

27 Graphs and diagrams

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.

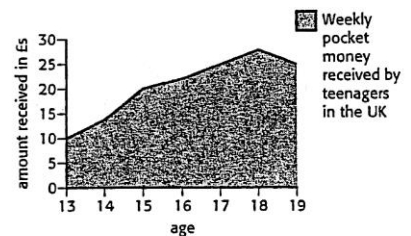
A table is a grid with columns and rows of numbers.

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 double¹, soar², multiply³, appreciate⁴ and exceed⁵.

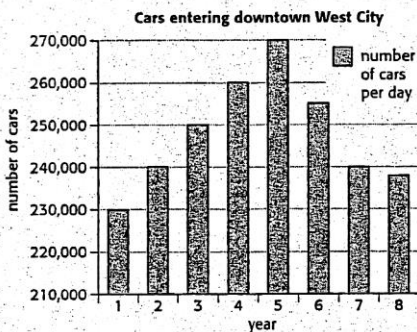
¹ grow to twice the size; opposite = halve ² (dramatic word) rapid movement upwards; opposite = plummet ³ grow rapidly to a very large number ⁴ used about the value of something, e.g. a painting or car; opposite = depreciate ⁵ go over, expresses a number in relation to another number; opposite = fall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



The chart the number of cars entering the downtown area of West City each day over an eight-year period (years 1–8). The totals are listed on the axis (*give two answers*), while the years are listed on the axis (*give two answers*). To the right of the graph we see the The number of cars over the period. The total rose in the first few years and a in year 5, after which the numbers started to This can be by the that a new mass transit railway was opened in year 6, which is a illustration of how good public transport can dramatically affect car use.

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

Computer language exercise

Exercise 1

Fill in the missing words:

- 1 Please send the file to me _____ email.
- 2 I'm afraid the server is _____ at the moment. It isn't working.
- 3 At the moment he's surfing _____ the internet.
- 4 You will find the information _____ www.bbc.com.
- 5 I'm afraid this program won't run _____ your computer.
- 6 She spends a lot of time _____ chat rooms talking to people.
- 7 A lot of information on our customers is kept _____ file.
- 8 She spends up to 8 hours a day working _____ her computer.
- 9 I store a lot of pictures _____ my computer.
- 10 You will find all the facts and figures stored _____ this document/file/folder.
- 11 I'm afraid this program is not compatible _____ your computer.
- 12 Remember to back _____ your files in case you get a virus and lose them.
- 13 Double-click _____ the Google icon.
- 14 You can buy it online _____ Amazon.
- 15 If your PC is infected with a virus, your data is _____ risk.
- 16 You can use this key to toggle _____ two documents in the same program.

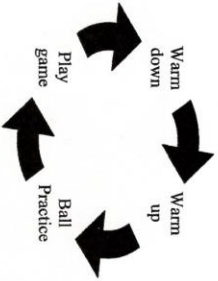
For questions 32 – 38, match the visual organisers with their names listed A – H.
 Mark the correct letter (A – H) on your answer sheet.
 There is one extra option which you do not need to use.

Visual organiser names

- A thought bubble
- B column table
- C Carroll diagram
- D pie chart
- E Venn diagram
- F bar chart
- G cycle
- H tree diagram

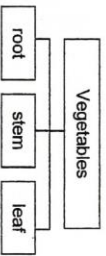
Visual organisers

32



G

33



H

34



- bread
- pasta
- rice
- potatoes

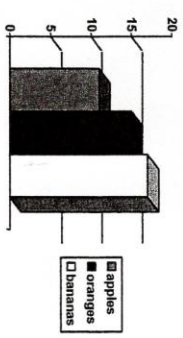
D

35

	Food	Drink
Natural	apples	water
Manufactured	pasta	coke

C

36



- apples
- oranges
- bananas

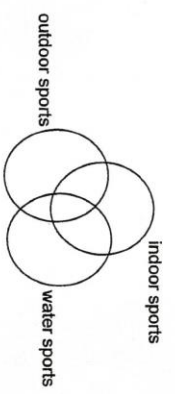
F

37

How often do you...	Me	Friend 1	Friend 2
go swimming?			
play tennis?			
do gymnastics?			

B

38



E

- 36 E
- 37 B
- 38 F
- 39 C
- 40 D
- 41 H
- 42 G
- 43 E

Body movements (1)

Stand up straight
and turn around,
bend your knees
and touch the ground.



Make a T
and make a Y,
then reach up
and touch the sky.



Touch your head
and touch your nose.
Now bend down
and touch your toes.



Stand up straight
and touch your lips,
touch your shoulders,
touch your hips.



Cross your arms
and shake your head.
With your body
now make a Z.



Stand up straight,
jump up and down,
nod your head,
and then sit down.



Collocation Quiz**A**

- 1 Romeo and ... Juliet
- 2 Laurel and ... Hardy
- 3 Tom and ... Jerry
- 4 bread and ... butter/jam
- 5 salt and ... pepper
- 6 bed and ... breakfast

- 7 a soft ... drink
- 8 a comfortable ... bed/chair
- 9 a silk ... tie/scarf
- 10 a single ... bed/ticket/room/man
- 11 a double ... bed/whiskey/room
- 12 a flat ... tyre/battery



- 13 an alarm ... clock
- 14 a credit ... card
- 15 a baby ... sitter
- 16 a hair ... dryer/brush
- 17 a washing ... machine
- 18 a safety ... belt/pin



- 19 to tell a ... joke/story/lie
- 20 to tell the ... truth/time
- 21 to make a ... mistake
- 22 to put on your ... clothes/shoes
- 23 to pay the ... bill/rent
- 24 to book a ... holiday/flight/taxi

25 Graham ... Workman

Collocation Quiz**B**

- 26 a pair of ... shoes/jeans/scissors
- 27 a bottle of ... wine/milk/water
- 28 a box of ... chocolates/tissues
- 29 a tube of ... toothpaste/mustard
- 30 a bunch of ... flowers/grapes/keys
- 31 a loaf of ... bread



- 32 roast ... chicken/beef
- 33 sliced ... bread
- 34 classical ... music
- 35 heavy ... rain/traffic/metal
- 36 a delicious ... meal/cake
- 37 a dry white ... wine

- 38 to catch a ... bus/train/cold
- 39 to climb a ... tree/mountain
- 40 to ride a ... bike/horse
- 41 to brush your ... hair/teeth
- 42 to drive a ... car/train/bus/taxi
- 43 to ask a ... question/favour

- 44 to speak English ... very well/fluent
- 45 to sleep ... soundly/well
- 46 to listen ... carefully
- 47 to drive ... carefully/slowly/fast
- 48 to breathe ... deeply
- 49 to whisper ... softly

50 Well ... done!

Maths Collocation Quiz 1**(Opposites)****A**

- | | | |
|----|-----------------------|---------------------------------------|
| 1 | positive and ... | negative |
| 2 | odd and ... | even numbers |
| 3 | maximum and ... | minimum |
| 4 | add and ... | subtract / take away |
| 5 | increase and ... | decrease |
| 6 | straight and ... | curved |
| 7 | major and ... | minor (axis / arc / sector / segment) |
| 8 | approximately and ... | exactly |
| 9 | dependent and ... | independent (variables) |
| 10 | terminating and ... | repeating / recurring (decimals) |

FOLD

Maths Collocation Quiz 1**(Opposites)****B**

- | | | |
|----|-------------------|----------------------------------|
| 11 | plus and ... | minus |
| 12 | numerator and ... | denominator |
| 13 | finite and ... | infinite |
| 14 | multiply and ... | divide |
| 15 | rise and ... | fall |
| 16 | exterior and ... | interior (angles) |
| 17 | long and ... | short (division) |
| 18 | definite and ... | indefinite (integral) |
| 19 | implicit and ... | explicit (functions) |
| 20 | domain and ... | codomain (of a function) / range |

Maths Collocation Quiz 2

(Verbs)

A

- | | | |
|----|-------------------------------|----------------------------------|
| 1 | to find the ... | value of x / solution / answer |
| 2 | to eliminate / get rid of ... | the brackets |
| 3 | to expand the ... | expression / brackets |
| 4 | to plot a ... | graph |
| 5 | to multiply out the ... | brackets |
| 6 | to calculate the surface ... | area |
| 7 | to approach ... | infinity |
| 8 | to bisect a / an ... | line / triangle / circle / angle |
| 9 | to satisfy an ... | equation |
| 10 | to cancel out ... | the common factors |
| 11 | to rationalise a ... | denominator / numerator |
| 12 | to transpose the ... | terms of an equation |

FOLD

Maths Collocation Quiz 2

(Verbs)


B


- | | | |
|----|-------------------------------|--|
| 13 | to work out the ... | answer / average / area / value of x |
| 14 | to solve a / an ... | problem / equation |
| 15 | to raise something to the ... | power of 2, 3, ... / 2^{nd} , 4^{th} , n^{th} power |
| 16 | to simplify a/an ... | equation / expression / fraction |
| 17 | to arrive at an ... | answer |
| 18 | to sketch a ... | graph |
| 19 | to rearrange the ... | equation |
| 20 | to collect like ... | terms |
| 21 | to round up/down to ... | the nearest ... / ... d.p./ ... s.f./ |
| 22 | to intersect the ... | x-axis / y-axis |
| 23 | to find a range of ... | values |
| 24 | to factorise a / an ... | quadratic equation / expression |


Describing change - revision

Look at the words below for describing change. Replace the missing vowels in each word.

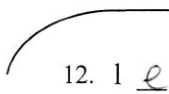
 1. I n c r e o s e 2. r l s e 3. g o u p


 4. f a l l 5. d e c r e e s e
6. g o d o w n 7. d r o p


 8. p e a k 9. r e a c h e m A x i m u m

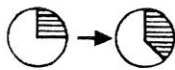
 10. r e a c h e m i n i m u m

 11. r e m a i n s t a b l e

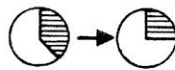
 12. l e v e l o f f 13. r e a c h e p l a t e a u

 14. f l u c t u a t e 15. v a r y

 16. s t a b i l i s e



17. e x p a n d



19. d e c l i n e

18. g r o w

20. s h r i n k

Graphs communicative crossword

Student A

Instructions

You have half of a crossword. Find out the missing words, e.g. ask your partner:

“What’s 5 across?”

Your partner will explain the word. When you know the word, you must say:

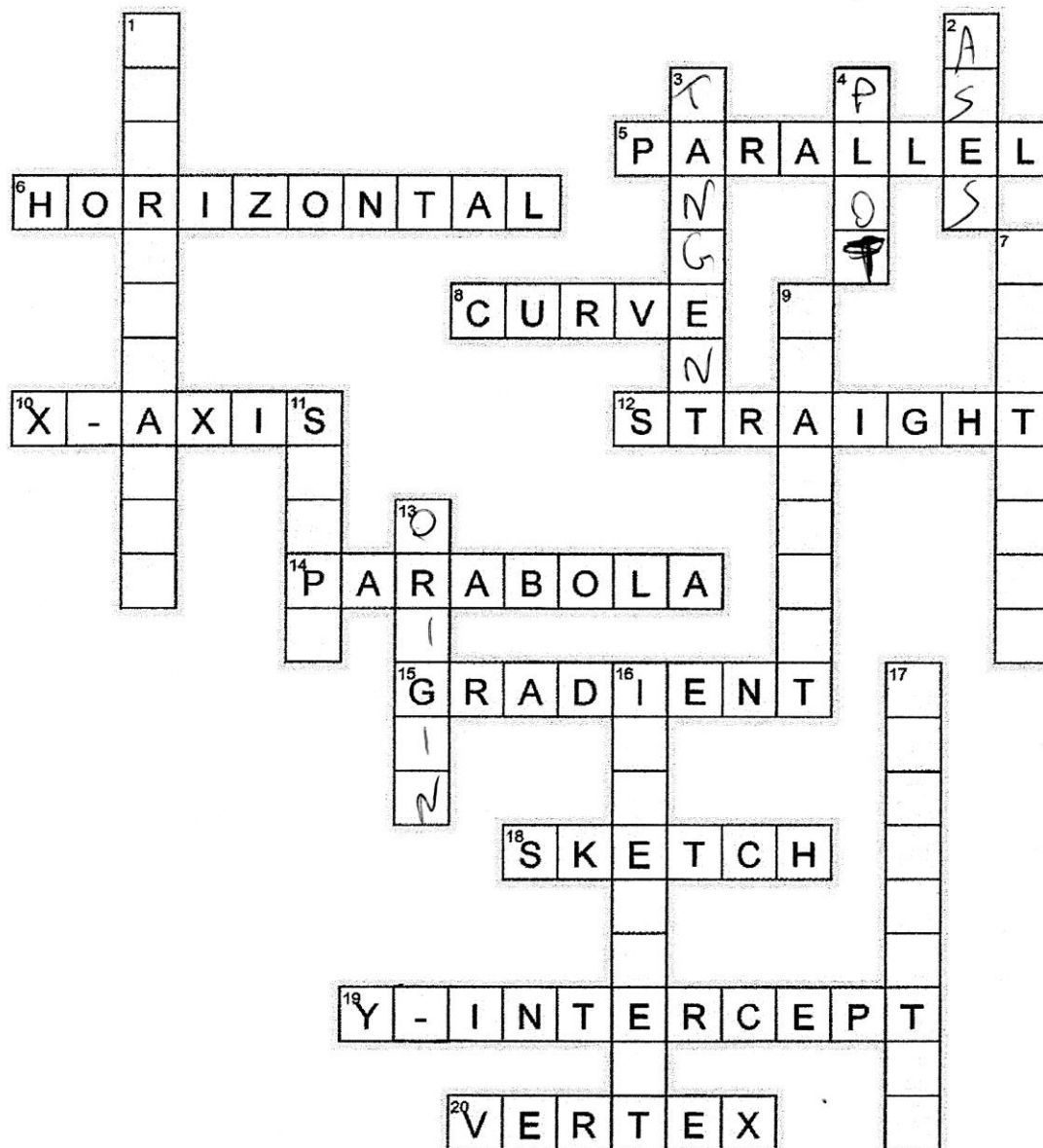
“Oh, I see!”

Do not say the word out loud. If you cannot understand what the word is, say to your partner:

“How do you spell it?”

Graphs communicative crossword

Student B



Instructions

You have half of a crossword. Find out the missing words, e.g. ask your partner:

“What’s 1 down?”

Your partner will explain the word. When you know the word, you must say:

“Oh, I see!”

Do not say the word out loud. If you cannot understand what the word is, say to your partner:

“How do you spell it?”

Maths: word stress (1) - Answers

1	2	3	4	5
Oo	oO	oOo	Ooo	Oooo
average axis axes centroid constant factor finite	acute alike bisect derive divide domain	adjacent concentric divisor exponent	accurate algebra analyse area asymptote calculate conical congruent correlate cylinder deviate factorise gradient	characterise
6	7	8	9	10
oOoo	oOooo	ooOo	ooOoo	oooOo
analysis arithmetic (n) binomial circumference commutative consecutive coordinates cylindrical derivative diagonal diameter divisible equivalent eliminate factorial geometry hypotenuse hypothesis	approximately denominator	algebraic Archimedes arithmetic (adj) asymptotic calculation coefficient correlation deviation exponential horizontal	equilateral geometrical hypothetical	characteristic

Maths: word stress (1)**Exercise 1**

Mark the stress on these words. Then listen to the words to check if you are right.

acute	algebra	algebraic
adjacent	factor	equivalent

Exercise 2 Mark the stress on the words below. Then check your answers.

accúrate	characterise	diagonal
alíke	characteristic	diameter
altítude	circumference	divide
anályse	coefficient	divisible
análysis	commutative	divisor
approxíately	concentric	domain
Archímédes	conical	eliminate
área	congruent	equilateral
áríthmetic (n)	consecutive	exponent
áríthmetic (adj)	constant	exponential
ásymptote	coordinates	factorial
ásymptotic	correlate	factorise
áverage	correlation	finite
áxis	cylinder	geometry
áxes	cylindrical	geometrical
binomial	denominator	gradient
bisect	derive	horizontal
calculate	derivative	hypotenuse
calculation	deviate	hypothesis
centroid	deviation	hypothetical