Centre No.						Surname	Initial(s)
Candidate No.						Signature	

Paper Reference(s)

4400/4H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 4H

Higher Tier

Thursday 4 November 2004 – Morning

Time: 2 hours

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Items included with question papers
Nil

Page Number	Leave Blank
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21	
22	
23	
Total	

Instructions to Candidates

In the boxes above, write your centre number and candidate number, your surname, initial(s) and signature.
The paper reference is shown at the top of this page. Check that you have the correct question paper.
Answer **ALL** the questions in the spaces provided in this question paper.
Show all the steps in any calculations.

Information for Candidates

There are 24 pages in this question paper. All blank pages are indicated.
The total mark for this paper is 100. The marks for parts of questions are shown in round brackets: e.g. **(2)**.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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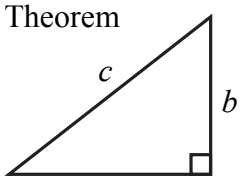
edexcel INTERNATIONAL

IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

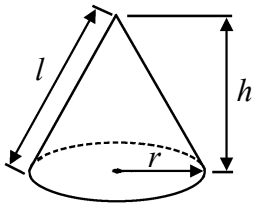
Pythagoras' Theorem



$a^2 + b^2 = c^2$

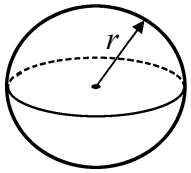
Volume of cone = $\frac{1}{3}\pi r^2 h$

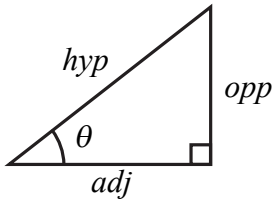
Curved surface area of cone = $\pi r l$



Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$





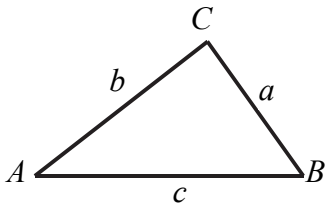
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

or $\sin\theta = \frac{\text{opp}}{\text{hyp}}$

$\cos\theta = \frac{\text{adj}}{\text{hyp}}$

$\tan\theta = \frac{\text{opp}}{\text{adj}}$

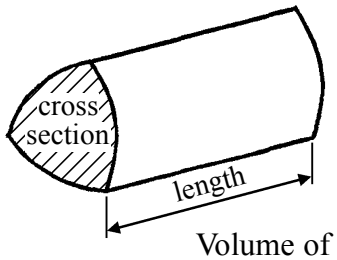
In any triangle ABC



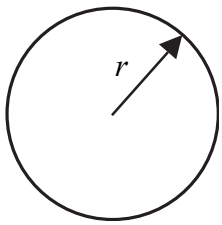
Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle = $\frac{1}{2}ab\sin C$



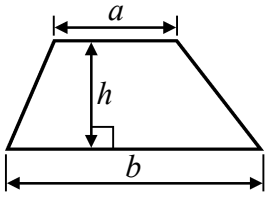
Volume of prism = area of cross section × length

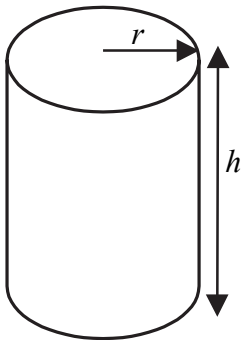


Circumference of circle = $2\pi r$

Area of circle = πr^2

Area of a trapezium = $\frac{1}{2}(a + b)h$





Volume of cylinder = $\pi r^2 h$

Curved surface area of cylinder = $2\pi rh$

The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Leave blank

Answer ALL TWENTY THREE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. The total weight of 3 identical video tapes is 525 g.
Work out the total weight of 5 of these video tapes.

..... g

(Total 2 marks)

Q1

2. Solve $5x - 3 = 2x - 1$

$x =$ .....

(Total 3 marks)

Q2

Leave blank

3.

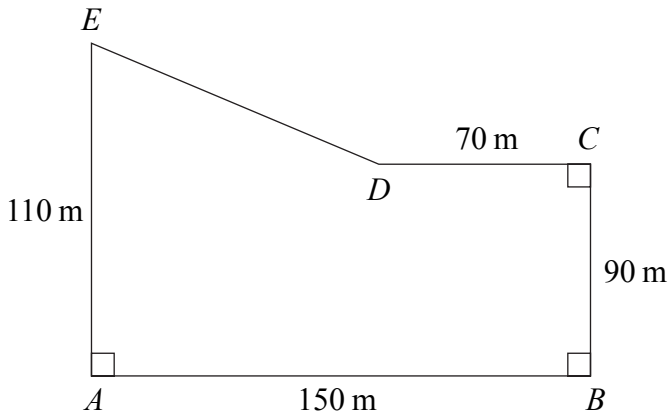


Diagram **NOT** accurately drawn

The shape *ABCDE* is the plan of a field.
AB = 150 m, *BC* = 90 m, *CD* = 70 m and *EA* = 110 m.
The corners at *A*, *B* and *C* are right angles.

Work out the area of the field.

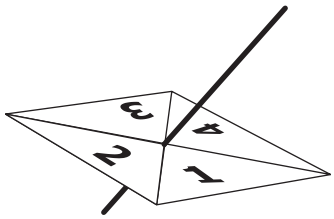
..... m^2

(Total 4 marks)

Q3

Leave blank

4. Here is a 4-sided spinner.



The sides of the spinner are labelled 1, 2, 3 and 4.
The spinner is biased.
The probability that the spinner will land on each of the numbers 1, 2 and 3 is given in the table.

Number	1	2	3	4
Probability	0.2	0.1	0.4	

(a) Work out the probability that the spinner will land on 4

.....

(2)

Tom spun the spinner a number of times.
The number of times it landed on 1 was 85

(b) Work out an estimate for the number of times the spinner landed on 3

.....

(1)

Q4

(Total 3 marks)

Leave blank

5. Calculate the value of $\sqrt{2.6^3 - 3.9^2}$
Write down all the figures on your calculator display.

.....

(Total 2 marks)

Q5

6. (a) Expand $y(y + 2)$

.....

(1)

(b) Expand and simplify $3(2x + 1) + 2(x - 4)$

.....

(2)

(Total 3 marks)

Q6

Leave blank

7. Paul got 68 out of 80 in a science test.

(a) Work out 68 out of 80 as a percentage.

.....%
(2)

Paul got 72 marks in a maths test.
72 is 60% of the total number of marks.

(b) Work out the total number of marks.

.....
(2) **Q7**

(Total 4 marks)

Leave blank

8. The nth term of a sequence is given by this formula.

$$n\text{th term} = 20 - 3n$$

(a) Work out the 8th term of the sequence.

.....

(1)

(b) Find the value of n for which $20 - 3n = -22$

$n =$ .....

(2)

Here are the first five terms of a different sequence.

8 11 14 17 20

(c) Find an expression, in terms of n, for the nth term of this sequence.

nth term = ...

(2)

Q8

(Total 5 marks)

Leave blank

9.

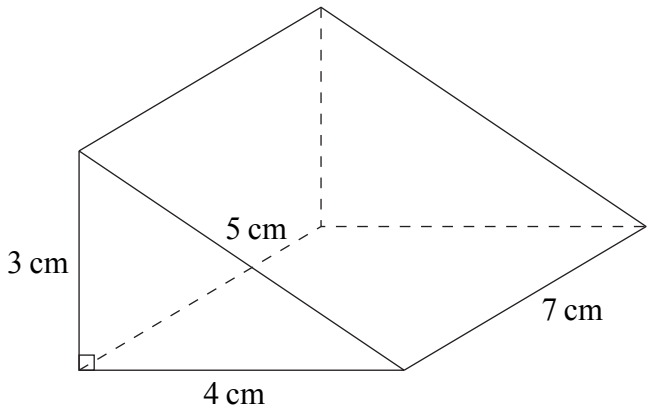


Diagram **NOT** accurately drawn

The diagram shows a prism.
The cross-section of the prism is a right-angled triangle.
The lengths of the sides of the triangle are 3 cm, 4 cm and 5 cm.
The length of the prism is 7 cm.

(a) Work out the volume of the prism.

..... cm^3
(3)

(b) Work out the total surface area of the prism.

..... cm^2
(3)

Q9

(Total 6 marks)

Leave blank

10. The table gives information about the speeds, in km/h, of 200 cars passing a speed checkpoint.

Speed (v km/h)	Frequency
$30 < v \leq 40$	20
$40 < v \leq 50$	76
$50 < v \leq 60$	68
$60 < v \leq 70$	28
$70 < v \leq 80$	8

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the probability that the next car passing the speed checkpoint will have a speed of more than 60 km/h.

.....

(2)

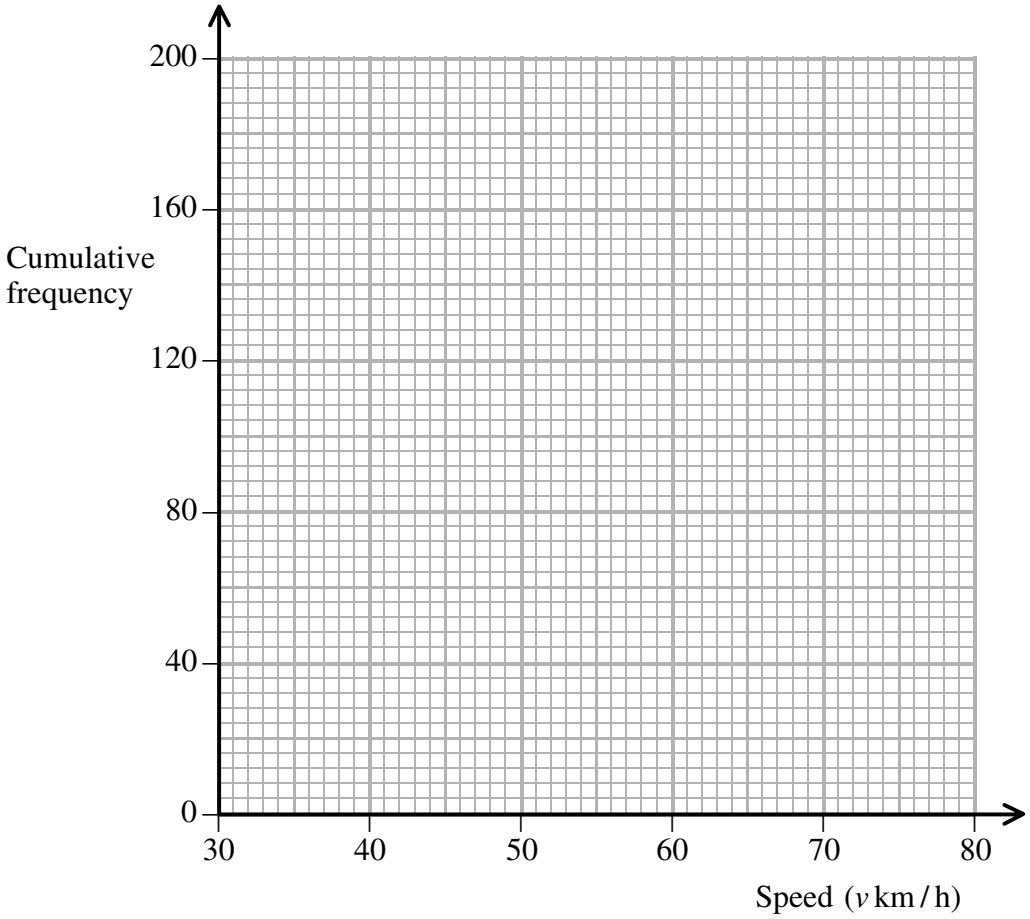
(c) Complete the cumulative frequency table.

Speed (v km/h)	Cumulative frequency
$30 < v \leq 40$	
$30 < v \leq 50$	
$30 < v \leq 60$	
$30 < v \leq 70$	
$30 < v \leq 80$	

(1)

Leave blank

(d) On the grid, draw a cumulative frequency graph for your table.



(2)

(e) Use your graph to find an estimate for the inter-quartile range of the speeds.
Show your method clearly.

..... km/h

(2)

Q10

(Total 8 marks)

Leave blank

11. (a) Simplify, leaving your answer in index form

(i) $2^4 \times 2^3$

.....

(ii) $3^8 \div 3^2$

.....

(2)

(b) $5^x = 1$

Find the value of x.

$x =$ .....

(1)

Q11

(Total 3 marks)

12. Solve the simultaneous equations

$$6x - 5y = 13$$
$$4x - 3y = 8$$

$x =$ .....

$y =$ .....

Q12

(Total 4 marks)

Leave blank

13.

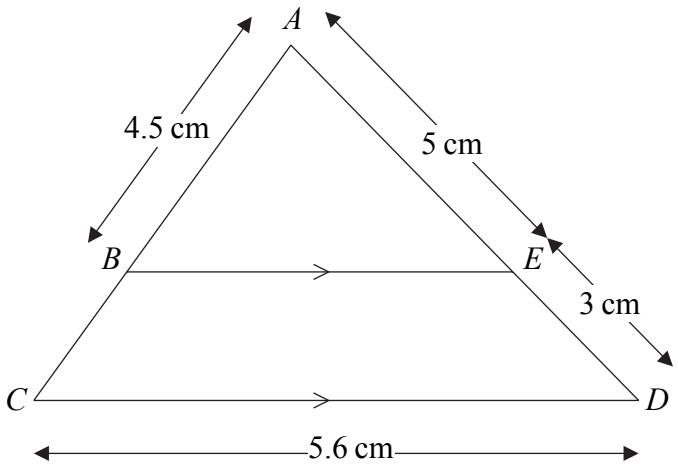


Diagram **NOT** accurately drawn

BE is parallel to *CD*.
AB = 4.5 cm, *AE* = 5 cm, *ED* = 3 cm, *CD* = 5.6 cm.

(a) Calculate the length of *BE*.

..... cm
(2)

(b) Calculate the length of *BC*.

..... cm
(2)

Q13

(Total 4 marks)

Leave blank

14. (a) Find the Highest Common Factor of 75 and 105.

.....

(2)

(b) Find the Lowest Common Multiple of 75 and 105.

.....

(2)

Q14

(Total 4 marks)

15. Make v the subject of the formula $m(v-u)=I$

v = ...

Q15

(Total 3 marks)

Leave blank

16. Kate is going to mark some examination papers.
When she marks for n hours each day, she takes d days to mark the papers.

d is inversely proportional to n.

When $n = 9$, $d = 15$

(a) Find a formula for d in terms of n.

$d =$ .....

(3)

(b) Kate marks for $7\frac{1}{2}$ hours each day.

Calculate the number of days she takes to mark the papers.

.....

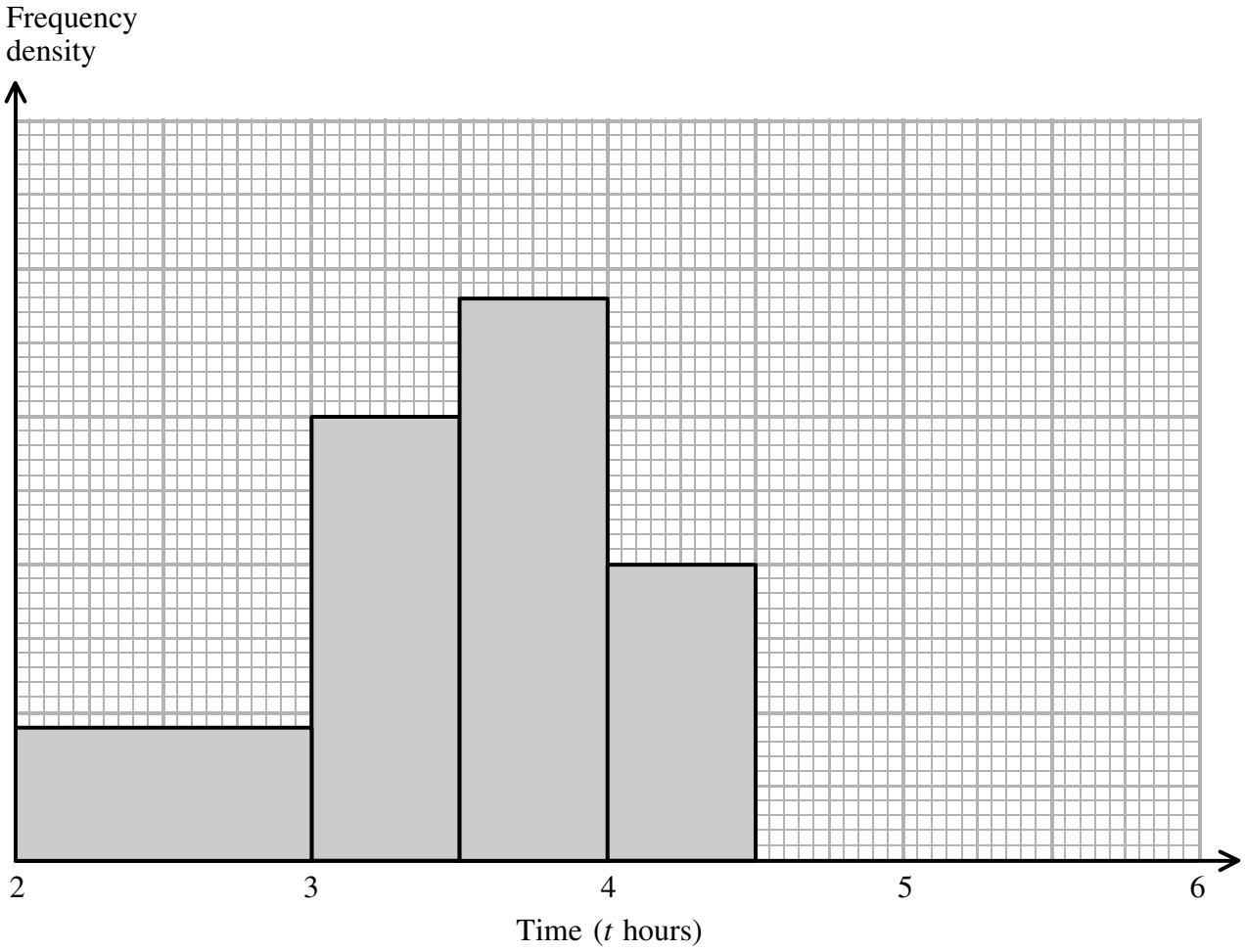
(2)

Q16

(Total 5 marks)

Leave blank

17. The unfinished histogram and table give information about the times, in hours, taken by runners to complete the Mathstown Marathon.



Time (t hours)	Frequency
$2 \leq t < 3$	
$3 \leq t < 3.5$	1200
$3.5 \leq t < 4$	
$4 \leq t < 4.5$	800
$4.5 \leq t < 6$	1440

(a) Use the histogram to complete the table.

(2)

(b) Use the table to complete the histogram.

(1) **Q17**

(Total 3 marks)

Leave blank

18.

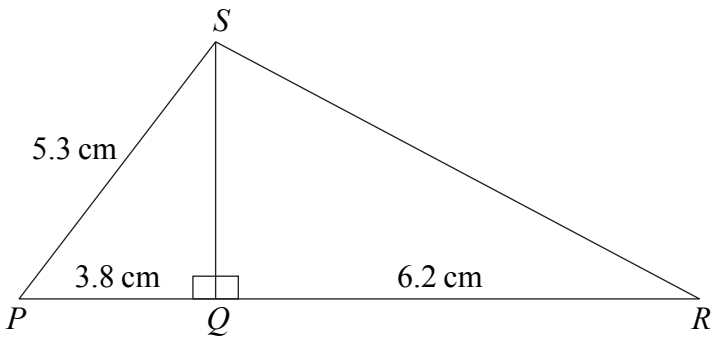


Diagram **NOT** accurately drawn

Angle $PQS = 90°$.
Angle $RQS = 90°$.
$PS = 5.3$ cm, $PQ = 3.8$ cm, $QR = 6.2$ cm.

Calculate the length of RS.
Give your answer correct to 3 significant figures.

..... cm

(Total 5 marks)

Q18

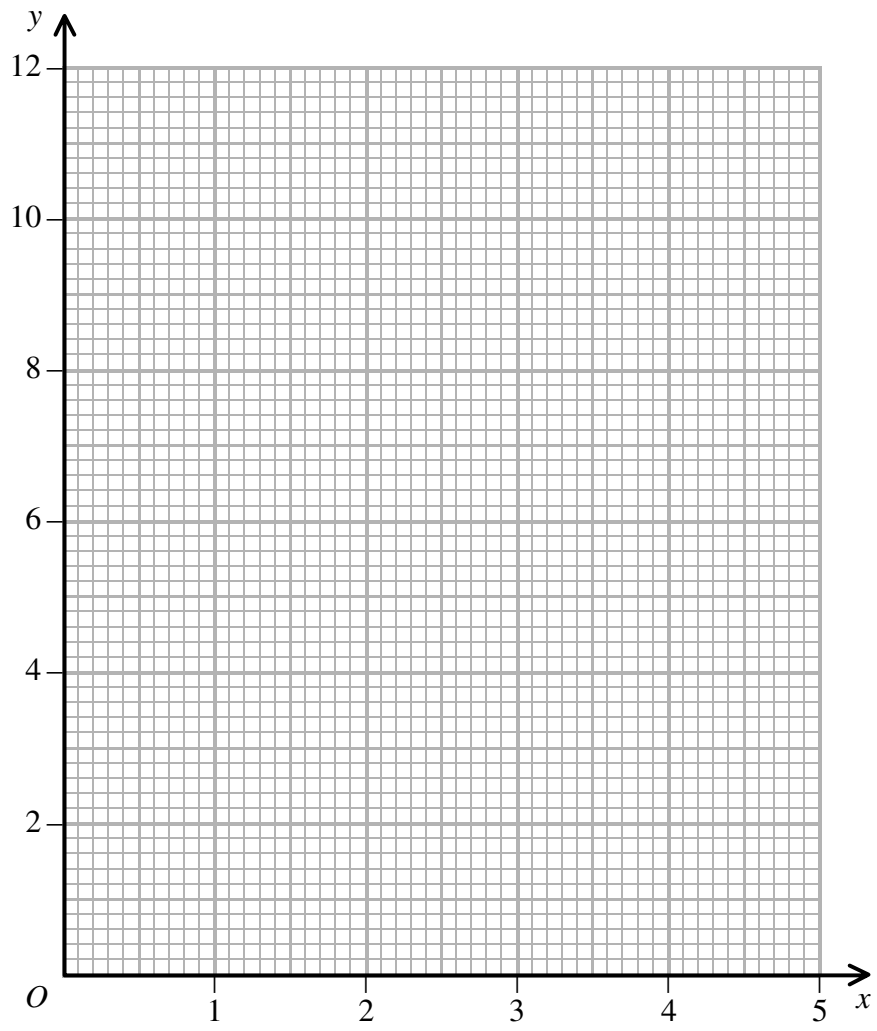
Leave blank

19. (a) Complete the table of values for $y = x + \frac{2}{x}$

x	0.2	0.4	0.6	0.8	1	1.5	2	3	4	5
y	10.2		3.9		3	2.8		3.7		5.2

(2)

(b) On the grid, draw the graph of $y = x + \frac{2}{x}$ for $0.2 \leq x \leq 5$



(2)

Leave blank

(c) Use your graph to find estimates for the solutions of the equation

$$x + \frac{2}{x} = 4$$

$x =$ ..... or $x =$ .....

(2)

The solutions of the equation $2x + \frac{2}{x} = 7$ are the x-coordinates of the points of intersection of the graph of $y = x + \frac{2}{x}$ and a straight line **L**.

(d) Find the equation of **L**.

.....

(2) **Q19**

(Total 8 marks)

Leave blank

20.

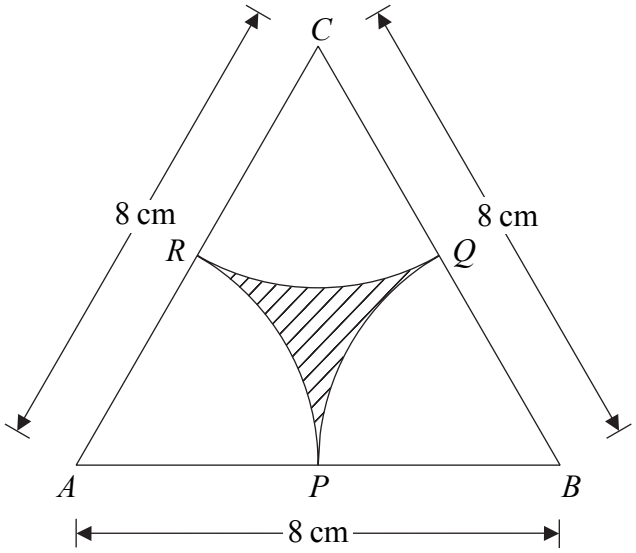


Diagram **NOT** accurately drawn

ABC is an equilateral triangle of side 8 cm.
With the vertices *A*, *B* and *C* as centres, arcs of radius 4 cm are drawn to cut the sides of the triangle at *P*, *Q* and *R*.
The shape formed by the arcs is shaded.

(a) Calculate the perimeter of the shaded shape.
Give your answer correct to 1 decimal place.

..... cm
(3)

Leave blank

(b) Calculate the area of the shaded shape.
Give your answer correct to 1 decimal place.

..... cm^2
(4)

Q20

(Total 7 marks)

21. Correct to 1 significant figure, $x = 7$ and $y = 9$

(a) Calculate the lower bound for the value of xy

.....
(2)

(b) Calculate the upper bound for the value of $\frac{x}{y}$

.....
(3)

Q21

(Total 5 marks)

Leave blank

22.

$$f(x) = x^2$$

$$g(x) = x - 6$$

Solve the equation $fg(x) = g^{-1}(x)$

.....

Q22

(Total 5 marks)

Leave blank

23. There are 10 beads in a box.
n of the beads are red.
Meg takes one bead at random from the box and does not replace it.
She takes a second bead at random from the box.
The probability that she takes 2 red beads is $\frac{1}{3}$.

Show that $n^2 - n - 30 = 0$

Q23

(Total 4 marks)

TOTAL FOR PAPER: 100 MARKS

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