Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

4338150928

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

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.

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

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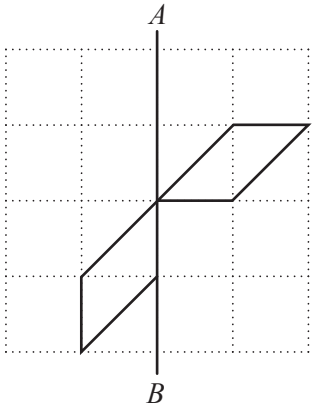
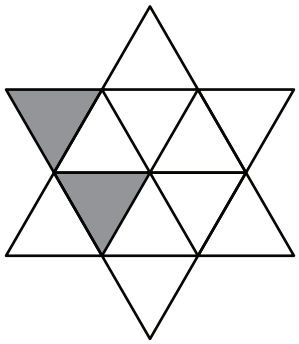
ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Complete the pattern so that AB is the only line of symmetry.



[1]

(b) Shade four more small triangles in the shape below to make a pattern with rotational symmetry of order 3.



[1]

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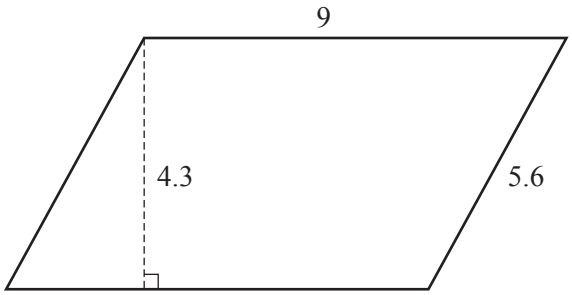
2 **(a)** Evaluate $5 + 1 \times 0.3$.

Answer ..... [1]

(b) Evaluate $18 \div 0.2$.

Answer ..... [1]

3



The diagram shows a parallelogram with lengths as marked.
All the lengths are in centimetres.

(a) Calculate the perimeter of the parallelogram.

Answer .....cm [1]

(b) Calculate the area of the parallelogram.

Answer ..... cm^2 [1]

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4 In the triangle PQR, $PQ = 5$ cm, $QR = 7$ cm and $PR = 9$ cm.

Decide whether the triangle is acute angled or obtuse angled.
Show calculations to support your decision.

Answer Triangle PQR is ..... [2]

[Turn over

5 **(a)** Solve $4 \leqslant 3y - 11$.

Answer y ..... [1]

(b) Write down all the integers that satisfy the inequality $-4 \leqslant 2x < 4$.

Answer ..... [1]

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6 **(a)** The angles of a triangle are in the ratio 3 : 4 : 5.

Calculate the smallest angle in the triangle.

Answer ..... [1]

(b) The ratio of boys to girls in a class is 4 : 5.
There are 3 more girls than boys.

Calculate the total number of students in the class.

Answer ..... [1]

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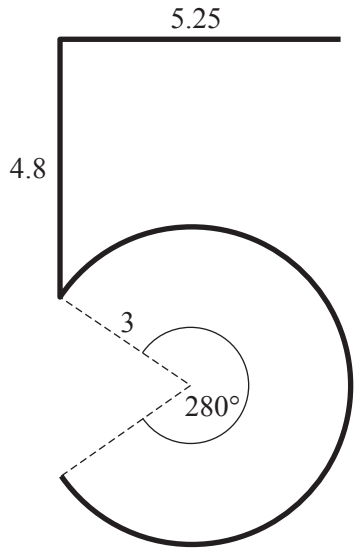
7 A thin piece of wire is shaped into a figure five as shown.



The shape has two straight sections of length 5.25 cm and 4.8 cm.
The curved part is the arc of the major sector of a circle, radius 3 cm.
The angle of the major sector is 280°.

The total length of wire needed to make the figure is $(a + b\pi)$ cm.

Find the values of a and b.

Answer $a =$ .....

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

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

$$\frac{28.6 + 47.7}{0.47 \times 21.4}.$$

Answer ..... [2]

(b) Write $\frac{8}{25}$ as a decimal.

Answer ..... [1]

---

9 Make a the subject of the formula $y = \frac{a-4}{3-a}$.

Answer $a =$ ..... [3]

---

10 **(a)** One morning the temperature was 5 °C.
By the evening the temperature had dropped 9 °C.

Write down the temperature in the evening.

Answer ..... °C [1]

(b) The times of some buses from Aytown to Deetown are shown.

Aytown	07 04	08 04	08 56	09 00	09 32	10 56
Beetown	-	-	09 05	-	09 41	11 05
Ceetown	07 18	08 18	09 14	-	-	11 14
Deetown	07 35	08 35	09 31	09 28	10 05	11 31

(i) Maryam lives in Ceetown and has to be in Deetown by 09 30.

What time is the latest bus from Ceetown that she can catch?

Answer ..... [1]

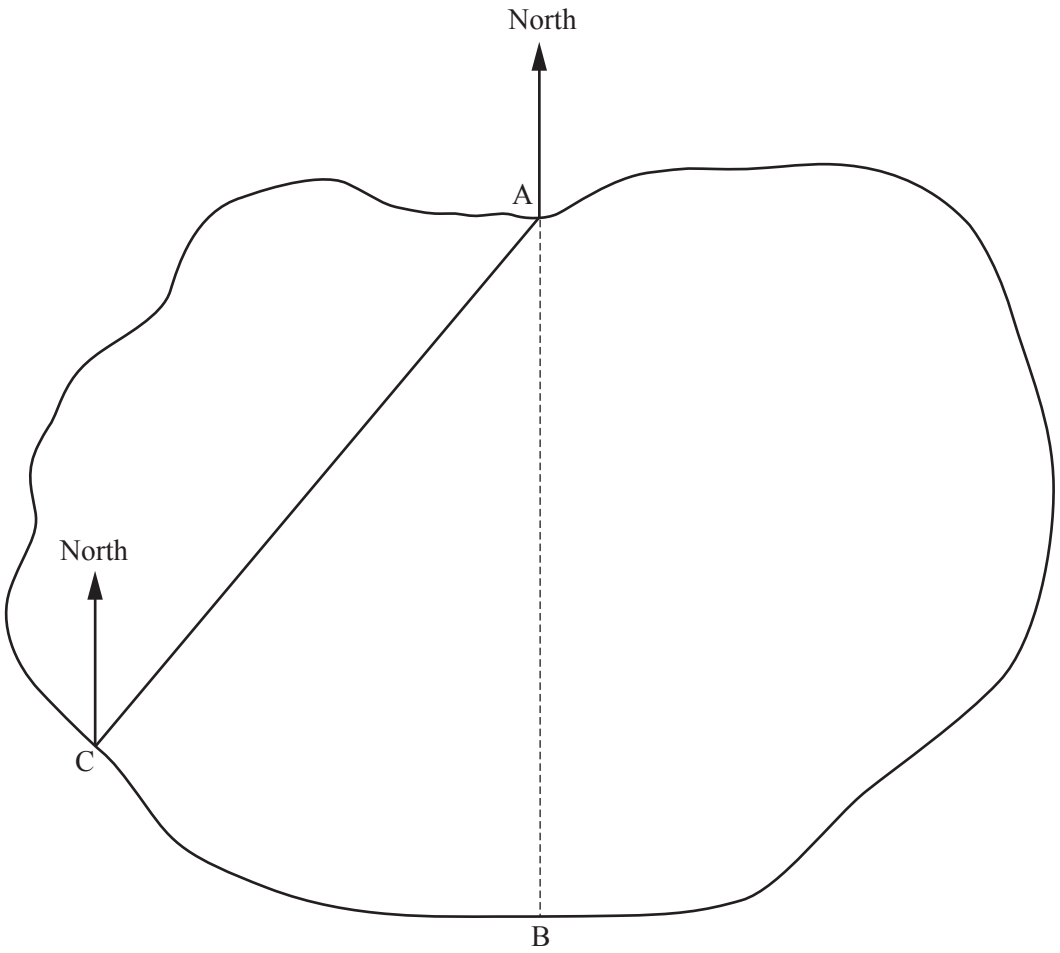
(ii) Aadil catches the 09 32 from Aytown to Deetown.

How long does his journey take?

Answer .....minutes [1]

[Turn over

11



The diagram shows a map of a lake.
Three points *A*, *B* and *C* are on the edge of the lake.

(a) A ship sails due south from *A* to *B*.

Write down the bearing of *B* from *A*.

Answer ..... [1]

(b) A yacht sails from *A* to *C*.

Measure and write down the bearing of *C* from *A*.

Answer ..... [1]

(c) A cruiser sails from *C* to *D* on a bearing of 105°.

Work out the bearing of *C* from *D*.

Answer ..... [1]

12 **(a)** Here are the first four terms of a sequence.

7 11 15 19

Write down an expression, in terms of n, for the nth term of this sequence.

Answer ..... [1]

(b) u_n is the nth term of another sequence.
Here is the formula connecting the nth and $(n+1)$th terms of this sequence.

$$3u_n - 4 = u_{n+1}$$

The value of u_3 is 11.

Find u_2 and u_4.

Answer $u_2 =$ .....

$u_4 =$ ..... [2]

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13 **(a)** Solve $2(5^p) = 250$.

Answer $p =$ ..... [1]

(b) Simplify

(i) $1 \div x^{-5}$,

Answer ..... [1]

(ii) $\frac{3a}{4} \div \frac{9a^2}{8}$.

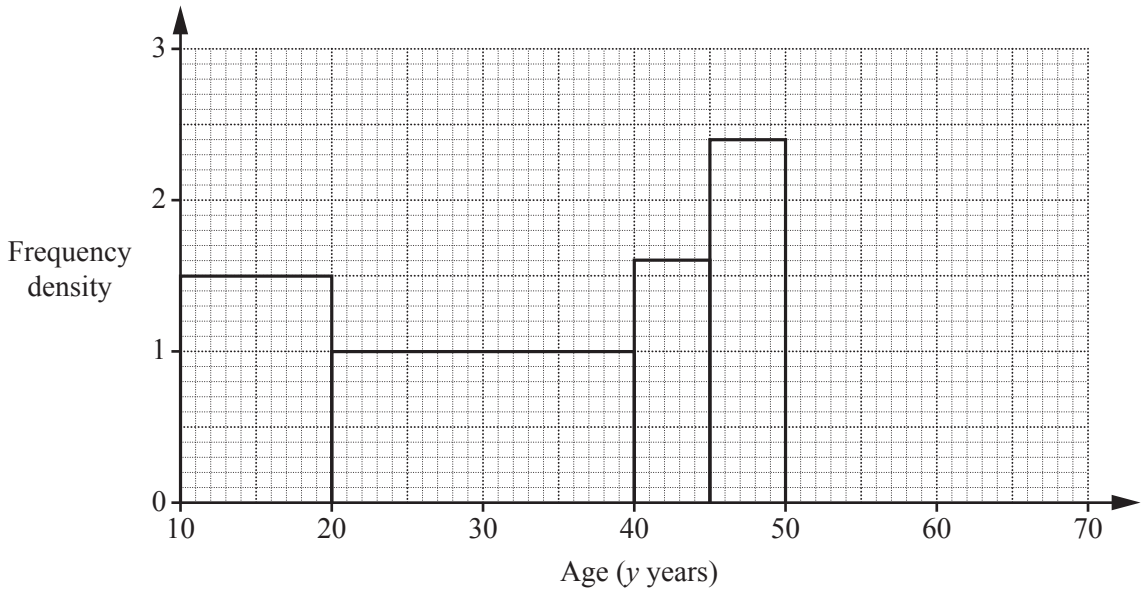
Answer ..... [1]

[Turn over

14 The table shows the ages of guests at a party.

Age (y years)	$10 \leqslant y < 20$	$20 \leqslant y < 40$	$40 \leqslant y < 45$	$45 \leqslant y < 50$	$50 \leqslant y < 65$
Frequency	p	20	8	q	18

The histogram represents some of this information.



(a) Use the histogram to find the value of

(i) p,

Answer $p =$ ..... [1]

(ii) q.

Answer $q =$ ..... [1]

(b) Complete the histogram. [1]

15 **(a)** Find an integer r such that $r > 5$ and $5r - 1$ is a square number.

Answer $r =$ ..... [1]

(b) Find the value of s which makes $8s + 2$ a prime number.

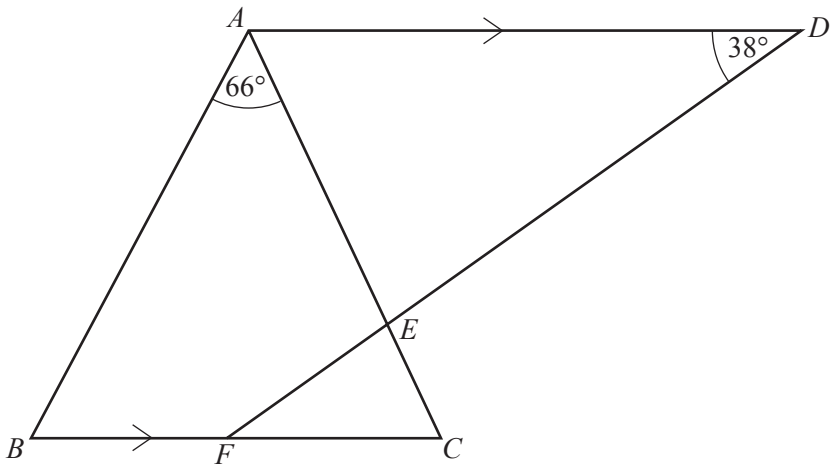
Answer $s =$ ..... [1]

(c) Write down an irrational number between 7 and 8.

Answer ..... [1]

[Turn over

16



In the diagram $AB = AC$ and AD is parallel to BC.
A line from D intersects AC at E and BC at F.
$A\hat{D}E = 38°$ and $B\hat{A}C = 66°$.

Find

(a) $D\hat{F}C$,

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

(b) $A\hat{B}C$,

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

(c) $A\hat{E}D$.

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

17 **(a)** Expand and simplify

(i) $4(2t + 3) + 5$,

Answer ..... [1]

(ii) $6p + 3q - 2(2p - 5q)$.

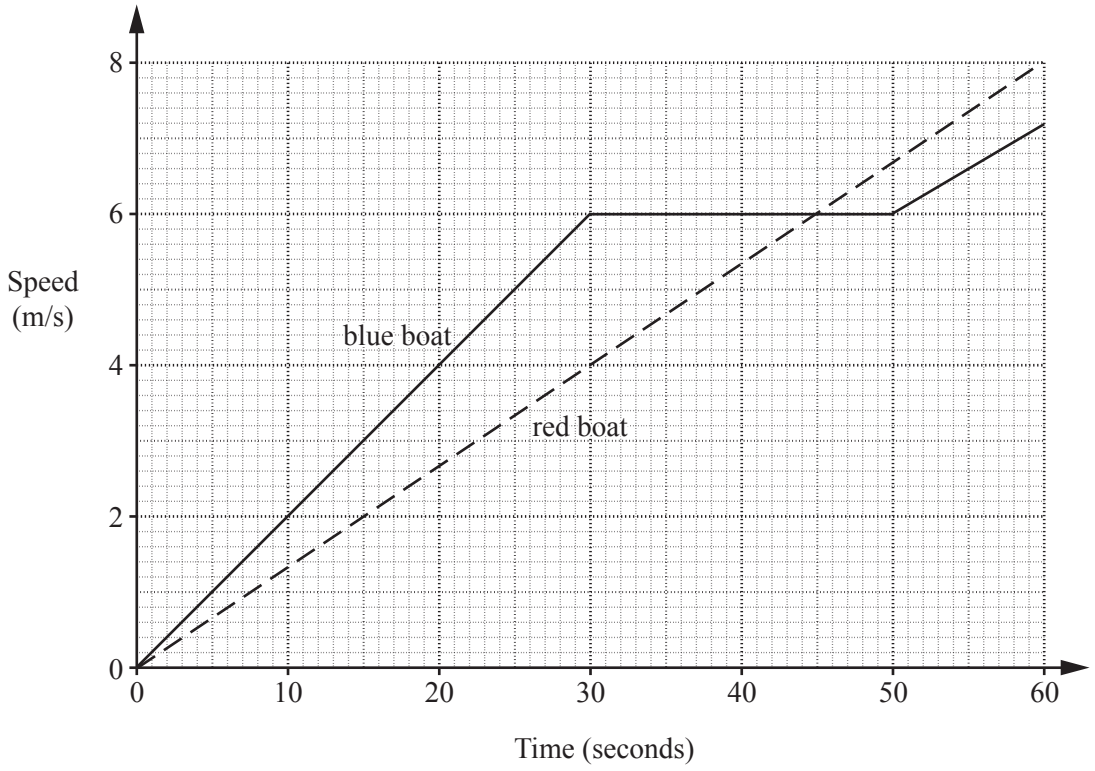
Answer ..... [1]

(b) Factorise completely

$25x^3y^2 - 15x^2y$.

Answer ..... [1]

18



Two boats, one red and one blue, leave a harbour at the same time.
They travel in the same direction.
The speed-time graphs for the boats are shown, for the first minute of their journey.

(a) Find the acceleration of the blue boat in the last 10 seconds.

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

(b) Find which boat is ahead after one minute and by what distance.

Answer ..... is ahead by ..... m [3]

19 **(a)** Light travels at a speed of 3×10^8 m/s.

Calculate the time it takes for light to travel 6 km.
Give your answer in standard form.

Answer .....s [2]

(b) One molecule of water is made up of two atoms of hydrogen and one atom of oxygen.
The mass of one atom of hydrogen is 1.67×10^{-24} g.
The mass of one atom of oxygen is 2.66×10^{-23} g.

Calculate the mass of one molecule of water.
Give your answer in standard form.

Answer ..... g [2]

---

20 **(a)** Given that $x^2 - 14x + 40 = (x - a)^2 + b$, find the values of a and b.

Answer $a =$ .....

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

(b) Solve the equation $3x^2 + 7x - 6 = 0$ by factorisation.

Answer $x =$ ..... or ..... [2]

[Turn over

21 **(a)** The line $2y = 6 - 3x$ meets the y-axis at A and the x-axis at B.

Write down

(i) the coordinates of A and B,

Answer A = (................ , ...)

B = (................ , ...) [2]

(ii) the gradient of the line.

Answer .... [1]

(b) Another straight line cuts the x-axis at $P\ (-4, 0)$ and passes through $Q\ (2, 18)$.

Find the coordinates of the midpoint of PQ.

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

22 **(a)** Construct, using ruler and compasses only, an equilateral triangle ABC.
The side AB has been drawn for you.

[1]

(b) Construct the locus of points, inside triangle ABC, which are

(i) equidistant from A and C, [1]

(ii) 4 cm from A. [1]

(c) A point X lies within triangle ABC, is nearer to A than to C and is less than 4 cm from A.

On your diagram shade the region in which X must lie. [1]

[Turn over

23 **(a)** A spherical tennis ball and a spherical beach ball have diameters in the ratio 1 : 3.
The surface area of the beach ball is 153 cm^2.

Calculate the surface area of the tennis ball.

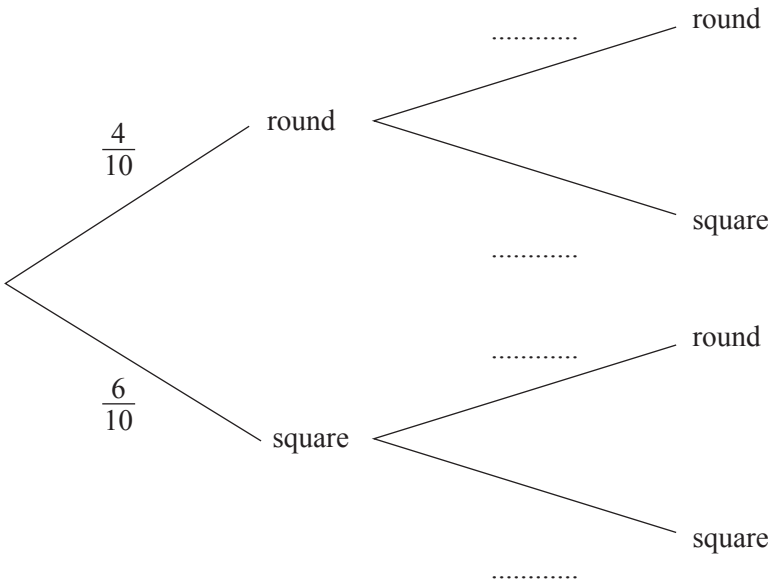
Answer ..... cm^2 [2]

(b) y is inversely proportional to the cube of x.
When $x = 2$, $y = 9$.

Find y when $x = 5$.

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

24 On a plate there are ten biscuits.
Four of the biscuits are round and six of the biscuits are square.
Sabah chooses a biscuit at random from the plate and eats it.
She then chooses another biscuit at random from the plate.
The tree diagram shows the possible outcomes and some of their probabilities.



(a) Complete the tree diagram. [2]

(b) Calculate the probability that Sabah chooses

(i) two round biscuits,

Answer ..... [1]

(ii) one round biscuit and one square biscuit.

Answer ..... [2]

25 $\mathbf{A} = \begin{pmatrix} 3 & -1 \\ -2 & 4 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 5 & 3 \\ 0 & -2 \end{pmatrix}$

(a) Find $3\mathbf{A} - \mathbf{B}$.

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

(b) Find $\mathbf{A}^2$.

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

(c) Find the 2×2 matrix $\mathbf{X}$, where $\mathbf{AX} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

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