UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

0893144481

MATHEMATICS **0580/02, 0581/02**

Paper 2 (Extended) **October/November 2007**

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.

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.

For Examiner's Use

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

1 Use a calculator to find the value of $\sqrt{(5.4(5.4-4.8)(5.4-3.4)(5.4-2.6))}$.

(a) Write down all the figures in your calculator display.

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

(b) Give your answer correct to 1 decimal place.

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

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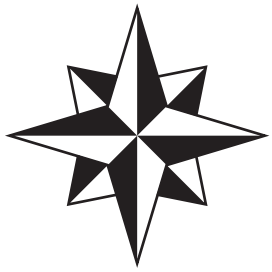
2 Use the formula

$$P = \frac{V^2}{R}$$

to calculate the value of P when $V = 6 \times 10^6$ and $R = 7.2 \times 10^8$.

Answer P = ... [2]

3



For the diagram, write down

(a) the order of rotational symmetry,

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

(b) the number of lines of symmetry.

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

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4 When $0 < x < 0.9$, write the following in order of size with the **smallest** first.

$\cos x°$ $\quad x^2$ $\quad x^{-1}$

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

---

5 $\frac{4c}{5} - \frac{3c}{35} = \frac{10}{7}$. Find c.

Answer $c =$ ..... [2]

6

$$p = \frac{0.002751 \times 3400}{(9.8923 + 24.7777)^2}.$$

(a) In the spaces provided, write each number in this calculation correct to 1 significant figure.

Answer(a) $\dfrac{\text{.....} \quad \text{.....}}{(\text{.....} + \text{.....})^2}$

[1]

(b) Use your answer to **part (a)** to **estimate** the value of p.

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

7 Solve the simultaneous equations

$$2x + \tfrac{1}{2}y = 1,$$

$$6x - \tfrac{3}{2}y = 21.$$

Answer $x =$ .....

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

8 **(a)** In October the cost of a car in euros was €20 000.
The cost of this car in pounds was £14 020.
Calculate the **exact** value of the exchange rate in October.

Answer(a) €1 = £ ..... [1]

(b) In November the car still cost €20 000 and the exchange rate was €1 = £0.6915.
Calculate the difference, in pounds, between the cost in October and November.

Answer(b) £ ..... [2]

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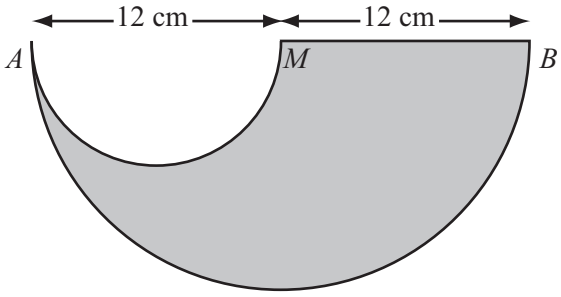
9 $x^2 + 4x - 8$ can be written in the form $(x + p)^2 + q$.

Find the values of p and q.

Answer p = ... and q = ... [3]

10



The shape above is made by removing a small semi-circle from a large semi-circle.
$AM = MB = 12$ cm
Calculate the area of the shape.

Answer ..... cm^2 [3]

---

11 M is proportional to the cube of r.
When $r = 3$, $M = 21.6$.
When $r = 5$, find the value of M.

Answer $M =$ ..... [3]

---

12 A and B are sets.
Write the following sets in their simplest form.

(a) $A \cap A'$.

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

(b) $A \cup A'$.

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

(c) $(A \cap B) \cup (A \cap B')$.

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

---

13 A rectangle has sides of length 6.1 cm and 8.1 cm correct to 1 decimal place.
Complete the statement about the perimeter of the rectangle.

Answer ..... cm $\leqslant$ perimeter $<$ ..... cm [3]

---

14 Solve the equations

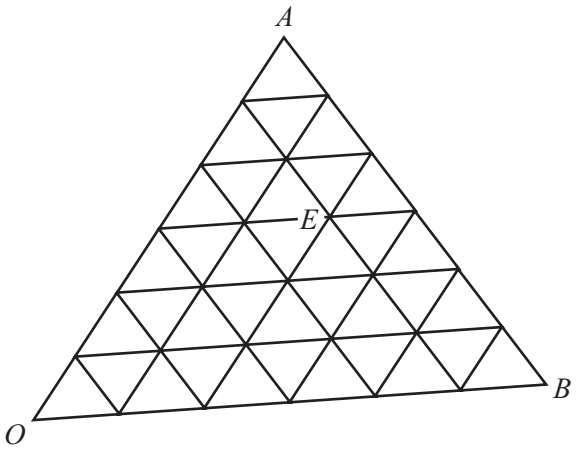
(a) $\frac{2x}{3} - 9 = 0$,

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

(b) $x^2 - 3x - 4 = 0$.

Answer(b) $x =$ ..... or $x =$ ..... [2]

15



O is the origin, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

(a) C has position vector $\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$.
Mark the point C on the diagram. [1]

(b) Write down, in terms of **a** and **b**, the position vector of the point E.

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

(c) Find, in terms of **a** and **b**, the vector $\overrightarrow{EB}$.

Answer(c) $\overrightarrow{EB} =$ ..... [2]

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16 A car manufacturer sells a similar, scale model of one of its real cars.

(a) The fuel tank of the real car has a volume of 64 litres and the fuel tank of the model has a volume of 0.125 litres.
Show that the length of the real car is 8 times the length of the model car.

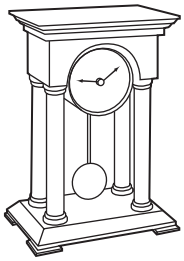
Answer(a)

[2]

(b) The area of the front window of the model is 0.0175 m^2.
Find the area of the front window of the real car.

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

17



The length of time, T seconds, that the pendulum in the clock takes to swing is given by the formula

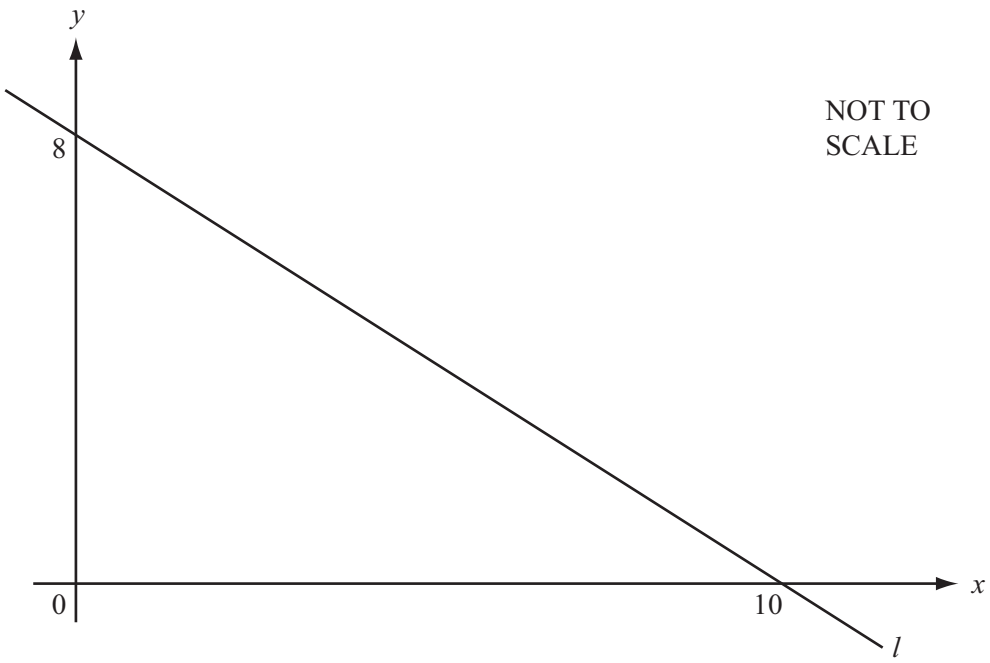
$$T = \frac{6}{\sqrt{(1+g^2)}}.$$

Rearrange the formula to make g the subject.

Answer g = ...

[4]

18



The line l passes through the points (10, 0) and (0, 8) as shown in the diagram.

(a) Find the gradient of the line as a fraction in its simplest form.

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

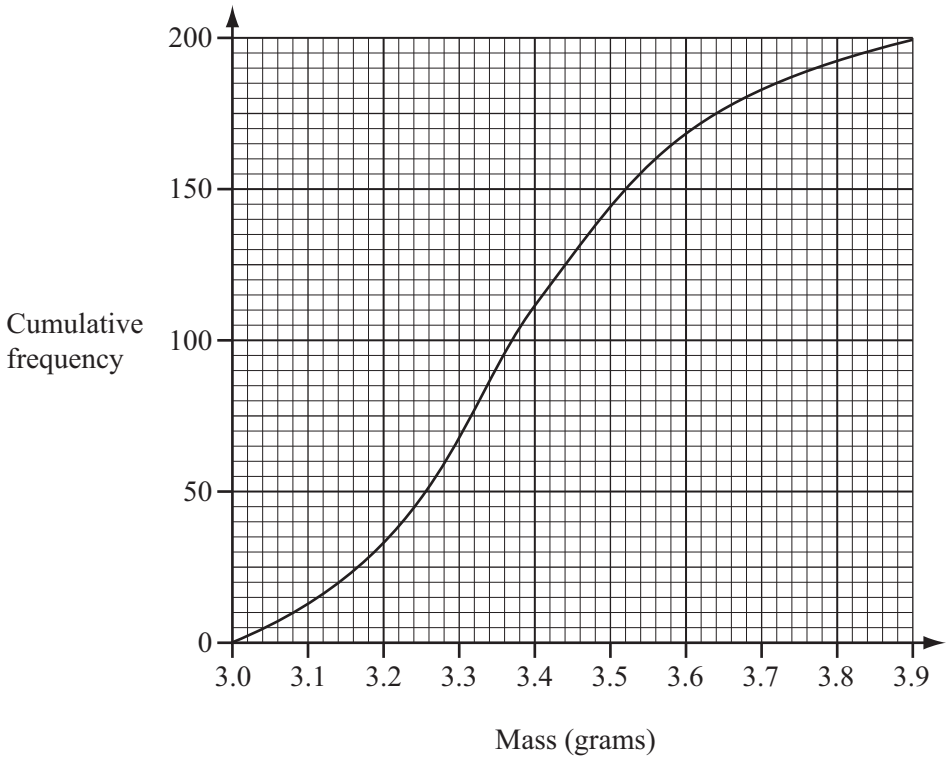
(b) **Write down** the equation of the line parallel to l which passes through the origin.

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

(c) Find the equation of the line parallel to l which passes through the point (3, 1).

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

19 The mass of each of 200 tea bags was checked by an inspector in a factory.
The results are shown by the cumulative frequency curve.



Use the cumulative frequency curve to find

(a) the median mass,

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

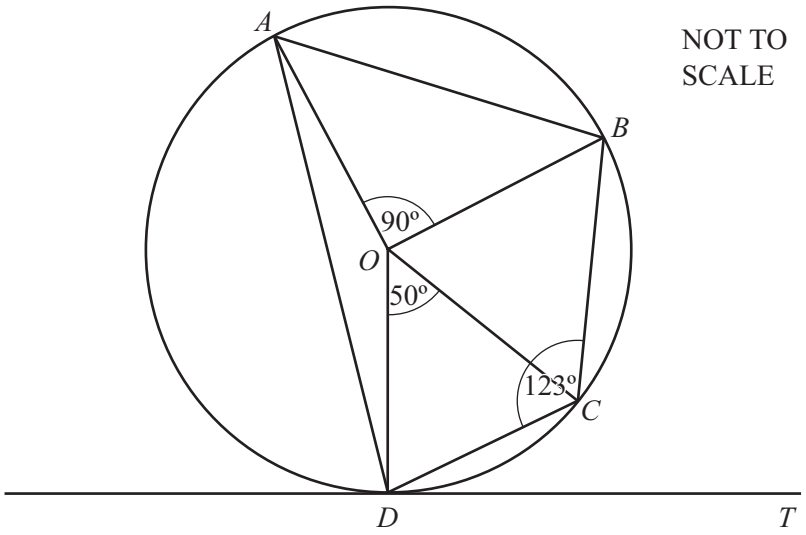
(b) the interquartile range,

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

(c) the number of tea bags with a mass greater than 3.5 grams.

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

20



NOT TO SCALE

The points A, B, C and D lie on a circle centre O.
Angle $AOB = 90°$, angle $COD = 50°$ and angle $BCD = 123°$.
The line DT is a tangent to the circle at D.

Find

(a) angle OCD,

Answer(a) Angle OCD = ... [1]

(b) angle TDC,

Answer(b) Angle TDC = ... [1]

(c) angle ABC,

Answer(c) Angle ABC = ... [1]

(d) reflex angle AOC.

Answer(d) Angle AOC = ... [1]

21 **(a)** Simplify $(27x^6)^{\frac{1}{3}}$.

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

(b) $(512)^{-\frac{2}{3}} = 2^p$. Find p.

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

22

$$\mathbf{A} = \begin{pmatrix} 1 & 2 \\ 1 & 1 \end{pmatrix} \qquad \mathbf{I} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

(a) The matrix $\mathbf{B} = \mathbf{A}^2 - 2\mathbf{A} - \mathbf{I}$.
Calculate **B**.
Show all your working.

Answer(a) $\mathbf{B} = \begin{pmatrix} & \\ & \end{pmatrix}$ [4]

(b) Simplify $\mathbf{AA}^{-1}$.

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

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