1   Simplify.
$$3a + 7b - 4a + b$$

.... [2]

2   A field, *ABC*, is in the shape of a triangle.
AC = 500 m and *BC* = 650 m.

Using a ruler and compasses only, complete the scale drawing of the field *ABC*.
Leave in your construction arcs.
Use a scale of 1 cm to represent 100 m.
The side *AB* has been drawn for you.

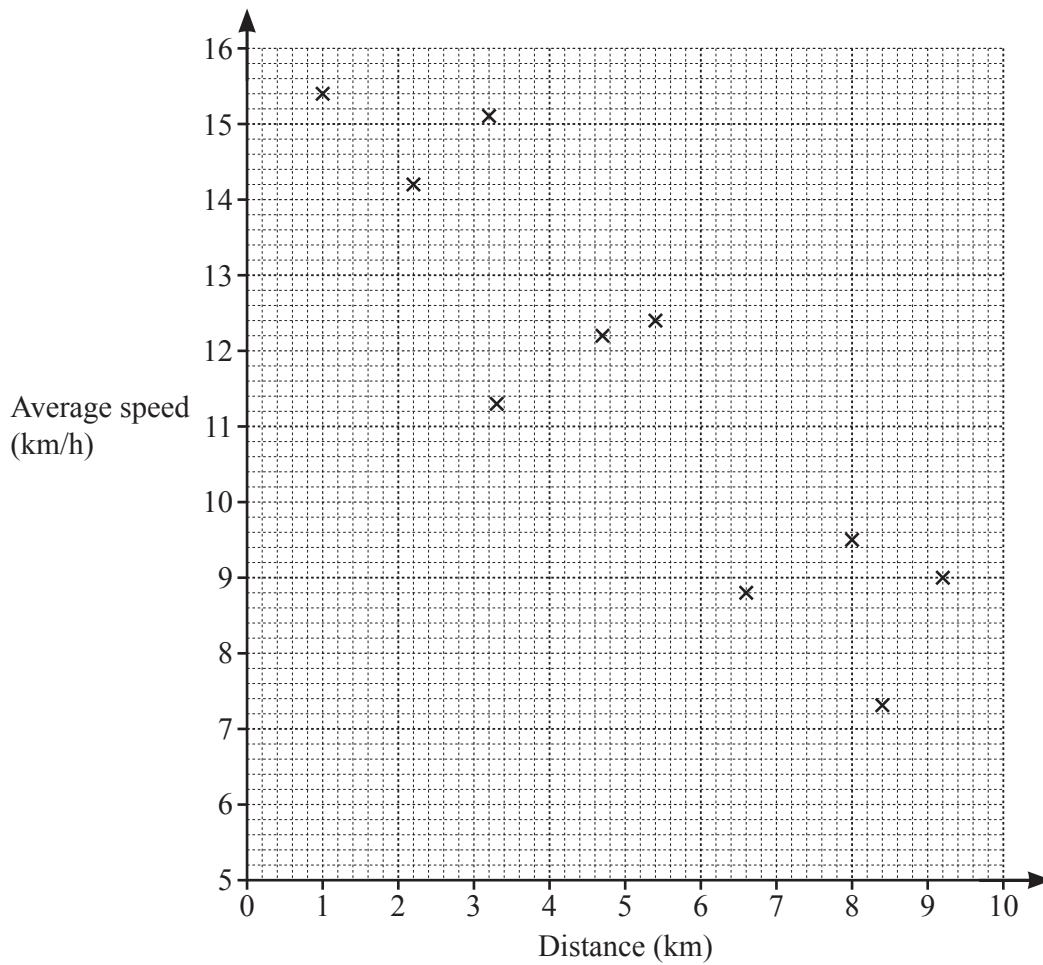*A* ——————————————————————— *B*

Scale: 1 cm to 100 m

[3]

3   Rangan buys 3.6 kg of potatoes and 2.8 kg of leeks.
The total cost is $13.72 .
Leeks cost $2.65 per kilogram.

Find the cost of 1 kg of potatoes.

$ .... [3]

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4 Aisha records the distance she runs and her average speed.
The results are shown in the scatter diagram.

(a) The table shows the results of four more runs.

Distance (km)	4.2	5.7	7.1	8.8
Average speed (km/h)	13.4	11.8	9.8	8.3

On the scatter diagram, plot these points. [2]

(b) What type of correlation is shown in the scatter diagram?

.... [1]

(c) On the scatter diagram, draw a line of best fit. [1]

(d) Use your line of best fit to estimate her average speed when she runs a distance of 6 km.

.... km/h [1]

5 $$T = \frac{49.2 - 9.59}{4.085 \times 2.35}$$

By writing each number correct to 1 significant figure, work out an estimate for T.
You must show all your working.

.... [2]

6 **Without using a calculator**, work out $2\frac{2}{3} \times 2\frac{3}{4}$.

You must show all your working and give your answer as a mixed number in its simplest form.

.... [3]

7 Make x the subject of this formula.
$$2y = 5x - 7$$

$x =$ .... [2]

8 **(a)** 1, 2, 3, 5 and 7 are all common factors of two numbers.

Write down the digit that the two numbers must end in.

.... [1]

(b) Write 84 as a product of its prime factors.

.... [2]

9 **(a)** Ahmed increases 40 by 300%.

From this list, put a ring around the correct calculation.

$$40 \times 1.300 \qquad 40 \times 3 \qquad 40 \times 400 \qquad 40 \times 4 \qquad 40 \times 300$$

[1]

(b) Ahmed finds the magnitude of the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$.

From this list, put a ring around the correct calculation.

$$\sqrt{2^2 + -3^2} \qquad 2^2 - 3^2 \qquad \sqrt{2^2 - 3^2} \qquad 2^2 + (-3)^2 \qquad \sqrt{2^2 + (-3)^2}$$

[1]

10 A town has a population of 45 000.
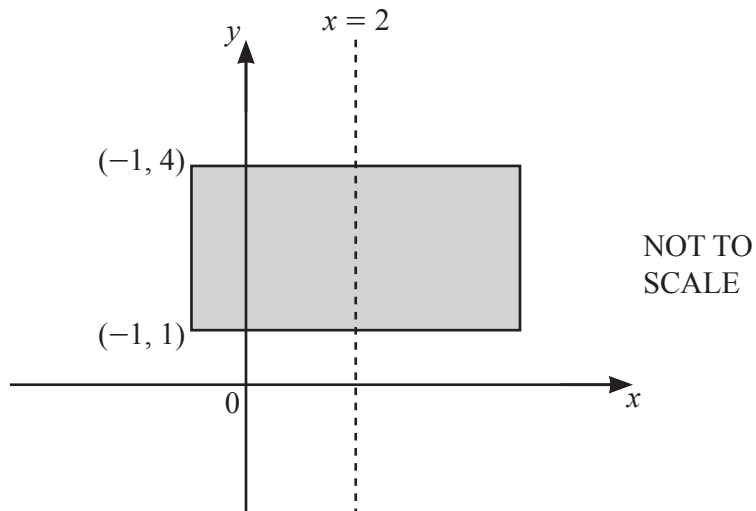This population increases exponentially at a rate of 1.6% per year.

Find the population of the town at the end of 5 years.
Give your answer correct to the nearest hundred.

.... [3]

11

The diagram shows a rectangle with a line of symmetry at $x = 2$.
Two vertices of the rectangle are at $(-1, 1)$ and $(-1, 4)$.

The shaded region is defined by the inequalities $a \leqslant x \leqslant b$ and $c \leqslant y \leqslant d$.

Find the values of a, b, c and d.

$a =$ ....

$b =$ ....

$c =$ ....

$d =$ .... [2]

12 The interior angle of a regular polygon with n sides is 156°.

Work out the value of n.

$n =$ .... [2]

13 Write the recurring decimal $0.1\dot{7}$ as a fraction in its simplest form.
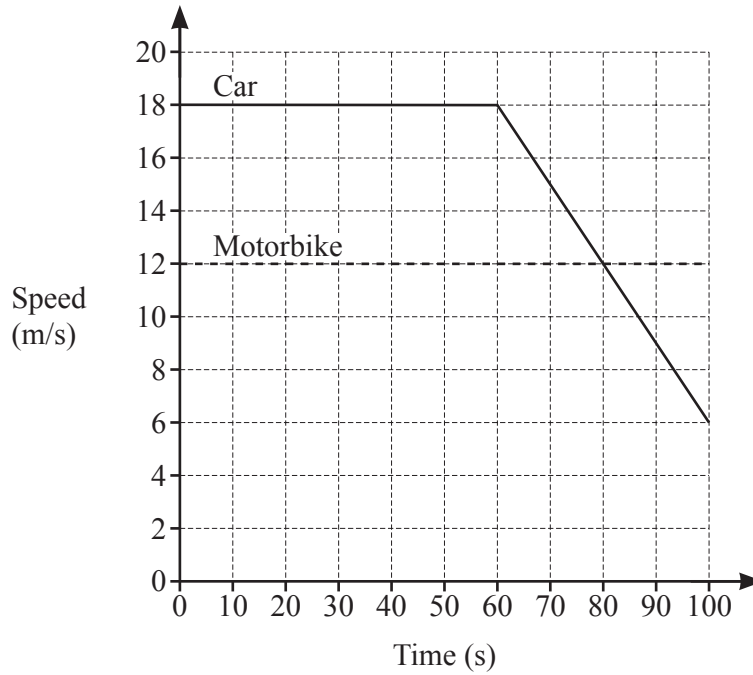You must show all your working.

.... [3]

14 Find the gradient of a line that is perpendicular to $8y + 4x = 5$.

.... [2]

15

The diagram shows the speed–time graph for 100 seconds of the journey of a car and of a motorbike.

(a) Find the deceleration of the car between 60 and 100 seconds.

.... m/s^2 [1]

(b) Calculate how much further the car travelled than the motorbike during the 100 seconds.

.... m [3]

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16 Factorise $6x^2 + 7x - 20$.

.... [2]

17 **(a)** $f(x) = 3x^2 + a$ where a is an integer.
$f(-2) = 19$

Find the value of a.

$a =$ .... [2]

(b) $g(x) = 2x + 7$ $\qquad$ $h(x) = 3x - 8$

(i) Find $gh(x)$ in its simplest form.

.... [2]

(ii) Find $g^{-1}(x)$.

$g^{-1}(x) =$ .... [2]

18
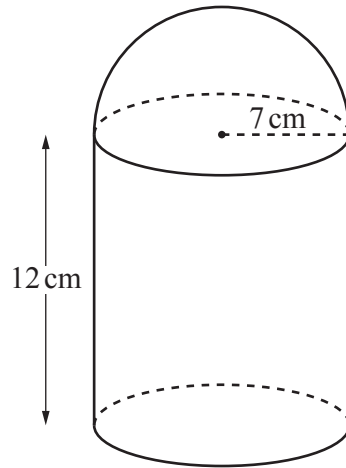
NOT TO
SCALE

The diagram shows a solid made from a cylinder and a hemisphere, both of radius 7 cm.
The cylinder has length 12 cm.

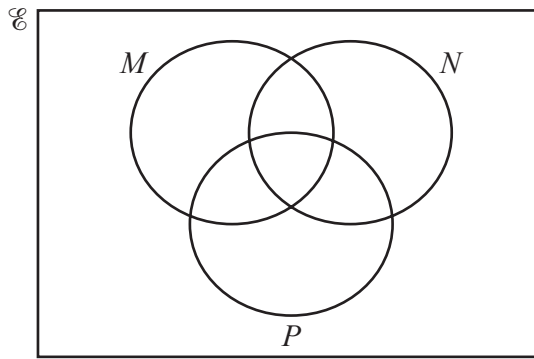Work out the total surface area of the solid.
[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

.... cm^2 [4]
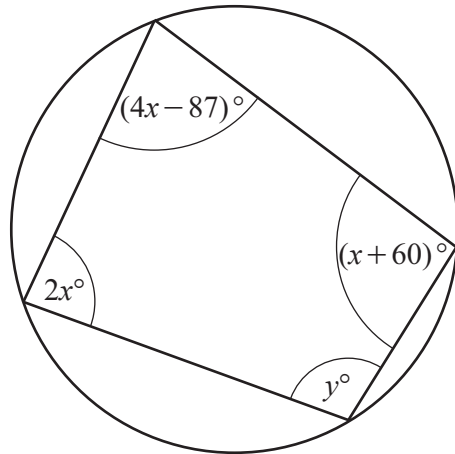
19 In this Venn diagram, shade the region $M' \cup N \cup P$.

[1]

20

NOT TO
SCALE

The diagram shows a cyclic quadrilateral.

Find the value of y.

$y =$ .... [4]

21
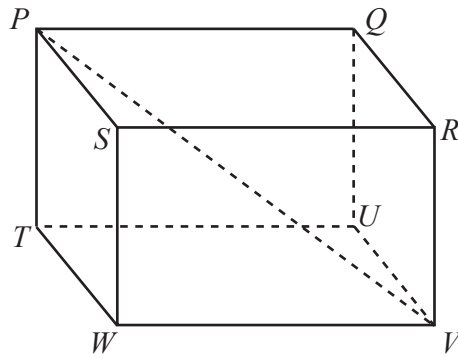
NOT TO
SCALE

The diagram shows a cuboid *PQRSTUVW*.
PV = 17.2 cm
The angle between the line *PV* and the base *TUVW* of the cuboid is 43°.

Calculate *PT*.

PT = ... cm [3]

22 Simplify.

$$\frac{x^2 - 5x}{2x^2 - 50}$$

.... [4]

Question 23 is printed on the next page.

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23 (a)
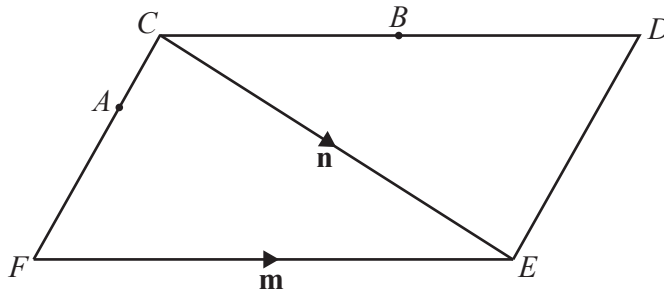
NOT TO SCALE

The diagram shows a parallelogram *CDEF*.
$\overrightarrow{FE} = \mathbf{m}$ and $\overrightarrow{CE} = \mathbf{n}$.
B is the midpoint of *CD*.
FA = 2*AC*

Find an expression, in terms of **m** and **n**, for $\overrightarrow{AB}$.
Give your answer in its simplest form.

$\overrightarrow{AB} =$ .... [3]

(b) $\overrightarrow{GH} = \frac{5}{6}(2\mathbf{p} + \mathbf{q})$ $\overrightarrow{JK} = \frac{5}{18}(2\mathbf{p} + \mathbf{q})$

Write down **two** facts about vectors $\overrightarrow{GH}$ and $\overrightarrow{JK}$.

....

.... [2]