Revision exercise A1

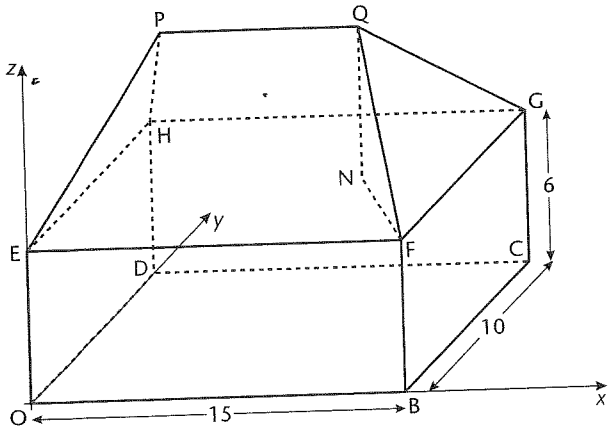
1 Find the coordinates of the midpoint of the line joining each of these pairs of points. Try to do it without plotting the points.

a) A(2, 1) and B(4, 7)

b) C(2, 3) and D(6, 8)

c) E(2, 0) and F(7, 9)

2 The diagram shows the outline of a house.



All the measurements are in metres.
All the walls are vertical.
E, F, G, H and N are in the same horizontal plane.

a) Write down the coordinates of each of these points.

(i) B

(ii) H

(iii) G

The coordinates of Q are (11, 5, 9).
N is vertically below Q.

b) Write down the coordinates of N.

3 Change each of these fractions to a decimal. Give your answers correct to 3 decimal places.

a) $\frac{5}{16}$

b) $\frac{4}{7}$

c) $\frac{7}{40}$

d) $\frac{4}{15}$

4 Change each decimal you found in question **3** into a percentage. Give your answers correct to 1 decimal place.

5 Karl cuts 20 cm from a piece of wood 1·6 m long.
By what percentage has he shortened the piece of wood?

6 The audience for a TV soap increased from 8 million to 10 million.
What percentage increase is this?

7 The number of students in a school went down from 850 to 799.
What percentage reduction is this?

8 Write down the multiplier that will increase an amount by each of these percentages.

a) 15%

b) 30%

c) 9%

d) 7·5%

e) 120%

9 Write down the multiplier that will decrease an amount by each of these percentages.

a) 12%

b) 40%

c) 58%

d) 2%

e) 4·5%

10 In a sale all prices are reduced by 15%. Find the new price of a pair of trainers that originally cost £65.

11 The value of an antique increased by 20%. The antique was originally worth £450.
What is it worth now?

12 Write each of these ratios in its simplest form.
- **a)** 50 : 35
- **b)** 30 : 72
- **c)** 1 minute : 20 seconds
- **d)** 45 cm : 1 m
- **e)** 600 ml : 1 litre

13 To make 12 scones Maureen uses 150 g of flour.
How much flour does she use to make 20 scones?

14 To make a fruit and nut mixture, raisins and nuts are mixed in the ratio 5 : 3 by mass.
- **a)** What mass of nuts is mixed with 100 g of raisins?
- **b)** What mass of raisins is mixed with 150 g of nuts?

15 Peter made a fruit punch by mixing orange, lemon and grapefruit juices in the ratio 5 : 1 : 2.
- **a)** He made a 2 litre bowl of fruit punch. How many millilitres of grapefruit juice did he use?
- **b)** How much fruit punch could he make with 150 ml of orange juice?

16 Show which is the better buy, 5 litres of oil for £18·50 or 2 litres of oil for £7·00.

17 Supershop sells milk in pints at 43p and in litres at 75p.
One pint is equal to 568 ml.
Which is the better buy?

18 A fair octagonal spinner is numbered 1 to 8.
When it is spun, what is the probability of getting
- **a)** a number greater than 5?
- **b)** a multiple of 3?

19 An unbiased coin is tossed and a normal dice is thrown.
What is the probability of getting both a head and a 6?

20 The probability that Jane wears red clothes is $\frac{3}{10}$.
What is the probability that she doesn't wear red?

21 A box contains five milk, six plain and four white chocolates. Chris picks one out at random.
What is the probability that he gets a plain chocolate? Give your answer as a fraction in its lowest terms.

22 The probability that City win their next game is 0·55 and the probability that they lose their next game is 0·3.
What is the probability that they draw their next game?

23 The probability of picking a black counter from a box of counters is $\frac{1}{6}$. Sue makes 300 selections from the box.
How many times might you expect her to pick a black counter?

24 The probability that United win any match is 0·85.
In a season of 40 matches, how many might you expect United to win?

25 Over the last year Rebecca has been late for school 25 times in 190 days.
Use these figures to estimate the probability that she will be on time the next school day. Give your answer correct to 2 decimal places.

26 The ages of the drivers of the last 250 cars to have crashes at an 'accident black spot' are shown in this table.

Age (years)	Number of crashes
17–20	40
21–24	35
25–49	105
50–64	45
65 and over	25

a) Use the table to estimate the probability that the next driver to have a crash at the black spot will be aged
(i) 25–49.
(ii) over 65.
b) Explain why these figures do not necessarily mean that drivers aged 65 and over are the safest.

27 Rachel has a four-sided spinner with the sides numbered 1, 2, 3 and 4. She wants to test whether the spinner is a fair one. Describe carefully how you would advise her to do this.

28 Pencils cost 20p each.
Write an expression for the cost of x pencils.

29 The posters in a sale all cost the same price. Tracey bought eight posters for £a. Write an expression for the cost of one poster.

30 Anna has t coins in her purse. Rebecca has four more than Anna, Sian has two fewer than Anna, and Jessica has twice as many as Anna.
Write an expression for the number of coins each of these women has.
a) Rebecca
b) Sian
c) Jessica

31 To convert temperatures on the Celsius (°C) scale to the Fahrenheit (°F) scale you can use the formula $F = 1{\cdot}8C + 32$. Convert each of these temperatures to Fahrenheit.
a) 40 °C
b) 0 °C
c) $^{-}5$ °C

32 The cost of a child's bus ticket is half the adult fare plus 25p.
a) Write an expression for the cost of a child's ticket.
b) Find the cost of a child's ticket when the adult fare is £1·40.

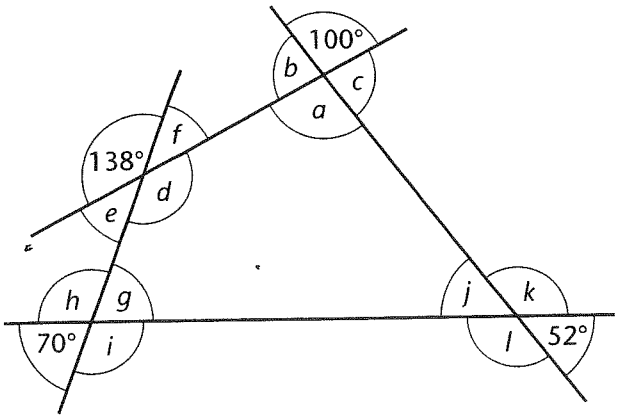
33 The area of a rhombus is found by multiplying the lengths of the diagonals together and then dividing by 2.
a) Write an expression for the area of a rhombus.
b) Find the area of a rhombus with diagonals of length
(i) 4 cm and 6 cm.
(ii) 5·4 cm and 8 cm.

34 $P = a^2 + b^2$
a) Find P when $a = 4$ and $b = 7$.
b) Find P when $a = 3$ and $b = 4$.
c) Find P when $a = {}^{-}3$ and $b = {}^{-}4$.

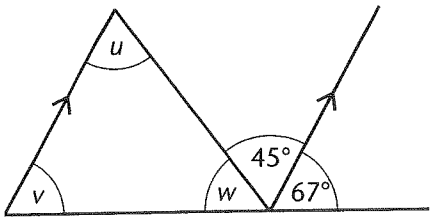
35 $h = 7a - 2bc$
a) Find h when $a = 2$, $b = 3$ and $c = {}^{-}1$.
b) Find h when $a = \frac{1}{4}$, $b = \frac{1}{2}$ and $c = \frac{3}{4}$.
c) Find h when $a = 3{\cdot}6$, $b = 7{\cdot}4$ and $c = 2{\cdot}5$.

Revision exercise B1

1 Work out the size of each angle marked with a letter.
Give a reason for each of your answers.



2 Work out the size of each angle marked with a letter.
Give a reason for each of your answers.



3 Four of the exterior angles of a pentagon are 85°, 66°, 54° and 97°.
Find the size of the other exterior angle.

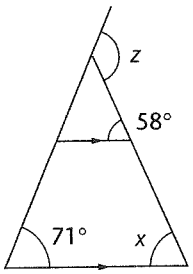
4 Calculate the sum of the interior angles of a heptagon.

5 A regular polygon has ten sides.
Find the size of each of its exterior and interior angles.

6 An irregular polygon has eight sides.
Seven of its interior angles add up to 940°.
Calculate the size of its other interior angle.

7 Find the size of each angle marked with a letter.

a)



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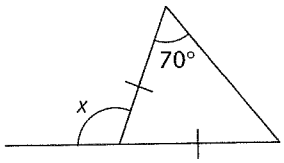
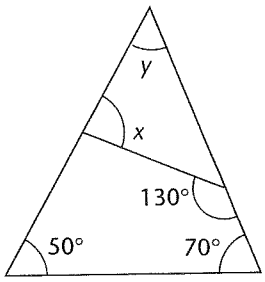


c)



8 Calculate the size of the interior angle of a regular polygon with 20 sides.

9 Calculate the number of sides of a regular polygon with an interior angle of 168°.

10 £C is the cost of L m of piping.
C is directly proportional to L.

a) Copy and complete the table.

L	1·3	5·2	
C	3·12		6·00

b) State the equation connecting C and L.

11 Find the equation connecting y and x if y is directly proportional to x and $y = 10{\cdot}8$ when $x = 6$.

12 A is directly proportional to h.
$A = 5{\cdot}6$ when $h = 4$.
Calculate the value of A when $h = 5$.

13 Estimate the cost of travelling 48 miles by car if the cost per mile is 31p.

14 Stephen has £25.
Show a rough calculation to check whether he has enough money to buy six CDs at £3·98 each.

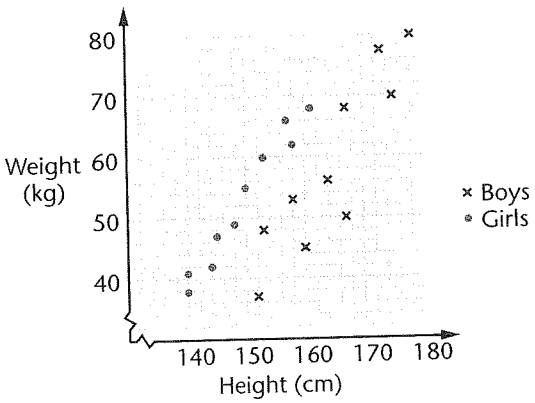
15 Estimate the answers to these.

a) $63{\cdot}9 \times 14{\cdot}9$

b) $\sqrt{143} \times \sqrt{170} \times \sqrt{80}$

c) $(6{\cdot}32 + 5{\cdot}72) \times (\sqrt{16{\cdot}1} + \sqrt{48{\cdot}9})$

16 The scatter diagram shows the heights and weights of ten boys and ten girls in a class.



Compare the boys and girls, noting any differences and any similarities.

17 Two judges at a cat show marked eight cats for the quality of their coats.
The marks are out of 30. The marks they gave are shown in the table.

Cat	Judge 1	Judge 2
A	17	7
B	23	23
C	15	9
D	28	27
E	22	13
F	18	15
G	27	25
H	14	4

a) Draw a scatter diagram to show the judges' scores, with Judge 1 on the horizontal axis.

b) Comment on the relationship between the two judges' scores.

c) Draw a line of best fit.

d) Judge 2 gave a ninth cat 18 marks. Estimate the marks that Judge 1 would give the same cat.

18 The table shows the predicted sales of replica shirts at different prices.

Price (£)	Number of shirts
20	7600
25	7400
30	6800
35	5600
40	5400
45	4500
50	3600

a) Draw a scatter diagram to show this information.

b) Comment on the relationship between price and predicted sales.

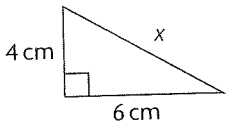
c) Draw a line of best fit.

d) Estimate the sales of shirts if the price is set at £33.

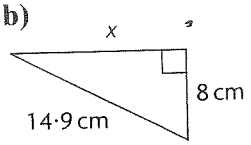
e) Why would it be wrong to predict the sales of shirts priced at £65?

19 Calculate the value of x in each of these triangles.

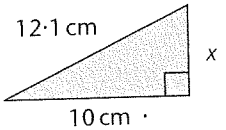
a)



b)



c)



20 Calculate the length of the diagonal of a rectangle with length 22 cm and width 12 cm.

21 A ship sails 20 km due north and then 30 km due west.
How far is it from its starting point?

22 A triangle has sides of length 8 cm, 9 cm and 12 cm.
Use Pythagoras' theorem to check whether or not this is a right-angled triangle.

Revision exercise C1

1 **a)** Copy and complete this table of values.

x	$^{-}1$	0	1	2	3	4	5	6	7
x^2									
$-6x$									
$+3$									
$y = x^2 - 6x + 3$									

b) Draw the graph of $y = x^2 - 6x + 3$, for $x = {}^{-}1$ to 7.
Label the x-axis from $^{-}1$ to 7 and the y-axis from $^{-}10$ to 10.

c) Use the graph to find the values of x when $y = 0$.

2 The height, h metres, of a ball thrown upwards at 40 metres per second is given by the formula $h = 40t - 5t^2$, where t is the time in seconds.

a) Copy and complete this table of values.

t	0	1	2	3	4	5	6	7	8
t^2									
$40t$									
$-5t^2$									
$h = 40t - 5t^2$									

b) Draw the graph of $h = 40t - 5t^2$, for values of t from 0 to 8.

c) Find the times when the ball is 70 metres above the ground. Give your answers correct to 1 decimal place.

3 **a)** Draw the graph of $y = x^2 + 2x$, for values of x from $^{-}4$ to 2.

b) Use your graph to solve the equation $x^2 + 2x = 0$.

4 **a)** Draw the graph of $y = x^2 - 5x + 5$, for values of x from 0 to 5.

b) Use your graph to solve the equation $x^2 - 5x + 5 = 0$.

5 The table shows a summary of the marks gained by students in a test.

Marks (m)	Frequency
$0 \leqslant m < 10$	4
$10 \leqslant m < 20$	10
$20 \leqslant m < 30$	8
$30 \leqslant m < 40$	4

Calculate an estimate of the mean mark for the test.

6 Harry picked and measured some runner beans. These were their lengths.

Length (L cm)	Frequency
$10 < L \leqslant 15$	3
$15 < L \leqslant 20$	7
$20 < L \leqslant 25$	11
$25 < L \leqslant 30$	8
$30 < L \leqslant 35$	1

Calculate an estimate of the mean length of the runner beans.

7 Lisa timed her little brother when he was playing with his new toys over Christmas.

Time (t minutes)	Frequency
$0 \leqslant t < 10$	2
$10 \leqslant t < 20$	5
$20 \leqslant t < 30$	7
$30 \leqslant t < 40$	10
$40 \leqslant t < 50$	4

Calculate an estimate of the mean of these times.

8 Kim and Petra asked their class, 'How much exercise have you had this week?' These were the results.

Time of exercise (h hours)	Number of people
$0 \leqslant h < 1$	3
$1 \leqslant h < 2$	8
$2 \leqslant h < 5$	12
$5 \leqslant h < 10$	5
$h \geqslant 10$	0

a) How many people were in the survey?
b) Calculate an estimate of the mean time of exercise.

9 Solve each of these inequalities and show the solution on a number line.
a) $2x > 5$
b) $x + 3 \leqslant 5$
c) $2x - 4 \geqslant x + 2$
d) $4x - 3 < 7 - x$
e) $4x - 9 \leqslant 2x + 7$

10 David has two brothers. One brother is two years younger than him and the other brother is five years older than him.
a) Let David be x years old.
Write down an expression for the sum of their ages.
b) The sum of their ages is 39. Write down an equation and solve it to find x.
c) What are their ages?

11 Angela has £5 to spend. She spends £3·20 on her lunch and decides to buy as many 24p packets of crisps as possible with the rest of the money.
a) If the number of packets she buys is x, write down an inequality in x and solve it.
b) How many packets of crisps does she buy?

12 A quadrilateral has angles of $x°$, $3x°$, 90° and $(x + 20)°$.
a) Write down an equation in x and solve it.
b) What are the sizes of the angles?

13 A cyclist travels 5 km in 20 minutes. Calculate her speed in kilometres per hour.

14 A metal weight has a mass of 200 g and a density of 25 g/cm^3.
What is its volume?

15 Stephen runs a 100 m race in 13·58 seconds.
Calculate his average speed. Give your answer to a sensible degree of accuracy.

16 Stanley has a population density of 5720 people/km^2. Its population is 47 500.
What is the area of Stanley?

17 Find the reciprocal of each of these numbers.
a) 8 **b)** $\frac{1}{7}$
c) $\frac{2}{5}$ **d)** 0·8

18 **a)** Express each of these numbers as a product of its prime factors.
(i) 84
(ii) 540
b) Find the highest common factor of 84 and 540.

19 Find the lowest common multiple of 24 and 78.

Revision exercise D1

1 Write each of these as simply as possible.

a) $\pi + \pi + \pi + \pi$

b) $5\pi + 7\pi$

c) $8^2\pi - 2^2\pi$

d) $2 \times 17\pi$

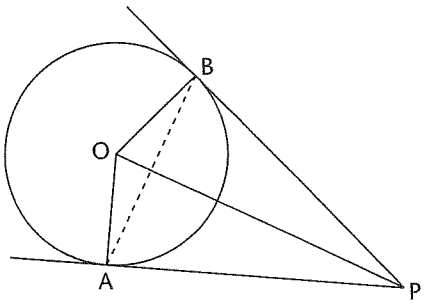
2 Calculate these, leaving π in your answers.

a) The circumference of a circle with radius 4 cm.

b) The area of a circle with radius 13 cm.

3 A ring is made by removing a circle of radius 5 cm from a circle of radius 6 cm. What is the area of the ring? Leave π in your answer.

4 Look at this diagram.



a) If angle BPO is 32°, calculate

(i) angle POB.

(ii) angle OAB.

b) If angle OAB is 25°, calculate angle APB.

c) If angle ABP is 75°, calculate angle AOB.

5 Rearrange each formula to make the letter in brackets the subject.

a) $x = y - 3b$ (y)

b) $t = \dfrac{u+v}{2}$ (u)

c) $P = 2b - a$ (a)

d) $p = qx + m$ (q)

e) $I = \dfrac{PTR}{100}$ (P)

f) $v^2 = u^2 + 2as$ (s)

6 The sum $s°$ of the interior angles of a polygon with n sides is given by $s = 180(n - 2)$.

a) Make n the subject of this formula.

b) How many sides does a polygon have when the sum of its interior angles is 2880°?

7 Solve these equations.

a) $3(x - 2) = x$

b) $5(2x + 3) = 55$

c) $4(x - 3) = 3(x - 2)$

d) $2(3x - 4) = 4(x + 1)$

8 Solve these inequalities.

a) $2x - 1 < 5$

b) $3x + 4 \leqslant 16$

c) $5x - 2 > 3 + 4x$

d) $2(3x - 1) \leqslant 3x + 5$

e) $2x - 3 < 3x - 1$

f) $x + 2 > 3x + 1$

g) $3(2x - 3) > 2(x - 5)$

9 An ice-lolly costs x pence and an ice-cream costs 20 pence more.

a) Write down the cost of an ice-cream in terms of x.

Jon buys three ice-lollies and two ice-creams and pays £3·40.

b) Write down an equation in x and solve it to find the cost of an ice-lolly and the cost of an ice-cream.

10 Marcia is x cm tall and her friend Carole is 25 cm shorter.

a) Write down Carole's height in terms of x.

Their total height is 3 metres.

b) Write down an equation in x and solve it to find Marcia's height.

11 Draw an angle of 65° .
Construct the bisector of the angle.

12 Draw a line AB, 5 cm long.
Construct the perpendicular bisector of AB.

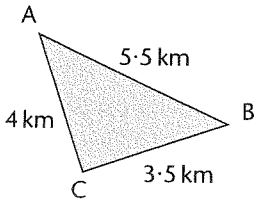
13 Draw a line 10 cm long. Mark a point anywhere above the line.
Construct the perpendicular from this point to the line.

14 Two points A and B are 6 cm apart.
Show, by shading, the locus of the points that are less than 5 cm from A and more than 5 cm from B.

15 Draw a rectangle ABCD with sides AB = 4 cm and BC = 3 cm.
Show the locus of the points outside the rectangle that are within 2 cm of the sides of the rectangle.

16 Draw a triangle ABC with AB = 8 cm, angle A = 47° and AC = 5 cm.
Show the locus of the points inside the triangle that are nearer to AB than AC.

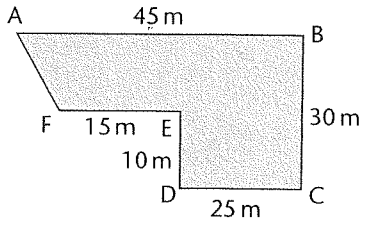
17 This diagram shows the position of three schools.



It is decided to build a swimming pool for the three schools. It must not be more than 3·5 km from any of the schools.
Using a scale of 2 cm : 1 km, make a scale drawing and show the region where the pool can be located.

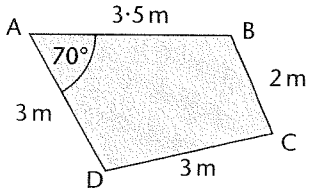
18 Carterknowle church hall is rectangular with sides AB = 12 m and BC = 5 m. The main door is at corner C.
A spotlight is to be fixed on the ceiling, more than 6 m from the main door, more than 5 m from the opposite corner and nearer to AB than AD.
Using a scale of 1 cm : 1 m, make a scale drawing of the hall and show the region where the light can be fitted.

19 This is a plan of the floor area of a shop.



All the corners are 90° except A and F.
A heat detector is placed at A and another at D. They both have a range of 20 m and do not work round corners.
Using a scale of 1 cm : 5 m, make a scale drawing of the plan and show, by shading, the region that is not covered by the heat detectors.

20 This is a sketch of Sarah's patio.



She wants to place a plant pot on the patio, within 1 m of AB, nearer to AB than AD, and no more than 2 m from A.
Using a scale of 2 cm : 1 m, make a scale drawing of the patio and show the region where the pot can be placed.

21 Work out these.
a) $3 \times 0{\cdot}5$
b) $0{\cdot}5 \times 0{\cdot}9$
c) $0{\cdot}4 \times 0{\cdot}2$
d) $12 \div 0{\cdot}2$
e) $69 \div 0{\cdot}3$
f) $135 \div 0{\cdot}5$

22 Work out these.
a) $6{\cdot}4 \times 2{\cdot}5$
b) $111{\cdot}7 \times 3{\cdot}85$
c) $8{\cdot}45 \times 0{\cdot}91$
d) $12{\cdot}9 \div 0{\cdot}03$
e) $5{\cdot}2452 \div 0{\cdot}12$
f) $20{\cdot}24 \div 1{\cdot}15$

23 Convert each of these fractions to a decimal. When the answer is a recurring decimal, use the dot notation.

a) $\frac{1}{8}$ **b)** $\frac{3}{11}$

c) $\frac{21}{125}$ **d)** $\frac{17}{33}$

e) $\frac{5}{32}$ **f)** $\frac{63}{132}$

24 Convert each of these decimals to a fraction in its lowest terms.

a) 0·02 **b)** $0\dot{6}$

c) $0\cdot0\dot{6}$ **d)** 0·72

e) 0·027 **f)** 0·1825