Adding and subtracting with negative numbers

Work out these additions and subtractions.

1 $4 - 7$ -3

2 $-7 + 9$ 2

3 $7 - 5$ 2

4 $-3 + (-5)$ -8

5 $-4 + (-6)$ -10

6 $8 - (-10)$ 18

7 $-2 + 4$ 2

8 $-8 - (-3)$ -5

9 $-3 - (-8)$ 5

10 $15 - 20$ -5

11 $24 - 51$ -27

12 $24 - (-51)$ 75

13 $-23 - (-17)$ -6

14 $-356 - (-512)$ 156

15 $-163 + (-104)$ -267

16 $23 + (-34)$ -11

17 $73 + (-56)$ 17

18 $-10 + 7$ -3

19 $4 - (-6) + 8$ 18

20 $6 + (-8) + 5$ 3

21 $-5 + 7 - 6$ -4

22 $-6 - (-4) - 12$ -14

23 $11 - (-8) - 5$ 14

24 $-2 + (-5) + 8$ 1

Arrange these numbers in order of size, smallest first.

25 5, –3, 9 -3, 5, 9

26 –2, 4, –6 -6, -2, 4

27 –4, –6, –8 -8, -6, -4

28 –2, –4, 3 -4, -2, 3

29 –2, –3, 1 -3, -2, 1

30 8, –7, 7 -7, 7, 8

Multiplying and dividing with negative numbers

Work out these multiplications and divisions.

1 $(-2) \times 5$ -10

2 $3 \times (-4)$ -12

3 $4 \times (-7)$ -28

4 $(-3) \times 10$ -30

5 $(-2) \times (-6)$ 12

6 $(-5) \times (-8)$ 40

7 $(-3) \times 12$ -36

8 $7 \times (-4)$ -28

9 $(-16) \div 8$ -2

10 $12 \div (-3)$ -4

11 $(-15) \div (-5)$ 3

12 $20 \div (-2)$ -10

13 $(-35) \div (-7)$ 5

14 $22 \div (-11)$ -2

15 $45 \div (-9)$ -5

16 $(-24) \div (-12)$ 2

17 $50 \times (-10)$ -500

18 $50 \div (-10)$ -5

19 $(-8) \times (-9)$ 72

20 $(-42) \div 6$ -7

21 $(-12) \times (-12)$ 144

22 $100 \times (-4)$ -400

23 $100 \div (-4)$ -25

24 $(-39) \div (-3)$ 13

Work out the value of each of these.

25 $2 \times 3 \times (-4)$ -24

26 $3 \times 4 \div 6$ 2

27 $4 \times 5 \div (-2)$ -10

28 $(-3) \times (-4) \times 5$ 60

29 $8 \times (-3) \div (-4)$ 6

30 $(-14) \times 3 \div (-6)$ 7

PUPIL'S PAGES 95–96

Prime factorisation

Write these products of primes as ordinary numbers.

1 2×3 ..... 6 .....

2 $2^2 \times 3$ ..... 12 .....

3 $2^2 \times 7$ ..... 28 .....

4 3×7 ..... 21 .....

5 3×7^2 ..... 147 .....

6 2×3^3 ..... 54 .....

7 2×5^2 ..... 50 .....

8 $2 \times 3 \times 5$ ..... 30 .....

9 $3 \times 5 \times 7$ ..... 105 .....

10 $2 \times 5 \times 7$ ..... 70 .....

11 $2^2 \times 5^2$ ..... 100 .....

12 $2 \times 5 \times 11$ ..... 110 .....

Write these numbers as products of prime factors.

13 22 ..... 2×11 .....

14 24 ..... $2^3 \times 3$ .....

15 18 ..... 2×3^2 .....

16 35 ..... 5×7 .....

17 36 ..... $2^2 \times 3^2$ .....

18 44 ..... $2^2 \times 11$ .....

19 45 ..... $3^2 \times 5$ .....

20 120 ..... $2^3 \times 3 \times 5$ .....

21 124 ..... $2^2 \times 31$ .....

22 154 ..... $2 \times 7 \times 11$ .....

23 220 ..... $2^2 \times 5 \times 11$ .....

24 360 ..... $2^3 \times 3^2 \times 5$ .....

Question **25** is all about **perfect numbers**. A **perfect number** is defined as a whole number whose value is equal to the sum of its factors, counting 1 but not counting the number itself.

For example, the number 6 has factors 1, 2, 3 (and 6), and $1 + 2 + 3 = 6$.

25 Find a perfect number between 20 and 30. ..... 28 .....

Find another perfect number just below 500. ..... 496 .....

You might want to find out more about perfect numbers, perhaps by using an internet search engine. But don't try to find any more by hand, as they are rather rare. The next one is over 8000, and the next after that is larger than 33 million!

PUPIL'S PAGES 96–97

HCF and LCM

Find the HCF (Highest Common Factor) for each pair of numbers.

1 12 and 15 ..... 3 .....

2 14 and 21 ..... 7 .....

3 12 and 18 ..... 6 .....

4 20 and 22 ..... 2 .....

5 10 and 15 ..... 5 .....

6 10 and 20 ..... 10 .....

7 18 and 30 ..... 6 .....

8 60 and 66 ..... 6 .....

9 24 and 36 ..... 12 .....

10 27 and 36 ..... 9 .....

11 44 and 55 ..... 11 .....

12 5 and 7 ..... 1 .....

13 15 and 27 ..... 3 .....

14 40 and 50 ..... 10 .....

15 100 and 120 ..... 20 .....

Find the LCM (Lowest Common Multiple) for each pair of numbers.

16 2 and 3 ..... 6 .....

17 12 and 3 ..... 12 .....

18 6 and 9 ..... 18 .....

19 15 and 2 ..... 30 .....

20 15 and 6 ..... 30 .....

21 22 and 33 ..... 66 .....

22 14 and 21 ..... 42 .....

23 8 and 12 ..... 24 .....

24 5 and 6 ..... 30 .....

25 10 and 20 ..... 20 .....

26 30 and 20 ..... 60 .....

27 9 and 10 ..... 90 .....

28 16 and 12 ..... 48 .....

29 9 and 12 ..... 36 .....

30 33 and 44 ..... 132 .....

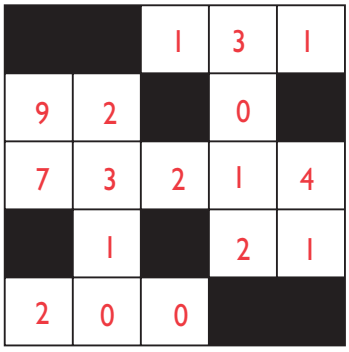
Number cross puzzles

PUZZLE 1

Fit these numbers into the grid to make a 'number crossword'.

Here are the numbers to use:

21	97	2310
41	131	3012
92	200	73 214

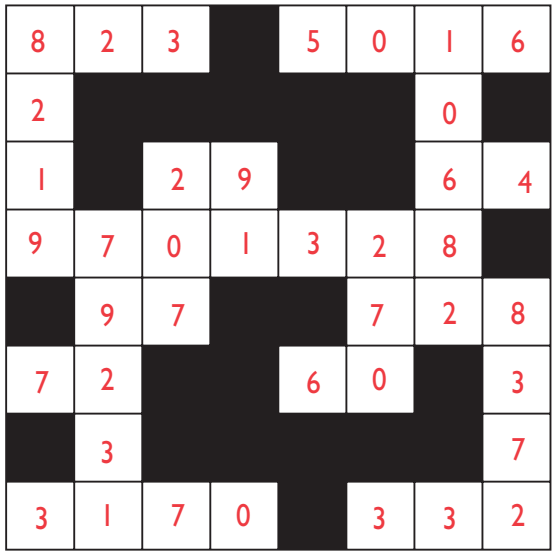


PUZZLE 2

Again, fit these numbers into the grid. This one is a little harder.

Here are the numbers to use:

29	207	5016
60	270	8219
64	332	8372
72	728	10 682
91	823	79 231
97	3170	9 701 328



Now try designing some similar puzzles of your own. Challenge a friend so solve them!

PUPIL'S PAGES 93–100

Adding and subtracting decimals

Work out these additions and subtractions.

1	11.47 + 25.38	36·85	**2**	34.9 – 16.5	18·4
3	205.7 + 23.46	229·16	**4**	38.06 – 15.14	22·92
5	185.79 + 263.04	448·83	**6**	60.03 – 7.2	52·83
7	17.9 + 3.15	21·05	**8**	100.04 + 7.09	107·13
9	257.2 – 48.46	208·74	**10**	6.49 + 18.7	25·19
11	200 – 48.12	151·88	**12**	18.4 – 5.306	13·094
13	52.5 – 37.67	14·83	**14**	52.5 + 37.67	90·17
15	1.308 + 11.456	12·764	**16**	68.983 + 36.7	105·683
17	185.6 – 97.738	87·862	**18**	20 – 3.04	16·96
19	12.34 + 37.06 + 4.73	54·13	**20**	126.07 – 58.39 + 17.68	85·36

21 Chris the carpenter has a piece of wood that is 2.40 metres long. She then cuts off two pieces each 0.54 metres long, and one piece 0.83 metres long. How long is the remaining piece of wood? 0·49 m

22 A toy rattlesnake is made up from a head, a body and a rattle. The head is 2.35 cm, the body is 21 cm and the rattle is 3.25 cm. Find the total length of the toy rattlesnake. 26·6 cm

23 A wedding cake is made up of three layers, or tiers. The top tier weighs 2.25 kg and the middle tier weighs 4.7 kg. The total weight of the cake is 13 kg. Find the weight of the bottom tier. 6·05 kg

24 Jay the joiner has to make 15 identical uprights for banisters. Each of them has to be 0.82 metres long. He has several pieces of wood, each of which is 2.15 metres long. How many does he need to use? How much wood will be wasted? 8; 4·9 m

25 When I started a journey the mileometer of my car read 47 834.8, and at the end it read 48 026.4. How long was the journey? 191·6 miles

PUPIL'S PAGES 102–103

Multiplying and dividing decimals

Work out the answers to these multiplication and division problems.

1	1.2×100	120	**2**	3.8×20	76
3	$4.8 \div 3$	1·6	**4**	$4.8 \div 30$	0·16
5	$4.8 \div 300$	0·016	**6**	3.45×50	172·5
7	$6.8 \div 2$	3·4	**8**	2.471×30	74·13
9	2.9×200	580	**10**	$6.34 \div 200$	0·0317
11	0.0472×200	9·44	**12**	0.74×12	8·88
13	$273 \div 5$	54·6	**14**	$273 \div 50$	5·46
15	$27300 \div 50$	546	**16**	2.34×3	7·02
17	2.34×30	70·2	**18**	23.4×300	7020
19	7.32×4.5	32·94	**20**	$19.11 \div 3.5$	5·46
21	18.04×1.5	27·06	**22**	$6.25 \div 2.5$	2·5
23	2.005×0.3	0·6015	**24**	$37.28 \div 1.6$	23·3
25	$18.3 \div 0.03$	610	**26**	$0.6 \div 0.02$	30
27	0.4×0.06	0·024	**28**	3.5×2.4	8·4
29	0.07×18	1·26	**30**	$0.98 \div 0.14$	7

PUPIL'S PAGES 103–104

Money problems

Add up these amounts of money.

1	£3.48 and £4.47	£7·95	**2**	£23.37 and £56.12	£79·49
3	£306.04 and £138.06	£444·10	**4**	£85.08 and £67.14	£152·22
5	£20.05 and £16.78	£36·83	**6**	£220.20 and £3003.33	£3223·53
7	49p, 23p and 35p	£1·07	**8**	67p and £1.56	£2·23
9	£1.99, 50p and £0.85	£3·34			

Work out the answers to these money subtractions.

10	£5.00 – £3.76	£1·24	**11**	£10.00 – £4.68 – £3.57	£1·75
12	£83.05 – £65.74	£17·31	**13**	£40.48 – £27.59	£12·89
14	£1.00 – 50p	£0·50	**15**	£1.23 – 58p	£0·65

Now try these mixed problems.

16 On a recent trip to town I bought a CD for £11.99, a pair of socks for £3.50 and a cup of coffee at £1.20. I had £20 to start with. How much did I have left at the end of the trip?

£3·31

17 In a computer store you can buy a PC for £599. A printer will cost another £135, and a scanner is £59. If you buy all three together as a package the total cost is £749. How much would a customer save by buying the package?

£44

18 I bought a box of 12 pencils for 69p. I intend to sell them for 5p each to forgetful students who have not brought their own pencils to class. How much money will I make or lose?

lose 9p

19 After selling nine of the pencils, I realise that I have made a mistake. How much should I charge for the remaining pencils in order to break even (i.e. not make a loss)?

8p each

20 I pay for my telephone bill by monthly budget plan. This year I am being asked to make one payment of £65.35, followed by 3 further payments of £58.55. How much does this add up to?

£241

PUPIL'S PAGES 102–104

Crossnumber

Fill in the answers to the clues.
If a decimal point is needed, give it a whole square.
The first one has been done to start you off.

1 1	4	2 5	·	3 1	■	4 3	·	5 3	7	6 5
.	■	2	■	7 0	.	6	■	7	■	.
8 8	9 3	.	10 5	2	■	11 4	12 1	.	13 6	5
■	14 3	3	5	.	5	4	4	3	2	■
15 4	3	9	.	6	■	16 1	1	7	5	17 6
.	■	■	0	■	■	■	7	■	■	.
18 9	19 1	20 3	8	21 3	■	22 0	.	23 6	24 2	5
■	25 3	6	9	2	6	.	0	3	7	■
26 3	5	.	1	2	■	27 1	8	.	5	28 3
.	■	4	■	29 9	.	2	■	1	■	.
30 1	7	8	.	2	■	31 5	.	8	3	2

Clues across

1 $126.7 + 18.4$
4 $1.5 \times 1.5 \times 1.5$
7 $6 \div 10$
8 9.6×8.7
11 8.33×5
14 3.2^5
15 21.98×20
16 58.78×200
18 $36.7 \times 24.9 \times 100$
22 $5 \div 8$
25 33.3^3
26 $245.84 \div 7$
27 $55.59 \div 3$
29 $10 - 0.8$
30 13.2×13.5
31 1.8^3

Clues down

1 0.6×3
2 4.03×13
3 $256.94 - 154.34$
4 1457.64×25
5 $112.11 \div 3$
6 $9.3 - 3.8$
9 9×37
10 6.71×8.21
12 48.2×29.4
13 25^2
15 $34.3 \div 7$
17 1.3×5
19 9×15
20 5.7×6.4
21 52×621
22 0.5^3
23 7.8×8.1
24 11×25
26 $1.7 + 1.4$
28 0.8×4

PUPIL'S PAGES 105–106

All change

Change these fractions to decimals, rounding off to three decimal places where necessary.

1 $\frac{7}{10}$ 0·7

2 $\frac{5}{9}$ 0·556 (3 dp)

3 $\frac{8}{100}$ 0·08

4 $\frac{4}{5}$ 0·8

5 $\frac{13}{25}$ 0·52

6 $\frac{2}{3}$ 0·667 (3 dp)

7 $\frac{1}{12}$ 0·083 (3 dp)

8 $\frac{19}{30}$ 0·633(3 dp)

9 $\frac{4}{7}$ 0·571 (3 dp)

Change these decimals to fractions or mixed fractions.

10 0.1 $\frac{1}{10}$

11 0.49 $\frac{49}{100}$

12 0.07 $\frac{7}{100}$

13 1.4 $1\frac{4}{10} = 1\frac{2}{5}$

14 2.809 $2\frac{809}{1000}$

15 0.001 $\frac{1}{1000}$

16 0.8 $\frac{4}{5}$

17 2.13 $2\frac{13}{100}$

18 0.25 $\frac{1}{4}$

Change these decimals to percentages.

19 0.73 73%

20 0.06 6%

21 0.8 80%

22 0.34 34%

23 0.01 1%

24 0.9 90%

25 1.03 103%

26 2.2 220%

27 0.005 0.5%

Change these percentages to decimals.

28 3% 0·03

29 87% 0·87

30 48% 0·48

31 30% 0·3

32 12% 0·12

33 205% 2·05

34 1% 0·01

35 $\frac{1}{4}$% 0·0025

36 $12\frac{1}{2}$% 0·125

PUPIL'S PAGES 111–112

Percentage problems

1 A school library contains 5280 books. At the end of the year it was found that 1460 of the books had not been lent out. What percentage of the library books had not been lent out?

27·7%

2 To reduce costs a company asks its workforce to take a wage cut of 4%. Calculate the wages these employees would get if the 4% cut is accepted:

a) a cleaner paid £80 per week — £76·80

b) a secretary paid £250 a week — £240

c) a manager paid £460 a week. — £441·60

3 VAT at $17\frac{1}{2}$% is added to the following items. Calculate the total price of each item, including the VAT.

a) a lawnmower at £99.00 — £116·33

b) a personal CD player at £62.50 — £73·44

c) a camera at £225 — £264·38

4 Car insurance is supposed to cost Rachel £350 per year, but she is entitled to a 30% reduction because of her 'no claims' discount. How much does Rachel actually pay for her insurance?

£245

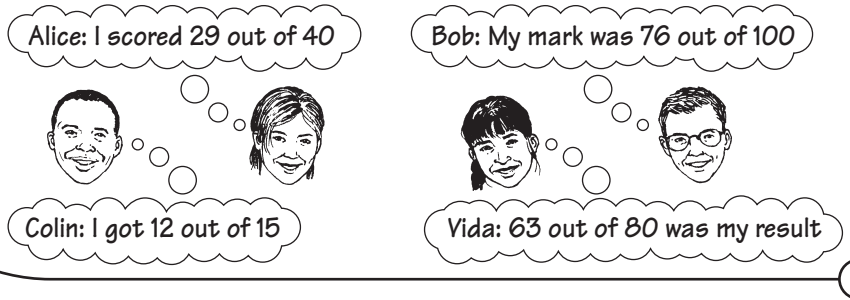
5 Richard pays £275 for his insurance after a 45% reduction for 'no claims'. What would be the full price if he did not qualify for the 45% reduction?

£500

6 Four of the Year 9 students at Greenview School are comparing their latest scores in mathematics tests. They are all in different classes, and each teacher has marked the tests out of a different total.

Change their scores to percentages, and write them in order, highest first.

Colin 80%
Vida $78\frac{3}{4}$ %
Bob 76%
Alice $72\frac{1}{2}$ %



Percentage problems (continued)

7 A cricket ground can seat 24 000 spectators. If 16 750 turn up to watch a match, what percentage of the seats are occupied? ..... 69·8% .....

8 If 75% of a number is 720, find the number. ..... 960 .....

9 Nicholas' salary is £1220 per month. Various costs, called 'deductions', are taken from this, and he then pays income tax at a rate of 22% on the rest. The 'deductions' figure is £404.

Work out:

a) the amount of his monthly salary which gets taxed ..... £816 .....

b) the amount of tax he pays per month ..... £179·52 .....

c) his take-home pay, i.e. how much he gets to keep each month. ..... £636·48 .....

10 Express each of these as a percentage, correct to the nearest 1%.

a) 53 out of 80 ..... 66% .....

b) 13 out of 32 ..... 41% .....

c) 27 out of 75 ..... 36% .....

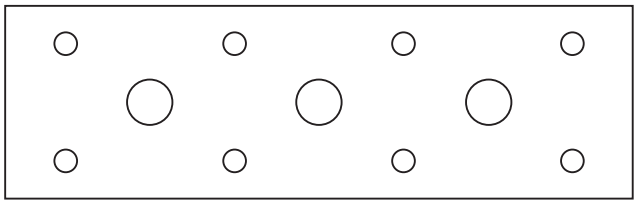
d) 108 out of 750 ..... 14% .....

e) 37 out of 60 ..... 62% .....

f) 28 out of 35 ..... 80% .....

Ratio

1 A shop sells buttons attached to a card like this:



a) What is the ratio of large buttons to small buttons on this card? 3 : 8

b) If I wanted to buy 24 large buttons, how many small buttons would I have to buy? 64

c) If I wanted to buy 24 small buttons, how many large buttons would I have to buy? 9

2 In a class there are 16 boys and 12 girls. Write the ratio of boys to girls in its simplest form. 4 : 3

3 A shortbread recipe uses flour, butter and sugar in the ratio 5 : 4 : 2.
If the amount of flour is 150 grams, find:

a) the weight of butter needed 120 grams

b) the total weight of the shortbread. 330 grams

4 Express each ratio in its simplest form.

a) 18 : 27 2 : 3

b) 54 cm : 9 cm 6 : 1

c) 42 g : 560 g 3 : 40

d) 27 kg : 6 kg 9 : 2

e) 27 days : 21 days 9 : 7

f) 10 : 12 5 : 6

5 A recipe for smoked salmon scrambled eggs requires 170 grams of smoked salmon, 8 eggs and 55 grams of butter. It serves four people.
Calculate how much of each ingredient you would need:

a) for 2 people 85 grams, 4 eggs, 27·5 grams

b) 7 people. 297·5 grams, 14 eggs, 96·25 grams

PUPIL'S PAGES 115–116

The unitary method

1 I can mark a pile of 20 exercise books in 30 minutes.

a) How long does it take me to mark 1 exercise book? $1\frac{1}{2}$ minutes

b) How long does it take to mark 30 books? 45 minutes

2 A car is going along a motorway at a steady speed. It can travel 130 miles in two hours.

a) How far does it travel in one hour? 65 miles

b) How far does it travel in three and a half hours? 227·5 miles

3 9 cans of fizzy drink cost £1.44.

a) How much does one can cost? 16 pence

b) How much do 15 cans cost? £2·40

c) How many cans may I buy for £4.00? 25

4 It takes two people half an hour to put up a tent. How long would it take three people? 20 minutes

5 It takes 30 children half an hour to take all the chairs out of the school hall. How long would it take 20 children? 45 minutes

6 I can make 20 greetings cards from 6 large sheets of card.

a) How many greetings cards can I make from 9 sheets of card? 30

b) How many sheets of card would I need to make 50 greetings cards? 15

7 After the Year 9 disco it took 20 minutes for 12 children to clear up. How long would it have taken if there had only been 8 children to clear up? 30 minutes

8 Two bags of food can feed three rabbits for six days. How many bags would be needed to feed five rabbits for nine days? 5 bags

9 Ten boy scouts can put up four tents in 18 minutes. How long would it take twelve scouts to put up eight tents? 30 minutes

10 Seven chefs can make fifteen salads in thirty minutes. How long would it take six chefs to make twelve salads? 28 minutes

PUPIL'S PAGES 116–118

Simplifying formulae

Simplify these expressions.

1	$x + x$	$2x$	**2**	$x + 3y + x$	$2x + 3y$
3	$2x + 5x - 3x$	$4x$	**4**	$7x - x + 4x$	$10x$
5	$18x - 15x + 2x$	$5x$	**6**	$x + 2y + 3x + 4y$	$4x + 6y$
7	$3a + 5ab + 7a$	$10a + 5ab$	**8**	$3 \times y \times y$	$3y^2$
9	$x \times x \times x$	x^3	**10**	$5 \times y \times y \times y$	$5y^3$
11	$a \times a$	a^2	**12**	$3 \times a \times a + 5 \times a \times a$	$8a^2$
13	$6 \times a + 4 \times a \times a$	$6a + 4a^2$	**14**	$5 \times a \times a + 4 \times b \times b$	$5a^2 + 4b^2$
15	$5a^2 + 3a^2 + 2a$	$8a^2 + 2a$	**16**	$6a^2 + 4b^2 + 2a^2$	$8a^2 + 4b^2$
17	$10a + 5b - 9a - 5b$	a	**18**	$5 \times a \times a + 7 \times a \times b$	$5a^2 + 7ab$
19	$4 \times y \times y - 3 \times y \times y$	y^2	**20**	$5a - 3a + 7a - 9a$	0

Simplify these expressions where possible – but be careful, some of them are already in their simplest form.

21	$7a + 5b + 8ab$	$7a + 5b + 8ab$	**22**	$14a + 5b + 7a + 2b + ab$	$21a + 7b + ab$
23	$5a^2 + 10a + 10b$	$5a^2 + 10a + 10b$	**24**	$5a + 4b + 3a + 2b$	$8a + 6b$
25	$7a + 3a - 9a$	a	**26**	$4a + 5a - 9a$	0
27	$3a - 4b + 2a - 3b$	$5a - 7b$	**28**	$4x + 5y + 2xy$	$4x + 5y + 2xy$
29	$3x + 2 + 4x$	$7x + 2$	**30**	$7m^2 + 5m^2 + 8m^2$	$20m^2$

Multiplying out brackets

Multiply out the brackets in these expressions.

1	$2(x - y)$	$2x - 2y$	**2**	$3(x + y)$	$3x + 3y$
3	$4(x + 2y)$	$4x + 8y$	**4**	$3(2x - y)$	$6x - 3y$
5	$10(2x + 3y)$	$20x + 30y$	**6**	$5(a + 5b)$	$5a + 25b$
7	$3(7a - 4b)$	$21a - 12b$	**8**	$12(3a + 5b)$	$36a + 60b$
9	$7(5a - 7b)$	$35a - 49b$	**10**	$11(3a + 2b)$	$33a + 22b$
11	$10(x + 2y + 5)$	$10x + 20y + 50$	**12**	$5(4x - 3y - 2)$	$20x - 15y - 10$
13	$6(x + y + 1)$	$6x + 6y + 6$	**14**	$6(5x - 6y - 7)$	$30x - 36y - 42$
15	$2(27x + 49y)$	$54x + 98y$	**16**	$8(2a + 3b + 4)$	$16a + 24b + 32$
17	$7(5a - 7b - 9)$	$35a - 49b - 63$	**18**	$12(3a - 11b)$	$36a - 132b$
19	$3(14a - 17b)$	$42a - 51b$	**20**	$10(2a + 3a^2)$	$20a + 30a^2$

Multiply out and simplify these expressions.

21	$4(x + 2y) + 5y$	$4x + 13y$	**22**	$7(2x + y) - 2y$	$14x + 5y$
23	$15(x + y) + 3x - y$	$18x + 14y$	**24**	$10(x + 2y) - 5x$	$5x + 20y$
25	$2(3x + 2y) + 2(2x + 3y)$	$10x + 10y$	**26**	$3(a + 4b) + 7(3a + b)$	$24a + 19b$
27	$5(2a + b) + 3(a - b)$	$13a + 2b$	**28**	$2(4a + 7b) + 5(2a - b)$	$18a + 9b$

29 $2(2a + 3b) + 3(3a + 4b) + 4(4a + 5b)$ $29a + 38b$

30 $10(2a + b) + 5(3a - 2b)$ $35a$

PUPIL'S PAGES 122–123

Algebra crossnumber

Look at the expressions in the clues, and replace the letters with the following values:
$a = 45$, $b = 55$, $c = 10$, $d = 7$, $e = 18$, $f = 12$, $g = 11$, $h = 9$.
Then write the answers in the grid.

1 2	2 4	7	3 5	■	4 3	0	5 2	5
■	5	■	6 5	5	0	■	2	■
7 2	1	8 6	0	■	9 3	10 3	0	11 7
12 1	8	0	■	13 3	■	14 9	8	0
9	■	15 5	6	7	0	3	■	0
16 4	17 4	1	■	3	■	18 2	19 5	2
20 5	8	3	21 2	■	22 1	5	8	4
■	6	■	23 1	9	2	■	8	■
24 2	0	3	6	■	25 1	2	6	0

Clues Across

1	ab
4	b^2
6	bc
7	$12ce$
9	$cg(e+f)+d$
12	$8e+3f$
14	$12a+8b$
15	$acde+\sqrt{h}$
16	$(3d)^2$
18	$2de$
20	e^3
22	gf^2
23	$ce+f$
24	$(a+b)\times(g+h)+3f$
25	$a\times(c+e)$

Clues Down

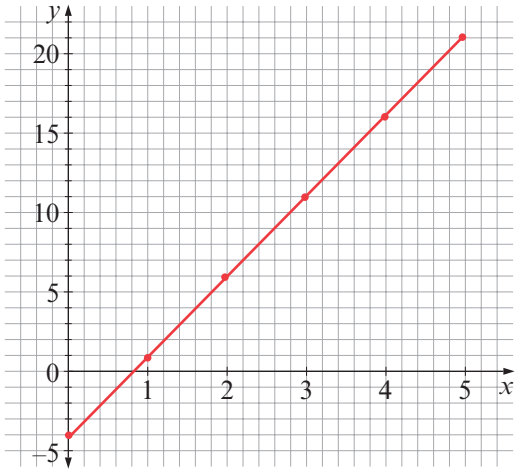
2	ac^2+e
3	bc
4	e^2-3d
5	$cd(e+f)+fh$
7	$300(b+e)+a$
8	$100bg+h+f\div 3$
10	$13b^2$
11	$100c^2d+2f$
13	d^2+e^2
17	afh
19	$h(bg+d^2)$
21	ef
22	g^2

PUPIL'S PAGES 125–128

Plotting straight lines

1 Complete the table for the function $y = 5x - 4$. Then plot the points on the grid below, and join them up to form a straight line graph.

x	0	1	2	3	4	5
y	-4	1	6	11	16	21



Here are some more tables of functions. See if you can work out the equation that has been used to make each one. They are all linear functions, i.e. they are of the form $y = ax + b$.

2

x	1	2	3	4
y	2	5	8	11

3

x	1	2	3	4
y	3	7	11	15

4

x	1	2	3	4
y	2	7	12	17

5

x	1	2	3	4
y	1	4	7	10

6

x	0	4	8	12
y	3	5	7	9

7

x	0	3	6	9
y	9	6	3	0

8

x	1	2	3	4
y	20	15	10	5

2 $y = 3x - 1$
3 $y = 4x - 1$
4 $y = 5x - 3$
5 $y = 3x - 2$
6 $y = \frac{1}{2}x + 3$
7 $y = -x + 9$
8 $y = -5x + 25$

PUPIL'S PAGES 125–128

Graphs of straight lines

Complete the tables for these five straight lines, and plot each of them on the grid below.

1 $y = 2x + 1$

x	−5	0	5
y	-9	1	11

2 $y = x + 3$

x	−7	0	7
y	-4	3	10

3 $y = 1 - x$

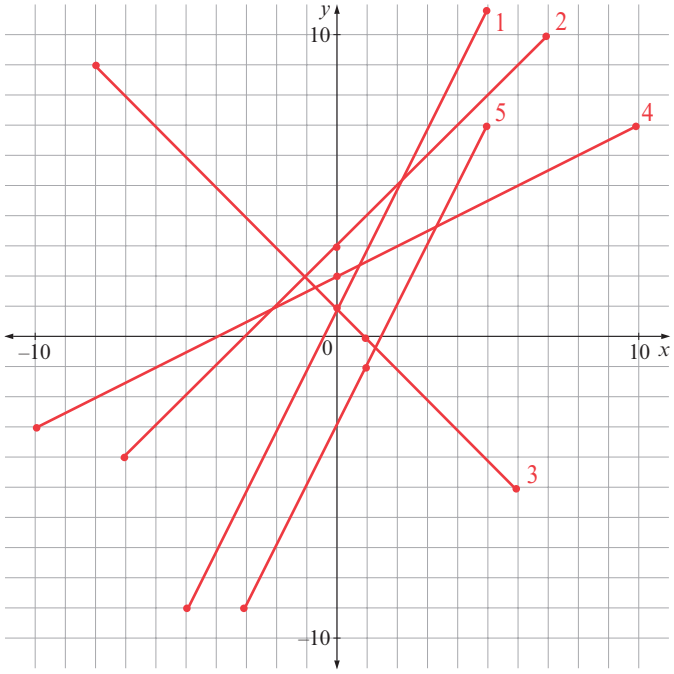
x	−8	1	6
y	9	0	-5

4 $y = \frac{1}{2}x + 2$

x	−10	0	10
y	-3	2	7

5 $y = 2x - 3$

x	−3	1	5
y	-9	-1	7



6 Which two lines are parallel, i.e. have the same gradient? 1 and 5

7 Which two lines have the same intercept? 1 and 3

8 Which two lines are perpendicular, i.e. cross at 90°? 2 and 3

9 Which line passes through (6, 5)? 4

10 Which line has the smallest positive gradient? 4

PUPIL'S PAGES 125–128

Yet more misprints

Spokes Card Game Company has produced a card game about straight line graphs. Players have to collect sets of three cards showing lines with the same gradient, i.e. the three lines are parallel. Here is one set:

$y = 3x + 1$ $y = 3x + 4$ $y = 3x - 11$

As usual, the cards were not checked before printing, and the full set, shown below, contains two misprints.

Find the matching groups of three, and hence identify the misprinted cards. See if you can work out what should be printed on the two cards that are wrong.

A $y = 3x + 1$

B $y = 0.5x$

C $y = -x + 9$

C $y = -x + 4$

A $y = 3x + 4$

D $y = 4x - 1$

G $y = 10x + 3$

E $y = 5x + 3$

C $y = 11 - x$

F $y = 2x - 1$

F $y = 2x$

A $y = 3x - 11$

B $y = \frac{1}{2}x + 3$

F $y = 2x + 5$

G $y = 10x$

D $y = 4x + 3$

E $y = 8 + 5x$

B $y = \frac{1}{2}x - 3$

G $y = 16x - 1$

$10x - 1$

E $y = 5x - 3$

D $y = 14x + 1$

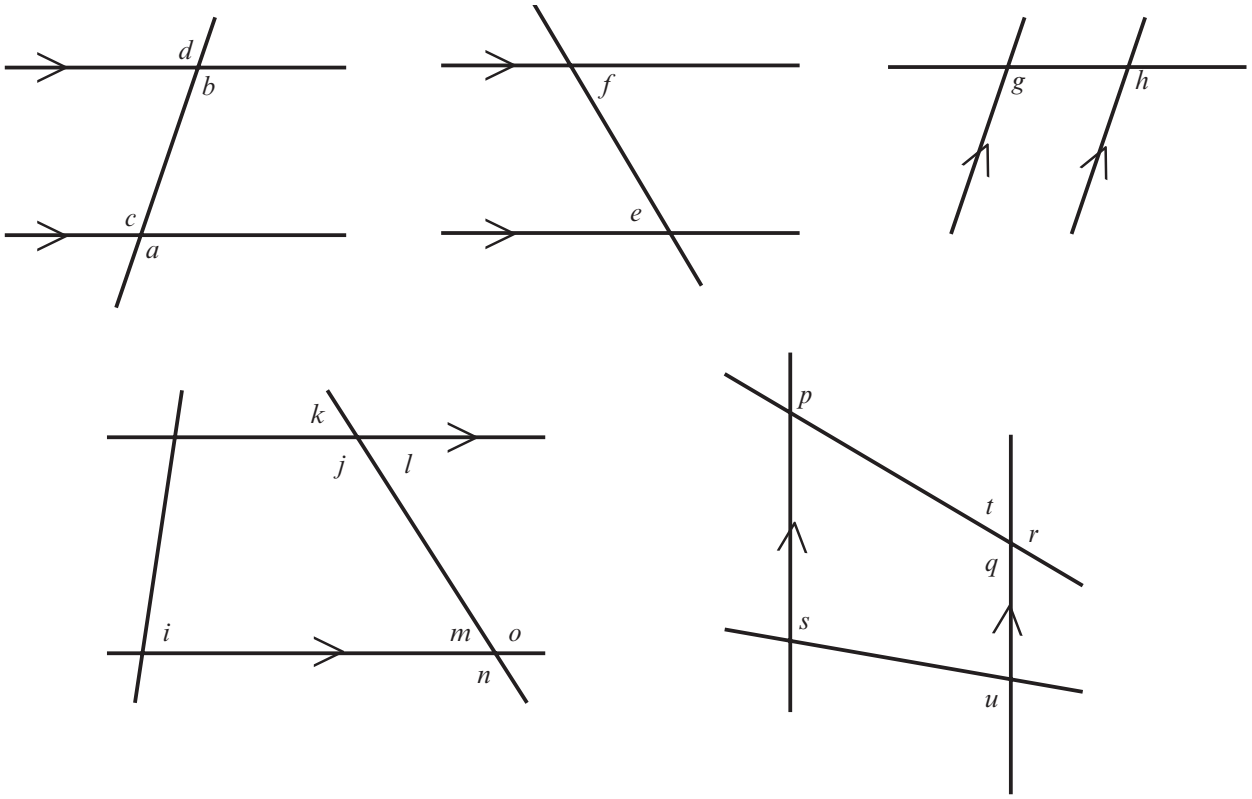
$4x + 1$

PUPIL'S PAGES 125–128

Alternate angles and corresponding angles

Alternate angles are sometimes known as Z-angles.
Alternate angles are equal.

Corresponding angles are sometimes known as F-angles.
Corresponding angles are also equal.
Look at the diagrams below. Then fill in the grid to say whether the given angles are alternate, corresponding or neither. The first one has been done to start you off.



a and *b*	*corresponding*
b *c*	*alternate*
c *d*	*corresponding*
e *f*	*alternate*
g *h*	*corresponding*

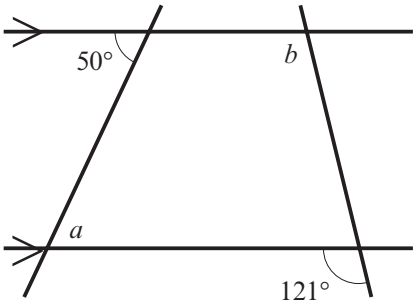
i and *m*	*neither*
j *m*	*neither*
k *m*	*corresponding*
m *n*	*neither*
n *o*	*neither*

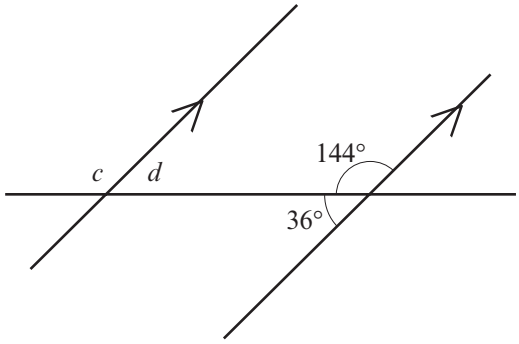
k and *o*	*neither*
p *q*	*alternate*
p *r*	*corresponding*
p *t*	*neither*
s *u*	*alternate*

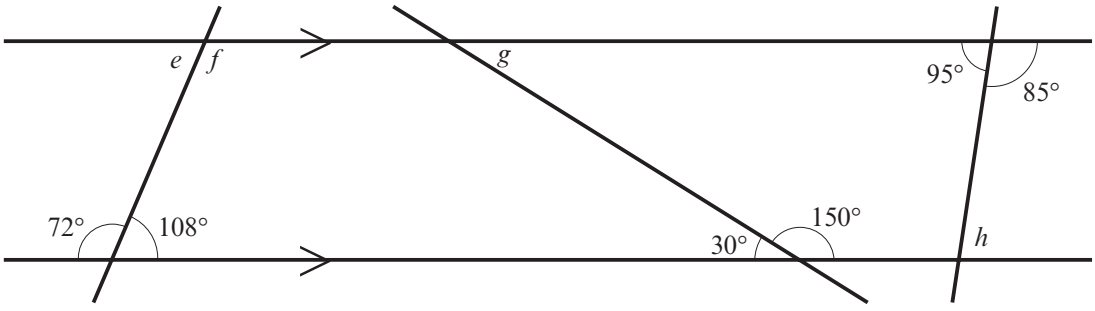
PUPIL'S PAGES 130–132

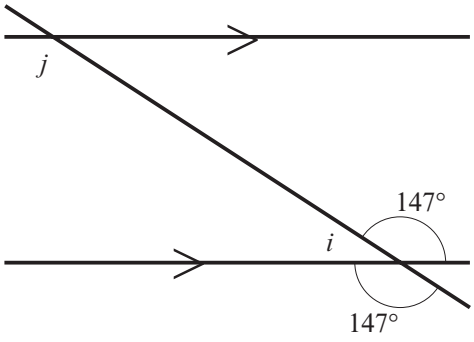
Missing angles

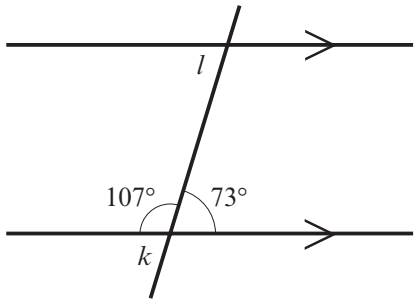
Look at the diagrams below, which are not drawn to scale.
Use alternate or corresponding angles to find the values of the letters.
Record your answers in the grid below.











$a =$	50°
$b =$	121°
$c =$	144°

$d =$	36°
$e =$	108°
$f =$	72°

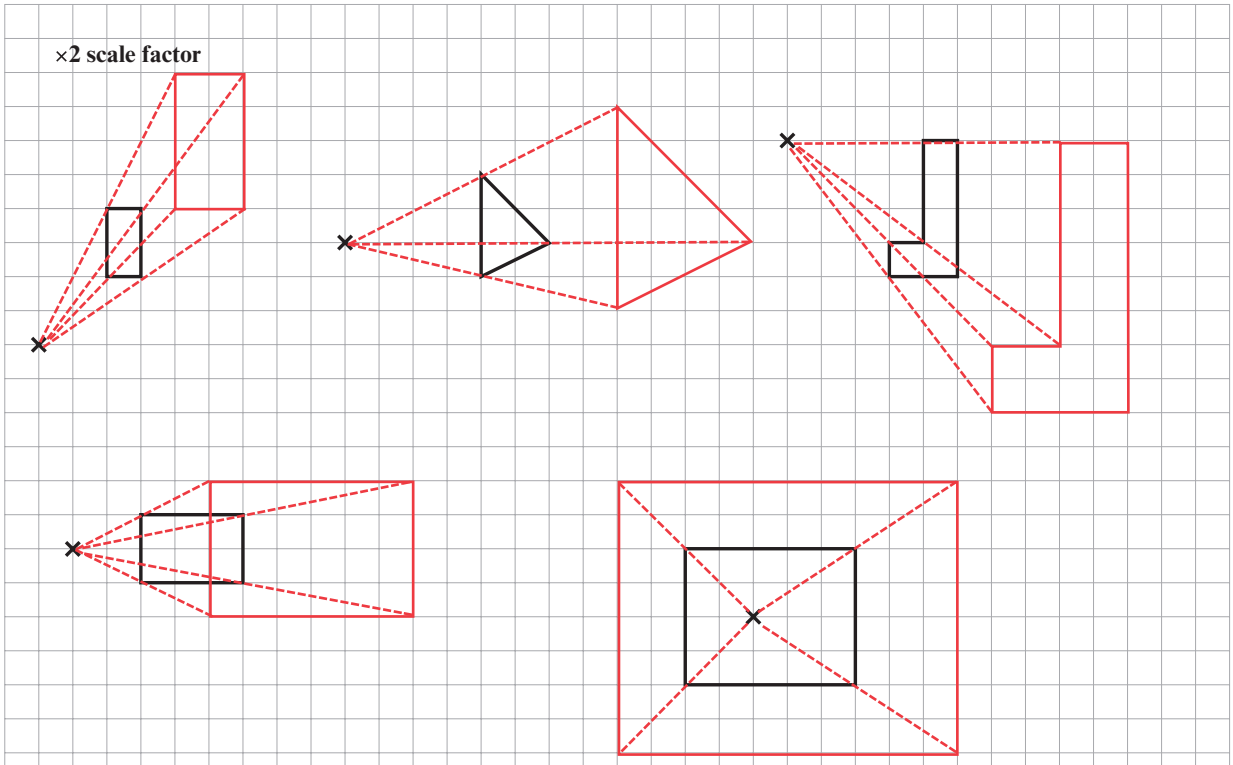
$g =$	30°
$h =$	95°
$i =$	33°

$j =$	147°
$k =$	73°
$l =$	73°

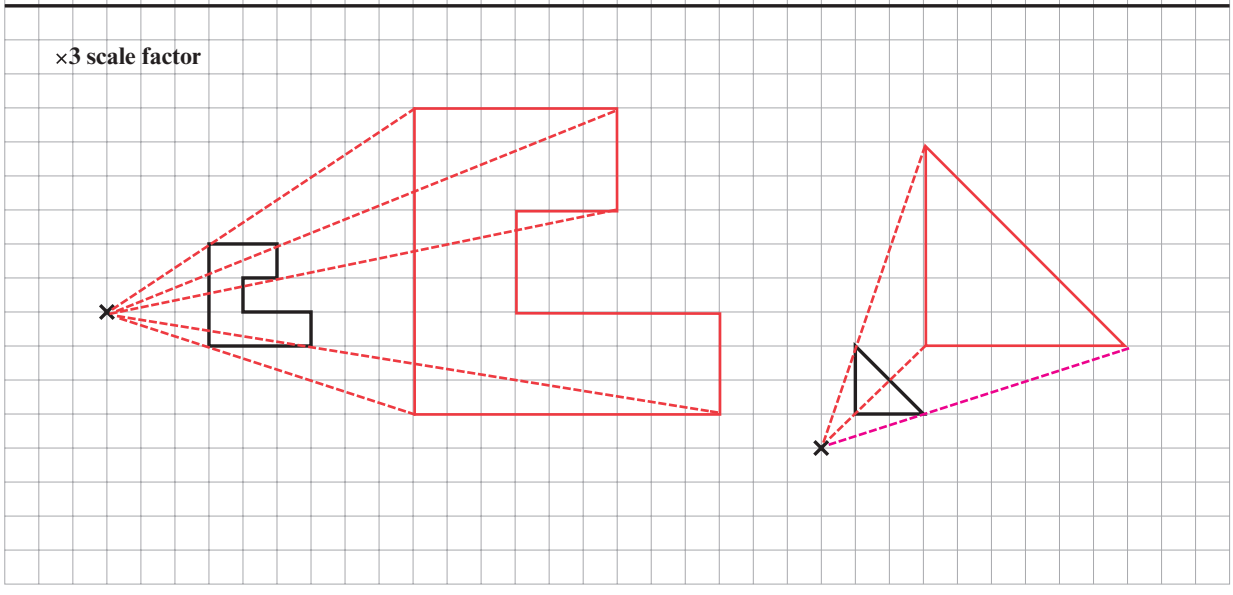
Enlargement

Enlarge each of the given objects.
Use the given scale factor, and the centre marked with a small cross.

×2 scale factor



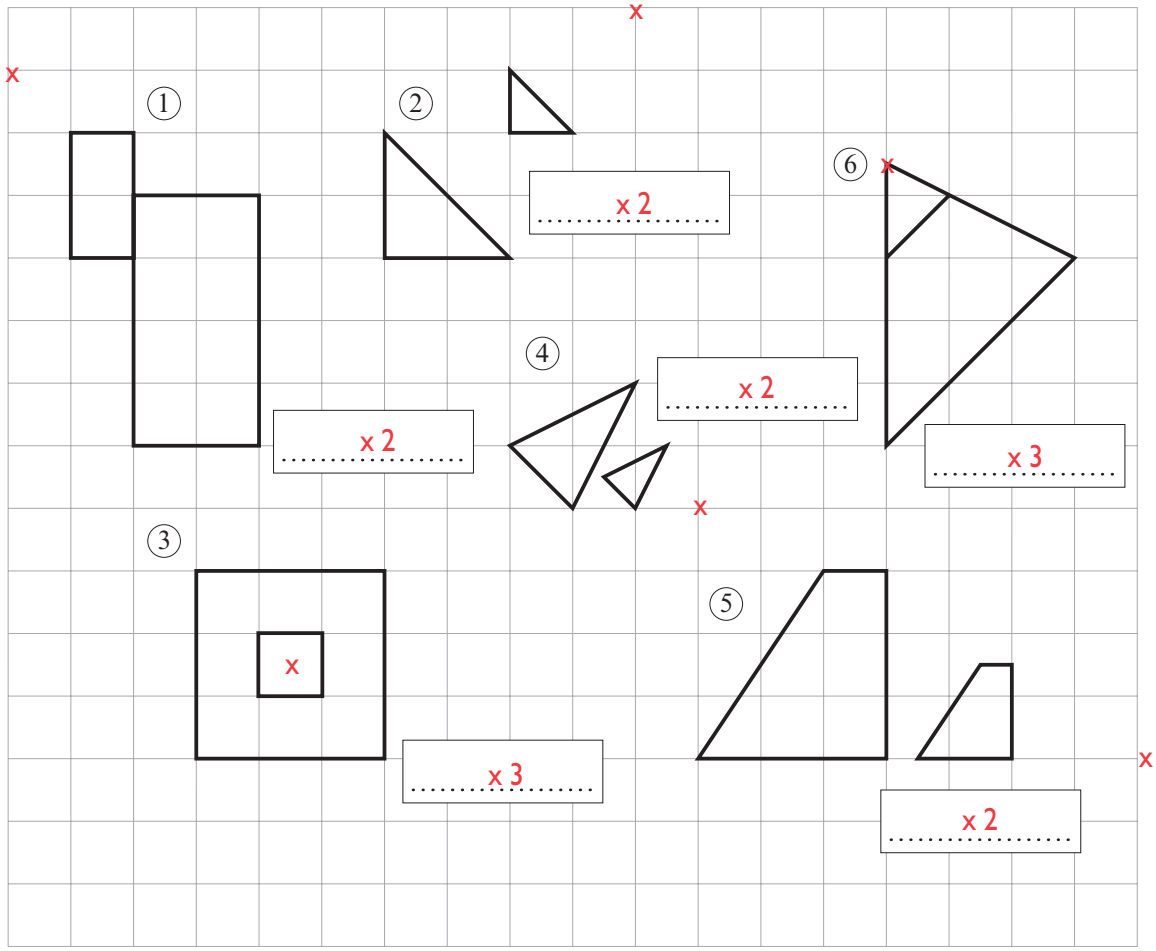
×3 scale factor



PUPIL'S PAGES 136–139

Finding the centre of enlargement and the scale factor

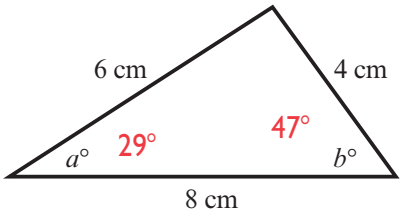
The diagrams below show some objects and their images after enlargement.
Use ray tracing to find the centre of enlargement and the scale factor in each case.
Mark the centre of enlargement with ✕
Write the scale factor in the space provided.

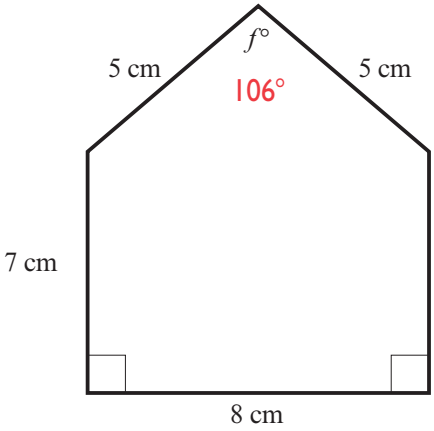


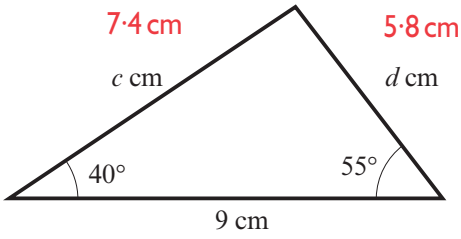
PUPIL'S PAGES 139–142

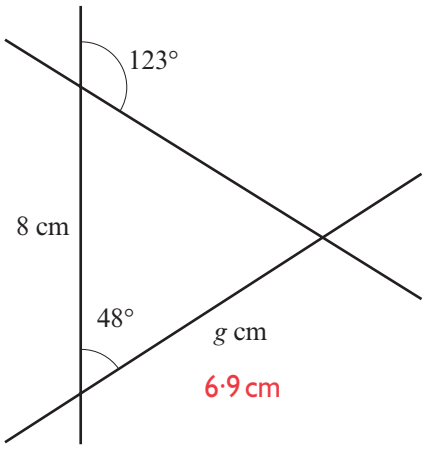
Scale drawings

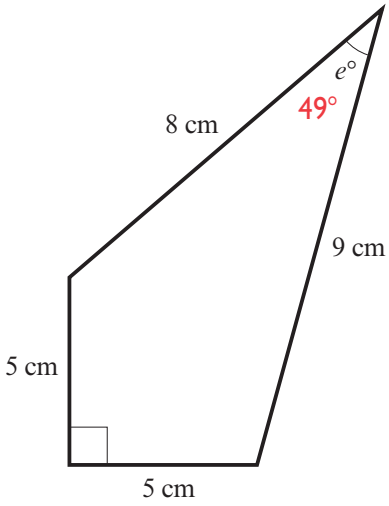
Look at the diagrams below, which are not drawn to scale.
Make accurate drawings of each of them, using compasses or protractors when necessary.

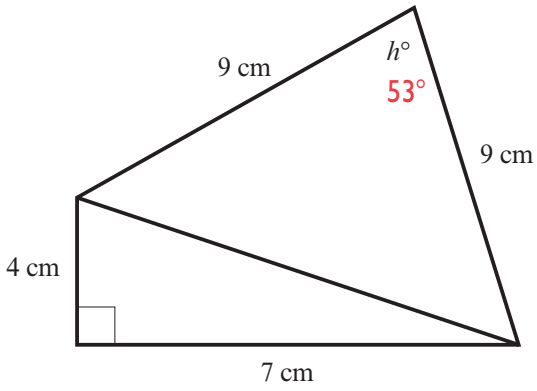












PUPIL'S PAGES 144–149

Disappearing triangles

Your drawing and measuring will need to be very accurate in this activity.
Use compasses and a straight edge to do the bisecting.

1 Bisect (cut into two equal parts) the angle at B, using compasses. Make D the point where this angle bisector meets AC.

2 Measure angle BDC. What do you notice about the triangle BCD? 72°; isosceles

3 Now bisect the angle at C. Make E the point where this bisector meets BD.

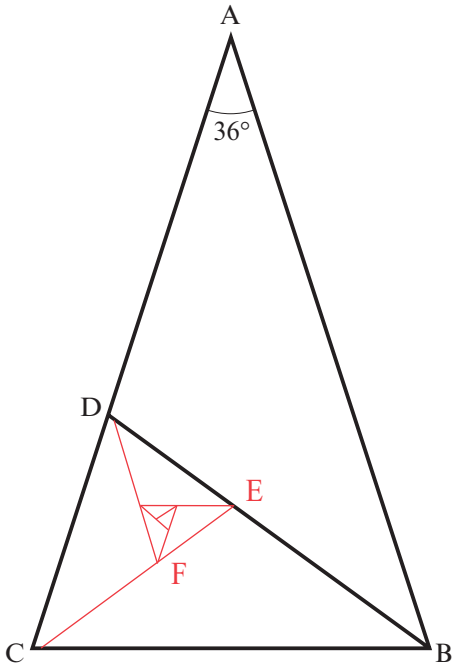
4 Go on bisecting the next angle clockwise (angle CDE) round the smaller triangle.

5 Continue the bisections for as long as you can.

6 Measure the lengths of the lines DE and BE. Can you see how they are connected with the '*golden ratio*' of 1.618?

DE = 2 cm
BE = 3·2 cm

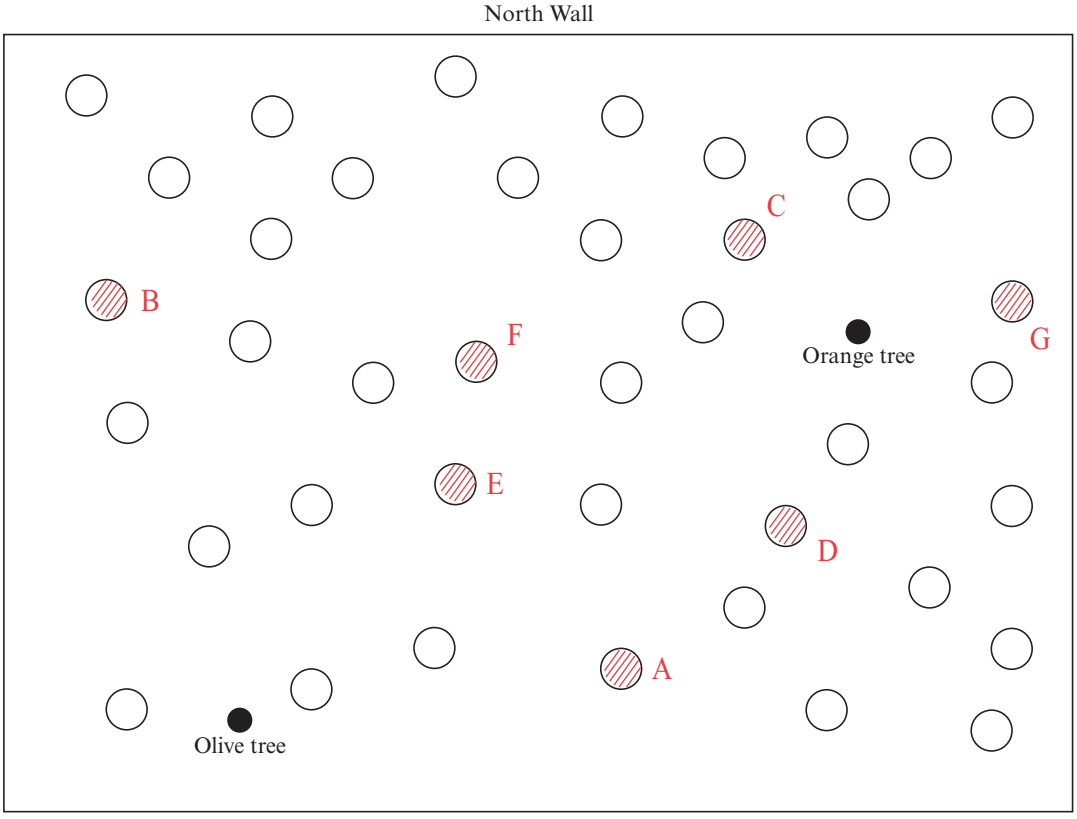
$\frac{BE}{DE}$ = golden ratio



PUPIL'S PAGES 151–152

Ali Baba and the 40 thieves

The thieves have placed 40 large oil-jars in Ali Baba's yard, and are hiding in them. Luckily for Ali, his faithful serving-girl Marjaneh has discovered the thieves' plan, and she has destroyed most of the thieves in the jars. Only seven remain for her to deal with. Follow the clues at the foot of the page to discover which jars the remaining seven thieves occupy.



Use these clues – and geometric instruments – to locate the jars on the map that contain the thieves.

A 5 cm from the olive tree, 5.5 cm from the orange tree

B 3.8 cm from the northwest corner of the yard, 5.7 cm from the olive tree

C 2.0 cm from the orange tree, 2.7 cm from the north wall

D 3.8 cm from the south wall, 3.8 cm from the east wall

E equidistant from the north wall and west wall, 4.2 cm from the olive tree

F bearing of 266° from the orange tree, 034° from the olive tree

G bearing of 079° from the orange tree

Areas of rectangles

Find the areas of these rectangles. The diagrams are not to scale.

1 14 cm, 5 cm — 70 cm²

2 11 cm, 9 cm — 99 cm²

3 39 mm, 6 mm — 234 mm²

4 2.4 cm, 5.8 cm — 13·92 cm²

5 23 cm, 17 cm — 391 cm²

6 44.6 cm, 13.2 cm — 588·72 cm²

7 28 m, 1.4 m — 39.2m²

8 3 mm, 18 mm — 54 mm²

9 210 m, 70 m — 14700 m²

10 14.3 cm, 4.3 cm — 61·49 cm²

11 12 km, 3.5 km — 42 km²

12 4.5 cm, 4.5 cm — 20·25 cm²

13 A football pitch is 110 metres by 72.4 metres. Find its area. 7964 m²

14 Find the area of a square if the perimeter is 24 centimetres. 36 cm²

15 A rectangle is twice as long as it is wide. The perimeter of the rectangle is 42 centimetres. Find its area. 98 cm²

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Areas of triangles

Find the areas of these triangles. The diagrams are not to scale.

1 Height 12 cm, base 10 cm. 60 cm^2

2 Height 22 cm, base 6 cm. 66cm^2

3 Height 14 cm, base 11 cm. 77 cm^2

4 Base 24 cm, height 16 cm. 192 cm^2

5 Base 46 cm, height 18 cm. 414 cm^2

6 Height 7 cm, base 5 cm. 17·5 cm^2

7 Base 13 cm, height 15 cm. 97·5 cm^2

8 Height 30 cm, base 40 cm. 600 cm^2

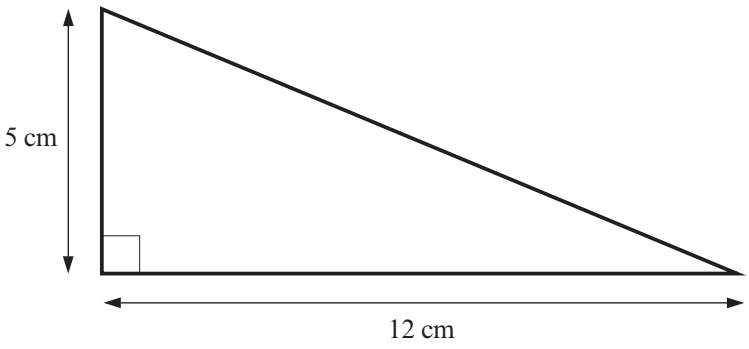
9 Base 72 cm, height 2 cm. 72 cm^2

10 Base 63 mm, height 5 mm. 157·5 mm^2

11 Height 9 cm, base 1 cm. 4.5 cm^2

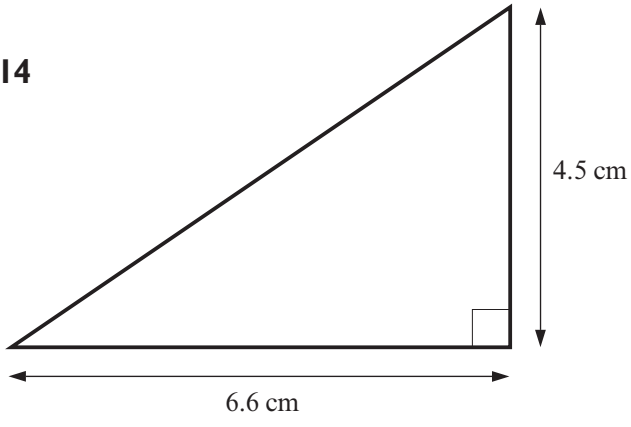
12 Base 1.8 km, height 2.5 km. 2.25 km^2

13



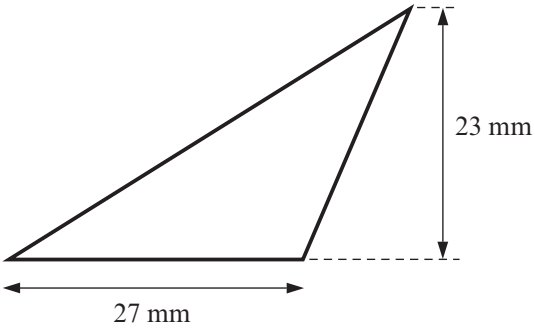
30 cm^2

14



14·85 cm^2

15



310·5 mm^2

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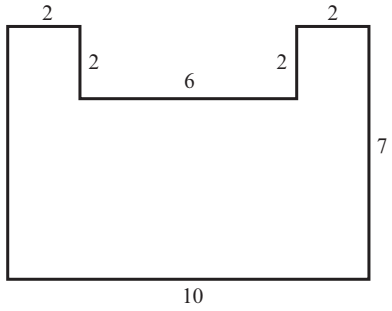
Areas of compound shapes

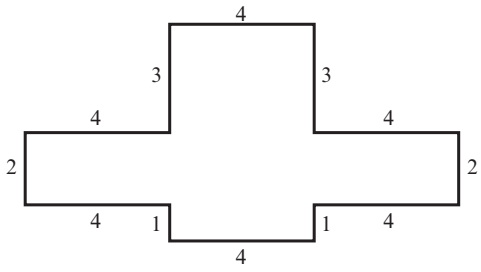
Find the areas of these compound shapes. The diagrams are not to scale.
All indicated lengths are in centimetres.

1



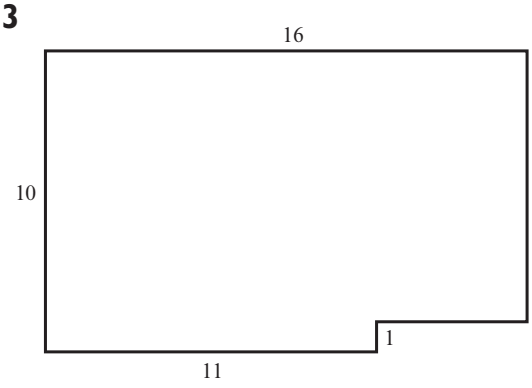
58 cm²

2



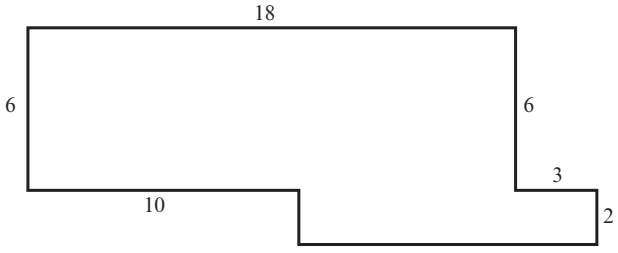
40 cm²

3



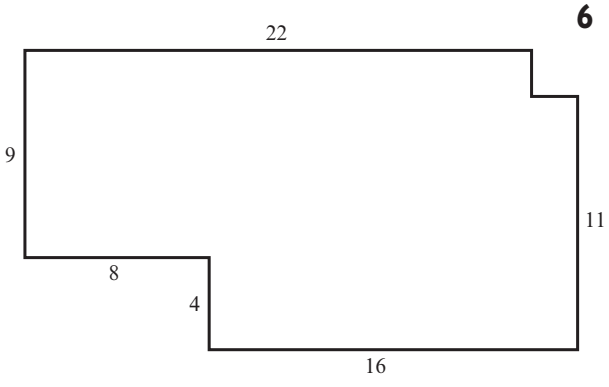
155 cm²

4



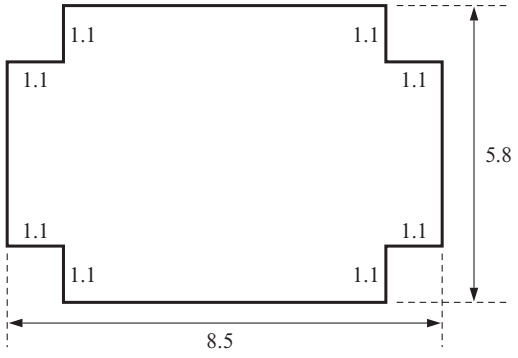
130 cm²

5



276 cm²

6



44·46 cm²

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Professor Puzzle's cuboids

Professor Puzzle has calculated the volume of some cuboids, and written them down in this table. Unfortunately, he forgot to write down all of the results.
Work out the missing values, and write them in.

Height (cm)	Breadth (cm)	Depth (cm)	Volume (cm^3)
6	4	3	72
2	1.5	1	3
9	6	4.5	243
5	4	2	40
1.7	1.2	2.4	4·896
2.3	4	8	73.6
1·5	2.5	6	22.5
3.7	2·5	6.3	58.275
9.9	2.1	0·9	18.711
3·5	1.4	6.6	32.34

This second problem is harder. Professor Puzzle has used a list of 30 numbers to create these volumes, but has forgotten to write the 30 numbers in the grid. The numbers available are:
2, 3, 3, 3, 3, 3, 3, 4, 5, 5, 5, 5, 5, 5, 5, 7, 7, 7, 7, 7, 7, 7, 8, 11, 11, 11, 12, 13, 17, 23.

Use these numbers to complete the grid.

Height (cm)	Breadth (cm)	Depth (cm)	Volume (cm^3)
3	3	3	27
2	5	7	70
3	7	11	231
3	5	5	75
5	5	5	125
4	8	12	384
7	7	7	343
5	7	23	805
3	7	17	357
11	11	13	1573

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Area and volume crossnumber

All lengths are in centimetres, areas in square centimetres and volumes in cubic centimetres.

1 1	7	2 6	4	■	3 2	4 1	3	5 9
3	■	6	■	6 2	■	2	■	3
7 8	4	6	5	9	0	5	3	6
6	■	7	■	4	■	6	■	0
■	8 1	1	7	■	9 1	2	1	■
10 9	■	6	■	11 1	■	2	■	12 4
13 5	2	0	4	3	4	7	1	9
5	■	6	■	2	■	2	■	0
14 5	6	1	0	■	15 2	0	0	0

Clues Across

1 Area of a square of side 42 cm

3 Area of a triangle with base 62 cm and height 69 cm

7 Volume of a cube of side 946 cm

8 Area of a rectangle 9 cm by 13 cm

9 Area of a square of perimeter 44 cm

13 Volume of a cuboid with edges of 901 cm, 817 cm and 707 cm

14 Area of a triangle, base 220 cm, height 51 cm

15 Perimeter of a square whose area is 250 000 cm^2

Clues Down

1 Area of a rectangle 42 cm by 33 cm

2 Volume of a cuboid 1221 cm by 991 cm by 551 cm

4 Volume of a cuboid 12 345 cm by 96 cm by 106 cm

5 Area of twelve rectangles, each 30 cm by 26 cm

6 Surface area of a cube of side 7 cm

10 Volume of 15 cuboids, each measuring 13 cm by 7 cm by 7 cm

11 Total length of all the edges of a cube of side 11 cm

12 Area of a square of side 70 cm

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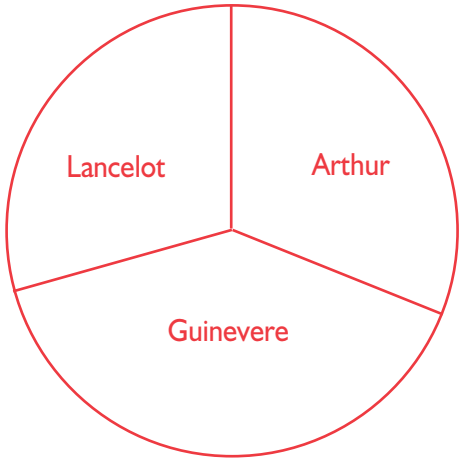
Pie charts

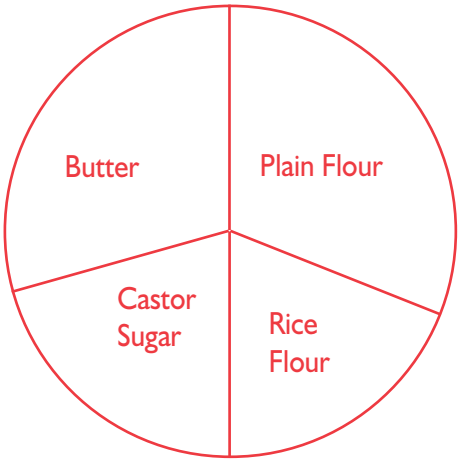
1 In the first 180 National Lottery draws, draw machine Arthur was used 71 times, Guinevere was used 56 times and Lancelot was used 53 times. Illustrate this information in a pie chart.

Arthur	71	142°
Guinevere	56	112°
Lancelot	53	106°



2 A recipe for shortbread includes 0.1 kg of plain flour, 0.05 kg of rice flour, 0.05 kg of caster sugar and 0.1 kg of butter. Show the ingredients in a pie chart.

Plain Flour	0.1kg	120°
Rice Flour	0.05kg	60°
Castor Sugar	0.05kg	60°
Butter	0.1g	120°

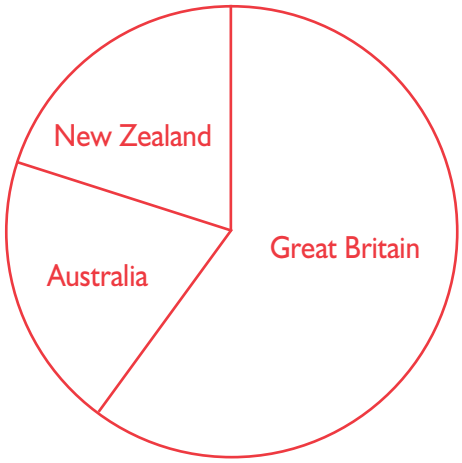


3 The McRobertson Shield is for croquet. It is contested at irregular intervals by Great Britain, New Zealand and Australia. The winners up to 1993 are given in the table below. Make a pie chart to show the number of times each country has won.

Pie charts (continued)

Year	Winner	Year	Winner	Year	Winner
1925	Great Britain	1950	New Zealand	1979	New Zealand
1928	Australia	1956	Great Britain	1982	Great Britain
1930	Australia	1963	Great Britain	1986	New Zealand
1935	Australia	1969	Great Britain	1990	Great Britain
1937	Great Britain	1974	Great Britain	1993	Great Britain

Great Britain	9	216°
Australia	3	72°
New Zealand	3	72°



4 Alan has been asking people what their favourite fruit is. He has drawn a pie chart, and the angle for bananas is 150°, which were chosen by 10 people.

a) How many degrees is equivalent to one person? 15°

b) How many people did Alan ask? 24

c) Eight people replied 'apples'. What angle should this have? 120°

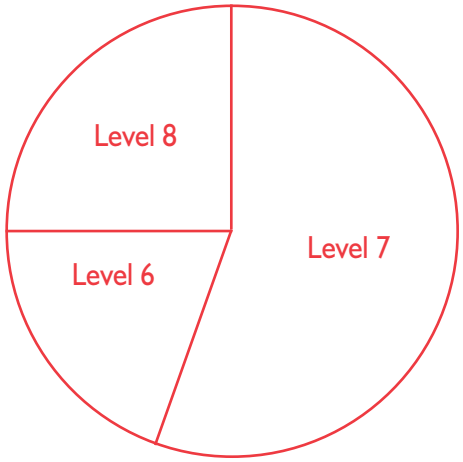
d) Oranges have an angle of 60°. How many people chose oranges? 4

e) How many people chose a fruit which was **not** one of these? 2

Pie charts (continued)

5 Twenty children in class 1 took a Key Stage 3 exam at Tier 6 to 8. Five of them got a Level 8, eleven got a Level 7 and the remaining four got a Level 6. Illustrate this information in a pie chart.

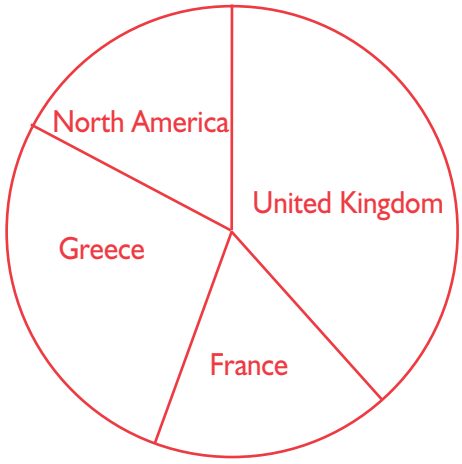
Level 8	5	90°
Level 7	11	198°
Level 6	4	72°



These questions are a little harder, since the angles do not work out quite so neatly as before.

6 Twenty-nine people were asked to name their favourite holiday destination. Eleven said the United Kingdom, five said France, eight said Greece and the rest said North America. Illustrate this information in a pie chart.

United Kingdom	11	137°
France	5	62°
Greece	8	99°
North America	5	62°



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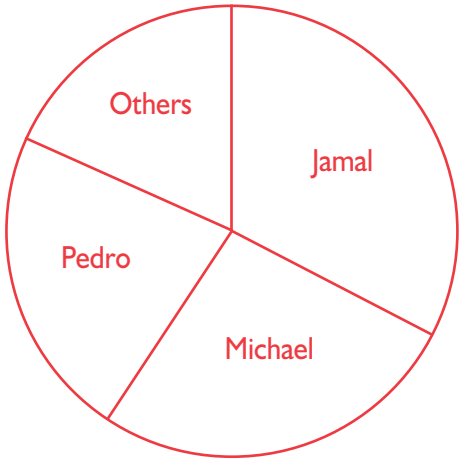
Pie charts (continued)

7 At the end of last season the leading goalscorer in the under 12s A side was Jamal, with 23 goals. He was closely followed by Michael with 19, and then Pedro with 16. The rest of the players scored 13 goals between them. Draw a pie chart to show this information.

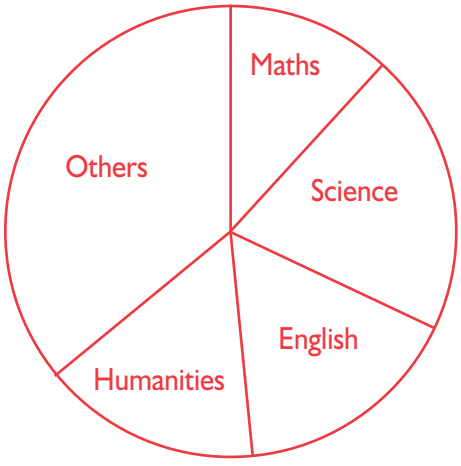
Jamal	23	117°
Michael	19	96°
Pedro	16	81°
Others	13	66°



8 There are twenty-five periods in the weekly timetable at Greenview School. Three of these are Mathematics, five are Science, four are English, four are Humanities and the rest are other subjects. Display this information with a pie chart.

Mathematics	3	43°
Science	5	72°
English	4	58°
Humanities	4	58°
Others	9	130°
TOTAL		361°

Since the total is 361° we alter the largest sector i.e. others to 129°.

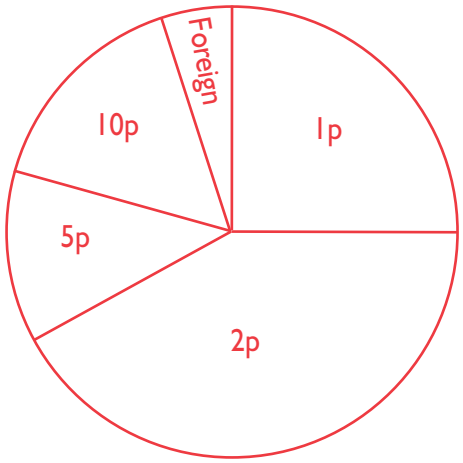


Pie charts (continued)

9 When I emptied my moneybox I found 26 one pence coins, 43 two pence coins, 13 five pence coins and 16 ten pence coins. There were also 5 foreign coins. Draw a pie chart to show the numbers of coins of each type.

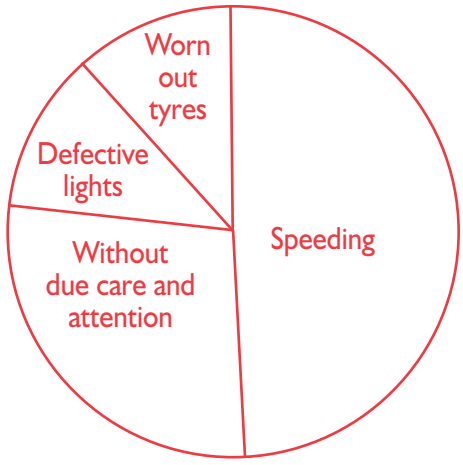
1p	26	91°
2p	43	150°
5p	13	45°
10p	16	56°
Foreign	5	17°
TOTAL		359°

Since the total is 359° we alter the largest sector i.e. 2p to 151°.



10 Last week the local police booked 43 motorists. 21 were speeding, and 12 were driving without due care and attention. Half the rest had defective lights and the others had worn out tyres. Illustrate this information in a pie chart.

Speeding	21	176°
Without due care and attention	12	100°
Defective lights	5	42°
Worn out tyres	5	42

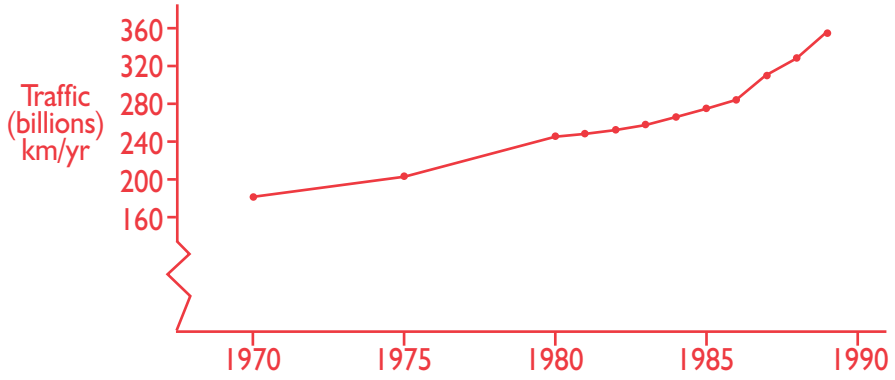


Line graphs

NB Zigzag on vertical axis indicates where unwanted part of scale has been omitted.

1 The table below gives the road traffic volumes for the UK in various years.
(The units are billions of kilometres per year.)
Illustrate the data with a suitable diagram.

Year	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Traffic	179	206	242	245	252	258	268	274	285	311	327	357



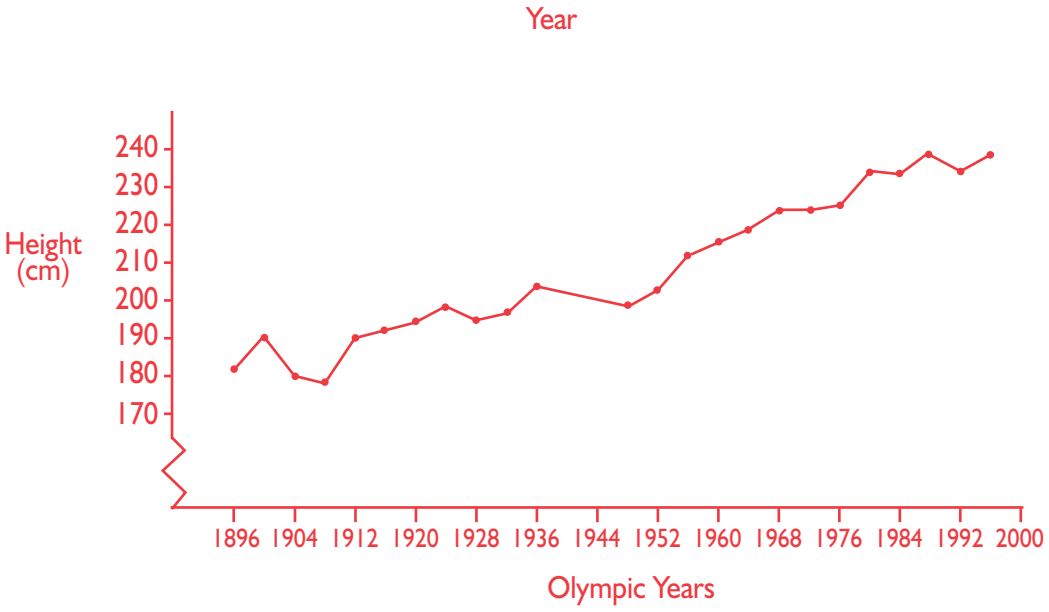
2 These are the winning heights, in metres, in the men's High Jump in the Olympic Games. Make a suitable diagram.

Year	Height	Year	Height	Year	Height
1896	1.81	1928	1.94	1968	2.24
1900	1.90	1932	1.97	1972	2.23
1904	1.80	1936	2.03	1976	2.25
1908	1.77	1948	1.98	1980	2.36
1912	1.90	1952	2.04	1984	2.35
1916	--	1956	2.12	1988	2.38
1920	1.94	1960	2.16	1992	2.34
1924	1.98	1964	2.18	1996	2.39

Use your diagram to predict a height for 2000. Then find out what the value was for 2000, using a library book or perhaps an Internet search, to check the accuracy of your prediction.

Between 2.35 and 2.40

Line graphs (continued)

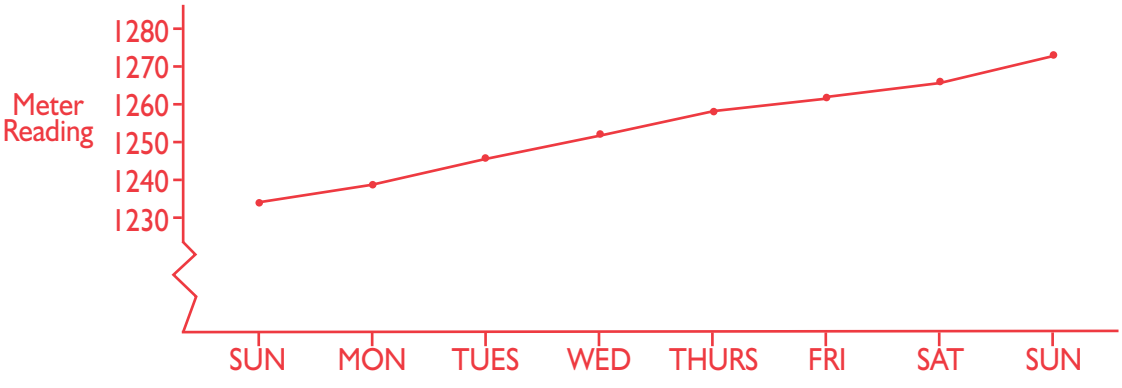


3 I checked my electricity meter at noon every day for 8 days, and obtained these readings:

Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1234	1240	1246	1251	1258	1261	1265	1273

a) Draw a suitable diagram to illustrate the information.

b) During which 24-hour period did I use the most electricity? Sat to Sun



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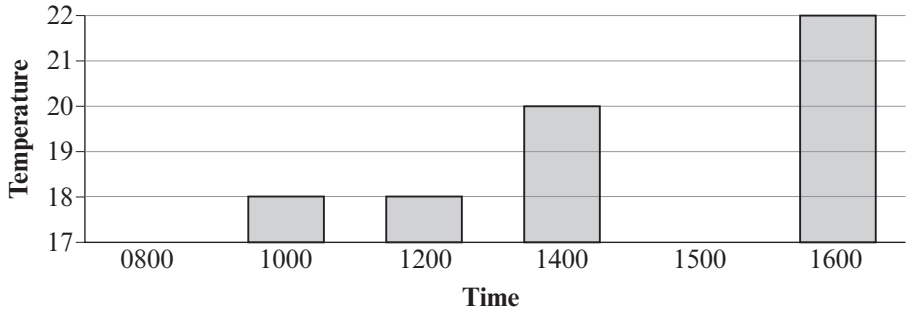
Line graphs (continued)

4 I have been checking the temperature in this room today, and have these readings.

Time	0800	1000	1200	1400	1600
Temperature, °C	17	18	18	20	22

I have made the diagram below.



a) There are some mistakes in the diagram. What are they?

1. Bars; dots joined by lines
2. Scale vertical needs zig-zag for 0 to 16
3. Scale horizontal 1500 should not be there

b) Display the data using a better type of diagram.

c) The room was shaded from the sun until a certain time. Can you estimate that time? Midday

Histograms and frequency polygons

1 Pupils in a class timed their journeys from home.
The times, to the nearest minute, are given below.

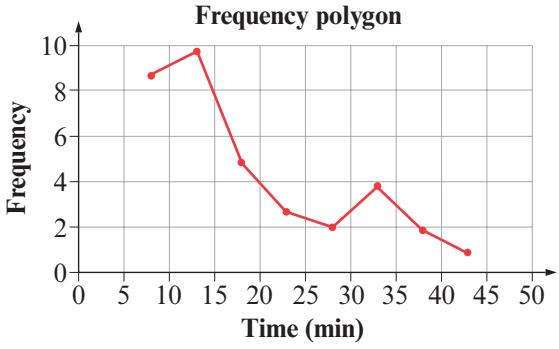
7	21	15	10	12
8	9	17	22	37
38	9	5	12	33
30	28	12	32	21

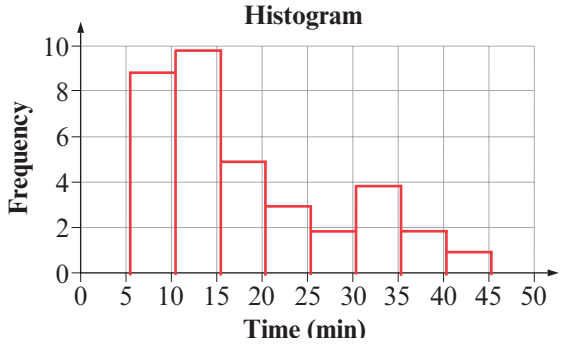
7	40	6	15	11
29	9	19	34	16
12	10	9	10	14
11				

a) Fill in the tally chart below.

Time (t min)	Tally	Frequency
$5 \le t < 10$	𝍸 IIII	9
$10 \le t < 15$	𝍸 𝍸	10
$15 \le t < 20$	𝍸	5
$20 \le t < 25$	III	3
$25 \le t < 30$	II	2
$30 \le t < 35$	IIII	4
$35 \le t < 40$	II	2
$40 \le t < 45$	I	1

b) Draw a frequency polygon and a histogram to illustrate the data.





c) What percentage of pupils have a journey time of over half an hour? 19%

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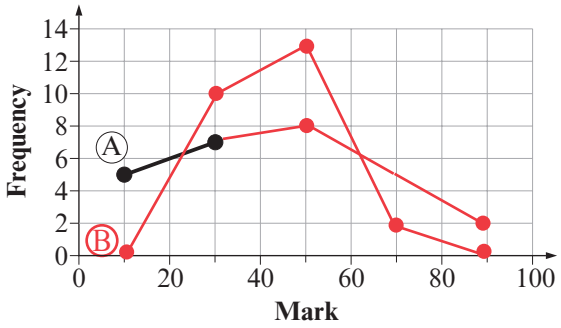
Histograms and frequency polygons (continued)

2 The same mathematics test was taken by two classes. The marks are given below.

Mark	0 to 19	20 to 39	40 to 59	60 to 79	80 to 99
Class A	5	7	8	5	2
Class B	0	10	13	2	0

a) Finish off the two frequency polygons on the grid below.



b) What similarities or differences can you see between the two class

The average mark is about the same for both classes, but class B has a higher proportion of middle marks, with comparitively few very high or very low marks.

Scatter graphs

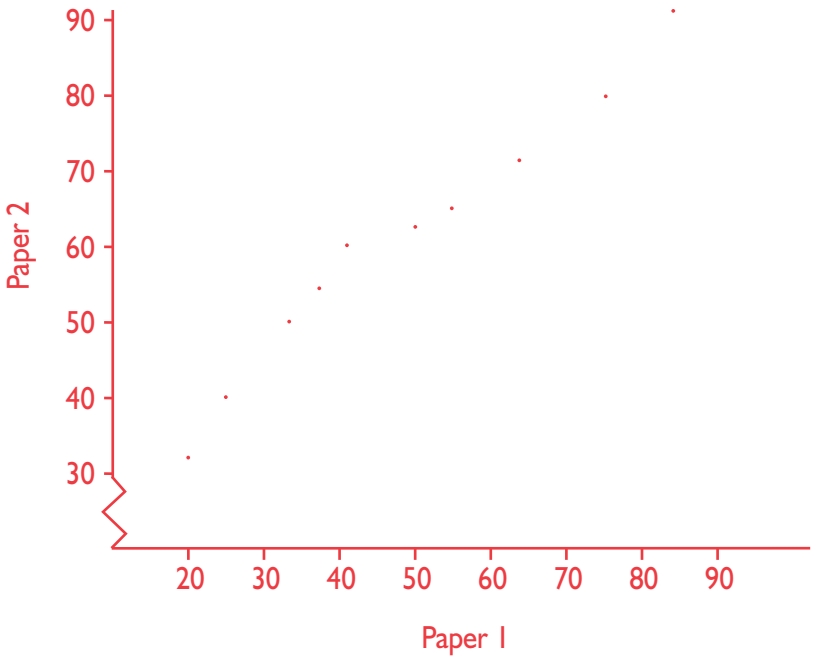
1 The marks of ten students in two mathematics tests were as follows:

Paper 1	20	25	33	38	41	50	55	64	75	84
Paper 2	32	40	50	54	60	63	65	71	80	91

a) Draw a scatter graph to illustrate the data.

b) What type of correlation is there? Strong positive

c) Antoine scored 60 marks on Paper 1 but was absent from Paper 2. 69
Use your graph to predict his Paper 2 score, had he taken the test.



2 The table gives the average monthly temperatures and the amount of gas used (in units called therms) by a family.

Temperature (°F)	42	40	50	55	60	65	70	67	62	58	51	43
Gas used (therms)	35	36	25	20	15	10	6	6	10	12	20	30

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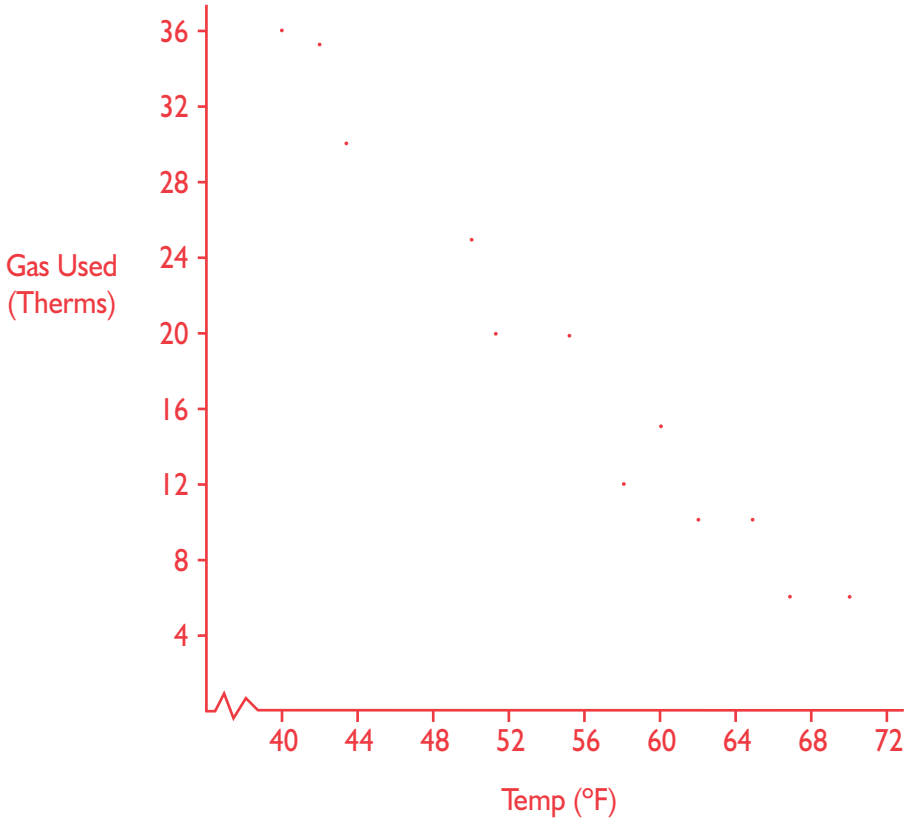
Scatter graphs (continued)

a) Draw a scatter graph, and comment on the correlation. Strong negative

b) In another month the average temperature was 46°F. Estimate the amount of gas used during that month. 28 therms



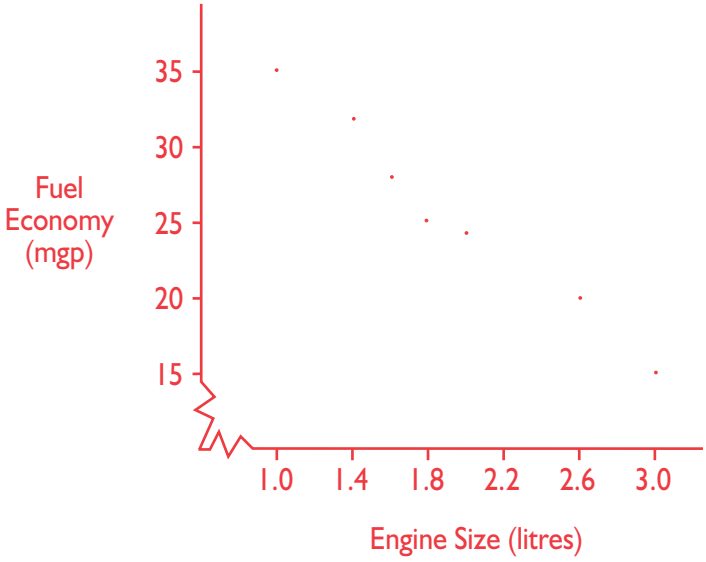
3 The table shows information about 7 cars.

Engine size (litres)	1.0	1.4	1.6	1.8	2.0	2.6	3.0
Fuel economy (mpg)	35	32	28	25	24	20	15

a) Draw a scatter graph, and comment on the correlation. Strong negative

b) Another car has an engine size of 1.1 litres. Use your graph to predict its fuel economy, in miles per gallon. 33 or 34 mpg

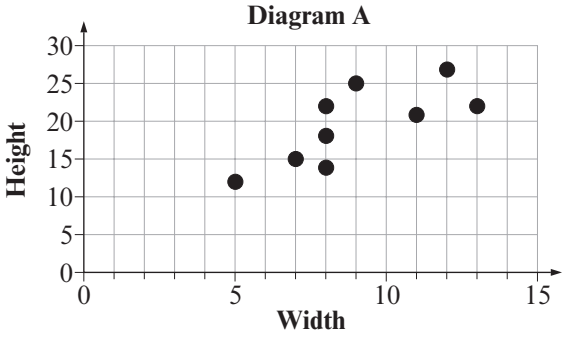
Scatter graphs (continued)

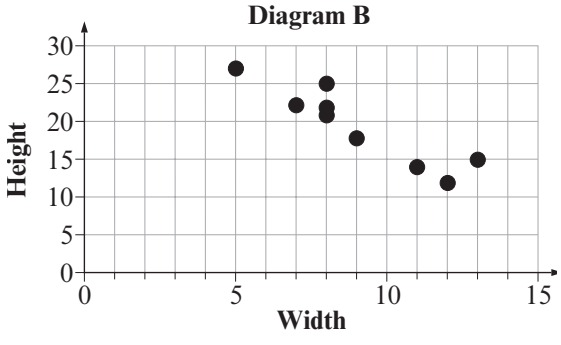


4 Nine children were shown a rectangle, and asked to estimate its width and height. Their replies are plotted on a scatter diagram.

a) Do you think the scatter diagram should look like Diagram A or Diagram B below?

b) Give a reason for your decision.





a) Diagram A

b) Children would be likely to overestimate (or underestimate) both values together, hence positive correlation.

Mutually exclusive outcomes

1 A computer generates a whole number at random.
The whole number lies between 20 and 30 inclusive.

a) Write out a list of all the possible numbers. 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30

b) Find the probability that the number is even. $\frac{6}{11}$

c) Find the probability that the number is odd. $\frac{5}{11}$

d) Find the probability that the number is 25. $\frac{1}{11}$

2 A letter is chosen at random from the letters of the word CURTAINS.

a) Find the probability that the letter is a C. $\frac{1}{8}$

b) Find the probability that the letter is not a U. $\frac{7}{8}$

c) Find the probability that the letter is a vowel. $\frac{3}{8}$

3 In class 5, 12 of the 30 children can speak German, and 18 of them can speak Italian. A child is chosen at random from the class.

a) Find the probability that the child can speak German. $\frac{12}{30} = \frac{2}{5}$

b) Find the probability that the child can speak Italian. $\frac{18}{30} = \frac{3}{5}$

c) Louis says '12 + 18 = 30, so that proves that everyone in the class either speaks German or Italian'.

Explain carefully whether you think Louis is right or wrong. Wrong – some people might speak both

4 In the car park at the local library there are 100 cars. 25 of them are British and 35 are European; the rest are made in the Far East. A car is chosen at random to take part in a survey.

a) What is the probability that it is British? $\frac{25}{100} = \frac{1}{4}$

b) What is the probability that it is made in the Far East? $\frac{40}{100} = \frac{2}{5}$

c) What is the probability that it is not European? $\frac{65}{100} = \frac{13}{20}$

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Mutually exclusive outcomes (continued)

5 I have a collection of 40 ties. Ten of them are red, eighteen are blue and the rest are yellow. One morning I choose a tie completely at random.

a) What is the probability that it is yellow?

$\frac{12}{40} = \frac{3}{10}$

b) What is the probability that it is green?

0

c) What is the probability that it is not blue?

$\frac{22}{40} = \frac{11}{20}$

6 In a word game there are 120 tiles, each carrying one letter of the alphabet. 48 of the tiles are vowels. The tiles are put into a bag and shaken, and then a tile is chosen at random.

a) Raffaele says 'There are 5 vowels in the alphabet, so the probability of choosing a vowel is $\frac{5}{26}$.' Explain why Raffaele is wrong.

The letters are NOT equally likely

b) Find the correct probability of choosing a vowel.

$\frac{48}{120} = \frac{2}{5}$

c) Find the probability of choosing a consonant.

$\frac{72}{120} = \frac{3}{5}$

7 A bag contains 30 chocolate animals. Ten of them are frogs and six are monkeys; the rest are dogs. Ginnie chooses an animal at random.

a) Find the probability that she does not choose a frog.

$\frac{20}{30} = \frac{2}{3}$

b) Find the probability that she chooses a frog or a dog.

$\frac{24}{30} = \frac{4}{5}$

8 When I play computer *Pinball* against my friend I either win, draw or lose. The probability that I win is 0.4 and the probability that I lose is 0.55.

a) Find the probability that I do not lose.

0·45

b) Find the probability that the game is a draw.

0·05

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Find the words

Find the words in this probability word search. (Words can go diagonally and backwards)
Make sure that you understand the meaning of each one.
You may need to look some of the meanings up in a mathematics book.

R	U	K	T	R	E	A	S	V	F	W	R	E	E	T	S	U
Y	S	A	O	I	O	X	H	T	T	J	O	F	C	R	Y	X
M	U	T	U	A	L	L	Y	E	X	C	L	U	S	I	V	E
T	T	A	T	H	T	Y	W	H	I	T	T	S	J	A	F	X
L	R	E	C	E	O	G	C	A	A	R	S	G	Y	L	E	P
J	B	L	O	R	B	R	F	K	U	R	E	T	Y	S	N	E
Q	I	D	M	T	V	I	L	E	L	S	P	I	N	N	E	R
R	A	M	E	C	N	A	H	C	N	E	V	E	I	S	H	I
O	S	T	E	R	L	F	U	N	O	M	W	W	I	F	F	M
F	R	A	N	Y	A	E	I	T	U	T	O	F	C	J	Y	E
F	Y	I	S	R	C	A	R	D	S	E	S	D	I	R	O	N
U	O	T	M	T	T	E	R	L	L	E	Y	I	N	A	G	T
C	E	L	W	R	Q	M	W	I	E	N	I	C	L	A	M	P
Y	Y	L	E	K	I	L	Y	W	R	P	B	E	Y	E	R	F
U	E	C	H	I	N	D	E	P	E	N	D	E	N	T	C	G

Here are the words to find. The list is given in dictionary order.

BIAS	**EVEN CHANCE**	**MUTUALLY EXCLUSIVE**
CARDS	**EXPERIMENT**	**OUTCOME**
CERTAIN	**FAIR**	**RANDOM**
COIN	**INDEPENDENT**	**SPINNER**
DICE	**LIKELY**	**TRIAL**

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