UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

Paper 2 (Extended)

0580/02 0581/02

Candidates answer on the Question Paper.
Additional Materials: Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

October/November 2006

1hour 30 minutes

Candidate Name

Centre Number

Candidate Number

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 in the spaces provided on the Question Paper.
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 THE BARCODE.
DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

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. Given answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 70.

For Examiner's Use

This document consists of **11** printed pages and **1** blank page.

For Examiner's Use

1 Two quantities c and d are connected by the formula $c = 2d + 30$.
Find c when $d = -100$.

Answer ..... [1]

---

2 **(a)** $\frac{2}{3} + \frac{5}{6} = \frac{x}{2}$.

Find the value of x.

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

(b) $\frac{5}{3} \div \frac{3}{y} = \frac{40}{9}$.

Find the value of y.

Answer(b) $y =$ ..... [1]

---

3 Use your calculator to work out

(a) $\sqrt{(7 + 6 \times 243^{0.2})}$,

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

(b) $2 - \tan 30° \times \tan 60°$.

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

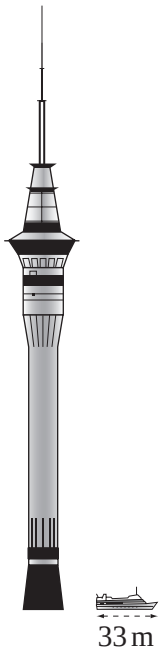
---

4 Angharad sleeps for 8 hours each night, correct to the nearest 10 minutes.
The total time she sleeps in the month of November (30 nights) is T hours.
Between what limits does T lie?

Answer ..... $\leqslant T <$ ..... [2]

For Examiner's Use

5



The picture shows the Sky Tower in Auckland.
Alongside the tower is a boat. The boat is 33 metres long.
Use the length of the boat to estimate the height of the Sky Tower.

Answer ..... m [2]

6

$0.0008 \qquad 8 \times 10^{-5} \qquad 0.8\% \qquad \frac{1}{125\,000}$

Write the numbers above in order, smallest first.

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

7 Find the value of n in each of the following statements.

(a) $32^n = 1$

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

(b) $32^n = 2$

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

(c) $32^n = 8$

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

For Examiner's Use

8 The Canadian Maple Leaf train timetable from Toronto to Buffalo is shown below.

Toronto	10 30
Oakville	10 52
Aldershot	11 07
Grimsby	11 41
St Catharines	11 59
Niagra Falls	12 24
Buffalo	13 25

(a) How long does the journey take from Toronto to Buffalo?

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

(b) This journey is 154 kilometres. Calculate the average speed of the train.

Answer(b) ..... km/h [2]

---

9 For each of the following sequences, write down the next term.

(a) 2, 3, 5, 8, 13, …

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

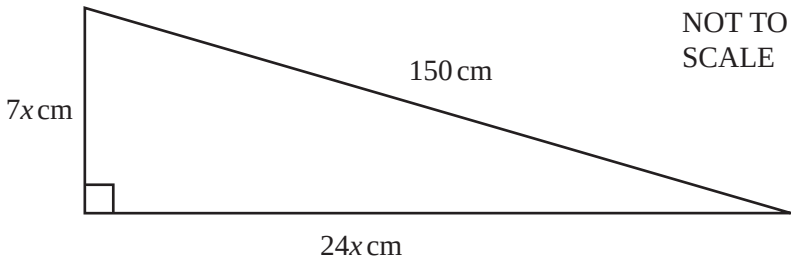
(b) x^6, $6x^5$, $30x^4$, $120x^3$, …

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

(c) 2, 6, 18, 54, 162, ...

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

10



The right-angled triangle in the diagram has sides of length $7x$ cm, $24x$ cm and 150 cm.

(a) Show that $x^2 = 36$.

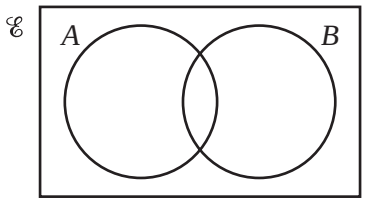
[2]

(b) Calculate the perimeter of the triangle.

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

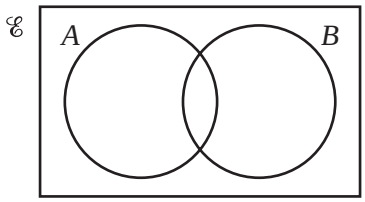
---

11 **(a)** Shade the region $A \cap B$.



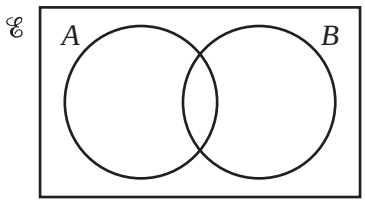
[1]

(b) Shade the region $(A \cup B)'$.



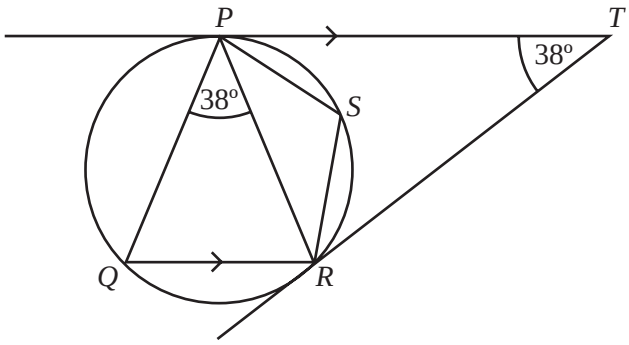
[1]

(c) Shade the complement of set B.



[1]

12



NOT TO SCALE

In the diagram *PT* and *QR* are parallel. *TP* and *TR* are tangents to the circle *PQRS*.
Angle *PTR* = angle *RPQ* = 38°.

(a) What is the special name of triangle *TPR*. Give a reason for your answer.

Answer(a) name .....

reason ..... [1]

(b) Calculate

(i) angle *PQR*,

Answer(b)(i) Angle *PQR* = ... [1]

(ii) angle *PSR*.

Answer(b)(ii)Angle *PSR* = ... [1]

---

13 A statue two metres high has a volume of five cubic metres.
A similar model of the statue has a height of four centimetres.

(a) Calculate the volume of the model statue in cubic centimetres.

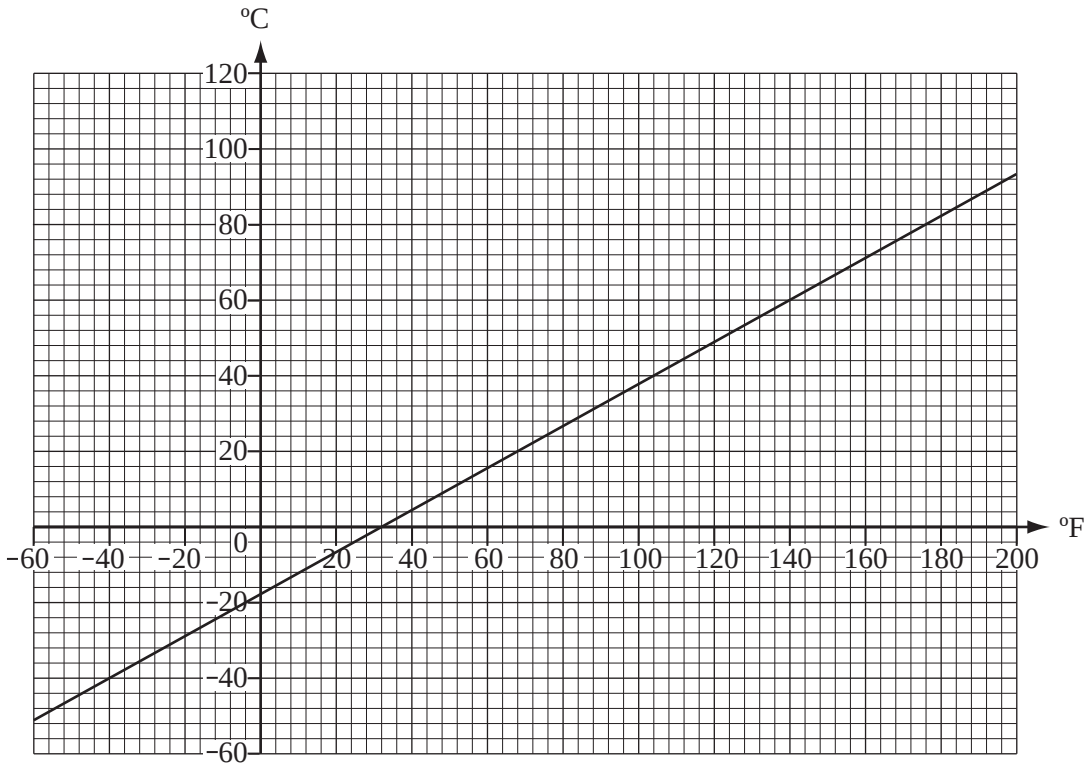
Answer(a) ..... cm^3 [2]

(b) Write your answer to **part (a)** in cubic metres.

Answer(b) ..... m^3 [1]

For Examiner's Use

14 The graph drawn below shows the conversion of temperatures in degrees Fahrenheit (°F) to temperatures in degrees Celsius (°C).



(a) The temperature of a room is 20 °C. What is the temperature in Fahrenheit?

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

(b) A liquid has a boiling point of 176 °F. What is the temperature in Celsius?

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

(c) Find T when T °C = T °F.

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

---

15 f: $x \mapsto 5 - 3x$.

(a) Find f(−1).

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

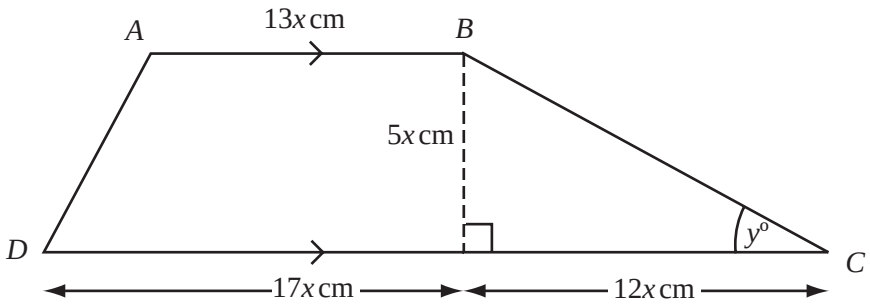
(b) Find $\mathrm{f}^{-1}(x)$.

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

(c) Find $\mathrm{f}\mathrm{f}^{-1}(8)$.

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

16



NOT TO SCALE

ABCD is a trapezium.

(a) Find the area of the trapezium in terms of x and simplify your answer.

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

(b) Angle $BCD = y°$. Calculate the value of y.

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

---

17 Solve the equations

(a) $0.2x - 3 = 0.5x$,

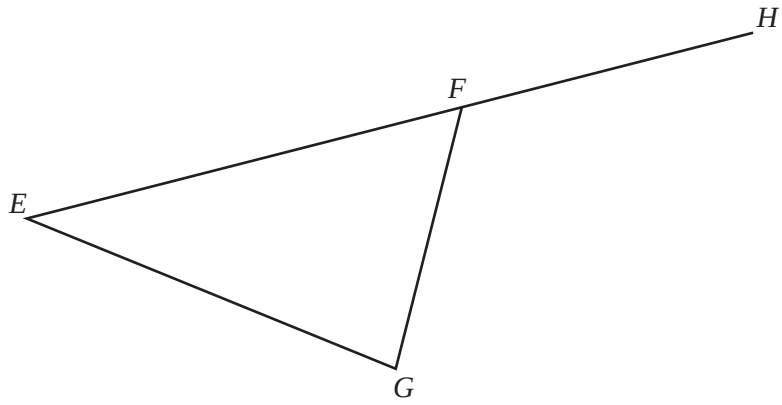
Answer(a) $x =$ ..... [2]

(b) $2x^2 - 11x + 12 = 0$.

Answer(b) $x =$ ..... or $x =$ ..... [3]

18

For Examiner's Use



The diagram shows a triangle *EFG*. The side *EF* is extended to *H*.

(a) Using a straight edge and compasses only, **showing your construction arcs**, draw

(i) the locus of points that are equidistant from *E* and *G*, [2]

(ii) the locus of points that are equidistant from *FG* and *FH*. [2]

(b) Measure accurately and write down the acute angle between the two lines drawn in **part (a)**.

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

---

19 **(a)** Find $\begin{pmatrix}3 & 4\end{pmatrix}\begin{pmatrix}5\\2\end{pmatrix}$.

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

(b) $\begin{pmatrix}7\\3\end{pmatrix}\begin{pmatrix}x & y\end{pmatrix} = \begin{pmatrix}28 & 42\\12 & 18\end{pmatrix}$. Find the values of x and y.

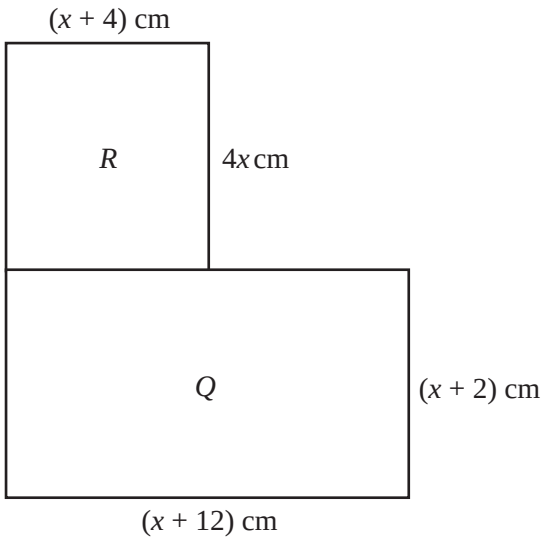
Answer(b) $x =$ .....

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

(c) Explain why $\begin{pmatrix}15 & 20\\6 & 8\end{pmatrix}$ does not have an inverse.

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

20



NOT TO SCALE

(a) (i) Write down an expression for the area of rectangle R.

Answer(a) (i) .....cm^2 [1]

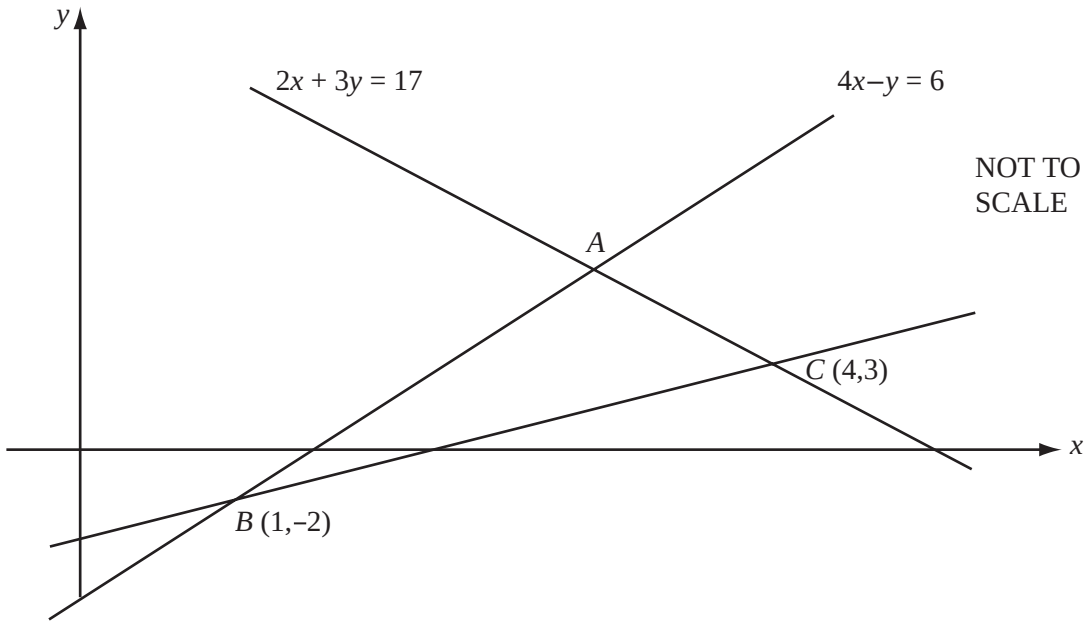
(ii) Show that the total area of rectangles R and Q is $5x^2 + 30x + 24$ square centimetres.

[1]

(b) The total area of rectangles R and Q is 64 cm^2.
Calculate the value of x correct to 1 decimal place.

Answer(b) x = ... [4]

21



In the diagram, the line AC has equation $2x + 3y = 17$ and the line AB has equation $4x - y = 6$.
The lines BC and AB intersect at $B(1, -2)$.
The lines AC and BC intersect at $C(4, 3)$.

(a) Use algebra to find the coordinates of the point A.

Answer(a) ..... [3]

(b) Find the equation of the line BC.

Answer(b) ..... [3]

BLANK PAGE