

## A

**Types of numbers**

Numbers in a group together may be called a series or set of numbers. If the order in which they occur is significant then they may be called a sequence of numbers. 1, 4, 9, 16, 25 is a sequence of numbers, for example – it represents the numbers 1 to 5 squared.

1, 3, 5, 7 ... = odd numbers; 2, 4, 6, 8 ... = even numbers; 2, 3, 5, 7, 11 ... = prime numbers. The highest number in a group is the maximum and the lowest is the minimum. *The room holds a maximum of 50 and we won't run the class without a minimum of 12 students.*

An approximate number is one which is roughly correct but is not the precise or exact number. *Look at the figures and work out in your head what the approximate answer is likely to be. Then use a calculator to find the exact number.*

An aggregate is a number reached by totalling a set of numbers = the total. *The average mark achieved in the exam is calculated by taking the aggregate of all the marks and dividing by the number of exam entries.*

A discrete number or unit is something which is separate and cannot be divided into smaller numbers or units of the same thing. The opposite of discrete is continuous. A bag of apples, for example, could be considered as consisting of discrete items whereas apple sauce could be considered – by mathematicians, at least – as continuous.

A constant number or quantity is one that does not change. *In the experiment we varied [changed] the amount of water in the beaker but kept the amount of salt added constant.* A random number is one chosen by chance, i.e. it is not predictable.

## B

**Working with numbers**

The word figure is often used to refer to the symbol used for a number. *Write the total number in words and figures.*

Verbs that are frequently used with the word number include calculate [work out] a number, estimate<sup>1</sup> a number, round a number up/down<sup>2</sup>, total [add up] a set of numbers. Numbers can also tally<sup>3</sup>. *My figures don't seem to tally with yours.* You can also deduct [take away, subtract] one number from another number.

<sup>1</sup> make a rough guess at    <sup>2</sup> make a fraction, e.g.  $\frac{1}{2}$  or 0.78 into the nearest whole number

<sup>3</sup> match, agree

Values and variables are also useful terms when working with numbers. Values are individual numbers in a set of data. *The graph shows the temperature values for different months of the year.* Variables are characteristics that can take on different values for different members of a group or set being studied. *In investigating living standards you must take key variables such as social provision and cost of living into account.*

The incidence of something refers to how frequently it occurs. *The incidence of twins in the population is growing.* When talking about numbers, magnitude simply refers to the size of something, whereas in other contexts it indicates large size or importance. *Write down the numbers in order of magnitude, beginning with the smallest.*

When making calculations in, say, an exam, it is often a good idea to make an estimate<sup>4</sup> first of what the answer is likely to be. Then you will see if your final answer is in the right area<sup>5</sup> or not. Exam candidates are also often advised to show their workings<sup>6</sup> so that the marker can see how they arrived at their answer and they may get credit for their method even if the final answer is incorrect.

<sup>4</sup> rough guess    <sup>5</sup> approximately the same    <sup>6</sup> leave all their calculations on the page

## Exercises

### 25.1 Answer these questions.

- 1 What is five squared?
- 2 What is the next prime number after 19?
- 3 How is this sequence of numbers created? 3, 9, 27, 81
- 4 What is the aggregate of this set of test marks? 6, 8, 9, 5, 6, 7
- 5 If you round up 6.66, what number do you have?
- 6  $\frac{7}{9}$  and 4 – which is a whole number and which is a fraction?
- 7 In your country is tax automatically deducted from employees' earnings?
- 8 Is an accountant pleased or displeased if figures that he/she is checking tally?

### 25.2 Dr Syal is advising one of his dissertation students who is interested in pollution in road tunnels. Complete the conversation. You are sometimes given the first letter to help you.

- Dr Syal: You could c..... the total number of private cars that use the tunnel each week, based on the day-to-day figures, and get an a..... figure for how much carbon they're all emitting.
- Melissa: How p..... would that figure have to be?
- Dr Syal: Oh, it doesn't have to be exact, you just need to e..... more or less what the total pollution will be. Then you can check to see if those figures t..... with the figures that have already been published for similar tunnels. And the figure won't be c..... of course; it'll go up and down depending on lots of factors such as weather conditions, average speed, etc.
- Melissa: But can we say if the figures will be true for the future too?
- Dr Syal: Well, we do know that the traffic growth has been c..... over the past ten years; it hasn't ever gone down, so I think you can make some useful predictions.
- Melissa: Should I present each daily total as a d..... item or can I just put them all together into one figure for each week?
- Dr Syal: A weekly total is fine, and you can ..... it up or ..... to the nearest 100.
- Melissa: Right, OK. Thanks so much for your help.

### 25.3 Rewrite these spoken sentences so that they are more appropriate for writing, using the word in *italics* in an appropriate form.

- 1 There were fewer car accidents last year. *incidence*
- 2 We made a rough guess at what the final figure might be. *estimate*
- 3 The graph shows the results from the lowest to the highest. *magnitude*
- 4 A computer program helped us work out the significance of the different variables. *calculate*
- 5 Taking x away from y will help you arrive at the correct answer. *subtract*
- 6 The results from the first experiment were not the same as those we got from the repeat experiment. *tally*

### 25.4 Fill in the gaps in this advice a maths lecturer is giving her students.

In the exam, don't forget to show all your (1) ..... as we want to see how you (2) ..... at your results. Make your (3) ..... very carefully – you'd be amazed at how many people submit answers that are hardly even in the right (4) ..... And please write legibly – we must be able to distinguish all your (5) ..... ! When doing graphs, plot your (6) ..... carefully and if asked to describe an experiment don't forget to take all significant (7) ..... into account. Good luck!

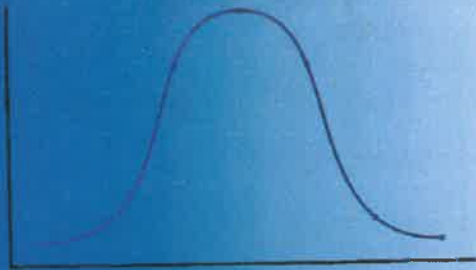
FOLLOW UP

Find some examples of the use of numbers in your own subject area. Note down some interesting phrases or sentences.

## A

## Basic statistical terms

Notice the key vocabulary in these three short texts about statistics.



A **normal distribution** of data means that most of the examples in a **set of data** are close to the average, while relatively few examples tend to one extreme or the other. Normally distributed data shown on a chart will typically show a **bell curve**. It will often be necessary to work out the extent to which individuals **deviate**<sup>1</sup> from the **norm**<sup>2</sup> and to calculate the figure that represents **standard deviation**<sup>3</sup>.

Six children are 7, 6, 8, 8, 11 and 12 years old. Their **average** age is 9 years old (the **sum** of their ages divided by six). The **mode** (the most frequent value) is 8. The **median** is 9.5 (the **halfway point** between the two extremes of the **range**).

Statisticians are often concerned with working out **correlations**<sup>4</sup> – the extent to which, say, left-handedness **correlates with** intelligence. They must ensure that any data they collect is **valid**, i.e. that it is measuring what it claims to measure – all the subjects in the **sample**<sup>5</sup> must be appropriately and accurately assessed as left- or right-handed, for example. The figures must also be **reliable**, i.e. they would be **consistent**<sup>6</sup> if the measurements were repeated. Usually, statisticians hope that their calculations will **show/indicate** a **tendency**, e.g. that left-handed people will be shown to be **significantly**<sup>7</sup> more intelligent than right-handed people.

<sup>1</sup> differ <sup>2</sup> the average <sup>3</sup> average difference from the norm <sup>4</sup> connections, often as cause and effect <sup>5</sup> the subjects of the experiment or group representing the total population measured <sup>6</sup> the same <sup>7</sup> noticeably

## B

A probability<sup>1</sup> problem

Notice the vocabulary in this problem from a statistics textbook.

Sue picks a card **at random**<sup>2</sup> from an ordinary pack of 52 cards. If the card is a king, she stops. If not, she continues to pick cards at random, without replacing them, until either a king is picked or six cards have been picked. The random **variable**<sup>3</sup>, C, is the total number of cards picked. Construct a **diagram** to illustrate the possible **outcomes**<sup>4</sup> of the experiment, and use it to calculate the **probability distribution**<sup>5</sup> of C.

<sup>1</sup> likelihood of something happening <sup>2</sup> by chance <sup>3</sup> number or element of a situation that can change <sup>4</sup> results <sup>5</sup> assessment of probabilities for each possible value of C

## C

## Other useful nouns for talking about statistics

In a class of 8 women and 4 men, what **proportion**<sup>1</sup> are male? Answer: one third

In the same class what is the female to male **ratio**<sup>2</sup>? Answer: 2:1

The figures show a **trend**<sup>3</sup> towards healthier eating habits.

The study investigates the increase in the **volume**<sup>4</sup> of traffic on the roads.

<sup>1</sup> number compared with another number <sup>2</sup> relationship between two numbers showing how much bigger one is <sup>3</sup> change in a particular direction <sup>4</sup> amount, quantity



We say **10 per cent** (NOT the 10 per cent or 10 percentage) of students got an A for their exam but the **percentage** of students achieving an A has increased.



## Exercises

### 26.1 Complete the sentences.

- The six subjects who took the test scored 24, 22, 16, 16, 16, and 14 points out of 30. The ..... was 16. The ..... score was 19 and the ..... score was 18.
- The ..... of all donations to the charity in 2003 was \$3,938. The smallest donation was \$10 and the largest was \$130. Most were around the ..... point of \$60.
- Each questionnaire item asked respondents to choose one of a ..... of six options, with the two ..... being 'very dissatisfied indeed' and 'completely satisfied'.

### 26.2 Use the correct form of the words in the box to complete this text.

distribute    trend    significant    probable    random    correlation    outcome    vary

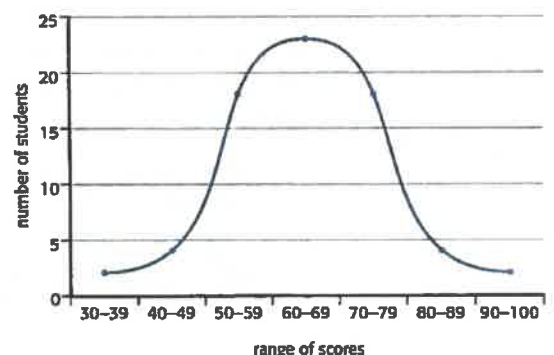
Life insurance companies base their calculations on the laws of ....., that is they assess the likely ....., given the different ..... such as age, sex, lifestyle and medical history of their clients. The premiums are therefore not chosen at ..... but are carefully calculated. The ..... of ages at which death occurs and causes of death are studied to see if they ..... with other factors to be taken into account in setting the premiums. Naturally, the companies also monitor social ..... and react to any changes which might ..... affect mortality rates.

### 26.3 Answer the questions.

- There are 12 male students and 6 female students in the class. What is the ratio of males to females? And what proportion of the class is male?
- If I am collecting data on course choices among second-year undergraduates and my sample is too small, what exactly do I need to do?
- If my data show that students have a tendency to choose the type of clothing their friends choose, does it mean that they always, often or rarely choose similar clothes?
- If I repeat the same experiment three times and the results are not consistent, is my method reliable?
- If 20 out of 200 students fail an exam, what proportion, in percentage terms, failed?
- If the average score in a test is 56, and Barbara scores 38, by how many points has she deviated from the norm?
- If the volume of court cases increases, what changes: the type of case, the size of each case or the total number of cases?
- What does standard deviation tell us? (a) What the standard of something is, (b) what the norm is, or (c) what the average difference from the norm is?
- If a general survey of teenage eating habits asks questions about what teenagers eat for breakfast and lunch, is the survey likely to be valid?
- Here is a graph showing how many students got scores within each 10-mark band in a biology test. Are the scores normally distributed? What is the shape of the graph called?

**FOLLOW  
UP**

What kinds of statistical data are likely to be discussed in your discipline? Find a relevant chart, graph or table and write about it using some terms from this unit.



## A Types of diagrams



pie chart



bar chart



histogram

Number	Amount
1	10
2	5
3	20

table



cross-section



flowchart

Diagrams are visual ways of presenting data concisely. They are often also called figures. In an academic article they are usually labelled Fig. (Figure) 1, Fig. 2, etc.

A pie chart is a circle divided into segments from the middle (like slices of a cake) to show how the total is divided up. A key or legend shows what each segment represents. A bar chart is a diagram in which different amounts are represented by thin vertical or horizontal bars which have the same width but vary in height or length. A histogram is a kind of bar chart but the bar width also varies to indicate different values.

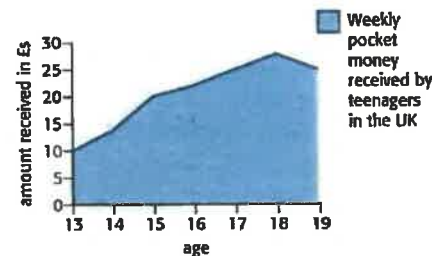
A table is a grid with columns and rows of numbers.

A cross-section is something, or a model of something, cut across the middle so that you can see the inside. A cross-section of the earth's crust, for example, shows the different layers that make it up. A label gives the name of each part of the cross-section. Cross-section can also be used to mean a small group that is representative of all the different types within the total group (e.g. *the survey looked at a cross-section of society*).

A flowchart is a diagram which indicates the stages of a process.

## B A graph

The graph presents data relating to teenagers and pocket money. A random sample of 1,000 teenagers were surveyed and the average pocket money received at each age has been plotted on the graph. The x axis or horizontal axis indicates age and the y axis or vertical axis shows the amount of money received per week. The graph shows that 15-year-olds receive twice as much pocket money as 13-year-olds. From the graph we can see that the amount received reaches a peak at the age of 18 and then starts to decline. This decline can perhaps be explained by the fact that many teenagers start earning and stop receiving pocket money at the age of 18.



Graphs are drawn by plotting points on them and then drawing a line to join adjacent points. If there are two lines on a graph – separate lines, for example, to indicate boys' and girls' pocket money – then the lines would probably cross or intersect at various points. Lines that run parallel to one another never intersect.

Graphs show how numbers increase or decrease. The nouns *increase* and *decrease* have the stress on the first syllable, but the verbs have the stress on the second syllable. Numbers can also be said to *rise* or *grow* and *fall*, *drop* or *decline*. The nouns *rise*, *growth*, *fall*, *drop* and *decline*, like *increase* and *decrease* are followed by *in* (to explain what is rising) or *of* (to explain the size of the change), e.g. *a rise of 10% in the number of cars*. Other verbs used about growth include *double*<sup>1</sup>, *soar*<sup>2</sup>, *multiply*<sup>3</sup>, *appreciate*<sup>4</sup> and *exceed*<sup>5</sup>.

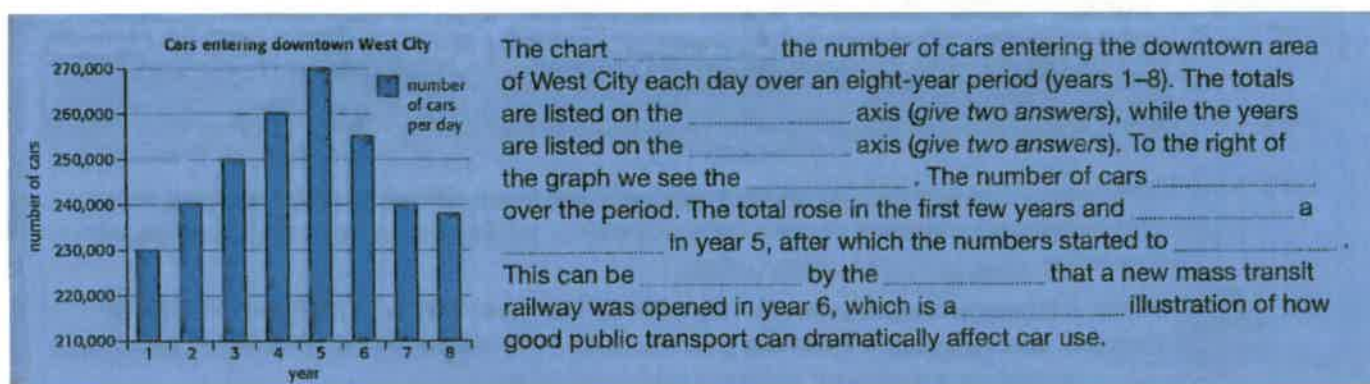
<sup>1</sup> grow to twice the size; opposite = halve <sup>2</sup> (dramatic word) rapid movement upwards; opposite = plummet <sup>3</sup> grow rapidly to a very large number <sup>4</sup> used about the value of something, e.g. a painting or car; opposite = depreciate <sup>5</sup> go over, expresses a number in relation to another number; opposite = fall below



Note that **graph** is a noun and **graphic** [relating to drawing: vivid, especially when describing something unpleasant] is usually an adjective. *The economics textbook contains a lot of fascinating graphs. My nephew studied graphic design. The book contains some very graphic descriptions of the massacre. Graphics can be used as a plural noun to refer to pictorial material, e.g. The graphics in that computer game are brilliant.*

## Exercises

### 27.1 Look at the chart. Complete the commentary with words from the opposite page.



### 27.2 Answer the questions.

- 1 Draw examples of a pie chart and a bar chart.
- 2 What would be the best type of diagram to present the different layers of rock in the Grand Canyon?
- 3 In a table, what is the difference between columns and rows?
- 4 What would be the best type of diagram to present the different stages in a research project you did?
- 5 How many segments are there in the pie chart opposite?
- 6 If you look at two adjacent columns in a table, are they next to each other or separated?
- 7 What is another name for a legend in a diagram?
- 8 What type of data collection are you doing if you survey the first 50 people you come across?
- 9 What do two lines on a graph do if (a) they intersect and (b) they run parallel to each other?

### 27.3 Make the rather informal words in bold sound more precise and academic.

- 1 The different bits of the pie chart show the numbers of people in each age group.
- 2 She kept a record by marking the midday temperature on a graph for a month.
- 3 People's salaries usually reach their **highest point** when they are in their late 40s.
- 3 This flowchart shows the different bits of our project over the next five years.
- 5 The two lines on the graph **cross each other** at point A.
- 6 Draw a line connecting the points that are **next to each other**.
- 7 The government's popularity in the opinion polls is beginning to **fall**.
- 8 If you look along the top line of the table you can see the figures for the 1950s.

### 27.4 Change the sentences using words with the same meanings as the words in bold.

- 1 Populations of some bird species in South Asia have **crashed** by 97% in recent years.  
The number of cases of death by poisoning has increased sharply.
- 2 In 2007 the child mortality rate was **lower than** 60 deaths per 1,000.
- 3 The average family car in the UK **goes down** in value by 20% per year. This means its value has **fallen by more than half** after just three years.
- 4 A typical piece of land on the edge of the city will **go up** in value by 15% per year, and house prices have **gone up** rapidly in the last six months.
- 5 Business courses have **increased greatly** in number while science programmes have **gone down**.
- 6 The temperature was **higher than** 45°C in some parts of the country during the heatwave.
- 7 Between 1983 and 2006, the number of this species of condor\* **went up** from 22 pairs to 273. Other bird populations have **gone up** by two times in the same period.
- 8 The numbers of old soldiers attending regimental reunions are **becoming smaller** each year.

\* large birds from South America



## A

## Periods of time

A century = 100 years. A decade = 10 years. An annual conference is one that happens every year. A quarterly journal is one that comes out four times a year. An era is a particular period of time that is marked by special events or developments, e.g. *the post-war era, an era of rapid social change*.

A phase is any stage in a series of events or process of development. A phase or stage can be initial [beginning], intermediate [middle] or final. It may also be described as preceding [happening before now], current [happening now], critical [particularly important] or transitional [in the process of change].

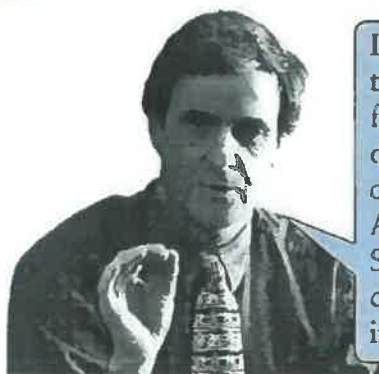
## B

## Adjectives relating to time

adjective	example	meaning
concurrent	There were <b>concurrent</b> riots in several northern towns.	occurring at the same time
contemporary	I studied all the <b>contemporary</b> accounts of the battle I could find. Jo is researching <b>contemporary</b> music.	dating from the same period existing now
eventual	The <b>eventual</b> cost of the project is likely to exceed €10 million.	happening or existing later, after effort or problems
forthcoming	My article will be published in the <b>forthcoming</b> issue of the <i>New Scientist</i> .	happening soon
ongoing	Helen has a number of <b>ongoing</b> projects.	happening now
simultaneous	There were <b>simultaneous</b> concerts in several cities.	happening at the same time
subsequent	The book examines the war and the <b>subsequent</b> changes in society.	happening after something else
successive	<b>Successive</b> governments would face similar problems.	happening immediately after something else
temporary	Georgia got a <b>temporary</b> position at the university.	not for a long period; not permanent

## C

## How times change



In recent times – particularly the last 20 years – society has gone through a period of considerable change. Prior to the 1990s very few people had access to a home computer. Nowadays<sup>1</sup> the majority of homes have at least one computer. This expansion in home computing has coincided with<sup>2</sup> the emergence<sup>3</sup> of internet technology. At the moment we are at a stage where the situation is still evolving<sup>4</sup>. Subsequent generations will live in a very different world although we do not know exactly how things will develop over the next few years, in the near future<sup>5</sup>, or, least of all, in the distant future<sup>6</sup>.

<sup>1</sup> at the present time (used to compare with the past, particularly in spoken English or more informal writing) <sup>2</sup> happened at the same time as <sup>3</sup> appearance <sup>4</sup> gradually changing <sup>5</sup> at a time which is not far away <sup>6</sup> far away in the future



Some time words, e.g. **early, late, daily** can be both adverbs and adjectives, e.g. *a(n) early/late/daily meeting, we met early/late/daily*. But **nowadays** is only an adverb. We talk about *present/present-day/current problems* NOT *nowadays-problems*.

## Exercises

**29.1** Read these emails sent out to staff and postgraduate students from their university. Complete the time expressions. You are given the first letters.

- 1 The i..... p..... of the construction of the new sports centre will begin on 1<sup>st</sup> March. From that date until completion of the works, the West Car Park will be closed. A t..... car park will be available during the period at Campus East, and a new, p..... car park will be opened when the f..... stage of construction of the centre is completed.
- 2 Due to o..... technical problems, emails with large attachments may not be accepted by the university's server. This is likely to continue during the t..... period while a new server is being installed. This will reach a c..... stage next week, when problems may be greatest. We apologise for the inconvenience.
- 3 Please report by 29 July 2007 all publications for the c..... academic year, including f..... papers and books (with the expected date of publication). These are needed for the University's a..... report for 2007. Include any publication from the p..... year (2006) which was not published at that time but which has since appeared.
- 4 The University today celebrates a c..... of research. 100 years ago this month, the Centre for Medical Research was officially opened. In the last d..... alone, five major new research centres have opened, a record for a ten-year period. We look forward to the start of a new e..... of research over the n..... f..... years.

**29.2** Choose the correct words in *italics* to complete these sentences.

- 1 In / At the moment, I'm writing up my thesis. I hope to finish in the *near* / *next* future.
- 2 Our research is *at* / *in* an *intermediate* / *ongoing* stage – we now need to analyse our data.
- 3 The *emergency* / *emergence* of internet technology has transformed the travel industry.
- 4 The university has *gone* / *got* through a period of great change in the *latest* / *last* decade.
- 5 In the *far* / *distant* future, scientists may be able to cure almost all common diseases.
- 6 Anti-social behaviour is *a nowadays problem* / *a problem nowadays* in many big cities.
- 7 A *series* / *serial* of events occurred in 1986 which changed the political climate in the country. In *consequent* / *subsequent* years, two new parties were formed which became engaged in *concurrent* / *eventual* attempts to win over voters.
- 8 Prior of / to 2001, the industry was unregulated. In *recent* / *the last* years, however, the government has introduced new regulations.
- 9 In 1968, a monetary crisis coincided *with* / *to* a huge budget deficit, and most *contemporary* / *temporary* political commentators warned that the *eventual* / *forthcoming* cost to the nation would be enormous.

**29.3** Fill in the missing forms. Do not fill the shaded boxes. Use a dictionary if necessary.



noun	verb	adjective	adverb
		eventual	
		successive	
	evolve		
emergence			
	coincide		
period			

FOLLOW UP

Write five sentences relevant to your discipline using forms from the table.



The language of presentations often contains less formal vocabulary than that of academic writing, so take care not to use the less formal expressions in your written work.

### A Introducing the presenter

Let's welcome Carmen Gregori, who's going to talk to us today on the subject of 'Healthcare in Paraguay'.

Now I'd like to call on Mieke to make/give her presentation. Mieke, thank you.

OK, thank you everybody. Now, Dr Ulla Fensel is going to present her research to us.



I'd like to introduce Dr Li Meiju, who's going to address<sup>1</sup> the topic of 'Preventive medicine'.

<sup>1</sup> rather formal; we can also say formally *speak to the topic of X*, or, less formally *talk about X*

### B Getting started

'In this presentation I'd like to focus on recent developments in biomass fuels. I'll speak for about 45 minutes, to allow time for questions and comments. Feel free to<sup>1</sup> interrupt if you have any questions or want to make a comment.'

'First I'll give a brief overview of the current situation with regard to intellectual property rights, then I'd like to raise a few issues concerning the internet. I'll try to leave<sup>2</sup> time for questions at the end.'

'I'd like to begin by looking at some previous studies of ocean temperatures. There's a handout going round<sup>3</sup>, and there are some spare<sup>4</sup> copies here if you want them.'

'In this talk I'll present the results of a study I did<sup>5</sup> for my dissertation. I'll try not to go over time and keep to 20 minutes.'

<sup>1</sup> an informal way of giving permission <sup>2</sup> less formal than *allow* – see 1 <sup>3</sup> a more formal version would be *which is being distributed* <sup>4</sup> extra <sup>5</sup> or, more formal, *carried out / conducted*

### C During the presentation – and closing it

Now let's turn to the problem of workplace stress.	begin to examine or talk about
Moving on, I'd like to look at the questionnaire results in more detail.	going on to the next point; less formal than <i>in greater detail</i>
I also want to talk about the supply of clean water, but I'll come back to that later.	or, more formal, <i>return to</i>
I'd just like to go back to the graph on the previous slide.	or, more formal, <i>return to</i>
Anyway, getting back to / to return to the question of inflation, let's look at the Thai economy.	<i>getting back to</i> is less formal than <i>to return to</i>
The results were not very clear. Having said that, I feel the experiment was worthwhile.	a less formal way of saying <i>nevertheless</i>
I'll skip the next slide as time is (running) short.	<i>skip</i> (informal) = leave out / omit
To sum up, then, urban traffic has reached a crisis. That's all I have to say*. Thank you for listening.	have no more time left * informal – not used in writing
Well, I'll stop there as I've run out of time. Thank you.	have no time left
Dr Woichek will now take questions*. Are there any questions or comments?	* rather formal = accept and answer questions

## Exercises

### 40.1 Fill in the missing words in these introductions to presentations.

- 1 Dr Anwar Musat will now ..... his research on soil erosion in Malaysian forests.
- 2 I'd now like to ..... on our next speaker, Eva Karlsson, to ..... (give two answers) her presentation.
- 3 Ladies and gentlemen, let's ..... our next speaker, Professor Prodromou from the University of Athens.
- 4 Thanks, everybody. So, Masanori is going to talk to us now ..... subject ..... 'Mental health issues in Japan'.
- 5 I'd like to ..... today's speaker, Dr Krishnan Gupta, who is going to ..... the topic of metal fatigue in rail tracks.

### 40.2 Rewrite these sentences by changing the words in bold so they are less formal. Remember that both formal and informal styles may be correct, but that it may not always be appropriate to be informal.

- 1 We need to consider family income too, but I'll return to that later.
- 2 So, to proceed to the next point, I'll omit item 4 on the handout and instead talk about number 5 in greater detail.
- 3 I'll try to finish by 3.30, but don't feel you need to ask permission to leave if you have a class or other appointment to go to.
- 4 There is a handout being distributed and I have some further copies too if anyone wants them.
- 5 I'll finish there as my time has come to an end.
- 6 We didn't want to make people uncomfortable by having a camera in the room. Nevertheless, we did want to video as many of the sessions as possible.
- 7 I'd like to return to a point I made earlier about river management.
- 8 So, I believe our experiments have been successful. I shall end there. Thank you.
- 9 To return to the problem of large class sizes, I'd like to look at a study carried out in Australia in 2002.
- 10 I'll try not to exceed my time, so I'll speak for 30 minutes, to allow time for questions at the end.

### 40.3 Fill in the missing prepositions.

- 1 I'd like to focus ..... waterborne diseases in this presentation.
- 2 The situation ..... regard ..... exports has been very good in recent years.
- 3 I'd now like to turn ..... a different problem.
- 4 I always find it difficult to keep ..... just 30 minutes, so please tell me when I have five minutes left.
- 5 I'd like to begin ..... asking you all to do a small task.

### 40.4 Write six sentences you might hear during a presentation using appropriate combinations of the words in boxes A and B. You may use words in box A more than once.

Box A | present   take   raise   make   give

Box B | issue   presentation   results   overview   comment   questions

FOLLOW UP

College and university libraries and departments often have audio or video recordings of talks, guest lectures and other presentations which can be borrowed. If you are able to do this, make a note of any useful words or expressions the speaker uses.

## A

## Useful word combinations

We may carry out a procedure or an experiment or a pilot study. [preliminary study]

We use or, more formally, employ a method or a technique or an approach or an instrument or a device. [an object or method used for a special purpose] You can also use or employ any particular type of research methodology.

Apparatus [equipment for a lab experiment] is assembled and checked. *Apparatus* is an uncountable noun but you can talk about a piece of apparatus.

## B

## Types of research method

research method	what the researcher does	limitation of method
experimental study	manipulates <sup>1</sup> a variable [anything that can vary] under highly controlled conditions to see if this produces [causes] any changes in a second [dependent] variable	done in the highly controlled setting of the laboratory – these conditions are artificial <sup>2</sup> and may not reflect what happens in the infinitely more complex real world; other researchers often try to replicate <sup>3</sup> successful experiments
correlational study	attempts to determine the relationship between two or more variables, using mathematical techniques for summarising data	only shows that two variables are related in a systematic way, but does not prove or disprove <sup>4</sup> that the relationship is a cause-and-effect relationship
naturalistic (empirical) observation (also known as field study)	observes and records some behaviour or phenomenon <sup>5</sup> , often over a prolonged period, in its natural setting without interfering with <sup>6</sup> the subjects or phenomena in any way	can be very time-consuming as researcher may have to wait for some time to observe the behaviour or phenomenon of interest; difficult to observe behaviour without disrupting <sup>7</sup> it
survey	makes inferences from <sup>8</sup> data collected via interviews or questionnaires	intentional deception, poor memory, or misunderstanding of the question can all contribute to inaccuracies in the data
case study	keeps in-depth <sup>9</sup> descriptive records, as an outside observer, of an individual or group	often involves only a single individual as the subject of the study and this person may not be representative <sup>10</sup> of the general group or population

<sup>1</sup> makes changes to <sup>2</sup> not natural <sup>3</sup> do in exactly the same way <sup>4</sup> show something is not true <sup>5</sup> something that exists and can be

seen, felt, tasted, etc. <sup>6</sup> altering <sup>7</sup> making it change <sup>8</sup> comes to conclusions on the basis of <sup>9</sup> detailed <sup>10</sup> typical



Remember that *phenomenon* is the singular and *phenomena* is the plural. The same applies to *criterion/criteria*. [a standard by which you judge, decide about or deal with something] See also Unit 31.



## Exercises

### 41.1 Complete the sentences in these two texts with words from the opposite page.

Scientists disagree as to whether cold fusion, the controlled power of the hydrogen bomb in the laboratory, is possible. In the past, some believed that e..... s..... under la..... c..... using palladium and platinum electrodes could in fact cause heavy hydrogen atoms to fuse into helium and release energy, as the sun does. In carefully controlled experiments, researchers believed they could ma..... the v..... arising from the complexity of the electrodes and other equipment used. In such co..... co....., they argued, cold fusion was possible. However, attempts to r..... some of the experiments which claimed to be successful failed, and many now believe that cold fusion is in fact theoretically impossible.

Some linguists believe that we can best d..... how language is processed by laboratory experiments. However, laboratory experiments are by definition ar..... and may not r..... what happens in the real world. Other linguists believe, therefore, that em..... o..... is better, and prefer to carry out f..... studies and c..... studies of individuals in na..... se..... In this way, i..... -d..... data can be c..... by observers without i..... with the process in any way, even though this may be a more t..... -c..... method. However, individual studies in real situations may not be r..... of the general p..... of second language learners. In short, both approaches have their advantages and disadvantages.

### 41.2 Use the words in the box to complete the diagrams. Add *a/an* and anything else needed to complete the phrase.

check methodology pilot study procedure assemble technique experiment device piece

carry out [ ] employ/use [ ] apparatus

### 41.3 Now complete the sentences using phrases from 41.2.

- 1 It was a new ..... of apparatus so we ..... it first and then ..... it before using it.
- 2 The team carried out a ..... before conducting the main ..... to see if the ..... they were using was reliable.
- 3 The team needed to employ a different ..... for measuring the pressure, so they used a new ..... which they manufactured in their own laboratory.

### 41.4 Correct the eight spelling and other vocabulary mistakes in these sentences.

- 1 It was very difficult to make reliable interferences from the data as we had so little.
- 2 A correlational study is a good way of seeing if one phenomena is related to another in a system way.
- 3 The experiment neither proved nor deproved Jessop's theory.
- 4 We had to explain the unusual scores of five of the subjets in the sample, who all had totals well below the norm. It was possible there were unaccuracies in the data.
- 5 An exterior observer can often unintentionally erupt the behaviour of the subjects they are observing.

Classifying means dividing things into groups according to their type.

## A

## Useful nouns when classifying

word	example	meaning
category	Each of our students falls into one of three <b>categories</b> .	a group that shares some significant characteristics
component	Milk is an essential <b>component</b> of any young child's diet.	a part which combines with other parts to create something bigger
existence	The <b>existence</b> of 'dark matter' in the universe was first proposed in 1933.	the fact that something or someone is or exists
feature	Effective use of metaphor is a <b>feature</b> of the poet's style.	typical part or quality
hierarchy	Humans can be described as being at the top of a <b>hierarchy</b> with amoebas on the bottom level.	system in which people or things are arranged according to their importance or power
nature	The <b>nature</b> of her work means that she is under a lot of stress.	type or main characteristic of something
structure	In this unit we shall be looking at the <b>structure</b> of the heart.	the way in which the parts of a system are arranged
type	The lion is one <b>type</b> of large cat.	group with similar characteristics, a smaller division of a larger set

## B

## One example of a classification system

There is an enormous variety/diversity of living things (or organisms). To help study them, biologists have devised<sup>1</sup> ways of naming and classifying them according to their similarities and differences. The system most scientists use puts each living thing into seven groups organised from most general to most specific. Therefore, each species belongs to<sup>2</sup> a genus, each genus belongs to a family, each family belongs to an order, etc. Species are the smallest groups. A species consists of<sup>3</sup> all the animals of the same type who are able to breed and produce young of the same kind; each species is distinct from<sup>4</sup> all other species. Biologists allocate<sup>5</sup> all organisms to a position in this system.

<sup>1</sup> thought of, invented   <sup>2</sup> is part of   <sup>3</sup> includes, is made up of   <sup>4</sup> significantly different from  
<sup>5</sup> place (also assign)

## C

## Categorising people

When categorising people, it is often necessary to take age, gender<sup>1</sup>, social class, occupation, marital status and ethnic background<sup>2</sup> into account. It may also be appropriate to consider the urban-rural<sup>3</sup> dimension<sup>4</sup>. Age, for example, is important in that different generations tend to have different attitudes and other characteristics. Social class can be described in different ways; the term blue collar may be used to mean working class while white collar denotes<sup>5</sup> middle class. The categories of student, homemaker (i.e. housewife/househusband), and senior citizen, as well as types of employment<sup>6</sup> are subsumed<sup>7</sup> under the heading<sup>8</sup> of occupation or occupational background/status.

<sup>1</sup> sex, male or female   <sup>2</sup> racial background   <sup>3</sup> city versus countryside   <sup>4</sup> aspect, way of considering something   <sup>5</sup> means   <sup>6</sup> paid work   <sup>7</sup> included as part of a larger group   <sup>8</sup> title summing up a group

## Exercises

### 42.1 Choose the words to complete these extracts from (1) a lecture and (2) a class.

1 belong categories components consist distinct diversity fall feature structure type

'Computer programming languages usually ..... into one of four .....: imperative, functional, object-oriented and logic. These languages are ..... from one another in how they operate. The ..... of imperative languages is based on commands, you know, "do this, do that thing". Languages such as Fortran and COBOL ..... to this ..... Functional languages ..... of mathematical functions. The ..... of object-oriented languages are commands which are combined with the data to create "objects". The main ..... of logic languages is that they state facts or relations between things. Now, in the case of human languages, ..... is considered a good thing. In the case of programming languages, it suggests we still haven't found the best one!'

2 blue collar class devise employment ethnic gender generations homemakers occupational senior citizens

'For your end-of-year project, you must carry out a survey of consumer preferences for one product or a type of product. You'll need to ..... a questionnaire, and you'll need to take a lot of factors into account. These include ..... , that is how many males and/or females are in your sample, social ..... , and so on. And also different ..... ; will it just be adults, or young people too? And what about ..... ? They may be retired, but they still buy a lot of things. Also, what about ..... status? Are you going to separate ..... and white collar workers? Or are you also interested in people who are not in ..... , such as ..... , but who are often the ones who buy the goods? And in our multicultural society, don't forget ..... background.'

### 42.2 Complete the table. Use a dictionary if necessary.



noun	verb	adjective	adverb
		similar	
		different	
	allocate		
	describe		

### 42.3 Now choose a word from 42.2 to complete these sentences.

- 1 It is hard to ..... between these two ..... plants. They hardly ..... at all.
- 2 The professor persuaded the university to ..... more resources to his department.
- 3 There are some magnificent ..... passages in the writer's later novels.
- 4 In your essay comment on the ..... and the ..... between the two poems.

### 42.4 Vary the sentences by using words of similar meaning instead of the words in bold.

- 1 It is difficult to categorise human emotions as we know little about their basic characteristics.
- 2 Sensation and action can both be included under the term *behaviour*.
- 3 Linguists **allocate** all languages to a place in the system of language families, based on their grammars and other key aspects.
- 4 The atmosphere of the planet **consists** of different gases.
- 5 City and country people often differ in their political attitudes. **Whether** one is married or single is also a relevant factor.



## A

## General nouns and verbs

Note the prepositions which follow the nouns in bold.

The next stage/step in the process of data collection was to send out 100 questionnaires.

The **procedure**<sup>1</sup> for Experiment B was different from that of Experiment A.

The **application**<sup>2</sup> of Thoren's method produced some interesting results.

They studied the behaviour of large corporations during periods of economic crisis.

The team carried out a computer **simulation**<sup>3</sup> of climate change over the next 30 years.

Twenty-five subjects were selected from the first group to take part in the second analysis.

She **designed** a course to train students to **utilise**<sup>4</sup> self-motivation strategies.

The article sets out to **unify**<sup>5</sup> some concepts in the theory of economic growth.

Personal interviews were conducted to **supplement**<sup>6</sup> the statistical data.

The experiments were repeated, in order to **verify**<sup>7</sup> the results observed in the original data.

<sup>1</sup> carefully controlled set of actions <sup>2</sup> using it for a practical purpose <sup>3</sup> a model of a problem or course of events <sup>4</sup> (formal) use something in an effective way <sup>5</sup> bring together/combine <sup>6</sup> add something to something to make it larger or better <sup>7</sup> make certain that they are correct

## B

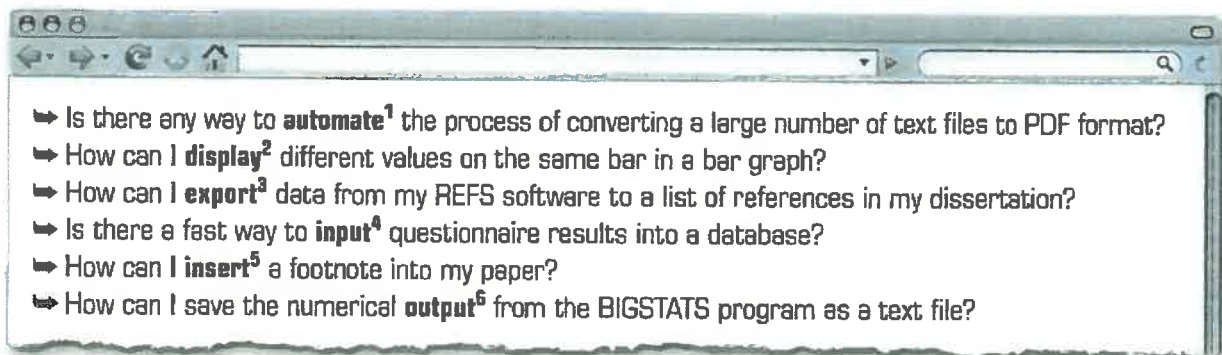
## Social/political/economic processes

example with noun	equivalent verb	meaning
The <b>emergence</b> of nation states changed Europe in the 19th century.	Nation states <b>emerged</b> in the 19th century.	process of appearing or starting to exist
The paper is a study of water <b>consumption</b> in Brazil during 2001.	Millions of litres of bottled water are now <b>consumed</b> .	process of using fuel, energy, food, etc.
<b>Ratification</b> of the trade agreement took place in 2004.	The agreement was <b>ratified</b> in 2004.	process of making an agreement official
<b>Security</b> of supply is the most important priority in the gas industry.	The new pipeline will <b>secure</b> gas supplies for the region.	(formal) process of getting something
Before the <b>advent</b> of computers, scientific analysis was a slow process.	Before computers were <b>developed/invented</b> , analysis took a long time.	arrival of an invention (the noun has no verb form)

## C

## Technological processes and procedures

Look at these questions on a college website dealing with computer problems.



<sup>1</sup> make a process be operated by machines or computers, instead of by humans <sup>2</sup> arrange something or a collection of things so that they can be seen <sup>3</sup> copy a large amount of it either to a different part of the computer's storage space or to another form of storage <sup>4</sup> put them into the computer's system <sup>5</sup> add <sup>6</sup> results produced by the programme

## Exercises

### 47.1 Choose the best word in italics to complete each sentence.

- 1 It is sensible to *unify* / *select* / *verify* your results before publishing them.
- 2 Hip replacement is usually a simple medical *application* / *procedure* / *behaviour*.
- 3 Many students *supplement* / *utilise* / *verify* their scholarships by doing some part-time work.
- 4 A computer *stage* / *procedure* / *simulation* shows what will happen if the ocean current does indeed change direction and start flowing from the Arctic to the West Indies.
- 5 As the next *step* / *behaviour* / *application* in our study we plan to carry out interviews.
- 6 Her aim is to *form* / *design* / *function* a radically different type of electric engine.

### 47.2 Rewrite each sentence, replacing the underlined word with a word from B or C opposite. Both the underlined words and the replacement words are correct in academic English; the difference is that the replacement words are more formal.

- 1 It is hardly surprising that people use far more electricity than they did ten years ago.
- 2 The arrival of the mobile phone has transformed the way young people manage their social lives.
- 3 The software allows you to present your data in a range of different types of chart.
- 4 A number of talented new designers have appeared this year.
- 5 You've missed out a letter here – you need to add a *p* between the *a* and the *t*.
- 6 He spent many years trying to create a machine that would automatically sort large numbers of coins.
- 7 The research assistants had to put in a huge amount of data to run the experiment.
- 8 The political party managed to gain more support than was anticipated.

### 47.3 Complete these tables and add the preposition which usually follows the verb or noun where you see (+). Use a dictionary for prepositions not given on the opposite page.



verb	noun
apply (+)	(+)
behave	(+)
simulate	(+)
(+)	selection (+)
	design (+)
ratify	(+)
(+)	insertion

verb	noun
	verification (+)
	utilisation (+)
emerge (+)	(+)
consume	(+)
secure	(+)
(+)	input
	display (+)

### 47.4 Choose a word from the tables in 47.3 to complete each sentence.

- 1 The article traces the ..... of Korea as a major economic force.
- 2 Because of the drought everyone has been asked to reduce their water .....
- 3 I think it would be a good idea to ..... some tables into the first part of your article.
- 4 It took considerable negotiations before all parties were prepared to ..... the treaty.
- 5 This course will focus on the ..... of theory to practice.
- 6 It took me a long time to ..... into the computer all the data from the survey.
- 7 Most psychology students choose to do a course on animal .....
- 8 My instructor gave some useful advice on how to ..... a new group of experiments.

FOLLOW UP

Use a dictionary to find some typical word combinations for these words – *process*, *procedure* and *stage*. Then write five sentences about aspects of your own subject using five of the word combinations.