

# 7 Manufacturing

## Switch on

- 1 Manufacturing is about changing materials into products. Choose from the list and complete the table with the materials required for products A–C.

alloy	copper
rubber	plastic
steel	wood
titanium	aluminium

	Materials	Processes
A		
B		
C		



- 2 Now choose from the list and complete the table with the processes involved in making these products.

assembly	impact extrusion
bending	injection-moulding
bonding	painting
colour printing	plating
cutting	welding

» Go to pp.56–58 for more manufacturing processes

## It's my job



- 1 Work in pairs and answer the questions.

- What stages are involved in manufacturing bread on a large scale?
- What kind of technician is responsible for keeping a plant bakery running?
- What do you think the numbers a–g refer to?
 

a 225 kg	d 21 minutes	f 10,000
b 3 minutes	e 110 minutes	g 240,000
c 54 minutes		

- 2 Listen to Nasser Aziz, a Manufacturing Engineer, and check your answers.



3 Listen again and complete the table to describe what happens at each stage in plant bakery bread-making.

Stage	1	2
What happens	_____	the dough is cut into loaves, put into tins, and left
Stage	3	4
What happens	_____	the loaves are left to cool, then taken out of their tins
Stage	5	6
What happens	_____	_____
Stage	7	
What happens	_____	

### Language spot

#### Present Passive

To describe a manufacturing process, we should answer these two important questions about each stage in the process:

*What happens?*

*When does it happen?*

We can answer the *What* question using the Present Passive:

*The ingredients are mixed.*

We can answer the *When* question by numbering the stages (1, 2, 3, etc.), or by using sequence words (*first, then, next, after that, finally*), or time clauses (see Unit 5):

*1 The ingredients are mixed.*

*First, the ingredients are mixed.*

*After the loaves are sliced, they are wrapped.*

#### In this unit

- key terms for common manufacturing processes
- Present Passive
- writing a short sequence
- how compound nouns work
- using your reading and search skills to find out how common products are made

Where necessary, we should also answer these questions:

*Where does it happen?*

*Why does it happen?*

*How does it happen?*

We can answer the *Where* question by adding information on the place the stage happens:  
*The ingredients are mixed in a steel mixer.*

We can answer the *Why* question using the infinitive with *to* (see Unit 6):  
*The ingredients are mixed in a steel mixer to make dough.*

We can answer the *How* question like this:  
*The loaves are taken out of their tins (by) using suction.*

» Go to **Grammar reference** p.118

1 Read what Nasser says in the Listening script on p.126. Then complete the *Where*, *Why*, and *How* information in the table with information provided in the text. You do not have all the information for each stage.

Stage	1	2	3
Where	_____	_____	_____
Why	_____		
How			
Stage	4	5	6
Where			_____
Why		_____	
How	_____		_____
Stage	7		
Where			
Why			
How	_____		

2 Now combine the information for each stage into one sentence.

#### EXAMPLE

1 *First, the ingredients are mixed in a steel mixer to make dough.*

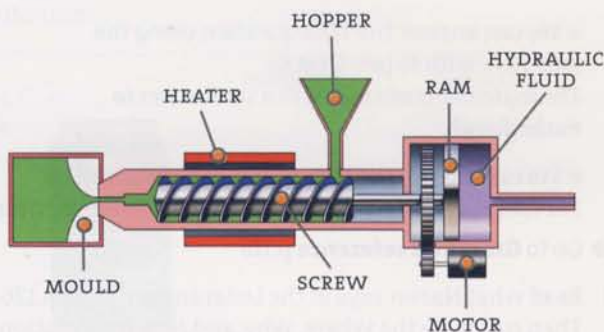


# 7 Manufacturing

## Writing

### Short sequence

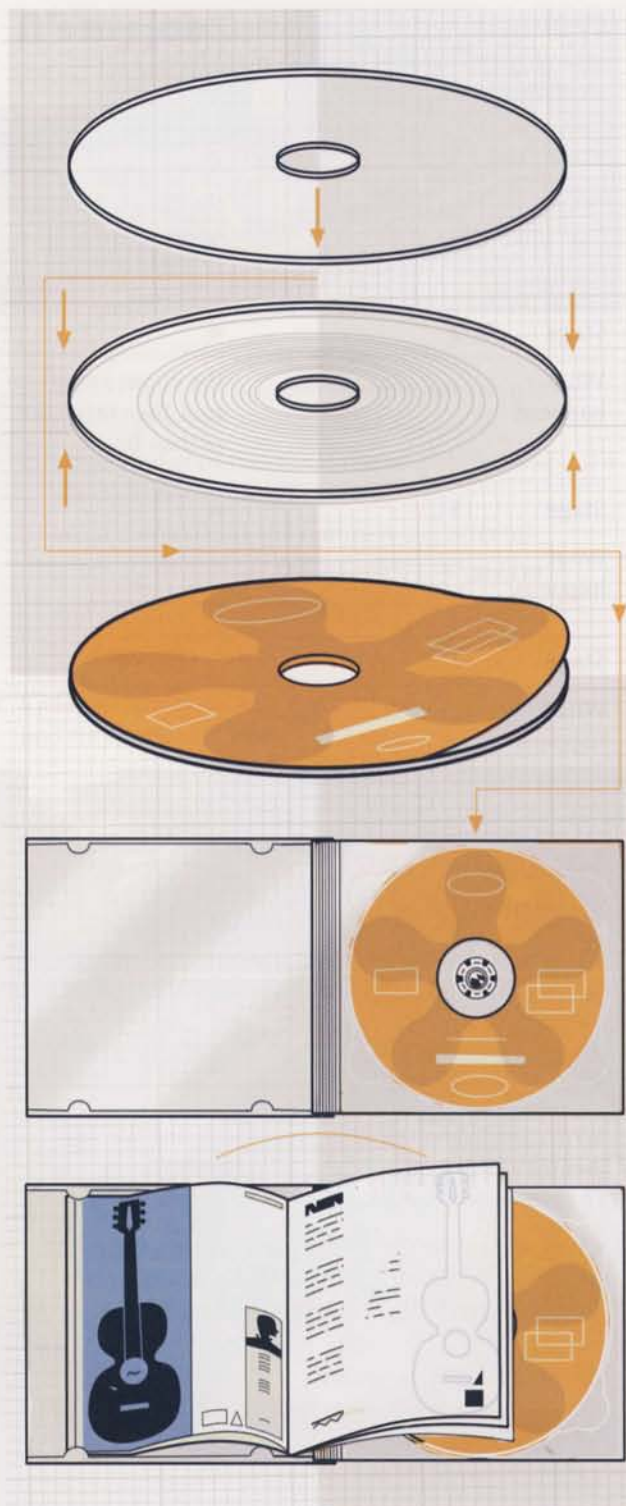
- 1 Study the injection moulding machine. It is for manufacturing plastic products like CD cases. Then put the stages in the injection moulding process in the correct sequence. The first and last stages are done for you.



- I The hopper is filled with plastic.
- a The plastic is carried through the barrel by the rotating screw.
- b The hot plastic is injected quickly into the mould.
- c The plastic is melted by the heaters.
- d The plastic travels through the barrel.
- e The plastic is fed into the barrel.
- f There is enough melted plastic in the barrel.
- g The mould is cool.
- h The plastic is left to set before the pressure is removed.
- i The screw is pushed forward by the ram.
- II The finished moulding is removed.

- 2 Combine the pairs of sentences using suitable time words (see Unit 5).

1 d+c                      2 f+i                      3 g+II



The world's largest manufacturers of:  
**hearing aids** = Siemens  
**microprocessors** = Intel  
**lifts / elevators** = Otis  
**memory chips** = Samsung  
**video games** = Electronic Arts  
**motorbikes** = Honda

## Pairwork

- 1 Work in pairs, A and B. Study this diagram of the stages in the manufacture of CDs. With the help of the diagram, discuss how CDs are made.
- 2 Each of you has a set of short texts describing some of the stages. Try to match each of your texts to one of the stages in the diagram. Be careful – some of the stages are not shown in the diagram.
- 3 Discuss your information with your partner and agree on the correct order for all of the texts.

**Student A** Go to p.111.

**Student B**

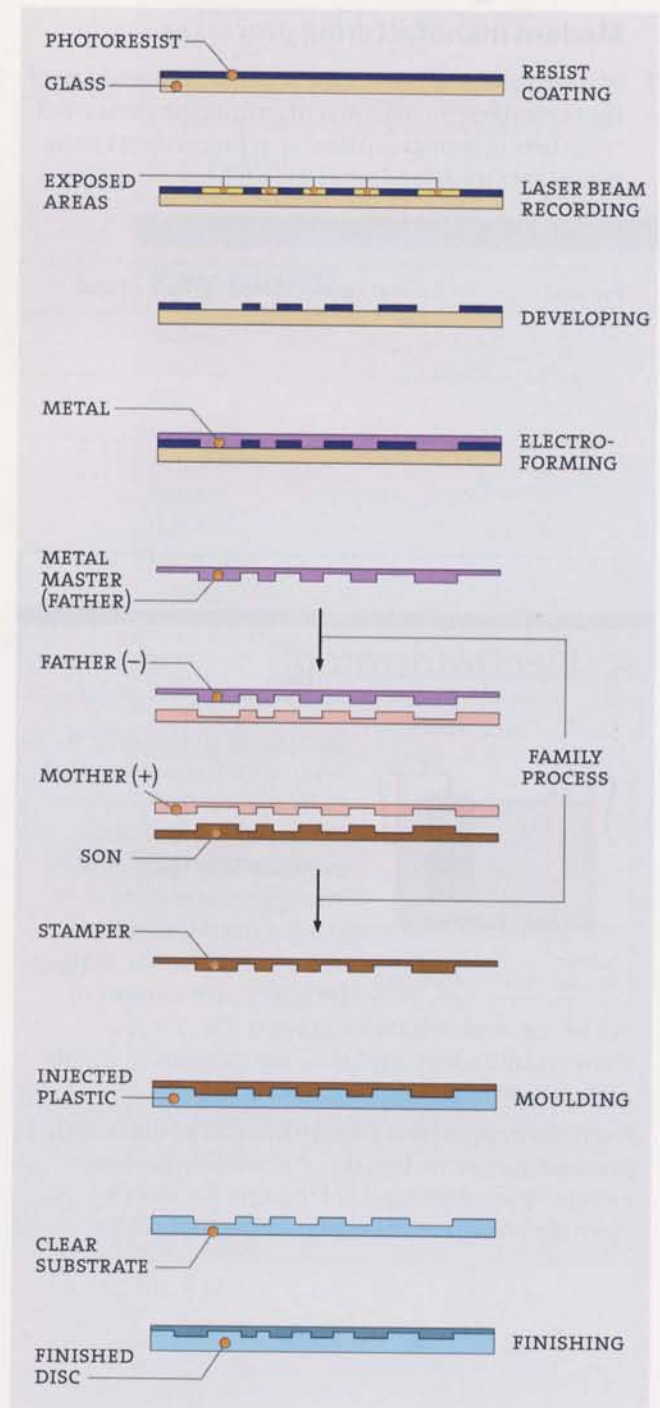
- D From the Father, multiple positive image metal Mothers are made by electroforming. Each Mother in turn produces a negative image Son which is also known as a stamper.
- E The glass master disc is placed in a chemical bath. The resist coating is not affected but where the laser has removed the resist, the chemical etches tiny pits into the surface of the glass.
- F Each disc is finished by applying a thin coating of aluminium to form a reflective layer. The disc is then covered with a protective coating of clear plastic, inspected, and labelled.

## Speaking

- 1 Work in groups of three. Make a list of at least nine food and drink products which, like bread, are manufactured on a large scale.
- 2 Choose one from your list and try to explain to the others in your group how it is made using your own knowledge of the process.
- 3 Now combine information as a group to try to make a better explanation. Using any useful information your partners have provided, repeat the explanation.
- 4 The next person should now choose a topic. Continue until everyone has made three explanations.

### Useful language

*I think ... happens next.*  
*You've forgotten about ...*  
*What about ... ?*





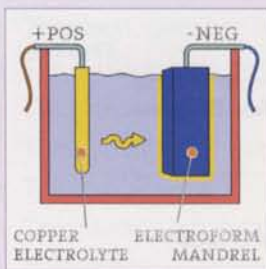
## Reading

### Modern manufacturing processes

- 1 Work in groups of three. Each of you should read one of the texts about modern manufacturing processes. Tell the others in your group how your process works, any advantages it has, and what it is used for.
- 2 Complete the table for each text.

Process	Advantages	Example of use

## A Electroforming

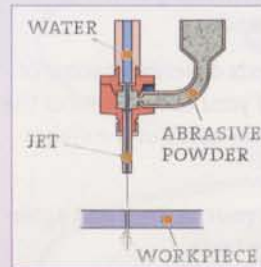


Electroforming is a way of making very accurate metal parts. It is similar to electroplating in that a metal coating is deposited on a special form in an electrolytic solution. The difference is that the coating is thicker so that the form

can be removed to leave a solid part. This process allows manufacturers to 'grow' components in metals such as nickel.

Electroforming is ideal for very fine components with precise dimensions. It makes it possible to produce extremely accurate copies of masters. For this reason, electroforming is used in the manufacture of CDs.

## B Water jet abrasive cutting

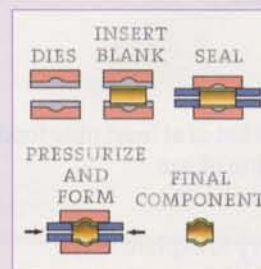


Water jet abrasive cutting uses a high pressure jet of water combined with an abrasive substance to cut through materials. The advantages of this form of cutting are that the jet can be adjusted and the kind of abrasive changed so that

almost any kind of material can be cut. In addition, the material can be cut without changing its properties in any way. With heat, there is always some damage to the areas nearest the cut.

This form of cutting has many applications. It can be used to cut metals, composites, and even thick concrete. At the other end of the scale, fine water jets, without added abrasives, are used in surgery.

## C Hydroforming



Hydroforming is a way of shaping materials such as aluminium or ultralight steel. The metal is pushed into shape using fluid pressure. For example, to produce components for car bodies, steel tubes are placed inside a mould and high

pressure applied in the tube which pushes the metal into the exact shape required. Hydroforming a component in this way means that several different operations such as stamping and welding are no longer required.

Hydroforming is used where there is demand for lower weight with high strength. It is used in the manufacture of top-of-the-range sports cars and motorbikes, such as Harley Davidsons. It is also used in the aerospace industry to produce panels for aircraft.

## Vocabulary

### Compound nouns

Compound nouns are often used in technical English. They consist of two nouns working together. Study these examples.

*car bodies* = *bodies of cars*

*plastic baths* = *baths made of plastic*

*injection moulding* = *moulding by injection*

*gas oven* = *oven which uses gas*

*gas canister* = *canister for gas*

Explain compound nouns 1–8 in the same way.

- 1 computer covers \_\_\_\_\_
- 2 vacuum forming \_\_\_\_\_
- 3 pvc pipes \_\_\_\_\_
- 4 plane wings \_\_\_\_\_
- 5 steel mixer \_\_\_\_\_
- 6 wind pump \_\_\_\_\_
- 7 steel bearings \_\_\_\_\_
- 8 clockwork radio \_\_\_\_\_

### Webquest

Use a search engine such as Google to find out what processes are used in the manufacture of items 1–5 and complete the table. (Tip: do an exact phrase search like this "car bodies are made by")

Item	Process
1 car bodies	
2 computer case	
3 plane wings	
4 plastic baths	
5 pvc pipes	

## Checklist

Assess your progress in this unit.

Tick (✓) the statements which are true.

- I know key terms for common manufacturing processes and treatments
- I can describe a manufacturing process
- I can write a short sequence
- I know some of the ways in which compound nouns work
- My reading and listening are good enough to understand most of each text in this unit

## Key words

Nouns

barrel  
blade  
bonding  
extrusion  
hopper  
ingredients  
plant  
plating  
process  
ram  
saw  
suction  
welding

Verbs

cool  
spray

Note here anything about how English is used in technology that is new to you.



# 8 Transport

## Switch on

- 1 Identify the different forms of transport in pictures A–F.
- 2 Work in small groups. List other types of land, sea, and air transport.



A



B



C



D



E



F

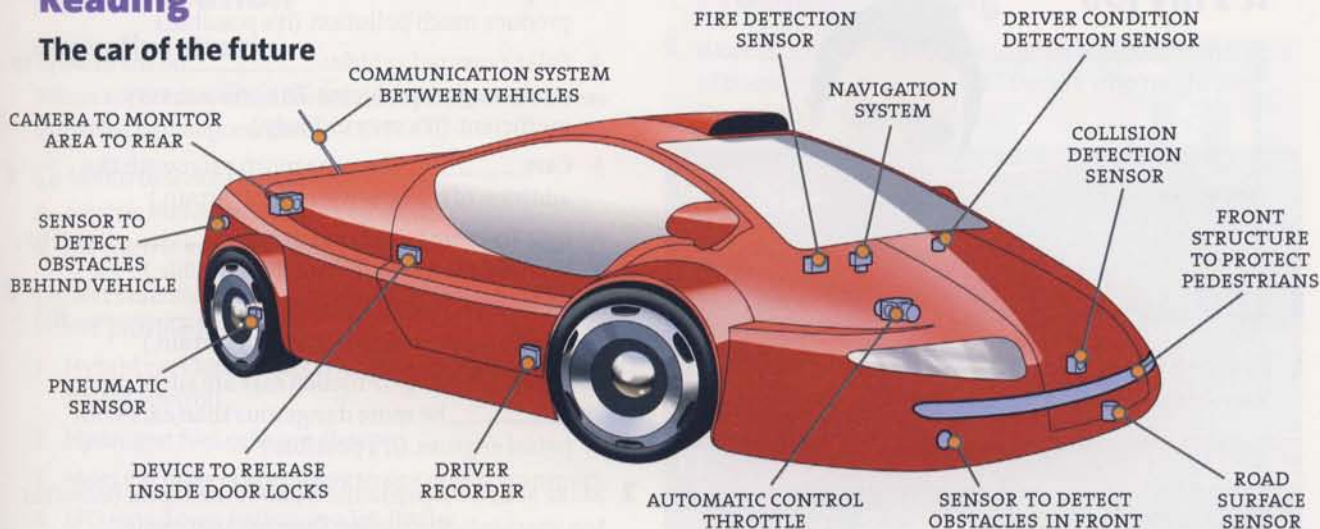


**In this unit**

- key terms for different forms of transport
- how to make predictions using *will, may, might*
- how to use corrective stress
- reading and listening for detail
- using your search skills to find out more about cars of the future

**Reading**

**The car of the future**



- 1** Look at the diagram and answer the questions.
  - 1 How is this car different from a typical car of today?
  - 2 What do you think ASV means?
  - 3 What are the aims of the designers of this car?
  - 4 What further improvements could you make to this car?
- 2** Read the text and check your answers to questions 1–3 in **1**.
- 3** Read the last paragraph of the text again and note the advantages and disadvantages of the forms of power in the table.

	Advantages	Disadvantages
1 electric		
2 hybrid (petrol and electric)		
3 LPG		
4 hydrogen fuel cell		

**ASVs**

Road traffic is increasing worldwide. This increase brings problems: road accidents, congestion, and pollution. However, engineers are working on Advanced safety vehicles (ASVs) which will be much safer for drivers, other road users such as cyclists, and for pedestrians. They are also working on new engines which use cleaner fuels.

ASVs will be equipped with electronic sensors to prevent accidents and to make it safer for people when accidents do happen. One sensor will stop the driver falling asleep. Others will warn drivers when they are too close to other vehicles.

The car of the future might be electric. Electric motors are very efficient and produce no pollution, but they need heavy batteries and their range is limited with current technology. Hybrid cars have both a petrol engine and an electric motor. They save about 15% of fuel. They need batteries but they don't have to be charged overnight as the motor acts as a generator when the car brakes. Liquefied petroleum gas (LPG) is already used as a fuel. Cars can be converted easily but LPG only cuts down pollution a little. Hydrogen fuel cells may be the long-term answer. They provide clean power but each cell is very expensive.





### Gadget box

The world's first hydrogen-powered motorbike can reach 80 kph in 12 seconds. It produces no pollution and is almost silent. However, the hydrogen fuel cell costs £15,000 and motorbike fans don't like the idea of a 'noise-free' bike!

How could you make this motorbike more attractive to bikers?

### It's my job



1 Listen to Jan Bronec, a Mechanical Engineer, and answer the questions.

- 1 What kind of transport is he concerned with?
- 2 How does his work improve life in cities?
- 3 What other product does his company make?
- 4 What kind of fuel does this product use?
- 5 Why might he have more opportunity to use English?

### ● Language spot

#### Prediction: will, may, might

● Study these examples:

*Advanced safety vehicles (ASVs) will be much safer.*

*The car of the future might be electric.*

*Hydrogen fuel cells may be the long-term answer.*

When we are talking about future developments, we use *will* for things which are certain. We use *may* and *might* for things which are possible. (There is little difference between *may* and *might* in written English.)

Note these short forms used in spoken English:

*won't = will not*

*mightn't = might not*

NOT *mayn't*

» Go to **Grammar reference** p.119

1 Complete the sentences using *will, may / might*, or their negative forms. The phrases in brackets will help.

- 1 We \_\_\_\_\_ use petrol engines in the future. (There are better alternatives. (I'm certain.)
- 2 Hydrogen fuel cells \_\_\_\_\_ get cheaper as technology improves. (I'm certain.)

- 3 A hybrid car \_\_\_\_\_ be the best choice. It doesn't produce much pollution. (It's possible.)
- 4 Solar-powered vehicles \_\_\_\_\_ be the answer to our transport problems. The cells are very inefficient. (It's very unlikely.)
- 5 Cars \_\_\_\_\_ become much safer with the addition of many sensors. (I'm certain.)
- 6 By 2015 more people in Europe \_\_\_\_\_ travel to work by train than by car. (It's possible.)
- 7 As world oil supplies dry up, petrol \_\_\_\_\_ get more and more expensive. (I'm certain.)
- 8 Because hydrogen-fuelled cars are silent, they \_\_\_\_\_ be more dangerous than cars with petrol engines. (It's possible.)



- 2 Make your own predictions about the topics below for ten years into the future. Then compare your predictions with your partner. Try to reach agreement.
- the number of cars in your country
  - the price of oil
  - the size of passenger aircraft
  - the most popular way to travel to work
  - the use of electric cars



## Pronunciation

### Corrective stress

When we correct what someone says, we often stress the point of disagreement.

- 1  Listen to this example.
  - A *Electric motors aren't very efficient.*
  - B *No, electric motors **are** very efficient.*
- 2 Correct statements 1–8. Use the words in brackets where provided.
  - 1 Hybrid cars have a diesel engine and an electric motor. (petrol)
  - 2 Hydrogen fuel cells are cheap.
  - 3 Most car drivers are happy to use public transport.
  - 4 LPG cuts down pollution a lot. (little)
  - 5 ASVs are more dangerous for pedestrians. (safer)
  - 6 Solar-power is the answer to our transport problems.
  - 7 Air travel is good for the environment.
  - 8 Trains and cars are examples of public transport. (buses)
- 3 Work in pairs. Take turns to correct each other using the statements above.
- 4  Listen and check your answers.
- 5 Work in pairs. Make statements of your own about the topics below. Disagree with your partner's views and give reasons to support your case. Use the dialogues in 4 as a model.
  - the best car made in Europe
  - the safest way to travel
  - travelling by air
  - studying English
  - travel by train in the past and now
  - the best motorbike
  - the answer to traffic problems
  - the most interesting job in technology

## Problem-solving

- 1 Work in pairs. Can you identify the less common forms of transport in pictures A–E? Decide who might use them and for what purpose.



- 2 In your pairs, decide what special features these forms of transport require to operate effectively.



328.767 mph / 529.33 kph

JCB breaks the land-speed record for a diesel engine vehicle (August 2006)



## Customer care

### Making and acknowledging apologies



If your company supplies faulty goods or if there is a delay in providing a service or meeting an order, you may have to apologize to the customer.

We can apologize face-to-face, by phone, or by email using phrases like these:

*I'm sorry that your order is late. We've been very busy but I'll see to it at once.*

*Sorry about the delay with your order.*

We can acknowledge the apology using phrases like these:

*That's alright. / OK.                      It's not a problem.*

*Don't worry about it.                      No problem.*

Sometimes we want to acknowledge the apology and make sure that action is taken. In this case we add *but...*

#### EXAMPLE

*It's not a problem but I'd like them to arrive tomorrow at the latest.*

Work in pairs. Take turns making and acknowledging apologies for the problems below. The customer starts by explaining the problem.

- The car batteries you received are for an old model – you wanted the ones for the new model.
- You are still waiting for an important delivery of solar panels, due this morning.
- One of the office telephones you received yesterday is faulty.

## Vocabulary

### Recording new expressions

In Unit 1 you studied useful ways of recording new vocabulary by grouping words according to **subjects**. It is also useful to group expressions by **function** – what they are used for.

- 1 Study the expressions for apologizing in the table of functions.

Function	Expression
Apologizing	<i>I'm sorry that ... Sorry about ... I / We apologize for ... I / We regret ...</i>
Opening a letter or email	
Closing a letter or email	
Referring to previous contact	
Giving reasons	
Promising action	

- 2 Now complete the table with the expressions below used for writing emails.

- a Hi ...
- b We will ...
- c I'm writing to you because ...
- d Regards ...
- e Dear ...
- f I wrote to you on (date) ...
- g We're going to ...
- h We spoke (last week) ...
- i Best wishes ...
- j *The reason I'm getting in touch is ...*
- k I can assure you that ...

- 3 Write a short email to a customer apologizing for sending five air-conditioning units instead of the six he / she ordered. In your email, you should refer to the telephone conversation you had yesterday and provide a reason for the error and tell him / her you will send the remaining unit by express delivery.

