Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

2640480179

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **October/November 2016**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

This document consists of **20** printed pages.

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1 **(a)** Evaluate $3\frac{1}{6} - 2\frac{3}{5}$.

Answer ..... [1]

(b) Evaluate 0.03×0.11 .

Answer ..... [1]

---

2 The paper on a roll is 4.5 metres long.
Mary cuts as many pieces as possible, each of length 60 cm, from the roll.

(a) Calculate the number of pieces.

Answer ..... [1]

(b) Calculate the length of paper that remains on the roll.

Answer ..... cm [1]

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3 **(a)** Express $32\frac{1}{2}$ % as a fraction in its simplest form.

Answer ..... [1]

(b) Arrange these values in order of size, starting with the smallest.

$$0.38 \qquad \frac{9}{25} \qquad 0.4 \qquad \frac{7}{20}$$

Answer ..... , ... , ... , ... [1]
smallest

---

4 **(a)** One kilogram of tea costs \$16.

Calculate the cost of 300 grams of tea.

Answer \$ ..... [1]

(b) Find the simple interest on \$400 for 3 years at 2% per annum.

Answer \$ ..... [1]

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5 **(a)** Write the number 357.864 correct to 2 significant figures.

Answer ..... [1]

(b) Estimate, correct to the nearest whole number, the value of $\frac{\sqrt[3]{67}}{1.03}$.

Answer ..... [1]

---

6 y is inversely proportional to x.

Given that $y = -50$ when $x = 3$, find y when $x = -10$.

Answer $y =$ ..... [2]

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7 Each interior angle of a regular polygon is 171°.

Find the number of sides of the polygon.

Answer ..... [2]

---

8 **(a)** Evaluate $2^3 - 2^0$.

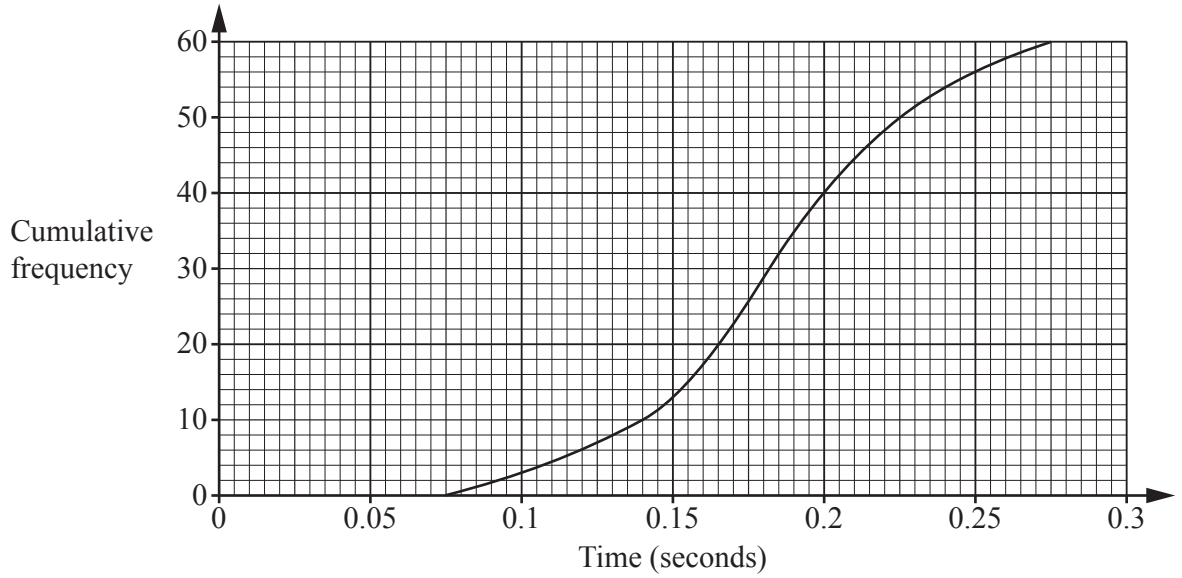
Answer ..... [1]

(b) Simplify $\frac{12xy}{9x^2}$.

Answer ..... [1]

---

9 The cumulative frequency graph shows information about the reaction times of 60 people.



Use the graph to estimate

(a) the lower quartile,

Answer ..... [1]

(b) the number of people who have a reaction time of more than 0.2 seconds.

Answer ..... [1]

10 **(a)** Write the number $450\,000\,000$ in standard form.

Answer ..... [1]

(b) Giving your answer in standard form, evaluate $\dfrac{1.5 \times 10^5}{5 \times 10^{-5}}$.

Answer ..... [2]

---

11 $$f(x) = \frac{3 - x}{10}$$

(a) Evaluate $f(-\frac{1}{2})$.

Answer ..... [1]

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

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

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12 **(a)** $\mathscr{E} = \{ 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96 \}$

$P = \{ x : x \text{ is an even number} \}$

$Q = \{ x : x \text{ is a multiple of } 3 \}$

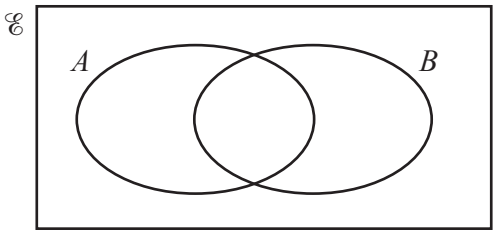
(i) Find $n(P \cup Q)$.

Answer ..... [1]

(ii) Given that $y \in \mathscr{E}$ and that y is a prime number, write down the value of y.

Answer $y =$ ..... [1]

(b) In the Venn diagram, shade the region represented by $A' \cap B$.



[1]

13 During one day, the temperature, in °C, was recorded every 2 hours.
The twelve results are given below.

−3 −2 −1 1 2 4 5 4 2 0 −2 −2

For these results, find

(a) the median,

Answer ..... °C [1]

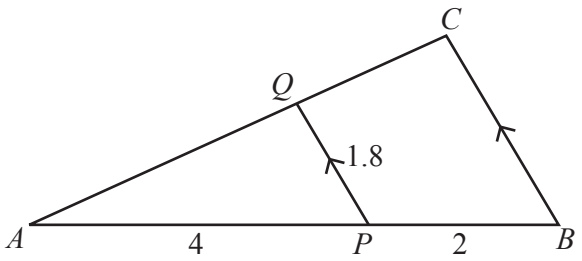
(b) the mean,

Answer ..... °C [1]

(c) the difference between the highest and the lowest of these temperatures.

Answer ..... °C [1]

14



In the diagram, triangles APQ and ABC are similar.
BC is parallel to PQ and $AP = 4$ cm, $PB = 2$ cm and $PQ = 1.8$ cm.

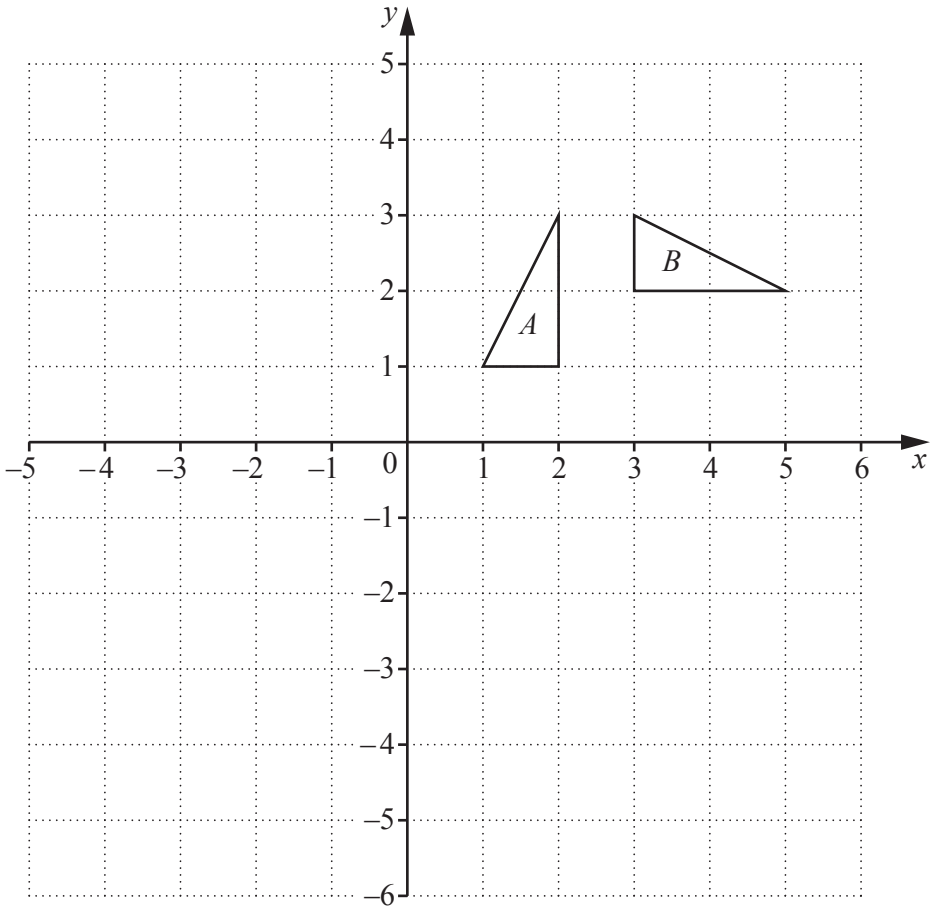
(a) Find BC.

Answer ..... cm [2]

(b) Find $\dfrac{\text{area of triangle } APQ}{\text{area of quadrilateral } PBCQ}$.

Answer ..... [1]

15



(a) Describe the **single** transformation that maps triangle *A* onto triangle *B*.

Answer .....

..... [2]

(b) Triangle *A* is mapped onto triangle *C* by an enlargement, centre (0, 2) and scale factor −2.

Draw, and label, triangle *C* on the diagram. [2]

16 Factorise completely

(a) $5 - 20t^2$,

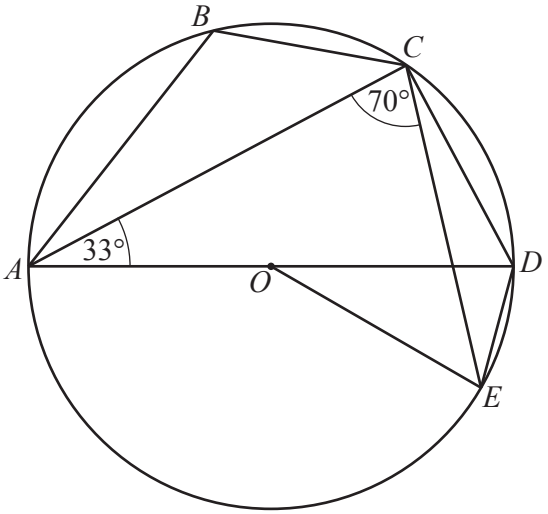
Answer ..... [2]

(b) $3y^2 - 2xy - 6x + 9y$.

Answer ..... [2]

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17



In the diagram, the points A, B, C, D and E lie on the circle centre O.
AD is a diameter.

$D\hat{A}C = 33°$ and $A\hat{C}E = 70°$.

(a) Find $C\hat{D}A$.

Answer $C\hat{D}A =$ ..... [1]

(b) Find $D\hat{E}C$.

Answer $D\hat{E}C =$ ..... [1]

(c) Find $A\hat{B}C$.

Answer $A\hat{B}C =$ ..... [1]

(d) Find reflex $E\hat{O}A$.

Answer reflex $E\hat{O}A =$ ..... [1]

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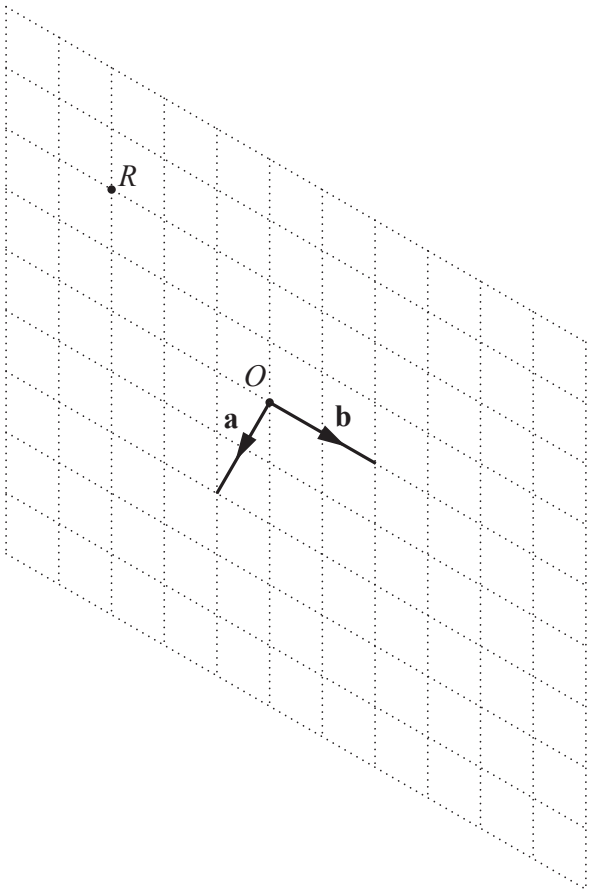
18 Solve the simultaneous equations.

$$2x + 5y = \quad 2$$
$$3x + 4y = -4$$

Answer $x =$ .....

$y =$ ..... [4]

19



The diagram shows the points O and R and the vectors **a** and **b**.

(a) Given that $\overrightarrow{OP} = 2\mathbf{a}$, mark and label the position of P on the grid. [1]

(b) Given that $\overrightarrow{OQ} = 2\mathbf{b} - \mathbf{a}$, mark and label the position of Q on the grid. [1]

(c) Express $\overrightarrow{OR}$ in terms of **a** and **b**.

Answer $\overrightarrow{OR} =$ ..... [2]

20 The diagram shows the quadrilateral $ABCD$.

(a) Measure $D\hat{C}B$.

Answer $D\hat{C}B$ = ... [1]

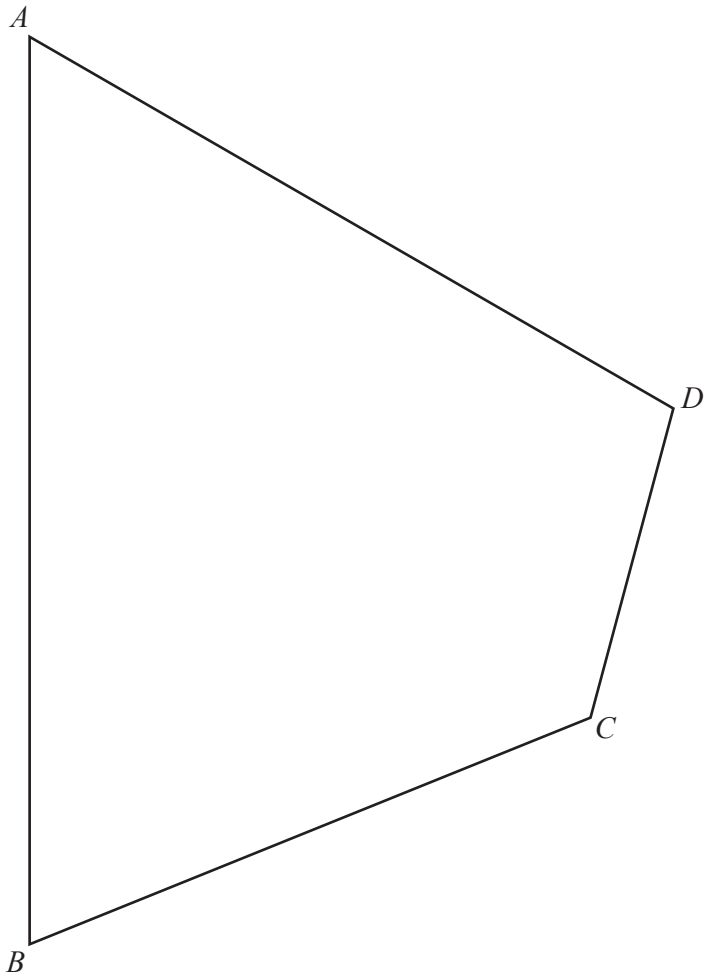
(b) (i) Construct the locus of points, **inside** the quadrilateral, that are 8 cm from B. [1]

(ii) Construct the locus of points, **inside** the quadrilateral, that are 5 cm from AB. [1]

(iii) These two loci meet at P.

Mark, and label, the point P on the diagram and measure PD.

Answer ..... cm [1]



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21

$$\mathbf{A} = \begin{pmatrix} 2 & -1 \\ 1 & 3 \end{pmatrix}$$

(a) Evaluate $3\mathbf{A} - 2\begin{pmatrix} 3 & 1 \\ -2 & 0 \end{pmatrix}$.

Answer $\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

(b) Find $\mathbf{A}^{-1}$.

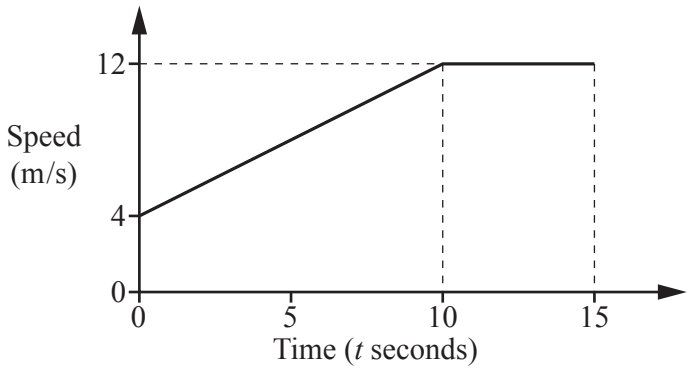
Answer $\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

(c) Write down the single matrix that is equivalent to $\mathbf{A}^{-1}\,\mathbf{A}$.

Answer $\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [1]

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22 The diagram is the speed-time graph of part of a car's journey.



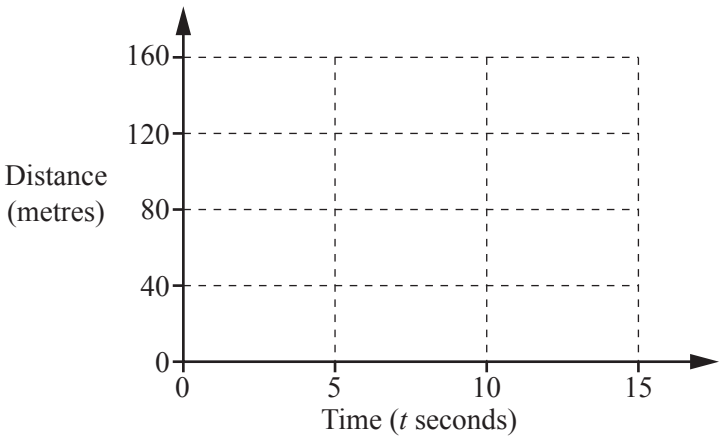
(a) Find the speed when $t = 8$.

Answer ..... m/s [2]

(b) Find the distance travelled by the car from $t = 0$ to $t = 10$.

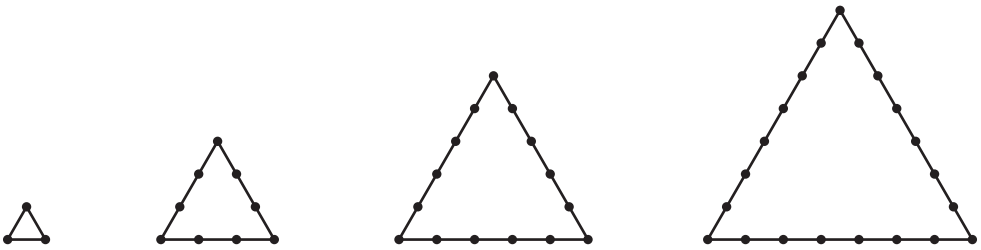
Answer ..... m [2]

(c) On the diagram below sketch the distance-time graph for $t = 0$ to $t = 15$.



[2]

23



Triangle 1 Triangle 2 Triangle 3 Triangle 4

The diagrams show a sequence of triangles made up of identical sticks.
Each triangle has two more sticks on each edge than its previous triangle.
The table shows information relating to this sequence.

Triangle number	1	2	3	4	.....	*n*
Number of sticks on each side	1	3	5		.....	*x*
Number of sticks in the triangle	3	9	15		.....	*y*

(a) Complete the column for triangle 4. [1]

(b) Find an expression, in terms of n, for x.

Answer $x =$ ..... [1]

(c) Find an expression, in terms of n, for y.

Answer $y =$ ..... [1]

(d) The total number of sticks in the first triangle = 3
The total number of sticks in the first two triangles = 12
The total number of sticks in the first three triangles = 27

(i) Write down the total number of sticks in the first four triangles.

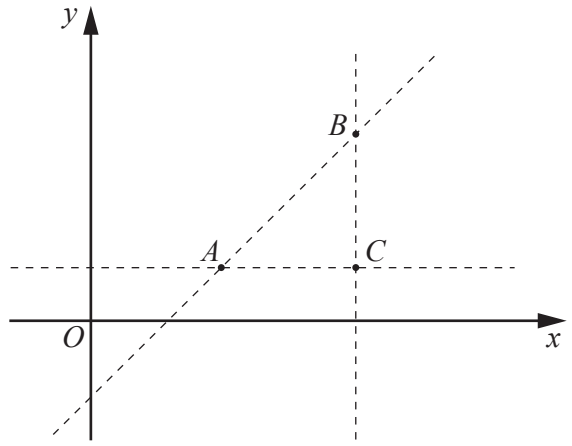
Answer ..... [1]

(ii) Find an expression, in terms of n, for the total number of sticks in the first n triangles.

Answer ..... [2]

Question 24 is printed on the next page

24



A is the point (5, 2) and B is the point (9, 6).
AC is parallel to the x-axis. CB is parallel to the y-axis.
The equation of the line AB is $x - y = 3$.

(a) Find the coordinates of C.

Answer (..... , ...) [1]

(b) The region **inside** triangle ABC is defined by three inequalities.

Write down these inequalities.

Answer .....

.....

..... [3]

(c) The point (a, b), where a and b are integers, lies **inside** triangle ABC.

It also lies on the line $y = \frac{1}{2}x$.

Find the value of a and the value of b.

Answer $a =$ .....

$b =$ ..... [2]

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