Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5456005398

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **May/June 2014**

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 a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, 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.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

1 **(a)** Evaluate $12 + 8 \div (9 - 5)$.

Answer ..... [1]

(b) Evaluate $0.018 \div 0.06$.

Answer ..... [1]

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2 Tasnim records the temperature, in °C, at 6 a.m. every day for 10 days.

$-6 \quad -3 \quad 0 \quad -2 \quad -1 \quad -7 \quad -5 \quad 2 \quad -1 \quad -3$

(a) Find the difference between the highest and the lowest temperatures.

Answer ..... °C [1]

(b) Find the median temperature.

Answer ..... °C [1]

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3 It is given that $\frac{3}{4} < n < \frac{7}{8}$.

(a) Write down a decimal value of n that satisfies this inequality.

Answer ..... [1]

(b) Write down a fractional value of n that satisfies this inequality.

Answer ..... [1]

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4 Here is part of a bus timetable.

Bus station	09 56	10 26	10 56	11 26	11 56
City Hall	10 03	10 33	11 03	11 33	12 03
Railway station	10 17	10 47	11 17	11 47	12 17
Hospital	10 28	10 58	11 28	11 58	12 28
Airport	10 43	11 13	11 43	12 13	12 43

(a) How long does the bus take to get from the bus station to the airport?

Answer ..... minutes [1]

(b) Chris has a flight from the airport at 14 05.
He must check in at the airport 2 hours before the flight.
He will take a bus to the airport from the City Hall.

Write down the latest time that Chris can take a bus from the City Hall to be at the airport in time.

Answer ..... [1]

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5 **(a)** Express $0.000\,085\,2$ in standard form.

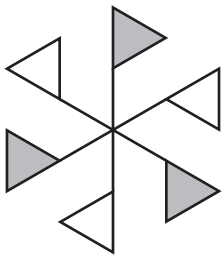
Answer ..... [1]

(b) Calculate $(3 \times 10^5) \div (6 \times 10^{-2})$, giving your answer in standard form.

Answer ..... [1]

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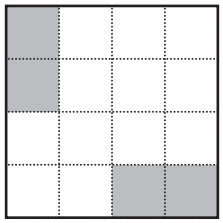
6 **(a)** Complete the description of the pattern below.



The pattern has rotational symmetry of order .....

and ..... lines of symmetry. [1]

(b) Shade in **two** more small squares in this shape to make a pattern with exactly 2 lines of symmetry.



[1]

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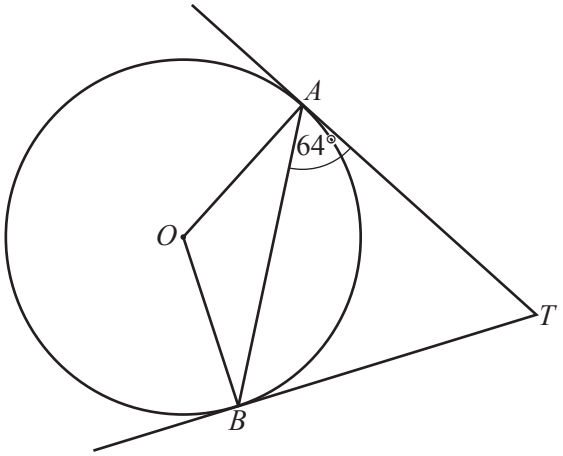
7 The cost of a mirror is directly proportional to the square of its width.
A mirror of width 40 cm costs $24.

Work out the cost of a mirror of width 60 cm.

Answer $ ..... [2]

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8 A and B are points on the circle, centre O.
TA and TB are tangents to the circle.
$B\hat{A}T = 64°$.



(a) What special type of triangle is triangle ABT?

Answer ..... [1]

(b) Work out $A\hat{O}B$.

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

9 **(a)** Evaluate $\frac{1}{7}+\frac{3}{4}$.

Answer ..... [1]

(b) Evaluate $5\frac{1}{3} \div 1\frac{3}{5}$, giving your answer as a mixed number in its lowest terms.

Answer ..... [2]

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10 **(a)** Write $405\,917\,628$ correct to three significant figures.

Answer ..... [1]

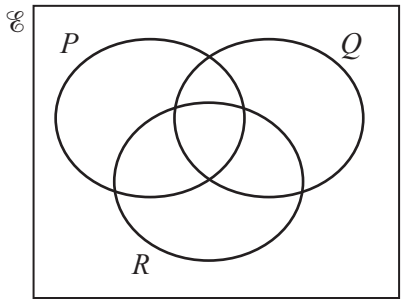
(b) By writing each number correct to one significant figure, estimate the value of

$$\frac{41.3}{9.79 \times 0.765}.$$

Answer ..... [2]

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11 **(a)** On the Venn diagram, shade the set $P' \cap (Q \cup R)$.



[1]

(b) A group of 40 children are asked what pets they own.
Of these children, 13 own a cat, 5 own both a cat and a dog and 15 own neither a cat nor a dog.

Using a Venn diagram, or otherwise, find the number of children who own a dog, but not a cat.

Answer ..... [2]

12 A café sells hot drinks.
On Monday it sells 80 teas, 60 coffees and 40 hot chocolates.
On Tuesday it sells 70 teas, 90 coffees and 50 hot chocolates.
A cup of tea costs \$0.80, a cup of coffee costs \$1 and a cup of hot chocolate costs \$1.20.

This information can be represented by the matrices **M** and **N** below.

$$\mathbf{M} = \begin{pmatrix} 80 & 60 & 40 \\ 70 & 90 & 50 \end{pmatrix} \qquad \mathbf{N} = \begin{pmatrix} 0.8 \\ 1 \\ 1.2 \end{pmatrix}$$

(a) Work out **MN**.

Answer [2]

(b) Explain what the numbers in your answer represent.

Answer .....

.....

..... [1]

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13 $f(x) = 2 - 3x$

Find

(a) $f(-5)$,

Answer $f(-5) =$ ..... [1]

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

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

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14 A rectangular garden has length 35 metres and width 25 metres.
These distances are measured correct to the nearest metre.

(a) Write down the upper bound of the length of the garden.

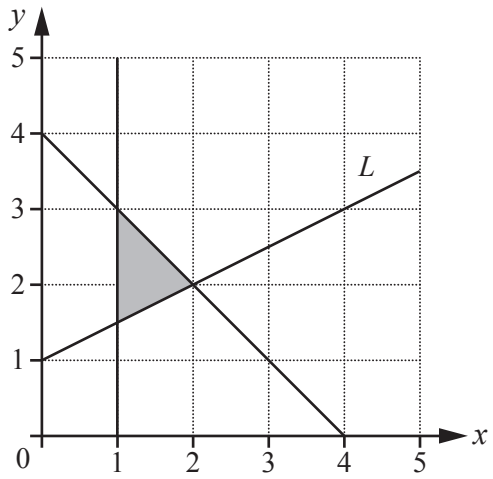
Answer ..... m [1]

(b) Work out the lower bound of the perimeter of the garden.

Answer ..... m [2]

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15



(a) Find the gradient of the line L.

Answer ..... [1]

(b) The shaded region on the diagram is defined by three inequalities.
One of these is $x + y \leqslant 4$.

Write down the other two inequalities.

Answer .....

..... [2]

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16 **(a)** Dwayne buys a camera for $90.
He sells the camera for $126.

Calculate his percentage profit.

Answer .....% [1]

(b) The price of a computer was $375.
In a sale, the price was reduced by 15%.

Calculate the reduction in the price of the computer.

Answer $..... [1]

(c) The exchange rate between euros and dollars is €1 = $1.25 .

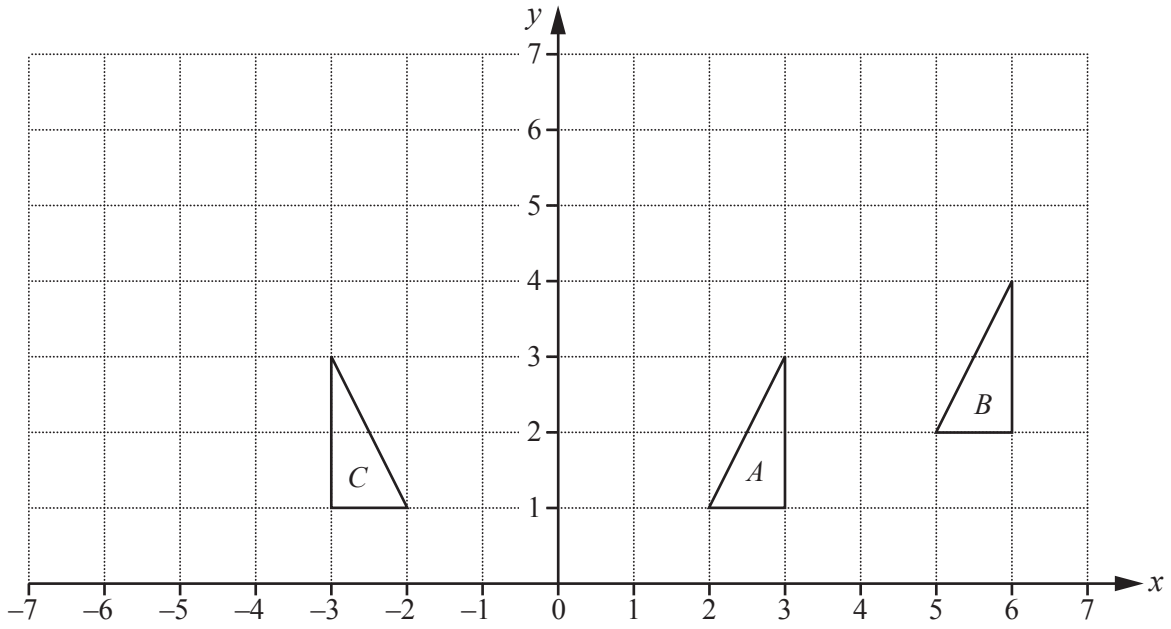
(i) Convert €180 to dollars.

Answer $..... [1]

(ii) Convert $500 to euros.

Answer €..... [1]

17 The diagram shows triangles A, B and C.



(a) Triangle A can be mapped onto triangle B by a translation.

Write down the column vector for the translation.

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

(b) Find the matrix representing the transformation that maps triangle A onto triangle C.

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

(c) Triangle A is mapped onto triangle D by an enlargement, scale factor 2, centre $(5,0)$.

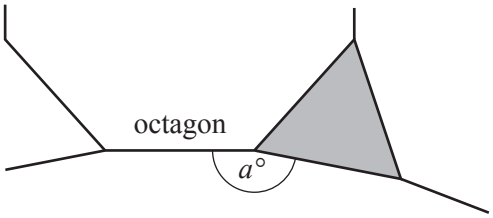
Draw and label triangle D. [2]

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18 **(a)** Find the size of the interior angle of a regular octagon.

Answer ..... [1]

(b) A regular octagon, an equilateral triangle and a regular n-sided polygon fit together at a point.



(i) An interior angle of the regular n-sided polygon is $a°$.

Find a.

Answer $a =$ ..... [1]

(ii) Find the value of n.

Answer $n =$ ..... [2]

19 **(a)** Evaluate

(i) $\sqrt[3]{216}$,

Answer ..... [1]

(ii) $16^{\frac{1}{2}} - 16^{0}$.

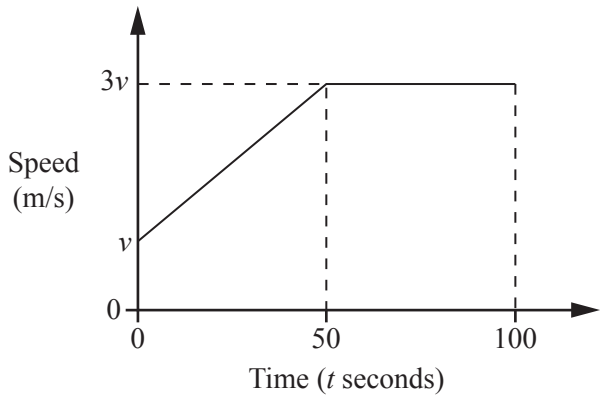
Answer ..... [1]

(b) Simplify $\left(\frac{3a^2b}{12ab^4}\right)^{-2}$.

Answer ..... [2]

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20 The diagram shows the speed-time graph for 100 seconds of a car's journey.
The car accelerates uniformly from a speed of v m/s to a speed of $3v$ m/s in 50 seconds.
It then continues at a constant speed.



(a) Find, in terms of v, the acceleration of the car in the first 50 seconds.

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

(b) The car travels 2500 metres during the 100 seconds.

Find v.

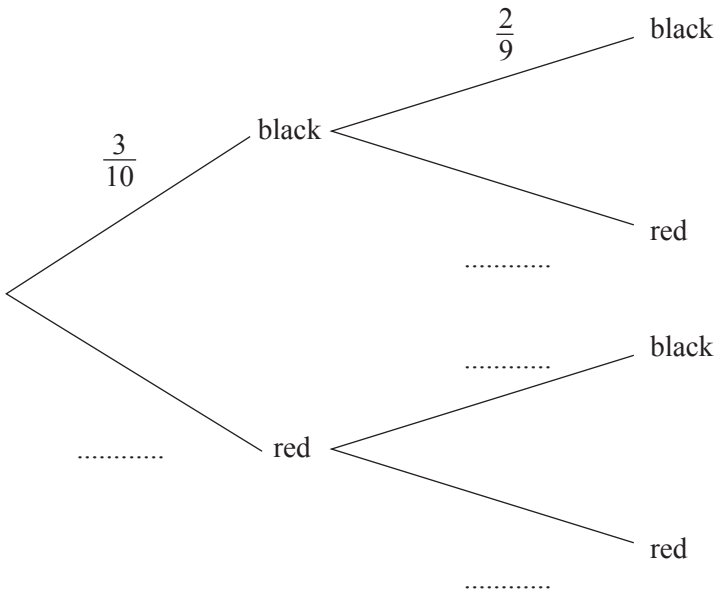
Answer $v =$ ..... [2]

(c) Find the speed of the car, in kilometres per hour, when $t = 75$.

Answer ..... km/h [1]

21 Luis has 3 black pens and 7 red pens in a case.
He takes two pens from the case at random without replacement.

(a) Complete the tree diagram to show the possible outcomes and their probabilities.



[1]

(b) Find, as a fraction in its lowest terms, the probability that

(i) Luis takes two black pens,

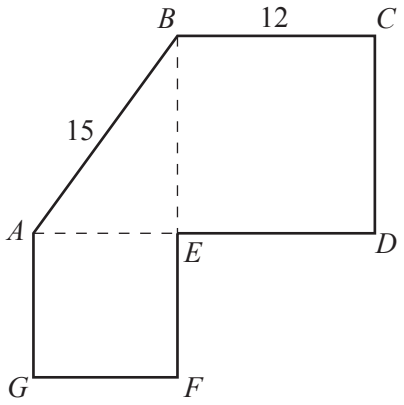
Answer ..... [1]

(ii) Luis takes two different coloured pens.

Answer ..... [2]

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22 Shape *ABCDEFG* is made from two squares and a right-angled triangle.
AB = 15 cm and *BC* = 12 cm.



(a) Find the length *AG*.

Answer .....cm [2]

(b) Find the total area of the shape.

Answer ..... cm^2 [2]

23 **(a)** Expand and simplify $(2x+1)(x+4)$.

Answer ..... [1]

(b) Write $\frac{3}{x}+\frac{4}{x+2}$ as a single fraction in its simplest form.

Answer ..... [1]

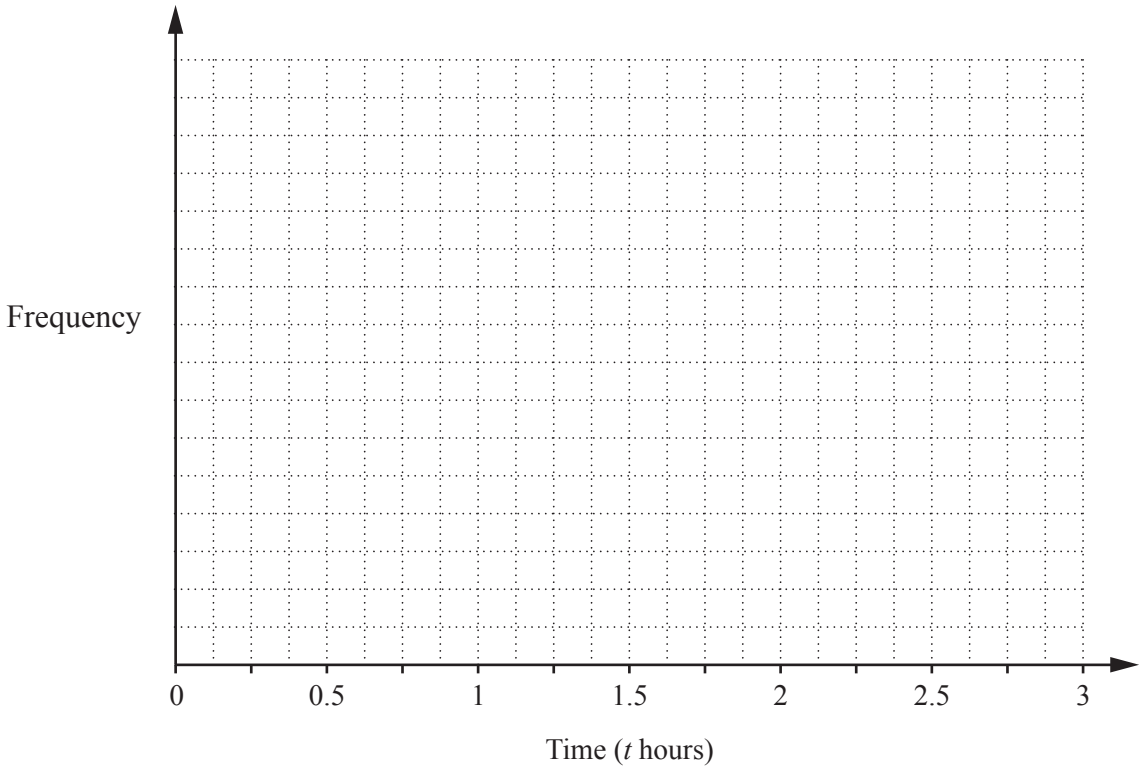
(c) Solve $\frac{10}{x}=x+3$.

Answer $x =$ ..... or ..... [3]

24 Some students were asked how long they had each spent doing homework the day before. The results are summarised in the table.

Time (t hours)	$0 < t \leqslant 0.5$	$0.5 < t \leqslant 1$	$1 < t \leqslant 1.5$	$1.5 < t \leqslant 2$	$2 < t \leqslant 2.5$	$2.5 < t \leqslant 3$
Girls	0	5	8	6	0	1
Boys	3	3	4	5	3	2

(a) On the grid, draw a frequency polygon to represent this information for the girls and another frequency polygon for the boys.



[3]

(b) Write down the modal group for the girls.

Answer ..... [1]

(c) Make a comment comparing the distribution of the times spent by the girls with the times spent by the boys.

Answer

.....

..... [1]

25 In quadrilateral $ABCD$

angle $A = (2y + x)°$
angle $B = (3y + x)°$
angle $C = (2y + 10)°$
angle $D = (3x + 5)°$

(a) By finding the sum of the angles in the quadrilateral, show that $7y + 5x = 345$.

[1]

(b) Given that angle $A = 90°$ then $2y + x = 90$.

Solve the simultaneous equations to find x and y.

$7y + 5x = 345$
$2y + x = 90$

Answer $x =$ .....

$y =$ ..... [3]

(c) Find the size of the smallest angle in the quadrilateral.

Answer ..... [1]

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