UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

6836641215

MATHEMATICS **0580/23**

Paper 2 (Extended) **May/June 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 During one week in April, in Quebec, the daily minimum temperatures were

–5°C, –1°C, 3°C, 2°C, –2°C, 0°C, 6°C.

Write down

(a) the lowest of these temperatures,

Answer(a) ..... °C [1]

(b) the range of these temperatures.

Answer(b) ..... °C [1]

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2 $\sqrt{23}$ 48% 4.80 $\frac{53}{11}$

Write the numbers in order of size with the **largest** first.

Answer ..... > ..... > ..... > ..... [2]

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3 Ricardo changed \$600 into pounds (£) when the exchange rate was \$1 = £0.60.
He later changed all the pounds back into dollars when the exchange rate was \$1 = £0.72.

How many dollars did he receive?

Answer \$ ..... [2]

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4 The maximum speed of a car is 252 km/h.

Change this speed into metres per second.

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

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5 Amalie makes a profit of 20% when she sells a shirt for \$21.60.

Calculate how much Amalie paid for the shirt.

Answer \$ ..... [2]

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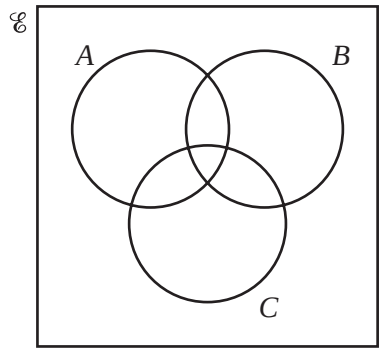
6 $3^x \times 9^4 = 3^n$.

Find n in terms of x.

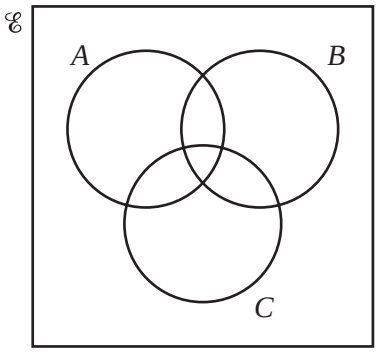
Answer $n =$ ..... [2]

---

7 Shade the required regions in the Venn diagrams below.



$(A \cup B)' \cap C$



$(A \cap B) \cup C$

[2]

---

8 Write as a single fraction in its simplest form

$$\frac{x}{3} + \frac{x-1}{2}.$$

Answer ..... [2]

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9 1 second = 10^6 microseconds.

Change 3×10^{13} microseconds into minutes. Give your answer in standard form.

Answer ..... min [2]

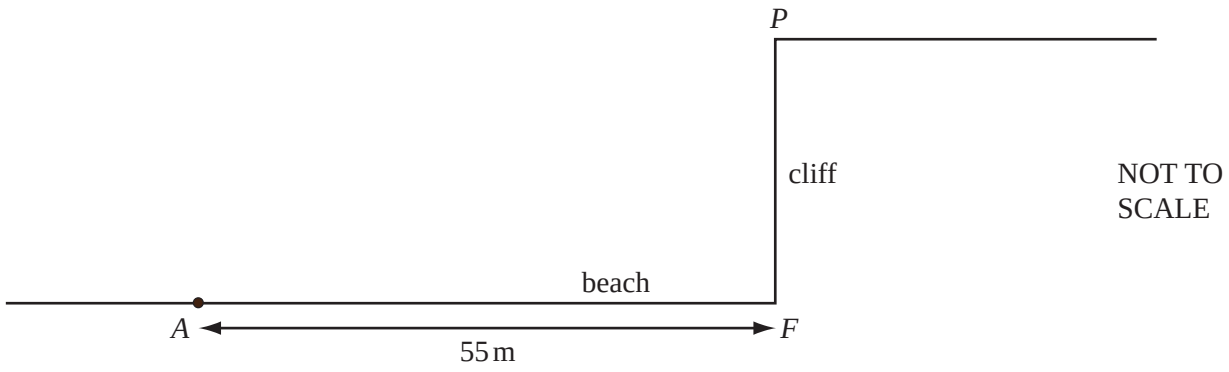
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10 The length of each side of an equilateral triangle is 74 mm, correct to the nearest millimetre.

Calculate the smallest possible perimeter of the triangle.

Answer ..... mm [2]

11



The diagram shows a point P at the top of a cliff.
The point F is on the beach and vertically below P.
The point A is 55m from F, along the horizontal beach.
The angle of elevation of P from A is 17°.

Calculate PF, the height of the cliff.

Answer PF = ... m [3]

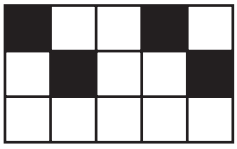
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12 Expand and simplify $2(x-3)^2-(2x-3)^2$.

Answer ..... [3]

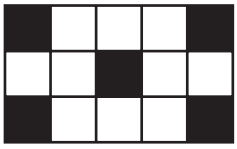
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13 **(a)** Write down the number of lines of symmetry for the diagram below.



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

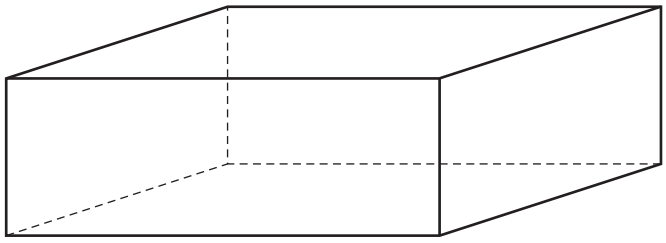
(b) Write down the order of rotational symmetry for the diagram below.



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

(c) The diagram shows a cuboid which has no square faces.

Draw one of the **planes** of symmetry of the cuboid on the diagram.



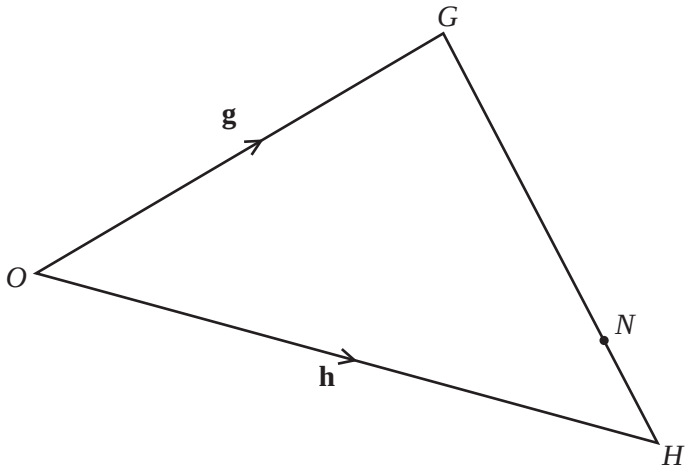
[1]

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14 Solve the equation $3(y-4)+\frac{y}{2}=9$.

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

15



NOT TO SCALE

In triangle OGH, the ratio $GN : NH = 3 : 1$.

$\overrightarrow{OG} = \mathbf{g}$ and $\overrightarrow{OH} = \mathbf{h}$.

Find the following in terms of **g** and **h**, giving your answers in their simplest form.

(a) $\overrightarrow{HG}$

Answer(a) $\overrightarrow{HG} =$ ..... [1]

(b) $\overrightarrow{ON}$

Answer(b) $\overrightarrow{ON} =$ ..... [2]

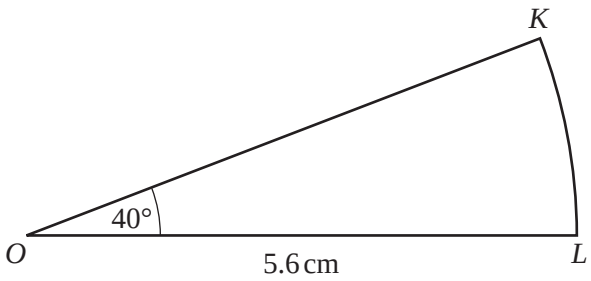
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16 Make y the subject of the formula. $A = \dfrac{r(y+2)}{5}$

Answer $y =$ [3]

17



NOT TO SCALE

OKL is a sector of a circle, centre *O*, radius 5.6 cm.
Angle *KOL* = 40°.

Calculate

(a) the area of the sector,

Answer(a) ..... cm^2 [2]

(b) the perimeter of the sector.

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

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18 $f(x) = x^2 + 2$ $g(x) = (x + 2)^2$ $h(x) = 3x - 5$

Find

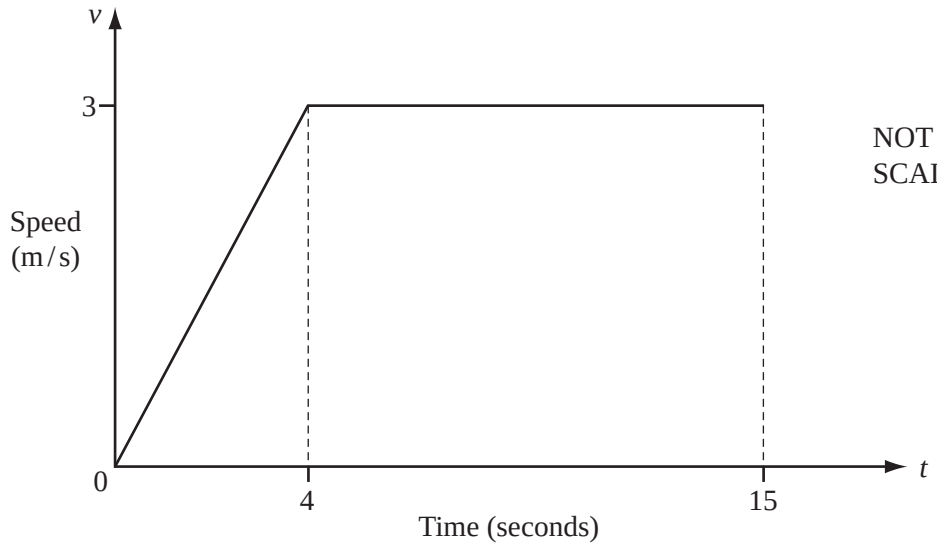
(a) gf(–2),

Answer(a) ..... [2]

(b) $h^{-1}(22)$.

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

19



The diagram shows the speed-time graph for 15 seconds of the journey of a cyclist.

(a) Calculate the acceleration of the cyclist during the first 4 seconds.

Answer(a) ..... m/s^2 [1]

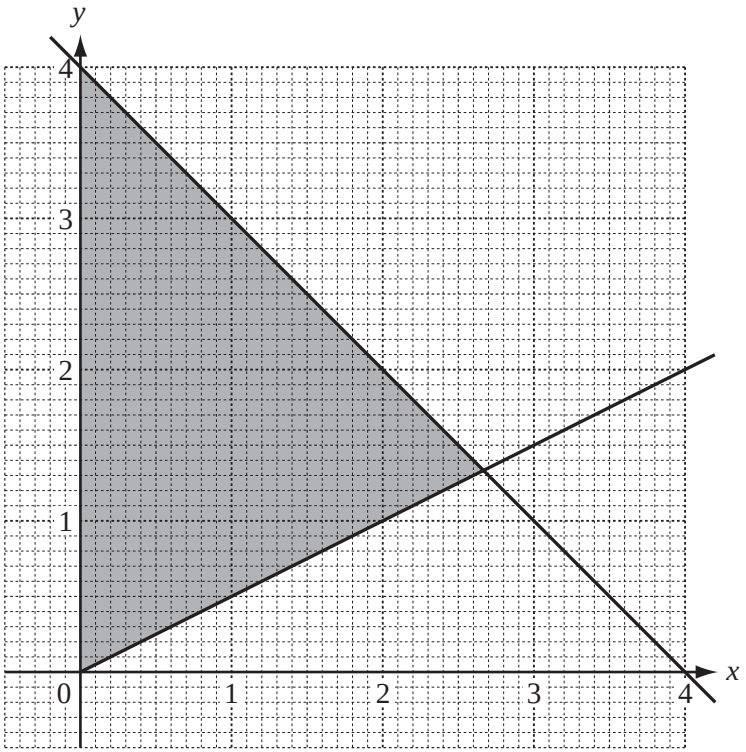
(b) Calculate the average speed for the first 15 seconds.

Answer(b) ..... m/s [3]

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20



Find the three inequalities which define the shaded region on the grid.

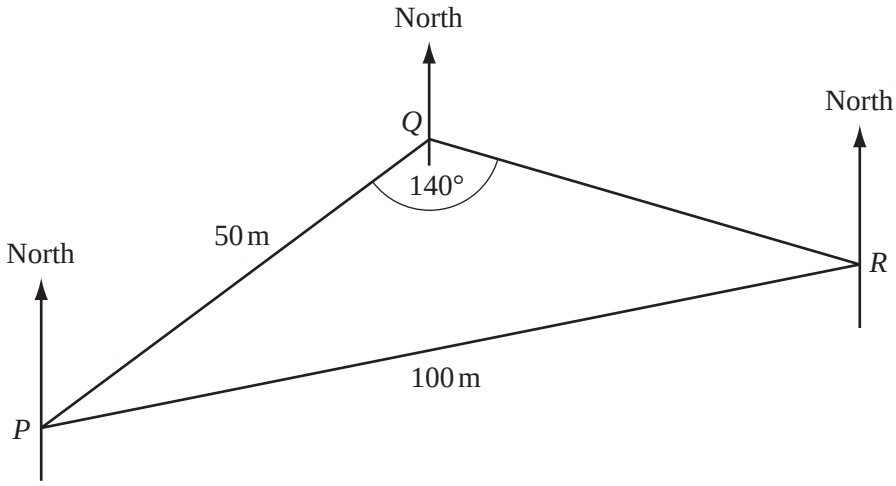
Answer .....

.....

..... [5]

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21



NOT TO SCALE

The diagram shows three points P, Q and R on horizontal ground.

$PQ = 50$ m, $PR = 100$ m and angle $PQR = 140°$.

(a) Calculate angle PRQ.

Answer(a) Angle PRQ = ... [3]

(b) The bearing of R from Q is 100°.

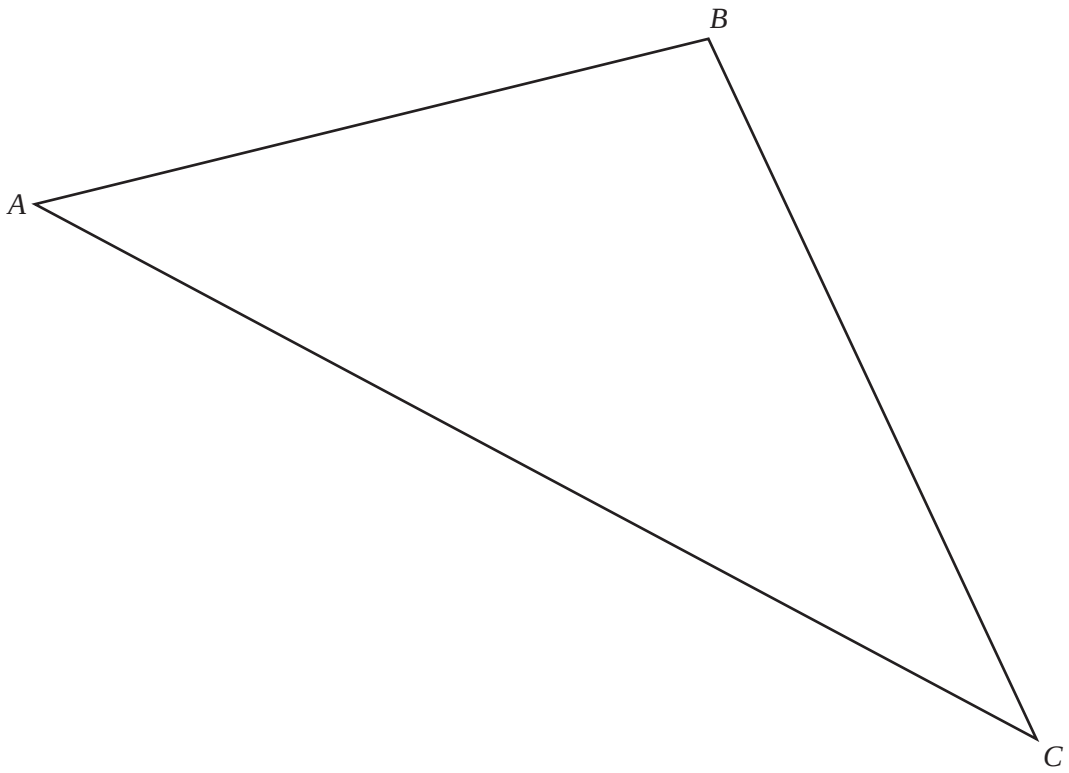
Find the bearing of P from R.

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

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22



The diagram shows a farmer's field *ABC*.

The farmer decides to grow potatoes in the region of the field which is

- nearer to *A* than to *C*

and

- nearer to *AB* than to *AC*.

Using **a straight edge and compasses only**, construct two loci accurately and shade this region on the diagram.

[5]

Question 23 is printed on the next page.

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23 $\mathbf{A} = \begin{pmatrix} 1 & 4 \end{pmatrix}$ $\mathbf{B} = \begin{pmatrix} 3 & -1 \\ -2 & 2 \end{pmatrix}$

Find

(a) **AB**,

Answer(a) **AB** = [2]

(b) the inverse matrix $\mathbf{B}^{-1}$,

Answer(b) $\mathbf{B}^{-1}$ = [2]

(c) $\mathbf{B}\mathbf{B}^{-1}$.

Answer(c) $\mathbf{B}\mathbf{B}^{-1}$ = [1]

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