UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

* 2 9 6 3 4 4 3 8 7 8 *

MATHEMATICS **0580/21**

Paper 2 (Extended) **October/November 2010**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Mathematical tables (optional)
Geometrical instruments
Tracing paper (optional)

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 below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
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 70.

This document consists of **12** printed pages.

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1 Write each number correct to 1 significant figure and estimate the value of the calculation. You must show your working.

$$2.65 \times 4.1758 + 7.917$$

Answer ..... [2]

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2 Use a calculator to work out the **exact** value of

$$1 + \frac{1}{5} + \left(\frac{1}{5}\right)^2 + \left(\frac{1}{5}\right)^3 + \left(\frac{1}{5}\right)^4.$$

Answer ..... [2]

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3 Expand the brackets and simplify.

$$\frac{1}{2}(6x - 2) - 3(x - 1)$$

Answer ..... [2]

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4 Write the following in order of size, **smallest** first.

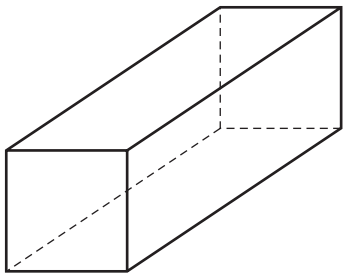
$$\sqrt{0.9} \qquad \sqrt[3]{0.9} \qquad 0.9^2 \qquad 0.9^3$$

Answer ..... < ..... < ..... < ..... [2]

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5 (a)

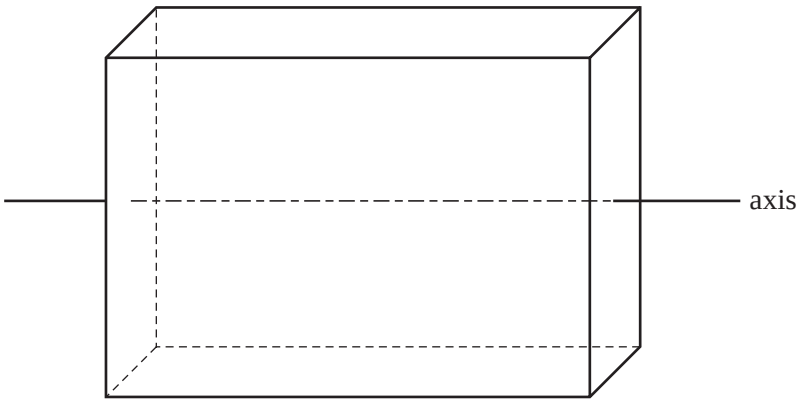


This cuboid has a **square** cross-section.

Write down the number of planes of symmetry.

Answer(a) ..... [1]

(b)



This cuboid has a **rectangular** cross-section.

The axis shown passes through the centre of two opposite faces.

Write down the order of rotational symmetry of the cuboid about this axis.

Answer(b) ..... [1]

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6 Work out $\dfrac{240^2}{5\times10^6}$.

Give your answer in standard form.

Answer ..... [2]

---

7 Write as a single fraction in its simplest form.

$$\frac{2}{x}+\frac{1}{2x}+\frac{1}{2}$$

Answer [2]

---

8 The length of a side of a regular hexagon is 6.8 cm, correct to one decimal place.

Find the smallest possible perimeter of the hexagon.

Answer ..... cm [2]

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9 Johan invested \$600 for 3 years at 4% per year **compound** interest.

Calculate the final amount he had after three years.

Answer \$ ..... [3]

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10 Solve the simultaneous equations $2x + y = 5$ and $2y = x - 10$.

Answer $x =$ .....

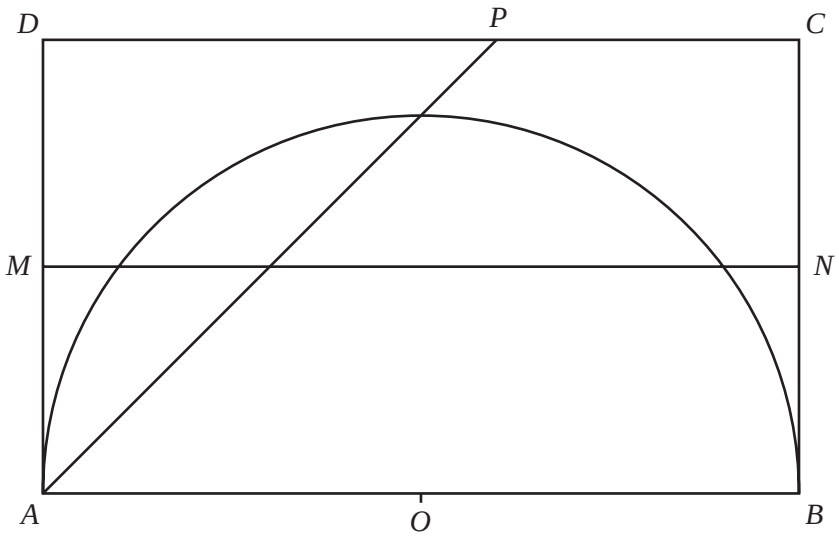
$y =$ ..... [3]

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11 $ABCD$ is a rectangle with $AB = 10$ cm and $BC = 6$ cm. MN is the perpendicular bisector of BC.

AP is the bisector of angle BAD.

O is the midpoint of AB and also the centre of the semicircle, radius 5 cm.



Write the letter R in the region which satisfies **all** three of the following conditions.

- nearer to AB than to AD
- nearer to C than to B
- less than 5 cm from O

[3]

---

12 Make x the subject of $y = \dfrac{(x+3)^2}{5}$.

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

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13 Solve the inequality. $2x + 5 < \frac{x-1}{4}$

Answer ..... [3]

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14 Find the value of n in the following equations.

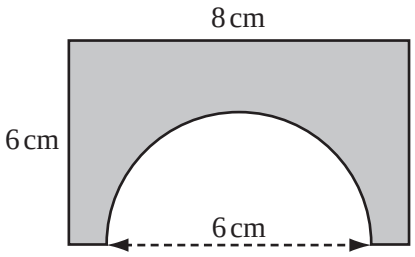
(a) $2^n = 1024$

Answer(a) $n =$ ..... [1]

(b) $4^{2n-3} = 16$

Answer(b) $n =$ ..... [2]

15



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A semicircle of diameter 6 cm is cut from a rectangle with sides 6 cm and 8 cm.

Calculate the perimeter of the shaded shape, correct to 1 decimal place.

Answer ..... cm [3]

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16 Simplify this fraction.

$$\frac{x^2 - 5x + 6}{x^2 - 4}$$

Answer [4]

17

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

Work out

(a) $\mathbf{A}^2$,

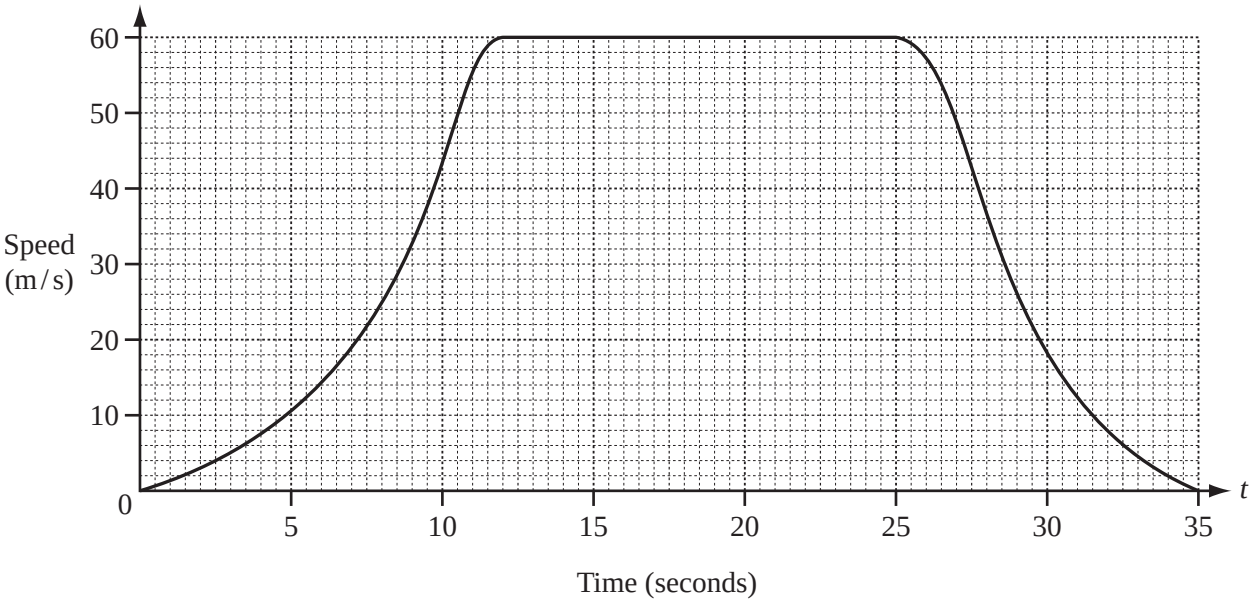
Answer(a) $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(b) $\mathbf{A}^{-1}$, the inverse of $\mathbf{A}$.

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

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The graph shows the speed of a sports car after t seconds.

It starts from rest and accelerates to its maximum speed in 12 seconds.

(a) (i) Draw a tangent to the graph at $t = 7$. [1]

(ii) Find the acceleration of the car at $t = 7$.

Answer(a)(ii) ..... m/s^2 [2]

(b) The car travels at its maximum speed for 13 seconds.

Find the distance travelled by the car at its maximum speed.

Answer(b) ..... m [2]

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19 Reina went on holiday to New Zealand.

(a) She travelled the 65 km from Tokyo to Narita Airport by taxi.

The taxi journey cost 300 yen (¥) per kilometre plus a fixed charge of ¥700.

Calculate the cost of the taxi journey.

Answer(a) ¥ ..... [2]

(b) At Narita Airport, Reina changed ¥71 190 into New Zealand dollars (NZ$).

The exchange rate was NZ$1 = ¥56.5.

How many New Zealand dollars did she receive?

Answer(b) NZ$ ..... [2]

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20 Solve the equation.

$$x^2 - 8x + 6 = 0$$

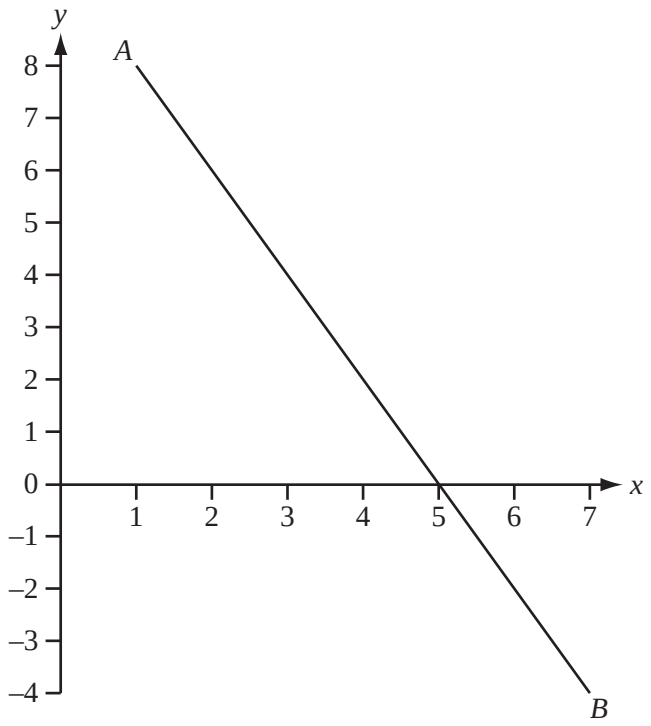
Show all your working and give your answers correct to 2 decimal places.

Answer x = ... or x = ... [4]

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(a) **Using a straight edge and compasses only,** construct the perpendicular bisector of AB on the diagram above. [2]

(b) Write down the co-ordinates of the midpoint of the line segment joining $A(1, 8)$ to $B(7, –4)$.

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

(c) Find the equation of the line AB.

Answer(c) ..... [3]

Question 22 is printed on the next page.

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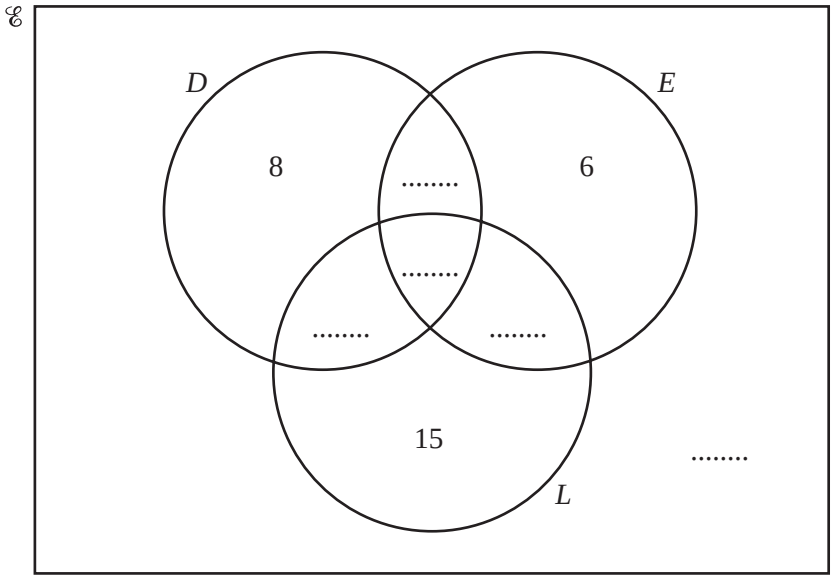
22 In a survey of 60 cars, 25 use diesel, 20 use liquid hydrogen and 22 use electricity.

No cars use all three fuels and 14 cars use both diesel and electricity.

There are 8 cars which use diesel only, 15 cars which use liquid hydrogen only and 6 cars which use electricity only.

In the Venn diagram below

$\mathscr{E}$ = {cars in the survey},
D = {cars which use diesel},
L = {cars which use liquid hydrogen},
E = {cars which use electricity}.



(a) Use the information above to fill in the five missing numbers in the Venn diagram. [4]

(b) Find the number of cars which use diesel but not electricity.

Answer(b) ..... [1]

(c) Find $n(D' \cap (E \cup L))$.

Answer(c) ..... [1]

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