-levels, GCSE, term (planner), overcrowded, timetable / schedule, bang on time

2. Listen to 6 people talking about their college education. Match the given statements (A –G) with the number of the speakers (1 – 6). There is one extra statement.

speaker	1	2	3	4	5	6
statement						

A. Exchange programs are important for your studies.
B. Organizing your studies efficiently is important.
C. Education is never extra when you haven't yet chosen a career.
D. Speaking a foreign language is useful for exchange students.
E. College atmosphere motivates students to study.
F. Learning a foreign language is never extra.
G. College discipline policy can be too tough.

3. Speak about your own college experience. Is it positive or negative? Is it useful?

Part II E-learning: Pluses and Minuses

Warm up (2)

1. Discuss these questions with your partner:
What is e-learning?
What people are interested in e-learning?
Have you ever done e-learning?
Do you think you will do it at some point of your life? Why?

2. What do these abbreviations stand for? They all have to do with education. Discuss with your partner.
MIT, Cal Tech, DIY, PhD, BS, MS, MA, GPA, TOEFL, GRE, GCSE, A-levels

Vocabulary (2)

Match these words from the text with the definitions:

1) curriculum	(a) a candidate for a university place or a job
2) pilot program	(b) a very smart person
3) to enhance	(c) a plan of subjects or things that are taught in a school or college
4) applicant	(d) refresh, improve, develop
5) to brush up	(e) a successfully completed part of a course at a university or college
6) credit	(f) a student in his first year at a university or college
7) to drop the class	(g) to increase, enlarge
8) freshman	(h) a small experimental project to test the idea
9) brainiac	(i) very important, serious
10) major	(j) to leave, withdraw, quit studying

Reading (2)

Read the text from the *Popular Science* magazine about the Internet education. Some parts have been taken out of the text. Where do they belong?

Homeschooled

The world's most prestigious universities have begun posting entire curricula on the Web – for free. But how much can you really learn with a DIY online education? One of the *Popular Science* journalists has given it a try.

Now I am taking my first physics class of my life, at the age of 35, it is at the Massachusetts Institute of Technology, and my professor is Walter Lewin, one of that institution's most respected instructors.

OK, I am not really "at" MIT. And "taking" the class may be a stretch. I am watching the video of one of Lewin's lectures from the comfort of my backyard in Brooklyn. Lewin is a star of MIT's OpenCourseWare (OCW). OCW program is a Web publication of every class taught in its halls and an example of a new kind of education built around a vast library of free online courseware.

Why will someone who is not paying $38,000 or getting a single credit take a course at MIT?

_____

MIT for free

How is the Internet going to change the education? And what is MIT going to do about it? A for-profit distance learning program doesn't make sense for MIT.

The problem is that MIT is, by its very nature, an exclusive institution, which accepts only 12 percent of its applicants, who pay a small fortune for the privilege of attending. If MIT puts a version of that online and still awards credit, it will potentially devalue the university.

_____

OCW went live as a pilot program in 2002 with 50 courses. Five years later MIT celebrated the publishing of its 1,800th course, and today more than 250 schools around the world have similar programs. And there is much more beyond MIT – sites like Academic Earth, Google Code University, YouTube EDU and thousands of free or for-profit sites teaching everything.

Reality check

"In physics we explore the very small of the very large," Levin is standing in front of the class in khaki pants, blue T-shirt and sandals. Lewin has dismissed the American system of measure as "extremely uncivilized". He bases his classes on the metric system. Now he is rolling the film "Powers of 10," at which point my screen has gone black. A note indicates that copyright prevents the film from being included. (Actually, only 79% of the OCW come with video lectures, other 21% come with audio.)

Day one, and I have stumbled over an important limitation of OCW experience.

_____

One week has passed by. I have been watching Levin's 50-minute lectures but I have understood almost none of them. I have been looking down at my scrawls for an hour or so. They all look like hieroglyphics. And so, in a departure lounge at Miami International Airport, in the middle of Levin's words "We are now coming to a much more difficult part, and that is multiplication of vectors," I have decided to drop the class.

Can't afford not to do OCW

No text or video, no matter who builds it, will ever be a substitute for an actual MIT education. (Or an education from Cal Tech, or Sorbonne, or anywhere else.) You can't actually use the labs or interact with faculty, who are the real draw of a college.

And that leads me to a few Free Online School Rules I'd learned by the end of my experiment:

1. You get what you pay for. "Free" means no asking questions in the middle of class.
2. It might help if you actually buy the textbook.
3. Free online learning is not going to teach you anything substantial overnight, or in a week. Plan to do a whole course.
4. We are at the beginning of this experiment, not the end.

So, why are institutions doing this?

_____

(adapted from 'Popular Science', 2009)

Some parts have been taken out of the text. Where do they belong?

a) You can already see it. OCW can enrich current students and faculty, enhance the institution reputation, provide an opportunity to show off to the prospective students. An institution can't afford not to do OCW. In five years all major institutions will be opening courses to let the world see what they do. It's a no-brainer, right?

b) Instead, if MIT puts everything out there for free, but with no offer of credit or degree, it will be great for the school's image, and it will be a tremendous resource for actual MIT students. It will cost a lot of money, sure, but it will give the whole world the opportunity to sample an MIT education. Shigeru Miyagava, a professor of Japanese and linguistics at MIT speaks of the program with idealism. "Why are we doing this? We are doing this because of the belief that knowledge, when you share it, expands."

c) MIT (or any other school) doesn't have the right to give away copyrighted materials such as films or textbooks used in class. Will I survive the experiment using only what is completely free? That turns out to be a major problem. It is clear that I am not equipped with the same academic basis in math or physics that the first-semester freshman is. Obviously, I can't ask a question, either.

d) For one thing, OCW offers elite teaching. College students at lesser schools can stretch themselves (32% of MIT's OCW users are enrolled at another college.) A high-school physics teacher can brush up on the laws of thermodynamics - or become a better teacher by observing different methods of instruction. An engineer can beef up by taking tests from the advanced-level classes to identify stuff he should know but doesn't. And then there are just curious people like me. I wonder: What's an MIT course like, anyway? Can I, more than a decade out of school, hang with these young brainiacs? I just want to see if I, in a month, balancing a semi-regular schedule and lots of other job and family obligations, can actually learn something.

Discussion (2)

1. Answer the questions:

1. In your opinion, what are the pluses and minuses of OCW?
2. Do you have OCW at your university?
3. What are the perspectives of OCW?

2. Question-game

Make up 5 questions basing on the content of the text. In groups, check all the questions and pick up 10 most interesting ones. Let the other group answer them and answer their questions. Count the score. Which group has won?

3. Group Discussion

Students are divided into groups. Each group writes 5 statements (facts and opinions) about OCW program at MIT. Then the students read their statements and the students of the other group have to agree or disagree giving at least one argument.

Students make use of the list of phrases for discussion:

Grammar (2) Present Simple vs. Present Continuous, State Verbs

1. In the first paragraph of the text "Homeschooled" find the examples of the Present Simple and Present Continuous Tenses. Explain their usage.

2. Which tense do we use in the following cases? Think of your own examples.

a) habitual and repeated actions
   with adverbs of frequency (e.g. *always, often, sometimes, seldom, never*)
   to say how often something happens
   for facts that are always true (permanent)
   for situations / states that are usually true

b) for actions in progress at the moment
   with *always*, to show that something happens often and is annoying
   for situations / states that are true for a limited period of time (temporary)
   with verbs that describe states (mental, attitude, sense, possession and some other)

3. Complete the sentences with Present Simple or Continuous.
In pairs, comment on the verb form.

1) Usually students *go / are going* to college right after high school.
2) Each semester Laura *takes / is taking* some extracurricular classes. This time she *takes / is taking* drama class.
3) Who *makes / is making* this terrible noise? I can't stand it!
4) - I *live / am living* in Cardiff at this moment. I *do / am doing* my Master in social studies.
   - Really? My cousin *lives / is living* near Cardiff. She *works / is working* in the hospital there.
5) Oh no! I haven't got my keys again. I *always lose / am always losing* my keys!

4. Complete the sentences.
1) He often _____ (work) on Saturdays. He _____ (not work) today, though. I think he _____ (be) sick.
2) - In my drama class we _____ (put on) a play by a Polish playwright.
   - How boring! I never _____ (go) to the theatre.
3) - How are you? How _____ the holiday _____ (go)?
   - We _____(have) great time!
4) - They _____ (publish) the university newspaper once a week.
   - Yes, I know. My brother _____ (work) there at the moment as a reporter.

State Verbs

Verbs that describe states are not usually used in the continuous form. Common state verbs include:

Mental / thinking verbs	agree, believe, know, remember, think, understand
Attitude verbs	hate, love, like, wish, need, prefer, want
Sense / perception verbs	hear, see, smell, taste
Appearance, qualities	appear, look (=seem), seem, sound
Being, possession	be, belong, contain, have, own
Other verbs	cost, fit, mean, owe

5. Choose the correct form of the verbs. Mind state verbs!
1) - Jessica *thinks /is thinking* of studying abroad.
   - I *think / am thinking* it will be a real challenge for her.
2) - I *make / am making* a new costume for the fancy dress party. My old one *doesn't fit / isn't fitting* any more.
   - Oh, *I love / am loving* your old dress! May I try it?
3) - *Does this watch belong / is this watch belonging* to Fred?
   - I *don't' know / am not knowing*. It could be Fred's.
4) – *Do you believe /are you believing* her?
   - We *think / are thinking* she is making it up.
5) –*Do you see / are you seeing* that tall man over there? It's William Ernst, our new academic advisor.
   - I *know / am knowing*. I *see / am seeing* him tomorrow morning to discuss my research work.

6. Use the Present Simple or Present Continuous of the verbs.

1) We _____ (have) lunch at the moment.
2) This soup _____ (taste) awful!
3) I'm not eating all the yoghurt! I _____ (taste) it to see if it's still OK.
4) I _____ (love) this shampoo. It _____(smell) of coconuts.
5) Sophie _____ (think) I watch too much television.
6) My college _____ (have) some very good sports facilities.
7) _____ you _____ (see) that red car over there? It's Ben's.

7. Complete the sentences with the verbs from the box. Use Present Simple or Present Continuous. Mind the use of state verbs.

cost	*cry*	*not agree*	*need*	*prefer*	*understand*	*wait*

1) _____ you _____ how this works?
2) I'm afraid I _____ with you.
3) Excuse me, how much _____ these DVD players _____?
4) What's the matter, Becky? Why _____ you _____?
5) I _____ soul music to rap.
6) Hurry up! Nikki and Anna _____ for us.
7) If you _____ some help at college, there are some good advisors there.

Listening (2)

1. Before you listen

Imagine you are a student studying in the UK. Think of five things that may be a problem for you.

2. Listen for general meaning

Listen to Jenny, a lecturer at a London university, talking about various problems her foreign students have. Read the situations below. What does Jenny mentions as common problem(s) for her students?

a) level of English lower than required
b) difficulty understanding the language used in class
c) difficulty understanding the language used socially
d) discussing students' personal life experience in class
e) writing essays
f) feeling homesick
g) not having qualifications for the course

3. Listen for details

Listen again and answer the following questions?

a) What is the name of the MA course that Jenny teaches?
International _____ and _____
b) Put the tick by the countries she says her students come from this year.
Japan / Poland / India / Brazil / Russia / Pakistan / Indonesia / Thailand
c) Do the students have the right level of English? (Yes / No)
d) All foreign students write essays in the same style as British students. (True / False)
e) Homesick means missing family and friends. (True / False)
f) Some students are doing their second MA. (True / False)
g) One student complained that people spoke to her very s_____ and l_____.
h) Jenny thinks that her students' past lives are not important to the course. (True / False)

Speaking (2)

1. Read the dialogue. Who are the speakers? Where does the talk possibly take place? Act it out with your partner.

- Hi, Dan, it's so nice to see you! How're you doing?
- Pardon… Do I know you? Have we met before?
- Sure, last year, math study group. Remember? I'm Steve, Steve Jones.
- Oh, Steve! Haven't seen you for ages! You look a bit different. And why are you wearing this funny hat and a gown? Getting ready for your drama class?
- Actually, we are preparing a fancy dress welcome party for our first years.
- Oh, great! Do you always do this for the freshmen? I have never heard about it!
- It's the first time we are doing it. You can join us if you want.
- Sure, sounds like fun!

2. What tenses are used in the dialogue?
What is the difference between these phrases: *How're you doing? / What're you doing?*
What is missing in these sentences? *...Haven't seen you for ages! ...Getting ready for your drama class?*

3. Make your own dialogue using underlined phrases as a basis.

Part III Studying Abroad

Listening (3)

1. Before you listen:
Imagine what you would personally do if you were going to study abroad and wanted to minimize possible problems.

2. Listen for general meaning:
Listen to the second part of the interview with Jenny, the lecturer at London University. She is giving advice to international students. Which pieces of advice are mentioned by Jenny and which are not?

a) do some academic reading in advance
b) when you are there, do not waste your time on social events
c) go to the website of the university and see what's available
d) try to hide away for a bit when you arrive in a place
e) if you feel low, don't show it to other people
f) be optimistic and expect that it's all going to be 100% perfect
g) consult with special supporting services

3. Listen for details:
Listen again to Jenny's talk. Here is an extract from it. Fill in the gaps with missing words in this:

-Yeah, and looking out for a kind of social events that are specially designed to _____1_____ students. And sometimes I think you know when you arrive in a place you just want to kind of _____2_____ for a bit. But actually forcing yourself to go to some of those _____3_____ in the beginning is a good way to begin to meet people. And probably, not to expect that it's all going

to be _____4_____, straight away and to understand that it will be _____5_____ and times where you miss home but there will also be many good times and for most of the students come away feeling really really _____6_____ as well as getting the qualification, they make _____7_____ that they can keep through a life. So, I wouldn't be put off by the _____8_____ that I've told.

-Yes, everyone feels the same as well, I mean lots of the students who will be feeling the same, won't they?

-Yeah, that's right. And look out for the support because if they are feeling low these are people whose job is to help students who are feeling in distress. So, look out for those services if you feel that you are in need, don't just skip or hide away, and keep it to yourself.

Reading (3)

1. Do you know the answers to the following questions?

What is the ECTS? Why is it used? What three levels of higher education are defined in ECTS? What credit range is required for these levels?

2. Now read the text and elicit the answers to the questions from exercise 1.

The Bologna Process and the European Credit Transfer System (ECTS)

The Bologna Process is a European initiative to bring about transparency and compatibility across higher education in Europe. Bologna process is the creation of the European Higher Education Area. The main objectives of the Bologna declaration are to increase the mobility and employability of European higher education graduates thus ensuring competitiveness of European higher education on the world scale. The Russian Federation joined Bologna process in 2003.

The Bologna Process defines three cycles of higher education: Bachelor's, Master's, and Doctoral. An important aspect of enabling student's mobility, and particularly moving on to a further degree in another country, is a system of credits, used for recognition and accumulation – the European Credit Transfer System (ECTS).

The ECTS grading scale is defined by the European Commission. Since many different grading systems co-exist in Europe, and considering that interpretation of grades varies considerably from one country to another, the ECTS grading scale has been developed in order to provide a common currency and facilitate the transfer of students and their grades between European higher education institutions. Grades are reported on a carefully calibrated and uniform A–F scale. Each institution makes their own decision on how to apply the ECTS grading scale to their own system.

The typical credit ranges are 180-240 for the first (Bachelor's) cycle and 90-120 units for the second (Master's) cycle. There is no credit range for the third cycle. All science and engineering courses are assigned a value in terms of ECTS units.

Grammar (3) Present Perfect vs. Past Simple

1. Which tense do we use in the following cases? Think of your own examples.

a) to talk about an action that happened in the past and has a result in the present (+ just, already, yet); we don't say when it happened because it isn't important

to talk about general experiences in our lives up to now (+ *ever / never*)

to talk about an action that started in the past and continues in the present <u>with state verbs</u> (+for, since)

b) to focus on a recent activity, not on its present result
to talk about an action that started in the past and continues in the present (+for, since)
to focus on how long
c) to talk about situations that finished in the past
to talk about the exact time of the past actions
to give more details about recent events

2. In pairs, comment on the use of the verb forms.

1) - Have you ever flown in a helicopter?
   - No, but I have flown in a plane.
2) Tom has hurt his leg. He can't go with us.
3) - Anna has always wanted to travel abroad.
   - I think her brother has already been to Spain, Italy and France.
4) I met Sam two years ago.
5) I've known Sam for two years.
6) Tom broke his leg two years ago.
7) - Have you heard? Mary's had a baby!
   - When did she have it?
   - Last night.
8) She passed her driving test yesterday.
9) - Have you seen Molly recently?
   - I met her last week.
10) I haven't taken this course yet.
11) I moved to London in 2002.
12) I've been living in London since 2002.
13) I've been painting the kitchen. There's one more wall left.
14) Ooh! I've painted the kitchen. Now we can move in!
15) I've been shopping since ten past ten.

3. Use the Present Perfect or the Past Simple of the verbs in brackets.

1) The kitchen is a mess because nobody _____ (do) washing-up.
2) Has she still got her car or _____ she _____(sell) it?
3) A lot of new people _____ (join) our drama class this semester.
4) A lot of new people _____ (join) our drama class last semester.
5) They _____ (move) to a new place last summer.
6) Two students _____ (raise) $500 for charity. They _____ (cook) a three-course meal for seventy people.
7) I _____ (learn) to ride a scooter. Now I can go on scooter everywhere.
8) - _____ Sophie ever _____ (talk) about her course?
   - No, she _____ (never / mention) it.
9) I _____ (be) very busy since January.
10) Are they still doing exams or _____ they _____ (finish)?

4. Present Perfect vs. Past Simple. Use *since / for / yet / in / ago* for time reference.

1) - So, have you started college _____?
   - Yeah, I've been there _____ Monday, just a few days really.
   - What are you studying?
   - Sport science. I've wanted to be a sport teacher _____ I was a little boy.

2) - Do you want to go to the gym?
- OK. I haven't been there _____ last week.
- Last week? I haven't been there _____ a month!
3) - How long have you been in the chess club?
- Just a few months. _____ Christmas. And what about you?
- I joined the club _____ March. It's great! I love it! I used to play chess with my dad. But we haven't played _____ ages.
4) - I've known David _____ years.
- Have you?
- Yes, I've met him ____ 2004.
- Really? I haven't met him _____. I only came here a week _____ .

Part IV Physics Department

Reading (4) (scanning for information)

Imperial Department of Physics

1. Read the info from Imperial College booklet and answer the following questions.

1. How is Imperial Department of Physics ranked?
2. What is the proportion of academic and research staff to the total number of students?
3. What requirements do you have to meet to enter the department?
4. How can you get more information about admission?
5. What degrees are offered by the department?
6. How much time does it usually take to do these degrees? And how many credits?
7. Answer the same questions about your department. Find some differences and similarities. What would you change in your department?

- Back to Undergraduate Prospectus
- Back to Faculties and departments

UCAS code	ECTS	Courses	Length
F300	180	Physics (BSc)	3 years
F325	180	Physics with Theoretical Physics (BSc)	3 years
F303	240	Physics (MSci)	4 years
F390	240	Physics with Theoretical Physics (MSci)	4 years
F309	240	Physics with a Year in Europe (MSci)	4 years
F3W3	310	Physics and Music Performance (BSc)	4 years
N/A*	186	Physics with Science Education (BSc)	3 years

**Apply for any other Physics course (apart from BSc Physics and Musical Performance) and transfer at the end of the second year.*

Overview

Total expected intake: 235
Research assessment

Ranked 2nd in the UK (based on volume of world-leading and internationally excellent research)

Staff:student ratio 1 : 11.1
Minimum A-level grades

- A in Mathematics
- A in Physics
- A in one other subject

Minimum IB score

- 39 points overall
- 6, 6, 6 at higher level, including Mathematics and Physics

These are the minimum entry requirements for the Department – actual entry requirements may vary. See Entry requirements.

Further information

Visit Imperial

Physics

- BSc Physics with Science Education
- Physics with Science Education
- Physics with Science Education

physics

The study of the universe and its origins; the understanding of how matter behaves through space and time.

Departmental website

- Physics

Science and Engineering Open Day: 27 June 2013

Physics First Year Project Open Day: 22 June 2012 (registration necessary)

Find out about campus tours, our interactive map and more

Admissions Tutor

Dr Robert Forsyth

Enquiries

+44 (0)20 7594 7513
ph.admissions@imperial.ac.uk

Discussion (4)

The survey of 4,000 people was carried out by YouGov-Cambridge, the results were then analyzed by Pearson Centre: Respondents were asked for one single word that explained why people choose to enter higher education. The most frequent word was … guess what?

1. What are the best universities in your field? Can you name the top ten? Discuss with your partner or surf the Internet.

2. Discuss the following questions about the University Life in the UK.

1. How many years does it take to do bachelor, master, doctorate degrees?
2. How much does university cost for undergraduate students, postgraduate students, foreign students?
3. How much does an average student have in debts after graduating from a British university?
4. When can students get some extra money?
5. What are some extracurricular activities for university students?

3. What else would you like to know about higher education in the UK?

4. Now the teacher will show you the computer presentation made by a British second year student about university life in the UK. Try to find the answers to your questions.

Speaking (4)

Make your own presentation about the department / university you study in or you are interested in. You can use multimedia, or posters, or just the blackboard.

Grammar (4) Present Perfect Simple / Continuous

1. Read the following paragraph from the text about the OCW at MIT. Comment on the use of the underlined grammar forms. Translate the paragraph.

One week has passed by. I have been watching Levin's 50-minute lectures but I have understood almost none of them. I have been looking down at my scrawls for an hour or so. They all look like hieroglyphics. And so, in a departure lounge at Miami International Airport, in the middle of Levin's words "We are now coming to a much more difficult part, and that is multiplication of vectors," I have decided to drop the class.

2. Present Perfect Simple / Continuous

1) - We've just *bought / been buying* a new computer.
   - Can I see it?
2) – Is Jane still in her room?
   - Yes, she has *revised / been revising* for the test all day.
3) – Sorry I'm late.
   - That's all right. I haven't *waited / been waiting* long.
4) - Have you *finished / been finishing*?
   - No, but you can use the computer. I don't need it.
5) – I've *tried / been trying* to phone you all day!
   - I was at the sport centre.

3. Present Perfect Simple / Continuous.

Use the prompts to write questions and answers with *How many?* and *How long?*

example: films/ she/ act in? six; seven years
- How many films has she acted in?
- She acted in six.
- How long has she been acting?
- She's been acting for seven years.

1. books/ she/ write? three; ten years
2. pizzas/ he/ cook? four; one hour
3. kilometers/ they/ cycle? thirty; 8 a.m.
4. games/ they/ play? five; four thirty
5. shirts/ he /iron? ten; he got up
6. pictures/ he /painted? three; four weeks

4. Present Perfect Simple / Continuous

Complete the second sentence so that it means the same as the first, using the word in bold.

1) Emma started typing that report two hours ago.
Emma _____**been**____ that report for two hours.
2) We met Joanna two years ago.
We _____**known**_____ two years.
3) Peter and Martha got married in 2005.
Peter and Martha _____**since**_____ 2005.

4) I've never read such a weird article before.
This is the _____**ever**____ read.
5) This is the first time I've ever acted on stage.
I _____**never**_____ on stage before.

5. Present Perfect Game

Students write 2 true and 2 false statements about their academic experience and university life using the Present Perfect Tense and then question each other to decide whether they are true or false.

examples: *1) This semester I have attended all laboratory classes. 2) Since my first year I have had three academic advisers. 3) I have never been called to the Dean's office, etc.*
Then ask your partner: *Have you attended all the labs this semester?*

Grammar (5) Present Tenses Review

1. Translate the sentences from Russian into English and put them into right column:

Present Simple V(-s/-es)	**Present Continuous** am/is/are + Ving.	**Present Perfect** have/has+V3	**Present Perfect Continuous** have/has + been +Ving

2. Use the correct verb forms to complete the student's profile. With your partner, ask and answer questions about Chris's university life.

Chris (Imperial College London, Engineering, 2nd year)

Career Choice?
I _____ [1](always / want) to be a computer engineer. As a child I _____[2] (want) to be a footballer, then a lawyer. At the age of eight I _____ [3](have) my own computer and since that time I _____ [4](destroy) seven computers with my curiosity, so it is the only subject for me.
I _____ [5](study) Electrical Engineering in Imperial College since 2009.
Favourite class?
At the moment my favourite class _____ [6](be) Language Processors as it's a fascinating subject and a very cool lecturer _____[7](teach) it.
Hobbies?
I _____ [8](be) quite an F1 fan, and Red Bull is my team. I'm pretty sure the amount of their drink I _____ [9](consume) has lead to a good number of advancements for the car.
Dream job?
My dream job _____ [10](be) to work for either Apple or an F1 race team.
Other interests?
I am an enthusiastic member of the College Chocolate Society. Hopefully, I'll set up an Apple Mac Society next year.
Living arrangements?

Currently I _____ [11](live) off-campus with four friends who I _____ [12](live) with in Halls last year. I _____ [13](have) the world's greatest housemates. The best part of it is the kitchen conversations that usually last till 3 in the morning.
Ways to relax?
To unwind after a hard day of labs I usually _____ [14](hang around) the campus with my buddies, _____ [15](go) to a free gig or to the club

Writing (informal letter)

1. Look at the letter a student has written to her American friend. Her teacher has used symbols to correct different kind of mistakes. Make sure you understand all the symbols.

T- Tense
P - Punctuation
WO – Word Order
Prep – Preposition
Sp - Spelling
WW –Wrong Word
Gr - Grammar
ʌ - Word missing
¶ - Paragraph

2. Read the letter and correct the mistakes.

Hi, Caroline!

How are you? I got your message in Prep Tuesday. Sorry, I didn't reply at once. I have been very busy this week, mainly with work for college. You know P I'm taking enveronmental Sp biology this semester, which turned out ʌ be really heavy WW. We have huge home assingments Sp and field research.

Also, Paulo, my new roommate needs some help of mine. He is ʌ first-semester freshman and has some tongue WW as well as academic problems. Also he is struggling to accommodate ʌ our terrible weather. By the way, it rained T for three days it haven't Gr stopped yet. ¶ Anyway, this weekend we arrange T a potluck dinner in our dorm for all our freshman Sp. Hopefully, can we WO eat out and make barbeque.

Sorry P I've got to rush to the next class.
Give me a ring or we can skype on Saturday.

Keep in touch,
Dan

3. Here is another student's letter. Have fun reading it. What has actually happened to Jane?

Dear Mom and Dad,

It has now been three months since I left for college. I am sorry that I haven't written before. I will bring you up to date but before that you'd better sit down. Okay?

I am getting along pretty well now. The skull fracture and concussion I got when I jumped out of my apartment window when it caught fire after my arrival here is pretty well healed. I only spent two weeks in the hospital. Now I can see almost normally and only get these sick headaches once a day. Fortunately, the fire and my jump were witnessed by Roger, an attendant at the gas

station, and he called the fire department. He also visited me in the hospital. As I have nowhere to live he was kind enough to invite me to share his apartment with him. He is a very fine man, and we are planning to get married. We haven't set the date yet, but it will be before my pregnancy begins to show. His divorce is final now. We are going to take care of his three kids together.

Now that I have brought you up to date I want to tell you that there was no fire, I did not have a concussion or skull fracture, I was not in the hospital, I am not pregnant, I am not engaged, and there is no divorced man in my life.

However, I am getting a "D" in Art and an "F" in Biology and I want you to see these marks in the proper perspective.

Your loving daughter,

Jane

4. Write a letter home or to your friend giving some of your news. It can be quite serious or humorous. Then exchange your letters and correct them (if necessary) using special symbols from ex.1.

Word Formation

1. Complete the word chains. Mind the parts of speech.

similar (adj) - _____ (n), similarly (adv)
differ (v) - _____ (n) – different (adj)
_____(v) – attendance (n) –attendant (n)
long (adj) – _____ (n) – length (n)
respect (n) – _____(v) - _____ (adj) – respectful (adj) – respectfully (adv)
shorten (v) - short (adj) - _____ (n) –_____ (adv)
value (n) – valuable (adj) – _____ (v) - _____ (v)
inform (v) – _____ (v) - _____ (n) - _____ (adj) – informative (adj)
use (v) – _____ (n) - _____ (adj) – useful (adj) – user (n)
_____ (n) – curricula (n, pl) – extracurricular (adj) – curriculum vitae
_____ (v) – decision (n) – _____ (adj) – indecisive (adj)
_____ (n) – brainiac (n) – no-brainer (n)
_____ (v) - celebration (n) – celebrity (n)
_____ (v) – equipment (n)
require (v) – _____ (n)
_____ (v) – retirement (n)
_____ (v) – _____ (n) - wonderful (adj) - _____ (adv)
amaze (v) - _____ (adj) – _____ (adj) –_____ (n)

Check yourself with the help of the Words List Un.1 (see in the end of the textbook).
What suffixes form nouns? How else can nouns be formed?

2. Complete the text using the words in brackets to form the appropriate part of speech.

Professor Levy is an _____ (amaze) lecturer and a _____ (respect) scientist. He is a _____ (celebrate) in the world of science. After his _____ (retire) he made a _____ (decide) to establish a _____ (scholar) for real brainiacs. In addition to tuition fee, it will cover all living expenses. `The _____ (announce) has been placed on the _____ (inform) board. The _____ (require) for the scholarship are tough. You must have an excellent _____ (attend) record and stay in the top five list of the department for the period of three years. No student has stayed in the top five list that _____ (length). So Levin has decided to _____ (shorten) the period to two years. I think I will apply though my attendance isn't really excellent. I _____ (wonder) if I can pass!

Module 2 **THE FUTURE OF WORK**

Grammar focus:
Future forms

Discuss these sayings with your partner.

Whenever you are asked if you can do a job, tell'em, - certainly I can, - and get busy and find out how to do it. (Theodore Roosevelt)

Choose a job you love, and you will never have to work a day in your life. (Confucius)

A lot of fellows nowadays have a B.A., M.D., or Ph.D. Unfortunately, they don't have a J.O.B.

PART I
Warm-up
Discuss the following questions with your partner, then report to the class.

1. Fifty years ago, experts predicted that in the future people would work less, and have more free time for themselves and their families. How true has this become? How likely is this to change in the future?
2. In some companies workers choose their own hours. If you choose your perfect working week, how will you do it? Think about *working hours, free time, days off, flexi-time, weekends, meetings, holidays, lunchtime*

Reading (1)

1. Read the text. Does your perfect working week comply with the predictions given in the text? Summarize the main ideas of this article; the subheadings may help you.

Two Billion Jobs to Disappear by 2030

SOME JOBS TO COME, SOME JOBS TO GO

Some jobs are disappearing, but there's still a future for work. Automation and information are changing the economic landscape and forcing workers to forge new career paths as the idea of permanent employment is becoming more and more out-of-date. Industries that **undergo** this **impact** won't disappear, but the number of jobs that they support will change dramatically.

Since 1970, manufacturing jobs as a percentage of total employment have declined from a quarter of payrolls to less than 10%. These jobs will probably not be replaced in the future. This is a part of transition toward a postindustrial economy. Jeff Dachis, a founder of Razorfish, coined the phrase 'everything that can be digital, will be. The question is, what is the future of work, and what can we do about it?

EMERGING TRENDS

The old model of work provided an enormous level of predictability as people knew how much they would earn on a monthly basis. So they were able to maintain large amounts of debt. The consumer economy **thrived** on this system for more than half a century.

The new trends for the workplace have **significantly** less built-in certainty. Location-based and formal jobs will continue to exist, of course, but this will become smaller parts of the overall economy. We will all need to rethink our sources of economic security. We will also become more resilient and capable of adapting to change.

Fixed hours, fixed location, and fixed jobs are quickly becoming a thing of the past for many industries. The 40-hour workweek is becoming less **relevant** as we see more subcontractors, temps, freelancers, and self-employed. Uncertain economics make **long-term** employment contracts less realistic, while improvements in communications make it easier to subcontract even complex jobs to knowledge workers who **log in** from airports, home offices, and coffee shops.

WORKPLACE ENVIRONMENT

Getting office space in the traditional sense will be expensive because of multiyear **leases,** renovation costs and monthly utilities. Although companies will provide space and opportunity for people that don't have it, employers will build support systems to benefit their workers, wherever they are and if they are formally employed or not.

Imagine an office where meetings will be optional. Nobody will be talking about how many hours they worked last week. People will have an unlimited amount of vacation and paid time off. Work is done any time and anywhere, based entirely on individual needs and preferences. However, there is **a catch**: quality work needs to be completed on schedule and within budget. As a result, people will be happier with their lives and their work, companies will benefit, too, with increase in productivity.

(adapted from the article "Two Billion Jobs to Disappear by 2030, by Thomas Frey, Journal of Environmental Health, June 2012)

2. According to the text, are the following statements true or false? Find the relevant sentences in the text to prove it.

1. In the future people will change jobs more often than now.
2. Since 1970, wages in manufacturing jobs have decreased by 15%.
3. By 2030, all manufacturing jobs will have been automated.
4. It is becoming more and more difficult for people to predict their monthly income.
5. Eventually, people will have to adjust to the new working patterns.
6. Subcontractors will work at least 40 hours per week.
7. Knowledge workers can work from wherever they are able to log in.
8. There will be no offices in the traditional sense.
9. There won't be any strict requirements in future work.
10. Work will be mostly result oriented.

3. Answer the following questions:

1. What changes are industries undergoing? Why?
2. What were the most important features of the old model of work?
3. What trends will emerge in the workplace?
4. What workplace improvements will people have in the future?

Vocabulary (1)

1. Look at the highlighted words in the text in Reading (1). What do you think they mean?

2. Match the highlighted words from the text to the correct definitions.

a. closely connected with the subject you are discussing or thinking about;
b. a legal agreement that allows you to use a building, a piece of equipment, some land for a period of time;
c. considerably, greatly, well;
d. to perform the actions that allow you to begin using a computer system;
e. to experience sth, especially a change, or sth unpleasant;
f. a hidden difficulty or disadvantage;
g. to become, and continue to be successful, strong, healthy, etc. ;
h. long-lasting or having an effect over a long period;
i. the effect or influence that an event has on sth.

3. Match the terms for employment with their definitions.

self-employed	a temporary employee in an office
temp	a person who works for him/herself, not employed by a company
freelancer	a person who works independently and sells his work to different companies
subcontractor	a person or company that does part of work given to another person or company

5. Use the following expressions to discuss pros and cons of the different types of employment (see ex. 4).

communicate with the employer and co-workers through the Internet;
make work easier and less stressful;
work in the relaxed atmosphere at home;
plan the working day in a more productive and convenient way;
be less time-consuming;
commute to the jobs;
have more time to work effectively;
have positive effect on the environment;
difficult to concentrate a home;
feel lonely at times;
not to be involved in the everyday life in an office.

6. Word formation: complete the table

verb	**noun**	**adjective**	**adverb**
1. _____	contractor	_____	contractually
2. _____	_____, _____	manufacturing	-
3. _____	predictability, _____	_____	_____
4. consider	_____	_____	_____
5. _____	productivity	_____	-
6. define	_____	_____	_____
7. _____	_____	unlimited	_____
8. employ	_____, _____, _____	_____	-
9. _____	quality	_____	_____
10. complete	completion, completeness	_____	_____

7. Choose the correct item.

1. My father gets a **wage/salary** of $60,000 a year.
2. The **perks/ bonuses** of this job include a company car and a mobile phone.
3. Please bring a copy of your **CV/application form** when you come for your interview.
4. If you want to **appoint/ apply** for the job you should write to the company.
5. I was made **redundant /fired** when the company closed down.
6. He left his **post/vacancy** at the company when he was invited to work for another company.
7. She is a(n) **experienced/ trained lawyer**; she has worked for several law firms since she left university.
8. She is a **full-time/ part-time** teacher – she only works twelve hours a week.

Grammar (1) Review: Future Forms

be going to **+ infinitive**	**present continuous: *be*+verb-*ing***	***Will, shall*** **+ infinitive**
Future plans and intentions He **is going to apply for** a grant. **Are** you **going to buy** a new car? **I'm not going to go** to New York next week.	**Future arrangements** They **are moving** to the new office in October. They're **meeting** at 10.00. She's **leaving** on Friday.	**Instant decision** I'**ll check** it myself. I **will help** you in a minute.
Predictions I think they're **going to win.** (They're playing very well.) It's **going to rain.** (The sky is very dark)		**Prediction** He **will make** a good manager.
		Offer **I'll carry** that bag for you. **Shall I help** you with your report?
		Suggestion **Shall** we **start** the meeting?
		Promise I **won't tell** anybody where you are.
Use *going to (*NOT *will / won't)* when you have already decided to do something. With the verb *go* you can leave out the infinitive. *I'm not going (to go) to New York.*	You can usually use present continuous or *going to* for future plans / arrangements; *going to* shows that you have made a decision. *We're going to get married in the summer.* Present continuous emphasizes that you have made the arrangements. *We're getting married on July 12th* (e.g. we've booked the church).	Use *will / won't* (NOT the present simple) for instant decisions, promises, offers, and suggestions. Use *shall* (NOT *will)* with *I* and *we* for offers and suggestions when they are questions. Use *will* or *going to* for predictions.

WILL
1) to predict future events
e.g, Robots will replace humans in farming.
2) After verbs and expressions like **<u>be afraid, be/feel sure, believe, doubt, expect, think</u>**, etc.**,** to talk about our hopes and expectations about the future.
e.g. I hope people will be happier with their work in the future.

BE GOING TO
1) to express the speaker's intention to do sth.
e.g. What are you going to do when you graduate from university?
2) to make future predictions where the speaker has evidence that sth will happen
e.g. Look at the screen! The device is going to break down.

GOING TO or WILL?
1. *Going to do sth* implies an intention and a plan, and *will+ inf* implies intention only. Often the action is decided at the moment of speaking.
Compare: 1. I'm going to take an exam next week.
2. –What do you want to drink? - I'll have apple juice, please.

2. *Going to do sth* usually refers to the near future. *Will* can refer either to the near or distant future.

3. We use *will* to talk about what we think or believe will happen. We may have no evidence.
e.g. I think people will become happier in the future.
We use *going to* to talk about sth in the future which we can see will happen as a result of sth in the present.
e.g. His breaks have failed! He's going to crash!

Grammar Practice: WILL or BE GOING TO

1. Find examples of *will*, and *be going to* in the text for Reading (1).

2. Choose the correct verb in the sentences.

1. In ten years jobs *will be/are going to be* much more specialized, more virtual, and more part-time.
2. - Your printer doesn't work.
   - OK, I*'ll/'m going to* replace the cartridge.
3. -You look tired.
   - I know. I*'ll/'m going to* take a break.
4. - Did you remember to order a new antibacterial filter?
   - Oh no! I'*ll/'m going to* call the dealer.
5. I hope I*'ll/'m going to* find some information on available programs in our department on the Internet
6. I'm sure he*'ll/'s going to* use only printed or electronic resources.
7. – I forgot to tabulate the latest quantitative indices.
   - That's OK. I*'ll/'m going to* do this for you.
8. I don't think they*'ll/ are going to* do this experiment in our lab.
9. –It's time to start work.
   - I know. I*'ll/'m going to* put the specimen into the chamber.
10. If anything goes wrong, the symbol *will / is going to* flash for two seconds.
11. –The internal temperature of the device is very high.
    -OK, I*'ll/'m going to* adjust it.
12. - Don't forget to close the door. The acoustic alarm *will / is going to* sound after a minute.

3. Complete the sentences. Use *will* or *be going to*. Explain your choice.

1) Matt probably _____ (not come) with us. He doesn't like football.
2) Don't worry about the spot on your shirt. I'm sure nobody _____ (notice) it.
3) It _____ (be) a lovely day today. Look at the clear blue sky.

4) We can have the party here. I'm sure the neighbors _____ (not mind) the noise.
5) The traffic is very bad this morning. We _____ (be) late for our meeting.
6) Don't worry, I _____ (pay) you back soon.
7) I'm sure he _____ (do) well at his interview.
8) In ten years' time, people's lives _____ (not be) very different.
9) I _____ (stay) in today. I'm coming down with the flu.
10) I'm sure we _____ (win).

4. Complete the conversation with *will* or *be going to.* Act it out with your partner.

A: I'm sorry you don't feel well.
B: Thanks, I'm sure I _____ (feel) better soon. I've decided to stay in bed today. I _____ (not do) any work on my report.
A: _____ you come to the office tomorrow?
B: I don't know. I haven't decided yet.
A: I could give you a lift.
B: Really? That would be great! I don't think my brother _____ (let) me borrow his car.
A: I _____(pick) you up at about eight. OK?
B: Yes, lovely! Thank you very much.

5. Complete the conversation with *will* or *be going to* and the verbs from the box. Act it out with your partner.

be	call	give	live	move	rent	study

A: Do you plan to go to university?
B: Yes. I _____ medicine in London.
A: Brilliant! I'm sure you _____ a great doctor!
B: Thanks!
A: Where _____ ?
B: I don't know. I haven't arranged anything yet. I think I _____ a room in a house with some other students. The problem is that everything is very expensive.
A: My brother _____ to London next month. He has just bought a flat there. I _____ you his phone number. He might be able to help you.
B: Thanks very much. I _____ him tomorrow.

Present Simple or Present Continuous?

6. Use Present Simple or Present Continuous to complete the sentences. Explain your choice.

1) We _____ (go) to Manchester by bus tomorrow morning.
2) Our bus _____ (leave) here at seven thirty.
3) The bus _____ (get) to Manchester at four thirty.
4) My sister _____ (not come) with us.

7. Complete the e-mail with Present Simple or Present Continuous.

Hi Dan,
What _____ (you / do) on Saturday? Amy and I _____ (go) to the sale at Mediamarkt. We _____ (meet) outside the shop at nine. I think we_____ (not have) much

time there as our sociology class _____ (start) at ten thirty. It _____ (finish) at twelve, so I can meet you after that. Or do you want to come to the sale with us?

Ruth

Listening (1)

1. Before listening, discuss the following questions with your partner.

Which of the skills you've learned or are learning do you think will continue to be useful for your job in 2030? (time management, multi-tasking, speaking English etc,)
What personal qualities will help you to function in a rapidly changing job market?

2. Listen to a part of a lecture about the future of the labor market. Circle the answers which are correct according to the recording: <u>a, b, or both.</u>

1. The speaker describes the transition
    a) from an agriculture-based economy to an industrial economy.
    b) from an industrial economy to today's information economy.
2. Technology has caused people to become redundant
    a) in industry
    b) in office jobs
3. Fashion designers, actors and inventors
    a) have a creative element to their work.
    b) can also be replaced by machines.
4. Hairdressers are mentioned as an example of
    a) a creative job.
    b) a job requiring interpersonal skills.
5. In the future, it may be necessary to
    a) adapt to changing circumstances.
    b) learn new jobs several times during your life.

3. In pairs or small groups discuss the following questions.
1. Do you know anyone who retrained for a new job? What did they do before? What do they do now? Why did they make the change?
2. Do you think it's true that creative jobs can never be done by robots or computers? Why? How about caring jobs?

Speaking (1)

1. What do you think the job of physicists involves?
In pairs, think if it fits each of the following qualities and add some more ideas.
be good with figures
be a good listener
have a 'can do' attitude
work well in a team
have an eye for details
be good at using your own initiative
be able to meet tight deadlines
keep calm under pressure

2. How do you think the work of a physicist will change in 100 years? In what ways do you think it will be the same?

PART II

Listening (2)

1. Before you listen match the situations 1-6 with the phrases a- f.

1 job interview	a) low wages, go on strike
2 a new job	b) unemployed, on the dole
3 workers feeling dissatisfied	c) pension, part-time job
4 asking for a pay rise	d) previous experience, CV
5 getting fired	e) starting salary, benefits
6 retirement	f) doing my job well, improved qualifications

2. Listen to 5 short dialogues related to work. Match the speakers 1-5 to the statements A-F. There is one extra statement that you do not need to use.

A. Someone is going to retire soon.
B. The boss is threatening to fire someone.
C. Employees are protesting against unfair treatment.
D. Someone is trying to get a job with an airline.
E. Someone is trying to get a pay rise.
F. Someone is explaining to new employees how good their job is.

3. Listen to the dialogue again. Complete this list of advantages of the job the person is talking about:

"We've got the best starting (1) s_____ in the country; fantastic (2) b_____: six weeks' (3) p_____ h_____ a year, guaranteed (4) s_____ p_____, free (5) d_____ c_____ for pre-school children."

Reading (2)

1. Before you read, discuss the following questions with your partner. Then report to the class.

Can you predict what jobs will be easily replaced in the near future? Can you think of any downsides of the replacement?

2. Read the texts below. While reading, try to answer the questions in the text. Pay attention to the highlighted words.

Two Billion Jobs to Disappear by 2030

Significant and fast-paced change will be occurring across society in general. The clearer our sense for the future is, the more able we are to take advantage of trends working their way through **virtually** every aspect of our lives today.

AUTOMOBILE TRANSPORTATION GOING DRIVERLESS

For the next 10 years the first wave of autonomous **vehicles** will be entering the roads with some of them delivering packages, groceries, and fast-mail envelopes. Driverless technology will initially require a driver, but it will quickly creep into everyday use much as airbags did. First as an expensive option for luxury cars, but eventually it will become a safety feature stipulated by the government.

The greatest benefits of this kind of automation won't be realised until the driver's hands are off the wheel. With over 2 million people involved in car accidents every year in the USA, it won't take long for legislators to be convinced that driverless cars are safer and more effective.

What related jobs will have gone away by 2030?
What jobs will have appeared by 2030?

EDUCATION

The Open Course Movement took hold in 2001 when MIT started recording all their courses and making them **available** for free online. They **currently** have over 2,080 courses available that have been downloaded 131 million times. Now, the Internet offers over 500,000 courses from 1,000 universities that have been downloaded 700 million times. All these courses are free for anyone to take. Courses are becoming a **commodity.** Teachers will only need to teach once, record it, and then move on to another topic or something else. Teaching requires experts. Learning only requires coaches. With all of the assets in place, we will be moving quickly into the new frontier of a teacherless education system.

What related jobs will have disappeared by this time?

ROBOTICS

Nearly every physical task will probably be done by a robot at some point in the future. As a result, bots will be gradually replacing humans in fishing, mining, farming, building. Warrior drones will replace soldiers.

What new jobs will appear in the future?

FINAL THOUGHT

Certainly, there is a **downside** to all this. The more technology we rely on, the more breaking points we will have in our lives. Driverless drones can deliver people. These people can deliver bombs or **illicit** drugs as easily as pizza. Robots that can build a building can also destroy it. Al this technology can make us fat, and lazy; thus we won't be solving the problems but aggravating them. We are not well equipped culturally and emotionally to have this much technology entering into our lives. There will be backlashes, 'destroy the robots, or 'damn driverless cars campaigns with legislation trying to limit its influence. At the same time, most of the jobs getting displaced are low-level, low-skilled labor positions. Our challenge will be to upgrade our workforce to match the labor demand of the coming era. Although it won't be an easy road ahead, it will be one filled with amazing technology and huge potentials as the industries shift.

(adapted from the article "Two Billion Jobs to Disappear by 2030, by Thomas Frey, Journal of Environmental Health, June 2012)

Vocabulary (2)

1. Try to guess the meaning of the highlighted words from the context.

2. Match those words to the correct definition.

a) that you can get, buy, or find;
b) a product or a raw material that can be bought or sold;
c) at the present time;
d) almost or nearly, so that any slight difference is not important;
e) a thing that is used for transporting people or goods;
f) not allowed by the law;
g) the disadvantages;

3. Make up your own sentences with the words from ex.2.

4. Word Formation

There are certain prefixes which are used to form new words. However, there are no certain rules to follow to form one word from another.

co- = with (cooperation) **over-** = to much (overeat) **post-** = after (postgraduate)
re- = again (reread) **sub-** = under (subgroup) **semi-** = half (semiconductor)

5. Find the words with these prefixes in the texts for Reading (1), (2) and translate them.

Speaking (2)

Do you agree with the futurologist's predictions (see the text in Reading 2)? What other jobs will go away or appear in the future?

Grammar (2) Future Continuous (will + be +Ving)

1. To express an action which starts before a definite future time and probably continues after it.
   e.g. This time next month I'll be travelling to France.
2. To talk about future events or actions that are already decided.
   e.g. I'll be working on my project this week.
3. To talk about sth that is not planned, but will happen because it is part of a routine.
   e.g. I'll be practicing my English tomorrow at school.

1. Find examples of Future Continuous in the text for Reading (2).

2. Complete the sentences with the Future Continuous form of the verb in brackets.

1. Don't call her tonight: she…(study) for her exam.
2. When…you…(install) the new equipment?
3. I…(see) him tomorrow. Do you want me to take anything?
4. They…(redo) the experiment again in the near future.
5. Why…you…(work) all day on Sunday?
6. He…(take) his exam some time next week.
7. This time next week we…(lie) on a beach.
8. I…(write) to his teacher.

9. We…(do) a lot of swimming in the next few months.
10. Hurry up! The supervisor…(arrive) at any minute!

3. Say what you will be doing at the following times tomorrow.
a) 06.30; b) 09.10; c) 13.00; d) 18.30; e) 23.00.
Future Perfect (will + have +Past Participle)

1. for an action that will be finished at some time before a certain date in the future
It is normally used with time expressions like *by then, by the year 2015,* etc.
example: I will have built myself a house by the year 2015.

2. With expressions like *if all goes well, if it goes according to plan,* etc., to talk about future
example: If all goes well, I will have retired by the age of 55.

4. Use Future Perfect to answer these questions.
1. A man smokes ten cigarettes a day. How many will he have smoked this time next year? Approximately how much will he have spent (use the current price)?
2. A girl saves $5 a week. How much will she have saved in a year's time?
3. A mechanic repairs three cars a week. How many will he have repaired in two years' time?
4. A woman eats 300 grams of vegetables every day. How much will she have eaten by this time next month? How much will she have spent (approximately)?

5. Complete the sentences with the Future Perfect form of the verbs below.

develop build perfect disappear introduce finish clean stop install

1. By 2020 this village _ into a small town.
2. By the end of this year, transport authorities_ a ban on smoking in buses and taxis.
3. Come and see me at ten. I_ my homework by then.
4. When he has been in England for ten years, he_ his English.
5. By the time you get home I _ the house from top to bottom.
6. Let's hope the volcanic eruption_ before we arrive on the island.
7. All being well, we_ the fire alarm by 20.00.
8. By 2030 a lot of manual jobs_ .

6. Use the Future Perfect to answer these questions.
What do you hope you will have done…
...by this time next year?
...by the end of the year?
...within the next five years?
...by the time you retire?

7. Complete the sentences using the Future Continuous or the Future Perfect form of the verb in brackets.
1. If all goes well, I _____ (make) five presentations by the end of the semester.
2. He _____ (not leave) university by the age of twenty.
3. What _____ you _____ (do) this time next week?

4. In ten years' time the world _____ (change) a lot.
5. If we don't hurry the lesson _____ (start) before we get to the university.
6. This time tomorrow the students _____ (write) Grammar Test.
7. If all goes well, he _____ (finish) the experiment in two months' time.

PART III Looking for a Job

Warm-up (3)

Discuss with your partner what your short- term and long- term goals are.
1. Short-term goals
Write down all of your classes for this semester and the grades *you are going* to receive. This is a list of short-term academic goals for the semester. Discuss them with your partner. Are your short-term plans realistic?

2. Imagine your future life in 15 years and think of your long-term goals.
Discuss these questions with your partner:

1. Where will you live? What city or town? What state or country?
2. Will you live in a house or an apartment?
3. What will you do for leisure/fun/vacations?
4. Will you have a family? Children?
5. What educational degrees will you attain, and what will be your career/job?
6. How successful or satisfied will you be with that career or job?

Listening (3)

1. Before you listen
a. What do you think is meant by the saying "There's no better time to look for a new job when you're quite happy with your old one"?
b. On today's job market many applicants may compete for few openings, so several people can be right for one job. Interviews are usually the deciding factor in the application process. What do you know about job interviews? Have you ever had one?

2. Listening
You will hear a radio interview with a woman advising people on how to get a job. Read the following sentences then listen to the recording and fill in the missing parts.

1. The two problems for those seeking work are getting… and performing well at it.
2. It's important that your CV is …
3. Once you've got a CV you should send it to possible…
4. To find a job you first look in … regularly.
5. The night before the interview you should get enough …
6. For a job interview you should wear the …
7. Make sure you arrive for the interview …early.
8. You should also be … to the receptionist.
9. Don't …before the interviewer asks you to do so.
10. During the interview, you should not … or chew gum.

3. After-listening
What else can you advise for those who are going to look for a job?

4. Vocabulary development
In addition to the technical interview specific to each field, a candidate should be prepared to answer some other questions, for example "What's your greatest strength?" Look at the following examples of personality traits, think of the corresponding nouns and find the ones that apply to you.
example: accurate – accuracy (I'm very accurate. / Accuracy is one of my strong points)
adaptable, cooperative, creative, dependable, flexible, mature, organized, persuasive, punctual, responsible, tactful, helpful, conscientious, diligent, earnest

Reading (3)

1. Before you read let's think about the future. What fields of employment will be the most popular when you graduate from university?

2. Read the text below to check your guesses.

The Most in-demand Jobs of 2020

This is what we know: By 2020 an additional 21 million jobs will be needed for the U.S. to return to full employment — and we know these jobs will be radically different from those of years past. Health care, business services, leisure and hospitality, construction, manufacturing and retail account for 66% of today's employment. By the end of the decade, those industries will account for 85%, according to a June 2011 report from the McKinsey Global Institute (MGI). Those fields may sound familiar, but the nature of work is changing. According to Susan Lund, director of research at MGI, jobs are becoming much more specialized, more task oriented, more virtual and more part-time. But what will those jobs actually look like? To get a better idea, TIME Moneyland spoke with Lund and conducted some of our own research to get specific examples of the jobs that will be in-demand in the next decade.

3. Here are some of the in-demand jobs of the next decade. Read eight texts and guess the jobs. Can you explain what these people do?

Text 1 _____

_____ work in coordination with health care teams to provide information and support to individuals and families with birth defects, genetic disorders and inherited conditions. They can also help answer the tough questions: What should I do if I have a gene for a genetic disease? Will my baby get it? Traditionally, _____worked primarily with patients making decisions about their unborn children, but as the cost of decoding a full DNA sequence — now around $5,000 — will be declining, the demand for _____ capable of advising families on the tough stuff will continue to increase. Those who pursue a career in the field are going to have a good income: according to a 2010 survey from the National Society of Genetic Counselors, the average salary for a _____ is approximately $63,700, but can be as high as $150,000, and 89% of _____ report being satisfied with their job.

Text 2 _____

The first Baby Boomer (*born between 1946 and 1960*) turned 65 this year. By 2029, all Boomers will be at least 65 years old. The size of the group, estimated at 70 million, combined with an increase in life expectancy, means the demand for ____ _____ is not only growing, it's

going to become a crisis. According to the Eldercare Workforce Alliance, within 20 years one in five Americans will be over 65 and an estimated 90% of them will have one or more chronic conditions. But the current health care system lacks the capacity to care for them. Because of this, _____is going to be the fastest growing employment sector within the health care industry. Overall, an estimated 3.5 million _____ will be needed by 2030. "These are not jobs that can be automated," Lund said.

Text 3 _____

This year may as well have been the year of the hacker. Members of Lulzsec, Anonymous and other hacker groups targeted the likes of Sony, Citigroup and the Turkish government, temporarily shutting down sites, leaking usernames and passwords, and publishing fake news stories. The mischief pointed out widespread weaknesses in computer security systems in the U.S., which increasingly relies on data networking for financial, transportation, telecommunications and military operations. According to a November 2010 report from the Center for Strategic and International Studies, the lack of cyber defense is in part due to a severe shortage of _____. The report estimates there are currently only some 1,000 people in the U.S. who have the specialized security skills to operate effectively in cyberspace, and somewhere between 10,000 and 30,000 people are needed in the field in order to meet the computer security needs of government agencies and large corporations.

Text 4 _____

The world's population just keeps getting bigger. A few weeks ago we hit 7 billion. By 2050 more than 9 billion will call the Earth home, and an estimated 80% of us will live in cities with food access problems. Add to that the fact that we could eventually run out of productive soil and water — not to mention other vital problems associated with modern agriculture such as deforestation, chemical-laden fertilizers and carbon-emitting transportation — and it's easy to see why roof-top farms are cropping up in urban areas nationwide. Though full-fledged vertical farms, called "farmscrapers," exist only in theory and experiments today, with the increasing urban population, the need for those who specialize in locally grown, sustainable (*kept at a steady level without damaging the environment*) food will only increase.

Text 5 _____

Companies are mining tons of data on all of us, but they have little idea how to use it. And a mountain of data with no one to interpret it is basically worthless. "Every time you swipe your credit card you're giving a company a large amount of data," Lund said. "Companies have a huge amount of data, but they need people who manipulate it to be useful for them so they can better understand how to target consumers." According to the *New York Times*, the rising demand for _____ is a byproduct of the dramatic increase of digital data. From the digitization of public records to massive amounts of information sent out each day through social media, in every industry there is a large amount of raw data out there to be explored. _____ are those who look for meaningful patterns and insights to do things like help Google make its search engine results more accurate and help Netflix better their movie recommendation system. The field will be growing 13% from 2008 to 2018, according to the Bureau of Labor Statistics.

Text 6 _____

Lund says one of the biggest surprises in her research was the number of employers who said they were having difficulty finding highly skilled _____. She speculates this is

because in the push for every American to have a college degree, _____ work is being overlooked as a good career option. But not only is it viable — it's lucrative (*money-making*). Lund cited one oil company that, because of a shortage in qualified workers, was offering $150,000 to welders to work on underwater pipelines. But since underwater welding might not be for everyone, here are other in-demand _____ jobs that pay higher than average wages: building inspectors, electricians, elevator installers and repairers, manufacturing technicians and aircraft mechanics.

Text 7 _____

In today's green-obsessed age, navigating the world of government regulations and environmental standards is a full-time job — literally.

As companies aim to be more environmentally friendly, they are increasingly looking for employees who have knowledge of carbon accounting, corporate social responsibility and economical manufacturing techniques. In fact, there is a 40% increase in the number of companies looking for _____ professionals just in the past year. One such company is Coca-Cola, which appointed a new Chief _____ Officer in May and created an office of _____ that, according to the *Wall Street Journal*, will oversee the company's recycling, water management and climate protection. Look for other companies to follow suit, as any large-scale institution that has a lot of facilities to maintain will need to be thinking even more about _____sustainability in the future.

Text 8 _____

The field of manufacturing has changed so much you might no longer recognize it. "Manufacturing is no longer just a row of unskilled laborers standing at an assembly line," Lund said. Instead, there is a demand for advanced manufacturers who have a narrowly focused, but high-level, skill set. The good news is training for these jobs generally only requires a two-year associates degree from a program dedicated to training students for work in fields such as specialty chemicals or precision toolmaking. _____ are responsible for many of the products we use every day — from cell phones to smoke detectors — that are developed using a computer, rather than piece by piece on an assembly line.

(by Kayla Webley, *http://moneyland.time.com/2011/11/21/nine-jobs-of-the-near-future*)

After-reading

Prepare a short retelling of one of the jobs.

Present it to your partner without naming the job and replacing the name with some other words like 'this professional' or 'this profession'. Has your partner guessed which profession you tried to describe?

Writing (4)

1. How to write a Resume

When you apply for a job or wish to continue your education, you are likely to be asked to present your resume. This document may prove crucial for your future. Although there are no standard forms for resume writing, the hints below can give some useful guidelines. (use past and present simple, "I" should be left out)

Your name
Your contact information
(home address/ phone/e-mail)
(optional: date and place of birth, marital status, citizenship)

Objectives (*the position you want*)
Education (*in reverse chronological order*)
University of ... (*city, country, date*)
Employment and Work Experience (*in reverse chronological order*)
Honors and Awards
Grants, Scholarships
Courses
Participation in Conferences and Seminars
Fields of Interest
Language Proficiency
Native language
Foreign languages
References are available upon request

2. Design your own resume

Listening (4)

1. Before you listen complete the sentences with the correct prepositions.

1. What are you interested _____
2. Are you the kind of person who is often worried _____things?
3. What sports are you good_____?
4. Why are you applying _____this job?
5. In your family, who are you similar _____and who are you different_____?
6. What music are you most keen _____?
7. When you decide to go _____holiday, what does it depend _____?
8. What are you most proud _____in your life?
9. Do you believe _____ things like horoscopes?
10. What do you hope to be doing _____10 years?
11. What do you do _____your spare time?

2. What questions do you think an interviewer and an applicant could ask at a job interview? Choose from the above exercise and add your own ones.
Now listen to the dialogue and write down two of the interviewer's and two of the applicant's questions.

Speaking (4)

Prepare to role-play an interview with a partner. Follow the instructions below.

1. Interviewees should prepare for the interview by making notes about:

-any relevant experience and qualifications you've got
-qualities that make you a suitable person for the job
-your plans for the future
-any further questions you'd like to ask

2. Interviewers should prepare for the interview by making notes about:

-how to start the interview
-questions to ask about relevant experience and qualifications
-questions to ask about personal qualities that make the candidate a suitable person for the job
-questions to ask about plans for the future
-how to finish the interview

3. Working in pairs, act out a job interview using expressions from the box below. Start as in the example.

What is/are…, I'd very much appreciate…, Could you tell me…, Would you be able to…, Would you mind…, etc.

e.g. A: Hello, Miss Jones. Thanks for coming. Please, sit down.
B: Thank you, sir.
A: Firstly, where did you see the advert for this post? …etc.

4. Discussion: would you give your interviewee the job? Why/ Why not?

Module 3 DISCOVERIES AND INVENTIONS

Grammar focus:
Past Tenses

Test Your Grammar

Read the joke about Albert Einstein. What verb forms are underlined? What is the difference in their use? Find some more examples of different Past Tenses.

Albert Einstein toured around the country and gave lectures. His driver used to sit at the back of the hall during each of his lectures. After a period of time, the driver remarked to AE that he could probably give the lecture himself, as he had already heard it several times.

So at the next stop on the tour, AE & the driver switched places. Now AE was sitting at the back, in driver's uniform, while the driver was giving the lecture, flawlessly. At the end, a member of the audience asked a detailed question about the subject. The lecturer replied that the answer to the question was quite simple and even his driver could answer it. He said that his driver was just sitting at the back there.

Grammar Review

Past Simple, Past Continuous, Past Perfect Simple / Continuous

Use PAST SIMPLE to talk about consecutive actions in the past.	*She bought a hat and then she ordered coffee in a café.*
Use PAST PERFECT to talk about smth which happened before the time we are talking about.	*When she wanted to pay, she saw that she had left her wallet in the department store.*
Use PAST CONTINUOUS to describe a longer continuous past action.	*It was raining when she left the café.*
Use PAST PERFECT CONTINUOUS to talk about an action continuing over a period up to a specific time in the past.	*She had been waiting for a bus for five minutes when it came.*

Reading (1)

1. Read the following text about the discovery of the photoelectric effect. Find all the examples of the Past Tenses. Draw the timeline of events connected with this discovery. Who did what and when?

Einstein's Radical Idea

A number of years earlier Herz had discovered the photoelectric effect, but it was Philip Lenard who examined it in detail in 1902. He published his results a few years later.

Einstein saw Lenard's paper and took an immediate interest in it. He had seen Plank's paper earlier and had been looking for a way to use the "quantum idea" that Plank had introduced. The photoelectric effect was exactly what he needed. Plank had assumed the emission of the light took

place in discrete amounts (quanta). To Einstein it seemed more logical to assume that light itself was discrete.

Einstein submitted his article for publication in 1905. Coincidentally, Plank was the editor of the journal. When Plank looked it over he thought little of it, but he decided to publish it anyway. Years later, Einstein got the Nobel Prize for it.

PART II Famous Scholars

Warm-up (1)
Do you know what these people are famous for? Who did what? Match scientists and their achievements.

Isaac Newton (1642-1727)	…(understand) the fundamental relationship between voltage, current, and resistance
James Maxwell (1831–1879)	…(discover) radio waves
James Watt (1736-1819)	…(propose) that continents drift
J P Joule (1818-1889)	…(develop) a theory of atomic energy levels and excited state of electrons
Georg Ohm (1787-1854)	…(write) the best seller *A Brief History of Time*
Blaise Pascal (1623-1662)	…(bring) together the ideas of electricity and magnetism, he (predict) the existence of electromagnetic waves
Henrich Hertz (1857-1894)	…(help) to develop quantum field theory
Richter (1900-1985)	…(obtain) the wave equation governing quantum mechanics
Charles Darwin (1809-1882)	…(found) classical mechanics
Sigmund Freud (1856-1939)	…(improve) the steam engine, a unit of power (name) after him
Gregor Mendel (1822-1884)	…(study) the nature of heat and its relationship to mechanical work that (lead) to the theory of conservation of energy and the first law of thermodynamics
Alfred Wegener (1880-1930)	…(develop) a theory of heredity based on classical genetics
Niels Bohr (1885-1962)	…(develop) scale to measure the strength of an earthquake
Erwin Schrödinger (1887-1961)	…(write) about evidence and a mechanism for evolution
Richard Feynman (1918-1988)	… A unit of pressure (name) after him …
Stephen Hawking (1942-)	…(give) start to the psychoanalytic school of psychology

Grammar (2) Past Simple, regular / irregular verbs

1. Make sentences. Use Past Simple Active / Passive. Check your answers in pairs.
example: Isaac Newton founded classical mechanics.

2. In exercise 1 find all the verbs in Past Simple. Are they regular or irregular? Revise three forms of the irregular verbs. What are they used for?

example:
regular: found (founded, founded), ……..
irregular: bring (brought, brought), ……

3. Practice with your partner: ask and answer different types of questions using these verbs.
example:
What ideas did James Maxwell bring together? – Maxwell brought together the ideas of electricity and magnetism.

Listening (2)

1. Before you listen discuss these questions with your partner.

Have people always believed that the Earth goes round the Sun? Why do you think people would doubt this?

2. Listen to the radio program about Copernicus. Then complete these notes and listen again to check.

Nicolaus Copernicus ([1]_____) a Polish astronomer, provided the first ([2]_____) theory of the solar system.

Copernicus held many important positions and studied in many fields, including ([3]_____and_____). His ideas led the way for science to question theories already held. He called into question ([4]_____) that knowledge came from what we understood with our senses.

There were seven parts in his heliocentric theory. Firstly, the universe doesn't have one ([5]_____). Secondly, the Earth is not the centre of the universe. Thirdly, any centre of the universe is near the Sun. Fourthly, the distance from the Earth to ([6]_____) is nothing if you compare it to the distance from the Earth to ([7]_____). Fifthly, the fact that the Earth revolves explains why the stars also revolve. Sixthly, the apparent movement of the Sun is caused by the Earth revolving around the Sun. And finally, the apparent ([8]_____) of the planets is caused by the motion of the Earth, from which they are observed.

Moreover, he gave the correct order of ([9]_____) and he showed why ([10]_____).

Speaking (2)

Make your own top five list of the most important discoveries and inventions of all times. Explain your choice.

PART III Milestones in Physics

Warm-up (3)

Match the following names of the prominent physicists (A) to their achievements (B). Can you arrange them in chronological order?

(A) Maxwell, Ptolemy, Volta, Rutherford, Copernicus, Kepler, Galileo, Newton, Faraday, Hubble, Hertz, Rontgen, Becquerel, Thompson, Plank, Einstein, Bohr, Broglie, Archimedes, Schrodinger Townes

(B) X-rays, buoyancy principle, radio waves, radioactivity, the model of the solar system and the universe with the Earth at the centre, three laws of planetary motion, one of the first telescopes, the atom, the wave nature of particles, three laws of motion and the law of gravity, first storage battery, existence of electro-magnetic waves, electron, theory of special relativity, proton, model of the wave form of quantum mechanics, the idea of an expanding universe, MASER and LASER, the idea of magnetic field lines, the first quantum formula

Vocabulary (3)

Match these words from the text with the definitions. You can find them in the text (in bold) and check your answers:

(1) buoyancy	to continue to exist after a long time
(2) to survive	to make someone feel sure that something is true
(3) scholar	a sudden clear understanding of a situation or idea
(4) tiny	the ability of the object to flow
(5) to convince	growth
(6) investigation	the part of mathematics that deals with changing quantities
(7) insight	something difficult but interesting that tests strength and skill
(8) expansion	an attempt to find out the truth about something
(9) challenge	extremely small
(10) calculus	an intelligent and well-educated person

Reading (3)

1. Read the text and choose the best title for each paragraph. There is one title, which you do not need to use.

A Atomic physics
B Science in Classical antiquity
C Mechanical devices
D **Challenges** nowadays
E What we can learn from physics
F Ideas that speeded up the industrial revolution
G Scientific revolution and the origin of modern physics

Brief History of Physics

(1) Why do things fall to the ground, not away from it? Why do the stars move? Why does the Sun come up in the east and go down in the west? These are all questions that physics can answer, and a lot more…

(2) In the beginning, people answered questions like these in philosophical or religious ways. A Greek philosopher Aristotle (384 BC – 322 BC) developed his theory of five elements (earth, water, fire, air, and aether). Archimedes (287 BC – 212 BC) discovered his principle of **buoyancy**. Ptolemy (90 – 168AD), created an Earth-centered model of the Solar system (which **survived** for almost thousand years).

(3) The works of Eastern **scholars** reached Europe in the 12th and 13th centuries. There were studies of planetary motion by Indian astronomers, the theories of light from Buddhist and Persian thinkers and especially the work of the Persian philosopher Nasir al-Din al-Tusi on the planetary system. Eventually, these ideas pushed Europe into a scientific revolution. Copernicus explained the planetary motion in his Sun-centered system. Johannes Keppler formulated three laws of planetary motion. After Galileo had built one of the first telescopes, he noticed the phases of Venus and the four **tiny** moons of Jupiter, two things that **convinced** him in the Copernican system.

(4) The next great area of **investigation** was electricity and in the 19th century Michael Faraday first demonstrated an electromagnetic motor. Later, it was improved by James Clerk Maxwell, whose equations were also used to describe light. In proving Maxwell's equations, Heinrich Hertz discovered radio waves and Wilhelm von Röntgen, X-rays. Maxwell's work was also the starting point for Einstein's Theory of Relativity. At the same time, other scientists were working on thermodynamics, that is, the study of changes of heat in matter. Röntgen's discovery of X-rays and the work of Pierre and Marie Curie on radioactivity led to the development of the science of nuclear physics.

(5) In the first half of the 20th century, developments in physics were concerned with the structure of atoms. The parts of the atom were identified – its nucleus, protons and electrons. Also at that time, scientists such as Max Planck were looking at the relationship between matter and wave motion. The field of quantum mechanics, which explains not only how atomic particles move, but how the universe does, came into being.

(6) Since the 1970s, fundamental particle physics has provided **insights** into early universe cosmology, particularly the "Big Bang" theory. However, starting from the 1990s, astronomical observations have also provided the need for new explanations of galactic stability (the problem of dark matter), and accelerating **expansion** of the universe (the problem of dark energy).

2. The following sentences are cut from the text. Decide where they belong.

a) Physicists such as Robert Boyle, James Prescott Joule and many others set out the theories that allow us today to make use of engines and other mechanical devices.

b) In this theory, the light elements (fire and air) had a natural tendency to move away from the center of the universe while the heavy elements (earth and water) had a natural tendency to move toward the center of the universe, thereby forming a spherical earth. Since the celestial bodies - that is, the planets and stars - were seen to move in circles, he concluded that they were made of a fifth element, which he called aether.

c) Eventually in the 1940s, scientists in the USA were able to split a nucleus and the result was the world's first nuclear explosion.

d) In 1687, building on their work, Isaac Newton set out his Laws of Motion and modern physics was born. Moreover, Newton and Leibniz independently developed **calculus** (the branch of mathematics and the so-called language of physics).

3. Translate the sentences into English. When in doubt, check with the text.
1. Греческий философ Аристотель развил теорию пяти элементов.
2. Наблюдали, что небесные тела двигаются по кругу.
3. Архимед раскрыл принцип плавучести.
4. Птолемей создал геоцентрическую модель солнечной системы.
5. Кеплер сформулировал три закона планетарного движения.
6. Галилео построил один из первых телескопов.
7. Ньютон и Лейбниц независимо друг от друга разработали интегральное и дифференциальное исчисление.
8. Фарадей впервые продемонстрировал электромагнитный мотор.
9. Учёные использовали уравнения Максвелла для описания света.
10. Максвелл усовершенствовал электромагнитный мотор.
11. Были определены части атома, - ядро, протоны и электроны.
12. Рентген открыл Х-лучи.
13. В конце концов, учёные США расщепили атом.

Grammar (3) Past Simple vs. Past Continuous

1. Use the Past Simple to complete the sentences.
1. When Faraday (work) as an errand boy to a bookseller he (read) some of the books that (pass) through the shop. 2. He (be) particularly interested in works on science and he (begin) to do simple experiments. 3. Besides his own reading his only education (consist) of some lectures on natural philosophy and chemistry. 3. Humphry Davy (help) Faraday to become an assistant at the laboratory at the Royal Institute where he (begin) original investigations, initially in chemistry and then in electricity. 4. From 1816 to 1819 he (publish) 37 papers. 5. Faraday (become) interested in electromagnetism in 1821 and (make) some experiments. 6. Though they (be) unsuccessful, the phenomenon (excite) his interest and he (decide) to study it. 7. In the summer of 1831, after years of patient and persistent experiments, Faraday (discover) the electromagnetic induction.

2. Use Past Continuous to complete the sentences.
1) - What you (do) yesterday at 15.00?
   - I (play) tennis and my brothers (listen to) music.
2) It (rain) when we went out.
3) While he (learn) to drive he had many accidents.
4) When we first met you (study) English.
5) Who you (talk to) as I came in? I (talk) to my new secretary.
6) Where he (live) when you saw him last?
7) He (write) a composition when I saw him.

3. Read the beginning (a) and ending (c) of a story. Put the verbs into Past Simple or Past Continuous. Answer the questions, and make up the middle part of the story.

a) It (be) a dull Sunday morning and a cold wind (blow) down the empty High Street. Tom Ridley (walk) to the newsagent's to buy his Sunday paper when he (hear) a strange noise. Tom (stop) and (look) up and down the street, then he (realize) that the noise (come) from behind the heavy iron door of the museum.

b) …

c) After the police (arrest) the robbers, the owner of the museum (turn) towards Tom.
"Please accept this with my thanks", she (say) and (hand) Tom a cheque for $ 500. Tom (look) at the cheque and (smile) happily. "You're very, very welcome," he (reply).

Answer the questions:
1. Where and when did the story take place? 2. Who was the main character in the story? 3. What was Tom doing? 4. What happened? 5. What did Tom realize? 6. What happened in the end? 7. How did Tom feel in the end? 8. Can you think of a title for this story?

Listening (3)

1. Pre-listening: What do you know about Lev Landau?
2. You will hear part of a talk about a famous Russian physicist. Listen and complete the sentences.
1. As a child, Dr Landau was a mathematical ……..
2. He received his ……..at the age of nineteen.
3. Dr. Landau worked both in Russia and …….
4. He taught and influenced many outstanding……..
5. He received many prestigious ……, including the 1962 Nobel Prize in Physics.
6. ……. was named after him.

Speaking (3)

Work in pairs. The teacher will give you handouts. Look through the information about a famous Russian physicist. What is the name of the scientist?

Students A and B will have different information gaps. Ask and answer questions to complete the gaps.

example: *student A: How old was he when he entered Baku University?*

student B: He was fourteen years old.

Discussion (3)

What facts about Lev Landau impressed you most of all? Discuss in groups.

- I didn't now that… / I was impressed that… / I was surprised to know that… / It is absolutely amazing that…

PART IV A Story of One Discovery

Warm up (4)

Discuss with your partner:
Who discovered radioactivity? What elements are capable of radiation? Where is radioactivity used at present?

Vocabulary (4)

1. Match these words from the text with their definitions. You can find them in the text and check.

(1) rod	to become greater in size, number or importance
(2) output	useless substance that is produced during the process of making smth
(3) to adjust	long, straight piece of wood, metal or glass;
(4) to expand	to divide smth into two or more parts;
(5) fission	the power, energy, etc. produced by a piece of equipment
(6) to split	to change smth slightly to make it work better;
(7) waste product	to put smth into smth;
(8) to insert	a process of splitting an atom to produce large amounts of energy

2. Fill in the gaps with the suitable words from ex. 1:
1) You should use this button if you want to… the volume.
2) They … the tube into his mouth to help him to breathe.
3) When burnt, plastic produces dangerous … .
4) Manufacturing … has increased by 8%.
5) When the researchers … the device they received better results.
6) The lightning… the old oak near the lake.

3. Word building: complete the table

VERB	NOUN	ADJECTIVE
expand	-	-
-	contraction	-
divide	-	-
absorb	-	-
-	converse	-
appoint	-	-
adjust	-	-
eject	-	ejectable
split	-	-

Reading (4)

Read the text and answer the following questions:

1) What project did Fermi work on?
2) How does the process of fission work?
3) How was he able to achieve the control over the chain reaction?
4) What event proved Fermi's idea?
5) Can you give examples of the applications of his discovery?

Fermi Creates Controlled Nuclear Reaction

Enrico Fermi (1901-1954) left Italy in 1938 to receive the Nobel Prize for physics in Sweden. He never went back. He and his wife moved to the USA to escape Italy's fascism and anti-Semitism.

Fermi realized that nuclear **fission** was accompanied by release of colossal amounts of energy from the conversion of mass into energy. When scientists convinced President Roosevelt of this, Fermi was appointed to head a research team as part of a secret project to develop an atomic bomb. Fermi's task, however, was to create a controlled nuclear reaction; that is, to split the atom without creating a deadly explosion.

Theoretically, it was possible. During fission a neutron is fired at the atom's nucleus, which **splits** and ejects a neutron. This ejected neutron could split another nucleus, releasing another free neutron to split yet another, and so on: a self-sustaining chain reaction. If this chain reaction went too fast, it became an atomic explosion, but under control it could produce a steady flow of energy.

At the University of Chicago, Fermi worked with a team to find a way to control the chain reaction. He did this by setting up the equipment - atomic pile - so that he could **insert** a neutron-absorbing material into the midst of the fission process to slow it down or stop it altogether. He found that **rods** made of cadmium would absorb neutrons. If the chain reaction speeded up, the cadmium rods could be inserted to slow it down and could be removed to accelerate it again.

By the end of 1942, the team was ready for its first test. The equipment was set up in a squash court at the University of Chicago. It was December 2. The moment was tense: if their theories and experiments until now proved wrong, they could blow up half of Chicago. A few of the rods were pulled out, and the reaction began. More rods came out. The reaction was self-sustaining. The team could increase or decrease the energy **output** by **adjusting** the rods. Fermi's idea worked, and the first controlled flow of energy from a source other than the Sun was achieved. A coded message told the government of this success: "The Italian navigator has just landed in the new world."

Since then, Fermi's theory has been **expanded** and refined. Nuclear reactors have been built in many countries to supply energy for military uses such as nuclear submarines and civilian uses such as ordinary electricity. But incidents through the years showed the dangers of the process and of its **waste products**, and nuclear power lost much of its original popularity.

Grammar (4) Past Perfect vs. Past Simple

1. Read the following letter. The author went back to his home town after many years and wrote this letter to his friend. Put the verbs into Past Perfect.

Dear Chris,

Many things *had happened* since I last was in New Baytown. My best friend, Tony, was no longer there when I came. He *(go)* away. By the way, the neighbors told me on the first day I came here that Mr. Jackson didn't live in Oak street any longer. He *(leave)* too. You wouldn't recognize

the Grand Street. They *(change)* everything there. But on the whole I found the town much as it *(be)*, green and quiet.

On the second day I went to see our school and it was still there, but they *(add)* a new wing. The bookshop where we used to buy textbooks and pens was no longer there. It *(close)* down. But they *(build)* a new bookshop not far from it and *(open)* a nice café in the old building where the bookshop *(be).* On the whole, I was very pleased to see the place again. I *(not/see)* it for ten years, you know.

Yours,
Mike

2. Read the abstract from a biography. Put the verbs in past simple, past continuous, or past perfect.

- How did you hear of John Lennon's death?
- It (be) early in the morning and it (rain). I (work) at my office when I (get) a phone call. It (be) an American journalist who (tell) me that John (be killed). A fan (shoot) him in a hotel in New York. I (be) horrified. First I (start) thinking, 'Will I be next?' But then I (realize) that it was the end of everything. When I (get) home that night I (cry)

Listening (4)

1. Pre-listening: match the scientists with their achievements

Russian Nobel Prize winners in Physics:

(Vitaly Ginsburg and Alexey Abricosov / Andrey Geim and Konstantin Novoselov / Pyotr Kapitsa / Pavel Cherenkov and Igor Tamm and Ilya Frank / Lev Landau / Nikolay Basov and Aleksandr Prokhorov / Zhores Alferov)

1958 They were given the Nobel Prize for the discovery and description of the effect which is very important in nuclear physics.
1962 He received the Nobel Prize in Physics for his theory of superfluidity in helium.
1964 They received the Nobel Prize for a project which led to the development of the laser.
1978 He won the Nobel Prize for his work on low-temperature physics.
2000 He received the Nobel Prize for the development of the semiconductor heterostructures used in high-speed electronics and optoelectronics.
2003 They received the Nobel Prize for pioneering contributions to the theory of superconductors and superfluids.
2010 They received the Nobel Prize for groundbreaking experiments regarding the two- dimensional material grapheme.

2. Listening: Listen to an interview where a commentator is talking about the Nobel Prize.

Then answer the questions.

1. According to the speaker, what is the greatest reward for winning a Nobel Prize?

A the money B the medal C the certificate D the honour

2. How are people nominated for the Prizes?

A Alfred Nobel chooses them.

B The committee chooses one of the members.

C Institutions suggest people who have done outstanding work in their field.

D They are voted for publicly on the Internet.

3. Why did Alfred Nobel decide to set up the Nobel Prizes?

A He didn't know what to do with his money.

B He wanted to do some good with his money.

C He wanted to help scientists only.

D He wanted to show people how rich he was.

4. How much money did Alfred Nobel give to set up the Prizes?

A more than $400,000

B more than $400,000,000

C more than $40,000

D more than $4,000,000

5. According to the speaker, which is true about the Nobel Prize winners?

A Most of them are women.

B Most of them are men.

C Most of them are European.

D Most of them are young.

6. There is NO Nobel Prize for

A literature B physics C peace D mathematics

Writing

Write a short story (200-250 words) of one discovery or invention.

Word Formation

Complete the word chains. Mind the parts of speech.

_____ (v) - _____ (n) – discoverer (n)

flaw (n) - flaw (v) – _____ (adj) - _____ (adv.)

_____ (v) – introduction (n) – introductory (adj)

_____ (v) – _____ (n) – publisher (n)

resist (v) - _____ (n) - _____ (adj)

_____ (v) – foundation (n) – founder (n)

equal (adj) - _____ (adv) – equate (v) - _____ (n)

_____ (v) - _____ (n) – observatory (n) – observer (n)

_____ (n) – scholar (n) – scholarship (n)

_____ (v) - _____ (n) – expanding (adj) – expandable (adj)

investigate (v) - _____ (n) – investigator (n) – _____ (adj)

invent (v) – invention (n) - _____ (n) - _____ (adj)

Module 4 LONGEVITY

Grammar Focus:
Passive Voice, All Tenses

Check your grammar (1)

Match each sentence in the first column with the sentence in the second column:

1) New drugs are being tested.	a) There are always some volunteers who take new drugs under doctors' observation.
2) New drugs are tested.	b) Some volunteers have taken new drugs under doctors' observation and now there are some interesting results.
3) New drugs were tested.	c) Last year some volunteers took new drugs and the doctors monitored them.
4) New drugs have been tested	d) Some volunteers are taking new drugs under doctors' observation.

What tenses are used? What is the reason for arranging these sentences in two columns?

PART I Aging

Warm-up (1)

1. What do you think is important for a long life?
2. Why do you think people age?
3. What were the main reasons for early deaths of our ancestors?

Vocabulary (1)

Complete the sentences below with the words and phrases from the box. Translate the sentences.

average	life expectancy	aging	fault	maintain
ancestor	commit suicide	senescent	replicate	rejuvenation

1) _____ is a process of getting older.
2) _____ is a member of your family who lived a long time ago. (syn. forerunner)
3) _____ is the length of time that a person or animal is expected to live.
4) To calculate the _____ amount we add together several quantities and divide this by the total number of quantities.
5) _____ is a mistake in something, which prevents it from working properly. (syn. defect)
6) If a cell _____, it divides and produces exact copies of itself.

7) To _____ means to kill yourself deliberately.
8) _____ is a process of making something work much better or look and feel younger and stronger.
9) To _____ means to look after something, to keep in good condition by checking and repairing it regularly.
10) _____ means aging and showing the effects of getting older.

Reading (1)

Read the following article paying attention to the highlighted words. Answer the questions after the text.

Why Can't We Live Forever?

It is often said that our **ancestors** had an easier relationship with death, because they saw it much more often. Just 100 years ago **life expectancy** was shorter by about 25 years in the West. Over the course of the past century sanitation and medical care dramatically reduced death rates in the early and middle years of life. Life expectancy is still increasing worldwide. Scientists are sure that aging isn't fixed, that **average** life spans haven't reached a limit. But what does science know about the **aging** process?

Many scientists believe that aging is caused by the gradual build-up of a huge number of tiny **faults** (in DNA, proteins and so on). This degenerative build-up means that the length of our lives is regulated by the balance between how fast new damage strikes our cells and how efficiently this damage will be corrected. The body's mechanisms to **maintain** and repair our cells are wonderfully effective - that's why we live as long as we do - but they are not perfect. Some of the damage passes unrepaired and accumulates as the days, months and years pass by. We age because our bodies keep making mistakes.

Nevertheless, in the 1980s certain genes were discovered by Tom Johnson and Michael Klass, who found that these genes can influence how long we live. Mutation of a gene which was named age-1 produced a 40% increase in average life span of nematode worms. Since then numerous other genes have been found which are capable of increasing life span of other animals, from fruit flies to mice.

The genes that extend life span mostly alter an organism's metabolism, the way it uses energy for bodily functions that carry out cellular maintenance and repair. It seems that lengthening life span requires changing exactly those processes we know protect the body against build-up of damage.

New ways of slowing aging will come from learning how to manipulate damaged cells. Such cells often **commit suicide**, a process called apoptosis. Or they may begin to **replicate** uncontrollably and become cancerous or enter a **senescent** state in which they function but do not replicate. In theory, rescuing damaged cells from apoptosis or from senescence and inducing their **rejuvenation** could protect organs from the unwanted effects of injured cells. These possibilities are being tested now and investigators hope they will lead to new drug treatments.

Comprehension questions:
1. Why is average life span increasing worldwide?
2. What does degenerative build-up mean?
3. Why do we live as long as we do?
4. What discovery was made by Tom Johnson and Michael Klass?
5. What phenomenon is called apoptosis?

Vocabulary Practice (1)

1. Complete the phrases with the words from the following list:
medical, bodily, commit, life, damaged, death, cellular
1…span; 2 to…suicide; 3…cells; 4 …maintenance; 5…functions; 6…rate; 7…care

2. Choose the correct word(s) in bold. Think of two more task sentences.
1. The cat's maximum recorded **death rate/life span** can reach 36 years.
2. People hope that new medicine for **aging/ rejuvenation** will be found in the future.
3. Unfortunately, **medical care/ death rate** of lab mice during the experiment was quite high.
4. _____
5. _____

Grammar (1) Passive Voice, All Tenses

The passive is formed by using the appropriate tense of the verb to **be + past participle**. Present perfect continuous, past perfect continuous, future continuous are not normally used in the passive.

Tense	Active Voice	Passive Voice
Present Simple	We clean the room every day.	The room is cleaned every day.
Past Simple	We cleaned the room.	The room was cleaned.
Future Simple	We will clean the room.	The room will be cleaned.
Present Continuous	We are cleaning the room now.	The room is being cleaned now.
Past Continuous	We were cleaning the room.	The room was being cleaned.
Present Perfect	We have cleaned the room.	The room has been cleaned.
Past perfect	We had cleaned the room.	The room had been cleaned.
Future perfect	We will have cleaned the room.	The room will have been cleaned.
Passive infinitive	We should clean the room.	The room should be cleaned.

1. Find nine examples of Passive Voice in the text (see Reading 1) and define their forms.

2. Read the sentences, find the verbs and decide if they are used in Active or Passive Voice. Then translate the sentences.

1. The idea was advanced on purely theoretical grounds. 2. You have forgotten to switch off the device and it has been spoiled. 3. Considerable progress will be made in this field in the nearest future. 4. The experiments presented are typical of our research. 5. This substance is characterized by a number of properties. 6. An electron device will operate correctly only for the time that the cathode emits electrons in the quantity required by the interaction process. 7. Bohr assumed that electrons could move around the nucleus only in certain orbits or discrete energy levels. 8. Penicillin was discovered by accident by Alexander Fleming, who noticed that bacteria in Petri dishes were being killed by the mold which had formed there. 9. I am interested in nuclear physics. 10. The measurements are being done in our lab to verify the theory.

3. Write the sentences in the passive:

1. The time machine / not invent / yet. 2. The joint research project / carry out / now. 3. The motion of planets / study / by Galileo. 4. Electrical energy / transmit / over great distances. 5. For many years the energy of the wind or running water / use / to get electricity. 6. When we entered the room the telescope / already / repair. 7. Velocity/ distinguish/from speed. 8. This experiment/ finish/ next week. 9. The Earth attracts and/ attract/ by the Moon. 10. Since the discovery of isotopes their practical usage/ expand/ greatly. 11. In future a space craft/ launch/ to Mars. 12. The accelerator/ repair/ by the end of this month. 13. The laser broke down while the experiment/ conduct/.

4. Change the active into the passive.

1. By adding heat to a solid body we transform it into a liquid. 2. They compared the experimental and theoretical data. 3. He has approached this problem in different way. 4. I hope they will get some interesting results in the course of their work. 5. They are measuring the radius of the tubes. 6. When the scientific supervisor entered the room, the students were finishing the calculations. 7. The author has presented entirely false picture of his actual procedure of discovery. 8. Faraday had discovered this law before Maxwell wrote it in differential form.

PART II Living Longer

Warm-up (2)

Do you agree with some researchers who claim that a little hunger can lengthen our life**?**

Vocabulary (2)

Match each word in the first column with its explanation in the second column.

influence (v)	to make longer or bigger; to increase
extend (v)	the smallest part of a living thing that can exist independently
subject (v)	to force sb/sth to experience sth very unpleasant, especially over a long time
restriction (n)	to effect the way someone or something develops, behaves, thinks etc
famine (n)	to change the direction or use of sth
cell (n)	to change, to make sb/sth change
divert (v)	a situation when there is little or no food for a long time
alter (v)	to make sth better, to become better
beneficial (adj)	having a good effect, useful, healthy
improve (v)	a rule that limits or controls what someone can do

Reading (2)

1. Read the following article in depth paying attention to the highlighted words. Answer the questions after the text.

Of Mice and Men

The amount of food available **influences** metabolism. In the 1930s it was discovered that underfeeding laboratory mice **extended** their life. When mice were **subjected** to dietary **restriction,** it increased the activity of maintenance and repair systems. A period of **famine** is a bad time to reproduce, and some evidence suggests that during famines certain animals will do better to switch off their fertility, **diverting** a large fraction of their remaining energy to cell maintenance.

The notion of caloric restriction - and its purpose is to extend life span - has captured the attention of people who wish to live longer. But such a mechanism is much less likely to work for us because our slow-paced metabolism differs greatly from that of organisms in which this strategy has already been tested.

Dramatic extension of life span has indeed been achieved in worms, flies and mice. These short-lived animals have urgent need to manage their metabolism in a way that adapts rapidly to changing circumstances. We humans, in any case, may not have the same flexibility in **altering** our own metabolic control. Immediate metabolic effects, of course, occur in humans who undergo voluntary dietary restriction, but only time - many hungry years - will tell if these have any **beneficial** impact on the aging process and, in particular, on longevity. The goal of gerontology research in humans, however, is always **improving** health at the end of life, rather than achieving Methuselean life spans.

*Methuselean (adj) - very old, Methuselah, a man in the Bible who is supposed to have lived for 969 years.

2. Answer the questions to the text:

1. How is life span of lab mice influenced by caloric restriction? Why?
2. Can humans' metabolism be influenced by dietary restriction?
3. Has any beneficial impact been achieved in humans who undergo voluntary dietary restriction?

3. Translate the following useful phrases from the text. Use them in your own sentences.

to undergo dietary restriction, to capture the attention, it is much less likely to work, cell maintenance, changing circumstances, beneficial impact (on), dramatic extension, in particular, life span, the goal is … rather than…

4. Translate the sentences. Pay attention to the underlined phrases.

1. Наши предки редко совершали самоубийства.
2. За последние 100 лет продолжительность жизни увеличилась на 25 лет.
3. Повреждённые клетки часто начинают бесконтрольно делиться или дряхлеют и не делятся вообще.
4. Ограничение в еде благотворно подействовало на пациента.
5. Голод резко изменил жизнь этого народа.
6. Цель этого исследования – улучшить здоровье людей в преклонном возраст, вместо того чтобы удлинять жизнь больных.

Grammar (2) Passive Voice (more practice)

1. Change the underlined verb forms in the text (Reading 2) from passive into active.

2. Change the questions into the passive and answer them.

1. Who discovered radioactivity?
2. What alternative sources of energy will people use in future?
3. Who invented the laser?
4. How did Mendeleyev discover the periodic law of elements?
5. Where do people use atomic energy?
6. How do scientists measure the mass of a nucleus?
7. How will one transform a liquid into a gas?
8. What do we call our galaxy?
9. Can a great explosion of a volcano significantly alter global weather patterns for decades?
10. Are researchers developing new types of lasers?

3. Make up sentences using Past Perfect Passive.

Henry came home last night and found that his flat had been broken into. He made a list for the police describing all the things that had happened.
example: clothes/ throw on the floor
When Henry came home, he found that his clothes had been thrown on the floor.

front door lock/ break; mirror/ smash; television/ steal; money/ take; furniture/ move; wine/ drink; posters/tear down; books/remove from the shelves; food from the fridge/ eat; watch/ smash; wife's diamonds/ steal.

4. What do you think will have happened on Earth by 2050? Make up sentences according to the pattern. Use some of the ideas from the list below, but think of your own ideas too.
example: By 2050 cure against AIDS won't have been found.

invent time travel; learn to predict earthquakes; stop global heating; find extraterrestrial intelligence; construct colonies on the Moon; learn to live on the seabed…

Listening (2)

Listen to the extract from a lecture about immunization. Then listen again and fill in the gaps.

Historically, _____ _____ against diseases is a relatively new thing but it doesn't mean the idea _____ _____ _____ of before. If we go as far back as 429 BC, the historian Thucydides noted that after a smallpox plague in Athens survivors didn't become infected again. This was at a time before there was even recognition of such things as bacteria and viruses.

Nowadays, we take it for granted that we _____ ____ _____ and avoid diseases like polio, but how many of us actually stop to ask ourselves what is behind the injection we have? How does vaccination work?

Basically, it is the process by which a person ____ _____ to an agent so that his or her immune system develops against this agent. The immune system makes antibodies which fight againt infection. Once the human immune system ____ _____, that is, made open to a disease, it is able to act against any future infection. Vaccination exposes a person to an immunogen

– something which helps develop immunity – in a controlled way by using a weak dose so he or she doesn't become ill while _____ _____.

The good thing about a vaccination programme is that it can limit the spread of a disease among a population, reducing the risk for people who _____ _____ _____ so we have something which ____ _____ as herd immunity. That means when the number of non-immune people has dropped to a certain level, the disease will disappear from the whole population. This is how nowadays we have achieved the elimination of many diseases.

PART III Who Lives Longer?

Warm-up (3)

1. Look at the list of factors that influence life span and arrange them to the degree of their importance and give your arguments:

ecology, way of life, occupation, family, environment, education, medicine, economical situation, science

2. Everybody wants to live longer. How many years, in your opinion, each of the following lifestyles and behaviours add to a person's life expectancy?

a. Eating chocolate *1 year (antioxidants in dark chocolate)*
b. Eating less meat
c. Keeping active
d. Keeping the right weight
e. University education (men)
f. University education (women)
g. Not smoking
h. Marriage (men)
i. Marriage (women)
j. Living in the right neighbourhood

Reading (3)

Women generally live about six years longer than men. Try to answer the question 'Why do women live longer than men?' using the following text and your own ideas.

Why Women Live Longer

Our journalist interviewed Thomas Kirkwood, the director of the Institute for Aging and Health at Newcastle University in England.

Ann: Mr.Kirk, we are used to thinking that women are the weaker sex. And boys are always brought up to help girls. The young girls are so slim and often look fragile. However, it is said that women live longer than men.

Kirk: If you still believe that women are the weaker sex you have to think again. The fact is that women are tougher than men from birth to old age. The average man may run a 100-meter race faster than the average woman and lift heavier weights. But women nowadays outlive men by about five to six years. By the age 85 there are six women to every four men.

Ann: So, why do women live longer than men? One idea is that men drive themselves to an early grave with all hardship and stress of their working lives.

Kirk: I can't agree with you. A woman's life in a typical household can be just as hard as a man's. Indeed, statistically speaking, men get much more profit out of marriage than their wives - married men tend to live many years longer than single men, whereas married women live only a little bit longer than single women. So who has the easier life?

Ann: It might be that women live longer because they develop healthier habits than men, for example, smoking and drinking less, choosing a better diet.

Kirk: Actually, the number of women who smoke is growing and plenty of others drink and eat unhealthy food. Maybe they are less disposable than men. This notion makes excellent biological sense. In humans, as in most animal species, the state of the female body is very important for the reproduction. So if the female's body is too much weakened by damage, there is a real threat to her chances of making healthy offspring. The man's reproductive role, on the other hand, is less directly dependent on his continued good health.

Speaking (3)

Working in groups make up a list of ideas giving advice to those who want to live longer. Be persuasive, support them with examples, and then deliver it in front of the class.

Vocabulary (3)

1. Complete the table with the words from the text:

VERB	NOUN	ADJECTIVE
extend	….	….
….	subject	….
….	productivity	reproductive, productive
….	….	restricted, restrictive
volunteer	….	….
….	….	suggested
….	difference	….
urge	urge	….
….	length, longevity	….
….	alteration, alternative	alterable, alternative
benefit	….	….

Grammar (3) Plural of Nouns

1. The plural of nouns is formed by means of the inflexion –s or –es. However, there are several irregular ways of forming plural (the letter **f** is changed into **v**; by changing the root vowel; nouns with no plural; nouns with –s with no difference between singular and plural and etc.) Some of them are used in the text above. Look through the article again and find irregular plural forms.

2. Nouns of foreign origin form their plural in their own ways. Read, translate and try to memorize them.

Plural of the Nouns of Greek and Latin Origin

GREEK		LATIN	
singular	**plural**	**singular**	**plural**
phenomenon	phenomena	nucleus	nuclei
criterion	criteria	focus	foci, focuses
analysis	analyses	locus	loci
crisis	crises	radius	radii, radiuses
hypothesis	hypotheses	formula	formulae, formulas
thesis	theses	datum	data
		spectrum	spectra
		bacterium	bacteria
		medium	media, mediums
		fungus	fungi

3. Give the plural of the words in italics. Make the changes if necessary.
1. We do research in a line *spectrum*. 2. The *radius* of the tubes has been measured. 3. This *phenomenon* is difficult to observe. 4. The *formula* has been verified in a variety of experiments. 6. The *analysis* of experiments suggests some new ideas. 7. The binding energy of a *nucleus* is determined experimentally. 8. This *criterion* should be satisfied. 9. Do you know any *hypothesis* concerned with the origin of the solar system?

4. Answer the questions. Use the preposition 'at' with the words: temperature, energy, speed, velocity, voltage, rate, pressure, intensity.
Which of the questions are in the Passive Voice?

1. When do the collisions of molecules become violent? (high temperature)
2. When do the molecules of a gas disrupt? (high temperature)
3. How was the experiment carried out? (normal pressure)
4. When do atoms act as elementary particles? (low energies)
5. How does the light travel? (the speed of 300,000 km per sec.)
6. How does the neon lamp operate? (a rather high voltage)
7. How is the light emitted from fluorescent lamp? (low intensity)

Writing (3)

Write an opinion essay on the topic "Is it possible to lengthen life span?"

An opinion essay is a formal piece of writing. It requires your opinion on the topic, which must be stated clearly, giving various viewpoints on the topic supported by reasons or examples. You should also include the opposing viewpoint in another paragraph.

STRUCTURE:
a) introductory paragraph in which you state the topic and your opinion.
b) main body which consists of several paragraphs, each presenting a separate viewpoint supported by reasons. You also include a paragraph presenting the opposing viewpoint and reason why you think it is an unconvincing viewpoint;
c) conclusion in which you restate your opinion using different words.

POINTS TO CONSIDER:
a) Decide whether you agree or disagree with the subject of the topic, then make a list of your viewpoints and reasons.
b) Write well-developed paragraphs, joining the sentences with appropriate linking words and phrases. Do not forget to start each paragraph with a topic sentence which summarizes what the paragraph is about.
c) Linking words and phrases should also be used to join one paragraph with the other.

USEFUL EXPRESSIONS FOR GIVING OPINIONS:
To my mind/to my way of thinking,…
It is my (firm) belief/opinion/view/conviction (that)…
In my opinion/view… My opinion is that… I (firmly) believe…
I feel /think that… I am (not) convinced that… I am inclined to believe that…
I (do not) agree that/with… It seems /appears to me… It strikes me that…

Extra Reading (4)

How to Live to 114 (in theory)

Doctors can now tell us which habits may extend our lives – and just how much extra time they give us.

(By Roger Dobson, The Independent, 21 October 2008)

New research shows exactly how many years longer people can live by adopting healthy behaviours – from stopping smoking and losing weight to eating less meat and being positive. Studies have suggested that dark chocolate is good for the heart and may boost longevity. Research based on Harvard graduates showed that people who eat chocolate lived a year or so longer than those who do not. Those who ate one to three bars a month came out best with a 36 per cent lower risk of premature death. Antioxidants, especially in dark chocolate, may be responsible

Diets with low levels of meat and vegetarian diets have been linked to lower risk of premature death. A review of research by public health specialists at Loma Linda University in America looked at the life expectancy of those who rarely ate meat and found that sticking to such a diet added 3.6 years to a person's life. The health effect may be due to lower saturated fat intake and higher antioxidant levels as a consequence of eating more fruit and vegetables.

Moderate to high levels of activity can extend life by between 1.3 and 3.7 years. Researchers at Erasmus University in the Netherlands say the main reason is the beneficial effect that physical activity has on the heart. People who take exercise are also less likely to be overweight and more likely to have a better quality of life.

Highly educated women can expect to live more than five years longer than less-educated women, while men with a university degree have an extra 7.8 years, according to a Harvard University study. One explanation is the adoption of healthier lifestyles, and one of the biggest differences was in heart disease rates.

Research at the Karolinska Institute in Sweden shows that golfers live five years longer. The study shows a 40 per cent reduced risk of a premature end. The health benefits of exercise and companionship may be the reason.

Losing weight can add as much as seven years to a person's life. A team at Oxford University showed that people who are obese at the age of 40 died, on average, seven years earlier.

Not smoking adds up to 10 years to life. A team at the University of Helsinki found that those who had never smoked lived an average 10 years longer than those who smoked more than 20 a day. Research on men in New Zealand showed that 50 per cent of smokers die prematurely, and that they die 14 years earlier than non-smokers. Heart disease and cancer are among the biggest killers. The

good news for smokers is that it is never too late to give up. According to the US National Institute on Drug Abuse, a 35-year-old man who quits smoking will increase his life expectancy by 5.1 years on average.

According to a Chicago University report, married men live, on average, 10 years longer than non-married men, while married women live about four years longer than non-married women. One theory is that married men adopt less risky and more healthy lifestyles as a result of the commitment that marriage brings. Married women may live longer due to improved financial wellbeing. However, one Swiss study found that being married shortens a woman's life by 1.4 years, possibly because of the stress of living with a man.

Wealthy people live longer than the poor. One of the clearest contrasts was found by Baltimore health officials in the US. In the poor neighbourhoods, the average life expectancy was 63 years, against 83 in wealthy suburbs.

Discussion (4)

1. What do you think of the research findings in the article?
2. Is the life expectancy in your country high or low? What are the reasons for this?
3. Is it good to live to a very old age?

Module 5 **SAFETY IS THE KEY**

Grammar Focus:
Modal verbs of obligation and permission

Check your grammar (1):

In pairs, discuss what these signs mean and where you can see them. Use different ways to express it:

have to / don't have to / can / can't / must / mustn't / be allowed to / not be allowed to

a) *You mustn't expose it to the sun.*

a) b) c)

d) e) f)

g) h)

PART I Safety at Work

Vocabulary (1)

Use the words from the box in the following sentences.

mention	*interrupt*	*promptly*	*accident*	*report*
appropriately	*thoroughly*	*complement*	*attendance*	*previous*

1) You mustn't _____ the speaker! Ask you questions after he finishes his talk.
2) I think he should come _____. It's really important.
3) He _____ that he was having problems, but he didn't explain exactly.
4) Most courses involve eight hours _____ at college each week.
5) Dan had an _____ at work and had to go to hospital.
6) You must _____ clean your working place.
7) Journalists in Cairo _____ that seven people were injured.
8) 400 illustrations _____ the text.
9) The process starts _____ with determining supply and demand.
10) Do you have any _____ experience of laboratory work?

Listening (1a)

1. Pre-listening

Do you have any lab classes? What lectures do they complement? What are the requirements for the lab work? Does your lab instructor take attendance? What safety measures do you have in your lab?

2. Listening

Listen to the regulations and instructions for the laboratory class. What are the three main points of the speaker? Do you think the rules are reasonable? Would you comply with them?

Reading (1)

1. Read the text from the listening task (1a) and underline all the modal verbs. Complete the sentences below.

In the Laboratory Class

Good morning. I am Michael Armstrong, and I am your laboratory instructor. This class is intended to complement the lecture which Dr. Ehrhardt will be conducting. This class will meet twice a week. The laboratory begins promptly at nine. You must be on time. I don't intend to wait for latecomers or repeat what has already been covered if you miss the explanation. You mustn't be late and interrupt your neighbors. You may as well not come if you can't be on time.

Attendance is equally important. Each laboratory session builds on the concepts and tools learned in the previous sessions. If you miss a lab session, it will be more difficult for you to grasp the presentation of the following session. If you miss three lab sessions, you are dropped from the lab – no excuses. You cannot complete the lecture without completing the lab work.

Safety is the key here. It is very important to keep things neat and clean, dress appropriately, and be careful. You may not eat, drink, or smoke in the laboratory, and you should always clean your counter and wash your hands thoroughly both before and after the laboratory session. Long hair must be tied back. Loose clothing must not be worn. See how easily the swab catches fire when passed over the burner! Any laboratory accident must be reported immediately.

I hope you'll enjoy the laboratory. It's a wonderful place, and all the requirements I've just mentioned are for your benefit. We will begin today by learning about the microscope.

2. Complete the following sentences using the modal verbs from the text:

1. You _____ obey laboratory rules while working there.

2. Students _____ come on time and _____ disturb others by being late.

3. You _____ come if you _____ be on time.

4. If you don't complete the lab, you _____ complete the lecture.

5. You _____ eat, drink or smoke in the laboratory.

6. Students _____ leave their working place tidy.

7. Long hair _____ be tied back.

8. Baggy clothes _____ be worn because they _____ catch fire.

9. If you _____ smell the fumes, you _____ report immediately.

3. Discuss in pairs which modals from the text are used to express:

obligation, negative obligation, no obligation, permission, recommendation, ability, inability

Grammar (1)

Modal verbs of obligation: must/mustn't, have to/ don't have to, should/ shouldn't

must (должен)	
- for obligation (which is the speaker's opinion)	*I must call him today.*
- for strong recommendations	*You must see this film.*
mustn't (нельзя)	
- not allowed, you can't	*You mustn't park here.*
have to (нужно, придётся)	
- for external obligation, laws, or rules	*You have to drive on the left.*
don't have to (не нужно, нет необходимости)	
- for no obligation or necessity	*We don't have to work on Sundays.*
should / ought to (следует)	*You should drive more slowly.*
shouldn't / oughtn't to (не следует) .	for recommendations , advice

1. Read the following sentences and translate them into Russian.

I	should must have to	take my computer to the service centre.

2. Make the sentences from exercise 1 negative.

3. Transform them into questions.

4. Transform them into the third person singular (he/she/it) affirmative, negative, questions.

5. Translate the sentences into Russian. Explain the use of the verb *have*.

1. Never spend money before you have it.
2. We have to obey the lab safety rules.
3. Overdocumentation has two dangers.
4. They have had many assistants.
5. Recent experiments have produced conflicting results.
6. They must be able to identify the particular error that has occurred in the input.
7. Someone had to confirm that light travels at a finite speed.

6. Match the "heads and tails".

You shouldn't take antibiotics	because it can evaporate.
You should ask the supervisor some advice	it may cause damage to the monitor.
You don't have to switch off the engine	because you can surf the Internet.
You don't have to go to the library	if the doctor hasn't prescribed them.
You mustn't keep this substance in the open dish	if you stop at the traffic lights.
You mustn't install the monitor close to the electric heater because	when you can't do the lab work.

7. Complete the sentences with *must* or *have to* in the correct form. Sometimes it is possible to use either.

1. You really… work harder if you want to pass that examination. 2. Last night he suddenly became ill. We… call the doctor. 3. She … wear glasses since she was eight years old. 4. I'm afraid I can't come tomorrow. I… work late. 5. I'm sorry I couldn't come yesterday. I…work late. 6. We couldn't repair the car ourselves. We…take it to a garage. 7. When you come to London again, you…come and see us. 8. It's 10 o'clock. I…go now.

8. Make questions with *have to*.
1. Tom had to repeat the last paragraph once more. - Why…
2. She has to make a report at the conference. - When…
3. We had to answer a lot of questions at the examination.- How many…
4. Nick had to pay a fine. - How much…
5. They will have to spend a lot of time in the institute next week. – Why…
6. We are exhausted. We have had to do all the calculations. – How many…

9. You are giving advice to your friend. Use *should or shouldn't*.
1. Your friend can't make a presentation. 2. Your friend has just been offered a job. 3. Your friend can't draw a graph. 4. Your friend doesn't have all the necessary equipment to do the experiment. 5. Your friend drives his car without a driver's license.

10. Complete with the correct form of *must, have to, or should*.
1. You… repair this device yourself. It's dangerous. 2. I … go to work because it's Sunday. 3. This offer is perfect for you. You … accept it. 4. We … attend all the lectures. I hate it. 5. I … remember to recharge the battery. 6. We were tired. We … process the measurements. 7. You … work too much on the computer. It's not good for your eyes. 8. My friend presented all the charts and diagrams. I … do anything. 9. My computer broke down so I ... phone the service.

11. You are working in the laboratory and you've got an emergency situation. In pairs, decide what you *have to, should, don't have to, shouldn't, mustn't do.*

1. A student's piece of clothes has caught fire 2. One of the counters is on fire. 3. There's a lot of smoke inside the laboratory room and you can't identify the source of fire. 4. An individual has inhaled too much carbon monoxide and fainted. 5. An individual has got an electric shock. 6. A student has a minor cut. 7. You are in the middle of the experiment and you can hear an emergency evacuation alarm.

Listening (1.b)

Listen to the conversation and answer the questions.

1) Where does the conversation take place?
2) What is the main topic of the conversation?
3) What does the teacher say about: a) clothes, b) shoes, c) hair?
4) What do you have to do if you spill chemical on your skin?
5) Why do you have to read labels twice?
6) What else mustn't you do, according to the speaker?

Speaking (1)

What are the most important safety rules that every laboratory worker must know? Discuss with your partner and agree on the top five.

Writing (1)

Write a leaflet for physics students to work safely in the laboratory. Use the necessary modal verbs.

PART II Home Sweet Home

Warm up (2)

1. Thanks to the achievements in new technologies, our life is becoming more and more comfortable and easier, but is it getting safer? What harm can household appliances do to their owners (a gas stove, a computer, a telephone, a microwave oven)? What instructions should people follow using them? What mustn't they do?

2. This is a list of some things and substances which can be dangerous. Arrange them to the degree of their danger. Justify your point of view.

carpets solvents cigarette smoke cleaners dry-clean clothes shower

Vocabulary (2)

In pairs, match the words in A to the definitions in B. When in doubt, find the words in the text (in bold type) and guess their meaning.

to avoid	a person or thing that causes serious damage, harm, or danger
to expose	changing easily into a gas
menace	very small
combustion	a mass of very small drops of liquid in the air
volatile	to put sb/sth in a situation where they are not protected
contaminant	to keep away from
fine	to make sth smaller, cut down
vapor	a chemical process in which substances combine with oxygen in the air to produce heat and light
harmful	pollutant
to reduce	able to hurt or cause damage

Reading (2)

1. Read the first part of the article and answer the questions after the text. Pay attention to the active vocabulary (in bold).

Indoor Pollution

Most citizens have the greatest contact with toxic pollutants not outside but inside their homes, offices and cars. The levels of many **contaminants** are much higher indoors than out. Daily routine **exposes** people to many **harmful** substances that cause cancer. Among them there are toxic **volatile** organic compounds, including benzene (which comes from cigarette smoke), tetra chloroethylene (which is used to dry-clean clothes) and chloroform (which forms from the chlorine used to treat water). The main sources of other toxic volatile compounds are ordinary products, such as air fresheners, cleaning compounds and various building materials. Other indoor contaminants are: carbon monoxide, a product of incomplete **combustion**, that robs the blood of oxygen; **fine** particles - particles smaller than 2.5 microns in size - the product of combustion, such as smoking, cooking, burning candles or firewood; pesticides and heavy metals; dust mites, mold and animal dander, which are allergens. People must know that the main sources of indoor pollutants are right under people's noses - most repellents, pesticides, solvents, deodorizers, cleansers, dry-cleaned clothes, dusty carpets, paint, adhesives, fumes from cooking and heating and cigarette smoke, to name a few.

Scientists in America came to the conclusion that everyday items, which people have to use in their homes, are more dangerous to their health than industrial pollution. For example, benzene can cause leukemia in workers who have to deal with its high concentrations. It is present in gasoline, some household products and in tobacco smoke. The average concentration of benzene people **inhale** in their houses is three times higher than typical outdoor levels. Some 45 per cent of the total exposure to benzene comes from smoking (as well as secondhand smoking), 36 per cent from inhaling gasoline, fumes or from using glues, 16 per cent from paints and gasoline, stored in basements. And only 3 per cent comes from the industrial pollution. So living with a smoker is dangerous for one's health. Cutting all industrial releases of benzene can reduce health risks only a little bit. Yet even a modest reduction in cigarette smoking will significantly **reduce** the rate of benzene causing diseases.

Other **volatile** organic compounds that are quite toxic at high concentrations also dominate indoors rather than out. The greatest exposure to tetrachloroethylene occurs when people live in buildings with dry-cleaning facilities, wear recently dry-cleaned clothes or store them in closets. Moth-repellents, toilet disinfectants and deodorizers are the major source of another cancer-causing compound, paradichlorobenzene. It is clear that people should **avoid** products containing such pollutants.

But there are other **worrisome vapors** that are difficult to avoid. When people take hot shower, boil water or use clothes washers they inhale chloroform - a gas, forming from the chlorine, used to treat water supplies. To minimize household exposure to chloroform you should drink bottled water or run it through a good-quality filter and improve ventilation in the bathroom. Better airflow can also reduce the level of carbon monoxide indoors. This gas is particularly harmful to people with heart illness. Poorly operated gas stoves and grills can cause extremely unhealthful conditions - even death.

2. Comprehension

1. Name the main indoor contaminants and their main sources.
2. What do the numbers from the article refer to? 2.5; 45; 36; 16; 3
3. Why do American scientists claim that some everyday items are more dangerous than industrial pollution?
4. How can people get exposed to tetrachloroethylene in every-day life?
5. How can people minimize exposure to chloroform?

3. Grammar work
Find 8 examples of modal verbs and constructions in the text (Reading 2) and translate them.

Speaking (2)

Read the conversation at the students' medical centre. Pay attention to the use of the modals in underlined phrases. Make up a similar dialogue with the underlined phrases.

Dr. Smith: Well, young man, there's nothing much the matter with you. You are just run down a bit. It often happens during the examination session.
Dan: You see, Dad, I've been telling you the same.
Mr. Brook: But **you mustn't neglect these things** or you may get into trouble.
Dr. Smith: That's right. Let me think… Yes, some vitamins, a good tonic and a few injections will sure help.
Dan: Oh, doctor, no injections, please. I don't like them at all.
Mr. Brook: Come, come, Dan, be your age.
Dr. Smith: **You don't have to come every day** for injection. Every second day will be enough.
Dan: Well, **if I must, I must.**
Dr. Smith: Now about the tonic. **You mustn't take it without** water.
Dan: All right, doctor, I'll try to remember.
Dr. Smith: Good. Take the vitamins three times a day, before meals.
Mr. Brook: And **you mustn't put them in** your drawer and forget all about them as you did last year.
Dan (smiling): **You needn't tell Doctor Smith** how bad I am.
Dr. Smith: Well, young man, **you mustn't forget about them this year**. If you do as I tell you, you'll be all right in no time. **You shouldn't worry**, Mr. Brook. There's nothing much the matter with your son.

PART III My Home Is My Castle

Warm-up (3)

How often do you clean your apartment? Which is better: to vacuum clean, to water clean, to sweep or not to clean it at all? Is house dust harmful to our health?

Vocabulary (3)

In pairs, match the words in A to the definitions in B. When in doubt, find the words in the text (in bold type) and guess their meaning.

urban	to give rise to, cause, produce, result in
threatening	very likely to be affected or harmed
concern	sth that is very important to you or worries you
surrounding	causing problems, worrisome, disturbing
troublesome	nearest-neighbour, next, proximate
to induce	sth increases or decreases by that many times
by a factor of	relating to towns and cities
ignorant	to take food into your body usually by swallowing
susceptible	not knowing facts and information that you ought to know, uneducated
to ingest	frightening, menacing

Reading (3)

1. Read the second part of the article and answer the questions after the text. Pay attention to the active vocabulary (in bold).

Indoor Pollution (continued)

Another environmental **concern**, which is more severe indoors than out, is the danger from fine particles. Exposures to these particles during the day are very high. Partly it can be explained by the fact that people cannot simply float through the air. They usually stir up personal clouds of dust from their **surroundings** as they move about.

Indoor air contains ten or more times higher concentrations of pesticides than outside air. Such poisons can be tracked on people's shoes. Pesticides that break down within days outdoors may last for years in carpets, where they are protected from the degradation caused by sunlight and bacteria. For example, the pesticide DDT, banned from using in 1972, was found in the carpets of the Americans twenty years later.

House dust is the major source of exposure to cadmium, lead and other heavy metals. Carpets are the most **troublesome**, because they act as deep reservoirs for these toxic compounds (as well as for dangerous bacteria and asthma-**inducing** allergens) even if the rugs are vacuumed regularly. Plush carpets are more of a problem than flat ones; floors covered with wood, tile or linoleum are better for health, because they can be easily cleaned. People should wipe their feet on a doormat. It reduces the amount of lead in a carpet **by a factor of** six. Removing shoes before entering is even more effective than just wiping the shoes. These preventive acts are very simple but they help to reduce the level of contaminants considerably.

Sadly, most people and officials as well are rather **ignorant** about indoor pollution. The Environmental Laws are focused mainly on outdoor pollution ignoring the fact that people spend 95 percent of their time inside. Few people know that pesticides and volatile organic compounds found indoors cause perhaps 3,000 cases of cancer a year. So these substances are just as **threatening** to people's health as radon and tobacco smoke for nonsmokers. Toxic house dust is a particular menace to small children, who play on floors, crawl on carpets and regularly place their hands in their mouths. Infants are particularly **susceptible**: their rapidly developing organs **ingest** five times more dust - 100 milligrams a day on average. Each day an average **urban** child ingests 110 nanograms of benzopyrene - it is equivalent to smoking three cigarettes.

People can't wait for their government to make changes in the environmental regulations. Reducing exposure will demand only modest alterations in one's daily routine. Giving up smoking, taking out carpets, improving ventilation, using water and air filters, avoiding household products, containing toxic compounds, will make our houses and offices healthier places to live and work.

2. Comprehension

1. What do the numbers from the article refer to? 10; 1972; 20; 6; 95; 3,000; 5; 100; 110; 3
2. Name the diseases which can be caused by indoor pollution.
3. Why is house dust a great menace especially to infants?
4. Name the preventive acts mentioned by the author in the article, add some more ones which you think can be very effective to reduce indoor pollution.

3. Grammar work

Find 5 examples of modal verbs and constructions in the text (Reading 3) and translate them.

Vocabulary practice

4. Complete the phrases with the words from the following list:
fine, poorly, volatile, organic, asthma inducing, concentrations, preventive, water supplies, household, menace
1… acts; 2 … compounds; 3… products; 4 treat…; 5…particles; 6 …allergens; 7 average…; 8 particular…; 9 …operated stove.

5. Fill in the correct preposition, then make sentences using the completed phrases.
1 give… smoking; 2 …average; 3 to expose sb…; 4 … people's noses; 5 to share sth… sb; 6 to break …; 7 … a factor of six.

6. Complete the table.

VERB	NOUN	ADJECTIVE
expose	….	….
….	contaminant	….
….	….	polluted / polluting
combust	….	….
….	….	reduced
harm	….	….
signify	….	….
	….	ventilating / ventilated
….	prevention	….
menace	degradation	….
….		….
….		

Grammar (3)
Expressing ability: can / could / be able <u>to</u>

can (могу, умею)
- much more common than *be able to* — *He can swim five kilometers non-stop.*
- for ability in the present — *He can speak four languages.*

could (мог)
- for general ability in the past — *He could swim when he was four.*

be able to (быть в состоянии, мочь)
- very formal — *Please inform us if you are able to attend the meeting.*
- for specific achievement in the past — *The house was on fire but he was able to escape.*
There were great waves, but he was able to swim to the shore.
(=There were great waves, but he managed to swim to the shore.)

Practice

1. Complete the sentences with *could* or *was/were able to*. In some sentences you can use both expressions.

1. Despite yesterday's snowfalls, we…drive home in less than an hour. 2. I only lived a mile from the office and…drive to work in less than an hour. 3. When she was the manager of the company she…take holidays when she wanted to. 4. I was very busy at work, but I… take a short holiday over Christmas. 5. In the 16th century, fishermen…smuggle wine into the country without fear of being caught by the authorities. 6. Robert…smuggle knife on board the plane without being detected by the security.

Speaking (3)

Speak up your mind on the subject of what people ***mustn't do, should do and can do*** to reduce the harmful effect to their health.

Grammar (4) Expressing permission and requests

Permission: can / may / be allowed <u>to</u> *You can use my computer.*
can / can't (можно / нельзя) *You can't use my computer.*

may (можно) *May I have a word with you?*
- more formal *May I come in?*

be allowed <u>to</u> (разрешается) *We aren't allowed to smoke in the office.*
- for rules *Are we allowed to use a dictionary for this test?*

Requests: can / could / will / would
can (можешь) *Can you help me?*
-a little more informal *Can I have your pen for a moment?*

could (могли бы вы) *Could you help me?*
- more polite *Could I speak to Mary, please?*

Practice (4)

1. Ask permission in these situations. Use Can I…? Could I…? May I…?
You want…
1…to change the conditions of the experiment.
2…to discuss the theme of your diploma work with your supervisor.
3…to ask exactly what your job is.
4…to talk to the employer about your application.
5…to call your brother from your friend's phone.

2. Use *aren't, weren't allowed to* or *couldn't.*

1. When I was a student, students…(not) do research in this institute. 2. Although he didn't have necessary papers, he… take part in the conference. 3. To our surprise, we… to work extra hours in the lab at weekends. 4. Although I had been waiting for two hours to talk to the Dean, I… speak to him. 4. She… leave the room until she had completed her work. 5. Students… to work with references in the reading room, but they …take them home. 6. Students… use laptops in classes. 7. Before the meeting finished, I…give my point of view.

Extra Listening

(from the book "English the American Way" by Sheila MacKechnie Murtha and Jane Airey O'Connor)

Emergency 911

Dialogue 1 Help! Fire!

Dispatcher: 911. What is your emergency?
Caller: HELP!HELP!MYHOUSEMYHOUSE!HURRY!HELPME!
Dispatcher: Ma'am, I can't understand what you are saying. Please calm down. What is your location?
Caller: My house. It's burning! There's a fire in my house! Can you send a fire truck? Please help!
Dispatcher: What is the address?
Caller: 123 Peachtree Street! Can you send a fire truck? Please help!
Dispatcher: Help is on the way, ma'am. What room is the fire in?
Caller: It's in the kitchen. The curtains caught fire when I was cooking. HURRY!
Dispatcher: Are you still in the house?
Caller: Yes! Yes! I'm in the bedroom.
Dispatcher: You must get out of the house right away. Can you do that?
Caller: Yes, the door is right here.
Dispatcher: Ma'am, go outside but stay on the line with me.
Caller: Okay, Okay. I'm outside now. PLEASE HURRY!
Dispatcher: Is there anyone else in the house?
Caller: MY DOG! MY DOG! My dog is in the house!
Dispatcher: Ma'am – Do NOT go back into the house. The fire trucks are on the way. The firefighters will find your dog.
Caller: I hear the sirens! I can see the truck! They're here! They're here!

Dialogue 2 Help! He's not breathing!
Listen and fill in the gaps.

Operator: Paramedic 128. What's the address of your _____?
Caller: HELP! HELP! I need an ambulance!
Operator: Okay, sir, what's the _____?
Caller: I'm not sure. I'm outside. It's … it's … I think it's Taylor Road. It's Lawrenceville. I need an _____!
Operator: Sir, we'll get help _____ _____. What's the phone number you're calling from?
Caller: Um, it's my cell phone. It's _____. Please hurry. There's a guy here …Hurry! Can you send an ambulance?
Operator: Okay, sir, what's the nature of your emergency?
Caller: There's a _____ lying here. He's not conscious. He's not _____! He's not _____!
Operator: Okay. ____'_ _____ _____? ____'_ _____?
Caller: _____.

Operator: Okay, sir ___ _____ ___ ___ ____ _____. But I need you to start CPR right now. I'll help you over the phone until _____ _____ _____.
Caller: The neighbor is doing CPR, but the guy isn't _____. He's not _____! He's not _____ and he's not _____.

Operator: Okay, sir, the ambulance is ___ ____ _____. They'll be there in minutes. Did you witness what _____ to the man?
Caller: No, I _____'__ _____ _____ _____.
Operator: Okay, sir, I've dispatched all _____ _____ to the paramedics. Keep up the CPR until they get there. They're just __ _____ _____ _____.
Caller: Thank you! This guy isn't responding to anything!
Operator: Okay, _____ _____ ____ _____.
Caller: Yeah, here they are! Thank you, ma'am, thank you.
Operator: Okay, sir, _____ ____ _____ __ _____ _____ ____ _____.

Dialogue 3 Stranger danger!
Listen and fill in the gaps.

Operator: _____. What's the exact _____ ___ _____ _____?
Caller: Hi, um, well my address is _____Cary Street. But it's across the street. I don't know the address.
Operator: Okay, sir. I ____'_ _____ _____. Are you on a cell phone? Tell me that address again.
Caller: Yeah, um, it's … I don't know, it's _____ Cary Street, but ___'_ _____ ____ _____.
Operator: Okay, that's fine. Is that _____ _____ _____ _____ ___ _____, sir?
Caller: _'_ _____ _____ _____ _____ _____. I think I need the police.
Operator: Okay, sir. _____'_ ____ _____ ___ ___ _____?
Caller: Well, I'm across the street. I'm not sure… My _____'_ away, and, um, um, there are _____ _____. I think they're _____ _____ the house. Um, it looks like there are two guys. HEY! THEY JUST BROKE A WINDOW! One guy just ripped through the screen door! _____'__ _____ _____ to see if anyone saw them! Can you get the police here? _____!
Operator: Okay, sir, we'll have someone there right away. ___ _____ _____ ____ _____ at all?
Caller: No, not at all. It's not my neighbor; they're away. __ _____ ___ _____ who these guys are, but they just broke the window and kicked in the door! __ _____ ____ _____ ___ _____ ___ _____ _____ _____.
Operator: Can you describe the men, sir?
Caller: They're inside now. __ _____'_ _____. __ _____'_____. To be honest with you, I didn't really notice what they were _____ or anything. Um, I think one guy was pretty tall. He was wearing some kind of baseball cap, I think. And, uh, the other guy entered through the window before I got a good look at him. All I know is these guy broke into the house! Can you get the police there?!
Operator: Sir, they're on their way. ___ _____ _____ __ ___ _____ _____ _ _____?
Caller: I don't know; I couldn't see from my angle. They had a hard time _____ ___ _____ ___ ___ _____. Um, but, um, they smashed the window with a bat, I think. A baseball bat.
Operator: Okay, sir, they're ___ ____ _____. _____'_ _____ ___ until they get there.
Caller: Okay. Thank you. Wait, okay, here they are! Thank you.

Module 6 TRAVELLING, TRANSPORTATION

Grammar Focus:
Conditionals, Time Clauses

'Travelling on Earth is expensive, but you have a free trip around the sun every year.'(Anonymous)

'If you look like your passport picture, you probably need a trip.' (Anonymous)

Grammar Review

1. Match a line in A with a line in B to make meaningful sentences, then translate them.

1. If you had arrived on time	a. we wouldn't have missed the train.
2. The airlines always inform the police	b. if somebody behaves badly on board.
3. If I don't see you at the check-in counter	c. I'd take a taxi home from the party.
4. I wouldn't go abroad on holidays	d. I'll give you a call.
5. If I were you	e. if we had hot summers here.

2. Answer the questions:
What verb forms are used in the two parts of each sentence? Which sentence expresses a future certainty, which a future possibility, a fact, a possibility in the past? How many types of Conditional sentences can you name? What are they? What are the grammar rules for Conditionals?

3. Review the types of conditional sentences. Read and translate the examples.

	condition	**if clause**	**result clause**	**translate**
REAL	Present conditions (Zero conditional)	**Present Simple** If/When people need help, If the sign is on,	**Present Simple / Imperative** they come up to the information desk. fasten your seat belts.	
	Future conditions (First conditional)	**Present Simple/Cont.** If I have more time, If he is working tomorrow,	**WILL + V / Imperative** I'll come over. he won't go with us.	
UNREAL	Unlikely Future or Present condition (Second conditional)	**Past Simple/Cont.** If I were you If you lived in the country, If he wasn't so busy,	**would /could /might + V** I would go there myself. you could go horse-riding. he might travel much more.	бы
	Unreal Past condition (Third Conditional)	**Past Perfect** If he had got the job, If he hadn't lost the final, If you had studied harder,	**would / could /might + have + V3** he would have gone to London. he might have won the tournament. you could have gone to university.	бы

Real Conditions: Present and Future

4. Present Condition (Zero Conditional) is used to describe real situations that can happen at any time, general truths, rules, scientific facts or with the imperative in the result clause for rules and instructions:

the condition (subordinate) *if* clause **Present tense**	**the result (principal) clause** **Present / imperative / modal**
If /when someone behaves badly on board, If / when I travel by plane If you have a long flight	the airlines always inform the police. I always get motion sickness. drink plenty of fluids.

5. Future Condition (First Conditional) is used to talk about the results of a POSSIBLE future condition, one we think likely to happen:

Present tense	**Future tense / Imperative**
If I don't see you at the check-in counter, If you wait here for a minute, If you run out of money,	I will give you a call. I'll get you some snack. let me know.

6. Alternatives to *if*. Read and translate the sentences.

unless	I won't wash your car *unless* you pay me. (если не)
in case	Take some cash with you *in case* you catch a bus. (на случай если)
even if	He won't wash her car *even if* she pays him! (даже если)
provided (that)	You can borrow the car *provided* I have it back by six o'clock. (при условии)
as long as	I don't mind taking a cab *as long as* I don't have to pay for it. (при условии, если только)

Grammar Practice

7. Complete the first conditional sentences.

1. If the weather _____ (be) fine, we _____ (ride) our bikes.
2. If it _____ (snow) heavily, the flight _____ (may) be delayed.
3. She _____ (help) us to pack if she _____ (have) more time tomorrow.
4. If my boss _____ (want) me to go on a business trip, I _____ (say) 'No'.
5. If she _____ (come) on her own, she _____ (need) help.
6. If you _____ (take) more driving lessons, you _____ (pass) your driving test for sure.
7. If they _____ (be) not there by 6 p.m., _____ (set) off alone.
8. If we _____ (find) some cheap accommodation, we _____ (save) money for souvenirs.
9. And what _____ (do) you if the hotel is fully booked?
10. If he _____ (take) a taxi, he _____ (be) home in an hour!

8. Chose the correct answer.

New Message
It's a long journey, so I'm going to take some sandwiches (0) *in case / as long as* we get hungry. I think we (1) *enjoy /'ll enjoy* it as long as we have some good magazines to read. We will get there at about seven, (2) *in case / provided that* the traffic is all right. I won't phone you unless there (3) *is / will be* a problem. Don't meet us at the bus station (4) *provided that / unless* you really want to. We can easily walk to your house from there. I (5) *bring / will bring* the map in case I can't remember the way. I'm really looking forward to seeing you! It will be great to walk round Edinburgh again if it (6) *doesn't rain / won't rain!*

9. Write the verbs in the correct form to make zero or first conditional sentences

1. If the light (go) on, don't leave your seat and fasten your seatbelt.
2. Press the button, if you (want) the seat to recline.
3. If it (be) noon in Lima, it (be) 6 o'clock in Rome.
4. If the air company (pay) all the insurance charges, it will go broke.
5. If it is a blizzard, your flight (delay).
6. Airlines usually provide meals and hotel rooms in case a flight (be) unduly delayed.
7. If I (fall) asleep, I can usually have a lot of reading done.
8. We will get to the airport in time unless there (be) much traffic on the motorway.

10. In each sentence find and correct one grammar mistake.

1. Take some extra money <u>if case</u> there is an emergency. (in case)
2. Dan has motion sickness. He never boards a plane provided he has some pills with him.
3. I'll meet you at 6.00, but when my bus is late, don't wait for me.
4. If you won't drink enough fluids during the flight, you'll get a headache.
5. The taxi won't wait at the airport if your train will be delayed.
6. I make some sandwiches in case you get hungry on the journey.
7. The flight might be cancelled unless the weather is really bad.
8. You can't take a seat near the emergency exit unless you are under 18 years old.

11. Complete the conversation. Use the correct form of the verbs in brackets.

book	do	find	go	look	not be able to stay	not know	spend

A: Where shall we go this summer?
B: I'd like to go to New York, but it's really expensive. If we (0) …… there, we (1) …… very long. How about going round Europe by train?
A: No way! If we (2) …… that, we (3) …… more time travelling than visiting places.
B: What do you suggest?
A: Let me search the Internet. If I (4) …… online, you never know, I might find a cheap flight to somewhere really exciting.
B: But how (5) …… you …… a cheap flight if you (6) …… where we're going?
A: There are websites that have special offers.
B: Well, if you see two cheap flights to New York, (7) …… them! Because that's where I want to go.

Part I Up in the Air

Warm-up (1)

1. Travelling time is a good learning time. Do you agree with this statement? Why?
2. Have you had any experience of travelling abroad?
3. Have you travelled much in your country?
4. What is the most convenient way of travelling in your country?
5. What changes will probably take place in the area of travelling in your lifetime?

Vocabulary (1)

Explain the following expressions from the text below.

to lie in store, iris-recognition technology, a fast-track system, to queue, to check in, to alert a passenger, to book a seat, to encounter a number of fellow passengers, to be on demand, noise cancellation technology, a seat armrest, to grab the headlines

Reading (1)

1. Read the article. Which of the experiences mentioned in the text would you like to try? Why?
Pay attention to the words and phrases in bold. Were your explanations correct?

Holiday of the Future

What **lies in store** for tomorrow's holidaymakers?

A future technology will change our experience of flying before we even get on a plane. Airport immigration procedures will be revolutionized by the introduction of **iris-recognition technology**. Regular flyers who have volunteered to place their biometric data on file will be able to go through a **fast-track system**. Rather than **queue to check in**, they will simply present themselves at a screen and have their eyes scanned. Meanwhile, the mobile phone will become a ticket and boarding pass; you'll simply have to show the screen of your phone as soon as you board the aircraft. Wireless location technology will allow airlines to text passengers in close proximity to the airport and offer them a seat number; if they accept, they will effectively have checked in. The same technology could be used **to alert a passenger** who has gone to the wrong terminal or, if the passenger is stuck in traffic and can't reach the airport in time, it will automatically **book him/her a seat** on the next flight.

Once on board their plane, travelers will probably **encounter a much larger number of fellow passengers** than at present. All passengers will of course be able to use mobile phones throughout the flight. Movies will be '**on demand**'. Aircraft engine noise will become less disturbing after noise **cancellation technology** is introduced in all **seat armrests**. Pop on a pair of headphones and engine noise will be reduced, allowing you to watch a movie.

Space tourism is already **grabbing the headlines**. It won't be cheap. Present estimates put the price of each trip at about £115,000 for an experience lasting approximately three hours. In fact you'll be in true space for just three minutes but for the thousands of astronauts none of that matters. In the film Total Recall, Arnold Schwarzenegger plays a construction worker who has a memory of an adventure holiday to Mars implanted. Although the movie was set in 2084, Ian Pearson believes such technology will be available much sooner. Tiny transmitters attached to your fingers, toes, face and lips, could enable you to enjoy the sensations of a virtual holiday-walking on a beach, feeling a warm sea breeze on your face. But will a virtual holiday be as much fun as a real one? And if this is the future, will we want it?

Grammar (1) First Conditional, Time Clauses

1. Find the following sentences in the text. What are their endings?

1. A future technology will change our experience of flying before…
2. You'll simply have to show the screen of your phone as soon as…
3. Wireless location technology will allow airlines to text passengers in close proximity to the airport and offer them a seat number; if they accept…
4. Aircraft engine noise will become less disturbing after…
5. And if this is the future…

2. Discuss grammar:
1. Underline the words that introduce the **time clauses** in ex.1 above.
2. These **conjunctions of time** *when, while, as soon as, after, before, until* introduce conditional time clauses.
3. Which tenses are the verbs?
4. Do they refer to the present or to the future?

3. Combine the sentences with the time expressions in brackets.
1. I'll get in touch with you. I'll arrive (as soon as)
2. Don't wait for me. My bus is late. (if)
3. We'll find a hotel. We'll arrive in Paris. (when)
4. She won't come to the gate. The boarding will be announced. (until)
5. I think I'll weigh my hand luggage. I'll get to the check-in desk. (before)
6. Don't cross the road. You'll see the green light. (until)
7. You'll see some duty free shops. You'll get through customs. (after)
8. I want to pack my luggage. We are going to have lunch. (before)
9. Keep an eye on the kids. I'll queue for the tickets. (while)
10. Let's watch a new movie. We'll be flying for 3 hours. (while)

Listening (1)

1. Pre-listening
Read through the lines of the article "This is your captain speaking…" Where do you think the situation takes place?
Work in groups. Give a definition to the following words.

to take off	to land	cruising speed		serve refreshments
duty-free goods	to request	landing card	flight attendant	cabin crew

2. Listening
Listen to the announcement and complete it with the missing words and numbers. Then listen again and check as a group.

This is your captain speaking…

Good morning, ladies and gentlemen. Welcome _____ this British Airways flight to Rome. In a very short time we'll _____. When we reach out cruising speed of _____, we will be flying at _____ feet. Our flight time today is _____, so we'_____ in Rome in time for lunch!

The cabin crew will be _____ during the flight. If you need any assistance, just _____ and a flight attendant _____ to help you.

[Near the end of the flight]

In a few moments time, the crew will be coming round with _____. We'll also be giving out landing cards. When you've filled them in, place them in your _____. They _____ as you go through passport control.

In twenty minutes' time we _____ at Leonardo da Vinci airport. Please put your seats in the upright _____. You are requested to remain _____ until the plane has come to a complete standstill.

We hope you _____ again soon with British Airways.

3. Discuss grammar

Find the examples of Conditional sentences in the text above and explain their use.

Speaking (1)

Speak on some changes that will probably happen in the area of travelling and transportation.

Part II Car Travel

Warm-up (2)

Do you often travel by car? Do you usually enjoy going by car? How do you feel about driving? Have you got driving license? What do you usually do during the car trip?

Vocabulary (2)

Match these words from the text with their definitions. When in doubt, get some clues from the text below.

to tailgate	a piece of equipment that makes a vehicle go more slowly or stop
a highway	to work or do something less hard, to improve
to ease (up)	to get in front of a moving vehicle
to clog	a wide main road that joins one town to another
a vehicle	to block, to stop, to make difficult
to overtake	a machine with an engine that is used to transport people or things
brake	a part of a vehicle that allows you to control its direction
steering	to follow somebody closely
to cover	stable, not changing
steady	to travel a particular distance

Reading (2)

1. Read the text from Euronews, 29th May 2012 and answer the comprehension questions after the text.

Volvo's Driverless SARTRE Project Takes on Public Roads of Spain

If there were no drivers inside cars, roads would be safer – well, at least that's what Volvo believes. **Tailgating** on the **highway** at high speeds is quite dangerous. However, according to Volvo carmaker, it would be the way forward in **easing up** traffic jams on the highways given the fact that a lot of motorists **clog** the road while keeping too big a distance up ahead. The Swedish carmaker known for its innovative approach towards high level of safety –has come up with another revolutionary safety research program, the 'Safe Road Trains for the Environment' Project or SARTRE.

"If we had 'trains' of self-driven cars on the highways, the cars would follow each other and wouldn't block the road while **overtaking** or keeping too far apart. Moreover, it would allow drivers to spend their time doing other things while cameras, laser sensors and radars monitored **vehicles** and controlled the **brakes** and the **steering** movements accordingly," says one of the Volvo officials.

Volvo tested its SARTRE project on the public roads of Spain. The project involved a 'road train' that included one leading truck and a convoy of 3 Volvos trailing behind, namely the XC60, V60 and S60. The cars followed the truck (relying entirely on radar, cameras and laser sensors) at a **steady** 85kph while keeping a distance of 6 metres between each other. The vehicles successfully covered a distance of about 200 kms along the Spanish motorways with other motorists.

"We **covered** 200 kilometres in one day and the test turned out well. We're really delighted," says Linda Wahlström, project manager for the SARTRE project at Volvo Car Corporation. "We've learnt a whole lot during this period. People think that autonomous driving is science fiction, but the fact is that the technology is already here. From the purely conceptual viewpoint, it works fine and it would be great if road trains were around in one form or another," she added.

2. Comprehension and discussion

1. According to the Volvo officials, what would be the way to ease congestion? And in your opinion?
2. What does abbreviation SARTRE stand for?
3. Why could self-driven vehicles be safer than traditional driver-operated ones?
4. What is the idea of a 'road train'?
5. What are the results of the SARTRE drive test?
6. In your opinion, what would be the advantages and disadvantages of 'road trains' and self-driven vehicles?

Grammar (2) Second Conditional

Discuss grammar

1. Read the first sentence of the text again and translate it. What grammar construction is used and why?

2. Find some more examples of this grammar pattern in the text and translate them.

Unlikely/unreal Conditions: Present and Future

3. Second conditional is used to describe future situations that are possible, but UNLIKELY.

We can use Second conditional for present situations that are imaginary, UNREAL.

We often use the expression *If I were you, I'd…* to give personal advice. (*If I was you* … is more informal.)

the *if* clause **Past tense**	**the result clause** **would (might, could) + V**
If I moved to another country, If there were no borders between countries, If I were you,	I would go to Mexico. wouldn't it be wonderful! I'd take a taxi home from the party.

4. Alternatives to *if*

unless	I wouldn't ask your help *unless* I needed it.
imagine	*Imagine* you had a million dollars, where would you go?
suppose	*Suppose* they lived in the country, would you visit them?
say	*Say* you could live anywhere in the world, where would you live?

Grammar Practice

5. Conditional sentences introduce real or unreal situations. Look at the conditional sentences below. Which sentences are second conditional? What verb forms are used in the two parts of each sentence?

1. When you board a plane, a flight attendant greets you and checks your boarding pass.
2. If I were traveling a long way, I would fly.
3. I'd love to go to Prague if I had a chance!
4. The car wouldn't break so often if you serviced it regularly.
5. Can planes leave when it's foggy?
6. If there's a snowstorm, airport closes.

6. Choose the correct meaning, A or B.

1. If Charles got a pay rise, he'd buy a better car.
(A) I think Charles will get a pay rise. (B) I think Charles is unlikely to get a pay rise.
2. If house prices rise, we'll sell our flat and buy a cottage in the country.
(A) The speaker thinks house prices will probably rise.
(B) The speaker thinks house prices probably won't rise.
3. If I were you, I'd take a train to Cornwall; it's more relaxing than driving.
(A) I'm giving advice. (B) You have taken the train before.
4. If I had a mobile phone, I'd call the police.
(A) I can call the police. (B) I can't call the police.
5. Suppose you had a yacht, where would you sail to?
(A) You have a yacht. (B) You don't have a yacht.
6. Pablo would be very disappointed if he didn't pass the exam.
(A) Pablo expects to pass the exam. (B) Pablo doesn't expect to pass the exam.

7. Write second conditional questions.

1. if / Sarah / have / a problem / who / she / talk to?
A: _____? B: She'd talk to you.
2. Marc / come / to the party / if / I / ask / him?
A: _____? B: No, he wouldn't.
3. What / you / do / if / you / be / in Kate's position?
A: _____? B: I'd tell the truth.
4. if / you / can / go / anywhere / where / you / go?
A: _____? B: I'd go to Cuba.
5. if / he / have / some free time / what / he / do?
A: _____? B: He'd go out with friends.

8. Rewrite the sentences using second conditional.
example: I'm busy, so I'm not going to the party tonight.
If I wasn't busy, I'd go to the party tonight.

1. Tony doesn't want to see us, so he doesn't phone us.
2. We don't eat out because it's so expensive.
3. You won't get in the football team because you don't come to training sessions.
4. The students enjoy your lessons, so they come to every class.
5. She practices every day, so she's very good.

9. Complete the conversation. Put the correct forms of the words in brackets.

A: If somebody (0) ……. (give) you a lot of money, what (1) ……. (you/do)?
B: I'd buy a motorbike and go travelling for a few months.
A: On your own?
B: No, with a friend. I (2) ……. (get) lonely if I (3) ……. (go) on my own. I'd ask Rob to come with me. He likes travelling.

A: He does, and he's good with bikes. If your bikes (4) ……. (break down), he (5) ……. (be) able to fix them.
B: That's true. And he's very calm. He (6) ……. (not panic) if we (7) ……. (have) a problem.
A: Would you stay in hotels all the time?
B: I don't know. If it (8) ……. (not be) cold, it (9) ……. (be) nicer to camp.
A: And cheaper. Your money (10) ……. (last) longer if you camped.

10. Work in pairs. Answer these questions about you.
1. What would you do if you had a lot of money?
2. If you had more time, would you consider travelling? Where to?
3. What means of transport would you choose?

Listening (2)

Pre-listening
1. Why do some people rent cars? Have you ever rented a car? Do you know any international car rentals? Can you think of any advantages and disadvantages of using car rentals?

Listening
2. Listen to a 60 seconds talk given by a reporter from Scientific American magazine. What is the problem about Zipcar hourly rental?
3. Listen again and fill in the blanks.

Big city dwellers who need a car for less than a day can (1) _____ Zipcars by the hour. Zipcar's ads emphasize (2) _____ and community. But a recent study shows that most Zipcar users primarily consider their own (3) _____ rather than being (4) _____ or part of a user community. The study is in the *Journal of Consumer Research*.

The investigation is a part of more general research about what's called access-based consumption—basically very (5) _____ —which has grown due to the economic recession and the cramped quarters of big cities.

In interviews with Zipcar users, researchers found that they (6) _____ selfishly, and don't worry about how their treatment of the car (7) _____. As one user interviewed for the study put it: "You can just beat the hell out of it—it's not your car."

And since (8) _____ assume everyone else is behaving the same way, they appreciate the rules that the company does try to enforce about, for example, (9) _____. Not surprisingly, these attitudes don't engender a feeling of community. Because the (10) __ _____ of your temporary car depends on the user who cared the least about it.

Speaking (2)

In your opinion, what would be some ways to solve traffic problems? For your ideas you might need some phrases, for example, *park and ride, road pricing, ring road, relief road, bypass, one-way road, bus lane, bike lane, HOV lane, carpooling.*

Part III GOING GREEN

"If we rightly consider, every green tree is far more glorious than if it were made of gold or silver." (Martin Luther King (1928 – 1968), awarded Nobel Peace Prize in 1964)

"If all the insects disappeared from the Earth, within 50 years all life on Earth would end. If all human beings disappeared from the Earth, within 50 years all forms of life would flourish."(Jonas Salk)

Warm-up (3)

How Green Are You?

1. Would you rather go by car, cycle or walk somewhere around the town?
2. Would you rather take public transport, share a ride or use your own car?
3. Would you use stairs rather than a lift?
4. If you were planning a trip to another city, what means of transport would you choose?
5. Do you think you travel green or not really?

Reading (3)

1. Read the texts about responsible travel practices. What should people consider to travel 'green and slow'?

What is green travel?

Green travel is a term used to describe responsible travel practices that focus on economic, socio-cultural, and environmental sustainability. Green travel considers six main factors:

1. Modes of transportation. Consider walking or cycling during your trip, using public transportation, renting hybrid vehicles, and traveling by train rather than plane whenever possible.
2. Offsets and environmental policy. Calculate and offset the carbon dioxide emitted by your travel and buy your trip from companies with policies that consider environmental, economic, and socio-cultural impacts.
3. Dollars spent locally. Ensure that local people benefit from your trip by spending money in locally owned businesses and working with tour operators and lodges that employ local people.
4. Environmental conservation. Choose a trip that strengthens the conservation efforts for the places you visit, including protected areas and wildlife habitats.
5. Respect for local culture. Accept the differences of other cultures...learning about their customs and social norms before you visit, and speaking their language when possible.
6. Natural resource use. Three Rs: reduce, reuse, and recycle...and consider the efficient use of water, energy, and building materials.

What Is Slow Travel?

The idea follows in the footsteps of the "Slow Food" movement that began in Italy to keep fast food establishments out of historically and culturally significant districts in cities. The Slow Food concept emphasizes locally produced foods, prepared and presented with care and authenticity. Applying that concept to travel, Slow Travel includes:

1. Visit smaller cities and towns, not just major capitals.
2. Spend more time in each location....avoid rushing....get to know the place, its culture, and its people.
3. Gain a greater appreciation of a few places rather than "collecting" a list of places visited.

4. Reduce carbon emissions and conserve on limited resources such as fresh water by selecting green hotels and vehicles.

2. Discussion
Do you think your personal travel habits are green enough? Would you change any habits?

Speaking (3)
If you were planning your holiday trip now, how would you organize it?

PART IV Space Travel

Warm-up (4)

1. What are conspiracy theories?
Everybody loves a good conspiracy theory. Whether it is the CIA (Central Intelligence Agency) shooting President Kennedy or unexplained princess Diana's death, there are few things that appeal to the imagination more than a mixture of mystery and a hint of evil-doing in high places. Many of the juiciest theories circulate on the Internet.

Reading (4)

1. Before you read
One of the most notorious conspiracy theories is the Apollo Moon landing. What do you know about the Apollo Moon landings? Discuss in groups and share the information.

2. Read the introduction. Were you right?

The Apollo Moon Landing: Truth or Hoax

For over 30 years rumors have been circulating that the Apollo Moon landing was faked. They say Neil Armstrong made no "giant leap" for mankind. They assert that the 1969 Moon mission was a hoax to prove America won the space race. The high point in the great Moon Landing Conspiracy came on 15 February 2001, the date that the Fox television network broadcast a programme entitled *Did We Land on the Moon*? This alleged that the whole Moon landing had been staged inside a film studio on a US military base somewhere in the Mojave desert.

3. Read the text. Do you believe in Apollo Moon landing or not?

The Apollo Hoax Theories

Doubts still linger about the moon landing. 9/11 and Kennedy aside, no event in world history has generated quite so many conspiracy theories than the Apollo Moon landings. Do they stand up? Here are the best reasons why it couldn't have happened and the rebuttals. Of course, you may disagree.

Where are the stars?
The pictures taken from the surface of the moon show a black sky, but space is full of stars. Where are they?

The stars are there, they are just too faint. The lunar landscape is lit by the sun and you are taking pictures of a man in a white spacesuit. So, you set a fast aperture speed on your camera, and hence the distant stars are too faint to be seen.

The fluttering flag
Why does the US flag planted appear to be fluttering in a breeze when the astronauts are in a vacuum?

The flag had a pole inserted across the top so that it would look right in the photograph. The astronauts didn't extend the pole fully and the flag was left with a crease in it.

The Van Allen Belt
Why weren't the astronauts killed by the radiation from the magnetic fields around the earth?

The radiation in the Van Allen belts is strong enough to kill, only if you linger. The astronauts were through in an hour - about the same level of radiation as an x-ray.

It's too hot.
The moon's surface temperature reaches up to 280 Fahrenheit. Nothing works at that temperature - the film used would have melted, for example.

The film was in protective canister, for example, and all equipment and astronauts were in pretty hi-tech gear themselves. And they landed at lunar dawn too, so the temperatures were significantly lower.

Footprints require moisture.
The footprints made in the dust on the moon would require moisture to make - try it with sand.

Well, you could also try it with talcum powder, which doesn't require moisture to retain a footprint and bears much resemblance to the fine grain of moon dust.

They would have been killed by meteors on the way.
Space is filled with fast, tiny meteors that would have punched through the spacecraft and killed the mission and astronauts.

There are millions of meteors travelling around 120 000kmph. But space is a big place, so the density is low and the chances of passing through unmolested are very high.

Where is the blast crater?
When the lunar module landed, there would have been a crater.

Most people slow down to park the car - so did the landing module. It landed rather gently and the thrust from the rockets is dispersed in a vacuum, and doesn't force air downwards as on earth.

The cameraman watched them leave.
How come there's footage of the astronauts leaving the moon? Who filmed it? It was a camera left on the surface of the moon and controlled from Earth.

4. In groups, discuss the Apollo Moon Landing. One group prepares the reasons why it couldn't have happened and the other group prepares the rebuttals.

example: If the lunar module had landed on the Moon, it would have made a crater. (reason)
It made no crater because the landing module slowed rather gently. (rebuttal)

Vocabulary (4)

Saying the opposite, antonyms
1. Compare these sentences. Which antonyms are used?

Some theories are plausible but others are implausible.
Some theories are plausible but others are ridiculous.

2. Antonyms can sometimes be formed with a negative prefix. What is the negative prefix for these words?

believable	honest	responsible
legal	credible	probable

3. Write antonyms for these words using prefixes if possible. The first word is given as an example.

fake (adj.) genuine, real, authentic, natural
tiny
safe
admit
encourage
appear
approve
likely
conventional
reversible
logical

4. Complete the sentences with the words from the previous exercise.

1. You won't be interested. His views are remarkably _____
2. Access to the information was _____to them as they were not employed by the company.
3. The council has spent an _____amount of money on this project.
4. The damage to the environment is likely to be_____
5. I don't personally _____ but I'm willing to live with it.
6. They especially _____ young scientists.

Grammar Practice (4) Third Conditional

Unreal Past Conditions

1. Discuss Grammar

We use the third conditional to imagine situations or actions in the past that we know are the opposite of the facts.

I would have spoken to you if I had seen you.

We can use the third conditional to talk about regrets from our past, often with *could / might*:

I could have got a better job if I had stayed at university.

We might not have had the accident if the weather had been better.

the *if* clause **Past Perfect**	**the result clause** **would / might / could (not) + have V3**
If we had arrived on time, If we had arrived on time, If he hadn't been rude to his boss,	we would have flown to Mexico. we wouldn't have missed our flight. he wouldn't have lost his job.

2. Match the results 1-5 with the conditions A-F using third conditional.
example: I would have bought a faster car if I'd had enough money.

1. I _____ bought a faster car	A. if I'd studied harder.
2. I _____called you yesterday	B. if I'd practiced the guitar every day.
3. I _____ got a better degree	C. if I'd remembered your phone number.
4. I _____ left my parents' home	D. if I'd had enough money.
5. I _____ played in an orchestra	E. if I'd known how much renting costs.
6. I _____taken the job	F. if I'd realized the company was in trouble.

3. Complete the e-mail, using the correct form of the verb in brackets.

Hi Mum and Dad,
I'm afraid I have to ask you for some money – and I'm very ashamed to tell you about this. You see, I lost my job a few weeks ago. I deserved it because I upset a customer – if I hadn't been rude to the customer, my boss (0) wouldn't have fired (fire) me. And I was in debt because of the car – obviously, I wouldn't have got into debt if I (1) _____ (not buy) the car, but I needed it for work. Then one day recently I was in a local shop and I took some money from the till. If it hadn't been open, I (2) _____ (not take) the money, but it was so easy. I left the shop before they noticed, but then, a couple of days later I went back into the shop and the shopkeeper saw me. That was really stupid – if I (3)_____ (not go back), he wouldn't have recognized me. I denied taking the money, so he called the police, and they arrested me. If I'd admitted it to the shopkeeper and paid him back, he (4)_____ (not call) the police. So ... can I borrow $1000 to pay the fine? I know I've been stupid – if I (5) _____ (ask) for your help weeks ago, this wouldn't have happened.
Love
Harry

4. Read the letter written by an angry Polish holidaymaker to a tourist agency. It contains 8 grammar errors in Conditional sentences. Can you correct them?

Dear Sir/Madam,

I am writing to complain about a terrible holiday I had, thanks to your company. As you may remember, I traveled to Egypt last summer on a package tour. Now I will never travel with your company again! The first thing was that all my luggage was lost and when it arrived at last, things had been taken from it. I lost an expensive camera and a leather jacket. If I know that, I would carry them with me on board the plane.

The next problem was that our hotel was completely different from what I saw in your booklet. Actually, your marvelous hotel was a photomontage. The hotel we lived in was a nightmare. There was no hot water and I had to share a room with other three people. If I saw the real photos of the hotel, I didn't book this holiday. Also the hotel was more expensive than I expected because we had to pay for drinks and meals. I didn't have enough money. But if you give the correct information, I took more money with me.

Finally, the return flight was delayed for two days and we had to wait in the airport and pay for accommodation. If I take a bus, it is faster and cheaper. If you are an honorable company, you will pay me back my money. I wish I had never chosen this terrible holiday and I will never travel with you in the future.
Yours sincerely,
Malgonata Waleski

5. Write what these people said. They are talking about their regrets with would, might or could. For 5 and 6, write sentences that are true for you.

example: Peter didn't get a place at college because he didn't apply in time.

If I'd applied in time, I might have got a place at college.

1. Last year Olivia spent all her money on clothes and couldn't afford a holiday.
2. Samuel didn't notice a speed camera and he got a fine for driving too fast.
3. Patrick broke his leg and didn't win the skiing competition.
4. Sarah didn't watch the race because she didn't know about it.
5. If I hadn't _____.
6. If I had _____.

6. Change the following situations into the past.

*example: He would receive you **if** he had more time.*

*He would have received you last time **if** he had had more time.*

1. I would start this work if I knew how.
2. I would answer this question if I knew how.
3. We would be warned if anything went wrong.
4. If this idea proved wrong, we would try another one.
5. I would write a paper if I had anything to report.
6. If we worked jointly with biologists, we would have more interesting results.
7. We could obtain a better result if we used this method in combination with X-ray analysis.
8. If I were informed about the symposium before it started, I could attend it.
9. If we knew more facts, this might stimulate out interest.

7. Translate into English.

1. Если бы ты присутствовал на лекции вчера, ты бы понял новый материал лучше.
2. Без силы гравитации не было бы давления в жидкостях.
3. Новые результаты могли бы вызвать большие изменения в ходе эксперимента.
4. Этот журнал содержит ряд статей на данную тему. Если бы вам удалось достать его, мы могли бы получить много ценной информации.
5. Предыдущая конференция была бы намного интересней, если бы на нее приехало большее количество ученых.
6. Если бы вам задали этот вопрос, сумели бы вы на него ответить?
7. Если он станет отказываться, я постараюсь убедить его.
8. Если бы ты слушал внимательно, ты бы все понял.
9. Если бы мне довелось писать статью на эту тему, я бы не стал приводить столько цитат.
10. Если бы я тогда знал английский, меня бы взяли на работу в эту компанию.

Module 7 EARTH IN THE UNIVERSE

Grammar Focus:
Modal Verbs of Probability

Check Your Grammar

Modal verbs can be used to express degrees of probability. Which of these sentences from the text *Contact: the Day After* do this? Which don't? Translate the sentences into Russian.

1. My guess is that the number of detectable civilizations in our galaxy right now must be 10 000.
2. If you and I speak different languages, and we're in the same room, I can point at a table, and I can say 'table'.
3. Constructing such an instrument might require international collaboration and funding, with no guarantee that the message could ever be deciphered.
4. Some scientists may be too conservative.
5. They couldn't verify the precise origin of the signal with a separate telescope as lightning had recently struck that telescope and fried its hard drive.
6. Some SETI researchers assumed that the language of science could provide common ground for communication.
7. Errors can take place right at the get-go.
8. The astronomers who made the discovery must send an International Astronomical Union telegram-now delivered as an e-mail- to observatories around the world.
9. Some SETI proponents suggest we should do more than passively wait for a signal.
10. There is no reason why an extraterrestrial civilization couldn't spot Earth.
11. Aliens who have a mere 1,000-year head start on us could be listening to our conversation right now.
12. May I make a suggestion?

Grammar (1) Modal Verbs of Probability

Modal verbs can express the idea of **probability or how certain you are** about a situation. When we want to speculate or make deductions about a particular situation, we can use the following modal verbs:
must, can't when we are 99% sure about something
may (not), might (not), could when we think something is possible.
These modal verbs can be followed by simple, continuous or perfect infinitives.

Present/Future

We **might interpret** it. (V - simple infinitive)
Elliott thinks he **could determine** whether a signal bears the characteristics of a language.
It **can't be** true. You **must be** wrong.
They **could be listening** to our conversation right now. (be + Ving - continuous infinitive)

Past

They **can't have produced** a similar effect. (have + V3 - perfect infinitive)
Scientists **must have examined** the problem in detail.
He **might have provided** them with the information they needed.

PART I They Might Contact Us

Warm-up (1)

Before reading the passage below, let us explain the following notions:
computer-processing power, computing advances, extraterrestrial civilization, worldwide collaborative effort, SETI, UFO, NASA, level of intelligence

Pre-reading (1)

1. Read the introduction to the article *Contact: The Day After*.

Computer-processing power has roughly been doubling every two years for the past 50. Some scientists believe that within 30 years or so, computing advances will allow them to sift through enough frequencies to have a reasonable shot at finding a signal from an extraterrestrial civilization. This worldwide collaborative effort is known as SETI - the search for extraterrestrial intelligence. "My guess is that the number of detectable civilizations in our galaxy right now must be 10 000", Frank Drake says, who is now chairman emeritus at the SETI Institute in Mountain View, Calif. "That means one of every some millions of stars has a detectable civilization."

Discussion: If Drake is right - if we are within a few decades of discovering that we are not alone in the universe - what then? What might happen after we detected a signal from an alien intelligence? Could we even translate the message? How likely is it that the message might contain knowledge that would transform our culture? Would it be dangerous to respond and reveal our existence to beings from other worlds? Discuss in groups and answer the questions.

Reading (1)

Below is an article that can help you to answer some of the above questions. Read the text and try to formulate the main idea of the passage in 4-5 sentences.
Pay attention to the underlined constructions. What meaning do they have? Try to use some of them.

Contact: The Day After

It happened at about 6 a.m. on a June morning 13 years ago. Jill Tarter, director of the SETI Institute's research center, was at the Green Bank observatory when the signal came in. It was a bunch of signals at discrete frequencies, with uniform spacing between them, which looked on a graph like a comb. Tarter and her colleagues at Green Bank followed their protocols to rule out false alarms. They swung the telescope away from the target star. The signal vanished. They aimed at the star again. The signal came back. Ordinarily they would have verified the precise origin of the signal with a separate telescope. But lightning has recently struck that telescope and fried its hard drive. By late afternoon the target star that was thought to be the source of the signal began to set below the horizon. That was when her team realized something was wrong. Although the target star was setting, the source of the signal seemed to be climbing, its strength undiminished. The signal, they eventually determined, was coming from a NASA satellite.

In the event of a signal that survives initial scrutiny - one that is quickly verified by a second observatory with a separate telescope - the astronomers who made the discovery must send an International Astronomical Union telegram to observatories around the world. What could happen next? A triumphant announcement, followed by headlines? Panic? New Age celebrations? Probably

none of the above, except for the headlines. Even if the signal is confirmed as an authentic transmission from an extraterrestrial civilization, it is unlikely that astronomers would be able to extract any information from it for many years. Any message content would likely be in the form of changes in amplitude or frequency buried within the pulse. Resolving the message would require an antenna far more powerful than Earth's largest one. Constructing such an instrument might require international collaboration and funding, with no guarantee that the message could ever be deciphered.

Then, the lack of any further knowledge about the nature of that alien intelligence might limit the immediate cultural impact. "We run into an irreducible problem with communication that isn't face to face. If you and I speak different languages, and we're in the same room, I can point to a table, and I can say 'table', and you infer that 'table' is my word for that thing, and then we can go from there. If you're not in direct contact, if you can't do that kind of pointing exercise, there's always this question of what you're referring to in these initial communications" Kathryn Denning said.

Some SETI researchers assumed –and still assume - that the language of science could provide common ground for communication. "We'll be dealing with the same physical structures in the universe. We can use them to speak and build up from there - send each other the value of pi. And even if it proves impossible to directly translate the message, it might be possible to discover patterns that they suspect are fundamental to all languages. Those patterns might reveal something about the nature of beings who sent the message, particularly how their level of intelligence compares with our own. But errors can take place right at the get-go. For example, if I give you a signal-beep, beep, beep- is that three or two? Are we counting the beeps or the spaces?

Some SETI proponents suggest we should do more than passively wait for a signal. They believe we should transmit messages and let anyone who might be listening know that we are here. Last spring, however, in a Discovery Channel series, Stephen Hawking at the University of Cambridge said that transmitting messages without knowing what is out there could be dangerous.

But in any case, it is probably too late. There is no reason why an extraterrestrial civilization couldn't spot Earth using the same –or better- techniques that terrestrial astronomers are already using to find planets around other stars. Aliens who have a mere 1,000-year head start on us could be listening to our conversation right now being aware that intelligence is common in the universe.

(by Tim Folger,
Scientific American, 2011)

Answer the comprehension questions:

1. What happened at the Green Bank observatory 13 years ago?
2. How come they didn't verify the precise origin of the signal?
3. When did the scientists realize that something was wrong?
4. What would happen if the signal was verified?
5. What could limit the immediate cultural impact?
6. Could there be anything common to refer to in the initial communication?
7. What would happen if aliens visited us?

Vocabulary (1)

1. Complete the chart of adjectives, nouns and verbs. The missing verbs are all in the above text.

noun	***verb***
	observe
aim	
verification	
	strengthen
target	
requirement	
	collaborate
	assume
reference	
tendency	
suspicion	
transmission	
confirmation	
extraction	
yield	
	announce
noun	***adjective***
precision	
theory	
	exciting
galaxy	
power	
value	
triumph	
	intelligent

Pre-listening (1)

Give definitions to the following words then read the explanation below.
planet, exoplanet, the Solar system, star

An **extrasolar planet**, or **exoplanet**, is a planet outside the Solar System. For centuries, many philosophers and scientists supposed that extrasolar planets existed, but there was no way of knowing how common they were or how similar they might be to the planets of the Solar System. The first confirmed detection of an exoplanet orbiting a star was made in 1995. Due to improved observational techniques, the rate of detections has increased rapidly since then. This means that scientists are getting closer to detect more systems that are similar to our own solar system.

Listening (1a)

Listen to the following text taken from Scientific American 60 Seconds Space. Dimitar Sasselov, director of Harvard's Origins of Life Initiative, explains how rocky exoplanets larger than Earth could have greater potential for life than Earth did. Fill in the blanks.

Text 1 Super-Earth Exoplanets Could Be Better for Life

Earth is the only planet we know of that (0) *harbors* life. But (1) _____ some exoplanets (2)____ even better for life?

"It just happened that in our own (3) _____ _____, the Earth is the largest rocky planet." Astronomer Dimitar Sasselov directs the Harvard's Origins of Life Initiative and wrote the new book 'The Life of Super-Earths'.

"Now we know that planets which are (4)_____ but bigger than the Earth are plentiful, they're around other stars in big numbers. And we certainly know that if you're smaller than the Earth a lot of things (5) ____ _____. Your (6) _____ is less stable, your (7) _____ can go away, like Mars, plate tectonic activity and (8)_____ enrichment goes away as well.

"The Earth is great. But if you're a little bit bigger than the Earth, all those things are the same or even better—more active, more chemistry, more stability—and nothing is worse. That you have a little bit higher G? That's not a (9) ____ _____, especially for the (10) _____."

Listening (1b)

Listen to the following text taken from Scientific American 60 Seconds Space. New telescopes could spot aliens on planets around distant stars, if they like their cities really brightly lit. Fill in the missing grammar structures.

Text 2 Bright Exoplanet Lighting Could Indicate Intelligent Life

There's probably no intelligent life in the outer solar system. But it (0) *couldn't hurt* to check. A new study suggests that astronomers (1) _____soon _____ _____ city lights on distant worlds. Astronomical campaigns already in the works, for instance, (2) _____ _____ a large illuminated city as far away as the Kuiper Belt, where Pluto and many other icy worlds orbit. The research is on the site *arxiv.org*.

Artificial illumination on a Kuiper Belt Object (3) _____ _____ ____ because it (4)_____ _____ less than reflected sunlight does when the world moved toward or away from the sun. "Just by checking for how their brightness varies with distance, you (5) _____ ____ _____ to identify interesting candidates." Princeton's Edwin Turner, a co-author of the new study. Unfortunately, Turner says, no telescopes currently in the works (6) _____ ___ _____ enough to identify city lights in other planetary systems unless the aliens like things really bright.

"Forthcoming facilities (7)_____ _____ _____ to see artificial lighting on another world if it's really much brighter than we use. It begins to become plausible that we (8)_____ _____ it. A million times (9) _____ ____ for sure, and 10,000 times we (10)__ _____ _____ a chance."

After Listening (1)

1. Explain the meaning of the following words and phrases from the texts above.

to harbor life, rocky planet, initiative, plate tectonic activity, plentiful, chemical enrichment, forthcoming facilities, to become plausible, to stand out, to spot aliens, be brightly lit

2. What interesting facts have you learnt from the texts above?

3. Revise the rule for Degrees of Comparison of adjectives and adverbs (regular / irregular).

Fill in the table. Use the text from Listening (1a) for help.

good		the best
bad		
well		
badly		

Grammar Practice (1) Probability in the Present and Future

1. Express your agreement with the following statements (but you are not sure). Use *may /might /could* in your sentences.

example:

- The experiments in the subject will probably need access to the chemical laboratory.

- Yes, the experiment in the subject may need access to the chemical laboratory.

1. They will probably develop several schemes of this type. 2 They will probably attach great importance to these facts. 3. They will probably create a satisfactory theory for such applications. 4. They will probably obtain sufficient experimental data for exotic particles. 5. Who knows, maybe they will gain more detailed information about such phenomena. 6. Maybe they will give a complete interpretation of these observations. 7. Our understanding of the properties of these particles will probably improve considerably. 8. Scientists will perhaps take into account these effects. 9. Scientists will perhaps account for the properties of these particles. 10. Engineers will perhaps apply the new method for practical purposes. 11. Physicists will perhaps make an attempt to study the phenomenon in detail. 12. Engineers will perhaps help to simplify the procedure of the experiment.

2. Say that the person mentioned *must be doing* the action now.

example:

- They are definitely refining upon that invention yet.

*- They **must be refining** upon that invention now.*

1. He is certainly developing the film now. 2. I'm sure they are reconstructing this experiment now. 3. I'm sure he's choosing suitable materials for the experiment right now. 4. I bet they are brainstorming the problem at the moment. 5. I'm sure he's learning the definitions at the moment. 6. Of course he is distributing the books to the students now. 7. There's every chance that they are conducting the improved version of this type of experiment.

3. Express supposition in connection with the following statements. Use the suggested words.

- His articles are always very good. (a smart man)

*- He **must** be a smart man.*

1. His theories are always very significant. (a talented scientist) 2. His experiments are always successful. (a skillful experimenter) 3. His articles are always carefully written. (an industrious writer) 4. His lectures are always excellent. (a brilliant speaker) 5. His students know English well. (a capable teacher) 6. His devices are always ingenious. (a talented engineer)

Speaking (1)

1. Read out the following conversation in pairs. What viewpoint is expressed?

Is Anybody Out There?

Dimitra Atri of Kansas University (USA) thinks we need to improve our messages to aliens.

- Dr. Atri, in your most recent study, you recommended that we rethink our attempts at interplanetary contact. Why?
- Our all previous messages into space must have been too anthropocentric. Unless you are familiar with our way of encrypting information, and have some human context, these messages make no sense. It's a bit like the film *The Gods Must Be Crazy*, where a bottle of cola falls out of a plane and lands among an isolated tribe in Africa, who spend the rest of the film trying to figure out what it means.
- What would be your ideal method of communication?
- The priority ought to be to have a message that is easily deciphered. The best thing would be to have a digital message, based on mathematical fundamentals, something like the universal rules of addition. Since there's no guarantee that aliens can see or hear, transmitting pictures or music might make no sense.
- The physicist Stephen Hawking has advised against sending out this kind of messages, saying that they might attract unwanted attention - or even provoke an alien invasion.
- I don't share this fear. Invasion is only necessary when you need more resources for yourself. If a civilization can travel many thousand light years to reach us, it will be technically so advanced that it will have no shortage of resources.
- Why have we not received any messages from other civilizations?
- Our wireless technology is still relatively primitive. We receive signals using antennae, which are set only at specific frequencies. Given this, it's hardly surprising that we have not been able to intercept any messages, despite the fact that there are plenty of planets out there in the universe that have the necessary conditions to support life forms.

2. Act out the similar conversation in pairs/small groups. Give your own answers to the questions. Add more questions and answer them.

Writing (1)

Write a one-page assay to express your opinion on the following topic. 'Should we search for extraterrestrial civilizations?' Use concrete examples and details to support your answer**.**

PART II Modal Verbs of Probability in the Past

Warm-up (2)

For the probability in the past, we use might/ must/can't have + V3 (perfect infinitive).
Change the following sentences into the past and translate into Russian. Do all of them express probability?

1. Well, the first sentence must always be the best, just to make people read the rest.
2. If you and I speak different languages, and we're in the same room, I can point to a table, and I can say 'table'.
3. Constructing such an instrument might require international collaboration and funding.

4. Some scientists may be too conservative.
5. Can we translate the message now?
6. A lot of new equipment can't be provided now.
7. Errors can take place right at the get-go.
8. Some SETI proponents suggest we should do more than passively wait for a signal.
9. There is no reason why an extraterrestrial civilization couldn't spot Earth.
10. Aliens who have a mere 1,000-year head start on us might be listening to our conversation.

Pre-reading (2)

Working in pairs, discuss the following problems.

The puzzle of the birth and death of the Universe is one of the most exciting problems in science comparable in importance with the puzzle of the origin of life. Can you recollect the most popular theories? Which theories seem more plausible to you? What can threaten the Earth from outside? What has the Earth overcome yet?

Reading (2)

The following article may help you to answer some of the question above. Read it in depth and answer the questions below.

Earth Odyssey

For billions of years, Earth has been on a **perilous journey** through space. As our planet **whirls around** the sun, the whole solar system undertakes a far grander voyage. **Circling** our island universe every 200 million years, we have drifted through brilliant spiral arms and **witnessed** the spectacular death of giant stars.

Many of these **marvels** may have been deadly. Some may have smashed up continents or turned the planet into ice. Some may have been more **benign**, perhaps even sowing the seeds of life.

In a nearby spiral arm of the Milky Way, more than 1000 light years away from our solar system's present position, lies the Orion nebula, a birthplace of giant stars. Our solar system must at times have drifted much closer to such stellar nurseries. To do so is to flirt with disaster. What could be the consequences of such trips? A massive star burns its fuel rapidly, and in a few million years its core can collapse, **unleashing the vast energy** of a supernova. X-rays from a supernova just tens of light years away could destroy Earth's ozone layer, letting in harmful ultraviolet rays from the sun. High-energy protons or cosmic rays would continue to bombard Earth for decades, depleting ozone, damaging living tissue and possibly seeding clouds to spark climate change. Such convulsions might have **triggered** some of the mass extinctions that so cruelly punctuate the history of life on Earth, - perhaps even hastening the **demise** of the dinosaurs 65 mission years ago, according to a theory formulated in the 1990s.

We know Earth has suffered such episodes, including big chills some 650 and 700 million years ago. Their cause remains **obscure**. It could have been the weathering of mountains that pulled carbon dioxide from the air, or volcanic eruption, or changes to Earth's orbit around the Sun - or a black cloud in space.

Planetary scientist Ian Crawford, University of London, proposes we can also look at the moon to find **clear evidence** of many astrocatastrophes. "The moon could tell us Earth's tale. It is a giant sponge **soaking up** everything thrown at it as we go around the galaxy. Up there, alien dust might have settled down to mix with the lunar soil. We might find fragments that would tell us what type of asteroids of comets were hitting the moon", he says. Getting to it won't be easy. "We may need to **sink** a drill into an area known to have lots of lava **flows**". Setting up a **drilling rig** on the moon is **beyond** our present capabilities.

To find out we would need to visit a variety of lunar surfaces, taking small rock samples to determine their ages, and then making a careful census of craters to see how the impact rate has fluctuated. We might find fragments that would tell us what type of asteroids or comets were hitting

the moon. For the moment, we can only look at the **craggy** face of our old companion and wonder what stories it has to tell.

(by Stephen Battersby, New Scientist, December 2011)

Comprehension questions:
1. What is Earth's journey like?
2. Is it safe?
3. What changes could it have caused?
4. According to scientists where could we find more information?

Vocabulary (2)

1. Find the highlighted words in the text above. Try to work out their meaning from the contexts.

2. Find the words in the text which have similar meanings to these phrases.

Paragraph 1
moving around
moving around by running and changing direction continuously
Paragraph 2
causing death
to plant or spread seeds on the ground
Paragraph 3
a place where young plants are growing
to take risks
to attack
Paragraph 4
a feeling of being cold
the action of sun, air or wind on rocks making them change their shape or colour
Paragraph 5
a piece of material that can hold water easily
a large piece of equipment that is used for taking oil or gas from the ground
Paragraph 6
to change frequently in size, amount, quality
several different sorts of the same thing

3. Here are six answers. Write the questions.
for billion years
the Orion nebula
Its core can collapse.
X-rays from a supernova
It could have been the weathering of mountains that pulled carbon dioxide from the air or volcanic eruption or changes to Earth's orbit.
to find clear evidence of astrocatastrophes

Grammar (2) Modal Verbs of Probability: Present, Future, Past

Read the article again paying attention to modal verbs and infinitives after them. Do they refer to the present, future or past? Put them into columns according to their meaning.

Modal verb of probability + infinitive with the present /future meaning	Modal verb or probability + infinitive with the past meaning
What could be the consequences of such trips? … …	*Many of these marvels may have been deadly.* … …

Grammar Practice (2) Modal Verbs of Probability in the Past

1. Re-state the following sentences using an appropriate modal verb with perfect infinitives.
example:
They certainly found a way to avoid such paradoxes.
The must have found a way to avoid such paradoxes.

1. They probably diminished the pressure. 2. Of course they performed the calculations in time. 3. I think they found the classical liquid structure. 4. They probably limited the heat produced to the proper amount. 5. He definitely exerted every effort to perform the task. 6. The producers probably supplied the demands of consumers.

2. Contradict the following statements. Use "It can't be so" as an opening phrase. Develop the situations saying that the person mentioned can't have done the actions.
example:
- They have produced a similar effect.
- It can't be so. They can't have produced a similar effect.

1. They applied the new device. 2. He has changed his viewpoint. 3. He has delivered a report in English.4. They have found topics of mutual interest. 4. They have simplified the procedure of the experiment. 5. They found another method of introducing ions into the system. 6. He demonstrated the truth of this hypothesis.

3. Re-state the following sentences.
example:
-He could test the device, but he didn't try.
-He could have tested the device if he had tried.

1. He could improve the device, but he didn't try. 2. He could answer the questions, but he didn't try. 3. You could encourage their discussion, but you didn't try. 3. They could check these figures, but they didn't try. 4. You could simplify the procedure of the experiment, but you didn't try. 5. They could make use of the new scheme, but they didn't try.

4. Should+ perfect infinitive.
Give short negative answers to the following questions. Develop the situations saying you realize now that you should have done the action. Follow the model.
example:
-Have you observed the process carefully?
-No, I haven't. But I realize now that I should have observed the process carefully.

1. Have you specified these values? 2. Have you examined the problem in detail? 3. Have you used both systems simultaneously? 4. Did you find a more convenient way to do it? 5. Have you formed the images in the traditional way? 6. Did you make an attempt to solve the problem? 7. Have you studied the general operating principles of this device?

5. Put the following sentences in to the passive voice.
example:
-They must have overlooked this possibility.
*-This possibility must have **been** overlooked.*

1. They must have underestimated the results. 2. They should have extended the conception to include this case too. 3. They may have disregarded smaller defects. 4. They must have postponed the further work. 5. They must have overestimated the potentialities of this technique. 6. They could have reorganized the physics department long ago. 7. They must have violated the conservation law. 8. They might have neglected smaller errors. 9. They should have included other works in the review. 10. They could have estimated this contribution more precisely.

6. Translate the following sentences.
1. These important results might have been easily overlooked, as they were published in a popular science magazine. 2. Johnson's data published in 1987 could have been used in our work but they lacked precision. 3. Originally, this word must have been used to describe this process for want of a better term. 4. But for the lack of precise measuring instruments these events might have been detected much earlier. 5. These studies should have been resumed, when it became clear that the original assumption had been correct. 6. The resulting figures should have been corrected for the energy losses to make the picture look more realistic. 7. The definition of this event suggested by Smith lacked clarity; otherwise it could have been taken for general use. 8. But for the support and encouragement of my colleagues this work might not have been completed. 9. Observation of the sun and the planets must have been made long before our civilization, as evidenced by recent archaeological findings.

7. Translate into English.
1. Должно быть, они упростили методику этого эксперимента. 2. Им следовало упростить методику этого эксперимента, но они этого не сделали. 3. Неужели (разве) они упростили методику этого эксперимента? 4. Не может быть, чтобы они упростили методику этого эксперимента. 5. Они, возможно, упростили методику этого эксперимента, но я в этом не уверен. 6. Они могли бы упростить методику этого эксперимента, но они даже не попытались этого сделать.

8. Read and translate in writing the following excerpt from Scientific American.

Interstellar gas permeates the Milky Way, but not evenly. The solar system happens now to inhabit an unusually empty patch of space, the local bubble, with only one hydrogen atom per five cubic centimeters of space. In the past we must have drifted through much denser gas clouds, including some more than 100 light years across in whose cold and dark interiors hydrogen forms itself into molecules.

In such nebula, Earth may have caught a cold. Usually, the solar system's interior is protected from harsh interstellar radiation by the solar wind, a stream of charged particles that flows deep into space, forming a huge electromagnetic shield called the heliosphere. When the interstellar gas gets denser, the solar wind can't push as far, and the heliosphere shrinks. Above a density of around 1000 molecules per cubic centimeter, it will contract to within Earth's orbit. That might happen every few hundred million years.

The accumulation of hydrogen in Earth's high atmosphere would alter its chemistry, creating a reflective aloud layer, while dust could mimic the shading effect of sulphate aerosols from volcanic eruptions. Alex Pavlov of the University of Colorado, Boulder, says the dust alone could trigger a global ice age.

Speaking (2)

Let's look at mysteries. There are so many things that we can't explain. Stonehenge, for example. It's a huge and very old circle of stones in the south of England. Some of its stones came from 300 kilometers away and that's one of the mysteries about Stonehenge. How were those huge stones brought there?
And what about the dinosaurs? They lived on Earth for 150 million years and then disappeared quite suddenly. Why? What could have happened?

Work in groups. Group A will speak about Stonehendge (They might have come by boats.), group B will speak about dinosaurs (There may have been a natural disaster.) Come up with as many ideas as possible. Use modal verbs.

Pre-listening (2)

1. Discuss briefly with your partner.
There are thousands of asteroids orbiting the Sun. They are rocky bodies that vary in diameter. As asteroids orbit, they occasionally collide and break into fragments. What harm can they bring to Earth?

2. Look through the text and try to predict the gapped words. Share your ideas before listening.

Listening (2)

Now listen to the following text taken from Scientific American 60 Seconds Space and check your predictions.

Earth Was Longtime Asteroid Punching Bag

An asteroid (1) _____ is widely blamed for killing off the dinosaurs 65 million years ago. An asteroid 10 kilometers wide struck the Yucatan (2) _____ and left a giant crater. It also tossed up enough (3) _____ to catastrophically darken the sky and cool the Earth.

Now a study in the journal *Nature* indicates that such impacts (4) _____ _____ _____ commonplace in Earth's history. As many as 70 asteroid impacts at least as severe as the one that did in the dinosaurs, rocked the planet long after such impacts were thought to have petered out.

The (5) _____ is a hypothesized collection of asteroids called the E belt, only a small (6) _____ of which survives today. The E belt was closer to Earth than the main asteroid belt is now, and it was (7) _____ by the giant planets as they settled into their current orbits.

It had been thought that Earth's heavy (8) _____ by asteroids and comets died down about 3.7 billion years ago. But E belt asteroids would have rained down frequently for another two billion years after that, with the occasional dino killer coming in even later on. All those impacts would have had (9) _____ effects on life. Somehow, it all worked out for us—if not for the (10) _____.

After Listening (2)

1. Explain the meaning of the following words and phrases; use the script to provide the context.

to punch**,** impact**,** to be blamed for**,** peninsula**,** to toss up debris, be commonplace, severe**,** culprit, a remnant of**,** to be disrupted**,** bombardment**,** dino killer

2. Summarize the main ideas of the text in 4-5 sentences.

Listening (3)

(from *the Scientific American 60 seconds-space*)

Pre- Listening (3)

Mars has been the target of a lot of recent exploration. What do you know about it? What might this planet be experiencing now?

Listening (3)

Listen to the following text and check your predictions. Rockfalls visible in orbiter images of Mars indicate that geologic activity occurred just a few million years ago and may be ongoing. Fill in the blanks.

Mars May Still Be Quaking

What's shaking on Mars? A new study suggests that tremors (1) _____ _____ rattled the Red Planet just millions of years ago. These earthquakes, well, Marsquakes, (2) _____ _____ ___ _____ today. That would mean that Mars is not geologically dead, as is usually assumed.

A team of European scientists analyzed imagery of a Martian fault system from a NASA orbiter. In the high-resolution photos, the researchers (3) _____ _____ individual boulders that have tumbled down cliffs near the fault.

They found that the most rockfalls, and the biggest boulders, were concentrated around one part of the fault system. That's what you (4) _____ _____ near the epicenter of a Marsquake. And it's not what you (5) _____ _____ from a more mundane cause—avalanches caused by melting ice, for instance. The study appears in the *Journal of Geophysical Research*.

Because the fault system cuts through terrain that is just millions of years old, the Marsquakes themselves (6) _____ also _____ _____ very recent. Some rockfalls appear so young that winds have not yet erased the tracks left by boulders rolling downhill.

Whether the Red Planet remains geologically active is uncertain. But rolling rocks support the idea that Mars is still rocking and rolling.

After Listening (3)

Think of as many synonyms of the word *shake* as possible.
Retell the text using the synonyms.

Listening (4)

(from *the Scientific American 60 seconds-space*)

Pre-Listening (4)

How is the heat transferred in different parts of the Sun? What part is the hottest?

Listening (4)

Listen and check your ideas. Then fill in the blanks.

Magnetic Tornadoes May Heat Solar Corona

The sun is hot. That's (1) _____. But it's *where it's hot* that has physicists (2) _____.

The sun's outer atmosphere, or (3) _____, is much hotter than the surface, even though the surface is closer to the (4) _____ _____ reactor of the solar interior. Why that should be is one of the big questions in solar physics. There have been several (5) _____ for how all that heat arrives in the corona, from oscillating (6)_____ waves to jets of (7) _____ _____.

Now a team of European researchers has discovered a new possibility: giant magnetic tornadoes. These supersize (8) _____ can be some 1,500 kilometers across. And they've been seen on the sun's surface and in its (9) _____ _____. With the help of NASA's Solar Dynamics Observatory the researchers (10) _____ the tornadoes reaching up into the corona as well. They (11) _____ their finding in the journal *Nature*.

The solar swirls are (12) _____ - more than 10,000 of them dot the sun at any given time. And they could funnel quite a bit of energy up into the solar atmosphere. It's too early to say how big a role the tornadoes (13) _____ ___ _____ the corona. But their discovery (14) ___ _____ __ _____ a hot topic even hotter.

Module 8 SCIENTIFIC RESEARCH: SUCCESS OR FAILURE

Grammar focus:
Indirect Questions
Sequence of Tenses
Reported Speech

"There are many hypotheses in science which are wrong. That's perfectly all right."

(Carl Sagan)

PART I Small Talk

Warm- up (1)

General knowledge quiz

1. Work in two groups. Write five general knowledge questions. Ask the other group. Be ready to provide the right answers to your questions.
2. What types of questions did you use? (special, general, tag questions, indirect and etc.)
Give examples and explain the rules of their formation.

Grammar (1) Indirect questions

1. Indirect questions have the same word order as statements and there is no *do/does/ did*.
2. We often make direct questions into indirect questions to make them sound 'softer' or more polite.
3. If there is no question word, use **if** or **whether**.
4. Look at some examples below. What has changed in grammar, meaning and style?

Direct questions:	**Indirect questions**:
At what laboratory did Rutherford work?	I don't know at what laboratory Rutherford worked.
Have you heard of Brown's experiments?	I wonder if you have heard of Brown's experiments.
How many electrons are there in a nitrogen atom?	Do you know how many electrons there are in a nitrogen atom?
What does 'homogeneity' mean?	Do you remember what 'homogeneity' means?

5. Here are some expressions that introduce indirect questions. Practice with your partner asking about different things.
example: Could you tell me where the library is?
Do you know…
you happen to know…
Do Have you any idea…
Do you remember…
Would you mind telling me…
I don't know…
I wonder…
I can't remember…
I've no idea…
I'd like to know…
I'm not sure…

Practice (1) Indirect questions

1. Working in pairs, give full replies to the following questions.
Use ***I know, I don't know, I remember, I don't remember, I can't tell you, I don't understand*** as an opening phrase. Answer the questions if possible.
example:
- When was DNA structure discovered?
***- I know** when DNA was discovered. It was…*

1. When did Newton live? Do you remember?
2. At what university did A. Einstein work after the Second World War?
3. Why did he go to the United States?
4. Which of his theories were confirmed experimentally?
5. What contribution did Einstein make to science?
6. How have his ideas been developed in more recent years?
7. In what year did Watson and Crick make their discovery?
8. In what year were they awarded the Nobel Prize?
9. What did they discover?
10. Who devised the first particle accelerator?
11. How are scientific discoveries made?
12. Why don't the planets fall down on the sun?
13. Why must time be considered as "the fourth dimension?
14. When was the Nobel Prize established?

2. Use the Internet to collect information and answer all the questions.

3. Change the sentence using *whether* clause according to the model. Do not change the meaning of the sentence.
example: This factor might play a role but we are not sure.
*We are not sure **whether** this factor plays a role here.*

1. This theory might work but we must check this. 2. This idea might work but we are yet to see it. 3. This method might be good but we are yet to see this. 4. This fact might be important but we must check. 5. This analogy might mislead us but we are to know this. 6. He might be qualified to do this work but I am not sure. 7. This formula might be correct but I am not sure. 8. His idea might be correct but I am not sure.

Listening (1)

1. Before you listen to a description of a scientific experiment, read and discuss the words that might be difficult to understand. Can you give their synonyms?

proxy, critter, to relish, torture, beast, habitat, strain, finely, to tug, strand, cozy, trial, cage, male, female.

Now can you guess what the text is about?

2. Listen to the text and check your predictions. Then listen again and fill in the missing particles and prepositions.

Be Nice to Mice

…and they may return the favour.

Only one drug of every ten successfully tested in laboratory animals, ends ____ working in people. One reason, of course, is that mice are not men. Another, though, might have to do _____ the fact that whereas human patients are afforded all manner of creature comforts, their animal proxies are not.

Although medical science's favourite critters relish temperatures of a little _____ 30^0C, laboratories routinely keep them _____ five or ten degrees _____ that. This is not _____ order to torture the beasts but, rather, when kept warm they are unmanageably aggressive. The downside is that they have to eat more than they otherwise would, ____ order to keep their bodies warm. That changes their physiology. And that _____ turn alters the way they metabolize drugs, _____ possibly confusing results.

Joseph Garner, of Stanford University, thinks the answer is to keep the labs cool, but let the mice cope _____ the low temperatures as they do _____ their natural habitat: not _____ eating more but _____ building nests. So far, though, no one has a clear idea _____ how much nesting material is needed to keep mice happy. Dr. Garner and his colleagues, therefore, decided to find _____. They have just reported their results in the *Public Library of Science*.

Dr. Garner and his team let each of their mice, 36 males and as many females from three strains commonly used in trials, roam free in two cages connected _____ a narrow tube. One cage was kept constant _____ one of six temperatures between 20^0C and 35^0C. The other was maintained _____ 20^0C but was stocked with up to ten grams of finely shredded paper, which the mice could use to weave a nest. The idea was to check whether the animals would rather build a nest in the cooler cage or move to the warmer one, possibly tugging nesting material along _____ them strand _____ strand.

The researchers found that the rodents' preferences varied slightly between strains, as well as between sexes (_____ females partial to higher temperatures, possibly because _____ their thinner protective layer of fat), confirming that there is no single set of conditions _____ which all mice feel cozy. In general, though, _____ little nesting material around, the animals laboriously carried strands of paper over to the warmer spot, one or two ____ a time. But leave ____ least six grams of paper in the chilly cage, and many mice will prefer instead to brave the cold and build a nest there. That seems a small price to pay for better drug trials.

3. Make up four questions to the content (use direct and indirect structures) and ask your partner to answer them.

example: Do you know why some drugs successfully tested in lab animals do not always work in people?

Revision: Prepositions

Fill in the prepositions, check and try to memorize the phrases.

1. _____ zero (выше нуля)
2. a graph of temperature _____ time (график температуры в зависимости от времени)
3. _____ rest (в покое)
4. _____ 150^0C (при 150^0C)
5. _____ the apparatus (позади аппарата)
6. _____ the angle of 30^0 (под углом)
7. _____ the end of the month (к концу месяца)
8. to stay _____ a week (находиться в течение недели)
9. _____ the morning (утром)

10. _____ the target (мимо цели)
11._____ five years (через пять лет)
12. a problem _____flow (задачи на обтекание)
13. _____ the atmosphere (сквозь атмосферу)
14. _____ observation (под наблюдением)
15. to measure _____an instrument (измерять прибором)
16._____our Galaxy (в пределах нашей Галактики)
17. _____ advance (заранее)

Reading (1)

1. Read the following dialogue. What is the major point of the discussion? And what are the minor ones?

Dr. ARCH: Dr. Curry, you said, if I followed you, that the use of animals for cruel experiments is justified if these experiments are conducted for the benefit of mankind.

Dr. CURRY: Yes, that's what I said.

ARCH: Does this mean, then, that the suffering (often unnecessary) and death of thousands of living things can be beneficial to the well-being and the harmonious development of another living being – man?

CURRY: Well, that's not exactly what I mean. What I was trying to say is that new areas of medicine and surgery must be safe for human beings. When considered from this point of view, I strongly believe that the life of just one animal may be taken to save the lives of thousands of people.

ARCH: I don't see it that way.

CURRY: You don't?

ARCH: The point is, animals ought to be allowed to enjoy the gift of life. In my opinion, one can't take the responsibility of disposing of the life of anything or anybody.

CURRY: Do you mean to say then that you would volunteer, or allow a member of your family to volunteer, to test new medicine, rather than use an experimental animal?

ARCH: That's a good question. But I think I would volunteer. I would if the motivation to do it were strong.

CURRY: Suppose you would. But do you expect there would be enough volunteers for a drug to be fully tested? Don't you think that the practice of using human volunteers might result in another thalidomide babies phenomenon?

ARCH: Sorry, I didn't catch the last point, Dr. Curry. Would you mind explaining it?

CURRY: Not at all. What I mean is the experiment might bring no damage whatever to the subject himself. But nobody knows how harmful the effect of it may be on the descendants.

2. Study some organizing elements of discussion. Find expressions that help to:

A. refer to what has been already said
example: You said that…

B. ask for explanation / clarification / opinion
example: Does this mean that…?

C. state / explain / emphasize your point
example: Well, that's not exactly what I mean.

D. disagree / argue
example: I don't see it this way.

Think of some more phrases helpful to lead the discussion.

3. In pairs or small groups, discuss one of the hot topics dealing with ethics in scientific research. Try to use the above expressions from ex.2. You might want to choose from the following topics or think of your own one.

1. Nuclear Energy: Should we pursue new nuclear technologies and build second generation nuclear power plants?

2. Human Cloning and Therapeutic Cloning

3. Animal Cloning

4. Food Irradiation

5. Stem Cell Research

6. Genetically Modified Crops (GMCs)

7. Medical Research Using Live Animals

8. Genetic Engineering

9. Artificial Human Organs and Selling of Human Organs

10. Gene Therapy

11. Medical Research Using Fetal Tissue

12. Chemical and Biological Weapons Research

13. Which is the best energy-producing strategy to pursue?

14. Research into bigger and better bombs (neutron bomb, particle beams, sound beams, etc.)

Speaking (1)

1. Think of your own scientific research (experiments, investigations, tasks) which you would like to discuss with your partner.

2. Make a list of questions that you will ask your partner about his/her scientific work? The exercise below might help. Begin the following questions with ***I wonder*** using **if** and the statement word order.
example: Is this a reliable method?
I wonder if *this is a reliable method.*

1. Are these results reliable? 2. Can you explain this result to me? 3. Do you understand this theory? 4. Are you still working on this problem? 5. What is the physical meaning of this process? 6. Did you observe any change in this process? 7. How did you arrive at this conclusion? 8. How many

experiments did you do? 9. Why did you decide on this technique? 10. What do your results indicate? 11. Are you going to publish your results?

3. Discussion: Work in pairs. One student gives an introduction to an account of his recent scientific work (research), his fellow student asks him about all sort of details, using the questions from the above exercise and beginning each question with" **I wonder"**. Exchange roles.

4. Present your partner's scientific experiment (research, investigation) in class as a one-minute talk.

Part II Reflecting on your research

Warm- up (2)

Look at the following description of a scientific experiment paying special attention to the tenses. Read out all the verbs and name the tenses. Can you explain the choice? What does "would" stand for? Put the events into chronological order. What happened first?

Some time ago we carried out a new plasma experiment. It was expected that the new heating technique would give a better result than in the previous experiments. It seemed likely that the plasma lifetime would be increased. But while we were experimenting it became evident that we would not be able to bring our experiment to conclusion. It was clear that we had made a mistake.

Grammar (2) Sequence of tenses

1. The rule states: if the verb in the principle clause is in one of the past tenses, a past tense must be used in the subordinate clause. The action expressed in the subordinate clause can be simultaneous with the action expressed in the principle clause, prior or subsequent to that of the principle clause. Study how the Rule of the Sequence of Tenses is observed in such clauses.
A useful rule: move the reported clause "one tense back."

2. Read and translate the following examples:

	Simultaneous action	**Prior action**	**Future action**
He said (that)	…he lived in London. …they were waiting.	… he had already finished the experiment.	…he would be working at 6. …they would give a better result.

3. Time and place changes
Here are some more expressions to be changed.

here	there
this	…
these	…
now	…
today	…

yesterday	…
a day ago	…
last night	…
tonight	…

4. The Sequence of Tenses is not observed if the clause expresses a general truth or something is represented as habitual, customary or characteristic, for example:

*He **said** that water **boils** at 100^0C.*
*He **asked** what time the lecture usually **starts**.*

Grammar Practice (2) Sequence of Tenses

1. Translate the following sentences.

1. It was assumed by some physicists that the planets had been formed from a dust cloud. 2. It was soon proved that this hypothesis had been based on the wrong assumptions. 3. It also seemed probable that the planets had come from the Sun. 4. Soon it became obvious that the experiment had been poorly designed. 5. Soon it became evident that the wrong samples had been taken. 6. It was suggested that there had been errors in the experimental results. 7. It appeared likely that some other changes had taken place.

2. Put the sentences into the past tenses. Use the Past Simple Tense.

example: It is shown that the changes are profound.
It was shown that the changes were profound.

1. It is observed that the substance precipitates. 2. It is demonstrated that the particle beams diverge. 3. It is shown that the material has wonderful properties. 4. It is known that the reaction is reversible. 5. It is assumed that this case obeys the same rule. 6. It is proved that the theory is valid. 7. It is considered that the cells have different structures.

3. Put the following sentences into the past tense. Use Past Simple and Past Perfect where necessary.

1. It is clear that the experiment has failed. 2. It is obvious that the situation has changed. 3. It is evident that other changes have taken place. 4. It is known that these results have not been published. 5. It appears that the phenomenon was observed before. 6. It seems unlikely that these facts were known before. 7. It is emphasized that the work has taken many years of great efforts. 8. It seems that the situation has somewhat improved. 9. It is reported that this hypothesis has recently been disproved.

Writing (2)

Write a one-paragraph essay describing one of your previous experiments as you saw it at the end of the work.

Example: I can describe the experiment that I tried to do last week. …

… By the end of the third day it became quite obvious that I had made a mistake somewhere at the beginning. It was possible that I had started with the wrong idea or that I had taken unsuitable material. It turned out later, however, that the counter had been out of order…

PART III What Happens When Scientists Get It Wrong?

"The first principle is that you must not fool yourself – and you are the easiest person to fool… After you've not fooled yourself, it's easy not to fool other scientists. You just have to be honest in a conventional way after that." (Nobel laureate physicist Richard P. Feynman)

Warm-up (3)

In his book 'Fact and Fraud: Cautionary tales from the Front Lines of Science' David Goodstein gives some statements:

"A scientist should never be motivated to do the science for personal gain."
"Scientists should always be objective and impartial when gathering data."|
"Scientists must never believe dogmatically in any idea."
"Scientists should never permit their judgments to be affected by authority."

Do you think all these statements are true? In your opinion, do scientists always follow these principles? Why?

Reading (3)

Two science journalists are talking about the problem of dishonesty and fraud in scientific research. Listen and read the beginning of their talk. What cases are they discussing? What does it show about how science is done?

(from *Talk of the Nation* radio program, July 13, 2012, http://www.npr.org/)

IRA FLATOW, HOST:

This is *Science Friday*; I'm Ira Flatow. A couple of years ago, we interviewed a young scientist about a type of alien life she'd discovered right here on Earth, a strain of bacteria that could build its DNA with arsenic rather than phosphorus, something no other known creature is able to do.

There were NASA press conferences celebrating the discovery. There were TED* talks. There were plenty of gushing news articles. But quite a few scientists who saw the paper were skeptical of the findings, saying the research was flawed. But this is research, right? So to disprove something, you have to try to replicate the study, research it, that's why it's called research, to see if you get the same results or not.

Well, two studies out this week in the journal *Science* did just that, and they could not replicate the original group's finding. They concluded that this bacterium does not break the rules of life as we know it; it's just like all the rest of us.

So, case closed or not? My next guest has been following this debate since the very beginning. Carl Zimmer is the author of "A Planet of Viruses." He's a contributor to *The New York Times* and *Slate* and a contributing editor at Discover, and he joins us from WSUI in Iowa City. Welcome back to *Science Friday*, Carl.

CARL ZIMMER: Hi, thanks for having me.

FLATOW: This shows us what about science?

ZIMMER: This shows us that science is something that's done by people, people who are not perfect. And if you want to understand how science works, you have to understand it as kind of a cultural process. It's a story about excitement, about hype, about debates and about ultimately how science can correct itself if you give it enough time.

FLATOW: But the original authors have stuck to their research, have they not?

ZIMMER: Yes, so the original authors have been interviewed by reporters at the Washington Post and other places, and they're saying that, you know, there's nothing in the data that actually undermines what they were - … undermining their own conclusions.

So - and they've made some suggestions, which frankly I don't quite understand. They, for example, have suggested that somehow during the transportation of these bacteria to these other labs, they changed somehow so they could no longer accommodate arsenic in their DNA.

Now, how it could be that two labs would both fail to get the same result after the stuff was transported raises some serious questions about that kind of an objection. But as you say, yeah, they are sticking by their guns (refuse to compromise, быть верным своему оружию, стоять на своём).

FLATOW: It sounds a little bit like … I remember cold fusion from those days.

ZIMMER: That subject has come up in some conversations I've had. Yeah, I mean, the people who claimed cold fusion was taking place, these two physicists, they did not back down (отступать, уступать в споре) long after the physics community, you know, decided that what they had found was not legitimate.

FLATOW: Does science really work the way we think it does? Is it realistic to expect scientists to drop everything they're doing to replicate a study that they don't like or suspect is not working?

ZIMMER: Well, you know, that is, in theory, what makes science really powerful is that we don't have to just rely on someone's authority. If someone says hey, I'm a big-shot scientist, you have to believe what I say, you don't have to accept that. You can question their results, and you can try to replicate them and see if you can do it yourself.

And the scientific community can evaluate big ideas. Carl Sagan really put it quite elegantly, as he often does. He said there are many hypotheses in science which are wrong. That's perfectly all right. And the reason was because science is a self-correcting process.

But as you say, it's harder in practice than it is in theory because, you know, it does take a lot of time. And, you know, a lot of people who looked at this arsenic life paper who I spoke to when I was reporting on this, they just, they read the paper, and they could see serious problems with it just looking at the paper itself. And so they were quite confident that it was wrong. And so a lot of them just said, well, I have better things to do with my time.

**TED talks - Talks on riveting ideas: Technology, Entertainment, Design and so much more*

Comprehension questions:

1. Why was a new strain of bacteria thought to be a type of alien life?
2. Could other scientists replicate the original study of these bacteria?
3. What were the original authors' suggestions when their conclusions were doubted?
4. Why did the journalists mention the subject of cold fusion in their discussion of the bacteria strain?
5. Why didn't the scientific community immediately evaluate the arsenic life article?

Grammar (3) Reported (indirect) speech

1. Complete the table. Mind the 'one step back rule'.

Tense Changes in Reported Speech

Direct speech		**Reported speech (one step back)**	
Present Simple	'I always write original papers.'	**Past Simple**	He said (that) he always wrote original papers.
Present Continuous	'I'm writing an original paper.'	**Past Continuous**	He said (that)…
Present Perfect	'I've written an original paper.'		
Past Simple	'I wrote an original paper.'		
Past Continuous	'I was writing an original paper.'		
Past Perfect	'I had written an original paper.'		
be going to	'I was going to write an original paper.'		
will	'I will write an original paper.'		
can	'I can write an original paper.'		
may	'I may write an original paper.'		
must	'I must write an original paper.'	**must / had to**	
mustn't	'I mustn't copy the original paper.'	**mustn't**	
could	'I could write the original paper.'	**could**	
would	'I must write an original paper.'		
should	'I must write an original paper.'		

Mind that some verb forms don't change (Past Perfect, could, would, should, mustn't).

2. The most important verbs for reported speech are *said* and *asked*.

However there are many others, some of which add extra meaning. Here are a few:

replied, told, complained, advised, agreed, reported, added, suggested, insisted, stated, …

Try to add some more verbs to this list.

3. Put the following direct speech into indirect (reported) speech. Follow the 'one step back' rule of sequence of tenses.

example: 'A couple of years ago, we interviewed a young scientist about a type of alien life she had discovered right here on Earth,' the host said.
The host said (that) a few years ago they had interviewed a young scientist about a type of alien life she had discovered right here on Earth.

1. 'There were NASA press conferences celebrating the discovery and plenty of news articles,' the host said.
2. 'But quite a few scientists who saw the paper were skeptical of the findings, saying the research was flawed,' he added.
3. 'Carl Zimmer, our next guest, has been following this debate since its very beginning,' the host announced the speaker.
4. 'The original authors have been interviewed by reporters at the Washington Post and other places, and they have stuck to their research results,' Carl Zimmer said.
5. 'There's nothing in the data that actually undermines our own conclusions,' the original authors retorted.
6. 'The authors have made some suggestions, which frankly I don't quite understand,' Carl Zimmer added.
7. 'Somehow during the transportation of these bacteria to these other labs, they changed somehow so they could no longer accommodate arsenic in their DNA,' the authors suggested.

4. Change the following sentences into indirect speech.

1. The speaker said: "Scientists the world over are searching for new and plentiful sources of power".
2. He said: "Our colleagues from MIT have just suggested a very interesting solution of this problem".
3. The teacher said: "Joseph J. Thomson an English physicist discovered the electron".
4. He asked: "When was the first spaceship launched into space?"
5. The student said: "In the near future many new practical uses for spaceships will obviously be found."
6. The student wondered: "How many colleges are there in the University of Cambridge?"
7. The chief of the group said: "We are ready to take off from the space station's orbit to the Moon".
8. The scientist explained: "Scientific observation and exploration has proceeded at the same time as commercial exploration".
9. The supervisor said: "The meteorological observations were transmitted as often as four times a day".
10. The teacher said: "Whereas the Arctic Ocean is locked by land and itself consists of nothing but ice, the Antarctic is a great continent of land".
11. A student from Africa said: "I have been to other countries, Britain in particular, and I have seen the conditions of foreign students there".

Listening (3)

Listen to the continuation of the discussion. According to the conversation, complete the given statements.
1. There is an unfortunate tendency for journals to go for…
2. If self-correction is so important for science, then…

3. There was a psychologist named Daryl Bern, who published a paper in the Journal of Personality and Social Psychology, where he claimed that…
4. And there were three groups of scientists who tried to replicate those findings. They all failed. And one of them submitted their results to this journal…
5. There's a general impulse to eagerly grab onto the next big thing…
6. And then some reporters like myself said, you know, actually…
7. When they claimed that there was arsenic in their DNA, which really would be quite radical if DNA was made up of arsenic, these critics said…

Vocabulary Practice (3)

1. Match the words from the texts with their definitions.

fusion	receiving or involving a lot of attention and discussion on TV, in newspapers;
eager	a set of attitudes or fixed ideas that smb has and that are difficult to change;
controversy	attracting attention by being bright, expensive, large;
arsenic	the process or result of joining two or more things together to form one;
high-profile	to make the situation exist;
dismiss out of hand	an extremely poisonous white powder;
mind-set	public discussion and argument about smth that people strongly disagree about;
flashy	without thinking about it;
engender	very interested and excited by smth that is going to happen or smth that you want to do

2. Make your own sentences with the vocabulary from ex. 1

3. Answer the following questions.
Do you know the difference between fusion and fission? Can you describe the process of nuclear fusion? Will you describe the process of nuclear fission?
What can the term *fusion* imply in music and cooking? What process does it denote in biology and chemistry?

SPEAKING (3)
1. In 1989 B Stanley Pons and Martin Fleichmann announced that they had been able to discover the room-temperature fusion in a bottle. The idea found a lot of supporters, but mainstream scientists rejected that variety of cold fusion. Is it plausible? Was it a deception or the scientists convinced themselves that they had done it? Can you find some examples of 'so-called discoveries' that were impossible to replicate?

2. Zimmer concludes that science is 'a self-correcting process'. What does it mean? What helps science do it? While discussing it use the following expressions: scientific community, colleague

collaboration, graduate student mentoring, peer review, experimental corroboration, result replication, environment of openness and honesty.

3. Is it possible to automate scientific discovery? Robot scientists could make research more productive and cost-efficient. Some scientific problems are so complex they require a vast amount of research, there are simply not enough human scientists to do it. What are advantages and disadvantages of using artificial intelligence?

Grammar Practice (4) Revision

1. Put Wh-questions. Who, why, what…

1. _____ don't journals want to publish things that don't show positive results?
2. _____ did Daryl Bern, a psychologist, claim in his paper in the Journal of Personality and Social Psychology?
3. _____ kind of studies should be published in journals if self-correction is so important for science?
4. _____ was named one of the Time 100 of the year for 2011?
5. _____ journal can present bad science without being skeptical?
6. _____ were the authors of the arsenic paper happy at the press-conference?
7. _____ do flashy and exciting papers get pushed too quickly through the peer review process?

2. Put the questions from ex.1 indirectly.

3. Complete the sentences.

A: Why haven't they eliminated the possibility that maybe the arsenic that they're trying to feed these bacteria is just contaminating their sample of DNA?
B: I'm afraid I don't know why …
A: What results did the scientists get after they replicated these studies?
B: I have no idea what …
A: Did they find arsenic once they'd washed the DNA?
B: No idea, but I'd love to know if ...
A: Have you heard of Rosie Redfield who has a blog basically to think out loud?
B: I'm not sure if …
A: Are the DNA and RNA the only molecules that can handle the job of life?
B: I haven't a clue if …
A: Why are giant viruses mistaken for bacteria?
B: I'd love to know why …

4. Read the text. What are some reasons to conduct an experiment?
Identify the modal structures and the situation they are used in. Translate the text.

THE EXPERIMENT MUST MAKE A DIFFERENCE.

When we do an experiment, we do it because we don't know what the result will be. If we knew in advance we wouldn't bother. There must be two, or several or a large number of possibilities. We may expect one of several outcomes, or we may not know at all what to expect.

In order for the experiment, whatever its purpose, to be considered a test of some theory, the outcome must make a difference. If the experiment has one result, we must be led to a greater degree of confidence in our theory, if it has another result, we must be led to a greater degree of doubt. If the degree of our belief was unaffected by the result, the experiment cannot be said to have been a test, although it may have been valuable or interesting for other reasons.

WORD LIST

Module 1
Higher Education
academic adviser
academic background
academic staff
accept (v)
achieve (v)
actually (adv)
admission (n)
advanced (adj)
A-level
announce (v)
amazed (adj)
amazing (adj)
applicant (n)
attend (v)
available (adj)
average (adj, n)
belief (n)
belong (v)
brainiac (brain+maniac)
BS
campus (n)
celebrate (v)
commencement (n)
common (adj)
compulsory (adj)
courseware (n)
cram (v)
credit (n)
curious (adj)
curriculum (n)
current (n, adj)
dean's office
decide (v)
degree (n)
delay (n, v)
devalue (v)
difference (n)
difficult (adj)
dismiss (v)
distress (v, n)
doodle (n, v)
dormitory (n)
education (n)
enhance (v)
enrich (v)
enroll (v)
enter (v)
equip (v)
exchange student
expand (v)
experience (n)
extracurricular (adj)
facility (n)
first year
freshman (n)
foreign (adj)
GCSE
grade (v, n)
graduate (v)
institution (v)
longevity (n)
major (n, v)
measure (n, v)
minor (n)
misinform (v)
MS
obligation (n)
obviously (adv)
offer (n, v)
overcrowded (adj)
overnight (adv)
participate (v)
PhD
postpone (v)
prevent (v)
prospective (adj)
profit (n, v)
quit (v)
rank (v)
research (n,v)
respected (adj)
retire (v)
retirement (n)
require (v)
requirement (n)
roommate (n)
sample (n, v)
scrawl (n, v)
schedule (n)
share (n, v)
shortage (n)
similarity (n)
source (n)
stretch (n,v)
stumble (n, v)
stuff (n)
substantial (adj)
substitute (n, v)
survive (v)
term (n)
timetable (n)
tough (adj)
tremendous (adj)
tuition (fee) (n)
vocational education (n)
wonder (n, v)

Useful Phrases:
bang on time
beef up
brush up (on sth)
can't afford (doing)
departure lounge
drop the class
feel homesick
give up
hang with
liberal arts
make sense
might be a stretch
no-brainer
provide opportunity
piece of advice
real draw
show off
take class
turn out (to be)
well-rounded

Module 2
Future of Work
available (adj)
application (n)
be fired
be made redundant
benefit(n,v)
bonus(n)
broaden (v)
consumer (n)
capable (adj)
catch (n)
career(n)
challenge (n)
confidence (n)
conscientious (adj)
coin (v,n)
commodity (n)
currently (adv)
CV
decline (n, v)
debt (n)

downside (n)
drastically (adv)
day off (n)
debt (n)
diligent (adj)
earnestness (n)
emerge (v)
employ(v)
encourage (v)
equip (v)
earn (v)
exist (v)
flexible (adj)
force (n, v)
founder (n)
undergo (v)
utility(n)
freelancers (v)
full-time/ part-time
genuine (adj)
fulfill(v)
influence (n,v)
impact (n, v)
illicit (v)
long-term (adj)
labor (n)
legislation (n)
leisure(n)
manufacture (v)
maintain (v)
monthly (adv)
overall (adj)
outdated (adj)
path (n)
permanent (adj)
physicist (n)
perk (n)
payroll (n)
predictability(n)
punctual (adj)
qualification (n)
replace (v)
relevant (adj)
resilient (adj)
redefine (v)
security (n)
slice (n)
significantly (adv)
self-employed (adj)
take advantage of
temporary (adj)
thrive (v)
time-consuming (adj)
temps(n)
subcontractors (n)
vehicle (n)
virtually (adv)

Module 3
Discoveries
adjust (v)
amount (n)
apparent (adj)
assume (v)
audience (n)
buoyancy (n)
by-product (n)
calculus (n)
cause (n, v)
challenge (n, v)
collision (n)
convince (v)
current (n)
decrease (v, n)
develop (v)
discover (v)
editor (n)
eject (v)
equation (n)
equipment (n)
examine (v)
expand (v)
expansion (n)
field (n)
flawless (adj)
found (v)
improve (v)
increase (v, n)
insert (v)
insight (n)
introduce (v)
investigation (n)
invention (n)
matter (n)
measure (n, v)
motion (n)
observe (v)
obtain (v)
output (n)
particle (n)
predict (v)
pressure (n)
propose (v)
prove (v)
publish (v)
receive (v)
refine (v)
relationship (n)
release (n, v)
resistance (n)
revolve (v)
rod (n)
rotate (n)
scholar (n)
self-sustaining
set up
speed (n, v)
split (v)
steam (n)
steady (adj)
submit (v)
survive (v)
voltage (n)
wave (n,v)
waste (n, v)
universe (n)

Module 4
Longevity
aging (=ageing) (n)
alter (v)
amount (n)
analysis (n)
ancestor (n)
available (adj)
average (n, adj, v)
beneficial (adj)
build-up (n)
cancer (n)
cancerous (adj)
capture (n, v)
cell (n)
criterion (n)
circumstance (n)
damage (n, v)
differ (v)
disposable (adj)
divert (v)
drug (n)
evidence (n)
extend (v)
extension (n)
famine (n)
fault (n,v)
fertility (n)
flexibility (n)

fraction (n)
goal (n)
hypothesis (n)
impact (n, v)
improve (v)
increase (v)
influence (n, v)
life expectancy
lifespan (n)
longevity (n)
maintain (v)
maintenance (n)
medium (n)
particular (adj)
rapidly (adv)
rejuvenation (n)
fragile (adj)
nuclei (n)
nucleus (n)
numerous (adj)
notion (n)
occur (v)
phenomenon (n)
remain (v)
replicate (v)
reproduce (v)
restrict (v)
restriction (n)
senescent (adj)
span (n)
subject to (v)
suggest (v)
threat to (n)
thesis (n)
treatment (n)
undergo (v)
urgent (adj)
voluntary (adj)
volunteer (n, v, adj.)

PHRASES:
carry out
commit suicide

Module 5
Safety
accident (n)
accidentally (adv)
adhesive (adj, n)
allow (v)
allergen (n)
allergic (adj)
allergy (n)
ambulance (n)
appropriate (adj)
appropriately (adv)
attendance
avoid (v)
cause (v.n)
concern (n,v)
contaminate (v)
contaminant (n)
combustion (n)
complement (n,v)
comply with (v)
CPR(Cardio Pulmonary Resuscitation)
damage (n,v)
dander (n)
dust (n,v)
emergency (n)
environment (n)
environmental (adj)
expose (v)
exposure (n)
fine (adj)
first aid (kit)
freshener (n)
fume (n, v)
gear (n,v)
glue (v, n)
glove (n)
goggles (n)
harm (n, v)
harmful (adj)
ignore (v)
ignorant (adj)
ignorance (n)
induce (v)
ingest (v)
intend
interrupt (v)
measure (n, v)
menace (v,n)
mention (v)
mite (n)
mold (n)
occur (v)
ordinary (adj)
pollute (v)
pollutant (n)
pollution (n)
previous (adj)
prohibit (v)
prompt (v, n, adj, adv)
promptly
reduce (v)
reasonable (adj)
reduction (n)
report (v, n)
safety (n)
solvent (n, adj)
source (n)
surroundings (n)
susceptible (adj)
thoroughly (adv)
threatening (adj)
troublesome (adj)
urban (adj)
vapor (n)
volatile (adj)

PHRASES:
catch fire
hang on
on the way
right away
stay on the line

Module 6
Travelling
ability (n)
accept (v)
alert (n, v, adj)
allege (v)
appeal (v)
approximately (adv)
armrest (n)
book (v)
board (v)
brake (n,v)
cancel (v)
cancellation (n)
check in (v)
clog (n,v)
consequence (n)
consider (v)
cover (v, n)
decline (v)
demand (n,v)
density (n)
disturb (v)
enable (v)
encounter (n, v)
environment (n)
eventually (adv)

fake (n, v, adj)
faint (adj)
fellow traveler
film (v, n)
flutter (v)
footage (n)
fossil fuel
highway (n)
hoax (v, n)
holiday-maker (n)
insert (v)
iris (n)
leap (n, v)
linger (v)
matter (v)
melt (v)
moisture (n)
offer (n, v)
overtake (v)
pole (n)
powder (n)
procedure (n)
proof (n)
prove (v)
proximity (n)
punch (v)
queue (n, v)
rebuttal (n)
reclaim (v)
recognize (v)
recognition (n)
rent (v, n)
responsible (adj)
rumour (n, v)
scale (n, v)
steering (n)
steady (adj)
sustainability (n)
tailgate (v)
thrust (n)
tiny (adj)
undoubtedly (adv)
unmolested (adj)
vehicle (n)
virtual (adj)

PHRASES:
cabin crew
board a plane
book a seat
cancel a flight
duty-free goods
flight attendant
land / take off

Module 7
Earth in Space
amplitude (n)
aim at (v)
bombardment (n)
benign (adj)
be commonplace
be disrupted
be blamed for
bunch of signals
culprit (n)
corona (n)
come up with
chemical enrichment
craggy (adj)
capability (n)
charged particles
collaboration (n)
cosmic rays
deadly (adj)
debris (n)
detect (v)
detectable (adj)
drilling rig
drill (n,v)
demise (n)
distinctly (adv)
distant planets
decipher (v)
eventually (adv)
extinction (n)
extraterrestrial (adj)
frequency (n)
figure out (v)
forthcoming facilities
fluctuate (v)
funding (n)
funnel (v)
graph (n)
galactic (adj)
giant (adj)
head start
hasten (v)
interpret (v)
initiative (n)
inhabit (v)
in detail
impact (n)
initially (adv)
interior (n)
lethal (adj)
mischievous (adj)
narrowband (adj)
outcome (n)
observatory (n)
obscure (adj)
peninsula (n)
particularly (adv)
precise (adj)
punch (v)
plausible (adj)
permeate (v)
plentiful (adj)
remnant (n)
rocky (adj)
roughly (adv)
shortage (n)
severe (adj)
satellite (n)
sow (v)
shelter (v)
swirl (v,n)
soak up (v)
spot (n, v)
set up (v)
set up (v)
shield (n,v)
spectacular (adj)
stellar (adj)
shelter (v,n)
target (n, v)
transmit (v)
toss up (v)
trigger (v, n)
undertake (v)
unleash (v)
vanish (v)
verify (v)
vast (adj)
witness (v)
wipe out (v)
whirl (n,v)
yield (n,v)

Module 8
Scientific Research
accept (v)
accommodate (v)
advance (v)
afford (v)
appealing (adj)

beast (n)
cage (n)
claim (v, n)
community (n)
conclude (v)
confident (adj)
confirm (v)
confuse (v)
contribute (v)
cozy, cosy (adj)
critter (n)
cuel (adj)
descendent (n)
dismiss (v)
disprove (v)
downside (n)
eager (adj)
editor (n)
evaluate (v)
evidence (n)
flashy (adj)
flaw (n)
frankly (adv)
finely (adj)
fusion (n)
gushing (adj)
habitat (n)
hype (n)
impartial (adj)
judgment (n)
justify (v)
legitimate (adj)
longstanding (adj)
manageable (adj)
mislead (v)
nest (n)
objection (n)
otherwise (adv)
perception (n)
profile (v)
proxy (n)
psychologist (n)
reject (v)
relish (v)
roam (v)
rodent (n)
shred (v)
submit (v)
suspect (v)
strain (n)
suggestion (n)
torture (n,v)
trial (n,v)
tug (v)
ultimately (adv)
undermine (v)
valid (adj)

PHRASES:
big-shot
role model
strand by strand
in advance
in order to do smth
to back down
to carry out the experiment
to dispose of smth
to go for sth
to have high profile
to live up to smth
to smth elegantly
the rest of…
to rule smth out
to raise a serious question
to stick by their guns

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