OXFORD ENGLISH FOR CAREERS

TECHNOLOGY ①

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Practice File

OXFORD

Contents

1 Technology and society

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 Technology is more interesting *that* / *as* / *than* geography.
2 Proton M is *more old* / *oldest* / *older* than Ariane S.
3 A smart car is *less powerful* / *more powerful* / *powerful* than a lorry.
4 Electric engines are *more better* / *more efficient* / *more faster* than petrol ones.
5 This old PC works *more slowly* / *more slow* / *slower* than my new laptop.
6 The new model *faster goes* / *goes faster* / *is fast* than the old one.
7 Computers are *very* / *more* / *much* smaller now than thirty years ago.
8 The new operating system is *much* / *much more* / *very* expensive than the old one.

2 Key words from the unit

Complete the sentences with the words from the list.

download
exploration
innovations
thrust
power stations
global warming
detector
hack

1 Carbon emissions cause _____ .
2 A smoke _____ is a safety device.
3 _____ the latest software from the website.
4 He can _____ into any company's intranet.
5 There seem to be new _____ every day.
6 China is building a lot of _____ .
7 _____ is measured in kN.
8 Rockets are used for space _____ .

READING AND VOCABULARY

The purpose of technology is to produce things that improve our lives, our work and our environment. The people who design, test and make these things are engineers and technologists. They work in areas such as civil, mechanical, electrical, electronic and marine engineering, and in information technology (IT). They use scientific knowledge and technological experience in their work. They often use old technology (e.g. radio waves) to create new things (e.g. mobile phones).

The people who install, work with and maintain technological equipment are technicians. A technician studies one area of technology like electricity, electronics or mechanics, and works with equipment in that area. Two examples are an electrician and a car mechanic.

But we all use technology every day. It is all around us and affects every part of our lives. Here are some examples:

- **transport** – cars, ships, air travel, space exploration
- **telecommunications** – mobile phones, internet, satellites
- **trade** – credit and debit cards, bank ATM machines, internet trade
- **work efficiency** – washing machines, microwave ovens, computer software
- **power** – heating, lighting, air conditioning equipment
- **entertainment** – DVDs, satellite TV receivers, digital cameras
- **health** – lasers in eye surgery, medicines, biotechnology
- **safety and security** – ABS brakes and air bags in cars, smoke detectors
- **food** – farming, processed food,
- **information management** – computers, flat-screen monitors, software
- **infrastructure** – roads, buildings, water supply
- **manufacturing** – machines and robots in factories

Because technology is so important in society, technologists and engineers have to think about its good points and bad points. Unfortunately, some technology has both positive and negative effects. Oil and coal, for example, make our lives easier, but they also pollute our environment. Cars and planes allow us to travel fast, but they also cause accidental deaths and add to global warming. The problem for technology is how to increase the positive effects on society and reduce the negative effects.

3 Comprehension

Answer the questions about the text.

1 What are 'these things' in the first paragraph?

_____

2 Who designs these things?

_____

3 Which old technology do mobile phones use?

_____

4 Who maintains technological equipment?

_____

5 Look at the list of technology around us. Find four things that you have used today.

_____

6 What are two negative effects of technology?

_____

4 Words from the text

Find in the text.
The first one is done for you.

1 two subjects ending in *-ology* *technology* *biotechnology*
2 two subjects ending in *-ics* _____ _____
3 two jobs ending in *-ian* _____ _____
4 two gadgets ending in *-ers* _____ _____
5 two gadgets ending in *-ors* _____ _____
6 two nouns ending in *-tion* or *-tions* _____ _____

5 Further vocabulary practice

Complete the sentences with the correct word.
The first letter is given.

1 Oil is very useful, but it also causes *p*_____.
2 The *w*_____ of the Boeing 747 is 397,000 kg.
3 It has a top *s*_____ of 1,127 kph.
4 This car has a very powerful *e*_____.
5 This new computer has a better monitor and a larger *m*_____ than the old one.
6 The *m*_____ industry uses machines to make things in large numbers.

WRITING

6 Compare two things

Read this paragraph comparing Airbus A380s and Boeing 747s.
(*See pictures on page 6 of the Student's Book*).

> Boeing 747s are smaller and lighter than Airbus A380s, so they can go faster. Boeings can also fly higher. But Airbus A380s can carry larger numbers of people because they are longer and wider. They have more powerful engines, and they can fly further than Boeings. So which are better? Boeings are better when speed is important, but Airbuses have better capacity and range.

Write a paragraph comparing desktop computers and notebook computers. You can use the words from the list.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

smaller
lighter
carry easily
cheaper
faster
powerful
bigger screens
keyboards
I prefer
because

2 Studying technology

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 He *like* / *likes* / *liking* studying more than working.
2 I *don't* / *doesn't* / *not* have classes on Thursdays.
3 Melting *is producing* / *produces* / *produce* liquids.
4 **A** Are you studying today? **B** Yes, I *am* / *'m* / *study*.
5 This week they *are* / *am* / *is* working with a trained engineer.
6 *Do you know* / *You are knowing* / *Are you knowing* the answer to the test question?
7 The technician *maintains* / *is maintaining* / *maintain* all the lab equipment.
8 We can't use CAD today – the software *doesn't work* / *aren't working* / *isn't working*.

2 Key words from the unit

Complete the sentences with the words from the list.

subject
career
lab
architecture
research
semester
qualification
overseas

1 We do experiments in the _____.
2 I haven't chosen a _____ yet.
3 Physics was my favourite _____ at school.
4 With this _____ you can go to university.
5 She studied in Europe but works _____.
6 I want to work in _____ and development.
7 We studied Maths in the first _____.
8 _____ is about designing buildings.

READING AND VOCABULARY

What is the difference between a technician, a technologist and an engineer? The main difference is in the level of education and training. Engineers have the highest level of training and normally have university qualifications. A technologist usually has 2–3 years of training, and a technician usually has 1–2 years.

You can progress from technician to technologist and then to engineer by doing courses at college and university. Colleges offer certificates and diplomas (a diploma is a higher qualification than a certificate). Universities offer degrees.

As an example, in the UK, young people who want a career in technology can start by studying at a college of further education or university. They normally follow the route: HNC (Higher National Certificate) → HND (Higher National Diploma) → B.Eng (Bachelor of Engineering degree). Some universities allow students to start a degree course after only one year of a diploma course.

It is also possible for students to leave school at sixteen and work for a company. The company may allow them to study at a college for part of each week. This is called a part-time, day-release or 'sandwich' course.

In Unit 2 of the Student's Book there is an example of a student, Alec, who is doing an HND diploma course in civil engineering at a college in Scotland. Civil engineers work in the planning and construction of airports, bridges, roads, etc. The course includes the following subjects:

- **Construction surveying** This teaches how to measure ground and how to mark out lines and points on the ground from plans.
- **Construction management** This teaches how to ensure that building work is completed on time, safely and with the correct materials.
- **Fluid mechanics** This teaches how liquids and gases move and affect structures. This is important in constructing pipelines, for example.
- **Geotechnics** This is about the properties of earth and rocks. This is especially important in underground construction.
- **Communications** (sometimes called complex communication, or communication skills) This teaches how to speak and write about technical matters.
- **CAD (Computer-Assisted Design)** Surveyors and architects use computer software to help them draw plans and designs.

3 Comprehension

Read the text. Then write the correct answer.

1 What is the main topic of this text?

a *jobs in technology* ***b*** *universities* ***c*** *training for technology* ***d*** *construction*

2 How can technicians become an engineers?

_____

3 Which qualification is below a diploma?

_____

4 Which course can you do while you are in a job?

_____

5 Construction managers must ensure work is completed safely and correctly. What else?

_____

6 Which part of the course is about explaining technical information to other people?

_____

4 Words from the text

Find a word that means:

1 teaching or being taught how to do a job (paragraph 1) _____
2 a complete series of lessons or training (paragraph 2) _____
3 a qualification from a university, higher than a diploma (paragraph 3) _____
4 the branch of engineering that includes construction of buildings and roads (paragraph 5) _____
5 measuring ground (in the list of subjects) _____
6 liquid or gas (in the list of subjects) _____

5 Further vocabulary practice

Complete these words so that they end in -al or -ing. Check your spelling carefully. Then complete sentences 1–6 with one of the words.

chemic-
comput-
draw-
electric-
manag-
plan-

1 I'm interested in electricity, so I'm studying _____ engineering.
2 _____ engineers use chemistry to make new products.
3 _____ comes before construction.
4 _____ was done by hand in the past; now CAD software is used.
5 This high-level engineering course prepares you for a _____ role.
6 This _____ course includes programming and web technology.

WRITING

6 Describe a course

Write a paragraph about your English course.
Here are some questions to help you.

1 Why are you learning English? (Give two or more reasons.)
2 What sort of job do you hope to do after the course? OR In which industry do you hope to work?
3 How many hours of English lessons do you have per week?
4 What language skills do you learn?
5 What else do you learn in your English lessons?
6 Do you study or practise English in your own time?
7 What is your biggest problem with English?
8 How can you try to solve this problem?

3 Design

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 **A** Is the prototype ready? **B** Yes, it *does / 's / is*.
2 **A** Where was this designed? **B** *Yes / In Madrid / No, it wasn't*.
3 *Does the design look / Is the design look / Look the design* attractive?
4 Which manufacturer *does make / do make / makes* these tables?
5 **A** Does he design cars? **B** No, he *doesn't / not / don't*.
6 How many templates *will need you / will you need / you will need*?
7 *Do you can / Can you / You can* mass-produce these?
8 *Who / Who designer / Which* created the Mini?

2 Key words from the unit

Complete the sentences with the words from the list.

prototype
mass-produce
evaluate
manufacturer
function
brief
costings
sketch

1 I _____ my ideas in pencil.
2 We _____ a variety of possible solutions.
3 The _____ should list all the requirements.
4 Test the _____ as much as you can.
5 The _____ will make the product.
6 It can be difficult to calculate the _____.
7 This simple design will be easy to _____.
8 What's the _____ of this object?

READING AND VOCABULARY

Design is at the heart of technology. This is why most technology courses include design. Look at any manufactured product, and you can see that someone has designed it: they have tried to make it look good and work well.

The design process has several stages. It starts when someone notices a need or problem. It ends when a product which meets that need or solves that problem is manufactured.

These are the stages of the design process:

- **Notice a need or a problem** For example, when a cooking pot is heated, the handle becomes too hot to touch. The designer may have to design a new product or change the product to improve it.
- **Write a design brief** This is a simple, clear statement of what is needed. For example, design a handle that stays cool when the pot is heated.
- **Investigate and research** The designer asks questions and looks for information: Who will use this product? What will it do? How will it look? What materials can I use? What will the materials cost? Do they have the right properties (such as light weight and durability)? How will the product be made? Will it be safe?
- **Develop alternative solutions** The designer thinks of various different ideas. He or she will then draw sketches (simple drawings), of these different designs.
- **Choose the best solution** The designer chooses the best design. He or she also considers cost, time and whether it can be manufactured easily.
- **Make a model or prototype** (also called the **realization** stage, when a design is made into a real object) First, a detailed drawing is made, probably using CAD software. Then a prototype (a first working model) is produced. Or a computer simulation may be used.
- **Test and evaluate** The prototype is physically tested to make sure it works and that it is strong enough. Then it is evaluated: *How well does it meet the design brief? Can it be improved?*
- **Decide whether to manufacture** If the final evaluation is positive, the company may decide to manufacture the product.

3 Comprehension

Answer the questions about the text.

1 What does this text describe?

_____

2 What usually causes the design process to start?

_____

3 What does the designer do before developing solutions?

_____

4 What things are produced at the realization stage?

_____

5 How does the designer know whether the product will work or not?

_____

6 Think about this question and give your opinion.
What can the company can do if the evaluation is negative?

_____

_____

4 Words from the text

Find words with these meanings. The first letter of each word is given.

1 finds a solution *s*_____
2 the steps in a process *s*_____
3 make better *i*_____
4 made hotter *h*_____
5 different but also possible *a*_____
6 a thing that is produced *p*_____

5 Further vocabulary practice

Complete the sentence with an adjective ending in -al or –able, or a verb ending in -ate. The first letter of each word is given.

1 At the realization stage, the designer produces detailed *t*_____ drawings.
2 Hard chairs usually have almost *v*_____ backs.
3 Soft chairs are more *c*_____ than hard chairs.
4 This product will last a long time; it's very *d*_____.
5 Before designing a new product, designers ask questions and look for answers. In other words, they *i*_____.
6 You should use non-specialist language to *c*_____ with customers.

WRITING

6 Write a summary

Look at the reading and vocabulary text in this unit and write a short summary of the design process. Begin like this:

The design process has several stages. First, someone notices a problem or need. So a design brief is written for a new product. Then the designer investigates and researches things like materials and costs. After that, ...

4 Technology in sport

LANGUAGE

1 GRAMMAR

Choose the correct option to complete the sentences.

1 Urethane is *used to make* / *used to making* / *used make* golf ball covers.
2 Composites *is used for* / *are used for* / *are used to* constructing modern equipment.
3 I *am used to* / *used to* / *used for* working with fibreglass.
4 *Does is made* / *Is it made* / *It made* of plastic laminates?
5 The body is made *to* / *from* / *for* a variety of components.
6 The racket is *used to* / *made of* / *made for* graphite composites.
7 What is a football *made for* / *made of* / *used of*?
8 An alloy is made *to* / *for* / *from* a combination of different metals.

2 Key words from the unit

Complete the sentences with the words from the list.

plywood
aerodynamic
bearings
flexible
alloy
stretch
wear
corrosion

1 This aluminium _____ is light and strong.
2 There are steel _____ in the wheels.
3 The paint will protect against _____.
4 If it is elastic, you can _____ it.
5 The skateboard deck is made of _____.
6 The design is very _____.
7 Kevlar is resistant to _____.
8 It bends without damage; it's _____.

READING AND VOCABULARY

When you play a sport, your equipment must be strong enough for the sport. If it isn't, powerful forces will break or damage it. When a racket hits a ball, for example, there is sudden compression (= *squeezing*) and tension (= *stretching*). The racket may also bend (= *compression* + *tension*). Clothing wears away with frequent use. Even strong metal bicycle pedals may break if they are turned the same way repeatedly. Water may cause corrosion of metal parts.

Sports materials must have properties to resist these forces. Equipment must be strong, corrosion-resistant, and tough, so that it's difficult to break. Clothing must be wear-resistant, fit the body tightly and be aerodynamic. Some materials should be flexible (able to bend) or elastic (able to bend, stretch or change shape and return to their first shape). Some equipment must be hard – able to cut, but not be cut by other materials. For many sports, especially fast sports, the equipment needs to have a high strength-to-weight ratio.

Special materials are used for making modern sports equipment and clothing:

- **plastics** – these are light and can be moulded into shape – examples: polycarbonate (used for bike helmets), polyurethane (footballs) and polystyrene (inside bike helmets)
- **fibres** – materials such as lycra, nylon and Kevlar are used for sports clothing because of their strength, lightness and elasticity
- **composites** – these mix fibres and plastic and have a good strength-to-weight ratio – examples: fibreglass (boats and vaulting poles), graphite and carbon-fibre (ski poles and expensive lightweight bicycle frames)
- **laminates** – these are formed from two or more layers of plastic or composite (boats and snowboards)
- **metals** such as titanium and aluminium, and alloys (mixtures) such as aluminium alloys, combine lightness, strength and corrosion-resistance

3 Comprehension

Answer the questions about the text.

1 What does *If it isn't* mean in the first paragraph?

_____

2 Give two examples of forces that can damage equipment.

_____

3 How can water damage metal?

_____

4 What is the difference between *elastic* and *flexible*?

_____

5 What properties do lycra, nylon and kevlar have?

_____

6 What is the advantage of titanium and aluminium?

_____

4 Words from the text

Find words in the text to complete the table.

PROPERTIES		
	adjective	**noun**
1		hardness
2	elastic	
3	strong	
4	light	
5		toughness
6	corrosion-resistant	

5 Further vocabulary practice

Choose the correct word in italics to complete the sentences.

1 Cheap bicycles have *steel* / *wood* / *rubber* / *titanium* frames.
2 *Tough* / *Brittle* / *Strong* / *Elastic* materials break easily.
3 Safety is important, so I'd *do* / *be* / *go* / *get* for a good helmet.
4 A tennis racket must be light but it must not *hit* / *turn* / *fit* / *bend*.
5 The frame and the wheels are the largest *properties* / *forces* / *components* / *materials* of a bicycle.
6 Thick tyres are good for riding on rough *surfaces* / *wheels* / *plastic* / *boards*.

WRITING

6 Properties and uses of materials

Study the information in the table. Then write about nylon and sports equipment. Begin like this:

Sports equipment is often made of nylon because nylon is very strong but not hard, heavy or expensive. It is also tough, wear-resistant ...

properties	uses
strong, ~~hard, heavy, expensive~~	sports equipment
tough, wear-resistant, elastic	sports clothing, e.g. cycling shorts
stronger than steel, flexible, light	fishing lines, ropes, tennis racket strings
tough, durable, easy to carry, cheap	sports bags and camping equipment, e.g. tents

5 Appropriate technology

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 He developed the solution after *leave* / *to leave* / *leaving* university.
2 Petrol ignites *as* / *before* / *when* it is lit.
3 When you turn the key, *the engine* / *the engine* / *it* starts up.
4 The weight goes up slowly *when* / *as* / *before* the rope is pulled down.
5 The water is cleaned *before* / *as* / *to* being used.
6 *After* / *As* / *Before* you can install it, you must read the instructions.
7 You should analyse results *as* / *when* / *after* an experiment.
8 *As* / *Before* / *When* mobile phones, few people had telephones in Africa.

2 Key words from the unit

Complete the sentences with the words from the list.

rural
accelerator
engage
generate
crankshaft
compression
two-stroke
charge

1 Some _____ areas do not have electricity.
2 The _____ converts rotary movement.
3 Motion can be used to _____ batteries.
4 _____ engines are powerful but pollute.
5 Press the _____ to go faster.
6 The piston causes _____.
7 It can _____ 3V of electricity.
8 As the shaft turns, the gears _____.

READING AND VOCABULARY

Appropriate technology is technology which finds inexpensive solutions to the needs of developing countries. It is especially useful in poor areas a long way from towns and cities. In these areas, it uses local materials and local skills. One example of appropriate technology is the wind pump. It is simple to construct and maintain, and does not need fuel. It contains a simple mechanism, a crankshaft. The crankshaft converts the rotary movement of the blades into an up-and-down movement – this moves the pump's piston up and down.

The clockwork radio is another example. It consists of a clockwork motor which drives a small generator. The step-up gears increase the speed of the motor, and the generator produces enough electricity for the radio. The clockwork computer uses the same form of power. Its cost is low because the computer is not advertised, and it uses free software (unlike Microsoft software, for example, which users must pay for).

Unlike a clockwork generator, most portable generators have an engine to drive them. These generators are used in emergencies or in places without electricity. They generate electricity for lighting, for example. Portable generators often use two-stroke engines. They can also use four-stroke engines, like car engines.

In a four-stroke petrol engine there is a cycle which is completed in four strokes (or movements) of the piston. On the first stroke, fuel and air are sucked into the cylinder. The second stroke is called the compression stroke: the piston moves up and compresses the air and fuel in the cylinder. The compressed fuel is ignited by the spark plug. On the third stroke, the gas from the burning fuel expands and pushes the piston down the cylinder. That is called the combustion stroke or power stroke. On the fourth stroke, the exhaust stroke, the rising piston pushes the exhaust gas out of the engine.

In the two-stroke cycle, power/combustion and exhaust are combined in one stroke, compression and ignition in the other stroke. This simplifies construction and reduces the cost of two-stroke engines. However, they are noisy and produce more pollution than four-stroke engines.

3 Comprehension

Choose the correct word or phrase (a, b, c or d) to complete the sentences.

1 Appropriate technology _____ developing countries.
a *is expensive* ***b*** *uses foreign technicians* ***c*** *always needs fuel* ***d*** *is useful*

2 A wind pump is driven by _____.
a *local people* ***b*** *wind power* ***c*** *petrol* ***d*** *electricity*

3 Electricity for a clockwork radio is _____ by the user.
a *bought* ***b*** *generated* ***c*** *paid for* ***d*** *received*

4 Most portable generators _____.
a *use clockwork* ***b*** *are in cars* ***c*** *need fuel* ***d*** *use electricity.*

5 In a four-stroke engine, each piston moves up and down inside a _____.
a *cycle* ***b*** *stroke* ***c*** *cylinder* ***d*** *spark plug*

6 Two-stroke engines are _____ than four-stroke engines.
a *simpler* ***b*** *more expensive* ***c*** *quieter* ***d*** *cleaner*

4 Words from the text

Find phrases in the text which mean:

1 materials from the same area (paragraph 1) _____
2 build and keep in good condition (paragraph 1) _____
3 it is inexpensive (paragraph 2) _____
4 generators that you can carry (paragraph 3) _____
5 the stroke that compresses the fuel (paragraph 4) _____
6 makes construction simpler (paragraph 5) _____

5 Further vocabulary practice

Write these numbers and symbols in words.

Example: 3.5V *three point five volts.*

1 40 MB _____
2 55 mm _____
3 0°C _____
4 99% _____
5 4 GB _____
6 16 KHz _____

WRITING

6 How does it work?

Write about a wind-up light and how it works. Use the words below and linking words like *and*, *as*, *when*, *before*.

consists of – light – handle
inside – gears, a spring and a small generator
turn the handle – wind up the spring
takes about one minute
the spring unwinds – the step-up gears engage
the generator turns very fast – generates electricity
can run for about 30 minutes – turn the handle again
small – weather-resistant – many uses

Begin like this:

A wind-up light consists of a light with a handle. Inside, there are gears, ...

6 Crime-fighting and security

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 These monitors are *for* / *to* / *used to* sensing motion.
2 The X-ray is used to *checking* / *check* / *checked* passenger's luggage.
3 Weatherproof paint is used for *protecting* / *protect* / *to protect* outdoor furniture.
4 The alarm is used *to* / *for to* / *as* give an early warning.
5 She used her handbag *as* / *for* / *to* a weapon.
6 The car *used as* / *is* / *is used* a vehicle.
7 I *used to* / *used for* / *am used to* dealing with dangerous criminals.
8 *A birthday* / *An ID* / *A credit card* can be used as identification.

2 Key words from the unit

Complete the sentences with the words from the list.

GPS
unique
low-tech
recognition
security
incapacitate
sensor
PIN

1 Everyone's fingerprints are _____.
2 _____ can be used to track vehicles.
3 Scientists are developing iris _____.
4 Don't tell anyone your _____.
5 The camera is fitted with a motion _____.
6 A baton is a _____ device.
7 The taser can _____ without injuring.
8 Many companies supply _____ CCTV cameras.

READING AND VOCABULARY

Technology is becoming very important in crime-fighting and security. At the same time, criminals are finding new ways to use technology. For example, they use it to steal money from people's credit cards and break into computer networks. Security at airports and other public places has become important in recent years, so new devices are needed to protect people there.

The photos on page 34 of the Student's Book show the equipment carried by a typical police-officer in the UK. This equipment protects officers against attack, and helps them to do their work. Handcuffs are used to restrain suspects and prevent them from using their hands. Guns are not normally carried in the UK. Instead police use a baton made from strong polycarbonate. Police may also use CS gas to incapacitate or weaken violent suspects. Some police forces use Taser guns which give a high-voltage but low-current shock to a violent suspect. This shock incapacitates the suspect without causing serious injury.

Personal identification numbers (PIN) and electronic chips in credit cards have reduced card crime. Electronic tags with Global Positioning Systems (GPS) can be used to monitor the movements of a convicted criminal. The convicted person must wear the tag, and the GPS can identify its location. This is cheaper than sending some people to prison.

Other ways of preventing crime include sensors which can detect or measure changes in the environment, such as movement, shock, smoke, etc. Cameras can be used to monitor an area continually. If the picture changes, an alarm sounds. The cameras can be turned and moved up and down by an operator, sometimes many kilometres away.

The science of biometrics is used to identify people by their voice or face. For example, iris scanning recognizes someone's eyes. Iris scanning is used to identify frequent-flying passengers on airlines so that they can go through security controls quickly. The US has introduced biometric passports to improve security.

Robots are sometimes used in security because they can often do things more cheaply than people. They are also useful when the work is dangerous.

3 Comprehension

Answer the questions about the text.

1 What does there mean at the end of paragraph 1?

_____

2 How do UK police officers normally protect themselves against attack?

_____

3 What is the advantage of a Taser?

_____

4 Find four examples of electronic devices that are used for security.

_____

5 How do biometric devices identify people? (two ways)

_____

6 In your opinion, which is the most useful security device and why?

_____

4 Words from the text

Find the word that means:

1 prevent injury or damage *p*_____
2 an electric current suddenly passing through a person *sh*_____
3 a device that can detect a change in the environment *s*_____
4 gray clouds that come from fire *s*_____
5 to watch or check continuously or regularly *m*_____
6 to check or find out who/what someone/something is *i*_____

5 Further vocabulary practice

Complete the answers. Use words with these affixes:

in- dis- anti- -proof -tight

1 Can water damage this watch?
No, the watch is _____.
2 Is your computer protected from viruses?
Yes, I've got _____ software.
3 Does this shop have adequate security?
No, the security is _____.
4 Tagging has a lot of advantages.
Yes, but it has _____ too.
5 Can air get into the container?
No, the container is _____.
6 Is this device expensive?
No, it's quite _____.

WRITING

6 A report with recommendations

Read the Gadget box on page 38 of your Student's Book and the information below.

The Rotundus robot

Advantages	Disadvantages
• cheap to run • does not require payment or holidays • can see in the dark and send for help • moves very quietly	• expensive to buy • cannot think • cannot take action against suspects, fires, etc. • cannot climb stairs or ladders

Write a short report for an airport security manager.

Paragraph 1: List the advantages and disadvantages of Rotundus, using linking words (*although, as, because, but, however, since*).

Paragraph 2: Recommend the best solution for mobile night-time security outside the airport building: Rotundus or security officers. Give reasons for your choice.

Mobile night-time security (outside) _____

_____

_____

_____

_____

_____

_____

7 Manufacturing

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 The metals *bend* / *is bent* / *are bent* into shape by the process.
2 **A** What happens at this stage? **B** The food *is canning* / *is canned* / *can canned*.
3 A lot of care *goes* / *is gone* / *go* into manufacturing.
4 **A** Are the panels made by hydroforming? **B** Yes, they *do* / *are* / *made*.
5 *When are* / *Are when* / *When* the CDs plated?
6 CDs are *produce* / *produced* / *producing* by electroforming.
7 Abrasives *aren't* / *isn't* / *not* added to water jets for surgical cutting.
8 Defects are removed *for* / *with* / *by* hand.

2 Key words from the unit

Complete the sentences with the words from the list.

hopper
process
ingredients
cool
barrel
plating
extrusion
welding

1 The first stage is to mix the _____.
2 Window frames can be made by _____.
3 The _____ is filled with plastic.
4 The plastic is forced through the _____.
5 There are many stages in the _____.
6 Metals are joined by _____.
7 Layers can be applied by _____.
8 Water is used to _____ the engine.

READING AND VOCABULARY

Manufacturing means changing materials into products. Many different processes are used. For example, in bread manufacturing, you start with the materials flour, water, yeast and fat. Then these materials are changed into a final product, a loaf of bread wrapped in thin plastic. They are changed into the product by a number of processes: for example mixing, cutting, putting into tins, baking, cooling, taking out of tins, spraying, slicing and wrapping.

In the past, these processes were mainly done by hand. Now there is more technology available, and all manufacturers want to make high-quality products as quickly as possible. They also need to keep costs low. Increasingly, manufacturing jobs are done automatically, using computer-controlled automation.

Food-processing is an important area of automated technology. A bread-making factory, for example, can run for 24 hours a day, and very little is done by hand. Only a few workers are needed, so costs are low. A lot of mass-produced food and drink comes from factories like this. They are more like car factories than traditional bakers, butchers, cheese-makers, and so on.

Every type of manufacturing has its own special processes. In metal manufacturing, for example, impact extrusion is a process in which a sheet of metal is pushed into shape. Aluminium cans are made in this way. Bonding means joining materials using adhesives. Welding joins metals by heating them until they become soft. They can then be joined easily. Plating is applying a thin coat of metal to another metal. Plating is used to improve the metal's appearance or to protect it from corrosion.

In plastics manufacturing, injection moulding is a common way of making plastic products such as bottle tops, caps and CD covers. The hopper is a container which feeds small pieces of plastic into the barrel of the machine. The ram is like a piston. It pushes the soft warm plastic along the barrel into the mould. The mould is usually water-cooled to allow the hot soft plastic to set (harden) quickly.

3 Comprehension

Read the text and correct the wrong information below.

1 Manufacturing processes change products into materials.

_____

2 Manufacturers want to reduce speed and increase costs.

_____

3 Automated food-processing requires a lot of workers.

_____

4 Aluminium cans are made by bonding.

_____

5 Welding and plating are processes in plastics manufacturing.

_____

6 An injection moulding machine pushes hard metal into a mould.

_____

4 Words from the text

Complete the sentences with words from the text.

1 The cooking process in bread production is called _____.
2 Many jobs that were done by hand are now done _____.
3 A lot of processed food is mass-produced in large _____.
4 Many different _____ are used in bonding.
5 Plating can make metals _____ - resistant.
6 Bottle tops and CD covers are examples of plastic _____.

5 Further vocabulary practice

Make compound nouns with the following meanings:

Example: factories where cars are made *car factories*

1 the tops of bottles _____
2 ovens that use gas _____
3 covers that you keep CDs in _____
4 radios that are powered by clockwork _____
5 cans that are made of aluminium _____
6 processes that are used in manufacturing _____

WRITING

6 Describe a manufacturing process

Write about the chocolate-making process by doing the following:

1 Put the nine stages a–i in the correct order.
2 Put the verbs in brackets into the correct passive forms.
3 Link a few sentences with and or and then.
4 Use *First*, *Then*, *Next*, *After that*, *Finally*.
5 Use correct punctuation and capital letters.

a the hard outside part of the beans (*remove*)
b the chocolate bars (*wrap*) and packed
c the inside part (*press*) into a thick paste called chocolate liquor
d the cacao beans (*cook*)
e the warm mixture is (*pour*) into moulds to make bars of chocolate
f the rest of the liquor (*mix*) with sugar, milk and extra cocoa butter
g some of the chocolate liquor (*separate*) into cocoa butter and cocoa solids
h this mixture (*heat*) and stirred for a few days to improve softness
i the bars (*cool*) until they set

Making chocolate bars

First, the cacao beans are cooked _____

8 Transport

LANGUAGE

1 Grammar

Choose the best option to complete the sentences.

1 Technology *will help* / *might helps* / *may helping* improve traffic flow in cities.
2 *Will how we* / *How we will* / *How will we* produce enough energy without oil?
3 I know that wind energy *not* / *may not* / *won't* be the answer to our energy needs.
4 Using wave energy *not* / *mayn't* / *mightn't* be very good for marine life.
5 *Might* / *May* /*Do* digital crime increase, in your opinion?
6 What will the car of the future *look* / *to look* / *looking* like?
7 This computer *might not* / *not might* / *not will* be powerful enough for our needs.
8 *When* / *When will* / *Will* the prototype be ready for testing?

2 Key words from the unit

Complete the sentences with the words from the list.

congestion
production
liquefied
efficient
hybrid
fuel cells
transport
detect

1 LPG is _____ gas.
2 _____ cars have two types of engine.
3 Hydrogen _____ are expensive.
4 Electric motors are very _____.
5 Buses are a form of public _____.
6 The sensor can _____ obstacles.
7 Increase in road traffic causes _____.
8 This factory increased _____ of electric cars.

READING AND VOCABULARY

Transport technology is concerned with all types of transport as well as roads, railways, airports and sea ports.

Safety is especially important in transport, and engineers are always trying to design safer vehicles. Advanced Safety Vehicles (ASVs) use sensors to detect possible dangers. The sensors can detect things near the car, such as other cars, walls or people; they can detect changes in temperature, speed, tyre pressure and road surface. They can also sense changes in the driver's condition, such as tired eyes. The sensors send a signal to the car's computer, which is programmed to deal with problems. For example, if the car is too close to another vehicle, the computer sounds an alarm or takes control of the car if necessary.

Engineers are also trying to design cars which run on 'environmentally friendly' fuels, rather than petrol or diesel. A hybrid car uses both an internal combustion engine and an electric motor. The aim is to use less fuel, but the car still has the power of a traditional engine when necessary. For example, when the car is moving slowly, it can switch to electricity, and when high speed is required, it can switch to petrol. Hybrid cars also have a longer range: they can travel 30% further than non-hybrid cars on the same amount of fuel.

Another way of reducing pollution from vehicle exhausts is the use of different kinds of fuel. LPG (Liquefied Petroleum Gas) produces less pollution than diesel fuel. In some countries, such as Brazil, biofuels are produced using plants such as sugar cane or maize.

Hydrogen may be the fuel of the future. Hydrogen fuel cells use the world's most common element, hydrogen, to generate electricity. Hydrogen is mixed with oxygen from outside the car. This generates chemical energy, which is converted into electrical energy for an electric motor. There is no pollution because only steam is produced.

Unfortunately, this technology has some disadvantages at present: the fuel cells are expensive to manufacture, the production of hydrogen requires a lot of energy, and hydrogen is dangerously explosive, so keeping large amounts in cities may not be safe.

3 Comprehension

Answer the questions about the text.

1 Which kind of vehicle can detect and deal with dangers?

_____

2 Which kind of vehicle can switch between two engines to save fuel?

_____

3 Which kind of fuel is made from petroleum but produces less pollution?

_____

4 Which kinds of fuel are made from sugar cane plants and maize?

_____

5 Which kind of fuel produces no pollution?

_____

6 In your opinion, which is the biggest disadvantage of hydrogen? Say why.

_____

_____

4 Words from the text

What is 'it'?

1 Sensors send it to the car's computer. _____
2 The driver hears it if there is a problem. _____
3 Hybrid cars use less of it. _____
4 The hybrid car's motor uses it when travelling slowly. _____
5 LPG produces less of it. _____
6 Hydrogen fuel cells convert it into electrical energy. _____

5 Further vocabulary practice

Complete the sentences with a phrase from the list that means the same as the words in brackets.

at once
at the latest
cut down
get in touch
run on
see to it

1 Please _____ (phone or write) if you have any questions.
2 I sent her an email, and she replied _____ (immediately).
3 There's a problem. Can you _____ (do what is necessary)?
4 The letter should arrive on Thursday _____ (or before that).
5 We need fuels that _____ (reduce) pollution.
6 These engines _____ (are powered by) LPG.

WRITING

6 An apology

Read the information below and write an email to the customer.

You work for a company that manufactures electric motors. A customer has not received 20 motors that he ordered from your company two weeks ago. Apologize, explain the delay and promise action. (The customer's name is Mr Andy Morton.)

TO: andymorton@hybka.com
SUBJECT: electric motors - order 00271

9 High living: skyscrapers

LANGUAGE

1 GRAMMAR

Choose the correct option to complete the sentences.

1 No *speak* / *to speak* / *speaking* when the studio light is red.
2 *Not* / *Don't* / *No* forget to attach your safety harness.
3 Chemicals *must always* / *always must* / *always* be stored safely.
4 *Must you* / *Must* / *You must* check the oil levels regularly.
5 *Never* / *Don't never* / *Do not never* smoke near petrol or kerosene.
6 *Wear always* / *Always wear* / *You wear* a hard hat on the construction site.
7 Fork-lift trucks must not be *drive* / *driving* / *driven* over 20 kph.
8 *You switch* / *Switch* / *Do you switch* off the power before attempting maintenance.

2 Key words from the unit

Complete the sentences with the words from the list.

pile
cladding
guard
girder
decking
lifeline
bonus
prefabricated

1 _____ covers the outside of the buildings.
2 A lot of the parts of a skyscraper are _____.
3 A _____ is horizontal.
4 A _____ is vertical.
5 They are paid a _____ if they finish early.
6 The safety harness has a _____.
7 The metal _____ is filled with concrete.
8 Do not remove the _____ from this machine.

READING AND VOCABULARY

Very high buildings, often called skyscrapers, allow us to make good use of the limited and expensive land in cities. They can also show the confidence and importance of a company, city, or country. This leads to never-ending competition to build the highest skyscraper.

When we look at a skyscraper, we see shining metal and glass. But this is only the outer covering. All the structure is inside the building. A high building is like a human or animal body: it has a strong structure inside and an outer skin or covering. The structural part of the skyscraper is made of steel: vertical steel columns and horizontal steel girders. To prevent them from buckling or bending, they are often made in the shape of the letter I (I-shaped girders).

When the columns and girders for one storey of a building are in position, the concrete floor is made. This is done by putting metal decking (flat metal sheets like the deck of a boat) across the girders and filling them with liquid concrete. The decking acts as a former, which forms or moulds the concrete to the correct shape. Most high buildings are constructed using the process of prefabrication: complete floors are first fabricated (built) at ground level, then lifted by cranes and fitted into position.

When the steel structure is completed, the outside of the building is covered with its outer skin. This skin is called the cladding or curtain wall. It is made of materials such as glass, aluminium, or steel.

The weight of a finished skyscraper is very great, so it must rest on good foundations. Where ground conditions are not good, piles and concrete rafts are used. Piles are long columns of steel or reinforced concrete. Steel piles are driven into the ground by a pile-driver until they reach hard ground or rock. Reinforced concrete piles are made by drilling holes and filling the holes with steel and concrete. A concrete raft is a flat platform of steel-reinforced concrete, which is formed above the piles. This spreads the weight of the building over a wider area.

3 Comprehension

Choose the best answer (a, b, c or d) to complete the sentences.

1 The first paragraph is about the _____ high buildings.
a *disadvantages of* ***b*** *reasons for* ***c*** *cost of* ***d*** *highest*

2 The second paragraph is about the _____ of high buildings.
a *outer covering* ***b*** *uses* ***c*** *strength* ***d*** *internal structure*

3 The third paragraph is about the _____ constructing the floors.
a *concrete for* ***b*** *dangers of* ***c*** *process of* ***d*** *advantages of*

4 The fourth paragraph is about the building's _____.
a *completion* ***b*** *walls* ***c*** *cladding* ***d*** *materials*

5 The fifth paragraph is about the parts of the building that are _____.
a *underground* ***b*** *heavy* ***c*** *reinforced* ***d*** *finished*

6 A raft is _____.
a *horizontal* ***b*** *vertical* ***c*** *made of steel* ***d*** *below the piles*

4 Words from the text

Find words in the text with a similar meaning to the words and phrases below.

1 bending *b*_____
2 thin, vertical, structural parts of a building *c*_____
3 floors of a building *s*_____
4 machines for lifting very heavy things *c*_____
5 the underground parts that a building rests on *f*_____
6 made stronger *r*_____

5 Further vocabulary practice

Complete each sentence with the word in brackets and the correct affix below.

dis-
-ion
-ive
re-
-ty
un-

1 You need _____ clothing. (protect)
2 You must wear eye _____. (protect)
3 _____ the machine from the electricity supply before you repair it. (connect)
4 Do not _____ the guard when this machine is running. (move)
5 Be extra careful with _____ machines. (familiar)
6 Remember that _____ is more important than speed. (safe)

WRITING

6 Safety information

Read the list of safety advice for workers in a factory that makes construction materials. The manager wants you to rewrite the list adding reasons for each rule.

1 Learn to lift things correctly.
2 Do not smoke in the factory.
3 Do not stand below places where men are working.
4 Do not use chemicals without protection.
5 Do not wear soft or open shoes.
6 Always learn about a machine before you use it.

Rules and reasons

1 *Learn to lift things correctly because you may injure your back if you lift heavy things incorrectly.*

2

10 Medical technology

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 These are the engineers *who* / *which* / *whose* developed the system.
2 The hospital *which* / , *who* / , *which* was built for $50m, came in under budget.
3 Mobility scooters are machines *who* / *they* / *which* help the disabled move around more easily.
4 An anaesthetist is a doctor *who* / *who person* / *which person* helps reduce pain.
5 That's the equipment *which* / *who* / , *which* I was telling you about.
6 Braille is an alphabet *who* / *which* / *how* allows the blind to read.
7 Where's the *technique* / *technical* / *technician* who set up the monitor?
8 Is this the sensor *who* / *which* / *were* receives the signal?

2 Key words from the unit

Complete the sentences with the words from the list.

rechargeable
valve
ultrasound
calculate
scanner
joystick
vibrate
artificial

1 You can monitor a baby by _____.
2 _____ limbs can be very effective.
3 The internal battery needs to be _____.
4 The wheelchair is operated by a _____.
5 A CAT _____ creates a 3-D image.
6 The buttons _____ to alert the user.
7 The _____ lets the fluid move.
8 A GPS device can _____ your exact position.

READING AND VOCABULARY

Medical technology applies engineering to biology and medicine – for example, in the development of aids or replacements for defective or missing body parts. Bioengineering combines biological science with engineering.

One product of bioengineering is the artificial heart. This is made of metal and plastic. It is used to keep very sick patients alive who might die while waiting for a transplant of a natural heart. An artificial heart has an electric motor and a pumping system with hydraulic fluid and hydraulic valves. It has external and internal parts (that is, outside and inside the body). Inside the body is a rechargeable battery which powers the pumping system. This internal battery is recharged by an external battery using a simple electrical coil, which induces a current. This current then recharges the internal battery. The whole system is controlled by a microprocessor (also called a controller) inside the body. Of course, biological safety is very important, so the plastics in the artificial heart are very durable. There is also a heart pacemaker under the skin, which keeps the heart working at a regular pace.

Another product of medical technology is scanning equipment. This scans internal organs of the body, and produces images using technologies such as X-Rays and ultrasound. CAT scanners use special X-ray equipment. (CAT is really CT, which stands for Computed Tomography.) A computer processes the images to create a cross-section of the soft tissue and organs of the body. CT imaging is very useful because it can show the soft parts of the body very clearly.

Electronic Assistive Technology or EAT is an example of mechatronics in medical technology. Mechatronics combines mechanical engineering, electronics and IT. This kind of technology can provide equipment for very disabled people. In a disabled person's house, for example, this equipment allows them to control doors, lights, televisions, computers, etc. with eye movements.

Another example of EAT is the ultracane. Blind people often carry a cane when walking. The ultracane uses ultrasound (sound above the level of human hearing) to help blind people detect objects around them. Some people call it the 'batcane' because bats use ultrasound when they fly at night.

3 Comprehension

Answer the questions.

1 Why are artificial hearts given to some patients before a heart transplant?

_____

2 What is the external battery in an artificial heart for?

_____

3 What do medical scanners do?

_____

4 Why are CT scans used for scanning hearts and other organs?

_____

5 How many examples of EAT are given?

_____

6 Why can't people hear ultrasound?

_____

4 Words from the text

Find words that mean:

1 things that help (paragraph 1) _____
2 not working correctly (paragraph 1) _____
3 a person receiving medical help (paragraph 2) _____
4 movement of something (e.g. a heart) from one fixed position to another (paragraph 2) _____
5 pictures (paragraph 3) _____
6 mechanical engineering with electronics (paragraph 4) _____ .

5 Further vocabulary practice

Complete the sentences with the opposite of the bold word.

1 There is a **right** way and a _____ way to use this machine.
2 An _____ heart is not as good as a **natural** heart.
3 There are **internal** and _____ parts.
4 This part moves _____ and **forwards**.
5 Medical robots have **advantages** and _____.
6 Turn the key **clockwise**, not _____.

WRITING

6 Describe a machine

Study the information about an electric toothbrush. Then write a description of the device.

Machine: electric toothbrush **Use:** clean teeth efficiently	
Components	**Function**
small brush	holds the toothpaste fits into the handle
handle	contains other components
motor	moves the brush very fast
rechargeable battery	powers the motor
switch	controls the motor
separate charger	plugs into a wall socket recharges the battery

An electric toothbrush

11 Personal entertainment

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 You should *to download / download / downloading* the latest updates.
2 Young children *not should / shouldn't / don't should* have a PC in their bedroom.
3 I don't think *should / you should / should you* visit that website.
4 **A** Should I burn this track? **B** Yes, you *burn / should / do*.
5 When *should I / do I should / will I should* receive the new software?
6 *We should / We shouldn't / Should we* invest in a new system?
7 *You shouldn't / Should not you / Shouldn't you* back up your documents regularly?
8 I don't think *people shouldn't / people should / should people* make illegal copies of DVDs.

2 Key words from the unit

Complete the sentences with the words from the list.

clip
online
broadband
updates
code
portable
hard disk
tracks

1 You can listen to music _____.
2 I only download album _____ legally.
3 You need a media player to play the _____.
4 A Programmer will write the _____ for you.
5 A virus can damage your _____.
6 Download the latest software _____.
7 _____ gives very fast internet access.
8 _____ means it can be carried easily.

READING AND VOCABULARY

The entertainment industry is one of the fastest growing areas of technology. Manufacturers have developed small personal entertainment devices for people on the move and larger home entertainment devices. All of this hardware depends on digital electronics.

Personal devices include music players like Apple's iPod, portable media centres which can play video and audio, and portable games consoles such as Sony's Playstation Portable.

Home entertainment devices include HD (high-definition) televisions and home games consoles which are plugged into a television and have controllers for a number of players. Home cinemas are another example. They combine DVD (digital video disk) players with hi-fi (high-fidelity) sound systems and LCD (liquid crystal display) screens. Increasingly, devices combine a number of functions. Many mobile phones can play music, show videos, identify your exact position through GPS (the global positioning system) and provide wireless connections to the Internet.

Popular music is now commonly bought by downloading tracks from online services such as Napster or iTunes. A track is any short and complete musical item such as a song or instrumental piece. Many people try to get tracks without paying. This illegal sharing of tracks damages the music industry because if the industry makes less money, it cannot continue to produce so much music. The music industry has tried very hard to prevent illegal downloading, but with little success so far.

Video games have become big business. Companies such as Electronic Arts employ large teams to develop the software for new games. The teams include computer programmers (who produce the program code for the games), animators and artists. There are many types of video games including racing games, FPS (first person shooters), RPG (role-playing games), simulations (imitations of real-life situations such as flight simulators or racing car simulators), adventure games and sports games.

Some games are for one player, others are team games, and some are for playing online with many players around the world. MMOG (massively multiplayer online gaming) is very popular. This kind of gaming has become possible because of very fast broadband internet connections. Some games have a more serious purpose. The US military uses video games and simulations in its training.

3 Comprehension

Answer the questions about the text.

1 What two kinds of hardware are discussed in the first two paragraphs?

_____

2 What two kinds of entertainment are discussed in the last three paragraphs?

_____

3 What trend is described at the end of paragraph 2?

_____

4 What problem is discussed in paragraph 3?

_____

5 What technological development has allowed MMOG to develop?

_____

6 Which types of video games have you played?

_____

4 Words from the text

Which words mean:

1 machines and devices, not software (paragraph 1) _____
2 recorded sound (paragraph 2) _____
3 not needing wires (paragraph 2) _____
4 copying digital data from the internet to an electronic device (paragraph 3) _____
5 a short complete piece of recorded music (paragraph 3) _____
6 video games which try to be like a real situation (paragraph 4) _____

5 Further vocabulary practice

Complete the sentences with the correct job title ending in these suffixes: *-er*, *-or*, *-ist*, *-ian*. The first letter of each word is given.

1 A *p*_____ writes computer programs.
2 An *a*_____ draws pictures and does 3D modelling for video games.
3 An *a*_____ makes characters move on a screen.
4 A *p*_____ oversees production of video games.
5 A lab *t*_____ looks after the equipment in a science laboratory.
6 A *d*_____ has medical qualifications.

WRITING

6 Reply to an email

Read this email and the information. Then read the instructions below.

TO: support@goobigames.com
FROM: samf@bluegrass.com
SUBJECT: no sound

Hi. I'm trying to play your game on my new laptop, but I can't hear any sound. The laptop has an external volume control and two external speakers. I have turned the volume control up to maximum but there is still no sound.

With thanks for your attention
Sam

Laptops may have various volume controls. Check these settings:
- external volume control
- volume controls on external speakers
- windows volume control
- a volume control for the game or program in use

Reply to the email as follows:

1 Thank the customer for contacting customer support.
2 Give her relevant information, suggest what to check and what to try doing.
3 Ask the customer to contact you again if these suggestions do not solve the problem.

TO: SAMF@BLUEGRASS.COM
FROM: SUPPORT@GOOBIGAMES.COM
SUBJECT: RE: NO SOUND

12 Information technology

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 This car *was made* / *were made* / *made* from 90% recycled materials.
2 **A** Were you given CADCAM training? **B** Yes, I *were* / *trained* / *was*.
3 The software *wasn't* / *weren't* / *not was* loaded onto the new PCs.
4 The 12-digit passwords were *forget* / *forgotten* / *forgot* very easily.
5 Modern cars *are mostly* / *were mostly* / *is mostly* assembled by robots.
6 *Where when* / *When where* / *When* the designs sent to the manufacturer?
7 They *was* / *are* / *were* not told about the change to the programme.
8 The telephone calls were all monitored *to* / *by* / *of* our managers.

2 Key words from the unit

Complete the sentences with the words from the list.

dimensional
defect
customized
supplies
peripherals
inspect
simulated
machine tools

1 The model can be _____ for each buyer.
2 The robot will _____ the car for faults.
3 My car had a _____ and was recalled.
4 In the _____ crash, the driver was unhurt.
5 CAD makes two- and three- _____ models.
6 The _____ shape the finished product.
7 The program orders new _____.
8 Printers and scanners are computer _____.

READING AND VOCABULARY

Information Technology (IT) is the application of computers to all kinds of technology. In car manufacturing, for example, computers are involved at every stage of the process, including design, machining, assembly, ordering of parts, quality control, and distribution of the finished vehicle. To test vehicle safety, computers can simulate the effect of a crash test, which is much cheaper than crashing real vehicles. Computers can also simulate different assembly methods so that the best methods can be chosen. They allow designs to be changed and defects to be corrected easily and quickly. They also allow designs to be easily customized (manufactured to meet the needs of a particular customer).

CAD (Computer Aided Design) has replaced working with paper and making models by hand. CAD programs produce 3D (three-dimensional) images on a computer screen. Dimensions can be calculated easily, and the forces on different parts of the structure can be shown. The data can be sent to a rapid modeling device which produces a solid model quickly.

When the design has been agreed, the complete CAD file is imported into a CAM (Computer Aided Manufacture) program, where the machining operations are planned. This data is then converted into a set of instructions which can be read by a CNC (Computer Numerically Controlled) controller. This automates all the machine tools which manufacture the product. This whole computerized process from design to manufacture is known as CADCAM.

The term CIM (Computer Integrated Manufacturing) includes CADCAM but goes further. In CIM, all stages of manufacturing are computer controlled. This permits faster production times, fewer workers, and fewer mistakes. CIM also allows manufacturers to move part of their operation to countries where costs are lower. For example, design may take place in one country and manufacturing in another.

In everyday personal computing, computers use many peripherals (external devices). These are attached to the computer or they may communicate wirelessly with the computer. Some peripherals are input devices which feed information into the computer – for example, scanner, web camera, keyboard, mouse, and so on. Output devices, which carry information from the computer, include external speakers and flat screen monitors. Some peripherals are both input and output, such as voice-over internet protocol (VoIP) phones.

3 Comprehension

Choose the best word (a, b, c or d) to complete these sentences.

1 The first paragraph lists three _____ of IT in car manufacturing.
a *costs* ***b*** *advantages* ***c*** *problems* ***d*** *stages*

2 Computers can reduce _____ in the manufacturing process.
a *efficiency* *b flexibility* ***c*** *quality* ***d*** *costs*

3 CAD can produce 3D images and _____.
a *data* ***b*** *models* ***c*** *forces* ***d*** *parts of the structure*

4 A CAM program is for _____ the machining process.
a *controlling* ***b*** *starting* ***c*** *importing* ***d*** *planning*

5 CIM _____ a lot of people in the manufacturing process.
a *replaces* ***b*** *needs* ***c*** *controls* ***d*** *allows*

6 A wireless keyboard is an _____ device.
a *internal* ***b*** *output* ***c*** *input* ***d*** *attached*

4 Words from the text

Which computer peripheral device:

1 produces paper copies of documents and pictures? _____
2 displays things on a screen? _____
3 lets you type words? _____
4 lets you control the pointer on the screen? _____
5 can copy a paper document to a computer? _____
6 produces sounds? _____

5 Further vocabulary practice

Complete the sentences with the correct verb. The first letter of the verb is given.

1 You must *d*_____ an update from the Internet.
2 *C*_____ on the icon to open the file.
3 *S*_____ an item from the menu.
4 *D*_____ the full-size picture on the screen.
5 *C*_____ a new spreadsheet and then key in the data.
6 Use the spreadsheet to *c*_____ all the costs.

WRITING

6 An IT report form

Remember a problem that you had with a computer or a peripheral and how you solved the problem. Then complete the report form.

IT problem report

1 What hardware and software were you using?

_____

_____

2 Where were you?

_____

_____

3 What were you trying to do?

_____

_____

4 What was the problem?

_____

_____

5 Did you ask for help? If not, why not?

_____

_____

6 How was the problem solved?

_____

_____

13 Telecommunications

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 Igor Kiorsky *has invented / invented / had invented* the helicopter in 1939.
2 **A** Did you serve in the army? **B** Yes I *served / have / did*.
3 Communication satellites *have been / have be / were* in operation since 1958.
4 *Have you / You did / Did you* get the job in 1993?
5 She has worked on the project *for / since / during* eleven months.
6 I *had / 've had / 'd* a lot of experience setting up communication systems.
7 I *has not / not have / haven't* got the adaptor for converting digital data.
8 **A** Have you worked here for a long time? **B** Yes, I *have / worked / did*.

2 Key words from the unit

Complete the sentences with the words from the list.

wireless hotspot
dish
router
network
antenna
screen
satellite
adaptor

1 The _____ picks up the signal.
2 The _____ is in geostationary orbit.
3 The _____ changes the signal to digital.
4 The _____ directs the packets.
5 Which mobile phone _____ do you use?
6 There is a _____ in the conference centre.
7 An icon will appear on the _____.
8 We have a satellite _____ on the roof.

READING AND VOCABULARY

In today's world, the fast transmission of information is essential to business, government and society. So telecommunications is an important area of modern technology. Much of the information is **transmitted** internationally. It includes sound, images, documents, and data output from computers and measuring instruments.

Telecommunications includes technologies such as telephones, radio, television, email, fax, and data transmission from one computer to another in a network. Data is transmitted in the form of signals. These signals can be electrical pulses (carried by copper cable or wire), light pulses (carried by **fibre-optic** cable, made of glass or plastic) or radio waves (transmitted between antennas on the ground, or between satellite dishes on the ground and satellites in **orbit** around the earth). Fibre-optic cables have many advantages over copper cables – for example, they can carry much more data than copper cables. Radio transmissions can cover a very wide area, and don't use cables.

More and more information is now sent in digital form, so analogue systems are likely to disappear soon. Analogue systems use a continuously varying signal. Digital systems use a stream of ON or OFF signals, which is more accurate. Digital radios and high-definition digital televisions, for example, have higher quality sound and pictures than analogue ones. Sounds and images in real life are analogue, and must be **converted** into digital signals before they can be transmitted digitally. Older analogue devices, such as telephones, need an analogue telephone adaptor (ATA) to adapt or convert analogue sound into digital signals. Analogue TV sets need a special adaptor box to convert digital TV signals into analogue pictures. More recent devices, such as IP phones and digital TVs, already have the adaptors built in.

Voice over Internet Protocol (VoIP) allows the internet to be used for telephone communication. Calls are made using a VoIP **handset** or a computer with a microphone and headphones. Data is **compressed** and sent in very small units called packets. These packets can travel by different routes, decided by a device called a router. Each packet has its own identification and address, so the message can be put together correctly by the receiving computer. VoIP offers much cheaper calls than traditional telephone systems.

3 Comprehension

Choose the correct word or phrase (a, b or c) to complete the sentences.

1 The first paragraph is mainly about the _____ of telecommunications.
a *business* ***b*** *importance* ***c*** *international use*

2 The second paragraph is mainly about ways of _____ different types of signals.
a *making* ***b*** *using* ***c*** *transmitting*

3 The third paragraph is mainly about the change from analogue to _____ technology.
a *information* ***b*** *digital* ***c*** *telecommunications*

4 The fourth paragraph is mainly about how VoIP _____.
a *works* ***b*** *helps people* ***c*** *compresses data*

5 Radio waves _____ transmitted between satellite dishes and satellites.
a *can be* ***b*** *are always* ***c*** *have never been*

6 Digital systems are _____ analogue ones.
a *changing* ***b*** *replacing* ***c*** *not as good as*

4 Words from the text

Match the words in the text in bold with the definitions 1–6.

1 sent from one thing to another _____
2 a circular route around an object _____
3 a type of cable that carries pulses of light _____
4 changed from one form to another form _____
5 the part of a telephone that you hold in your hand _____
6 made smaller _____

5 Further vocabulary practice

Complete the sentences with these words in the correct form.

different
entertain
invent
text
transmit
wire

1 TVs are used mainly for _____ in the home.
2 What is the _____ between a CD and a DVD?
3 I've _____ him and now I'm waiting for an answer.
4 Antennas are used for the _____ and reception of radio signals.
5 The _____ of radio by Marconi was very important.
6 I don't need a wire for the router. My computer connection is _____.

WRITING

6 Describe a phone

Write a description of your phone or a phone that you would like. Think about the following:

- size, weight, colour
- keypad or keyboard
- screen
- features
- software

What are the most important features for you?

My Phone

14 Careers in technology

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 Top qualifications are necessary. You *mustn't / should / must* have a degree.
2 If you work in Canada, then you *shouldn't / must / should* learn English and French.
3 *Must I / Do I must / I must* be physically fit for the job?
4 *You must / You mustn't / You should* have experience in projects, but it isn't essential.
5 The candidates *mustn't / shouldn't / don't have to* speak a foreign language.
6 You *mustn't / must / shouldn't* like working with people, we are a close team.
7 *Should applicants be / Should be applicants / Applicants should be* prepared to relocate to London?
8 You must *to be / be / being* investigative if you want to work in research.

2 Key words from the unit

Complete the sentences with the words from the list.

maintenance
supervise
interview
CV
studio
requirement
management
experience

1 I sent my _____ with the application.
2 Have you done any project _____?
3 Do you have _____ in this field?
4 I was very nervous before the _____.
5 I worked in a recording _____ for a year.
6 A degree is an essential job _____.
7 I'll _____ the installation.
8 The technician does repairs and _____.

READING AND VOCABULARY

The difference between an engineer and a technician is the level of qualifications and responsibilities. Engineers should have a detailed understanding of their chosen subject and the ideas behind it. They are often involved in design and management. Technicians need a practical understanding of their specialism and practical skills. They must know how to use equipment and how to convert the engineers' designs ideas into working solutions.

Most engineers work in a team that includes other engineers and technicians. Employers need people with good communication skills as well as engineering qualifications – they like people who are good team players. Engineers have technicians working for them as part of the team. These technicians make parts, fit parts together, do tests and so on

Here are some examples of engineering and technician jobs:

Environmental engineers often work in a manufacturing industry. They make sure that the company's products are good for certain conditions or environments, such as high and low temperatures. They design safety tests for products and make sure that products are environmentally friendly. A different kind of job for environmental engineers is environmental protection – this uses technology to prevent or reduce pollution and other dangers to humans, plants and animals.

Petroleum engineers specialize in oil exploration and production activities of oil and gas companies. They work with sophisticated technology in often dangerous conditions: from the cold Arctic to hot desert temperatures, and from land to the deep ocean.

Sound technicians have a working knowledge of electrical engineering, electronics and sound recording equipment.

Aerospace engineers apply engineering knowledge to spacecraft, planes, satellites and rockets. Their work involves the control of flight, aerodynamics, jet engines, etc.

Agricultural engineers design agricultural machinery and equipment. They find ways to improve farming methods and the processing of food products.

Biomedical engineers apply engineering to the development of medical devices to replace or support damaged body parts. They also develop devices such as scanners.

Chemical engineers apply chemistry (combined with maths and economics) to the process of converting materials or chemicals to more useful or valuable forms – for example, converting natural gas into plastics.

3 Comprehension

Answer the questions about the text.

1 What is the main difference between a technician and an engineer?

2 What kind of people are "good team players" according to the text?

3 Which kind of engineers find ways to reduce pollution?

4 What does "exploration" mean for oil and gas companies?

5 Which three kinds of engineers are most likely to work outside?

6 Which area of technology interests you most? Can you say why?

4 Words from the text

Find two-word phrases that match these definitions.

Example: very cold situations (paragraph 3) *low temperatures*

1 the thing that they chose to study (paragraph 1) _____
2 not bad for the environment (paragraph 3) _____
3 very modern, complex equipment (paragraph 4) _____
4 converting words or music into a permanent form (paragraph 5) _____
5 ways of producing food from land (paragraph 7) _____
6 fuel from under ground that you can't see (paragraph 9) _____

5 Further vocabulary practice

Match these groups of words to the correct descriptions.

assembly, installation, maintenance
communication skills, diploma, experience
dependable, hard-working, team player
chemical, civil, nuclear
dates, employer, position held
maths, economics, chemistry

1 Items on a CV _____
2 Job requirements _____
3 Things that technicians do _____
4 Types of engineering _____
5 Personal qualities _____
6 Subjects _____

WRITING

6 A personal statement

Look at Aisha Chetty's CV on page 101 of your Student's Book. She has to write a personal statement. You are going to write it for her. First, think about these questions:

1 What is her present job?
2 What has she done in her job? Since when?
3 What qualification does she have? And what did the course cover?
4 What communication skills does she have?
5 Does she work well under pressure?
5 Which two sentences match information at the end of the CV?
  a She's artistic and creative.
  b She's energetic and physically fit.
  c She likes a challenge.
  d She has management experience.

Personal Statement

Name: *Aisho Q Chetty*

I am a skilled and experienced _____

_____

_____

_____

15 The future of technology

LANGUAGE

1 Grammar

Choose the correct option to complete the sentences.

1 They have carried *up* / *out* / *in* various tests on the prototype.
2 The safety lights will switch *off* / *out* / *on* in an emergency.
3 Your fridge computer will work *out* / *off* / *up* what food you need.
4 Plug *out* / *on* / *in* your USB stick.
5 I'll *set up it* / *it set up* / *set it up* for you if you like.
6 We only found *on* / *out* / *up* he got the job after he left.
7 Many coal-fired power stations have closed *down* / *off* / *in*.
8 I always use Wikipedia to look *out* / *up* / *in* new information.

2 Key words from the unit

Complete the sentences with the words from the list.

smart
virus
interact
intranet
chip
voice-operated
automatically
unmanned

1 You can _____ with the television.
2 Computers will _____ prepare dinner.
3 Cars will be _____ and have no pedals.
4 _____ weapons will locate their own targets.
5 _____ aircraft will save pilots' lives.
6 You can insert a _____ into almost anything.
7 A _____ can close down a business.
8 An _____ is a private network using internet technology.

READING AND VOCABULARY

Large companies such as British Telecom employ futurologists to predict social and technological developments. These predictions help companies to prepare for the future. It is very hard to predict future developments in technology with any certainty. However, we can look at today's technology and imagine how it might develop. Here are some possibilities.

It is likely that intelligent machines such as robots will be used more than they are now. One possible area is surgery in hospitals. In some situations, computer-controlled robot arms can already work more accurately than a surgeon's hand. Intelligent machines can also be used in telemedicine. This means that doctors can help patients at a distance, even in different countries.

Nanotechnology (technology using tiny parts) can already make machines that are small enough to be injected into the body. These tiny machines can deliver medical drugs to the correct place in the body. They can also destroy something that is causing a problem. These nanobots (tiny robots) are not in practical use yet, but they may be soon.

In transport, many cars now have satellite navigation, and this may become standard in all cars. The most modern sat nav devices can provide information about road and traffic conditions too. As this becomes more common, it may reduce problems and hold-ups on busy roads. Governments may even require that all cars have these devices. In the distant future road vehicles may come under computer control on main roads. The computer controls will ensure safe speeds and prevent crashes.

In all branches of technology computers will be very important. These future computers will be faster and more powerful than today's. This will allow new devices and new technologies to be invented. We have already seen examples of this: CAD-CAM car manufacture and wireless telecommunications were made possible by increased computer power and speed.

Unfortunately, not all new applications will be good for society. Computer crime, such as identity theft, will continue. As more of our personal information is stored and transmitted electronically, hackers and other criminals will try harder to steal it. Military use of computer technology will increase. Governments around the world are already spending large amounts of money on computer applications to make military activity more efficient.

3 Comprehension

Answer the questions about the text.

1 Why do companies try to predict social and technological changes?

_____

2 Why does the writer think robot arms will be useful for surgery?

_____

3 How small are nanobots?

_____

4 Does the writer think that computers will control cars very soon?

_____

5 What effect will increased computer speed and power have?

_____

6 What will criminals try to steal from us?

_____

4 Words from the text

Match the definitions to words from the text that start with the prefixes *nano-*, *pre-* or *tele-*.

1 make an informed guess about the future: _____
2 medical information and services from a long distance: _____
3 producing and using very tiny machines and parts: _____
4 microscopic robots: _____
5 stop something before it happens: _____
6 transmission of signals over long distances: _____

5 Further vocabulary practice

Which word or phrase is the odd one? Underline it.

Example:

a Bye. **b** Take care. **c** Hi. **d** See you later.
(*Hi* is the odd one because it is not a way of saying goodbye.)

1	**a** cars	**b** planes	**c** bridges	**d** trains
2	**a** mini-	**b** micro-	**c** nano-	**d** super-
3	**a** processor	**b** program	**c** screen	**d** disc
4	**a** human	**b** robot	**c** machine	**d** computer
5	**a** factory	**b** studio	**c** hospital	**d** surgeon
6	**a** plastic	**b** fibreglass	**c** medicine	**d** metal

WRITING

6 Predictions

Write three predictions for technology in the future. Give reasons for your predictions.

Future technology?

_____

_____

_____

_____

_____

_____

_____

_____

_____

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