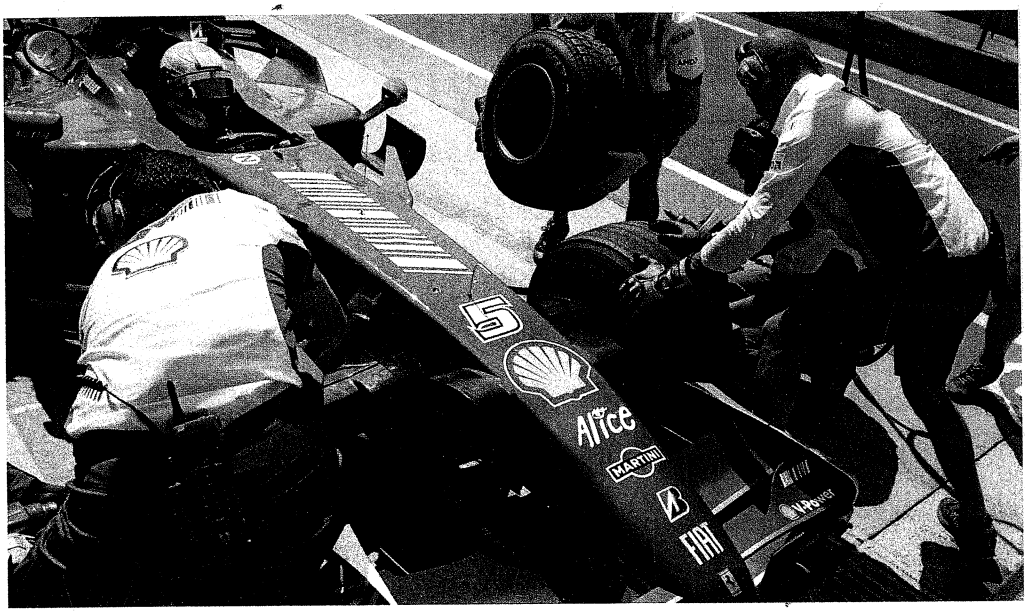
1 Action



1 Teamwork

Start here

1 Discuss these questions with a partner.

- How many mechanics work in a pit-stop crew in a big race?
  a) about 4 b) about 10 c) about 20
- What jobs do they do? List the most important jobs.

Reading

2 Read this interview with the head of a pit-stop crew. Check your answers to 1.

Making every second count

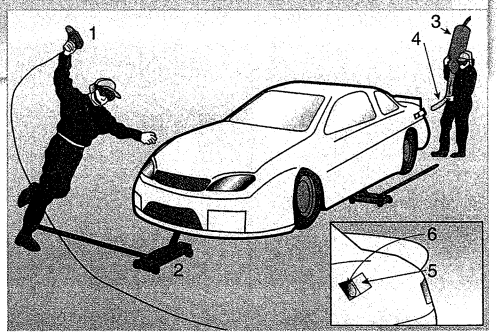
How do mechanics service a car so quickly in the middle of a car race? Will Peters is chief mechanic and crew leader of a pit-stop crew. Here he explains his work.

I'm the crew leader, and I have twenty mechanics in my crew. It's dangerous work, so we wear fire suits and safety helmets. I have five teams: *wheel-gun*, *wheel-on*, *wheel-off*, *wheel-jack* and *fuel*.

Every second is important in the middle of a race, so everyone moves quickly and works together as a team.

– 30 secs	I give the order: 'Get ready!' The four *wheel-on* mechanics bring out the new wheels. The tyres are still covered in warm blankets. The team leader adjusts the air pressure in the tyres.
– 10 secs	The car enters the pit lane, and slows down. The driver presses a button in his cockpit. This opens the fuel flap.
– 3 secs	The car approaches the garage. I signal to the driver: STOP. The driver slows down and drives towards the crew. The *wheel-gun* team leader signals with his hand, and the driver stops the car next to the wheel guns.

00:00 secs	The four *wheel-gun* mechanics run to the car. They loosen the nuts with their wheel guns. Then they move back quickly.
00:01 secs	The two *wheel-jack* team members run to the car, and place the jacks under the front and rear of the car. They raise the car off the ground and move back quickly.
00:01.5 secs	Then three members of the *fuel* team move forward. One carries the fuel nozzle, and the other two carry the fuel hose. (It weighs 40 kg!). The front fuel mechanic pushes the nozzle into the fuel socket on the car. They then switch on the fuel pump.
00:02 secs	The *wheel-off* mechanics move forward. They take the old wheels off and take them away quickly.
00:02.5 secs	Now the *wheel-on* guys move forward. They take the warm blankets off the new wheels, put the new wheels on the car, and move back quickly. On the other side of the car, another mechanic puts his arm into the cockpit and cleans the driver's visor.
00:03 secs	The *wheel-gun* guys move forward and tighten the nuts. Then they raise a hand to signal that everything is OK.
00:04 secs	The *wheel-jack* people lower the car to the ground and take the jacks away. Now everyone is waiting. The *fuel* guys are still pumping fuel into the car. They hold the fuel nozzle and hose in place until all the fuel is in the car.
00:05.5 secs	I signal to the driver: SELECT FIRST GEAR. He pushes the gear lever into first gear, and waits.
00:06.5 secs	The fuel pump switches off, and the fuel guys pull out the fuel nozzle. Another *fuel* team member cleans spilled fuel off the car, and moves back quickly. Immediately, I signal to the driver: GO.
00:07 secs	The car moves to the end of the pit lane. The driver presses the button to close the fuel flap.
00:10 secs	The car speeds up and leaves the pit lane. It's in the race again.



3 Label the parts.

flap hose jack nozzle socket wheel gun

4 Complete this checklist of instructions for each team.

TEAM 1: WHEEL-JACK
1 _____.
2 Raise the car off the ground.
3 WAIT
4 _____.
5 Take _____.

TEAM 2: WHEEL-GUN
1 Loosen the wheel nuts on the old wheels.
2 WAIT.
3 Tighten the wheel nuts on the new wheels.
4 _____.

TEAM 3: WHEEL-OFF
1 Take the old wheels off.
2 _____.

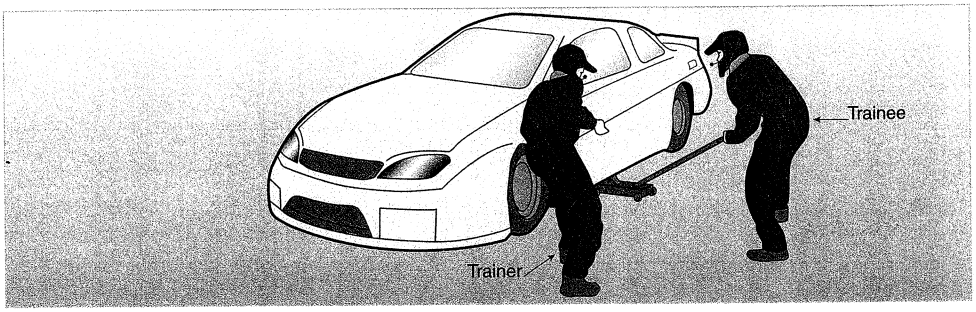
TEAM 4: WHEEL-ON
1 Bring out the new wheels.
2 Adjust _____.
3 WAIT.
4 Take the covers _____.
5 _____.

TEAM 5: FUEL
1 Push _____.
2 Pump _____.
3 _____.
4 _____.

2 Training

Start here

1 02 You are a trainee pit-stop mechanic. A trainer is giving you instructions. Listen and write numbers 1–10 to show the correct order of instructions.

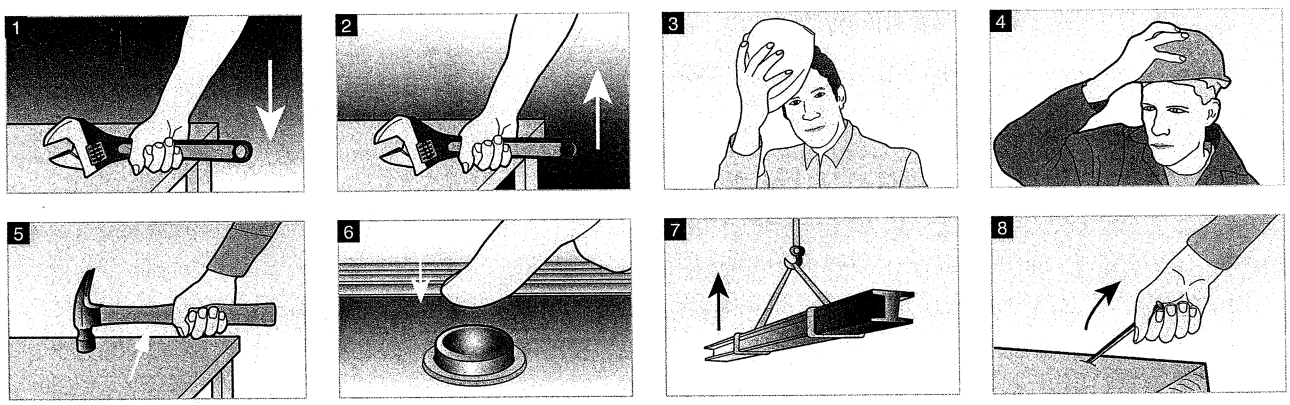


Tighten the wheel nuts.		Adjust the air pressure in the tyre.	
Raise the car with the jack.		Bring the new wheel out.	
Loosen the wheel nuts.		Put the new wheel on.	
Take the old wheel off.		Put the jack under the car.	
Take the old wheel away.		Lower the car and take the jack away.	

Vocabulary

2 Match the pictures with the verbs in the box.

lift up pick up pull out push in put down put on take away take off



Language

Imperative	Present continuous	Present perfect
Take the tyres off.	I'm taking the tyres off now.	I've taken the tyres off.
Take off the tyres.	I'm taking off the tyres now.	I've taken off the tyres.
Take them off.	I'm taking them off.	I've taken them off.
Not: ~~Take off them.~~	Not: ~~I'm taking off them.~~	Not: ~~I've taken off them.~~

3 03 Listen and respond to these instructions quickly. Confirm (a) what you are doing and then (b) what you have done.

Example: 1 (You hear) Bring out the new tyres. (You say) Right. I'm bringing them out now. OK, I've brought them out.

Speaking **4** Work in pairs. Make dialogues between a supervisor (S) and a trainee (T) from the checklists.

1	• put new tyres on • tighten wheel nuts • adjust air pressure	*done* *in progress* *not yet done*	4	• switch off electricity • test all circuits • find any faults	*done* *in progress* *not yet done*
2	• take cover off • repair computer • take out damaged chip	*done* *in progress* *not yet done*	5	• strip off old paint • plaster holes in wall • buy new paint	*done* *in progress* *not yet done*
3	• replace burnt wire • switch on power • check other wires	*done* *in progress* *not yet done*	6	• take apart telephone • put it together again • test it	*done* *in progress* *not yet done*

Phrases to gain more time:
Hang on. Just a minute.
One minute. Nearly finished.
Almost done.

S: How are you getting on?

T: I've put the new tyres on. I'm still tightening the wheel nuts. It's almost done.

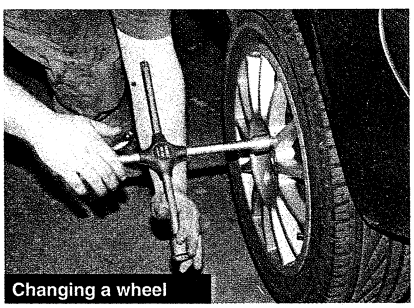
S: OK, good. Have you adjusted the air pressure yet?

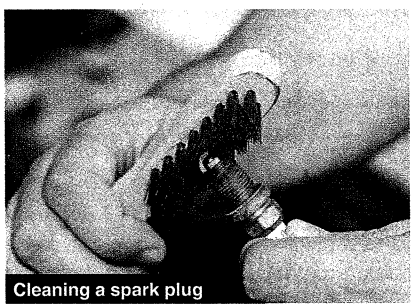
T: No, I haven't done that yet. I'll do it next.

Language *yet* is used with present perfect questions and negatives to emphasise the period of time up to now.

Has Bill finished that job yet? The speaker wanted or expected Bill to finish the job before now. *John hasn't cleaned the car yet.* The speaker wanted or expected John to clean the car before now.

Task **5** Work in small groups. Choose one of these car jobs. With your group, make a set of instructions for doing the job.


Changing a wheel


Cleaning a spark plug


Checking the oil level

6 Turn to page 111. Find useful instructions from the list. Revise your own set of instructions. Rewrite them if necessary, and make them short and simple.

7 Roleplay this situation with someone from another group with a different job.

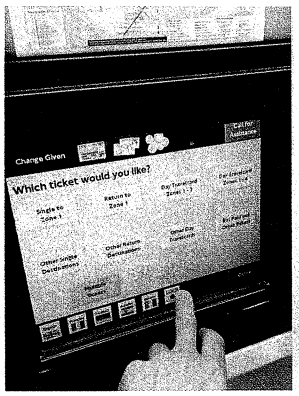
Student A. You're the manager of a garage. You're showing a new trainee how to do the job. Tell the trainee how to do the job, but don't look at your set of instructions. Give instructions, and check how the trainee is getting on.
First of all, loosen the wheel nuts. Have you done that yet? Good. Right. Now lift up the car with the jack. OK? Well done.

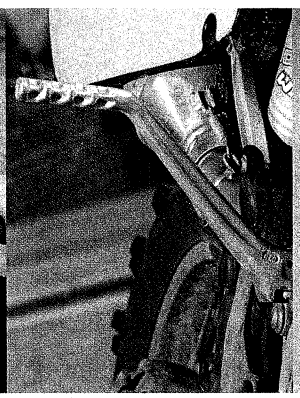
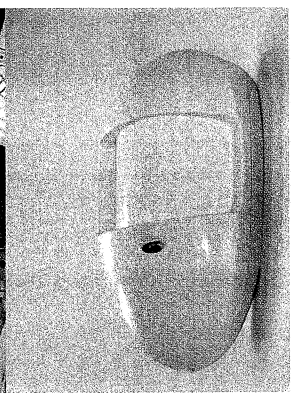
Student B. You're a new trainee in the garage. Follow the manager's instructions. Mime the actions if you can. Tell the manager how you're getting on.
Hang on. Just a minute. No, not yet. I'm still loosening the wheel nuts. It's almost done. OK, I've finished. I've taken it off. What do I do next?

3 Method

Start here

1 How do you start or activate these devices?



2 Complete the sentences.

break kick pick up press pull switch on touch

1 The passenger activates the ticket machine by *touching* the screen.
2 You switch on the phone by _____ _____ the handset and _____ the green button.
3 The user starts the outboard motor by _____ the handle of the cord.
4 The rider starts the engine by _____ _____ the battery and _____ the lever downwards.
5 The burglar activates the alarm by _____ the laser beam.

Speaking

3 Make questions and answers.

A: How does the passenger activate the ticket machine?
B: He activates it / He does it by touching the screen.

Language

	Method	
You start the outboard motor	by pulling	the cord.
The burglar activated the alarm	by breaking	a laser beam.

4 Work in pairs. Match the devices with the methods.

Device	How to start/activate it
1 accelerator on motorbike	a) put it under an electric lamp
2 voice-operated computer	b) step on a sensor in the door mat
3 solar battery	c) rotate the handle
4 emergency stop in train	d) insert the key and turn it
5 shop door alarm	e) pull the lever
6 car engine	f) speak to it

Speaking

5 Make questions and answers.

A: How do you activate the accelerator on a motorbike?
B: By rotating the handle. (or *You activate it by rotating the handle.*)

Writing **6** Write sentences explaining how to activate or start the devices in 4.

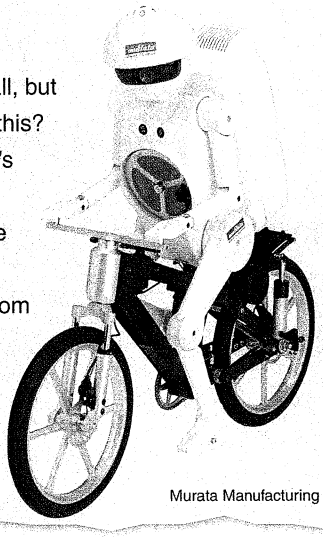
you, the user, the customer, the driver, the passenger

1 You activate / The user activates the accelerator on a motorbike by rotating the handle.

Reading **7** What can this robot do? How does it work? Discuss with your partner.

8 Read this magazine article. Write the names of the devices in the chart.

MURATA BOY weighs less than 5 kg and is only 508 mm tall, but it can do something that no other robot can do. It can ride a bike. How does it do this? By means of sensors and wireless technology. One sensor is located in the robot's body. This sensor keeps the robot upright and prevents it from falling sideways. The robot can look ahead using a small camera in its head. The camera helps the robot to ride in a straight line. Another sensor is located in its chest. This sensor prevents it from hitting a wall or other object. The robot can receive instructions from an external computer by means of a wireless receiver in the box on its back. The computer makes it follow the correct road. Finally, if the road is not flat, another sensor (in the frame of the bike) can feel the movement of the wheel. The sensor allows the robot to ride over bumps in the road.



Murata Manufacturing Co Ltd

Murata Boy can do these things	device	location
(1) It can stay in a vertical position on the bike	sensor	body
(2) It can receive instructions from an outside computer		
(3) It can detect changes in the surface of the road		
(4) It can look straight ahead and move straight forward		
(5) It can detect walls and move away from them		

Language

The robot can look ahead	by using by using by means of	a camera in its head.

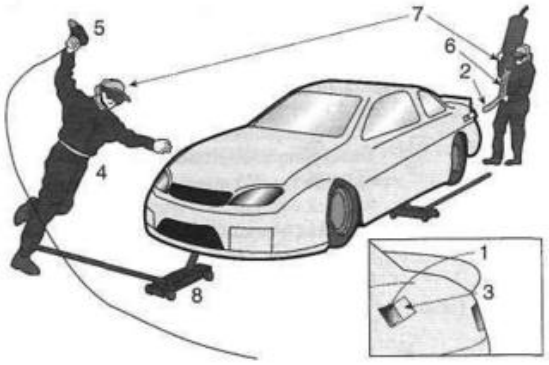
Speaking **9** Supply the questions for this interview with the inventor of the robot.

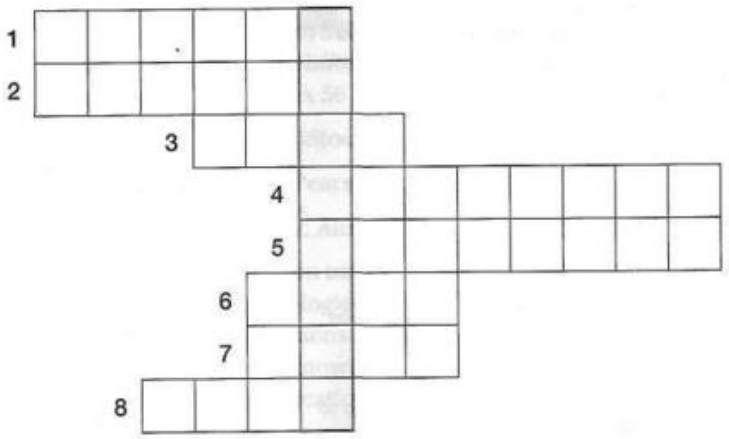
1 A: *What* _____?
B: It can ride a bicycle.
2 A: *How* _____?
B: It works by means of sensors and wireless technology.
3 A: _____?
B: By means of a sensor in the frame of the bike.
4 A: _____?
B: By a sensor in its chest.
5 A: _____?
B: By using a camera.

1 Action

1 Teamwork

1 Look at the pictures and complete the crossword puzzle. What is the vertical word?





2 Number the steps for refuelling a plane in the best order.

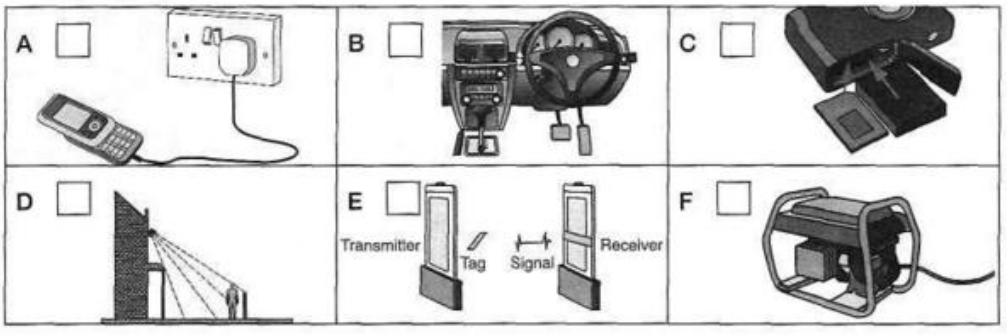
- [ ] Switch on the pump.
- [ ] Push the nozzle into the fuel socket.
- [1] Drive the fuel tanker to the plane.
- [ ] Pump fuel into the plane's fuel tanks.
- [ ] Clean any spilled fuel off the plane.
- [ ] Switch off the pump.
- [ ] Close the fuel flap.
- [ ] Remove the fuel nozzle.
- [ ] Open the fuel flap under the wing.

3 Give these sentences the opposite meaning. Use words from 2, Section 1 on Course Book pages 4–5.

1 The car enters the pit lane.
1 *The car leaves the pit lane.*
2 The driver opens the fuel flap.
2 _____.
3 They loosen the wheel nuts.
3 _____.
4 They raise the car off the ground.
4 _____.
5 Someone switches on the fuel pump.
5 _____.
6 They take off the old wheels.
6 _____.
7 They take away the old wheels.
7 _____.

3 Method

1 02 Listen to six dialogues. Write the dialogue number next to the device.



2 03 Complete the explanations about the devices in 1. Use the verbs from the box. Then listen and check your answers.

activate activate attach carry deactivate pass plug press press protect start start start switch turn turn

1 You *start* the motor by *pressing* this button.
2 A person coming near the house _____ on the light by _____ the motion sensor.
3 You _____ it on by _____ this button.
4 The driver _____ the engine by _____ the key in the lock.
5 You _____ the charging process by _____ in the adapter and switching it on.
6 The store _____ goods by _____ a magnetic strip to them.
7 The sales person _____ the strips by _____ them over a scanner.
8 A thief will _____ the alarm by _____ unsold goods between the transmitter and receiver.

3 Read the text about the robot in 8, Section 3 of the Course Book, page 9. Write questions for this interview with the inventor of the robot.

1 A: *How much* _____?
B: It weighs less than 5 kilos.
2 A: *How* _____?
B: It's only 508 mm tall.
3 A: _____?
B: By means of a sensor in its body.
4 A: _____?
B: The camera.
5 A: _____?
B: It's in the robot's head.
6 A: _____?
B: By using a computer.
7 A: _____?
B: By means of a wireless receiver.
8 A: _____?
B: It's in the box on its back.

4 Word list

NOUNS (car)	NOUNS	VERBS	PHRASAL VERBS
accelerator	camera	activate	lift up
air pressure	chest	adjust	pick up
blanket	cord	break	pull out
cockpit	device	detect	push in
driver	dial	insert	put down
emergency stop	fault	kick	put on
fire suit	handset	locate	put together
flap	iPod	lower	strip off
front	laser beam	pump	switch off
fuel	outboard motor	raise	switch on
gear lever	plaster hole	repair	take apart
hose	receiver	replace	take away
mechanic	robot	service	take off
nozzle	sensor	signal	take out
passenger	surface	spill	turn off
pit lane	technology	test	turn on
pit-stop crew	ticket machine	touch	**ADVERBS**
rear	water heater	**TIME PHRASES**	ahead
socket	water valve	almost done	away
trainee	wireless	hang on	forward
tyre		immediately	sideways
visor		just a minute	upright
wheel-gun		nearly finished	
wheel-jack		one minute	

1 Tick the words and phrases that you remember from Workbook 1. Study the others.

2 Complete the sentences with nouns from the Word list. Some alternatives are possible.

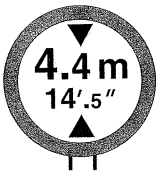
1 Loosen the nuts with the _____.
2 Raise the _____ of the car with the wheel-jack.
3 Adjust the _____ in the tyres.
4 Pull the cord on the _____ to start the engine.
5 If you see an accident ahead, press the brake and do an _____.
6 Push down the _____ with your right foot.
7 Clean the _____ on the driver's helmet with a cloth.
8 If you need hot water, turn on the _____.
9 Tighten the safety belt across your _____.

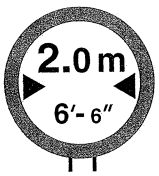
3 Comparison

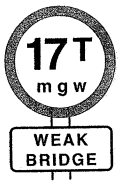
1 Limits

Start here

1 What do these road signs tell you?

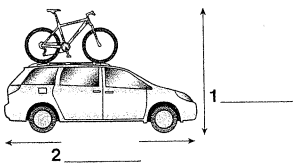


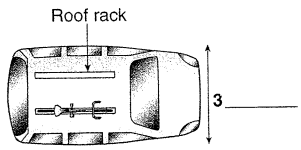




Listening

2 09 A customer wants to drive her car onto a car ferry. Listen to her phone conversation with the sales staff of the ferry company. Complete the specifications of the customer's vehicle on the left.



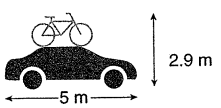


3 Listen again and complete the conversation.

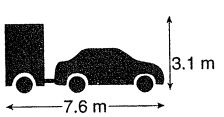
- ● How (1) _____ ?
- ○ It's just under (2) _____ metres wide.
- ● OK, that's fine. The vehicle must not be (3) _____ 2 metres.
- ○ Great.
- ● (4) _____ ?
- ○ It's exactly (5) _____ metres long.
- ● Please measure it again carefully. It must not be (6) _____ 7 metres.
- ○ OK, I'll do that and get back to you.
- ● (7) _____ ?
- ○ It's just over (8) _____ metres high, including the bicycles.
- ● Mm, that's too high. The vehicle must not be (9) _____ 2.9 metres.
- ○ OK, I'll take the bikes off.

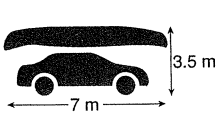
Reading

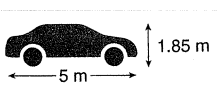
4 Read the SuperFerries web page. Which vehicles on the left can board the ferry? What are the vehicle types (*large car*, *standard car*, etc.)?



5 passengers







6 passengers

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SuperFerries is a cars-only service: we do not take coaches or lorries.

WEIGHT AND DIMENSION LIMITS FOR ALL VEHICLES
Vehicles must not be heavier than 3.5 tonnes. They must not be wider than 2.0 m, longer than 7.0 or higher than 2.9 m.
STANDARD CAR: A 'standard car' must not be longer than 5.0 m, wider than 2.0 m or higher than 1.85 m. It must carry a maximum of five passengers. If it carries more than five persons, it becomes a 'large car'.
LARGE CAR: A 'large car' must not be longer than 7.0 m, wider than 2.0 m or higher than 2.9 m. It must carry no more than nine passengers.
HIGH CAR: A 'high car' must not be higher than 2.9 m, longer than 5.0 m or wider than 2.0 m. It must carry a maximum of five passengers. This vehicle type allows passengers to put extra luggage on the roof of their cars, within the limits.
CAR AND TRAILER: A car and trailer must not be longer than 7.0 m, higher than 2.9 m or wider than 2.0 m. It must carry no more than nine passengers over the age of three.

Language

The comparative form of single-syllable adjectives ends in *-er*, e.g. *longer, wider.* Two-syllable adjectives ending in *-y* also end in *-er*, e.g. *noisy* → *noisier.*

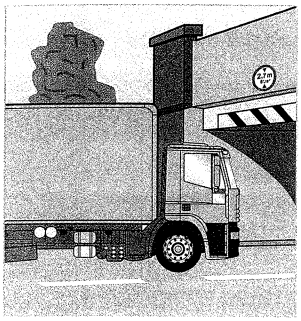
Notice the spelling changes: *big* → *bigger*; *wide* → *wider*; *easy* → *easier.*

than is used after the comparative adjective, e.g. *The van is higher than the car.*

Irregular comparatives: *better, worse, farther/further, more* and *less.*

more + adjective is used with adjectives of more than one syllable, e.g. *more expensive. less* is used with all types of adjective, e.g. *less cheap, less expensive.*

If something is the wrong dimension for something, or above a limit, you can say: *The lorry is too wide for the bridge. The bridge is not wide enough for the lorry.*



5 Explain the problem.

The bridge is 2.7 metres high, but the lorry is 2.9 metres high. The lorry is too high for the bridge.

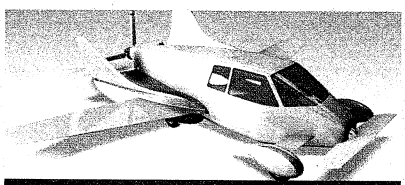
1 height of bridge: 2.7 m; height of lorry: 2.9 m
2 width of ship: 12.2 m; width of canal: 11.5 m
3 length of plane: 19.3 m; length of hangar: 18.8 m
4 diameter of CD: 12.2 cm; width of box: 11.3 cm
5 thickness of coin: 3 mm; width of slot: 2.88 mm
6 length of screw: 5.5 cm; length of hole: 4.35 cm

Task

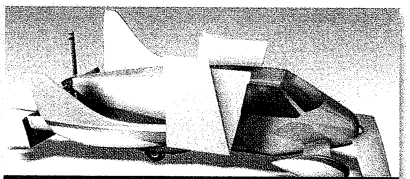
6 Work in pairs. Read the text, then discuss the invention. Do you think people will buy it? Give your reasons. Make notes of your discussion.

- compare it with (a) a normal car and (b) a small aircraft
- list (a) its strengths and (b) its weaknesses

The road-ready plane



1 in flying mode

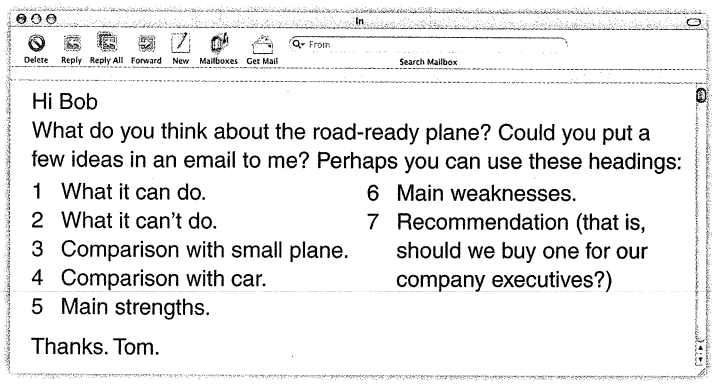


2 in car mode

You can park it in your garage, drive it to your nearest airfield, fly it to your destination, land it, then drive off the runway, along a road to your workplace. In the air, it has a wingspan of 8.4 m, a length of 5.7 m and a height of 2 m. It can fly at a speed of 185 kph for 740 km on a single tank of fuel. The tank holds 76 litres of super-unleaded petrol. In car mode, it can go 17 km per litre of fuel, and can travel at normal car cruising speeds, but it has only two seats and no space for luggage. The cost of the road-ready plane is approximately £75,000.

Writing

7 Work individually. Reply to this email from your company director. Use the notes from your discussion.



2 Products

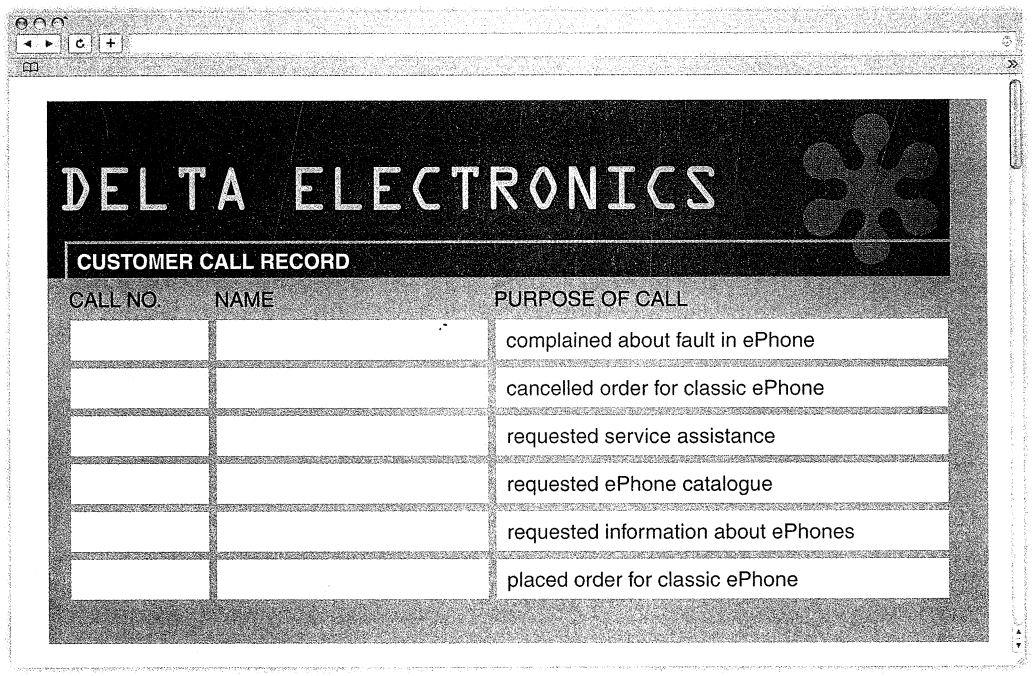
Start here

1 Which features are most important to you in a mobile phone? List them in order of importance. Compare your list with your partner's.

Here are some examples: *size of phone*, *screen size*, *size of keys*, *talking time*, *recharging time*, *storage capacity*, *weight*, *video*, *music*, *organised address book*. Think of other features.

Listening

2 10 Listen and complete the details in the customer call record.



DELTA ELECTRONICS

CUSTOMER CALL RECORD

CALL NO.	NAME	PURPOSE OF CALL
		complained about fault in ePhone
		cancelled order for classic ePhone
		requested service assistance
		requested ePhone catalogue
		requested information about ePhones
		placed order for classic ePhone

3 Listen again and complete the sentences.

1 Sorry, _____ you repeat that, please? (Phone call 1)
2 _____ I have your name, please? (Phone call 2)
3 I _____ like to cancel an order, please. (Phone call 3)
4 _____ you think you _____ tell me the model number, please? (Phone call 3)
5 I _____ like some information about the ePhone, please. (Phone call 4)
6 _____ you like me _____ send you a specification table? (Phone call 4)
7 _____ I put you through to the service department? (Phone call 5)
8 _____ you mind _____ me what the problem is? (Phone call 6)

4 Match the sentences from 3 with these language functions.

a) saying what you want
b) offering to do something
c) asking someone to do something
d) checking information

Speaking

5 Work in pairs. Roleplay phone conversations between customer and service staff. Practise the six dialogues. Use the customer call record in 2.

Study the Audio script on page 121 before you begin.

6 Look at the chart and complete this phone conversation.

Comparison between two ePhones		
	Classic	**Fonarama**
Dimensions	115 x 61 x 11.6 mm	96 x 52 x 9.7 mm
Weight	135 g	94 g
Screen size	88.9 mm (diagonal)	72 mm (diagonal)
Capacity	8GB, 12 GB	8GB, 12GB, 16GB
Battery	16 hours	24 hours
Charging time	3.5 hours	3 hours

A: *What's the difference between the Classic and the Fonarama ePhones?*
B: Well, the Fonarama is much (1) _____ than the Classic. It's only 9.7 mm thick.
A: *I see. And what about the weight?*
B: The Fonarama is much (2) _____ than the Classic. It weighs only 94 g.
A: *OK, and what about the screen size?*
B: The screen of the Fonarama is much (3) _____. It's only 72 mm across.
A: *I prefer a* (4) _____ *screen size. I want to watch movies on it. I'll order the Classic.*
B: Certainly. Which one would you like? The 8 GB one or the 12 GB one?
A: *The 12 GB one, please.*

7 Practise the conversation. Add more information from the chart.

8 Which word does ***one*** refer to in this dialogue?

A: *I'd like to buy an MP3 player, please.*
B: Which one would you like? Do you want the white one or the black one?
A: *The black one, please.*

Language

one is used when someone has already mentioned a thing, there is a choice between two or more types of the thing, and you don't want to repeat the name of the thing.
A: *Please pass me a spanner.*
B: *Which one do you want? The long one or the short one?*

Speaker B wants to mention two types of spanner, but does not want to repeat the word *spanner.*

Speaking

9 The word ***one*** is missing from four places in this dialogue. Mark the places.

A: Hello, I'd like to buy a portable radio, please.
B: Certainly. We have two colours, red or black. And there are two models. There's with rechargeable batteries, and there's with normal batteries. Which would you like?
A: I'd like the red with the rechargeable batteries, please.

10 11 Listen and check your answers.

11 Practise the corrected dialogue with your partner. Use these notes.

Portable radio
model: with rechargeable or normal batteries / **colour**: red or black

3 Equipment

Start here

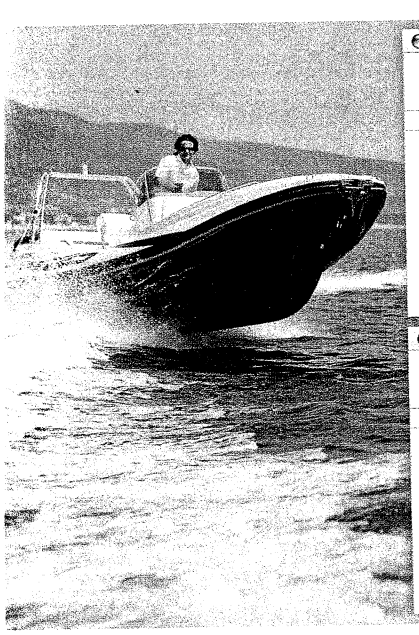
1 Work in small groups. Discuss these questions about each world record.

- Is it still a world record? If not, what is the new record?
- If it is still a record, how long will it last? Why?

1 The fastest men in the world are Powell and Gatlin. They ran 100 m in 9.77 seconds.
2 The world's tallest building is the Taipei 101 (Taiwan), at 509.2 m.
3 The world's smallest transistor is only 18 nanometres long.
4 The longest stay in space was 437 days by Valeri Polyakov.

Reading

2 Jeff and Bob work in a company that provides motorboats for hire to tourists. Read their email correspondence and answer the questions.



In

Delete Reply Reply All Forward New Mailboxes Get Mail Search Mailbox

To: Chief Engineer
From: Manager, Motorboat Fleet
Subject: Tender for purchase of new outboard engines

Jeff
As you know, we're going to replace all our outboard engines. Could you please test five engines from different suppliers? Let me know the cheapest and the best performance.
Thanks. Bob.

In

Delete Reply Reply All Forward New Mailboxes Get Mail Search Mailbox

To: Manager, Motorboat Fleet
From: Chief Engineer
Subject: Re: Tender for purchase of new outboard engines

Hi Bob
Thanks for your email. I can confirm that we've finished the tests on the five engines. I'm attaching specs and test results. I'll send you a full report in a couple of days.
Cheers. Jeff.

1 What is the purpose of (a) the first email (b) the second email?
2 In the first email, what does Bob (a) remind Jeff about (b) want Jeff to do?
3 In the second email, (a) what new information does Jeff tell Bob (b) what does Jeff promise to do?

Scanning

3 Practise your speed reading. Look for the information you need on the SPEED SEARCH pages (118–119). Try to be the first to complete the task.
Task: Underline the correct answers below.

Specifications

1 Engine A has a (*shorter/longer*) shaft than Engine B.
2 The heaviest engine is Engine (*A/B/C/D/E*).
3 Engine D is the (*cheapest/most expensive*) engine.
4 Engine C is (*as powerful as/more powerful than/less powerful than*) Engine E.

Test results

1 The (*fastest/slowest*) engine was Engine C.
2 The (*most rapid/least rapid*) acceleration from 0–40 km/h was Engine C.
3 The (*quietest/noisiest*) engine was Engine B.
4 The engine with the lowest fuel consumption was Engine (*A/B/C/D/E*).

Language To change the comparative into the superlative form, change *-er* to *-est*, *more* to *most* and *less* to *least*, e.g. *longest*, *widest*, *biggest*, *noisiest*, *most expensive*, *least noisy*.

the is used in front of the superlative, e.g. *the fastest car in the world.*

There are five irregular superlatives: *best*, *worst*, *farthest/furthest*, *most* and *least*.

Speaking

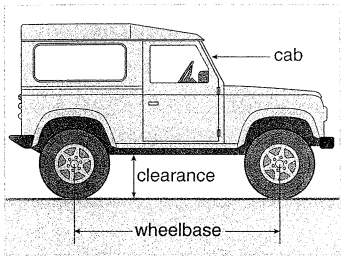
4 Make comparisons. Think of as many differences as possible. Think of some more groups and make comparisons.

1 Zinedine Zidane / Wayne Rooney / Cristiano Ronaldo
2 Mount Everest / North Face of the Eiger / Aconcagua
3 coal-fired power / nuclear power / wind power
4 diesel / petrol / LPG

5 Work in pairs. Write down three items or products you know about. Compare them and make notes.

Task

6 Work in small groups. Have a meeting to discuss this problem and agree on the best solution.



4 x 4 = four wheel drive
say: *four by four*

You and the other members of your group work on an oil rig in a desert. The rig is about 130 km from the nearest town. The town has a small airport. There is no road between the town and the rig, and an aircraft cannot land at the rig. Between the town and the rig the land is sandy and rocky, with some hills. Your team needs to transport small teams of three to eight engineers and to tow a trailer with heavy drilling equipment between the airport and the rig. Your team wants to buy a 4x4 with the following features:

- long wheelbase
- high clearance
- powerful engine
- space for up to 8 passengers
- low fuel consumption
- large fuel tank
- towing power (able to pull other vehicles)
- high cab (to allow driver to see easily)
- low price

Student A: your information is on page 111.
Student B: your information is on page 113.
Student C: your information is on page 115.
Student D: your information is on page 117.

Writing

7 Work individually. Write a short report on your meeting. Give your group's decision and the reasons for the decision. Use these headings.

1 Introduction
Our team held a meeting yesterday to choose ...

2 Comparison of four vehicles
We compared the specifications of the four vehicles:
1.1 The Toyota Land Cruiser has the longest wheelbase. It is 2850 mm in length.
1.2 ...

3 Decision
We decided to buy the _____ because ...

3 Comparison

1 Limits

1 Read the text and answer the questions.

Eurotunnel Freight runs rail freight services through the Channel Tunnel. Lorries are loaded onto wagons at one terminus and unloaded at the terminus on the other side. The train journey lasts 35 minutes. At €400 for a one-way crossing, the price is higher than by ferry. Containers or unaccompanied trailers cannot be carried. Dangerous loads can be carried but not large, abnormal loads.

However, there are advantages in using the tunnel. First, the journeys are quicker and loading and unloading takes less time. Train journeys are more frequent than ferry crossings. There are between three and six departures per hour, compared with one per hour for ferry sailings. Finally, the trains are not affected by the weather, with 94 per cent of trains departing on time. In winter, fog and high winds can cause delays or cancellations of ferry services. However, trains continue to operate below the Channel whatever the weather.

1 How long does the train journey take through the Channel Tunnel?

_____

2 Which is more expensive, a crossing by tunnel or by ferry?

_____

3 What kinds of loads cannot be taken through the tunnel?

_____

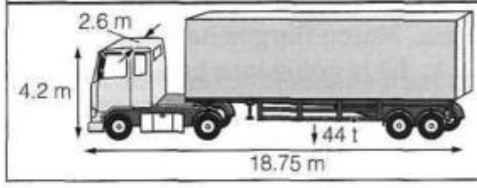
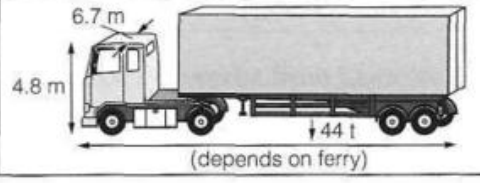
4 What are two advantages of using the tunnel?

_____

5 What is one disadvantage of using the ferry?

_____

2 Complete the factsheet on maximum dimensions from the diagrams.

Eurotunnel freight	Ferry freight
	

Eurotunnel freight

1 Lorries *must not be heavier* than 44 tonnes.
2 Lorries _____ 18.75 metres.
3 Lorries _____ 4.2 metres.
4 Lorries _____ 2.6 metres.

Ferry freight

5 The *length limit* depends on the individual ferry.
6 The _____ for lorries on all ferries is 4.8 metres.
7 The _____ for lorries on all ferries is 6.7 metres.
8 The _____ for standard lorries is 44 tonnes.

2 Products

1 Match the words to the questions about ePhones.

1	dimensions	a)	What is the diagonal distance across the screen?
2	weight	b)	How long does it take to recharge the battery fully?
3	screen size	c)	How much does it weigh?
4	capacity	d)	How long does the battery last?
5	battery	e)	What other things are in the specification?
6	charging time	f)	What are its measurements?
7	features	g)	How many gigabytes does it have?

2 Complete Part 1 of a phone dialogue. A customer (C) is asking a sales clerk (S) about power boats.

C: Hello. I'm interested in the Combo 150 and the Combo 200.
S: Right. (1) Would you _____ Sales Department, or (2) _____ a catalogue?
C: At this stage, I just need a catalogue.
S: OK. Could (3) _____?
C: Sure. It's McCredy. That's M little-C big-C R-E-D-Y. McCredy, initial B.
S: Is (4) _____ or _____?
C: B for Bravo.
S: And (5) _____?
C: The Firs, Wyatt Avenue.
S: Could (6) _____?
C: Yes, it's W-Y-A-double-T. Wyatt Avenue, Dundee, Scotland. Postcode DD3 7NU.
S: Would (7) _____?
C: DD3 7NU.
S: And could I (8) _____?
C: Sure. 01382 458222.
S: Fine. I'll get that in the post to you today.

3 Complete Part 2 of the dialogue. The customer (C) is placing an order. Use information from the table.

Model	ProCraft Combo 150/200	Colour	blue/yellow; red/cream
Fuel tank	50/70 litres	Trailer (extra)	€460/525

C: Hello, I'd like to order a Combo power boat. I've seen your catalogue.
S: (1) *Which one would you like to order*, the 150 or the 200?
C: (2) *The larger one*, the 200 model.
S: OK. What size fuel tank? The smaller size holds 50 litres and the larger one holds 70 litres.
C: (3) _____.
S: Which colours? We have a blue and yellow one in stock and a red and cream one.
C: (4) _____.
S: What about a trailer? We do a standard one at €460, or we do a heavier one at €525.
C: (5) _____.

3 Equipment

1 07 Read the quiz and circle your answers. Then listen and check.

1 How far away is the nearest star?
a) 3.46 b) 4.24 c) 4.36 light years away.

2 How deep is the deepest part in the world's oceans?
a) 6,742 metres b) 8, 213 metres c) 10,911 metres

3 On the Mohs scale of mineral hardness, which of these materials is the hardest?
a) silver b) glass c) iron

4 Which of these gases is the least common in the atmosphere?
a) oxygen b) hydrogen c) nitrogen

5 What was the hottest temperature on Earth, recorded in 1922?
a) 49° Celsius b) 53° Celsius c) 58° Celsius

6 What was the coldest temperature on earth, recorded in 1983?
a) –78° Celsius b) –89° Celsius c) –97° Celsius

2 08 Listen and complete the sentences.

1 The nearest star _____ is called Alpha Centauri. It's _____ and can be seen from the southern hemisphere.

2 A _____ ship sent down an _____ probe to the deepest point on the seabed at a place called the Marianas Trench in the _____.

3 The Mohs scale of mineral hardness _____. It ranges from talc, which is _____ on the scale, to diamond, which is _____. Silver is _____ of the three materials and glass is _____.

4 The _____ of these three gases is nitrogen. Hydrogen is _____ than oxygen and is _____ of these three gases.

3 Read the headings in the specification table for four luxury yachts, then delete the wrong answers below.

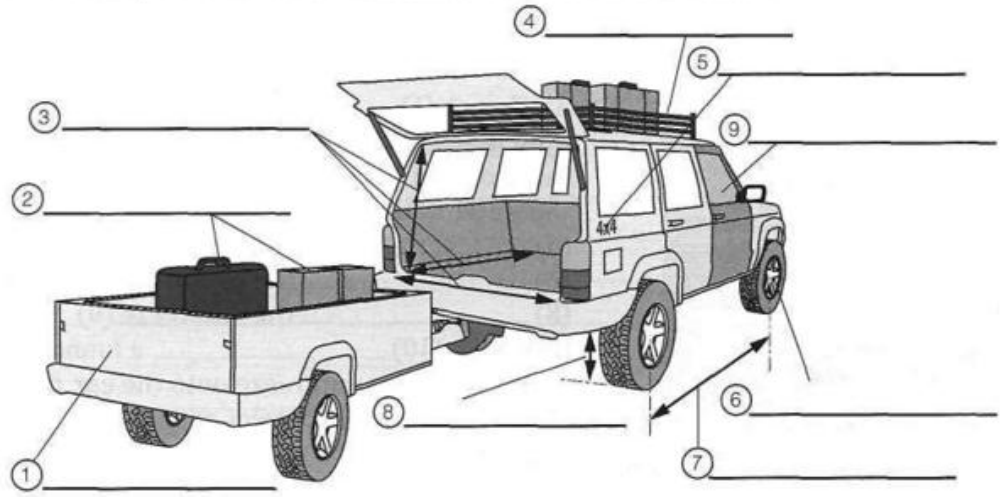
NAME	COST	LENGTH	TOP SPEED	MAX GUESTS	NO. OF CREW
Alysia	$116.7m	85.3m	33kph	36	34
Oceanco 702	$111.8m	82m	35kph	12	28
O'Mega	$64.1m	82.6m	30kph	32	–
Sherakhan	$55.4m	69.8m	10kph	26	–

1 Sherakhan is the (*most / least*) expensive of the yachts.
2 Oceanco 702 is (*as expensive as / not as expensive as*) Alysia.
3 The second longest yacht is (*Sherakhan / O'Mega / Oceanco 702 / Alysia*).
4 Alysia is the (*fastest / second fastest / slowest*) of the yachts.
5 (*More / Fewer*) guests can stay on O'Mega than on Alysia.
6 There are (*fewer / more*) crew members per guest on Alysia than on Oceanco 702.

4 Word list

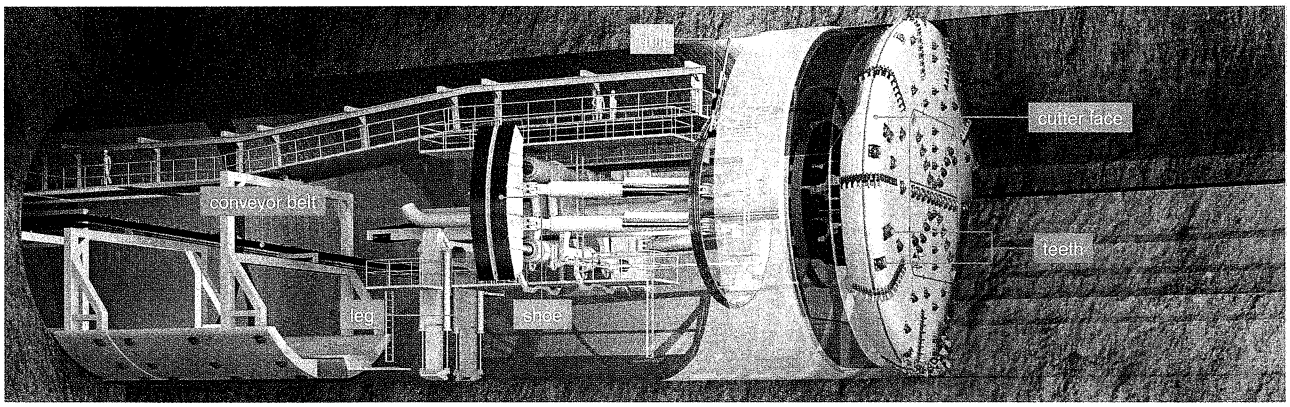
NOUNS (vehicle)	NOUNS (other)	VERBS	ADJECTIVES
4x4	catalogue	board	classic
acceleration	coin	cancel	coal-fired
cab	hire	complain	external
clearance	mode	cruise	normal
combination	nanometre	idle	portable
consumption	nanotube	tow	rapid
cruising speed	nuclear power		rechargeable
diesel	propeller		standard
dimension	purchase		unleaded
fleet	recommendation		**IRREGULAR COMPARATIVES AND SUPERLATIVES**
idle speed	strength		
luggage	tender		
performance	transistor		
petrol	weakness		better
roof rack	wingspan		best
steel rim wheel	world record		worse
storage capacity			worst
trailer			farther
van			farthest
vehicle			further
wheelbase			furthest
			more
			most
			less
			least

1 Label the parts of the vehicle with words from the Word list.



4 Processes

1 Infrastructure



Start here **1** What is this? What does it do? How does it work? Discuss with your partner.

Listening **2** ▶ 12 Listen and complete the specifications chart.

MB471/316 Tunnel Drill Specifications	
Length	
Diameter	
Speed	
Manpower needed	
Cost	

Reading **3** Read this article and put these headings in the correct place.

Collecting the rocks Controlling the movement Moving the cutter
Cutting the rock surface Strengthening the roof Supplying the electricity

THE MB471-316 TUNNEL DRILL – one of the largest hard-rock drills in the world

1 _____

The face of the cutter has 85 teeth. Each tooth is 60 cm long. The cutter face rotates about seven times a minute. When it rotates, the teeth cut large circles into the surface of the rock.

2 _____

Pieces of rock fall to the ground. They are collected by large scoops. They are then dropped into chutes. When the cutter face rotates upwards, the rocks fall onto conveyor belts. They are then carried to the rear of the machine.

3 _____

Hydraulic cylinders push the body of the cutter slowly forwards. As it moves forwards, steel shoes move outwards and grip the tunnel walls. At the same time, two legs push down and lift the machine off the floor.

4 _____

Fifteen electric motors supply the machine with 6,375 horsepower. The power is connected to the cutters by means of a 13,800-volt cable.

5 _____

There are two drills attached to steel arms. These are located immediately behind the cutters. When the machine moves forwards, holes are drilled into the roof of the tunnel. Then the holes are filled with bolts and cement. This strengthens the roof.

6 _____

The machine operator sits in a cabin at the heart of the machine. Here he/she controls its speed and direction. Video cameras monitor the cutter and the tunnel.

Vocabulary **4** Make a list of all the names of parts of the body and clothing in the text in 3.

5 List other technical contexts where the items in 4 are used.

Example: 'teeth' are also found on gears.

Language In an active sentence, the subject = the agent. The subject does the action.

Subject = agent	Active verb	Object
Hydraulic cylinders	push	the cutter.
Large scoops	collect	the rocks.

In a passive sentence, the subject is NOT the same as the agent. The subject does not do the action. The agent does the action to the subject.

Subject	Passive verb		Agent
	be	Past participle	
The cutter	is	pushed	by hydraulic cylinders.
The rocks	are	collected	by large scoops.

6 Change this set of instructions into a description of a process, using the passive and the words in the box.

finally first next now then

How to change the oil in a car

1	Run the engine for a few minutes.	5	Put the oil drain plug on
2	Switch off the engine.	6	Take off the oil filler cap.
3	Take off the oil drain plug.	7	Pour in the new oil.
4	Empty the old oil into a container.	8	Put the oil filler cap back on.

Begin: First the engine is run for a few minutes. Then it is switched off. Now the …

7 Make a set of instructions about a process you know about. Then rewrite it as a process description in the passive.

Examples of processes: food manufacture, steel making, canning, assembling computer components, manufacturing a CD, dairy processing.

8 Fill in the gaps, using the correct form of the verbs in brackets.

1 Large drills _____ (make) holes in the roof of the tunnel. Then the holes _____ (fill) with bolts and cement.
2 A large propeller _____ (push) the hovercraft forwards. The propeller _____ (drive) by a powerful engine.
3 Hot water _____ (flow) from the engine into the radiator. Here it _____ (cool) by the fan.
4 The robot _____ (monitor) by a computer. This computer also _____ (control) all the other robots in the building.
5 First, the rusty machine parts _____ (bring) into the factory. Then they _____ (clean). Then the rust _____ (remove). Next the parts _____ (paint). Finally, they _____ (take) out of the factory again.

9 Make a list of headings for the main stages of a process you know about. Make each heading begin with a verb ending in ***-ing***, like the ones in 3.

Example: Moulding and shaping steel – 1 Melting the steel; 2 Casting; 3 Cooling; 4 Rolling the steel; 5 Straightening; 6 Cutting.

10 Give a short talk to the class explaining your process. Use your headings.

2 Manufacturing

Start here

1 What do you know about cars? Discuss with a partner the location and function of these parts: *body*, *chassis*, *drive shaft*, *axle*, *transmission*.

2 The photos show the main stages in assembling a car, but they are in the wrong order. Write the figure numbers in the correct boxes in the flow chart.

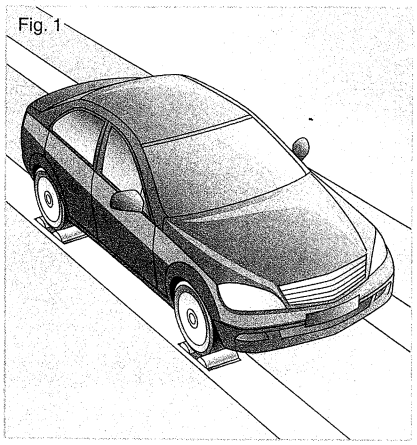


Fig. 1

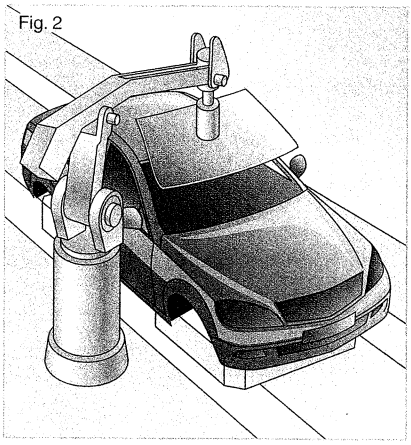


Fig. 2

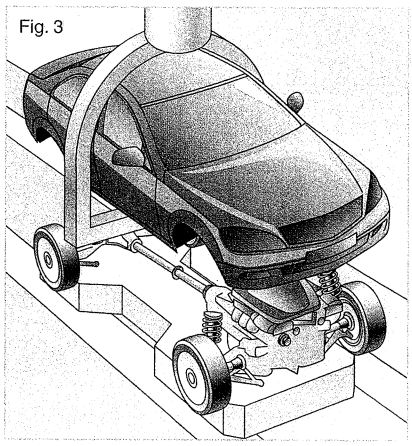


Fig. 3

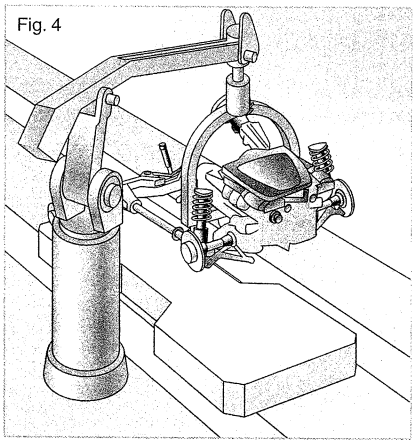


Fig. 4

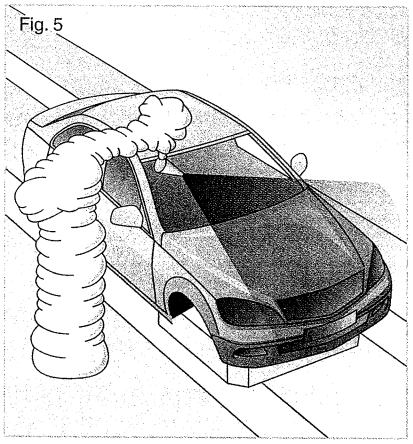


Fig. 5

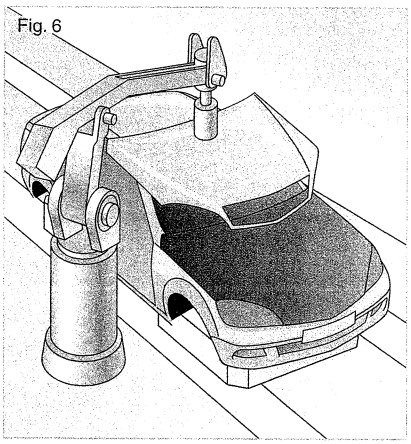
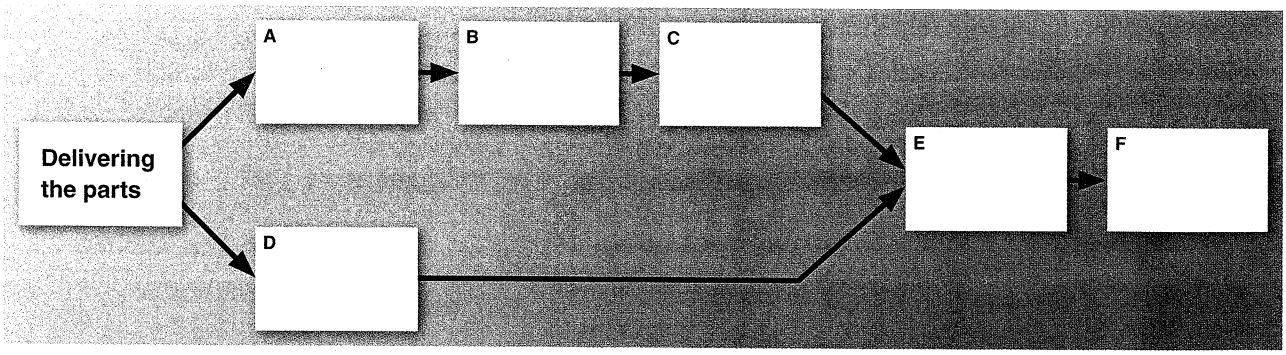


Fig. 6



3 Make captions for the six photos with the verbs and nouns in the box. Use verbs ending in ***-ing***.

add attach install paint test weld body chassis finished car parts

Example: Fig 6. Welding the body panels to the body frame.

Reading **4** Read this website of a car company and check your answers to 2 and 3.

Assembling a car

First, the parts are delivered by truck or rail to the *delivery area* of the car assembly plant. From here, some parts are taken to the body shop, and other parts are transported to the chassis line. The parts are carried around the plant by forklift trucks or conveyor belts.

In the *body shop*, the panels are welded to the frame to form the body of the car. This is done by more than 400 robots.

Then the body is taken to the *paint shop*. Here it is cleaned and painted by robots. Special clothing is worn by the robots to protect the paint. After this, the body is checked by human workers to look for faults.

Next, the painted body moves along a conveyor belt to the *trim line* and many parts are added to it. For example, the instrument panel, the air conditioning system, the heating system and the electrical wiring are all installed here. The windscreen is inserted by robots using laser guides.

Meanwhile, in the *chassis line*, components are added to the chassis. First, the chassis is turned upside down, to make the work easier. Then the fuel system, the transmission, the suspension, the exhaust system, the axles and the drive shaft are all installed. Next the chassis is turned over (rightside up). The engine is lowered into the chassis and connected to it.

Now the chassis and the body move simultaneously to the *final assembly line*. Here the body is attached to the chassis, and all the final parts are added. The tyres and the radiator are added here. The hoses are connected, and the radiator and air conditioner are filled with fluid. The car's central computer is also installed here.

Lastly, the finished car and all electrical systems are tested. The car is filled with fuel and the engine is started for the first time. The car is put on special rollers to test the engine and the wheels. If it passes the test, the car is finally driven out of the assembly plant.

Language *to* + verb is used to talk or write about the purpose of an action.

Why do you paint the car body? To protect it from rust.
The car body is painted to protect it from rust.

Speaking **5** Match actions with their purposes. Refer to the text in 4.

	action		**purpose of action**
1	workers weld thin metal sheets to a frame	a)	to check the movement of the wheels
2	they turn the chassis upside down	b)	to make the car body
3	the robots wear special clothes	c)	to inspect it for faults in the paint
4	they turn the chassis rightside up	d)	to protect the wet paint from dust
5	workers put the finished car on rollers	e)	to install the fuel system easily
6	workers check the car body by hand	f)	to lower the engine into it

6 In pairs, ask and answer the questions in 5. Use the passive form in the question.

A: Why are thin metal sheets welded to a frame?
B: To make the car body.

7 Ask questions to get these answers. Refer to the text in 4.

1 They're delivered by truck or rail.
2 They're welded together in the body shop.
3 They're carried by forklift trucks or conveyor belts.
4 To look for faults in the paint.
5 It's done by human workers.
6 It's done using laser guides.

3 Communications

Start here

1 What do you know about communications satellites? Do this quiz with your partner. All the numbers are approximate.

1 How high are communications satellites above the Earth?
a) 15,000 km b) 25,000 km c) 35,000 km d) 45,000 km
2 How fast do these satellites travel around the Earth?
a) 7000 km/h b) 11,000 km/h c) 15,000 km/h d) 21,000 km/h
3 What frequency are signals from a communications satellite to your satellite dish?
a) 12 GHz b) 1 GHz c) 500,000 MHz d) 5000 MHz
4 What frequency are the signals from your satellite dish to your TV?
a) 150 MHz b) 1500 MHz c) 15,000 MHz d) 150,000 MHz

Scanning

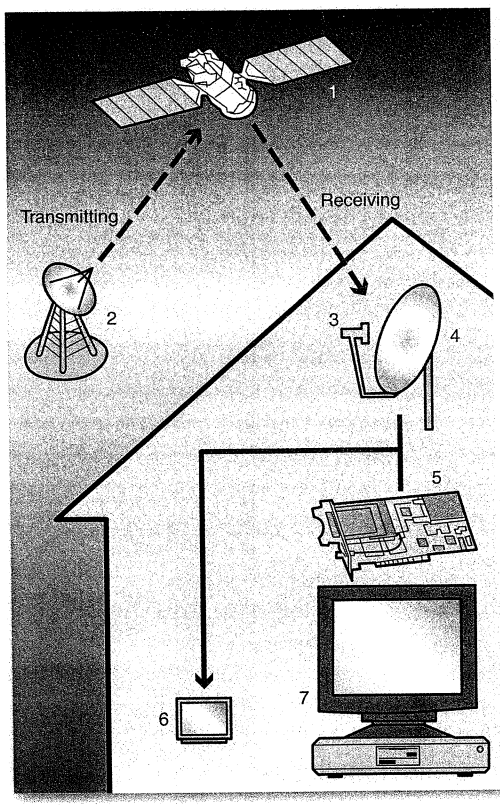
2 Practise your speed reading. Look for the information you need on the SPEED SEARCH pages (118–119). Try to be the first to complete this task.

Task: Check your answers to the quiz in 1.

Reading

3 Read this instruction leaflet and label the diagram with the words in the box.

computer dish DTV card feed horn satellite TV TV station



How to receive satellite digital video broadcasts

Equipment needed

You will need a computer with a DTV (digital TV) card. This is connected by cable to a satellite dish, which should be between 60 cm and 1.8 m in diameter. The dish must have a feed horn. This converts high-frequency signals to low-frequency ones.

How it works

There is a communications satellite in orbit high above the Earth. TV programmes are transmitted from TV stations up to the satellite, which then sends the signals down to Earth. These signals have a high frequency of several GHz.
Your dish receives the high-frequency signals and reflects them to the feed horn, which then converts the signal into a lower frequency.
The feed horn is connected via a cable to the DTV card, which processes the signal. It extracts the video and audio, and plays them via the PC monitor and speakers.

via = by means of

4 What does ***which*** refer to in the text?

1	line 5	a) the cable	b) the satellite dish
2	line 13	a) the satellite	b) the TV stations
3	line 17	a) the frequency	b) the feed horn
4	line 20	a) the DTV card	b) the feed horn

Language

Signals are transmitted to	the satellite. The satellite the satellite, which	then sends the signals to Earth.

John reports to	Adel. Adel Adel, who	is the training manager.

5 Join these pairs of sentences. Use ***who*** or ***which***.

1 My computer has a DTV card. This is connected by cable to my satellite dish.
2 If your DTV card doesn't work, contact our technician. He will repair it.
3 The dish reflects the signal to the feed horn. This converts the signal to a lower frequency.
4 Please send any complaints to our customer service manager. She will then contact you.
5 The radio station sends signals to the satellite. This then transmits the signals to my dish.
6 My DTV card extracts the audio and video. These are then displayed on my PC monitor.

Example: 1 My computer has a DTV card, which is connected by cable to my satellite dish.

Vocabulary

6 Match words with the same or similar meaning.

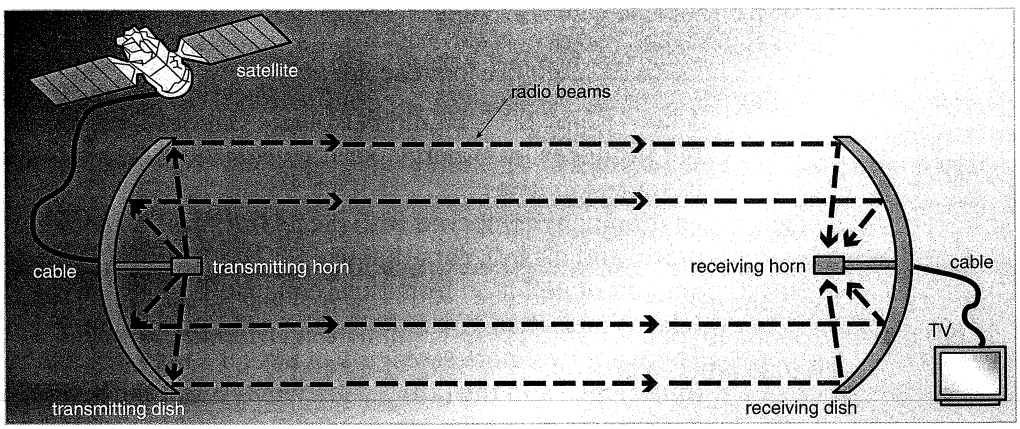
transmit	receive	convert	get	send	take out
extract	display	operate	change	work	show

7 Complete the sentences. Notice the hyphens (-).

1 The signal has a high frequency. It's a *high-frequency* signal.
2 This pump uses high pressure. It's a _____ pump.
3 The fuse breaks at 13 amps. It's a *13-amp* fuse. (Note: amps → amp)
4 The cable carries 13,800 volts. It's a _____ cable.
5 My satellite dish is 1.8 metres wide. It's a _____ dish.

Speaking

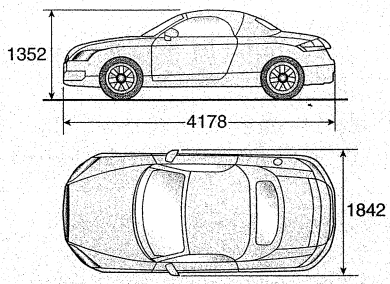
8 Draw a simple diagram and make notes about a setup you know about. If you prefer, use this satellite dish setup and make notes about the diagram.

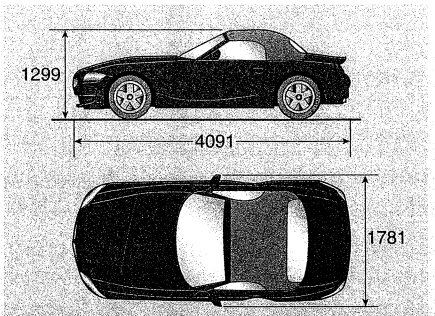


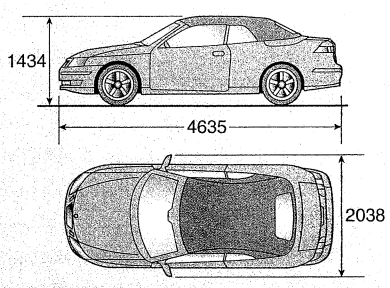
9 Describe the setup and explain to the class how it works.

Review Unit B

1 Choose two of these cars and make comparisons between them.







Car 1: the Audi TT 2.0T FSI	
Fuel tank capacity	55 L
Engine size	1,984 cc
Top speed	149 mph
Acceleration	0 to 62 mph: 6.6 sec.
Fuel consumption	36.7 mpg
CO^2 emission	183 g/km

Car 2: the BMW Z4 2.0i SE Roadster	
Fuel tank capacity	55 L
Engine size	1,998 cc
Top speed	137 mph
Acceleration	0 to 62 mph: 8.2 sec.
Fuel consumption	37.7 mpg
CO^2 emission	181 g/km

Car 3: the Saab 93 convertible 1.8t 150bhp	
Fuel tank capacity	62 L
Engine size	1,998 cc
Top speed	127 mph
Acceleration	0 to 60 mph: 11.0 sec.
Fuel consumption	37.2 mpg
CO^2 emission	233 g/km

2 Compare all three cars. Say which one you like best, and why.

3 Complete the text.

Which is the better fuel for a car? Is it petrol or diesel? Petrol is (1) *more common* (common) because it makes a car go (2) *faster* (fast) than diesel. It's also much (3) *less noisy* (noisy) than diesel. Diesel usually costs less than petrol, and you can travel for more kilometres per litre, because diesel has about 10% more energy per litre than petrol. But diesel engines are (4) _____ (noisy) and (5) _____ (heavy) than petrol ones, although they last longer. From an environmental point of view, diesel oil is (6) _____ (good) than petrol, because the exhaust from diesel engines produces less pollution. It's also (7) _____ (safe). Because diesel is (8) _____ (combustible) than petrol, it's less likely to catch fire in an accident.

A newer fuel, LPG (Liquid Petroleum Gas), makes cars go as fast as petrol, but produces less energy per litre. However, LPG is becoming very popular in some countries because it's the (9) _____ (harmful) to the environment compared with diesel or petrol. Of the three types of fuel (LPG, petrol and diesel), cars that use LPG emit the (10) _____ (small) amount of pollution from their exhaust. LPG is also the (11) _____ (clean) fuel when you're filling the car, because the gas is completely sealed. There are two more strengths of LPG: it's the (12) _____ (quiet) fuel, and the (13) _____ (expensive) of the three. LPG engines are about the same weight as petrol ones, but they're much (14) _____ (durable).

4 Match the sentences with their language functions.

Sentence	Language function
1 I'm sorry about the delay.	a) saying what you want
2 Sorry, could you repeat your surname, please?	b) offering to do something
3 Is that B-E-N or B-E-N-N?	c) checking what someone said
4 Would you mind sending me the invoice today?	d) asking someone to do something
5 I'd like to speak to the manager, please.	e) checking how to spell something
6 Would you like me to send you a brochure?	f) apologising for doing something

5 Complete the phone conversation. Add capital letters where necessary. You don't need all the words in the box.

I I'll I'd do did will shall would could

● *MobileExpress. This is Customer Service, Robert speaking. How can I help you?*
○ Hello. (1) _____ like some information about your new mobile phone, please.
● *Certainly.* (2) _____ *you like me to send you a brochure?*
○ Yes, please. Do you think you (3) _____ send it by email?
● *Of course.* (4) _____ *I send it as a Word attachment?*
○ Yes, that's fine.
● *Good. So* (5) _____ *I have your email address, please?*
○ Yes, it's db30@easisoft.com
● *Sorry,* (6) _____ *you say db13?*
○ No, db30.
● *Thanks. And how* (7) _____ *you spell easisoft?*
○ E-A-S-I-S-O-F-T.
● *Right.* (8) _____ *send it today.*

6 The word ***one*** is missing from six places in this dialogue. Mark the places.

● *Hello, I'd like to buy an external hard drive, please.*
○ Certainly. We have two types. There's with a cable, and there's a wireless. And there are two types of cable. There's with a USB connection, and there's with FireWire connection. Which would you like?
● *I'd like the with the USB cable connection, please.*

7 Match these descriptions of a 4 x 4 vehicle.

1 it has a long wheelbase	a) it can drive a long way on one tank of petrol
2 it has low fuel consumption	b) it can pull another vehicle or trailer easily
3 it has high clearance	c) the petrol tank is very big
4 it has strong towing power	d) the drive shaft is long
5 it has large fuel capacity	e) the driver can see clearly all around
6 it has good driver visibility	f) there's a lot of space between the ground and the chassis

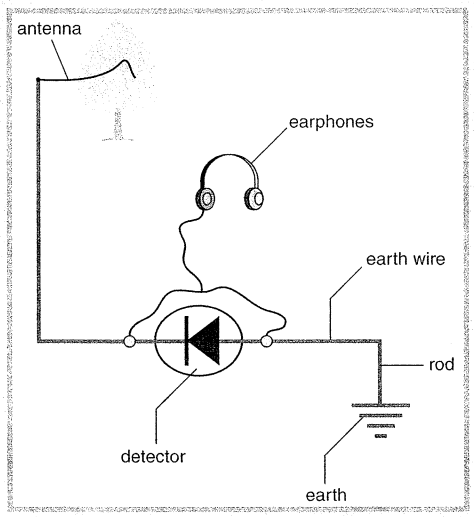
8 Change these instructions into a description of a process, using the passive.

How to clean a spark plug

1 Take off the spark plug cover.
2 Loosen the spark plug with a special wrench.
3 Remove the spark plug from the socket.
4 Clean the spark plug using a wire brush.
5 Replace the spark plug in the socket.
6 Tighten the spark plug using the wrench.
7 Put the cover back on the spark plug.

Begin: First of all, the spark plug cover is taken off.
Then the spark plug is ...

9 Change the second paragraph into a set of instructions, using imperatives.



You can make your own radio using a few simple components: two lengths of wire (one 3 m long, and the other 6 m long), a metal rod, earphones and a detector. This is how to do it.

First, the rod is hammered into the ground. Then the insulation is stripped off the end of the 3-metre wire. The wire is twisted around the rod ten times to make a good connection. This is the earth wire. Next, the detector is attached to the other end of the earth wire. The 6-metre wire is now taken and one end is connected to the other end of the detector. (This wire is your antenna.) The antenna is hung from a tree (making sure that the bare end does not touch the earth). The two wires from the earphones are connected to each end of the detector. Finally, the earphones are put on. Now you can hear the radio station (if you are very close to the transmitter!).

Begin: 1 Hammer the rod into the ground.
2 Strip the insulation off the end of the 3-metre wire.

10 Make a set of headings for a talk on these topics. Make each heading begin with a verb ending in ***-ing.***

1 First, I'd like to talk about how the communications satellite is launched.
2 After that, I'll talk about how the programmes are transmitted to the satellite.
3 Then I'll look at how the digital signals are received from the satellite.
4 Next, I'll explain how your satellite dish and digital receiver are installed.
5 Then I'll go on to mention how your dish is connected to the digital TV receiver.
6 The next topic is how high-frequency signals are converted to low-frequency ones.
7 And then I'll move on to how the video and audio are extracted from the digital signal.
8 Finally, I'll mention how the video and audio are played via the monitor and speakers.

Example: 1 Launching the communications satellite

11 Complete these. Use hyphens (-). Note: Be careful with plural nouns.

1 The plane is ready for the road. It's a *road-ready* plane.
2 The engine has a cycle of four strokes. It's a *4-stroke* engine.
3 The propeller has three blades. It's a _____ propeller.
4 The cable is six metres long. It's a _____ cable.
5 This computer is activated when you use your voice. It's a _____ computer.
6 That ticket machine starts when you touch the screen. It's a _____ ticket machine.

12 Ask and answer questions about a car assembly plant.

location = where something happens
destination = where something is going to

	Action	**Purpose, method, agent, time, location, destination**
1	deliver car parts	a) *method*: truck or rail b) *destination*: delivery area
2	carry parts	a) *destination*: different parts of plant b) *method*: forklift trucks or conveyor belts
3	weld panels to frame	a) *location*: body shop b) *agent*: 400 robots c) *purpose*: make the body of car
4	check the car body	a) *time*: after painting b) *agent*: human workers c) *purpose*: look for faults in the paint
5	insert windscreen	a) *destination*: front of car body b) *agent*: robots c) *method*: laser guides
6	move chassis and body simultaneously	a) *destination*: final assembly line b) *purpose*: attach body to chassis

1 a) How are the car parts delivered? They're delivered by truck or rail.
b) Where are they delivered? To the delivery area.

13 Write full sentences using the passive.

Example: 1 The car parts are delivered to the delivery area by truck or rail.

14 Rewrite this set of instructions as a paragraph describing a process. Use the passive form of the verbs.

Servicing a car battery

Open the bonnet of the car. Locate the battery.
Loosen the battery cables, using a wrench. Remove the battery cables from the posts.
Always remove the negative (or earth) cable first, then the positive.
Carefully lay the detached ends of the cables to one side.
Wipe away corrosion from the top of the battery, using baking soda and water.
If corrosion is very heavy, you can clean it from the posts using a wire brush.
Apply petroleum jelly to the inside of the terminals and the posts.
Reattach the cables. Close the car bonnet.

Begin: First the bonnet of the car is opened and the battery is located. Then ...

Project **15** Research an industry you are interested in.

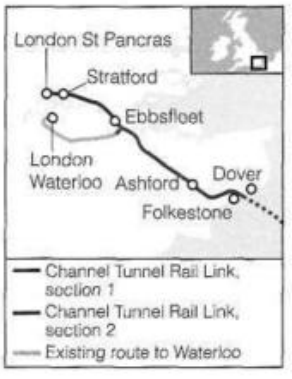
- Find out about an important process in the industry.
- Draw a flow chart of the main stages in the process.
- Write a description of the process.
- Explain the process to the class.

4 Processes

1 Infrastructure

1 09 Listen to the interview about Stage 2 of the High-Speed Rail Link. Write down the details.

Channel tunnel opens: _____
Rail Link Stage 1 opens: _____
Rail Link Stage 2 opens: _____
London–Paris (2002): _____ hours
London–Paris (2007): _____ hours
Stage 2 took _____ years.
Manpower: _____ hours
Number of tunnel drills used: _____
Cost: £_____ @ cost per drill: £_____
A train travels through _____ kms of tunnels and over _____ bridges.

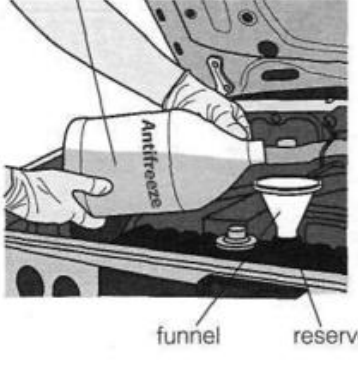


2 10 Listen and circle the words and phrases that you hear.

1 You must be very pleased with the successful completion / success and completion of the project.
2 The French built their high-speed link 30 months / 13 years ago and now we've just finished ours.
3 Eurostar / First-class trains can now travel at a speed of up to 298 kph / 148 mph.
4 The twin-bore / twin-core tunnels pass under seven miles of service / surface railway track.
5 Did you use a tunnel / funnel drill like the ones / one in this photo?
6 The rock around / ground under London was so hard that we bored / wore out six of them.
7 It means / seems we spent £17 / £70 million on drills.

3 Use the words and the verbs in the box to complete the text about antifreeze.

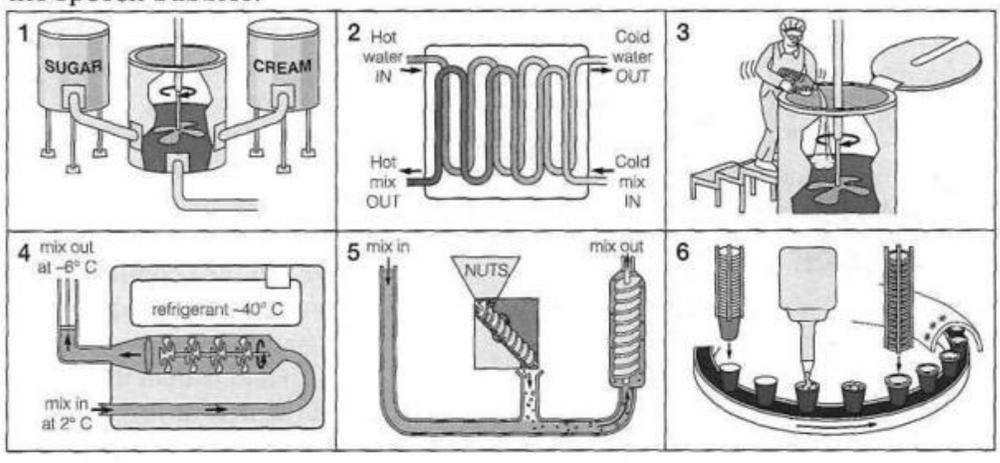
finally first next at this stage then	increase open pour prevent screw unscrew use use



Antifreeze (1) _____ to prevent the water in the radiator from freezing. Rust (2) _____ from building up in the radiator system by the use of antifreeze. Also, the boiling point of the water in the cooling system (3) _____.
(4) _____ the bonnet of the car (5) _____.
(6) _____ the cap to the reservoir (7) _____.
(8) _____ the antifreeze (9) _____ into the reservoir. (10) _____, a funnel (11) _____ to avoid spilling antifreeze onto the car. (12) _____, after pouring in the correct amount, the cap (13) _____ back on.

2 Manufacturing

1 The pictures show the stages of manufacturing ice cream. Match them with the speech bubbles.



A
We heat the mix to 82° C to kill off bacteria. (1). Then we cool the mix rapidly to 4° C.
Picture _____

B
Here we pack the ice cream in tubs and put it into a blast freezer at –30° to –40° C. So we freeze the tubs of ice cream to make them harder.
Picture _____

C
We add flavours and colours to the mix.
Picture _____

D
Here we pump the mix through a special barrel freezer. We whip a lot of air into it at the same time. Up to half the volume of ice cream is air.
Picture _____

E
Here we weigh all the ingredients and mix them together in large tubs. We use cream, milk and sugar to make ice cream.
Picture 1

F
Here we add any fruits, nuts or biscuit pieces to the semi-frozen mixture.
Picture _____

2 Write a description of the manufacturing process, using the passive. Use the linkers from the box. One of them is placed in the middle of a section.

Finally Next First Simultaneously Then First At this point

1 *First, all the ingredients are weighed and mixed together in large tubs. Cream, milk and sugar are used to make ice cream.*

2 _____

_____

3 _____

_____

4 _____

_____

5 _____

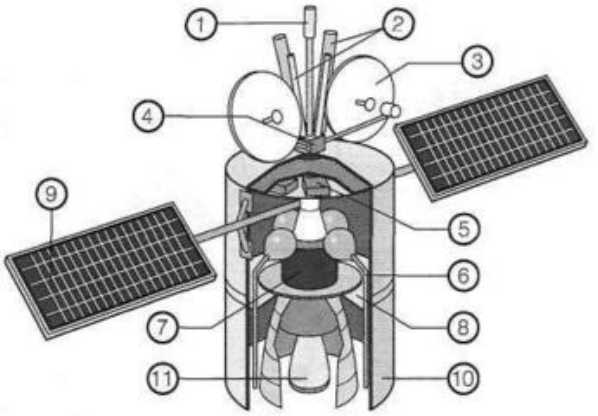
_____

6 _____

_____

3 Communications

1 Write the numbers of the satellite parts next to the descriptions in the text.



Each satellite has a frame or **bus** (***10***), which is strong enough to hold everything together.
All satellites need a source of **electrical power**. This comes from solar panels (_____). However, these do not work when the satellite is in shadow, on the side of the Earth away from the Sun. Therefore a ring of rechargeable batteries (_____) is installed.
All the satellite's systems are monitored and controlled by a **computer** (_____).
All satellites have antennas, which receive radio wave information from the ground (**uplink**) (_____) and transmit radio wave information back to Earth (**downlink**) (_____). The antennas (_____) are connected to the **radio** (_____) on the satellite. Satellites are controlled by the ground-control crew in many ways. They can change the satellite's orbit by firing the main rocket (_____) or request information.
All satellites have an **attitude control system**, which controls the positioning of the satellite. For example, the side with the solar panels may need to face the sun. Or the side with the camera or antennas may need to face the Earth. Puffer jets (_____) use gas from a pressurised tank (_____) to change the attitude of the satellite.
Satellites carry items of **equipment** that 'listen, speak, see and touch'. In addition to radio antennas, they may carry a telescope or camera, a thermometer or sensors.

2 What do these words in the text refer to? Underline your answers.

1	which (line 1)	a) satellite	b) bus
2	This (line 3)	a) electrical power	b) frame
3	these (line 4)	a) solar panels	b) satellites
4	which (line 10)	a) satellites	b) antennas
5	They (line 15)	a) ground-control crew	b) ways
6	which (line 17)	a) attitude	b) attitude control system
7	that (line 22)	a) items	b) equipment

3 Join these pairs of sentences. Use *who* or *which*.

1 The first artificial satellite was a metal ball. It measured 1 metre across and weighed 83 kg.
2 It had four long antennas. These sent radio signals back to Earth.
3 The first creature in space was a dog called Laika. It spent ten days in orbit in 1957.
4 In 1968, Apollo 8 sent photos back to Earth. It orbited the Moon.
5 The first man on the Moon was Neil Armstrong. He landed there in 1969.
6 The first tourist in space was a man called Mark Shuttleworth. He paid $20 million for his trip.
7 Two Mars Rovers sent back information about the planet to Earth. They landed in 2003.

Example: 1 *The first artificial satellite was a metal ball, which measured 1 metre across and weighed 83 kg.*

4 Word list

NOUNS (tunnels)	NOUNS (communications)	NOUNS (cars)	VERBS (cars)
belt	communications satellite	air conditioning	deliver
chute		assembly line	drill
conveyor belt	digital TV card	body shop	grip
cutter	feed horn	bonnet	strengthen
cutter face	frequency	bumper	supply
drill	high frequency	chassis	transport
hydraulic cylinder	low frequency	chassis line	weld
manpower	orbit	component	**ADJECTIVES**
propeller	PC monitor	drive shaft	rusty
scoop	satellite dish	laser guide	**ADVERBS**
steel shoe	transmitter	oil drain plug	finally
tooth/teeth	TV station	oil filler cap	first
	VERBS (communications)	paint shop	lastly
		panel shop	meanwhile
	convert	roller	next
	display	rust	now
	extract	suspension	rightside up
	process	transmission	simultaneously
	reflect	trim line	then
			upside down

1 Cover the table. Make compound nouns from the words in the boxes.

conveyor	cap	laser	card
drive	line	paint	monitor
hydraulic	cylinder	PC	horn
drain	shaft	satellite	satellite
assembly	belt	feed	dish
air	conditioning	communications	shop
filler	plug	DTV	guide

2 Write adverbs from column 4 on the correct line.

At the beginning: *first*, _____

After this: _____

At the same time: _____

At the end: _____

B Review

Section 1

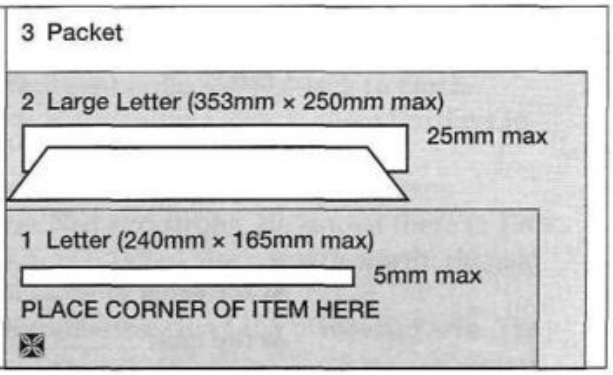
1 Complete the dialogue between a car salesman (S) and a customer (C). Make comparisons between the two cars.

	1000	1300
Engine size	1.0 litre	1.3 litre
Top speed	155 kph	170 kph
Acceleration	0-100 kph: 15.7 seconds	0-100 kph: 11.5
Fuel tank capacity	40 litre	50 litre
Fuel consumption (combined)	18.5 km/litre	16.5 km/litre

S: The 1300 is quite a bit (1) *faster* (fast) than the 1000.
C: Yes, but doesn't it use (2) *more* petrol?
S: Sure, the fuel consumption on the 1300 is a little bit (3) _____ (high).
C: So, I'll have to fill up with petrol (4) _____ (often).
S: In fact, the 1300 has a (5) _____ (large) fuel tank.
C: How much (6) _____ (large)?
S: It holds 10 litres (7) _____ than the 1000. So that evens things out. The 1300 has (8) _____ (great) acceleration. So it's much (9) _____ (safe), because you can overtake (10) _____ (fast).
C: Because it's got a (11) _____ (powerful) engine, I suppose.
S: Of course, The 1300 is (12) _____ (good) value for money.
C: But it's quite a bit (13) _____ (expensive). You see, the 1300 is (14) _____ £13,000, and I want to spend (15) _____ than £10,000. So the 1000 will be (16) _____ (good) for my budget.

2 Complete the left-hand side of the leaflet about post sizes.

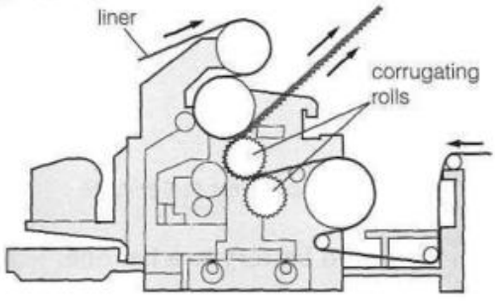
1 **Letter:** If your item fits inside the blue area, i.e. *is less than 240mm × 165mm*, is *no thicker than 5mm* and weighs *under* 100g, it is classed as a **Letter.**
2 **Large Letter:** If your item fits inside the _____ area, i.e. is _____, is _____ 25mm and weighs _____ 750g, it is classed as a **Large Letter.**
3 **Packet:** If your item fits inside the _____ area, i.e. is _____ 353mm × 250mm or is _____ 25mm and weighs _____ 750g, it is classed as a **Packet.**



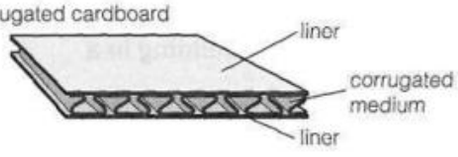
Section 2

1 Put the verbs in brackets into the passive and fill in the missing words.

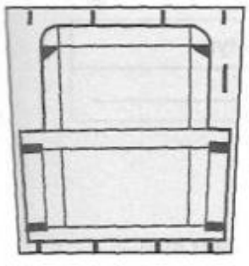
Corrugating the cardboard



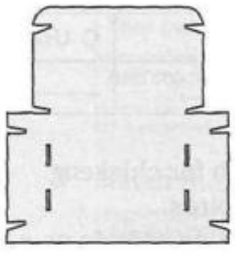
Corrugated cardboard



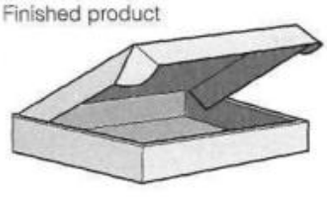
Die-cutting tool



Die-cutting blank



Finished product



How corrugated cardboard is made.

Large rolls of paper, (1) *which* weigh about 2.7 tonnes, (2 transport) *are transported* from the paper mill to the cardboard packaging factory. Here they (3 load) _____ into one end of a huge machine called a corrugator, (4) _____ is 91 metres long. One roll of paper (5 press) _____ between two heavy corrugating rollers, (6) _____ are heated (7) _____ steam to a temperature of 185° C. (8) _____, this corrugated paper (9 glue) _____ between two other layers of paper, called liners. At the end of the machine, the roll of corrugated cardboard (10 trim) _____ by slitting wheels and (11 cut) _____ into large sheets called blanks.

(12) _____, the cardboard blanks (13 feed) _____ into a printing machine, (14) _____ prints the product information and the manufacturer's name. After the printing process, some batches of cardboard (15 wax) _____ (16) _____ make them water-resistant.

Die-cutting is a process which cuts a cardboard blank into the required shape. (17) _____, a die-cutting tool (18 make) _____ out of a flexible base and sharp raised lines of steel. This (19 fit) _____ onto a roll in a rotary die-cutting machine. Cardboard blanks (20 feed) _____ into one end of the machine and pieces of cardboard (21 cut) _____ out of the blanks by the die-cutting tool. (22) _____, the blanks (23 band) _____ together and (24 transport) _____ to the customer.

2 Answer these FAQs about satellites. Write full sentences using the passive.

1 How do we put satellites into orbit?
a) location: round the Earth b) method: rockets
Satellites are put into orbit round the Earth by rockets.

2 How do we provide electricity on a satellite?
a) method: cells b) location: solar panels
_____

3 How do we change a satellite's orbit?
a) method: rocket b) location: base of the satellite
_____

4 How do we collect weather pictures all over the world?
a) method: dozens of satellites b) location: in orbit
_____

5 How do satellites transmit weather photos?
a) destination: back to Earth b) method: radio signals
_____

6 How do we use images from survey satellites?
a) method: computer b) purpose: to update maps
_____