UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

4274470357

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

Paper 1 **October/November 2012**

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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For Examiner's Use

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

Answer ..... [1]

(b) Evaluate $\frac{2}{3} \div 3\frac{3}{4}$.

Answer ..... [1]

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2 **(a)** Evaluate $0.7 + 0.2 \times 0.3$.

Answer ..... [1]

(b) Evaluate $\frac{0.9}{0.06}$.

Answer ..... [1]

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3 **(a)** Alice and Brenda share \$300 so that Alice's share : Brenda's share = 3 : 7.

How much more does Brenda receive than Alice?

Answer \$ ..... [1]

(b) Find the simple interest on \$200 for 4 years at 2% per year.

Answer \$ ..... [1]

---

4 Arrange these lengths in order of size, starting with the smallest.

2300 mm 220 cm 0.021 km $2\frac{1}{4}$ m

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

For Examiner's Use

5 Pierre goes on a holiday from France to the UK.

(a) His journey takes 4 hours and 43 minutes.
It ends at 02 13 on Saturday.

At what time on Friday does his journey start?

Answer ..... [1]

(b) Pierre changes 400 euros into pounds (£).
The exchange rate is 1 euro = £ 0.845.

How many pounds does he receive?

Answer £ ..... [1]

---

6 **(a)** Write the number 0.000 034 in standard form.

Answer ..... [1]

(b) Expressing your answer in standard form, find $(5 \times 10^8) \times (4 \times 10^7)$.

Answer ..... [1]

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7 **(a)** **Estimate**, correct to the nearest whole number, the value of $\sqrt{\frac{72.187}{\pi}}$.

Show clearly the approximate values you use.

Answer ..... [1]

(b) The values of three cube roots, correct to 1 decimal place, are given below.

$\sqrt[3]{5} = 1.7$ $\sqrt[3]{50} = 3.7$ $\sqrt[3]{500} = 7.9$

Using as much of the above information as is necessary, find the value of $\sqrt[3]{0.005}$.

Answer ..... [1]

---

8 The mean mass of Ali, Ben and Carl is 40 kg.
The mass of Dan is 48 kg.

Find the mean mass of the four boys.

Answer ..... kg [2]

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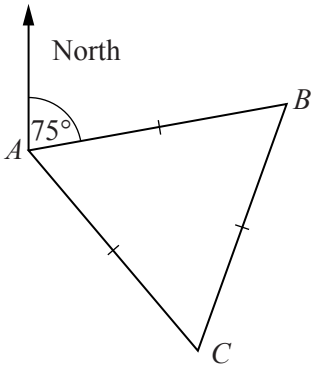
9 y is inversely proportional to x.

Given that $y = \frac{1}{5}$ when $x = 20$, find y when $x = \frac{1}{7}$.

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

---

10 In the diagram, the triangle ABC is equilateral.
The bearing of B from A is 075°.



(a) Find the bearing of C from A.

Answer ..... [1]

(b) Find the bearing of C from B.

Answer ..... [1]

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11 In an experiment, 4 dice are thrown and the number of Fives is recorded.
The experiment is repeated 12 times.
The table shows the results.

Number of Fives	0	1	2	3	4
Frequency	1	2	3	5	1

For this distribution of Fives,

(a) write down the mode,

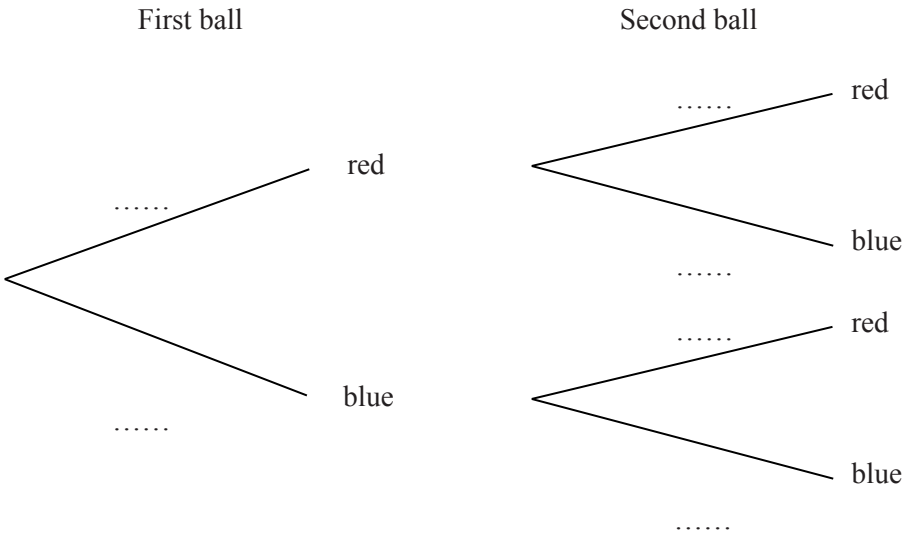
Answer ..... [1]

(b) find the median.

Answer ..... [1]

---

12 A bag contains 1 red and 3 blue balls.
Two balls are taken from the bag, at random, without replacement.
The tree diagram that represents all the outcomes is shown below.



(a) Write the appropriate probability on each branch. [2]

(b) Find the probability that the second ball taken is red.

Answer ..... [1]

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13 The mass of a box is 2 kilograms, correct to the nearest kilogram.

(a) Write down the lower bound for the mass of the box.

Answer ..... kg [1]

(b) The mass of a can is 350 grams, correct to the nearest 10 grams.

Giving your answer in kilograms, calculate the lower bound for the **total** mass of the box and 20 identical cans.

Answer ..... kg [2]

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14 **(a)** Evaluate

(i) $5^1 + 5^0$,

Answer .....[1]

(ii) $\left(\frac{4}{3}\right)^{-2}$.

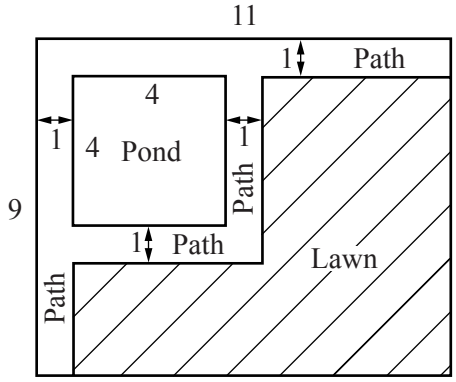
Answer .....[1]

(b) Simplify $\left(2x^2\right)^3$.

Answer .....[1]

---

15 The diagram shows the plan of a rectangular garden, measuring 11 m by 9 m.
All the angles are right angles.
The pond is a square of side 4 m.
The paths are 1 m wide.
The remainder of the garden is a lawn.



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(a) Find the perimeter of the lawn.

Answer ..... m [1]

(b) Find the total area of the paths.

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

(c) The paths are paved with square tiles of side 50 cm.

How many tiles are used?

Answer .....[1]

16

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$$\mathbf{A} = \begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix}$$

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

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

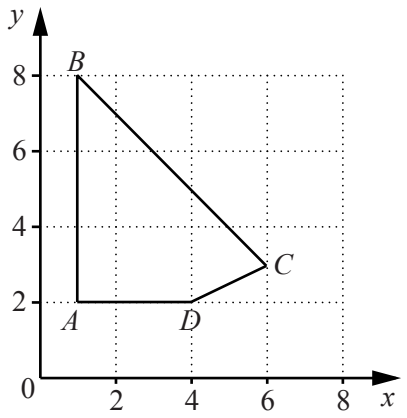
(b) Describe, fully, the transformation that is represented by **A**.

Answer .....

.....[2]

17 The quadrilateral $ABCD$ is bounded by the lines $x = 1$, $y = 2$, $2y = x$ and $x + y = 9$.

The region **inside** the quadrilateral is defined by four inequalities.
Two of these are $y > 2$ and $2y > x$.



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(a) Write down the other two inequalities.

Answer .....

..... [2]

(b) How many points, with **integer** coordinates, lie **inside** the quadrilateral $ABCD$?

Answer ..... [1]

18 Factorise completely

For Examiner's Use

(a) $20p + 25p^2$,

Answer ..... [1]

(b) $9 - 4t^2$,

Answer ..... [1]

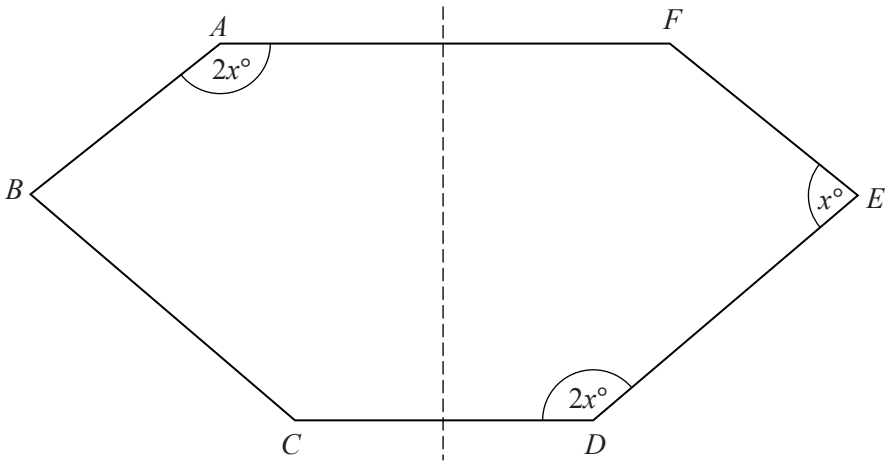
(c) $9 + 35x - 4x^2$.

Answer ..... [1]

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In the diagram, the dashed line is a line of symmetry.
$B\hat{A}F = 2x°$, $F\hat{E}D = x°$ and $C\hat{D}E = 2x°$.

Find the value of x.

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

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20 $\mathrm{f}(x) = \dfrac{x+3}{2}$

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

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

(b) Given that $\mathrm{f}(-9) + \mathrm{f}(t) = A + Bt$, find the values of A and B.

Answer $A =$ .....

$B =$ ..... [2]

---

21 **(a)** Given that $A = \{ 1, 2, 3, 4, 5 \}$ and $B = \{ 3, 4, 5, 6, 7 \}$, find $\mathrm{n}(A \cup B)$.

Answer ..... [1]

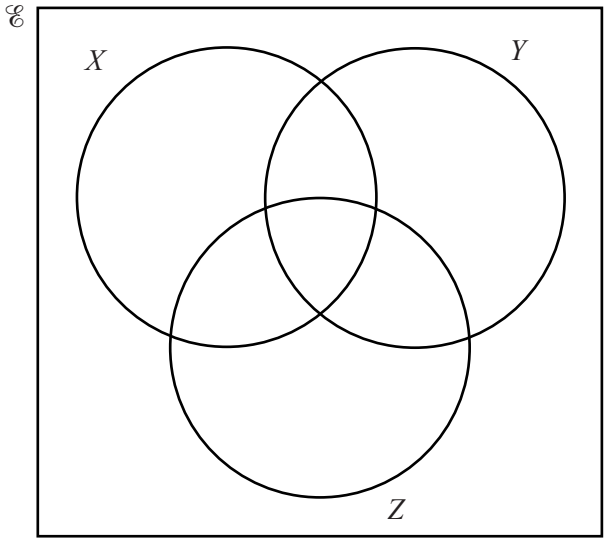
(b) $\mathscr{E} = \{ p, q, r, ... \}$

On the Venn diagram, write each of the letters p, q, and r in its appropriate subset, given that

$p \in X \cap Y \cap Z$,

$q \in X' \cap Y' \cap Z'$,

$r \in (X \cup Y)' \cap Z$.

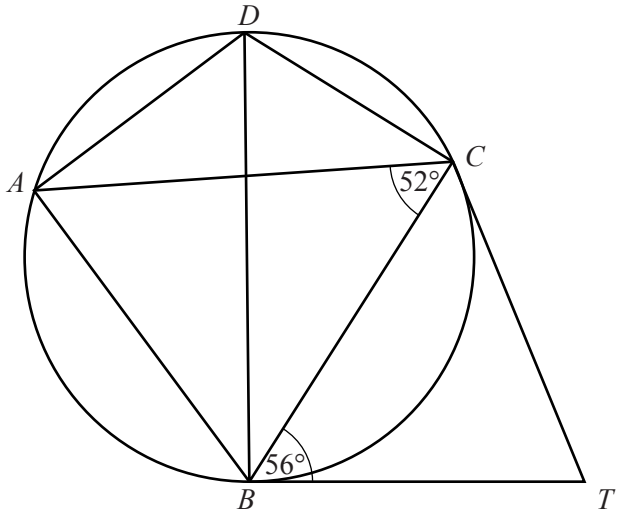


[3]

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In the diagram, the points A, B, C and D lie on the circle.
BD is a diameter.
The tangents from T touch the circle at B and C.
$A\hat{C}B = 52°$ and $T\hat{B}C = 56°$.

Find

(a) $B\hat{T}C$,

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

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

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

(c) $B\hat{D}C$,

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

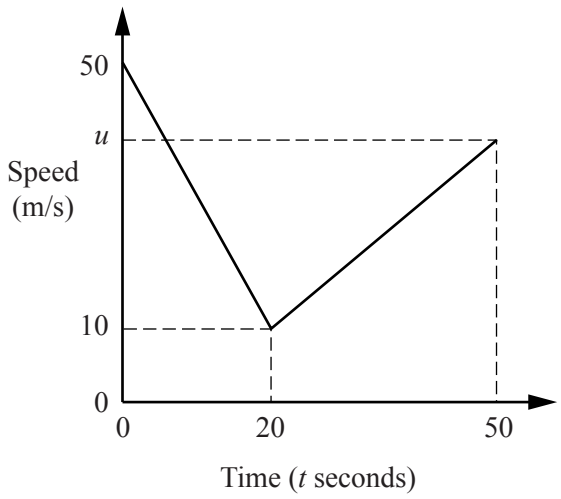
(d) $A\hat{B}C$.

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

23 The diagram is the speed-time graph of part of a train's journey.

The train slows down uniformly from a speed of 50 m/s to a speed of 10 m/s in a time of 20 seconds.

During the next 30 seconds, it accelerates uniformly to a speed of u metres/second.



(a) Calculate the retardation from $t = 0$ to $t = 20$.

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

(b) Calculate the speed of the train when $t = 15$.

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

(c) Calculate the distance travelled by the train from $t = 0$ to $t = 20$.

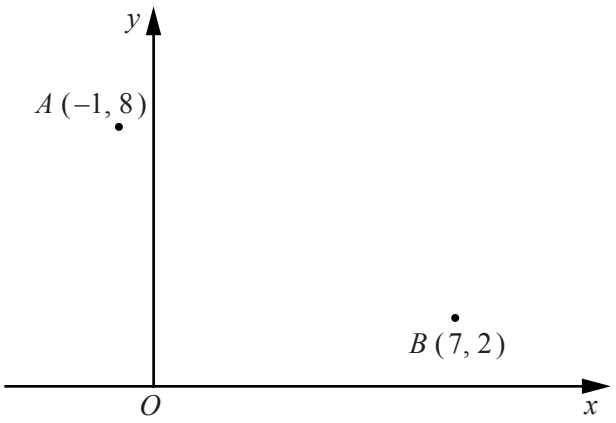
Answer ..... m [1]

(d) The size of the acceleration is half the size of the retardation.
Find the value of u.

Answer $u =$ ..... [1]

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24 The diagram shows the points $A\,(-1, 8)$ and $B\,(7, 2)$.



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(a) Find the coordinates of the midpoint of AB.

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

(b) $\overrightarrow{BC} = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$

(i) Find the coordinates of C.

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

(ii) Given that $\left|\overrightarrow{AB} + \overrightarrow{BC}\right| = \sqrt{k}$, find k.

Answer $k =$ .....[2]

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25 The sequence of positive integers is arranged in the pattern below.

Row 1	1	2	3
Row 2	4	5	6
Row 3	7	8	9
Row 4	10	11	12
.	.	.	.
.	.	.	.
.	.	.	.
Row n	.....	$3n - 1$	.....

(a) Complete Row n. [1]

(b) The table shows some results obtained from this pattern.

Row number	1	2	3	4		n
Square of the middle number in the row	4	25	64			x
Product of the first and the last number in the row	3	24	63			y

(i) Complete the column for Row number 4. [1]

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

Answer ..... [1]

(iii) Show that $x - y$ is always equal to 1.

[2]

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26 The diagram at the bottom of the page shows the lines AB and BC.

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(a) By measuring an angle, find reflex angle ABC.

Answer ..... [1]

(b) The point D is on the opposite side of AC to B.
$CD = CB$ and $AD = 10$ cm.

On the diagram, construct quadrilateral $ABCD$. [1]

(c) On the diagram, construct the locus of points, **inside** the quadrilateral $ABCD$, that are

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

(ii) equidistant from BC and BA. [1]

(d) On the diagram, shade the region **inside** the quadrilateral $ABCD$ containing the points that are

nearer to A than to B and
nearer to BC than to BA. [1]



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27 **(a)** Express as a single matrix $2\begin{pmatrix}-1 & -2\\ 0 & 1\end{pmatrix} - \begin{pmatrix}1 & -3\\ 2 & 3\end{pmatrix}$.

Answer [2]

(b) The matrix **X** satisfies the equation $\mathbf{X}\begin{pmatrix}2 & -1\\ 0 & 3\end{pmatrix} = (8 \quad 5)$.

(i) Complete the following statement.

"The matrix **X** has ..... row(s) and ..... column(s)." [1]

(ii) Find **X**.

Answer [2]

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