



CANDIDATE
NAME

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CENTRE
NUMBER

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CANDIDATE
NUMBER

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4024/12

May/June 2023

2 hours

You must answer on the question paper.

You will need: Geometrical instruments

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary working clearly.

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 Work out.

(a) $3.25 - 1.73$

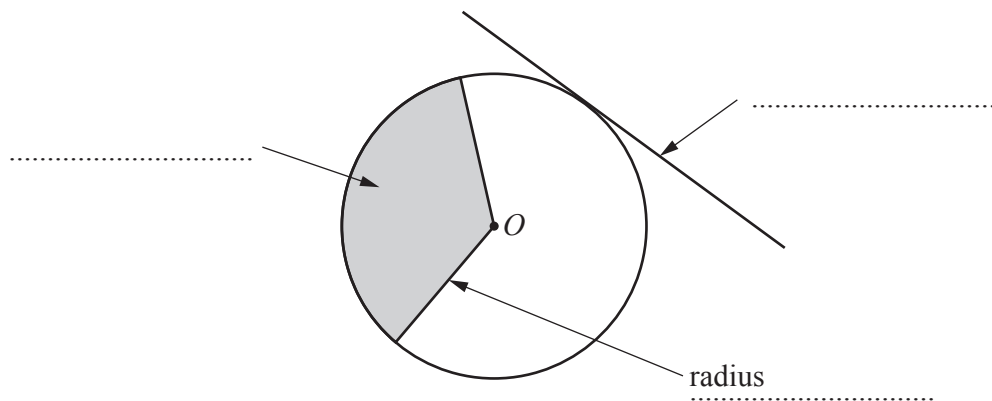
..... [1]

(b) 1.2^2

..... [1]

2 The diagram shows a circle with centre O .
A straight line touches the circle.

Complete each label with the correct mathematical name.
A radius has been labelled for you.



[2]

3 Write these numbers in order of size, starting with the smallest.

0.65 $\frac{5}{8}$ 62% $\frac{11}{20}$ 0.595

..... , , , , [2]
smallest

- 4 (a) At midday the temperature is 8°C .
At midnight the temperature is 12°C lower.

Find the temperature at midnight.

..... $^{\circ}\text{C}$ [1]

- (b) Shazia records the temperature, in $^{\circ}\text{C}$, at 6 am every day for one week.

5 2 -1 -7 -2 5 -5

- (i) Find the median.

..... $^{\circ}\text{C}$ [1]

- (ii) Find the range.

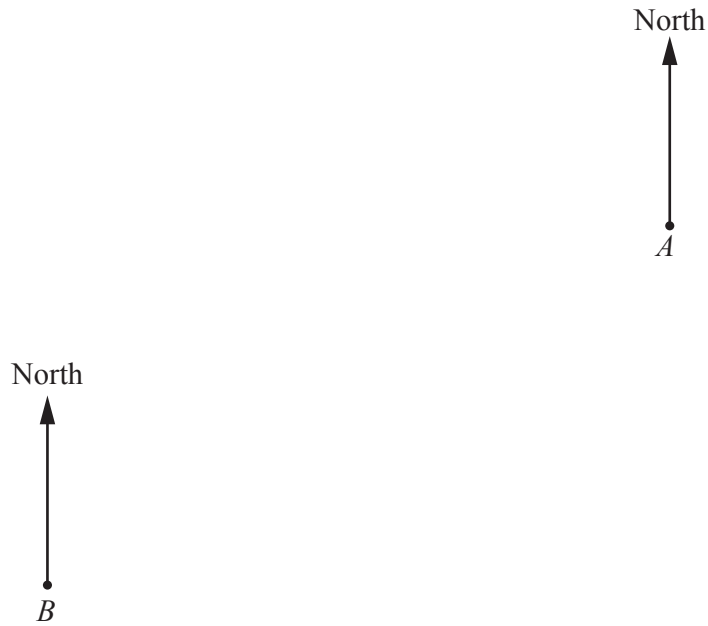
..... $^{\circ}\text{C}$ [1]

- 5 Maya invests \$480 at a rate of 2% per year simple interest.

Calculate the total amount of interest she receives at the end of 5 years.

\$ [2]

- 6 The scale drawing shows the positions of two villages, A and B .
The scale is 1 cm to 2 km.



Scale: 1 cm to 2 km

- (a) (i) Find the actual distance AB .

..... km [2]

- (ii) Find the bearing of B from A .

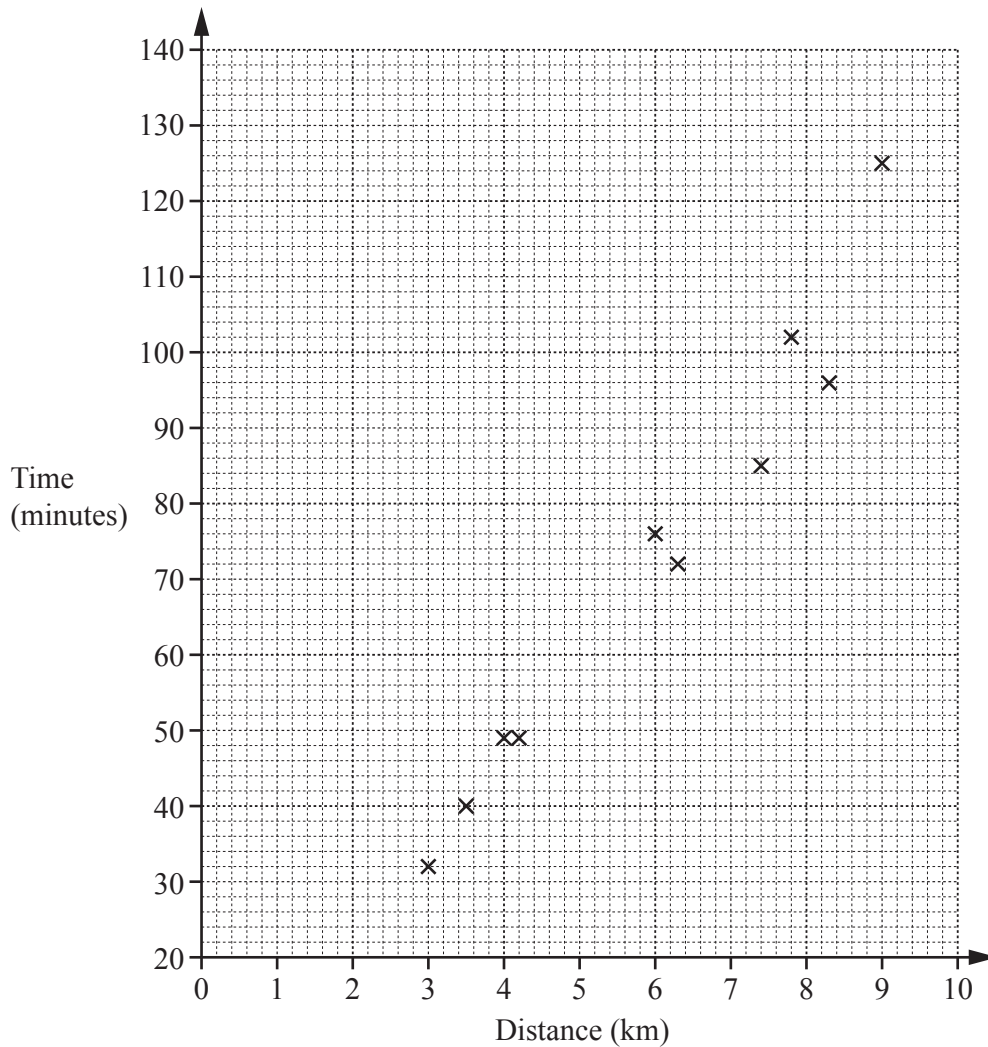
..... [1]

- (b) A plane flies so that it is always equidistant from A and B .

Using a straight edge and compasses only, construct the path of the plane. [2]

- 7 Ben walks for exercise.

The scatter diagram shows the distance for 10 walks and the time each walk takes.



- (a) Write down the type of correlation that the scatter diagram shows.

..... [1]

- (b) Draw a line of best fit.

[1]

- (c) Use your line of best fit to estimate the time Ben takes for a 5 km walk.

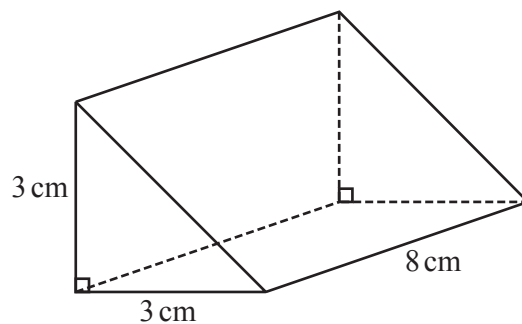
..... minutes [1]

- 8 Work out $1\frac{3}{4} + \frac{5}{6}$.

Give your answer as a mixed number in its simplest form.

..... [2]

9



The diagram shows a triangular prism.
The cross-section is a right-angled isosceles triangle.

- (a) Write down the number of planes of symmetry of the prism.

..... [1]

- (b) Work out the volume of the prism.

..... cm^3 [2]

- 10 Solve the simultaneous equations.
Show your working.

$$\begin{aligned}x + 2y &= 7 \\ 3x + 4y &= 11\end{aligned}$$

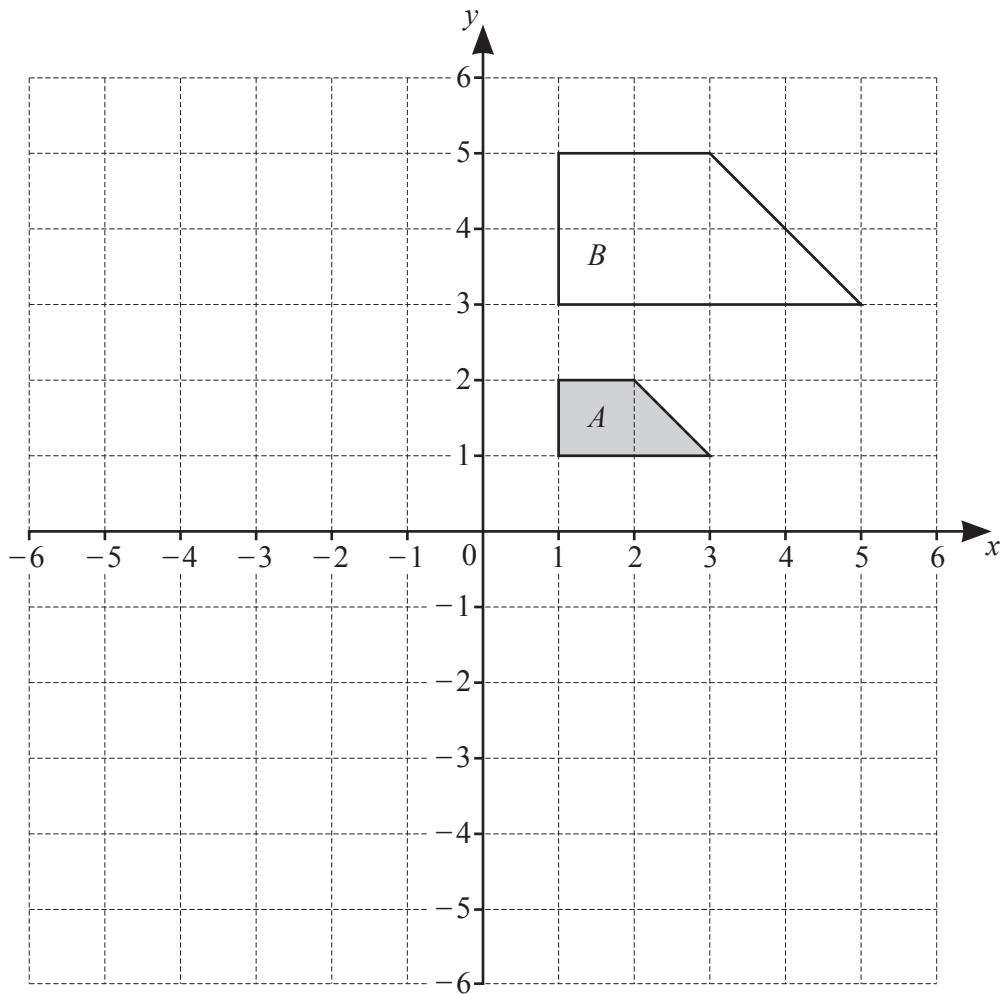
$$x = \dots\dots\dots$$

$$y = \dots\dots\dots [3]$$

- 11 By writing each number correct to 1 significant figure, estimate the value of

$$\frac{18.2^3}{0.395}.$$

$$\dots\dots\dots [2]$$



Shape *A* and shape *B* are drawn on the grid.

- (a) Describe fully the **single** transformation that maps shape *A* onto shape *B*.

.....
 [3]

- (b) Draw the image of shape *A* after a rotation of 180° about $(0, 0)$.

[2]

- 13 (a) These are the first four terms of a sequence.

1 3 9 27

Find the next term of the sequence.

..... [1]

- (b) These are the first five terms of a different sequence.

35 31 27 23 19

Find an expression, in terms of n , for the n th term of this sequence.

..... [2]

- 14 (a) Write 325 as a product of its prime factors.

..... [2]

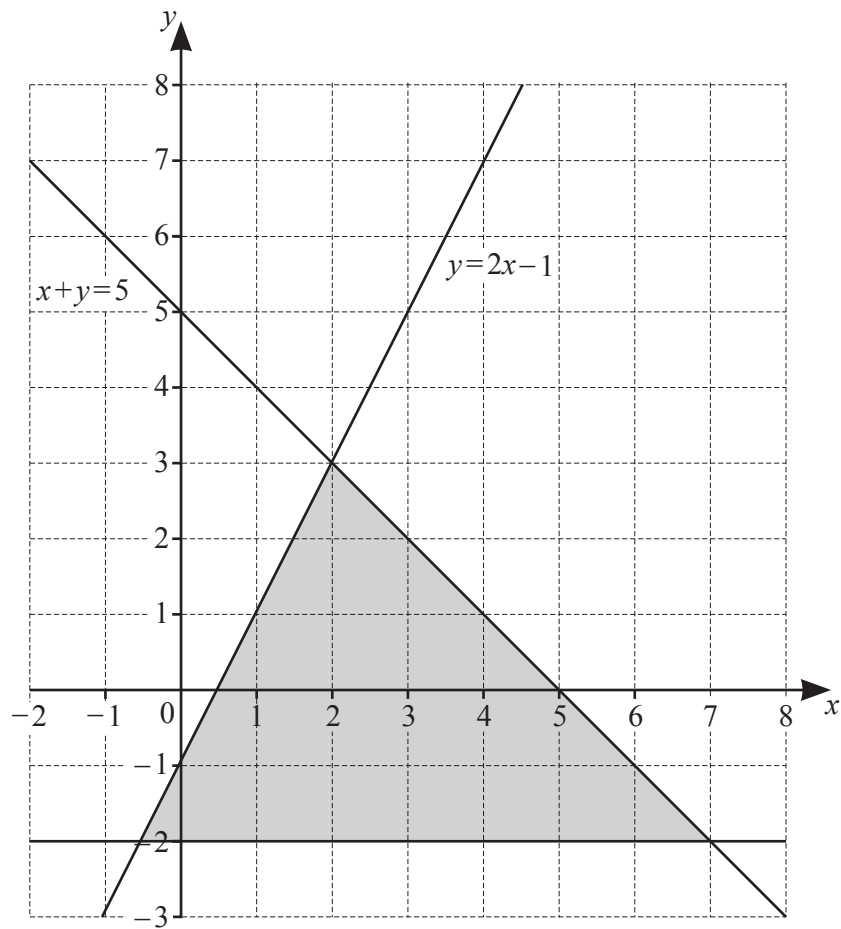
- (b) $P = x^n y^2$ and $Q = x^{n-1} y^4$, where x and y are prime.

Find the highest common factor (HCF) of P and Q .

Give your answer in terms of x , y and n .

..... [2]

- 15 Three lines and a shaded region are shown on a 1 cm square grid.



- (a) Find the three inequalities that define the shaded region.

.....

 [2]

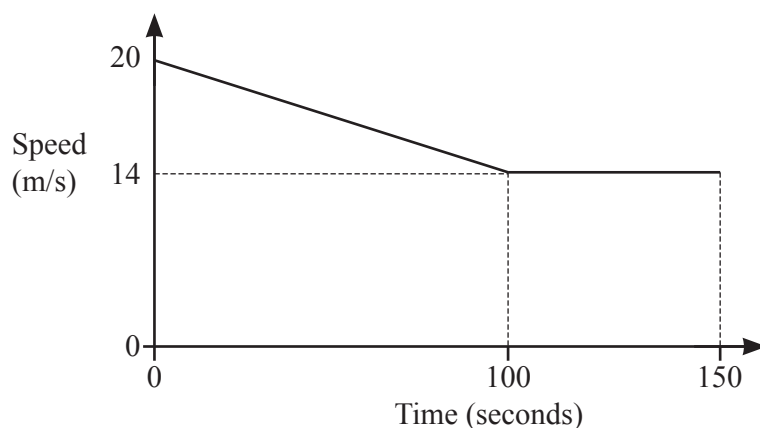
- (b) Another region, R , is defined by these three inequalities.

$$x + y \leq 5 \quad y \geq 2x - 1 \quad x \geq 1$$

Find the area of region R .

..... cm^2 [1]

- 16 The diagram shows the speed–time graph for part of a car’s journey.



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SCALE

Calculate the distance travelled by the car in the 150 seconds.

..... m [2]

17 $f(x) = 2 - 3x$ $g(x) = x - 4$

(a) Find $f^{-1}(x)$.

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

(b) Solve $f(x + 5) = 3g(x)$.

$x =$ [3]

- 18** Juan sells gift bags containing soaps and candles.
Matrix **C** shows the contents of a large gift bag and a small gift bag.

$$\mathbf{C} = \begin{array}{cc} \text{soaps} & \text{candles} \\ \begin{pmatrix} 6 & 4 \\ 2 & 1 \end{pmatrix} & \begin{array}{l} \text{large} \\ \text{small} \end{array} \end{array}$$

- (a)** Find how many more candles are in a large gift bag than in a small gift bag.

..... [1]

- (b)** The mass of a soap is 120 g and the mass of a candle is 60 g.
Matrix **M** represents this information.

$$\mathbf{M} = \begin{pmatrix} 120 \\ 60 \end{pmatrix}$$

- (i)** $\mathbf{N} = \mathbf{CM}$

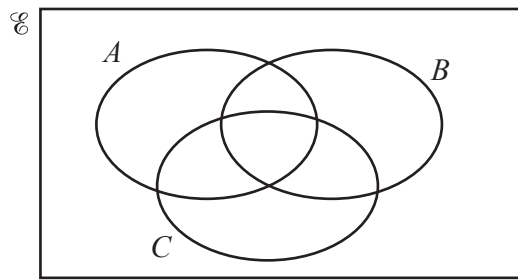
Find matrix **N**.

$\mathbf{N} =$ [2]

- (ii)** Explain what each element in matrix **N** represents.

.....
..... [1]

- 19 (a) In the Venn diagram, shade the region represented by $(A \cap B') \cup (B \cap C')$.



[1]

- (b) One morning 50 people visit a library.

- 35 of them borrow a book.
- 12 of them use a computer.
- 8 of them do not borrow a book and do not use a computer.

Using a Venn diagram, or otherwise, find the number of people who use a computer but do not borrow a book.

..... [2]

- 20 (a) Expand and simplify.

$$(4x - y)(2x + 5y)$$

..... [2]

- (b) Simplify.

$$\left(\frac{x^{12}}{8}\right)^{\frac{2}{3}}$$

..... [2]

21 Solve.

$$\frac{5x}{x-3} = x+4$$

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots [4]$$

- 22 y is directly proportional to w^2 .
 x is inversely proportional to w .

When $w = 10$, $y = 5$ and $x = 0.4$.

Find y in terms of x .

Give your answer in its simplest form.

$$y = \dots\dots\dots [4]$$

- 23** There are 10 cards in a set.
 Each card shows either a square or a triangle.
 Every shape on each card is either green or red.
 The table shows the number of cards of each type.

	Green	Red
Square	3	1
Triangle	4	2

- (a)** Ken takes a card at random from the set, notes the colour and replaces it.
 He then takes a second card at random from the set, notes the colour and replaces it.

Find the probability that both cards show a green shape.

..... [2]

- (b)** Irina takes two cards at random from the set of 10 without replacement.

Find the probability that both cards show the same shape.

..... [3]

Question 24 is printed on the next page.

- 24 A is the point $(3, 11)$ and B is the point $(-5, -5)$.
The equation of line L is $2y + x = 5$.

Show that line L is the perpendicular bisector of AB .

[5]

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