

10


Safety

1 Rules and warnings

Start here



1 Work in pairs. What safety rules are in your workplace or college? Make a list.

2  53 Listen and complete the warnings with the words in the box.

don't might must mustn't

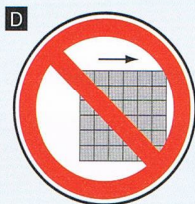
- 1 You _____ wear a hard hat on the building site.
- 2 _____ go through that door!
- 3 You _____ wear safety gloves everywhere in the factory.
- 4 _____ touch that machine! It's very hot.
- 5 Be careful! High-voltage electricity. You _____ get an electric shock.
- 6 You _____ use your mobile phone here.

Reading

3 Work in pairs. Why do the signs below have different colours and shapes?

4 Read the text. Match the examples to the signs.

The safety signs below follow the ISO international standard. This standard is used in the EU because it has many different languages. There are three types of safety sign:



- **WARNING SIGNS.** These signs warn you about a danger. They say things like this: *Warning. Danger. Be careful. Look out. There is a danger or hazard here. You might injure yourself.* The signs are yellow and black in colour and triangular in shape. Here are some examples:

- 1 Warning. Poison: see (1) C
- 2 Danger. Fire hazard here: see (2) _____

- **PROHIBITION SIGNS.** These signs prohibit an action. They say: *Do not do this. You must not do this. Never do this.* The signs are red, white and black in colour and round in shape. Here are some examples:

- 3 You must not lift this with a hook: see (3) _____
- 4 Never take the guard off this machine: see (4) _____

- **MANDATORY ACTION SIGNS.** These signs order you to do something. They say: *Do this. You must do this. Always do this.* These signs are blue and white in colour, and round in shape. Here are some examples:

- 5 Always read the manual before you service this machine: see (5) _____
- 6 You must use the guard on this circular saw: see (6) _____

Language	Wear	a hard hat here.	Do not	touch the machine.
	Always		Don't	
	You must		Never	
	wear		You must not	
			You mustn't	

5 Complete the instructions with the words in the box.

always do do not must mustn't never



- 1 _____ use a lighted match in this workshop.
- 2 _____ wash your hands after using these chemicals.
- 3 _____ enter this small space.
- 4 You _____ wear safety boots when you lift this.
- 5 _____ not smoke in this factory.
- 6 You _____ touch this machine with bare hands. It's hot.

6 Write these signs in another way.

Example: 1 Do not smoke here.



Use *might* or *could* to explain the possible result of the hazard.



You	might	burn your arm.
	could	injure/hurt yourself. get an electric shock.




7 Complete these warnings with the words or phrases in the box. You can use the words or phrases more than once.

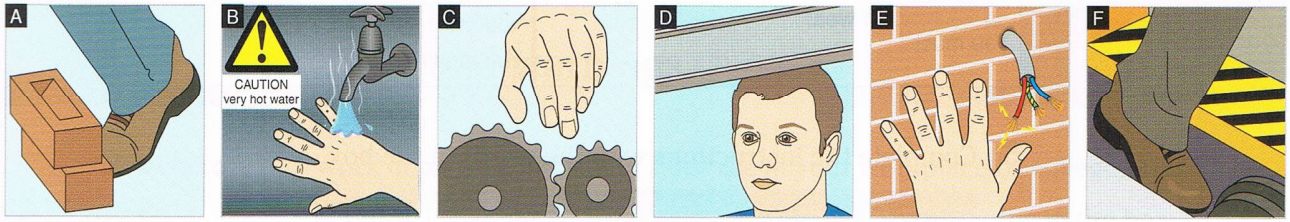
could might there are there's



- 1 Take care. Heavy weight. You _____ injure your back.
- 2 Warning. _____ a cold surface here. You _____ injure your hands or arms.
- 3 Be careful. You _____ trap your hand in the gears.
- 4 Danger. _____ lasers in this laboratory. You _____ injure your eyes.

2 Safety hazards

Start here **1**  54 Listen and match the warnings with the pictures.



2 Listen again and write the warning number in the table.

Warning	Possible result
	You might burn your hands.
	You could injure your head.
	You might fall into the gap.
	You could trip over the bricks.
	You might trap your hand in the gears.
	You could get an electric shock.

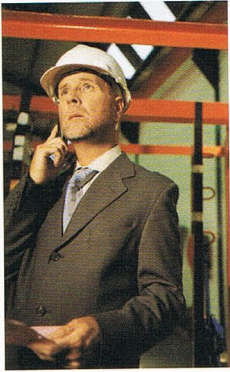
Speaking 3 Say the warnings and their possible results.

*Example: 1 Look out! There's a low beam in front of you.
You could injure your head.*

4 Work in pairs. How many safety hazards can you see?
Make a list.



5 You are a safety inspector, inspecting the workshop in 4. Describe what you see.



There is	a	liquid	in the workshop.	A cable	is	damaged.
There's	some	bricks	on the floor.	Two windows	are	locked.
There are	no	boxes	around the bricks.	The fire exit		broken.
		food	on the machines.	Some cables		coiled.
		drink	on the stairs.			
		tools	on the benches.			
		fire extinguishers				
		fire exit				
		cones				
		guards				

Language Past simple of *is* and *are*.

	There was	some liquid	on the floor.
	There were	some boxes	on the stairs.
The fire exit	was	locked.	
Some cables	were	coiled.	

6 Change more sentences from 5 into the past.

Writing 7 Complete the inspector's report. Describe all the hazards in the workshop.

Safety inspection report

Visit to: Kwik Automotive Workshop
Date of report: 25th October

I inspected the workshop on 22nd October. Here are my findings.

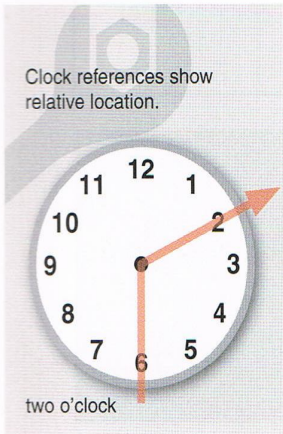
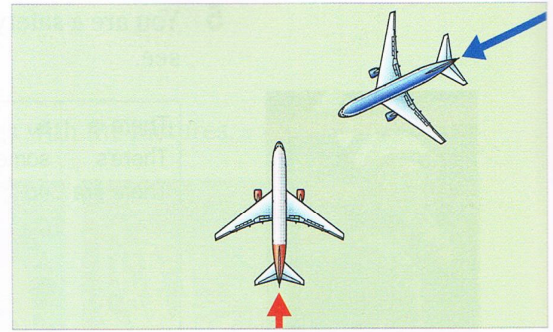
- 1 There were no fire extinguishers anywhere in the workshop.
- 2 There was a single fire exit, but the door was locked with a padlock.
- 3

8 Work in small groups. Write at least ten safety rules for the workshop in 4.

- Put away all tools after work.*
- Do not bring food or drink into the workshop.*
- No eating or drinking in the workshop.*
- Always ...*
- Never ...*
- Staff must/must not ...*

3 Investigations

- Start here** 1 Work in pairs. Discuss these questions.
- What's happening?
 - Which directions are the planes moving in?
 - Who will talk to the pilots?



- 2 55 Listen and complete the warning to the pilot from air traffic control.
- ConAir 286. *Unknown traffic.* (1) _____ o'clock. (2) _____ metres. *Crossing right to left.*
 - ConAir 286. *Negative contact. Request vectors.*
 - Turn (3) _____. *Heading* (4) _____. *Descend.* (5) _____ metres.
 - Right turn. *Heading* (6) _____. *Descending.* (7) _____ metres. ConAir 286. ...
 - Con Air 286. *All clear. Resume own navigation.*
 - Roger. ConAir 286.

- Reading** 3 Read this newspaper article and complete the incident report.

Near Miss Over Manchester

25 November

Last night, a military jet plane almost crashed into a large passenger plane over northern England.

The incident happened in dense clouds 10 km west of Manchester. The Boeing 757 passenger plane was 3505 metres above sea level. At 22.17, the F16 military plane passed at an altitude of 3527 metres. At its closest point, the total distance between the two aircraft was only 36 metres.

The Boeing, flight number BA 4058, had 234 passengers,

and was on a flight path from Manchester to Greece. The military plane was on its way from Scotland to the south of England.

The pilot and passengers on the plane did not see the incident because of the clouds, but the emergency anti-collision system (TACS) in BA 4058 switched on automatically. The TACS system steered the passenger plane safely away from the military plane.

There were no injuries in the incident.



Aviation near-miss incident report

Date of incident:
 Time:
 Location:
 Distance between two planes:

PLANE 1

Type: *Boeing 757 passenger plane*
 Altitude:
 Flight number:
 Number of passengers:
 Flying from:
 Flying to:

PLANE 2

Type:
 Altitude:
 Flight number: -
 Number of passengers: *none*
 Flying from:
 Flying to:

Speaking 4 Work in pairs: an investigator and a pilot. Ask and answer these questions.

- 1 Where / incident / happen
- 2 When / it / take place
- 3 How high / be / Boeing
- 4 What / be / height / of / F16
- 5 What time / F16 / pass / Boeing
- 6 How far / be / jet / from / passenger plane
- 7 What / be / flight number / passenger plane
- 8 How many passengers / be / in / Boeing

take place = happen

Language

Where	were	the planes?		(They were) 3500 m above NW England.
When	did	the incident	happen?	(It happened) at 22.17.

Task 5 Work in pairs. Follow the instructions.

Student A. Turn to page 115.

Student B:

- 1 Investigate Student A's incident. Ask questions and complete the report form.
- 2 Change roles. Your incident is on page 118.

About the accident	About the injured person
Date: _____	Name: _____
Time: _____	Job title: _____
Location: _____	Injury: _____
Height above ground: _____	Description of accident
Type of accident (tick one box):	
• lifted something and injured self <input type="checkbox"/>	
• received an electric shock <input type="checkbox"/>	
• slipped, tripped or fell on the same level <input type="checkbox"/>	
• fell from a height <input type="checkbox"/>	
• other <input type="checkbox"/> _____	

Social English 6 Complete the dialogue with the words in the box.

are can't don't I'd I'll must

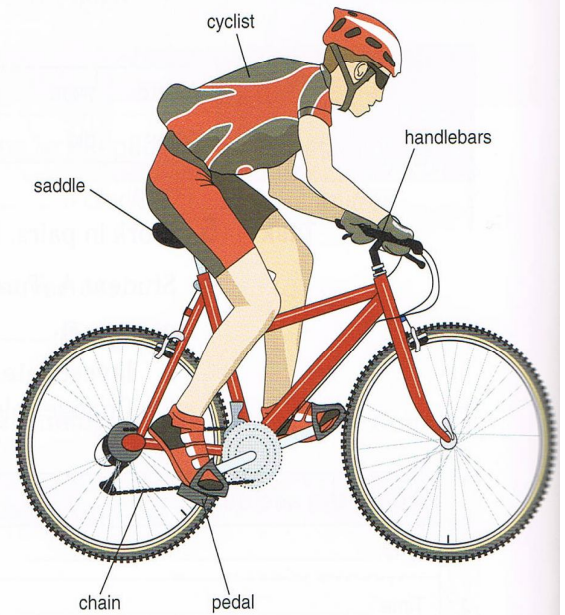
- We (1) _____ go out for a drink soon.
 - Yes, (2) _____ like to do that. How about tomorrow? (3) _____ you free tomorrow?
 - I'm sorry, I (4) _____ do it tomorrow. What about Saturday?
 - Yes, Saturday's fine. What time?
 - I (5) _____ know yet. (6) _____ phone you tomorrow morning.
 - OK, good. Talk to you then.
- 7** Work in pairs. Practise the dialogue in 6 with your partner.
- 8** Work in pairs. Make similar dialogues. Use different times and days.
go and see a film / have a meal together / go bowling / have a party

Review Unit E

1 Complete the sentences with the correct forms of verbs in the box.

control increase move
propel push rotate steer
support turn

- The saddle _____ the cyclist. The cyclist _____ the pedals downwards.
- The pedals _____ the chain and the wheels _____. This _____ the bike forwards.
- The cyclist uses the pedals to _____ the speed. If the cyclist pedals quickly, this _____ the speed of the bike.
- The cyclist _____ the bike with the handlebars.
- If the cyclist _____ the handlebars to the left, the bike goes left.



2 Complete the description with the correct form of the verbs in the box.

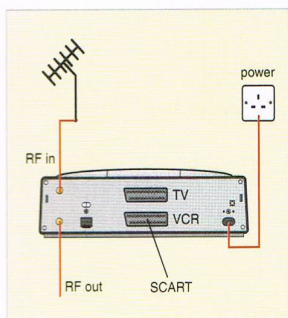
contain drive move suck work

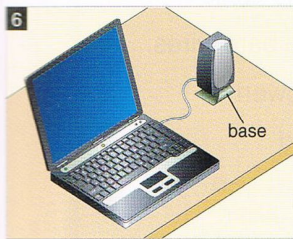
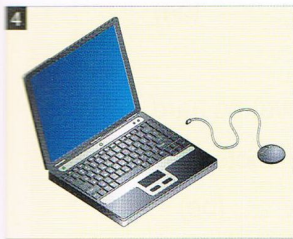
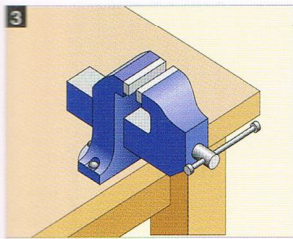
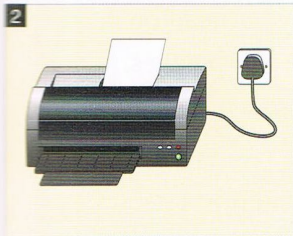
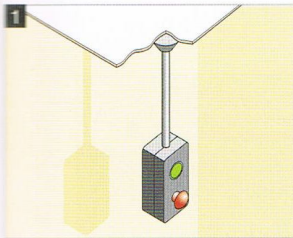
This hovercraft moves over land and water. How does it (1) _____? A powerful engine (2) _____ two large fans. The fans (3) _____ the air in. They force some of the air backwards and push some of the air downwards. A rubber skirt (4) _____ the air and the hovercraft (5) _____ on the cushion of air.

3 Complete the sentences with the words and phrases in the box.

above below between in the centre on the left/right to the left/right

- The RF sockets are _____.
- The SCART sockets are _____.
- The SCART sockets are _____ the RF sockets and the power socket.
- The power socket is _____ of the SCART sockets.
- The RF OUT socket is _____ the RF IN socket.
- The TV SCART socket is _____ the VCR SCART socket.





4 Identify the equipment from the description. Use the words in the box.

battery digital receiver disk drive modem router starter motor

- 1 This device can change digital signals into analogue signals for a TV.
- 2 This device stores electricity. When it is flat, you recharge it.
- 3 This equipment can connect two or more computers to one modem.
- 4 This device connects a computer to the Internet through a phone line.
- 5 This machine uses electricity from a battery. It starts the engine of a car.
- 6 This hardware can copy data from a computer to a CD-ROM.

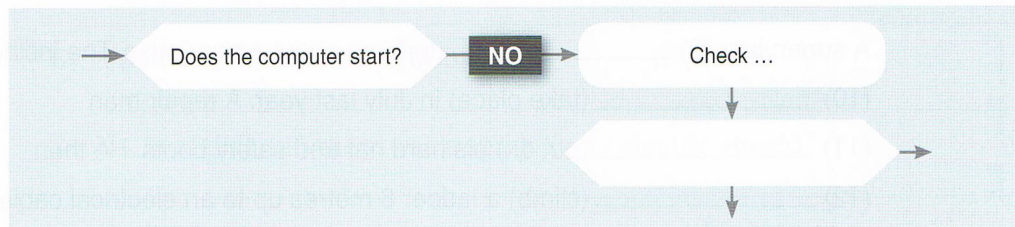
5 Look at the pictures and complete the sentences with the phrases in the box. You can use the words more than once.

attached to connected to disconnected from mounted on suspended from

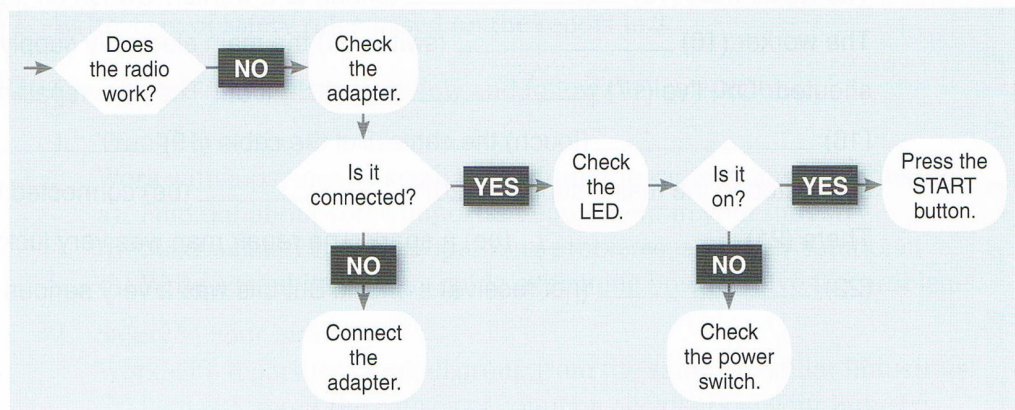
- 1 The switch is _____ the ceiling.
- 2 The printer is _____ the power socket.
- 3 The vice is _____ the workbench.
- 4 The mouse is _____ the computer.
- 5 The hook is _____ the rope. The rope is _____ a bar.
- 6 The speaker is _____ a base. It is _____ the computer.

6 Draw and complete the flowchart.

If your computer does not start, check the adapter. If the adapter is not connected, connect it to the computer. If the adapter is connected, check the disk drive. If there isn't a disk in the the drive, press the power button. If there is a disk in the drive, take it out.



7 Write a troubleshooting guide from this flowchart.



Begin:

If the radio doesn't work, check the adapter

8 Complete the warnings. Use each word once only.

always could don't might must mustn't never

- 1 Staff _____ wear hard hats at all times on this site.
- 2 You must _____ use a lighted match near petrol or gas.
- 3 You _____ smoke in the workshop or on the building site.
- 4 This low beam is very dangerous. You _____ injure your head on it.
- 5 _____ wear gloves if you lift these boxes. They have sharp edges.
- 6 The oven is very hot. You _____ burn yourself. Please _____ touch it.

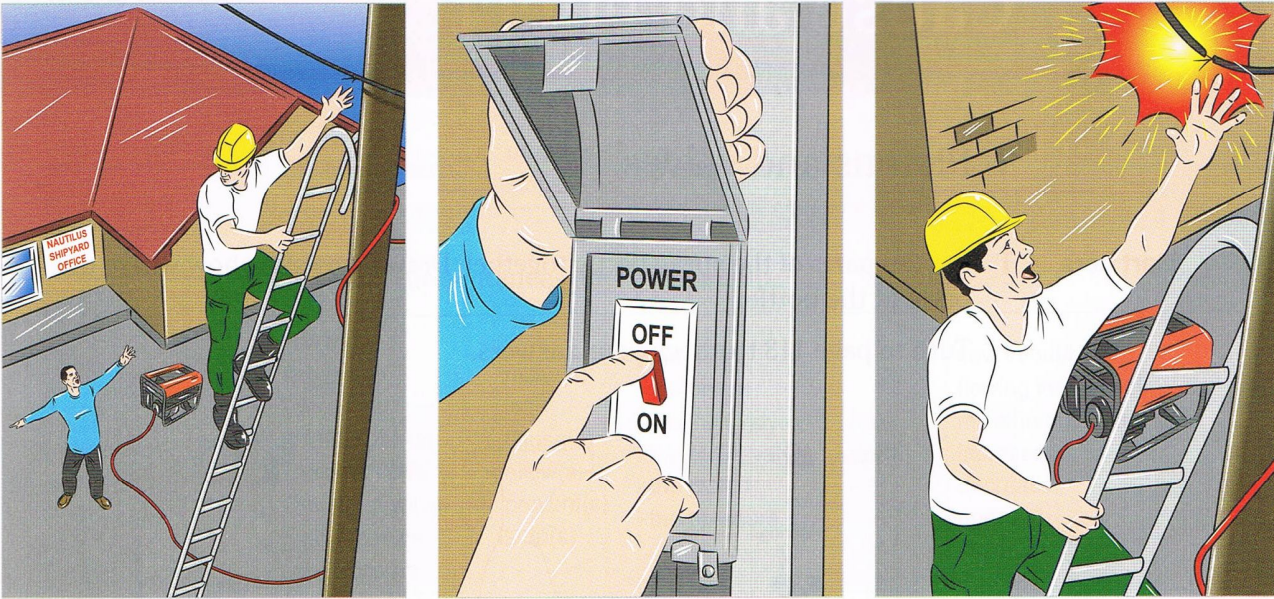
9 Complete the safety report with the correct form of the verbs in brackets.

On 24th August last year, I inspected the Nautilus shipyard. I (1) _____ (find) many safety hazards. Here are the main points of my safety report.

The emergency exit (2) _____ (be) locked. There (3) _____ (be) some ropes on the ground, between two boats. Two fire extinguishers (4) _____ (be) damaged. Five workers (5) _____ (have) no hard hats or safety gloves. One welder (6) _____ (not wear) his safety boots. A high-voltage cable (7) _____ (be) coiled. There (8) _____ (be) many tools on the ground.

A supervisor (9) _____ (tell) me about a near miss. The incident (10) _____ (take place) in July last year. A repair man (11) _____ (put on) his hard hat and safety boots. He then (12) _____ (climb) a ladder 8 metres up to an electrical cable. The cable (13) _____ (be) damaged. It (14) _____ (have) some bare wires. The repair man (15) _____ (shout) to a worker: 'Switch off the power!' The worker (16) _____ (switch off) the main electricity supply and shouted: 'OK, I've (17) _____ (switch) it off!' Then the repair man (18) _____ (touch) the cable. But the cable (19) _____ (not be) connected to the mains supply. It (20) _____ (be) connected to a generator. There (21) _____ (be) a spark. The repair man was very lucky. He (22) _____ (not receive) a shock. But this was a very serious incident.

10 Ask the questions for these answers about the near miss incident in 9.



- 1 It took place in the Nautilus shipyard. (Where / incident)
Where did the incident take place?
- 2 It happened in July last year. (When / happen)

- 3 Yes, he wore his hard hat and his safety boots. (repair man / hard hat)

- 4 He used a ladder. (How / climb / to the cable)

- 5 It was about 8 metres high. (How / cable)

- 6 It had some bare wires. (problem)

- 7 No, he didn't, but there was a spark. (get / electric shock)

- 8 No, it wasn't. It was connected to a generator. (cable / mains supply)

11 Write a set of safety rules based on the report in 9.

Project 12 Choose one of the projects below and follow the instructions.

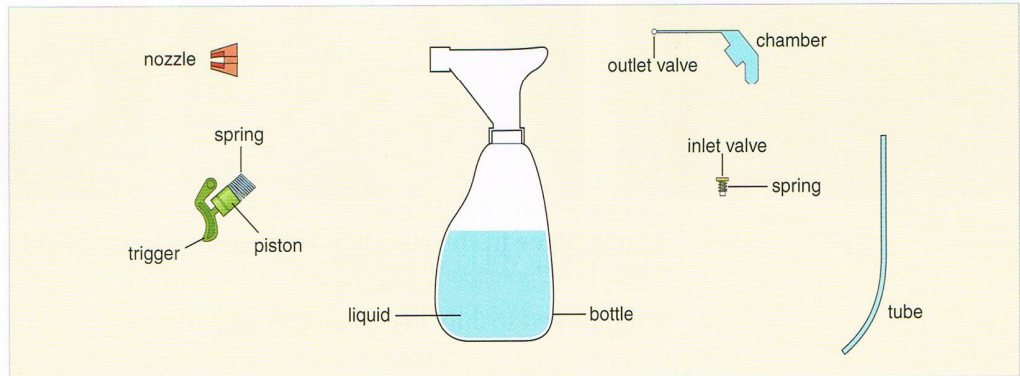
- 1 Troubleshooting in your industry
Work with a partner or small group from the same or similar industries.
 - a) Find out about some important equipment in your industry.
 - b) Make a list of common operating problems, and their solutions.
 - c) Write a troubleshooting guide explaining how to solve the problems.
- 2 Safety in your industry
Work with a partner or small group from the same or similar industries.
 - a) Find out about the causes of common accidents in your industry.
 - b) Design a safety poster to avoid one of these accidents.
 - c) Write a set of safety rules for your poster.

11

Cause and effect

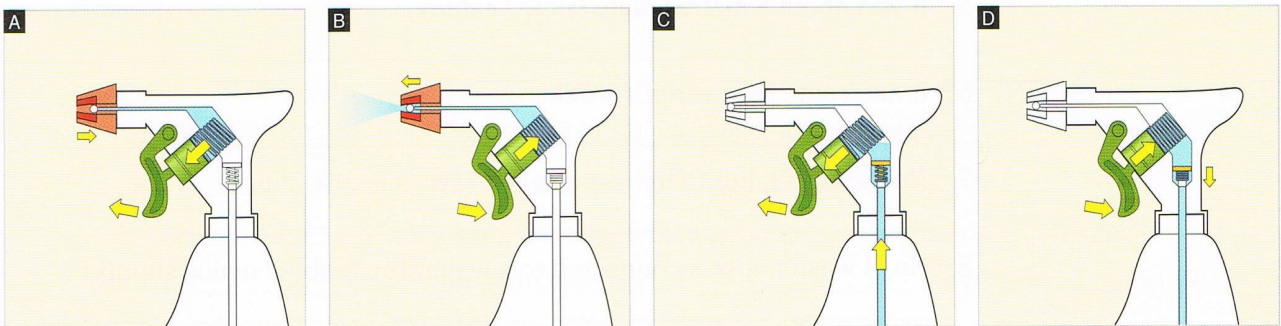
1 Pistons and valves

Start here 1 Put the parts of the spray bottle together. Draw arrows to show where the parts fit the bottle.
Turn to page 113 to check your answers.



2 Work in pairs. How does the pump in the spray bottle work? Discuss with your partner.

Reading 3 Match each diagram with a caption below.



increase the temperature/
pressure/speed/volume



decrease the temperature/
pressure/speed/volume



Caption 1: The trigger makes the piston move in. This makes the water pressure increase. The high pressure causes the outlet valve to open. The open outlet valve allows the water to flow out of the chamber.

Caption 2: The piston moves in. This causes the water pressure to increase. The high pressure makes the inlet valve close. The closed inlet valve prevents the water from flowing back into the bottle.

Caption 3: The piston moves out. This makes the water pressure decrease. The low pressure causes the inlet valve to open. The open inlet valve lets water flow from the bottle into the chamber.

Caption 4: The piston moves out. This makes the water pressure decrease. The low pressure causes the outlet valve to close. The closed outlet valve stops air from flowing into the chamber.

Language

The motor	causes	the shaft	to	move.
	makes	the shaft		move.
The open valve	lets	the water		flow out.
	allows	the water	to	flow out.
The closed valve	prevents stops	the water	from	flowing out.

4 Make true sentences about the pump.

The trigger				flow in/out/back.
The piston	make(s)	the water		flowing in/out/back.
The spring	let(s)	the piston	(to)	move in/out/in and out.
The two valves	cause(s)	the inlet valve	(from)	increase.
The inlet valve	allow(s)	the outlet valve	(-)	decrease.
The outlet valve	prevent(s)	the piston		open.
High pressure	stop(s)	the pressure		close.
Low pressure		the air		

5 Rewrite these sentences to give similar meanings. Replace the verb(s) in *italics> with the correct form of the verb(s) in brackets.*

- Heat makes a metal expand and cold *makes* it contract. (cause)
- Overflow pipes *let* extra water flow out of the tanks. (allow)
- The valve on the oil well *does not allow* the oil to explode. (prevent)
- These powerful pumps *force* the water to rise 30 m up the hill. (make)
- These fire extinguishers *do not allow* electrical fires to spread. (stop)
- Show your ID card and the guard will *allow* you to enter the factory. (let)

6 Delete the wrong words.

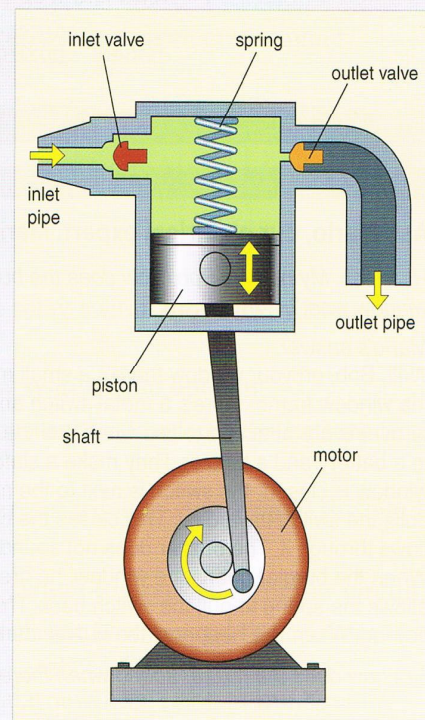
PISTON PUMPS

Piston pumps can pump any fluid. This one pumps water. The pump has a motor, a shaft, a piston, a spring and two valves. The valve on the right is the outlet valve. The valve on the left is the inlet valve.

This is how it works. The motor makes the shaft (1 move/to move) in and out. The shaft makes the piston (2 move/to move) in and out. Let us look at the two movements of the piston.

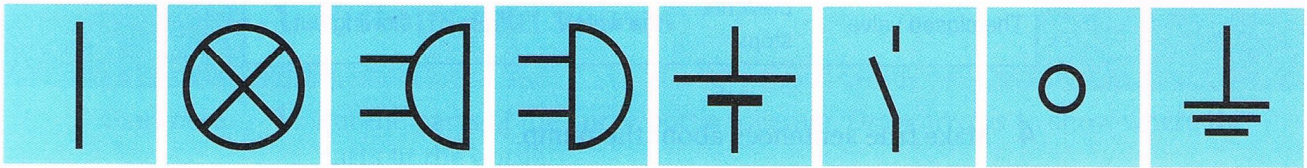
1 The piston moves in. This causes the water pressure (3 increase/to increase). The high pressure forces the outlet valve (4 open/to open). The open valve allows the fluid (5 flow/to flow) out of the pump through the outlet pipe. At the same time, the high pressure makes the inlet valve (6 close/to close). This closed valve prevents the fluid (7 to flow/from flowing) back through the inlet pipe.

2 The piston moves out. This makes the water pressure (8 decrease/to decrease). The low pressure forces the inlet valve (9 open/to open). The open inlet valve lets fluid (10 flow/to flow) into the pump through the inlet valve. At the same time, the low pressure makes the outlet valve (11 close/to close). This closed valve stops the fluid (12 to flow/from flowing) back into the pump through the outlet pipe.




2 Switches and relays

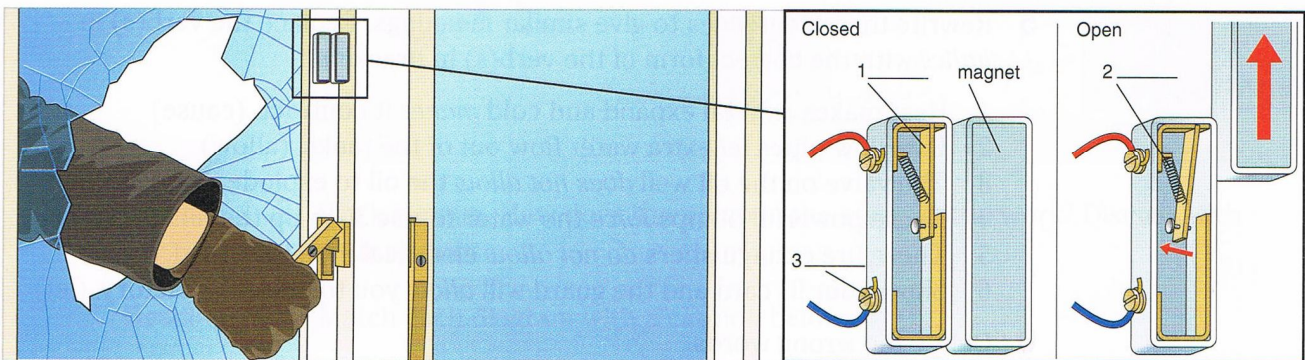
Start here 1 Work in pairs. Try this quiz. How many electrical symbols do you know?
battery, bell, buzzer, conductor, earth, lamp, switch, terminal



Answers: see the glossary of electrical symbols on page 109.

2  56 Listen and name the sounds. Choose from the list below.
buzzer, door bell, click, siren, horn, beep, alarm bell, dial tone

Reading 3 Work in pairs. How does this window burglar alarm work?



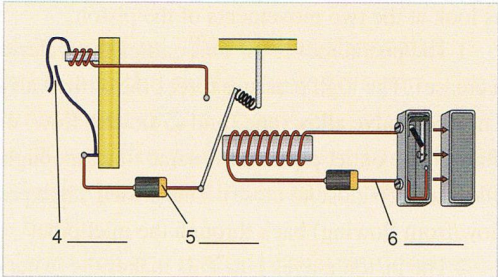
4 Read the web page. Label the circuit diagram and the diagram in 3.

battery buzzer spring switch terminal wire

Ask Mario, our electrical expert. Mario answers all your questions

Hi, Mario. My name's Bob. How does the burglar alarm on my window work?

Mario's answer:
Well, Bob, on your window there's a small magnet. Next to it, on the window frame, there's a metal switch and two terminals. The terminals are attached to two wires and the wires are connected to a battery and a buzzer. They make a simple circuit. When the window is closed, the switch is next to the magnet. The magnet pulls the switch towards it. This closes the circuit and electricity flows through it. The buzzer does not sound.
When the burglar opens the window, he breaks the circuit. The magnet moves away from the switch and this allows the spring to pull the switch back. This opens the circuit. The open circuit prevents the current from flowing. When this happens, the buzzer makes a sound.
But how does the buzzer sound when there is no circuit?



5 Work in pairs. What is the answer to Bob's second question?

6 Read the next part of the web page. Check your answer to 5.

Because there is another circuit. The buzzer has its own circuit. When the window circuit opens, this makes the buzzer circuit close.

How does this happen?

The buzzer circuit has its own battery, an electro-magnet and a relay switch. This is how it works:

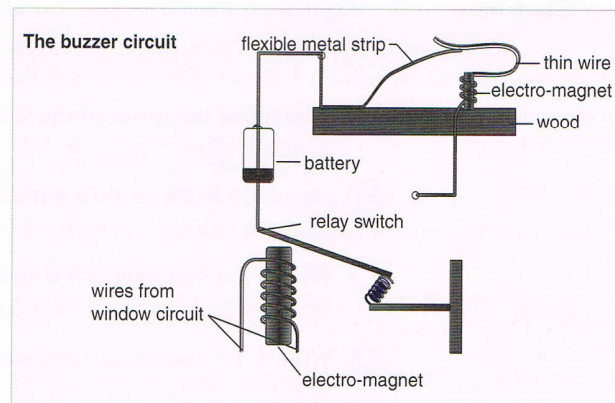
- 1 The window circuit opens.
- 2 This causes the electro-magnet in the window circuit to switch off.
- 3 The electro-magnet releases the relay switch on the buzzer circuit. This allows the spring to push the switch. The buzzer circuit closes.
- 4 The current flows from the battery around the buzzer circuit. This makes the buzzer produce a loud noise.

OK, I understand the circuit. But how does the buzzer make a sound?

That's easy. Here's what happens:

- 1 The current flows through the buzzer circuit.
- 2 The current makes the electro-magnet switch on.
- 3 The electro-magnet pulls the metal strip away from the thin wire.
- 4 This causes the current to switch off again.
- 5 When the current switches off, the electro-magnet switches off.
- 6 This allows the metal strip to spring back towards the thin wire.
- 7 The metal strip moves quickly up and down. This makes the loud buzzing noise.

Thanks, Mario. I get it now.



7 Answer these questions about the complete burglar alarm.

- 1 How many circuits are there?
- 2 How many electro-magnets are there? What is an electro-magnet?
- 3 How many switches are there?
- 4 What makes each switch open and close?

Language 8 Complete the sentences with the correct form of the verbs in the box.

allow cause let make prevent stop

- 1 The electro-magnet _____ the relay switch move away from the contact.
- 2 The magnet _____ the window switch from opening.
- 3 The wires _____ the electric current to flow from the battery to the electro-magnet.
- 4 The open switch _____ the current from flowing around the window circuit.
- 5 The spring _____ the window switch to break the window circuit.
- 6 The closed switch _____ the current flow around the buzzer circuit.

Speaking 9 Work in pairs. Explain how the burglar alarm works. Look at the circuit diagram, but don't look again at the reading text.

3 Rotors and turbines

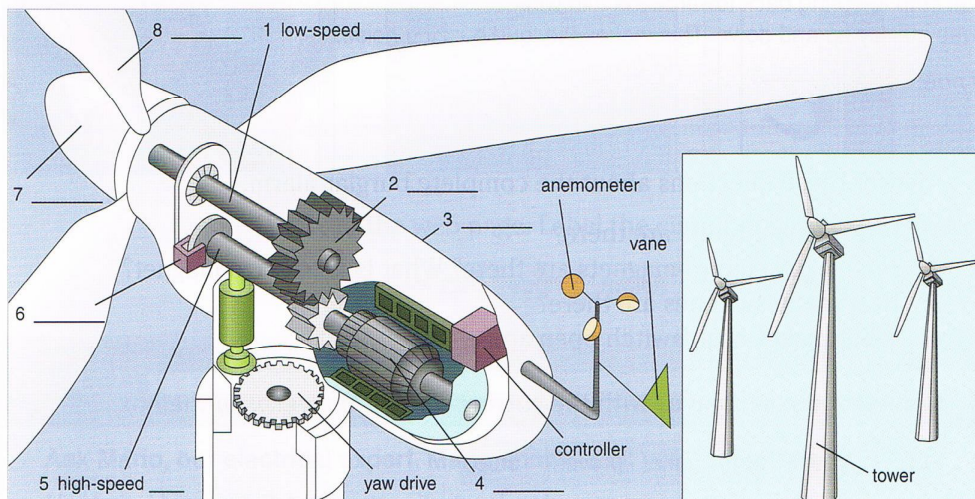
Start here 1 Try this quiz. What do you know about wind turbines?

- 1 **How tall is the tower of the world's tallest wind turbine?**
a) about 100 m b) about 180 m c) about 200 m
- 2 **How high is the world's highest turbine?**
a) about 1800 m b) about 2300 m c) about 2600 m
- 3 **What's the minimum wind speed for a large wind turbine?**
a) about 15 km/h b) about 20 km/h c) about 25 km/h
- 4 **What's the maximum wind speed for a large wind turbine?**
a) about 45 km/h b) about 70 km/h c) about 90 km/h

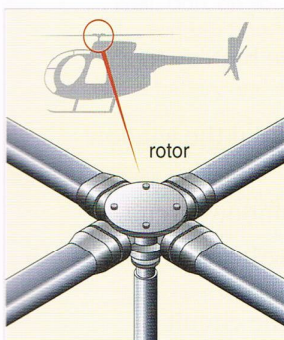
2  57 Listen to this radio programme and check your answers to the quiz.

Vocabulary 3 Label this diagram with the parts of a wind turbine in the box.

blade brake gear generator housing hub shaft



4 Read the text. Check your answers to 3.

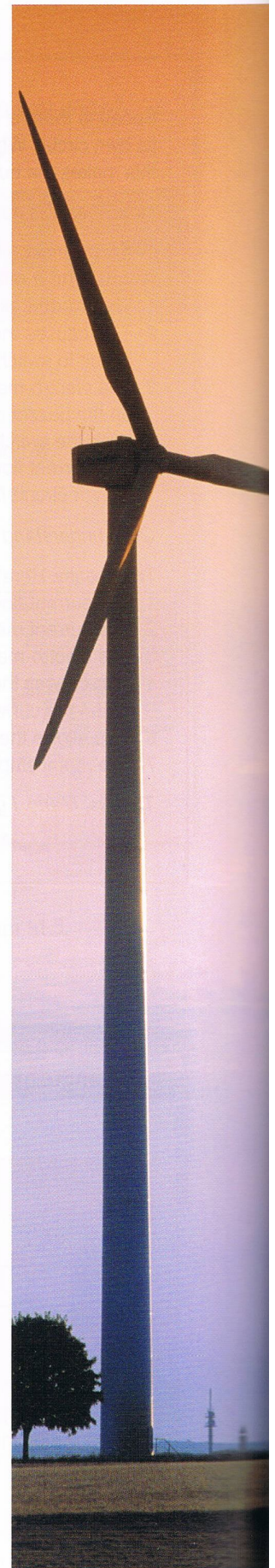


The wind turbine consists of a tower, a rotor and a housing. The rotor consists of three blades, and a hub.

The housing is a strong rigid container. It contains a low-speed shaft, a high-speed shaft, two gears, a generator, a controller, and a brake.

The low-speed shaft connects the rotor to the gears. The high-speed shaft connects the gears to the generator.

Inside the housing, at the back, behind the generator, is the controller.



Reading 5 Read the web page and answer the questions below.

TECHNO CHANNEL: the TV channel for people who love technology

Yesterday, Techno Channel interviewed the wind turbine expert, Dr Roger Jones. Here is part of the script. To download the whole script, [click here](#).

How does the wind turbine work?

5 The wind blows on the blades and makes them rotate. This causes the shaft to rotate at a speed of about 30–60 rpm.

But isn't that too slow? The shaft in a generator must rotate at about 1200–1400 rpm.

10 That's right. There are two shafts. There's a low-speed shaft and a high-speed shaft. The low-speed one is attached to a large gear. The high-speed one is attached to a small gear. The large gear makes the small gear turn and the small gear makes the high-speed shaft rotate. This shaft rotates at 1200–1400 rpm.

15 That's right. And then the generator produces AC electricity.

What happens if the wind is too strong?

The anemometer measures the speed of the wind. It sends this data to the controller. (The controller is a small computer.) If the speed of the wind is more than about 90 km/h, the controller automatically switches off the wind turbine. This prevents the wind from damaging the turbine.

- Which part makes the low-speed shaft turn?
- What are the two main functions of the controller?
- Which part transmits rotation to the generator?

6 What do these words refer to? Choose the correct answer.

- | | | | |
|------------------------|--------------------|---------------------|---------------|
| 1 <i>one</i> (line 10) | a) generator | b) shaft | c) gear |
| 2 <i>it</i> (line 14) | a) low-speed shaft | b) high-speed shaft | c) small gear |
| 3 <i>It</i> (line 17) | a) anemometer | b) speed | c) wind |

data = information

Language 7 Complete the sentences with the correct form of the verbs in the box.

cause make prevent

- The wind _____ the blades rotate.
- The controller _____ the wind turbine from operating in a strong wind.
- The blades _____ the low-speed shaft to rotate.

Speaking 8 Work in pairs. Explain how the wind turbine works. Look at the diagram, but don't look again at the reading text.

Social English You can use *let's* (= *let us*) to suggest something for you and others to do together.

Let's go to the café after work. Let's have a party for our class next week.

You can also say: *Why don't we go to the café after work? Why don't we have a party next week?*

9 Make your own suggestions.

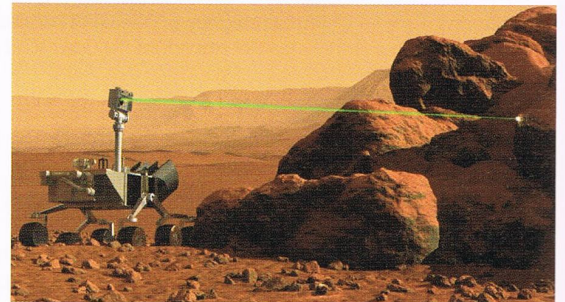
- A: *We have a free period after this class.*
B: Let's _____.
- A: *Work finishes early today.*
B: Why don't we _____?
- A: *Next week is the half-term holiday.*
B: _____.
- A: *The cinema is closed, so we can't see the film.*
B: _____?

12

Checking and confirming

1 Data

- Start here** 1 Work in pairs. You are a TV reporter. Prepare questions about the Mars rover.
- Reading** 2 Read the text quickly. Does the text answer any of your questions?



include ≠ exclude
 Weight of boat = 1000 kg.
 This *excludes* crew, passengers and fuel.
 Weight of crew, passengers and fuel = 200 kg.
 Total weight of boat = 1200 kg.
 This *includes* crew, passengers and fuel.

range = from minimum to maximum

Use *mass* on Mars, not *weight*.
 If you travel to Mars, your weight changes, but your mass stays the same.

The Mars Science Laboratory, or MSL, is a rover, or mobile robot. It can move around on the surface of Mars.

Look at the diagram of the rover. It has a body, six wheels, two robot arms, two antennas and a mast. The antennas and the mast are mounted on the body, and the robot arms are attached to the front of the body.

There are special tools at the end of each robot arm. Some tools break pieces of rock. Other tools dig and collect samples of soil. Scientific instruments in the rover then analyse the soil and rock powder.

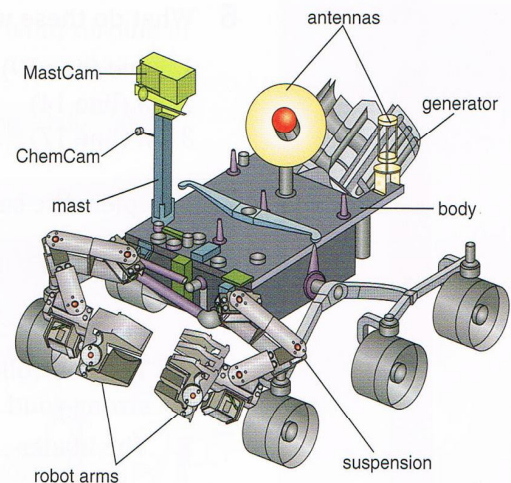
The top of the mast is about 2.1 metres above the ground. The mast supports two special cameras. They are called the MastCam and the ChemCam. The MastCam (mast camera) is at the top of the mast. It looks all around the rover. The ChemCam (chemistry camera) has a laser gun. The gun fires a laser beam at rocks up to 10 metres away and breaks them into powder. The camera then analyses the powder.

The rover is about 2.2 m long and its total mass is just under 800 kg. This includes at least 60 kg of scientific instruments.

It has a six-wheel drive and a special suspension system. The wheels are made of titanium and are 25 cm in diameter. The suspension system allows the six wheels to remain on the ground all the time. It also allows the rover to go over big rocks (up to 75 cm high), and over deep holes. Each wheel has its own motor. This allows the vehicle to rotate 360 degrees. It can move at a speed of up to 90 metres per hour. The average speed is about 30 metres per hour.

The rover can operate in the temperature range on Mars. This ranges from -120°C minimum up to 85°C maximum.

The rover can travel up to 200 metres per day and can operate for up to one Mars year (approximately 687 days).



3 Read the text again and complete this specification chart.

Mars Science Laboratory (Mars rover): specifications			
1	Total height	7	Maximum rotation of rover
2	Total length	8	Maximum obstacle height
3	Total mass	9	Maximum speed
4	Mass of instruments	10	Average speed
5	Number of wheels	11	Max./Min. temperature range
6	Wheel size	12	Maximum daily distance

Vocabulary Ways to express approximation:

~ about, approximately	> more than, over	≤ up to
	< less than, under	≥ at least

4 Complete the sentences. Use the information in brackets.

- The Mars rover _____
(height ~ 2.1 m; length ~ 2.2 m)
- The rover _____
(mass > 750 kg)
- The scientific instruments _____
(mass ≥ 60 kg)
- The wheels _____
(rotation ≤ 360°)
- The rover _____
(distance > 100 metres per day; operation ≤ ~ 687 days)

Speaking **5** Write questions for these answers about the rover.

- It's called the Mars Science Laboratory.
- It has six wheels.
- Titanium.
- They're attached to the front of the body.
- It's mounted on the top of the body.
- About 2.1 metres.
- It looks at the whole area around the rover.
- It fires a laser beam at rocks and analyses them.
- Around 60 kilograms.
- Up to 90 metres per hour.

6 Work in pairs. Practise asking and answering the questions in 5.

7 Work in pairs. Student A guess the answers. Then check them with Student B.

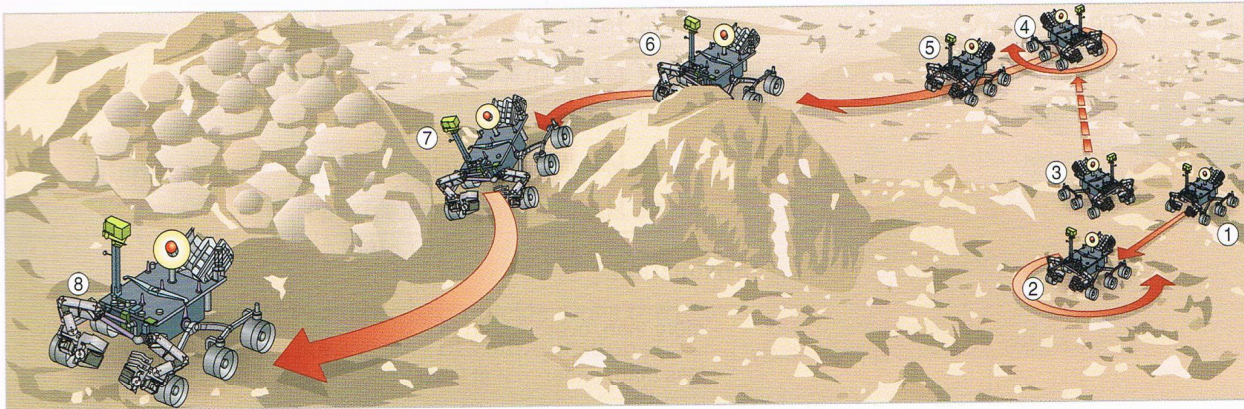
- The diameter of Mars is ... a) ~ 4280 km. b) ~ 6740 km. c) ~ 11,290 km.
- Mars rotates 360° in ... a) ~ 24 hours. b) ~ 36 hours. c) ~ 48 hours.
- Mars is ... kilometres from the Sun. a) ~ 220 million. b) ~ 150 million. c) ~ 300 million.
- Mars orbits the Sun in ... a) ~ 365 Earth days. b) ~ 685 Earth days. c) ~ 905 Earth days.

Example: 1 The diameter of Mars is about 4280 km. Is that right?

Student B: Turn to page 113.

2 Instructions

Start here 1 Make a list of the instructions to give the Mars rover.



2  58 Listen and complete the dialogue between the controller and the rover.

- Move forwards 200 cm.
- Confirmed. I'm (1) _____ forwards 200 cm.
- Now rotate 15 degrees to the left.
- Confirmed. I'm (2) _____ 15 degrees to the left.

3 You are the rover. Confirm your actions.

Instruction	Confirmation
1 Move forwards 200 cm.	<i>I'm moving forwards 200 cm.</i>
2 Rotate 15 degrees to the left.	
3 Reverse for 300 cm.	
4 Rotate 80 degrees to the right.	
5 Go up the hill.	
6 Roll down the hill.	
7 Go round to the left of the rocks.	
8 Stop.	

Listening 4  59 Listen and complete the dialogue.

A is training B how to control the Mars rover.

A: Right. I'll give you an instruction. First, do it. Then confirm what you're doing, OK?

B: OK.

A: Then confirm what the rover's doing. Is that clear?

B: Yes.

A: Right. Let's go. First, (1) _____ the rover (2) _____ 200 cm.

B: OK. I'm (3) _____ the joystick forwards.

A: Good. Now what's (4) _____?

B: The rover (5) _____ moving.

A: Right. Wait five seconds. Now what's happening?

B: OK. It's (6) _____ forwards now.

Task 5 Work in pairs. Discuss the question below.

In this simulation on Earth, the Mars rover responds after five seconds. If the rover is on Mars, it responds after about ten minutes. Why?

Speaking 6 Complete the table. Use information from the table in 3 and the notes below.

Instruction	Confirmation	After 1 second	After 5 seconds
1 Make the rover move forwards 200 cm.	OK. I'm pushing the joystick forwards.	The rover isn't moving.	Now it's moving forwards.
2			
3			
4			

- 1 push joystick forwards
- 2 turn wheel left
- 3 pull joystick backwards
- 4 press 'rotate' button

7 Work in pairs. Practise the dialogues, using the notes in 3. Try not to look at the table.

Begin:

A: *Make the rover move forwards 200 cm.*

B: *OK. I'm pushing the joystick forwards.*

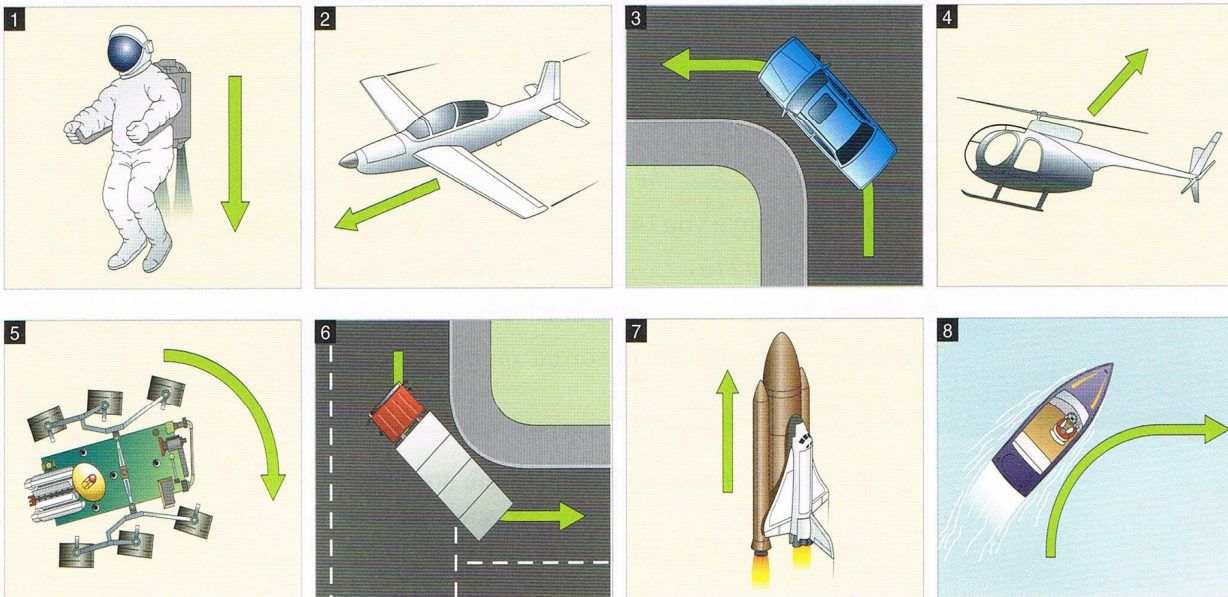
A: *Good. What's happening now?*

B: *The rover isn't moving.*

A: *That's OK. Wait for five seconds. Is it moving forwards now?*

B: *Yes, it is.*

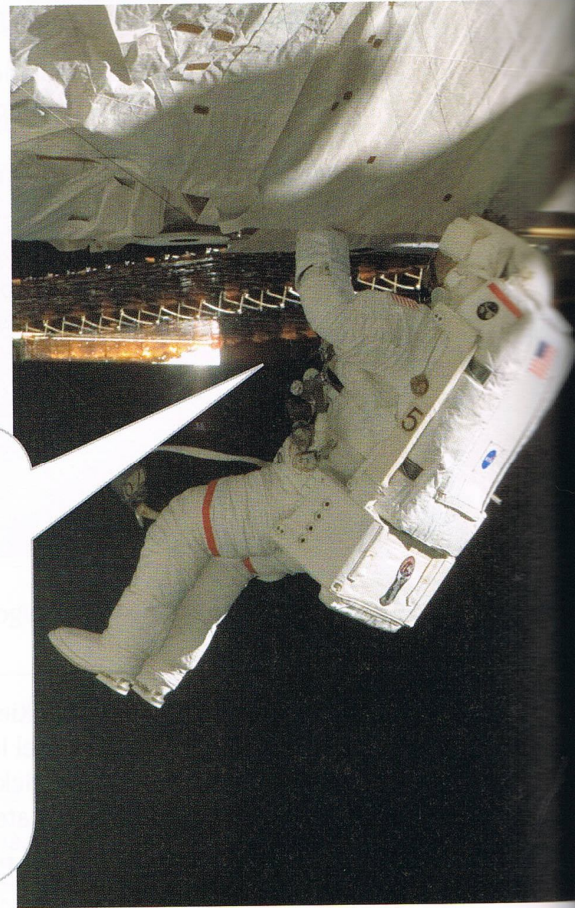
8 Test your memory. Look at the pictures for 10 seconds. Then turn to page 113.



3 Progress

Start here 1 60 Listen to the astronaut talking about his work. Complete the list of tasks with the verbs in the box.

assemble attach bring connect
disconnect dismantle inspect
remove repair replace take test



(1) Test the equipment for the spacewalks.

On spacewalk 1: (2) _____ the damage.

(3) _____ photographs of the tank. Plan the repair and prepare for the next spacewalk.

On spacewalk 2: (4) _____ the pipes. (5) _____ the tank. (6) _____ the tank into the station.

(7) _____ the tank. (8) _____ the damage or

(9) _____ the part. (10) _____ the tank.

On spacewalk 3: (11) _____ the tank to the space station.

(12) _____ the pipes to the tank.

Vocabulary 2 Find the opposites of these words in 1.
connect, assemble, damage, remove

Listening 3 61 Listen to the controller talking to the astronaut. Complete the dialogue.

The controller is speaking from the control centre on Earth. The astronaut is on a space station.

Task	June		
	5	6	7
Do first spacewalk.			
Repair the oxygen tank.			

● OK, today is the 6th of June, 7 pm in the evening. I'm checking progress on the space station. Have you (1) _____ the first spacewalk yet?

○ *Yes, we have.*

● Good. When (2) _____ you do it?

○ *We (3) _____ the spacewalk yesterday, on the 5th of June.*

● Right. And have you (4) _____ the oxygen tank yet?

○ *No, we haven't (5) _____ it yet. We're still (6) _____ it.*

● When (7) _____ you finish it?

○ *We'll complete the job tomorrow morning.*

Language You can use *yet* with some questions and negatives in the present perfect. It means *up to now*.

- 1 We *haven't repaired* the oxygen tank *yet*.
- 2 A: *Have you repaired* the oxygen tank *yet*? B: No, *not yet*.

Speaking 4 Work in pairs. Make similar dialogues. Today is 17th June.

Task	June											
	10	11	12	13	14	15	16	17	18	19	20	21
Test equipment for first spacewalk.	█											
Do first spacewalk.		█										
Take photograph of damaged tank.		█										
Inspect damage to tank.			█	█								
Remove tank.					█	█						
Repair tank.							█	█	█			
Replace tank.										█	█	
Dismantle old ventilation system.						█	█	█				
Lubricate moving parts on all fans.									█	█	█	
Install new valves on pumps.												█

Task 5 Work in pairs. Follow the instructions.

- Student A: Turn to page 117.
- Student B:

It's 8th August. You're doing a progress check. Ask Student A questions and complete your checklist.

Task	Y/N?	Notes
Dismantle old water system	<input checked="" type="checkbox"/>	Completed 4 th Aug.
Assemble new water system	<input type="checkbox"/>	_____
Install water system	<input type="checkbox"/>	_____
Test equipment for third spacewalk	<input type="checkbox"/>	_____
Take video of damaged nose cap	<input type="checkbox"/>	_____
Inspect damage to waste tank	<input type="checkbox"/>	_____
Assemble new robot arm	<input type="checkbox"/>	_____
Attach new robot arm	<input type="checkbox"/>	_____

B: *Have you dismantled the old water system yet?*

A: *Yes, we have.*

B: *When did you complete the job?*

Review Unit F

1 Complete the sentences with the correct form of the verbs in the box.

allow cause let make prevent stop

- The water flows down onto the water wheel. This _____ the wheel turn.
- The valve opens. This _____ the water flow in.
- The valve closes. This _____ the water from flowing out.
- The switch touches the contact. This _____ the electric current to flow.
- The switch moves away from the contact. This _____ the electric current from flowing.
- The water level rises. This _____ the float to rise.

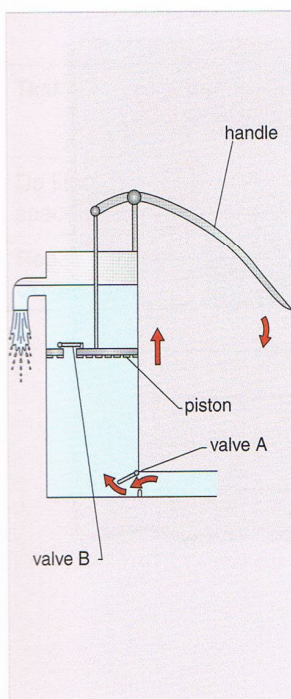
2 Complete the driving instructor's words with the correct form of the verbs in brackets.

- If you _____ (press) the accelerator pedal, this _____ (make) the car _____ (go) faster.
- If you _____ (push) the brake pedal down, this _____ (cause) the car to _____ (stop).
- If you _____ (pull) the parking brake up, this _____ (prevent) the car from _____ (move).
- If you _____ (release) the parking brake, this _____ (allow) the car to _____ (move) again.

3 Complete the sentences with the correct form of the verbs in the box.

close flow from go down open rise to

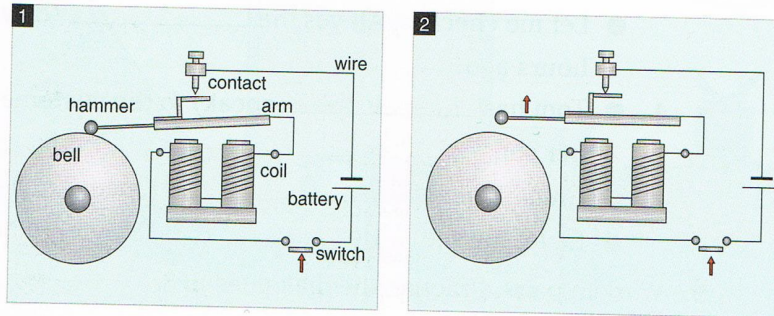
- You push the handle down. This makes the piston _____.
- The piston rises. This makes valve B _____ and causes valve A _____.
- Valve B closes. This prevents water _____ into the chamber.
- Valve A opens. This allows water _____ into the chamber.
- You pull the handle up. This causes the piston _____.
- The piston goes down. This makes valve B _____ and causes valve A _____.



4 Draw a line from each word or phrase to its opposite.

increase expand bring decrease low assemble
 contract dismantle inlet outlet less than
 take more than high connect
 remove replace disconnect approximately exactly

5 Complete this explanation of how the electric bell works with the correct form of the words in the box.

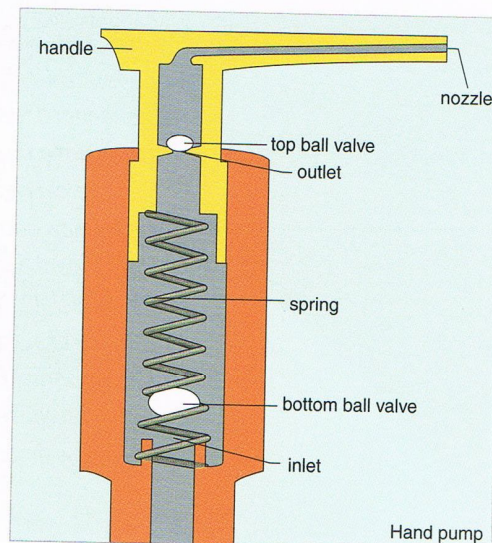


close flow make move open pull strike

How an electric bell works

Someone presses the bell button, and the switch (1) _____.
 An electrical current (2) _____ through the coil. This
 (3) _____ the coil become an electromagnet. The electromagnet
 (4) _____ the metal arm towards it. (Diagram 1). This causes the
 hammer to (5) _____ the bell. At the same time, it
 (6) _____ the circuit. Now the coil is not a magnet. The hammer
 (7) _____ away from the coil. (Diagram 2). This
 (8) _____ the circuit again. The hammer (9) _____ the
 bell again and again.

- 6 Work in pairs. Explain how this hand pump works.
- 7 Write your explanation of how the hand pump works.



8 Complete these dialogues. Use the correct form of the verbs in brackets.

A supervisor in a car repair workshop is reporting on progress to his manager.

- 1 ● The men have _____ (replace) the windscreen.
○ *Good. When did they _____ (replace) it?*
● Let me check the file ... They _____ (replace) it yesterday.
- 2 ● They've _____ (take) out the old brake system.
○ *That's good. When did they _____ (take) it out?*
● Let me see ... They _____ (take) it out this morning.
- 3 ● Bob has _____ (drive) the car to the body repair shop.
○ *That's great. When did he _____ (drive) it there?*
● Let me check ... Ah yes, he _____ (drive) it there about two hours ago.
- 4 ● Tom has _____ (speak) to the customer about the damage to her car.
○ *Great. When did he _____ (speak) to her?*
● Er, let me see ... He _____ (speak) to her yesterday.

9 Work in pairs. Practise the dialogues in 8.

10 Work in pairs. Practise the dialogue below. The supervisor is checking progress with a mechanic. Then make new dialogues using the information from the table.

- Have you repaired the brakes yet?
- *Yes, I have.*
- Good. When did you do that?
- *I did it yesterday.*
- Right. And have you replaced the windscreen yet?
- *No, I haven't. I'm replacing it now.*
- OK. And what about the main shaft? Have you lubricated it?
- *No, I haven't. I'll do that tomorrow morning.*

Repair brakes	✓ yesterday
Replace windscreen	✗ in progress
Lubricate main shaft	✗ tomorrow morning

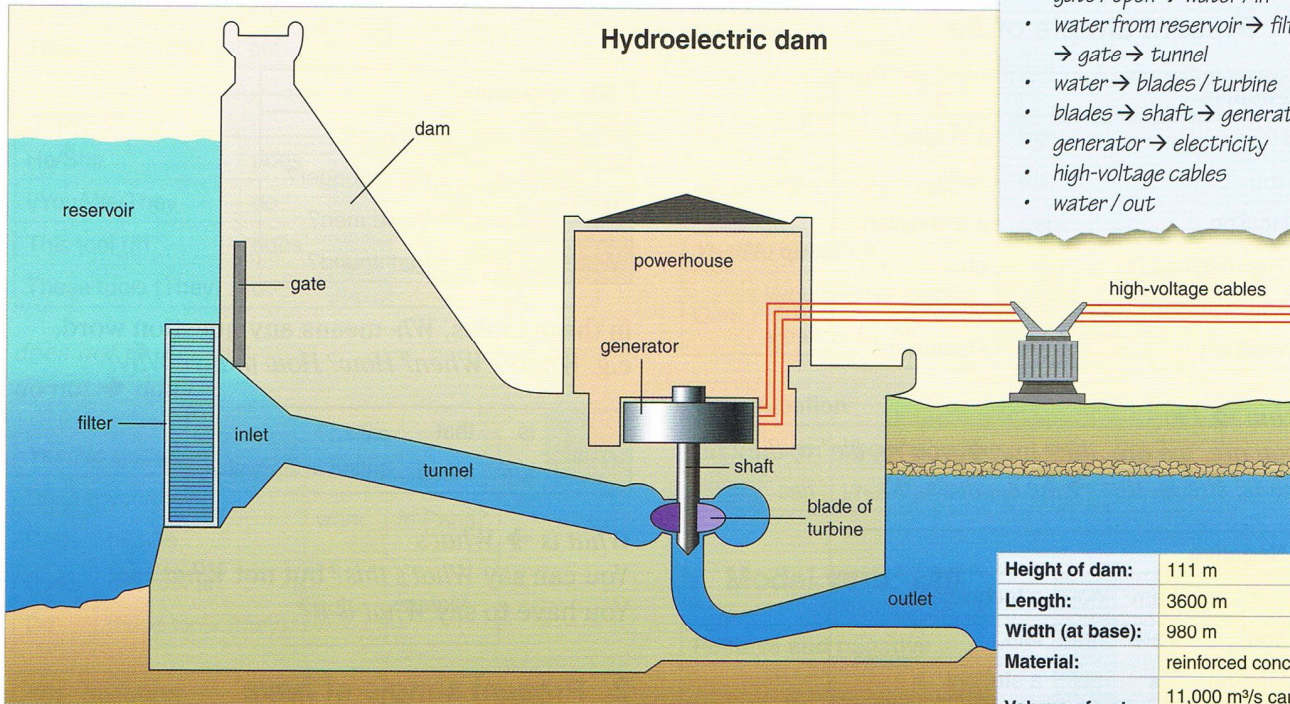
Lubricate axles and shafts	✓
Inspect damaged fuel tank	✓ last week
Disconnect fuel pipe from fuel tank	✓ yesterday
Take photographs of dented panels	✗ tomorrow morning
Remove old radiator	✗ tomorrow afternoon
Install new cooling system	✗ in progress
Repair dented bumpers	✓
Replace damaged valve on water pump	✗ in progress
Service the brake system	✗
Repair damaged radio	✗ later today
Connect battery to starter motor	✓ two days ago
Test new air conditioner	✓ 8.00 this morning

11 Write a description of this dam and how it works, using all the information and the words in the box.

allow carry cause drive enter flow generate
leave make open pass produce rotate turn

Function of dam
Main parts
Dimensions
Material
How the dam works

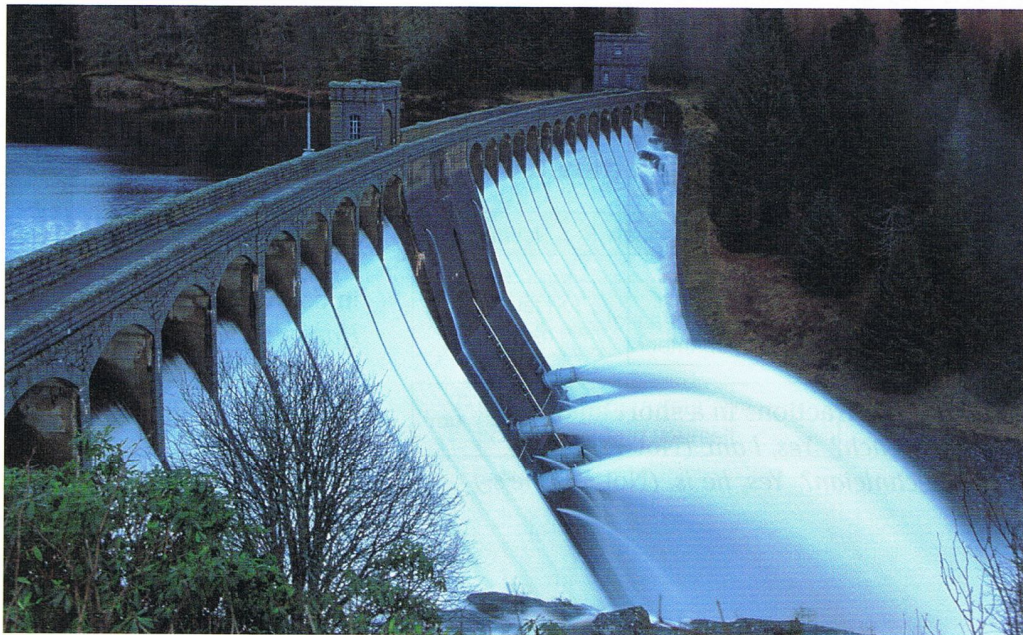
- gate / open → water / in
- water from reservoir → filter → gate → tunnel
- water → blades / turbine
- blades → shaft → generator
- generator → electricity
- high-voltage cables
- water / out



Height of dam:	111 m
Length:	3600 m
Width (at base):	980 m
Material:	reinforced concrete
Volume of water:	11,000 m ³ /s can pass through dam
Size of reservoir:	132 km ³

Project 12 Find out some facts about a major engineering project in your country or region.

- 1 Draw a simple labelled diagram.
- 2 Make a specifications chart.
- 3 Write a short description of the project:
 - Function of project
 - Dimensions
 - How it works
 - Main parts
 - Materials



Grammar summary

1 Present simple of *be*

Positive		
I	am	a student.
You	are	early.
He/She	is	a technician.
The machine (It)	is	on.
The switches (They)	are	off.
We/They	are	electricians.

I am → *I'm*

you are, we are, they are → *you're, we're, they're*
he is, she is, it is → *he's, she's, it's*

Negative			
I	am	not	a technician.
You	are	not	late.
He/She	is	not	a student.
That	is	not	an M6 spanner.
We/They	are	not	from Italy.

I am not → *I'm not*

you are not → *you're not* or *you aren't*
he is not/she is not → *he isn't/she isn't* or *he's not/she's not*
it is not → *it isn't* or *it's not*
we are/they are → *we aren't/they aren't* or *we're not/they're not*

Yes/No question		
Am	I	early?
	we	late?
Are	the switches	on?
	you	the manager?
Is	he/she	a technician?
	that	an AC adapter?

Don't use contractions in a short answer.
Are you French? Yes, I am. (Not ~~Yes, I'm.~~)
Is he a technician? Yes, he is. (Not ~~Yes, he's.~~)

Wh- question		
Where	are	we now?
Who	is	the manager?
	are	those men?
What	is	that sound?

In these tables, *Wh-* means any question word, e.g. *Where? When? How? How many? Why?*

What	is	that	called?
	are	those	called in English?

What is → *What's*

You can say *What's this?* but not ~~*What's it?*~~
 You have to say *What is it?*

2 Present simple of *have*

Positive		
I/You/We/They	have	25 screws.
My bike (It)	has	21 gears.

Negative				
I/You/We/They	do	not	have	any screws.
My bike (It)	does			27 gears.

does not → *doesn't*

do not → *don't*

Yes/No question			
Do	you/we/they	have	any screws?
Does	your bike (it)		27 gears?

In colloquial English:

Have you got any screws? (BrE) = *Do you have any screws?* (AmE)

I've got 25 screws. (BrE) = *I have 25 screws.* (AmE)

Wh- question				
How many	gears	does	your bike (it)	have?
	screws	do	you/we/they	

3 Present simple of other verbs

Positive		
He/She	works	in Paris.
I/You/We/They	work	
This tool (It)	cuts	wood.
Those tools (They)	cut	

Negative				
He/She	does	not	work	in Rome.
I/You/We/They	do			
This tool (It)	does	not	cut	metal.
These tools (They)	do			

does not → doesn't

do not → don't

Yes/No question				
Do	you/they	work	in Paris?	
Does	he/she			
Does	this tool (it)	cut	metal?	
Do	these tools (they)			

Wh- question				
Where	do	you/they	work?	
	does	he/she		
What	does	this tool (it)	do?	
	do	these tools (they)		

Spelling

There are three different ways to spell the ending of a present simple verb:

+ -s		+ -es		-y → -ies	
flow	flows	go	goes	carry	carries
move	moves	pass	passes	study	studies
rise	rises	push	pushes	fly	flies

Pronunciation

There are three different ways to say the -s/-es ending of a present simple verb:

z	s	iz (rhymes with his)
flows	sinks	rises
moves	stops	passes
burns	strikes	presses
goes	hits	pushes

4 Modal verb: can

Positive		
I/You/He/She/We/They	can	operate this machine.
A helicopter (It)	can	fly backwards.

Negative			
I/You/He/She/We/They	can	not	operate the forklift truck.
An aeroplane (It)	can	not	fly backwards.

can not → can't or cannot

Yes/No question		
Can	I/you/he/she/we/they	operate this machine?
	a helicopter (it)	fly backwards?

Wh- question				
How	can	I/he/she/we/they	help	you?
What	can	I/he/she/we/they	do	for you?

5 Modal verb: will

Positive and negative				
I/You/He/She/We/They	will	build	the wall	tomorrow.
	will not			

will not → won't

I will, you will, he will, she will, it will, they will →
I'll, you'll, he'll, she'll, it'll, they'll

Yes/No question				
Will	I/you/he/she/we/they	build	the wall	tomorrow?

Wh- question				
When	will	I/you/he/she/we/they	build	the wall?

6 Modal verbs: must, could and might

You	must	wear a hard hat here.
-----	------	-----------------------

You	must not mustn't	touch the machine.
-----	---------------------	--------------------

You	might could	burn your arm. hurt yourself.
-----	----------------	----------------------------------

7 Present continuous

Positive				
I	am	pressing	the brake pedal	now.
You/We/They	are	breaking	the safety rules.	
He/She	is	turning	the steering wheel.	
The car (It)	is	moving	to the left.	

I am → *I'm*

He is, She is, It is → *He's, She's, It's*

We are, They are → *We're, They're*

Negative				
I	am	not	pressing	the accelerator.
You/We/They	are	not	following	the safety rules.
He/She	is	not	moving.	
The car (It)	is	not	moving.	

is not → *isn't*

are not → *aren't*

Yes/No question				
Am	I	talking	to the manager?	
Are	you/we/they	working	on the same project?	
Is	he/she	wearing	a hard hat?	
Is	your radio (it)	working?		

Wh- question				
Who	am	I	meeting	today?
Why	are	you/we/they	leaving	now?
Where	is	he/she	going?	
What	is	the piston (it)	doing?	

Spelling

There are three different ways to spell the *-ing* ending of a present continuous verb:

Add <i>-ing</i>		Lose final <i>-e</i> and add <i>-ing</i>		Double final letter and add <i>-ing</i>	
do	doing	leave	leaving	cut	cutting
go	going	move	moving	drop	dropping
break	breaking	rise	rising	put	putting

8 Present perfect

Positive				
I/You/We/They	have	damaged	the car.	
He/She	has	broken	the windscreen.	

I have, you have, we have, they have → *I've, you've, we've, they've*

he has, she has, it has → *he's, she's, it's*

Negative				
I/You/We/They	have	not	dented	the bumper.
He/She	has	not	broken	the lamps.

have not → *haven't*

has not → *hasn't*

Yes/No question				
Have	you/we/they	damaged	the car?	
Has	he/she	broken	the windscreen?	

Wh- question				
Where	have	you/we/they	parked	the car?
	has	he/she	driven	

9 Past simple

Positive				
I/We/They/He/She	went	to Madrid	last year.	
The incident (It)	happened	last week.		

Negative					
I/You/He/She/We/They	did	not	go	to Paris	last year.
The incident (It)	did	not	happen	yesterday.	

did not → *didn't*

Yes/No question					
Did	I/you/he/she/we/they	go	to Paris	last year?	
	the incident (it)	happen	yesterday?		

Wh- question					
When	did	I/you/he/she/we/they	go	to Madrid?	
		the incident (it)	happen?		

Time expressions

Some time expressions you can use with the past simple:

- *yesterday, this morning, the day before yesterday*
- *three minutes ago, two days ago, five weeks ago*
- *last week, last month, last year*
- *in 2005, on the 20th October, at 6.30 am*

10 Past simple and past participle forms

The past participle is part of the present perfect verb. Here are some examples of verbs in this book.

Most verbs are regular. Both the past simple and the past participle end in *-ed*.

Regular (ending in <i>-ed</i>)	
verb	past simple/past participle
attach	attached
close	closed
connect	connected
cool	cooled
crack	cracked
crash	crashed
damage	damaged
dent	dented
disconnect	disconnected
drop	dropped
fit	fitted
happen	happened
inspect	inspected
launch	launched
mount	mounted
press	pressed
remove	removed
repair	repaired
replace	replaced
scratch	scratched
suspend	suspended
travel	travelled

Some verbs are irregular. The past simple and the past participle don't end in *-ed*.

Irregular (not ending in <i>-ed</i>) past simple = past participle	
verb	past simple/past participle
bend	bent
bring	brought
build	built
burn	burnt
buy	bought
cut	cut
find	found
get	got
have	had
hold	held
leave	left
let	let
lose	lost
make	made
put	put
read	read
say	said
sell	sold
send	sent
sit	sat
tell	told

Irregular (not ending in <i>-ed</i>) past simple ≠ past participle		
verb	past simple	past participle
become	became	become
break	broke	broken
do	did	done
drive	drove	driven
fall	fell	fallen
fly	flew	flown
go	went	gone
rise	rose	risen
run	ran	run
speak	spoke	spoken
steal	stole	stolen
take	took	taken
tear	tore	torn
write	wrote	written

Pronunciation

There are three different ways to say the *-ed* ending of a past simple verb:

d	t	id*
flowed	launched	mounted
moved	increased	added
changed	dropped	inspected
opened	gripped	rotated

* rhymes with *did*

Here are some past participles often used as adjectives:

Damage

cracked, damaged, dented, punctured, scratched, broken, stolen, torn, bent, burnt, cut

Location

connected (to), disconnected (from), suspended (from), mounted (on), attached (to)

Example: *The pipe is cracked. The switch is connected to the battery.*

11 Past simple of *be*

Positive		
I/He/She	was	in London last year.
You/We/They	were	in the workshop yesterday.

Negative		
I/He/She	was	not in Dubai last year.
You/We/They	were	not in the workshop last week.

was not → *wasn't*
were not → *weren't*

Yes/No question		
Was	I/he/she	in Dubai last year?
Were	you/we/they	in the workshop last week?

Wh- question			
When	was	I/he/she	in London?
	were	you/we/they	in the workshop?

12 Zero conditional

If	the sun	shines	,	the current flows from the panel.
	the sun	does not/doesn't	shine	, the current flows from the battery.

If	the battery	is	full	,	the current doesn't flow into the battery.
	the lamps	are not/aren't	on	,	the current flows into the battery.

13 Countable and uncountable nouns

screws are countable		cement is uncountable	
a one	screw	some	cement
some two	screws		
a bag of two bags of			

Countable nouns can be both singular and plural. Examples: *screw, nail, hammer, bottle.*

Uncountable nouns are always singular. Examples: *concrete, cement, sand, oil, water.*

How much/How many

Do you need	some/ any	screws? cement?	How	many much	screws cement	do you need?
-------------	--------------	--------------------	-----	--------------	------------------	--------------

14 Verb constructions

cause, allow + to infinitive

make, let + bare infinitive

stop, prevent + from + gerund

The motor	causes	the shaft	to	move.
The open valve	allows	the water	to	flow out.
The motor	makes	the water		flow out.
The open valve	lets			
The closed valve	prevents	the water	from	flowing out.
	stops			

15 Describing damaged or missing items

Passive

The screen	is	scratched.
The speakers	are	

have/don't have

The cable	has	no	plug.
	doesn't have	a	
The cables	have	no	plugs.
	don't have	any	

There is/There are

There is	a scratch	on the screen.
	no manual	in the box.
There are	some scratches	on the screen.
	no batteries	in the box.

there is → there's

there are → there're

Reference section

1 Abbreviations

SI units of measurement

Abbreviations are usually *singular* (e.g. 50 metres is 50 m, not 50 ~~ms~~)

Abbreviations are usually *lower-case* (e.g. mm, not ~~MM~~) with very few exceptions. Note that:

- litre can be L or l
- ampere (A), watt (W) and volt (V) use upper-case (capital) letters

Length

mm	millimetre(s)
cm	centimetre(s)
m	metre(s)
km	kilometre(s)

Area

mm²	square millimetre(s)
m²	square metre(s)
km²	square kilometre(s)

Volume/Capacity

mm³	cubic millimetre(s)
m³	cubic metre(s)
km³	cubic kilometre(s)
ml	millilitre(s)
cl	centilitre(s)
L (or l)	litre(s)

Mass/Weight

mg	milligram(s)
g	gram(s)
kg	kilogram(s)
t	tonne(s)

Electricity

A	ampere(s) or amp(s)
Ah	ampere hour(s)
W	watt(s)
kW	kilowatt(s)
kWh	kilowatt hour(s)
V	volt(s)

Speed

m/s	metre(s) per second
km/s	kilometre(s) per second
km/h	kilometre(s) per hour
rpm	revolution(s) per minute

Other units in common use

gal	<i>gallon(s)</i>	1 gal (US) = 3.7854 L 1 gal (UK) = 4.5461 L
pt	<i>pint(s)</i>	1 pt (US) = 0.4732 L 1 pt (UK) = 0.5683 L
in	<i>inch(es)</i>	1 in = 25.4 mm
yd	<i>yard(s)</i>	1 yd = 0.9144 m
mi (or m)	<i>mile(s)</i>	1 mi = 1.61 km
mph	<i>mile(s) per hour</i>	100 mph = 161 km/h
lb	<i>pound(s)</i>	1 lb = 0.4536 kg
oz	<i>ounce(s)</i>	1 oz = 28.3495 g

Temperature

°C	degree(s) Celsius
°F	degree(s) Fahrenheit

To convert Celsius to Fahrenheit:

$$^{\circ}\text{F} = ^{\circ}\text{C} \times 9/5 + 32.$$

To convert Fahrenheit to Celsius:

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9.$$

Some other abbreviations used in this book

am	in the morning
AC	alternating current
approx.	approximately
CD	compact disc
CD-ROM	compact disc, read-only-memory
DC	direct current
DVD	digital video disc
etc.	and so on/etcetera
FAQ	frequently asked questions
GB	gigabytes
ID	identity
ISO	International Organisation for Standardisation
IT	information technology
LED	light-emitting diode
LH	left-hand
MB	megabytes
n/a	not applicable; write this when there is no possible answer, or no need to answer a question on a form
no.	number
NS	near-side (of car), away from the steering wheel
N, S, E, W, NW	north, south, east, west, north west
OS	off-side (of car), next to the steering wheel
pm	in the afternoon (or evening)
qty	quantity
R&D	research and development
ref.	reference/with reference to
RF	radio frequency; the RF IN socket on a TV comes from the antenna
RH	right-hand
SCART	a connector between two audio-visual machines, e.g. a TV and a DVD player, also called a Euro-connector
SI	International System of Units; metric units
TV	television
VCR	video cassette recorder

2 Numbers, times and dates**Numbers up to 100**

1	one	14	fourteen
2	two	15	fifteen
3	three	16	sixteen
4	four	17	seventeen
5	five	18	eighteen
6	six	19	nineteen
7	seven	20	twenty
8	eight	21	twenty-one
9	nine	22	twenty-two
10	ten	23	twenty-three
11	eleven	24	twenty-four
12	twelve	25	twenty-five
13	thirteen		
30	thirty	70	seventy
40	forty	80	eighty
50	fifty	90	ninety
60	sixty	100	a hundred/one hundred

Numbers over 100

100	a hundred/one hundred
1000	a thousand/one thousand
10,000	ten thousand
100,000	a hundred thousand/one hundred thousand
1,000,000	a million/one million
1,000,000,000	a billion/one billion

Ordinal numbers

1 st	first	11 th	eleventh	21 st	twenty-first
2 nd	second	12 th	twelfth	22 nd	twenty-second
3 rd	third	13 th	thirteenth	23 rd	twenty-third
4 th	forth	14 th	fourteenth	24 th	twenty-fourth
5 th	fifth	15 th	fifteen	25 th	twenty-fifth
6 th	sixth	16 th	sixteenth	26 th	twenty-sixth
7 th	seventh	17 th	seventeenth	27 th	twenty-seventh
8 th	eighth	18 th	eighteenth	28 th	twenty-eighth
9 th	ninth	19 th	nineteenth	29 th	twenty-ninth
10 th	tenth	20 th	twentieth	30 th	thirtieth
				31 st	thirty-first

Decimal numbers

0.1	nought point one/zero point one
15.1	fifteen point one
15.15	fifteen point one five
15.015	fifteen point oh one five/fifteen point zero one five

Times

24-hour clock	12-hour clock	Some ways to say it
05.15	5.15 am	oh five fifteen five fifteen in the morning five fifteen am
10.30	10.30 am	ten thirty in the morning ten thirty am
14.45	2.45 pm	fourteen forty-five two forty-five in the afternoon two forty-five pm
21.55	9.55 pm	twenty-one fifty-five nine fifty-five pm nine fifty-five in the evening

Months

January, February, March, April, May, June, July, August, September, October, November, December

Days

Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday

Saying years

- 1998 = *nineteen ninety-eight*
- 2000 = *two thousand*
- 2008 = *two thousand and eight* (BrE); *two thousand eight* (AmE)

Writing dates

- 2011-06-14 (yyyy-mm-dd) – ISO 8601: an international standard
- 14/06/11 (dd/mm/yy) – commonly used in Europe
- 06/14/11 (mm/dd/yy) – commonly used in the US
- 14th June 2011
- 14 June 2011
- June 14, 2011
- June 14th, 2011

Saying dates

- *the fourteenth of June, two thousand and eleven* (BrE); *two thousand eleven* (AmE)
- *June the fourteenth, two thousand (and) eleven*

3 Symbols

General warnings and safety symbols
danger/warning/caution/hazard



Specific hazards



flammable



toxic/poison



Danger
high voltage
high voltage

Safety equipment or help



emergency exit/ fire exit



fire alarm



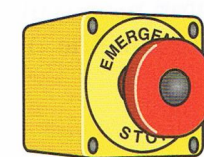
fire
extinguisher



hospital



first aid



emergency stop

Prohibitions



no entry

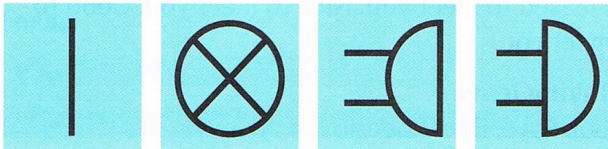


no exit

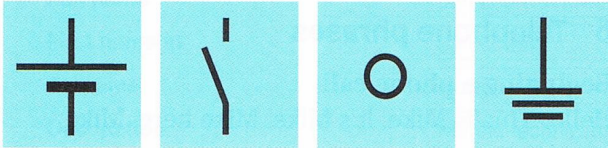


no smoking

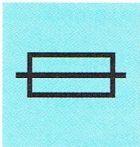
Some electrical symbols



conductor lamp buzzer bell



battery switch terminal earth



fuse

Other symbols

- + plus/positive
 - minus/negative
 - # hash/number
 - ° degree(s)
 - ± plus or minus
 - = equals
 - ≠ does not equal
 - ≥ at least (also more than or equal to)
 - ≤ up to (also less than or equal to)
 - ~ approximately/about (also has other uses)
 - < less than, under
 - > more than, over
 - ✓ tick
 - ✗ cross
 - .
- point (decimal number)

Currency symbols

- € euro(s)
- \$ dollar(s)/peso(s)/real(s)
- £ pound(s)
- ¥ yen
- 元 renminbi/yuan
- ﷼ rial(s)/riyal(s)
- Rs Rp rupee(s)

Internet symbols

- @ at
- .com dot com
- A-B A hyphen B / A dash B
- A/B A slash B / A forward slash B
- A_B A underscore B

4 Useful words

Industries and technologies

aerospace
 agriculture
 automotive engineering
 biotechnology
 chemical engineering
 civil engineering
 building and construction
 electrical engineering
 electronics/electronic engineering
 environmental engineering
 information technology/IT
 information and communications technology/ICT
 manufacturing
 marine engineering
 materials testing
 mechanical engineering
 petroleum
 public health
 security
 telecommunications/telecoms
 transport

Names of jobs

engineer
 manager
 technologist
 technician
 supervisor
 team leader
 mechanic
 operator

Materials

Metals: aluminium, titanium, copper, iron, lead, tin

Alloys: steel, chrome, cromoly

Plastics: polycarbonate, polyester, polystyrene, nylon

Composites: fibreglass, graphite

British and American English

Here are some of the words used in this book, but there are many more. Key the words *American British English* into an Internet search engine or *Wikipedia* to find complete lists. Some AmE words and spellings are now used also in BrE, for example, *antenna, disk*. Some BrE words are now used in AmE, for example, *car*.

British English (BrE)	American English (AmE)
accelerator	gas pedal/gas
aerial	antenna
aeroplane	airplane
aluminium	aluminum
cable/wire (<i>electricity</i>)	cord
car	automobile
centre	center
colour	color
disc	disk
earth (<i>electricity</i>)	ground
fibreglass	fiberglass
flat (<i>battery</i>)	dead
lift (<i>in a building</i>)	elevator
litre	liter
metre, kilometre,	meter, kilometer,
millimetre	millimeter
mobile/mobile phone	cellphone
petrol	gas/gasoline
polystyrene	styrofoam
postal code	zip code
spanner	wrench
storey (<i>in a building</i>)	floor/story
torch	flashlight
tyre	tire
vice (<i>in a workshop</i>)	vise
windscreen	windshield

5 Social phrases

Meeting a friend or co-worker

Hello. Hi. Morning. Good morning.
How are you? How are things? How are you doing? How's it going?
Fine, thanks. Great. How about you?

Introducing yourself

I'm Hans. My name's Hans.

Introducing someone else

This is Mia. She's a student here. She's a technician.

Meeting someone for the first time

Pleased to meet you. Nice to meet you. Good to meet you

Taking leave

Goodbye. Bye. Cheerio.
See you. See you later. See you tomorrow.

6 Telephone phrases

Beginning a phone call

Hello. This is Mike. It's Mike. Mike here. Mike speaking.
Hello. Is that Mike?
Yes, this is Mike. Is that Jim?

Listening to a voicemail

Thank you for calling ABC Computers.
You've reached the voicemail of John Wilson.
Please leave a message after the tone.

Leaving a voicemail

Hello. My name is ...
My phone number is ...
My email address is ...
My address is ...
I'd like to order/buy ...
I'd like some information about ...
Could you please send me your catalogue/
brochure.
Please call me back. It's urgent.
Please get back to me when you can. Thanks.
Thank you.

Listening to an automatic message

Thank you for calling ABC Computers.
For the sales department, please press 1.
To hear information about our services, press 2.
To speak to a service technician, please hold.
Please wait.

Answering a call from a customer

Thank you for calling ABC Computers.
This is the service department.
My name's Jason. This is Jason. Jason speaking.
I'm the service technician.
How can I help? How can I help you? What can I do for you? What's the problem?

7 Forms and email conventions

Forms

Title (Mr/Ms/Mrs)	Mr
Full name	Jan Lorenz Nowak
First name(s)	Jan Lorenz
Surname	Nowak
Occupation	Marine technician
Designation/Job Title	Team Leader, Section 2
Company	Fleet Engineering Co.
Company address/Work address	Unit 34, Marina Docks, Ring Road, Bristol BS98 4NT
Nationality	Polish
Passport number	n/a
Date of birth (dd/mm/yy)	10/12/90
Qualifications	Diploma in Marine Technology
Home address	14 Watling Street, Bristol BS88 9Q1
House number	14
Postal code	BS88 9Q1
Mailing address*	same
Billing address**	same
Email address	nowak.jl43@fleet.co.uk
Office telephone number	01234 8856967
Extension	x 340
Mobile	07734 123 456

* we'll send the goods to this address

** we'll send the invoice to this address

Email

Subject: Re: Steering problem
 From: info@motors.co.uk
 To: Peter Jones

Dear Mr Jones
Thanks for your email of 07/11.
With reference to your steering problems, I've inspected your car. It needs a new power steering pump.
Do you want me to install a new pump?
Please confirm.
 Regards
 John Stevens

Hi Peter*
<i>Thank you for</i>
<i>Re /With regard to/Concerning</i> <i>Would you like me to</i>
<i>Please let me know.</i> <i>Best regards/ Best/ Best wishes</i> John*

* Use this form when you know your customer well.

Extra material

2 Parts (1) 3 Ordering

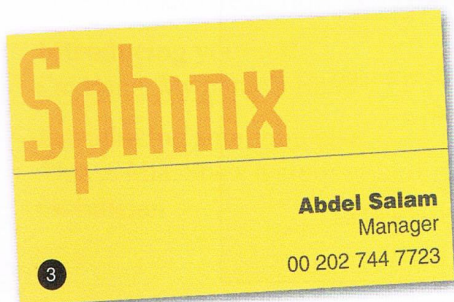
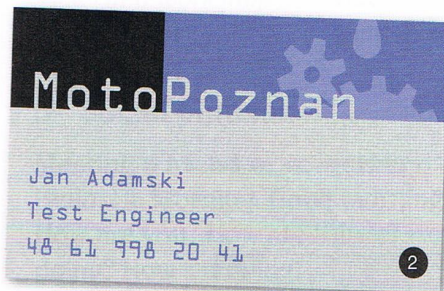
Speaking exercise 4 page 14

Student A

- 1 Listen to Student B and make notes like this.
- 2 Change roles. Leave phone messages for Student B. Use the business cards below. Spell out the name of the person, and the company.

Example:

Hello. This is John West. That's W-E-S-T. Manager of Kesko. That's K-E-S-K-O. My phone number is 00 44 1224 867 4490. Please call me back.



2 Parts (1) 3 Ordering

Task exercise 5 page 15

Student A

- 1 You are the sales person. Student B (the customer) telephones you. Ask Student B what they want to buy.

Skateboard accessories for sale

decks



large Other colours
medium
small

helmets



large Other colours
medium
small

pads



large Other colours
medium
small

Item	Colour			Size			Quantity		
Helmet	red	yellow	blue	large	medium	small	1	2	3
Deck	red	yellow	blue	large	medium	small	1	2	3
Pad	red	yellow	green	large	medium	small	2	4	6

Useful phrases

What size/How many/What colour do you need?

What's your name? Please spell that. What's your phone number?

- 2 Change roles. You are a customer. You want to buy the items circled in blue. Telephone Student B (the sales person) and order the items.

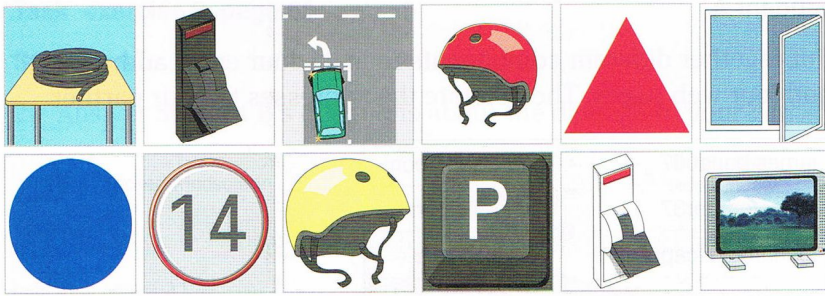
Begin:

A: *Hello. I need to buy some things for my skateboard.*

- 3 Circle new items and phone up to order them.

Review A

Exercise 16 page 18

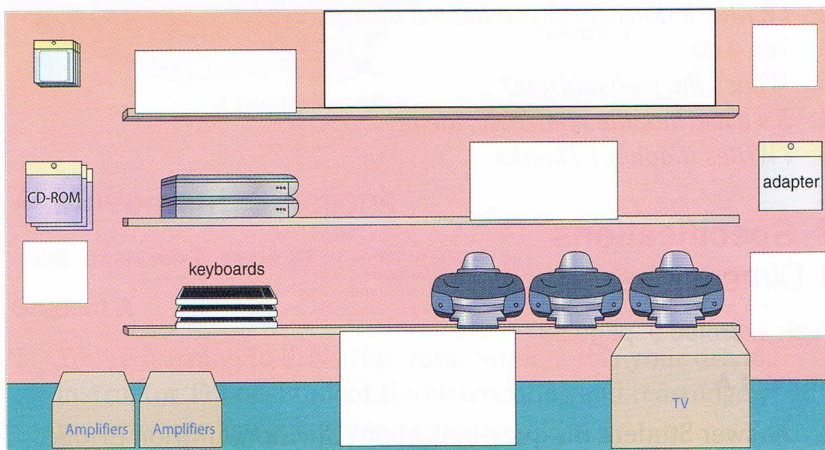


3 Parts (2) 3 Locations

Task exercise 8 page 25

Student A

- 1 Ask Student B where these items are and write them in their correct locations: *speakers, mouses, notebook computer, headphones, cables, computer monitors, DVD players.*
- 2 Then change roles. Answer Student B's questions.



Here are some useful phrases:

- on the top/middle/bottom shelf
- to the left/right of the shelves
- in/at the top/middle/bottom
- on the left/right
- above/below the shelves

2 Parts (1) 1 Naming

Speaking exercise 11 page 11

Check your answers.

- | | | |
|--------------|-------------|-----------------|
| 1 racing car | 2 rocket | 3 mountain bike |
| 4 plane | 5 motorbike | 6 boat |

Unit 12 Checking and confirming 1 Data

Speaking exercise 7 page 91

Student B

Confirm or correct Student A's answers.

Mars

- 1 6747 km
- 2 24 hours and 37 minutes
- 3 228 million km (average)
- 4 687 Earth days

Yes, that's right.

No, that's wrong. Change it to ...

Unit 12 Checking and confirming 2 Instructions

Speaking exercise 8 page 93

Write down what is happening in the pictures using the words in the box.

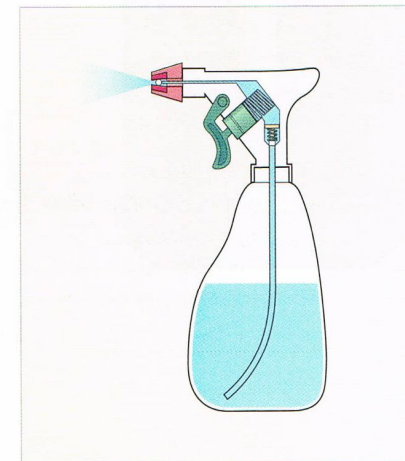
astronaut car helicopter
motorboat plane rover
shuttle truck

Unit 11 Cause and effect

1 Pistons and valves

Start here exercise 1 page 84

Check your answers.



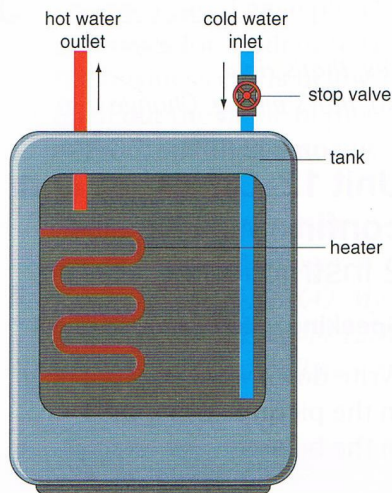
5 Flow 1 Heating system

Task exercise 8 page 37

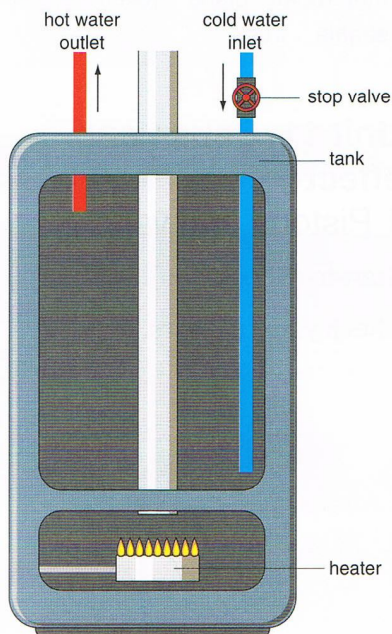
Student A

- 1 Explain one of these systems to Student B.
- 2 Listen to Student B, and ask questions. Then draw a simple diagram of his/her system.

Electric water heater



Gas water heater



6 Materials 3 Buying

Speaking exercise 3 page 46

Student A

Put together different components to make four email addresses and four web pages. Then dictate the addresses to your partner.

james.bond007	@	microsoft.com
roger.federer37		mozilla.com
leonardo.di.caprio89		toyota.co.fr
danielcraig19		citroen.com

www.	microsoft.com	/sales-department	/index.html
	mozilla.com	/service_and_repairs	/italian_pages
	toyota.co.fr	/catalogue.search	/new-products
	citroen.com	/new_ideas	/form-downloads.pdf

Example:

A: What's your email address?

B: It's danielcraig17@mozilla.com.

A: (Writes it down.) Do you have a website?

A: Yes, I do.

B: What's the web address?

A: It's www.mozilla.com/new_ideas

B: (Writes it down.) Thanks.

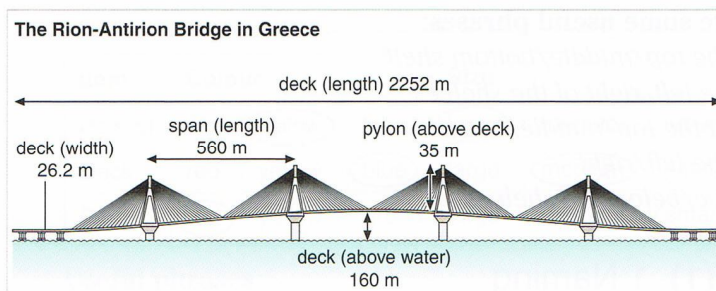
7 Specifications

1 Dimensions

Task exercise 9 page 53

Student A

- 2 Answer Student B's questions about the Rion-Antirion Bridge.



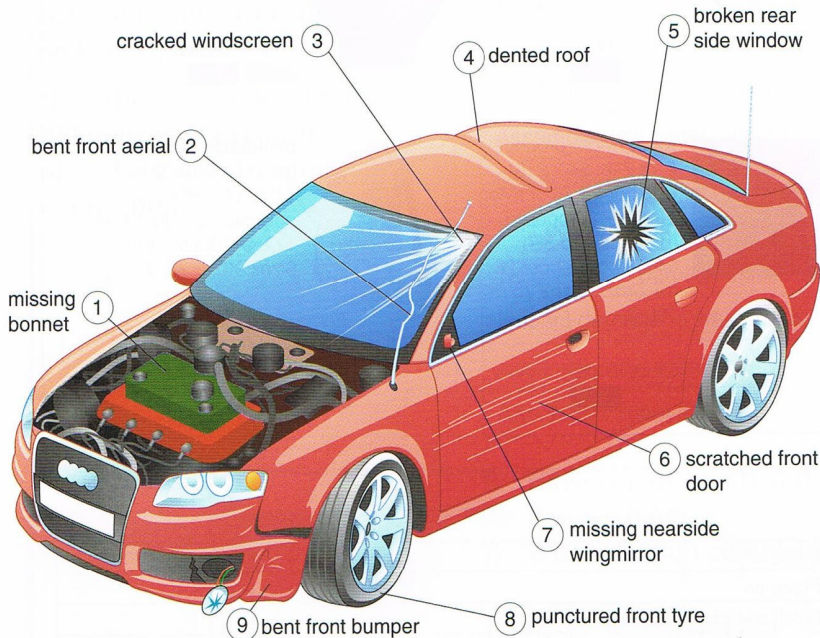
8 Reporting

2 Damage and loss

Task exercise 9 page 61

Student A

2 Answer Student B's questions about the damage to your car.



4 Movement 3 Actions

Task exercise 7 page 31

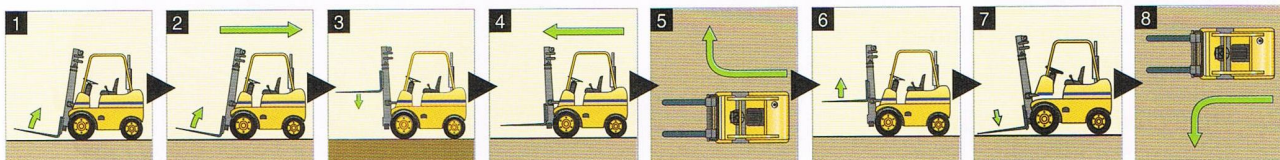
Student A

1 You're learning to drive the truck. Student B is your driving instructor. Follow Student B's instructions and rearrange your pictures into the correct sequence.

The correct sequence of the instructions is:

--	--	--	--	--	--	--	--

2 Then change roles. Tell Student B to follow these instructions in the correct sequence.



10 Safety

3 Investigations

Task exercise 5 page 79

Student A

1 Read about your incident and answer Student B's questions.

Two days ago, 23rd November, a builder called Gino Petri had an accident on the 3rd floor of the new building. The accident happened at 09.38. Mr Petri was about 20 m above the ground at the time. He tripped over a metal girder and he fell from the 3rd floor to the 2nd floor. He fell into a safety net and received no injuries from the fall, but the girder cut his leg.

2 Then change roles. Investigate Student B's incident. Ask questions and complete the report form on page 79.

6 Materials 3 Buying

Task exercise 6 page 47

Student A

- You are the sales person in the sports shop. Ask Student B questions and complete this order form. Ask about the features they want (size, colour, material), and the price.
- Then change roles. You are now the customer. Circle three items you would like to buy, and circle the features you want and the price. Then phone up the shop and place your order. You can either make up details (e.g. names, phone numbers, etc.) or use your own.

USEFUL LANGUAGE

- What's your name/phone number/email address?
- Could you spell/repeat that, please? Is that sixteen or sixty?
- What's the product name/number?
- What colour/size/material would you like/do you need?
- Do you want to pay in dollars (\$), sterling (£) or euros (€)?
- How many would you like/do you need?

helmet: polycarbonate (product # 16-384: \$80/ £40/ €60) or fibreglass (product # 18-399: \$70/ £35/ €50). Sizes: L, M or S.

jacket: cotton (product # 14-556: \$70/ £37/ €58) or polyester (product # 17-765: \$75/ £40/ €60). Sizes: XL, L, M, S.

rope: nylon (product # 13-246: \$40/ £18/ €25 per 25 m) or nylon + rubber composite (product # 30-356: \$45/ £22/ €33 per 25 m). Sizes: 50 m/ 75 m/ 100 m.

backpack: nylon (product # 19-231: \$120/ £60/ €90) or polyester (product # 90-113: \$110/ £55/ €85). Sizes: XL, L, M, S.

Name						
Phone no.						
Email address						
Order						
Product name	Product no.	Colour	Size	Material	Price	Quantity

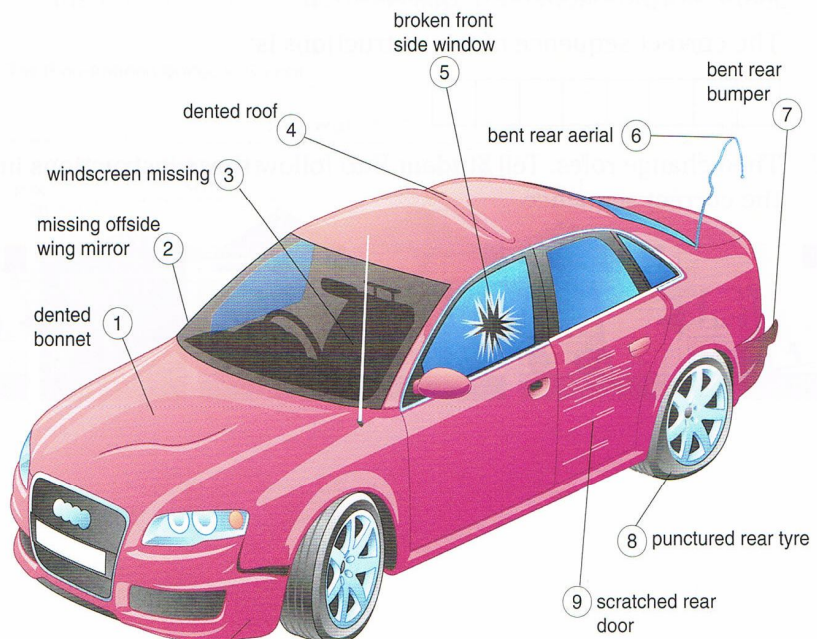
8 Reporting

2 Damage and loss

Task exercise 9 page 61

Student B

- Answer Student A's questions about the damage to your car.
- Then change roles. Now ask Student A questions about the damage to their car. Turn back to page 61. Label your diagram.



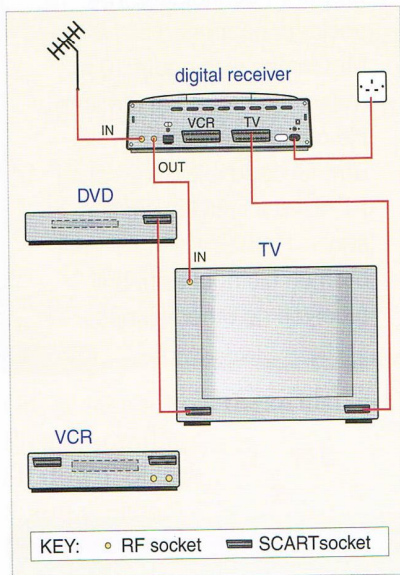
9 Troubleshooting 2 Hotline

Task exercise 8 page 71

Student A

Find out all the differences between your wiring diagram and your partner's.

Hint: there are at least ten differences of (a) location of sockets and (b) wiring connection.



USEFUL LANGUAGE

digital receiver, DVD, VCR, TV, antenna, SCART socket, RF socket, in, out, power, socket

Do you have a/an ... ?

Look at the ...

Where is the ... ?

Does the ... connect to the ... ?

Have you connected the ... to the ... ?

Is the ... connected to the ... ?

Unit 12 Checking and confirming 3 Progress

Task exercise 5 page 95

Student A

It's 8th August. Answer Student B's questions about your chart.

Task	August												
	2	3	4	5	6	7	8	9	10	11	12	13	
Dismantle old water system	■	■	■										
Assemble new water system				■	■								
Install water system						■	■						
Test equipment for third spacewalk				■									
Take video of damaged nose cap					■								
Inspect damage to waste tank							■	■					
Assemble new robot arm							■	■	■	■			
Attach new robot arm										■	■	■	■

B: Have you dismantled the old water system yet?

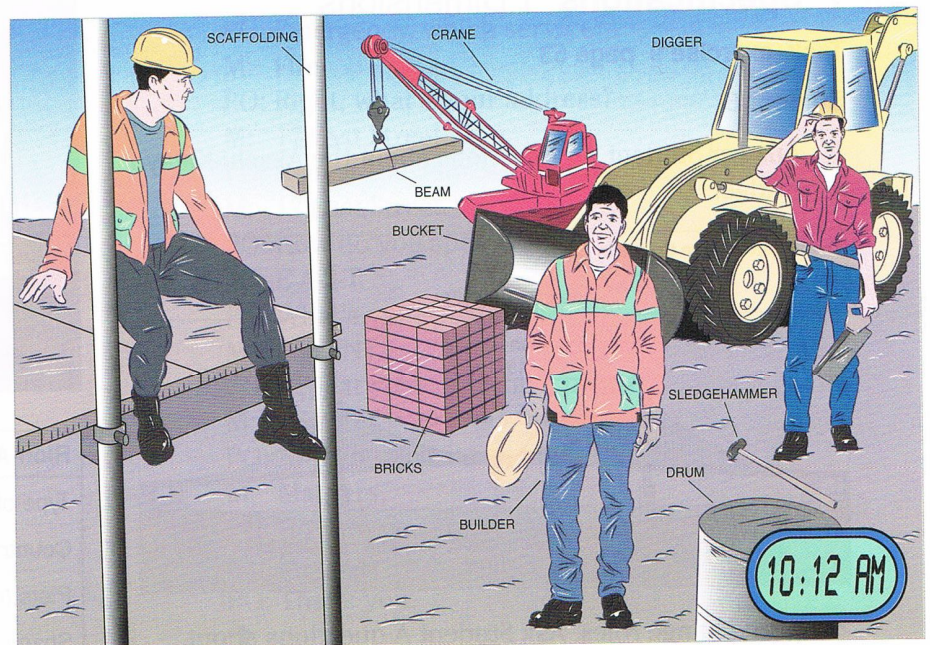
A: Yes, we have.

B: When did you complete the job?

Unit 8 Reporting 1 Recent incidents

Speaking exercise 7 page 59

Look at this picture for one minute. Then turn back to page 59.



6 Materials 3 Buying

Speaking exercise 3 page 46

Student B

Put together different components to make four email addresses and four web pages. Then dictate the addresses to your partner.

william.tell.17	@	apple.co.uk
david.bowie88		siemens.co.de
sean.penn519		UPS.com
michael.schumacher		vodafone.com

www.	vodafone.com	/country/uk/en	/manual/download.doc
	siemens.co.de	/technical_support	/welcome.html
	UPS.com	/country/us/en	/support.html
	apple.co.uk	/training-and-development	/application_form.pdf

Example:

A: What's your email address?

B: It's william.tell.17@apple.co.UK

A: (Writes it down.) Do you have a website?

A: Yes, I do.

B: What's the web address?

A: It's www.apple.co.uk/country/uk/en

B: (Writes it down.) Thanks.

10 Safety

3 Investigations

Task exercise 5 page 79

Student B

- 2 Read about your incident and answer Student B's questions.

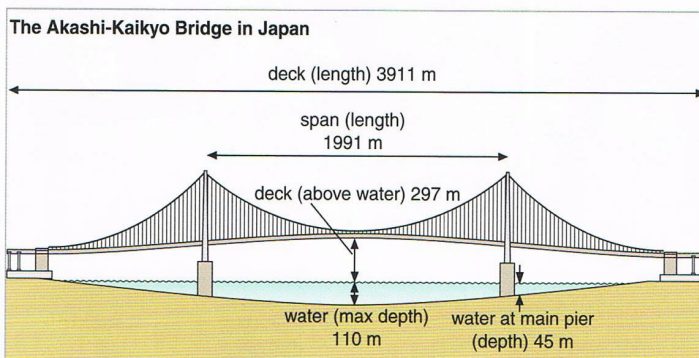
Yesterday, 15th July, an electrician called Pedro Gomez had an accident on the #1 scaffolding. The accident happened at 14.46. Mr Gomez was about 10 m above the ground at the time. He raised his right arm. His arm touched a live wire and received a small electric shock. He had a small 2 cm burn on his right arm, but received no other injuries.

7 Specifications 1 Dimensions

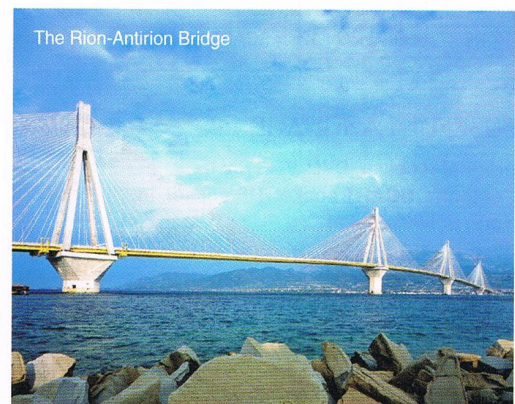
Task exercise 9 page 53

Student B

- 1 Answer Student A's questions about the Akashi-Kaikyo Bridge.



- 2 Then change roles. Ask Student A questions about the Rion-Antirion bridge. Complete your specification chart.



Rion-Antirion Bridge: specifications

Type of structure	Cable-stayed
Country	
Piers (number)	
Span (length)	
Deck (above water)	
Deck (length)	
Deck (width)	
Pylon (above deck)	

Audio script

Unit 1 Check-up

▶ 02

- 1 A: Hello. I am Hans Beck.
B: Hi. My name is Pedro Lopez.
A: Pleased to meet you.
- 2 A: Excuse me. Are you Mr Rossi?
B: Yes, I am.
A: Pleased to meet you, Mr Rossi. I'm Danielle Martin.
B: Nice to meet you, Danielle.
- 3 A: Hi. My name's Jamal.
B: Hello, Jamal. I'm Borys.
A: Good to meet you, Borys. Are you from Russia?
B: No, I'm from Poland.

▶ 03

OK, please follow these instructions.

Please stand up.

Sit down, please.

Stand up again.

Please stand up again.

Raise your left arm.

Please raise your left arm.

Lower your arm, please.

Now raise your right arm.

Please raise it.

Now lower your arm, please.

OK, sit down.

Sit down!

Sit down, please.

Write your name, please.

Now say your name.

Please say your name.

Say Hello.

Say Hello, please.

Please pick up a book.

Please read it silently.

Now read it aloud.

Read it aloud, please.

Stop!

Stop!

Please stop.

Please be quiet.

Please say Goodbye.

▶ 04

I'm Bruno Martyn. That's M-A-R-T-Y-N. My phone number is oh oh three three, oh five six two, one nine, eight five, six four. My email address is mart seventeen at macrosoft dot co dot fr, that's M-A-R-T seventeen at macrosoft dot co dot fr.

▶ 05

1

[R = Receptionist; Q = Mr Quayle]

R: Welcome, sir. Could you give me your surname, please.

Q: Yes, it's Quayle. Q-U-A-Y-L-E.

R: And your company name, sir?

Q: It's Vox.

R: How do you spell that?

Q: V-O-X.

R: Thank you. And your email address, sir?

Q: It's pq99 at biz.com. That's P-Q ninety-nine at biz.com. That's B-I-Z dot com.

2

[PO = Phone operator; M = Ms Mathers]

PO: Emergency, which service?

M: Fire.

PO: Right, what's your address?

M: 17 East Street.

PO: Repeat the address, please.

M: 17 East Street.

PO: How do you spell East?

M: E-A-S-T.

PO: What's your postcode?

M: CS4 8NT.

PO: Repeat your postcode, please.

M: CS4 8NT.

PO: And your surname, please.

M: Mathers.

PO: How do you spell that?

M: M-A-T-H-E-R-S.

PO: Thank you.

→

3

[CS = Customer Services; PB = Pieter Braun]

CS: This is Customer Services. How can I help you?

PB: My radio doesn't work.

CS: Oh, I'm sorry to hear that, sir. All right, please give me some details. What's your full name?

PB: Pieter Braun.

CS: How do you spell your surname?

PB: B-R-A-U-N.

CS: Thank you, Mr Braun. And what's your postcode?

PB: 20953.

CS: Thank you, and your house number please?

PB: 67.

CS: Thank you, sir. And what's the model number of the radio?

PB: GJ 8041.

CS: Could you repeat that, please?

PB: GJ 8041.

CS: Thank you.

06

- 1 Counter number 11, please.
- 2 This is Radio 1 on 98.8 FM.
- 3 Please pay 18 pounds and 80 pence.
- 4 The 14.43 train to Oxford will depart from platform number 9.
- 5 Flight number EZ 370 is boarding now. Please go to gate number 14.
- 6 To donate money to Live Aid, ring this number now: 0207 903 8672.
- 7 Begin countdown now: 20, 19, 18, 17, 16, 15, 14, 13 ...

07

eighty euros
 fifteen degrees
 thirteen amps
 eighty-nine degrees Celsius
 forty watts
 one point two kilometres
 thirteen point eight metres
 one hundred and ninety kilometres per hour
 one hundred and fifty thousand litres
 twelve thousand five hundred revolutions per minute
 two hundred and thirty volts
 one hundred and sixty kilograms

08

Here are the results of the finals of the men's 1500 metre race:

In first place, it's El Guerrouj from Morocco. His time is three minutes, thirty-four point one eight seconds.

In second place, it's Lagat from Kenya. His time is three minutes, thirty-four point three oh seconds.

In third place, it's Silva from Portugal. His time is three minutes, thirty-four point six eight.

In fourth place, it's Timothy Kiptanui from Kenya. His time is three minutes, thirty-five point six one.

In fifth place, it's Heshko from the Ukraine. His time is three minutes, thirty-five point eight two.

In sixth place, it's Mike East from Britain. His time is three minutes, thirty-six point three three.

09

- 1 The 28th of December 2010.
- 2 The 18th of November 2008.
- 3 The 21st of July 1999.
- 4 The 12th of January 2009.

10

- 1 LH 306 departs from Frankfurt at seven thirty am and arrives in Warsaw at nine oh five am.
- 2 AF 835 departs from Paris at eight twenty am and arrives in Madrid at ten ten am.
- 3 EK 971 departs from London at six thirty am and arrives in Bahrain at three fifteen pm.
- 4 MS 740 departs from Dubai at two forty pm and arrives in Cairo at five fifty pm.
- 5 AZ 7788 departs from Rome at nine ten pm and arrives in Tokyo at four fifteen pm the next day.
- 6 SA 104 departs from Johannesburg at three forty-five pm and arrives in Lagos at nine twenty-five pm.

11

- 1 It's eighteen thirty-five on the fifteenth of September.
- 2 It's eight fifty-five on the fifth of November.
- 3 It's thirteen forty-five on the thirteenth of December.
- 4 It's fourteen fifty-five on the thirtieth of October.

Unit 2 Parts (1)

12

The world record for a high jump on a skateboard is 7.1 metres. A young skateboarder, Danny Way, jumps 7.1 metres on the 19th of June 2003.

The world record for a long jump on a skateboard is 24 metres. Skateboarder Danny Way jumps 24 metres on the 8th of August 2004.

13

- 1 tail 2 truck 3 deck 4 nose
5 wheel 6 axle 7 plate

14

- A: What's this called?
B: It's called a deck.
A: What's this called in English?
B: It's called a truck.

16

[C = Customer; S = Shopkeeper]

- C: Hello.
S: Good morning. What can I do for you?
C: I need a spanner, please.
S: What size do you need?
C: Erm, I think it's ten millimetres.
S: OK. Here you are. One ten millimetre spanner.
C: Thanks. And I need some nuts, please.
S: Some nuts, did you say? OK, what size do you need?
C: Erm ... seven mil.
S: Right. And how many do you need?
C: Four.
S: Right. Here you are. Anything else?
C: Yes, I need some bolts, please.
S: What size?
C: M5.
S: And how many M5 bolts do you think you need?
C: Eight, please.
S: OK, here you are.
C: Thanks.

18

Thank you for calling Skateboards 4 U. Please leave a message after the tone.

Erm, Hello. Erm, I need some parts ... er ... for my skateboard. My name is Ben, Ben Johnson. That's J-O-H-N-S-O-N. My er ... my phone number is ... double oh, double 4, 208 8947. Please call me back. Thanks.

19

- 1 Abdul ... that's A-B-D-U-L Monim ... spelt M-O-N-I-M Waheed ... that's W-A-H-E-E-D, and my phone number is 00 202 48830.
2 José ... that's spelt J-O-S-E Fernando ... that's F-E-R-N-A-N-D-O Ruiz ... that's R-U-I-Z. Phone number 00 35 912 828 990.
3 Adil spelt A-D-I-L Al-Mansur ... that's A-L hyphen M-A-N-S-U-R. Phone number 00 971 2 605 9943.
4 Nikolai that's N-I-K-O-L-A-I Kuznetsev ... that's spelt K-U-Z-N-E-T-S-E-V. Phone number 00 7 455 988-22-77.

20

- A: I'm Luis. I'm a student. And this is Paulo. He's a student, too.
B: Hello, Luis. Hello, Paulo. Nice to meet you.

Unit 3 Parts (2)

21

This is the new Multi Tool! Use it at home. Use it on the building site. Use it when you travel. It has a hammer and a pair of pliers. It also has a saw, a blade and a can opener. The Multi Tool has everything you need! Only £29.99. Buy one now!

22

- A: Do you have a Multi Tool?
B: Yes, I do.
A: Does the Multi Tool have a hammer?
B: Yes, it does.
A: Does it have a pair of scissors?
B: No, it doesn't.

25

- A: OK, now put the cursor on the START button.
B: Where's the START button?
A: It's at the bottom. On the left. Do you see it?
B: Yes. Is that it?
A: Yes, that's correct. ... Now, move the cursor up to the CLOSE button.
B: Where's that?
A: It's an X. It's on the right. At the top.
B: Is that it?
A: Yes, that's it. Now click.

Unit 4 Movement

26

- 1 19 degrees. 2 40 degrees.
3 70 degrees. 4 118 degrees.

27

- 1 A fast CD-ROM can rotate at 9800 revolutions per minute.
- 2 Sound travels at about 1200 kilometres per hour.
- 3 The maximum land speed is about 1228 kilometres per hour.
- 4 The maximum speed of a boat on water is about 154 metres per second.
- 5 The Earth rotates at 1000 miles per hour.
- 6 The Earth moves around the Sun at 67,000 miles per hour.

Unit 5 Flow

28

[L = Lecturer; S = Student]

- L: Right. Now let's look at this diagram of the circuit, up here. Can you see it clearly? On the left, here, you can see a solar panel. OK? The solar panel collects the sunlight and changes it into electricity. And here, on the right, you can see three lamps. These three long things. OK? And there, between the panel and the lamps, you can see a controller and a battery.
- S: Excuse me, sir. Which one is the controller?
- L: Well, the controller's at the top, OK? And of course the battery's at the bottom, here, below the controller. And finally, you can see some electrical cables or wires. The cables run from the panel, through the controller, into the battery, and also into the lamps.

29

[L = Lecturer; S = Student]

- L: OK? So to summarise, here again, these are the main parts of the system. A sixty watt solar panel; ... a five amp controller; ... a twelve volt one hundred ampere hours battery; ... and three twelve volt eight watt lamps.
- S: Excuse me, what kind of electrical current is it?
- L: It's a direct current – DC. Is that clear now?

30

- 1 A: Turn down that thermostat, please. The water's too hot for a shower. The correct temperature is about 60 degrees.
B: Fahrenheit?
A: No, Celsius, of course.
- 2 A: This refrigerator is too cold. Turn the temperature up to about 4.5 degrees.
B: Fahrenheit?
A: No. That's too cold. 4.5 degrees Celsius.
- 3 A: That freezer's too warm. Turn the temperature down to zero degrees.
B: Zero degrees Celsius?
A: No, that's too warm. Zero degrees Fahrenheit. That's the same as minus eighteen degrees Celsius.
- 4 A: Do you know the record for the coldest air temperature in the world?
B: No.
A: It's minus 89 degrees.
B: Fahrenheit?
A: No, Celsius.
B: Where is it?
A: In Antarctica.
- 5 A: And the hottest temperature in the world. Do you know that?
B: No.
A: It's 136 degrees.
B: Celsius?
A: No, no. Fahrenheit.
B: Where is it?
A: In Libya.
- 6 A: The car engine is too hot.
B: Why? What's the correct temperature?
A: About 110 degrees.
B: Is that Fahrenheit?
A: No, Celsius.

31

[D = Dan; J = Jack]

- D: I work in the electronics workshop every Thursday and Friday.
- J: When do you attend lectures?
- D: Every Tuesday morning.
- J: What do you do on Tuesday afternoons?
- D: I do my practical work then.

Unit 6 Materials

32

[L = Lecturer; T = Trainees]

- L: Today, we're doing a tensile strength test for this mountaineering rope. OK. Is everyone ready? Can you see and hear me clearly?
- T: Yes.
- L: All right, now listen and watch carefully. The rope is made of nylon. Now I'm pulling the rope. I'm stretching it. Is it breaking?
- T: No.
- L: That's right. It isn't breaking.

35

Hello, This is Manuel Vargas. That's V-A-R-G-A-S. My phone number is double oh, 34 94 double 6 389. I'll repeat that: double oh, 34 94 double 6 389. Please send me your catalogue of sports equipment. My email address is mvargas17@xtreme_sports.co.es. I'll say that again, mvargas17 that's M-V-A-R-G-A-S seventeen all one word ... at ... xtreme underscore sports, that's spelt X-T-R-E-M-E underscore S-P-O-R-T-S dot co dot E-S.

36

- 1 waleed at sports dot com
- 2 adam at city dot co dot U, K
- 3 theo walcott, that's T-H-E-O then W-A-L-C-O-T-T at goalfeast, that's G-O-A-L-F-E-A-S-T, all one word dot com
- 4 C dot ronaldo, that's R-O-N-A-L-D-O at back-of-the-net, that's B-A-C-K dash O-F dash T-H-E dot net
- 5 WWW dot toyota, that's T-O-Y-O-T-A dot com forward slash customer dash support
- 6 WWW dot orascom, that's O-R-A-S-C-O-M dot com dot E-G forward slash sales underscore one

37

- A: What's your surname, please?
- B: It's Lint.
- A: Could you repeat that, please?
- B: Lint.
- A: Could you spell that, please?
- B: L-I-N-T
- A: Is that T or D?
- B: It's T. T for teacher.
- A: Thanks. And what's the product number?
- B: It's seventeen dash three oh five.
- A: Is that 17 or 70?
- B: Teen. Seventeen. One seven.
- A: Right. Thanks.

38

[J = John, M = Mike]

Dialogue 1

- J: Hello?
- M: Hello. Is that John?
- J: Yes?
- M: It's Mike.
- J: Oh hi, Mike.
- M: Hi. How are you?
- J: OK, thanks. How are you?
- M: Fine. I want to ask you ...

Dialogue 2

- J: Hello?
- M: Hello. Is that John?
- J: Yes. Is that Mike?
- M: Yes, it's me. Hi. How are you?
- J: Fine, thanks. How about you?
- M: I'm fine. Would you like to ...

Dialogue 3

- J: Hello. John Davis here.
- M: Oh hi, John. This is Mike.
- J: Hi, Mike.
- M: Hi. How are things?
- J: Great, thanks. How are you?
- M: Good. I'm phoning you to ...

Unit 7 Specifications

39

This is a photograph of the Millau road bridge. That's Millau, spelt M-I-L-L-A-U. It's a beautiful bridge and it's very high. In fact, it's one of the highest bridges in the world. It's in the south of France and it crosses the river Tarn. The bridge is three hundred and thirty-six point four metres above the river.

40

[P = TV presenter; E = Engineer]

- P: Yes, the total height of the Millau road bridge is 336.4 metres above the river Tarn. Now I'm talking to the chief engineer of the bridge. So, can I check with you? Three hundred and thirty-six point four is the total height from the top of the pylons to the river, is that right?
- E: Yes, that's right. That's the total height. The road deck itself is 246 metres above the river. Then the pylons, or towers, rise another 90 metres above the deck.
- P: I see. And how wide is the river valley at the bridge?
- E: Well, the valley is almost 2.5 kilometres wide. In fact, the bridge is 2460 metres long, or 2.46 kilometres.
- P: And how long are the spans?
- E: They have different lengths. The bridge has two outer spans and six inner spans. The two outer spans are 204 metres long, and the six inner spans are 342 metres long.
- P: How wide is the road deck?
- E: It's 32 metres wide. It has four lanes of traffic.
- P: And what's the bridge made of? It's really beautiful and it looks very light.
- E: Yes, it looks light because it is light. It uses the minimum material. But it's also very strong. The cables and the road deck are in fact made of steel. The seven piers, of course, are made of reinforced concrete.

41

- Picture 1 is Taipei 101 in Taiwan. Its height is 508 metres.
- Picture 2 is the Shanghai World Financial Centre in China. Its height is 492 metres.
- Picture 3 is the Abraj Al Bait Towers in Saudi Arabia. Its height is 485 metres.
- Picture 4 is the Petronas Towers in Malaysia. Its height is 452 metres.
- Picture 5 is the Federation Tower in Russia. Its height is 448.2 metres.
- Picture 6 is the Dubai Towers in Doha, Qatar. Its height is 445 metres.
- Picture 7 is the Sears Tower, in the USA. Its height is 442 metres.

42

[T = Tom; Dr J = Dr Jensen]

- T: Today on RadioTech, I'm talking to Dr Tore Jensen. He's a civil engineer and his company is working on plans for a tunnel under the Atlantic Ocean. So, Tore, tell me about this tunnel, or tube, under the Atlantic. Are you building it now?
- Dr J: No, no, we're not building it now. That's a long time in the future. Right now, we're thinking about it and planning it. Another company is designing a small-scale model.
- T: So, when will they build it?
- Dr J: I think they'll start in 2080 and complete it in 2100.
- T: Wow! That is a long time in the future.
- Dr J: Yes, it is!
- T: So, where will the tunnel be? How long will it be? How deep?
- Dr J: The tube will be below the Atlantic Ocean. It'll connect the USA with Britain. It'll be about 5000 km long and about 100 metres deep in the ocean.
- T: Will the tube move around in the water?
- Dr J: No, it won't move. One hundred thousand cables will attach it to the sea floor.
- T: Will the train use electricity?
- Dr J: No, it won't. It'll use magnetism. The tube will contain a vacuum. MagLev trains will be able to travel through the tube at 8000 km/h.

Unit 8 Reporting

43

[PO = Phone operator; D = Driver]

- PO: Hello. Crash Recovery Company. How can I help you?
- D: Oh hi! I've broken down on the motorway!
- PO: OK, don't worry. What's your name and car registration number?
- D: My name's Anita Zubaid. That's Anita, spelt A-N-I-T-A Zubaid, spelt Z-U-B-A-I-D. The car is Y449 MNE.
- PO: And where are you, Ms Zubaid?
- D: I'm on the M13. Between Junctions 15 and 16. Going south.
- PO: Right. And what's the problem?
- D: Well, the exhaust pipe has fallen off.
- PO: OK. We'll be there in 30 minutes. Stay with your car, please.
- D: All right. Bye.

44

Call number 1

[C1 = Caller 1; S = Security]

C1: Hello? Hello? Is that Security?

S: Yes, Security here. How can we help?

C1: Some thieves have broken into my office.
They've taken my computer.**Call number 2**

[IT = IT technician; C2 = Caller 2]

IT: IT department. How can I help you?

C2: Is that the IT hotline?

IT: Yes. What's the problem?

C2: Something has happened to my computer.
I've lost all my data.**Call number 3**

[EO = Emergency phone operator; C3 = Caller 3]

EO: Emergency. Which service?

C3: I need an ambulance, quickly.

EO: What's happened?

C3: It's my daughter. She's fallen down some
stairs. She's cut her leg.**Call number 4**

[PO = Phone operator; C4 = Caller 4]

PO: Crash Recovery. How can I help you?

C4: Oh, hello. Yes. I've had an accident. I've
driven my car into a bridge.

45

[D = Del; Mr E = Mr Ericsson]

D: Customer Services. Del speaking. Please
give me your order number.

Mr E: AX 5831-77 ...

D: Ah yes, Mr Ericsson. You've bought a radio
from us. How can I help you?Mr E: I've opened the box and taken out the
radio. There's some damage and there are
some missing items.

D: I'm sorry to hear that. What's missing?

Mr E: The power cable has no plug. ...

D: No ... plug ... on ... cable. OK. Anything
else?Mr E: Yes. There are no batteries and no
headphones. ...D: No batteries ... and no headphones. OK. Is
that all?Mr E: No. There are no cables for the speakers
and there's no user manual. ...D: Cables for speakers and user manual ...
missing. Anything else?Mr E: There's some damage. The body is cracked.
There's a scratch on the screen. ...D: Screen ... scratched. Body ... cracked. OK.
Is there any more damage?Mr E: Yes. The antenna is bent and the speakers
are dented. And there are some holes in
one speaker. ...D: Oh dear, I do apologise for all that. Please
put everything in the box again. We'll
collect it from your house tomorrow. Then
we'll send you a new radio.

Mr E: OK.

D: Goodbye, sir. Thanks for calling.

46

[CS = Customer Services; BJ = Ben Jones]

CS: Hello, Electronic Repairs. Don speaking. How
can I help you?BJ: Hi. My name's Ben Jones. I've broken my MP3
player. Can you repair it?

CS: OK, sir. What's the model number?

BJ: It's a Super 30 GB.

CS: And when did you buy it?

BJ: Er, let's see Yes, I bought it on the 18th of
August.

CS: And what's the problem?

BJ: I've dropped it and I've cracked the screen.

CS: And, er ... when did you crack the screen?

BJ: Yesterday.

CS: OK, bring it into the shop and I'll look at it.

BJ: Thanks. Bye.

Unit 9 Troubleshooting

47

A: Look at the airboard. You can see the five
main parts: the body, the engine, the fan,
the handlebar and the two levers. The body
supports the rider, and the engine drives the
fan. The handlebar steers the airboard left
and right.

B: Ah yes, I see. So what does the fan do?

A: It pulls the air in and forces it downwards.

B: Right. And what do the two levers do?

A: They control the speed and acceleration of
the airboard.

48

Thank you for calling New Tech. For the sales department, press 1. For the service department, press 2.

This is the service department. For computers, press 3. For printers, press 4.

This is the computer unit. To hear information about our services, press 5. To speak to a service technician, press 6.

49

Hello, you've reached the computer service hotline. This is Jan speaking. I'm the technician. How can I help you?

50

[C = Customer; ST = Service technician]

C: Hello, is that the IT hotline?

ST: Yes, it is. I'm the technician. My name's Sofia. How can I help you?

C: I've got a problem with my wireless router. It doesn't work.

ST: OK. I'll talk you through it. Are you sitting at the computer now?

C: Yes, I am.

ST: OK. Look at the back. Is the router connected to the power outlet?

C: Yes, it is.

ST: OK. And is the router connected to the modem? That's the green cable.

C: Ah ... no, it isn't.

ST: So, connect the router to the modem now. ... Have you done that?

C: Yes, I have. I've connected it.

ST: OK. Now, have you connected your computer to the router? That's the blue cable.

C: Erm ... no, I haven't.

ST: OK. Do it now. ... Have you done that?

C: Yes, I have.

ST: OK. Now let's look at the lights ...

51

1 A: Are the lights on?

B: Yes, they are.

2 A: Is the computer connected to the adapter?

B: No, it isn't.

3 A: Have you sent the email?

B: Yes, I have.

4 A: Does your new radio work?

B: No, it doesn't.

5 A: Did you go to the cinema yesterday?

B: No, I didn't.

6 A: Can I speak to your brother?

B: Yes, you can.

7 A: Do you work in the city?

B: Yes, I do.

8 A: Are you sitting at the computer now?

B: No, I'm not.

9 A: Do those speakers cost a lot of money?

B: No, they don't.

10 A: Has your car broken down?

B: Yes, it has.

52

A: Press the power button.

B: OK. I'm pressing it.

A: Does the computer start?

B: No, it doesn't.

A: OK. Check the green LED.

Unit 10 Safety

53

1 You must wear a hard hat on the building site.

2 Don't go through that door!

3 You must wear safety gloves everywhere in the factory.

4 Don't touch that machine! It's very hot.

5 Be careful! High-voltage electricity. You might get an electric shock.

6 You mustn't use your mobile phone here.

54

1 Look out! There's a low beam in front of you.

2 Be careful! There are some bricks on the floor.

3 Watch out! There's no guard on the gears.

4 Mind the gap! There's a gap between the train and the platform.

5 Careful! There are bare electrical wires on the wall.

6 Look out! The water is very hot.

55

[AC = Air traffic controller; P = Pilot]

AC: ConAir 286. Unknown traffic. Two o'clock.

P: 150 metres. Crossing right to left.

P: ConAir 286. Negative contact. Request vectors.

AC: Turn right. Heading 045. Descend. 85 metres.
 P: Right turn. Heading 045. Descending.
 85 metres. ConAir 286. ...
 AC: ConAir 286. All clear. Resume own navigation.
 P: Roger. ConAir 286.

Unit 11 Cause and effect

56

- 1 [Urgent sound of alarm bell]
- 2 [Sound of beep in automatic phone]
- 3 [Sound of buzzer]
- 4 [Sound of car horn]
- 5 [Sound of dial tone after picking up phone]
- 6 [Sound of door bell, ding-dong]
- 7 [Sound of mouse click]
- 8 [Sound of siren]

57

The German company Enercon manufactures the world's tallest wind turbine. The tower of this huge turbine, the Enercon E112, is 186 metres tall. But the world's highest wind turbine is about 2300 metres up a mountain in GÜtsch in Switzerland. The tower of the wind turbine isn't very tall, but at 2322 metres, it's the highest in the world.

Wind turbines start producing power at the minimum wind speed of about 15 kilometres per hour. If the wind speed is less than 15 kilometres per hour, the wind turbine doesn't switch on. The maximum wind speed for a turbine is about 90 kilometres per hour. If the speed of the wind is more than this, the turbine switches off and the blades stop.

Unit 12 Checking and confirming

58

[C = Controller; R = Rover]

- C: Move forwards 200 cm.
 R: Confirmed. I'm moving forwards 200 cm.
 C: Now rotate 15 degrees to the left.
 R: Confirmed. I'm rotating 15 degrees to the left.

59

[T = Trainer; Tr = Trainee]

- T: Right. I'll give you an instruction. First, do it. Then confirm what you're doing, OK?
 Tr: OK.
 T: Then confirm what the rover's doing. Is that clear?

- Tr: Yes.
 T: Right. Let's go. First, make the rover move forwards 200 cm.
 Tr: OK. I'm pushing the joystick forwards.
 T: Good. Now what's happening?
 Tr: The rover isn't moving.
 T: Right. Wait five seconds. Now what's happening?
 Tr: OK. It's moving forwards now.

60

We sometimes have to make many spacewalks outside the space station, just to do one simple repair job. Let me give you an example. A small piece of rock from space has hit an oxygen tank. What do we do?

First, we must test our equipment for the spacewalks.

Then, in the first spacewalk, we inspect the damage. We take photographs of the tank and the hole.

After that, we go back into the space station.

There we plan the repair and prepare for the next spacewalk.

In the second spacewalk, we disconnect the pipes from the tank – these pipes carry the oxygen into the space station. We remove the tank. Then we bring the tank into the space station.

Back in the space station, we dismantle the tank. We repair the damage. If this isn't possible, we replace the part.

Then we assemble the tank again.

In the third spacewalk, we attach the tank to the side of the space station and connect the pipes to the tank.

61

[C = Controller; A = Astronaut]

- C: OK, today is the 6th of June, 7 pm in the evening. I'm checking progress on the space station. Have you done the first spacewalk yet?
 A: Yes, we have.
 C: Good. When did you do it?
 A: We did the spacewalk yesterday, on the 5th of June.
 C: Right. And have you repaired the oxygen tank yet?
 A: No, we haven't repaired it yet. We're still repairing it.
 C: When will you finish it?
 A: We'll complete the job tomorrow morning.

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