

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

Paper Reference(s)

**4400/4H**

**London Examinations IGCSE**

**Mathematics**

**Paper 4H**

**Higher Tier**

**Thursday 4 November 2004 – Morning**

**Time: 2 hours**

Examiner's use only

--	--	--

Team Leader's use only

--	--	--

Page Number	Leave Blank
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
Total	

**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

**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**

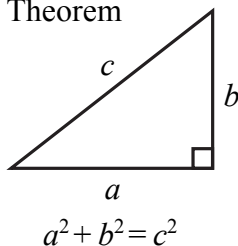
Write your answers neatly and in good English.

**Turn over**



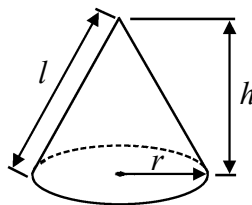
# IGCSE MATHEMATICS 4400 FORMULA SHEET – HIGHER TIER

Pythagoras' Theorem



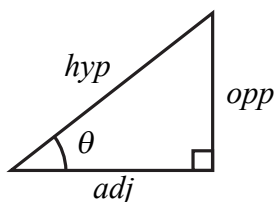
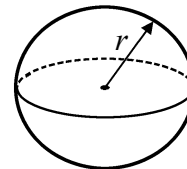
$$\text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Curved surface area of cone} = \pi r l$$



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

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



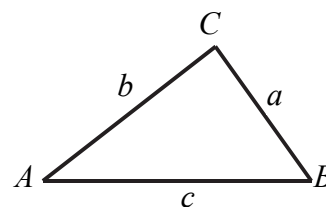
$$\begin{aligned} \text{adj} &= \text{hyp} \times \cos \theta \\ \text{opp} &= \text{hyp} \times \sin \theta \\ \text{opp} &= \text{adj} \times \tan \theta \end{aligned}$$

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

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

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

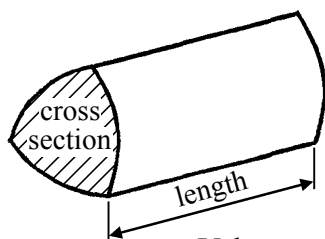
In any triangle ABC



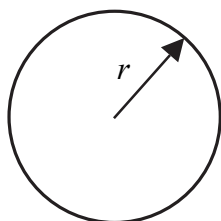
$$\text{Sine rule} \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



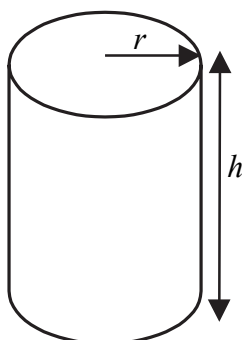
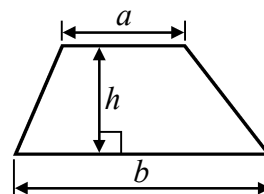
$$\text{Volume of prism} = \text{area of cross section} \times \text{length}$$



$$\text{Circumference of circle} = 2 \pi r$$

$$\text{Area of circle} = \pi r^2$$

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



$$\text{Volume of cylinder} = \pi r^2 h$$

$$\text{Curved surface area of cylinder} = 2 \pi r h$$

The Quadratic Equation

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

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

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

3.

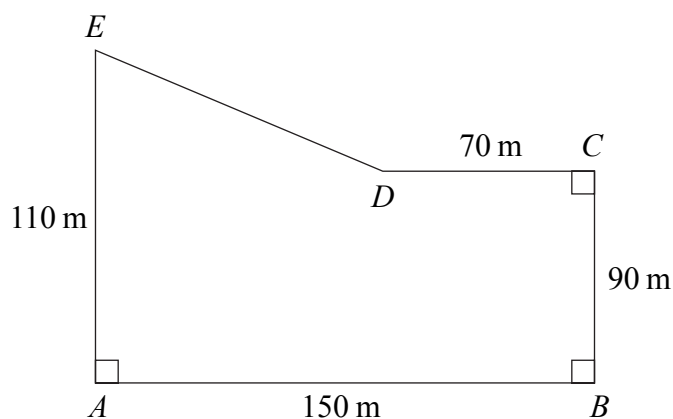


Diagram **NOT**  
accurately drawn

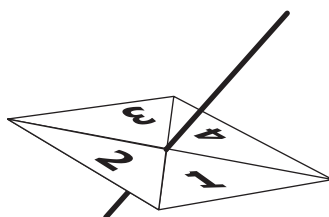
The shape  $ABCDE$  is the plan of a field.  
 $AB = 150$  m,  $BC = 90$  m,  $CD = 70$  m and  $EA = 110$  m.  
 The corners at  $A$ ,  $B$  and  $C$  are right angles.

Work out the area of the field.

..... m<sup>2</sup>  
 (Total 4 marks)

Q3

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)

(Total 3 marks)

Q4

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

Q5

(Total 2 marks)

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

(1)

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

(2)

Q6

(Total 3 marks)

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)

(Total 4 marks)

Q7

8. The  $n$ th 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  $n$ th term of this sequence.

$n$ th term = .....  
(2)

(Total 5 marks)

Q8



9.

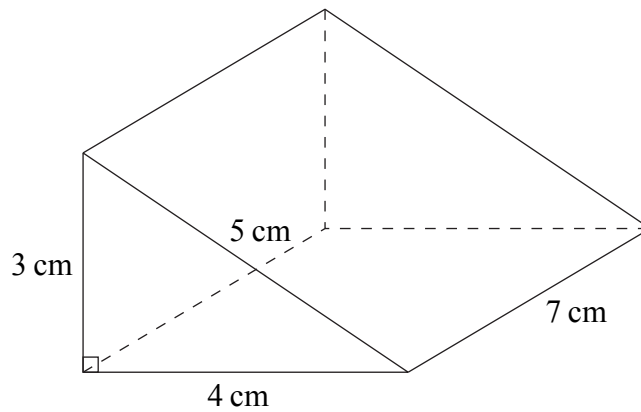


Diagram **NOT**  
accurately drawn

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.

.....  $\text{cm}^3$   
(3)

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

.....  $\text{cm}^2$   
(3)

(Total 6 marks)

Q9

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.

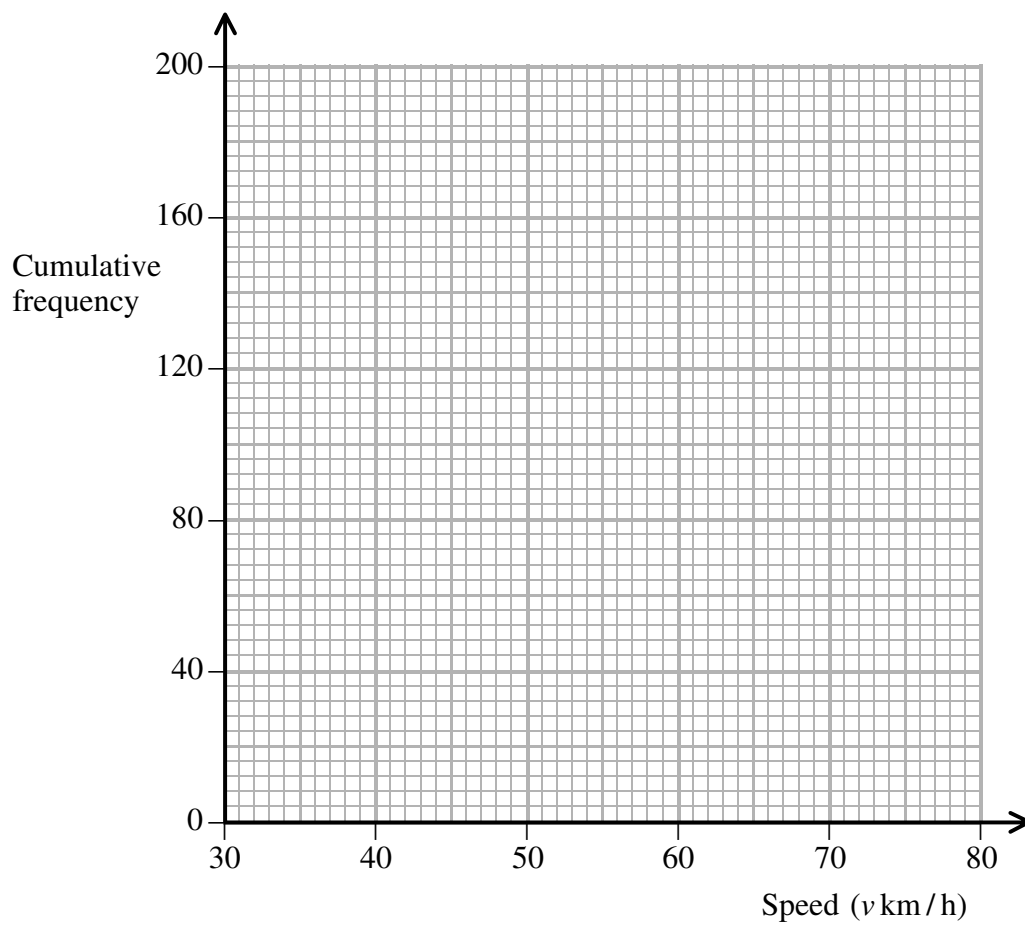
.....  
(2)

- (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)

(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)

(Total 8 marks)

Q10

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)

The diagram shows a triangle  $ABC$  with a line segment  $DE$  drawn parallel to the base  $AC$ . The vertices are labeled  $A$  at the top,  $B$  at the bottom left, and  $C$  at the bottom right. Point  $D$  lies on side  $AB$ , and point  $E$  lies on side  $BC$ . The length of the base  $AC$  is  $5.6\text{ cm}$ . The length of the segment  $DE$  is  $3\text{ cm}$ . The length of the segment  $AD$  is  $4.5\text{ cm}$ , and the length of the segment  $BE$  is  $5\text{ cm}$ . Arrows on  $AC$  and  $DE$  indicate that they are parallel.

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

..... cm  
(2)

..... cm  
(2)

**Q13**

**(Total 4 marks)**

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

.....  
(2)

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

.....  
(2)

(Total 4 marks)

Q14

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

$v =$  .....

(Total 3 marks)

Q15

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  $n$ .

$$d = \dots\dots\dots (3)$$

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

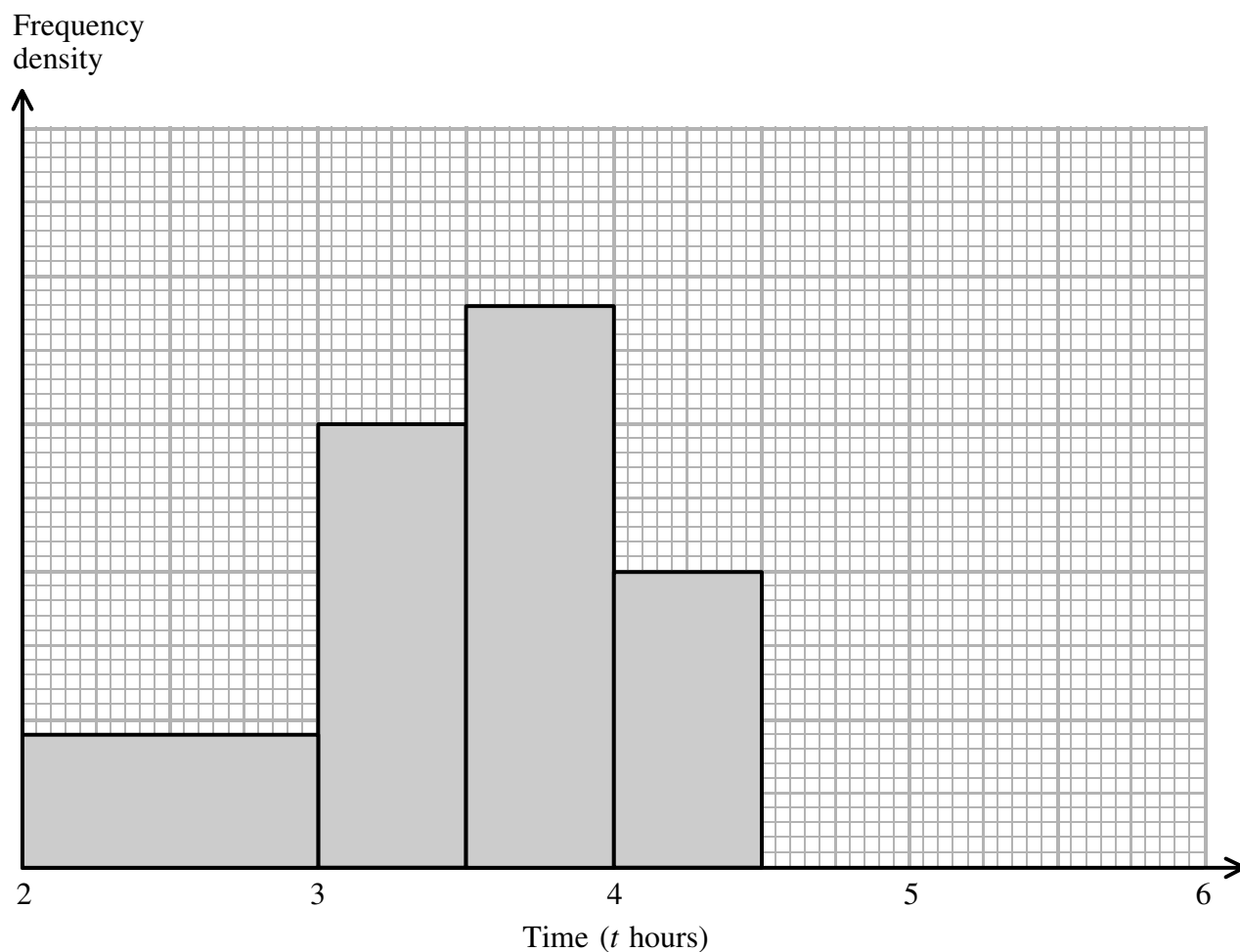
Calculate the number of days she takes to mark the papers.

$$\dots\dots\dots (2)$$

(Total 5 marks)

Q16

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)



18.

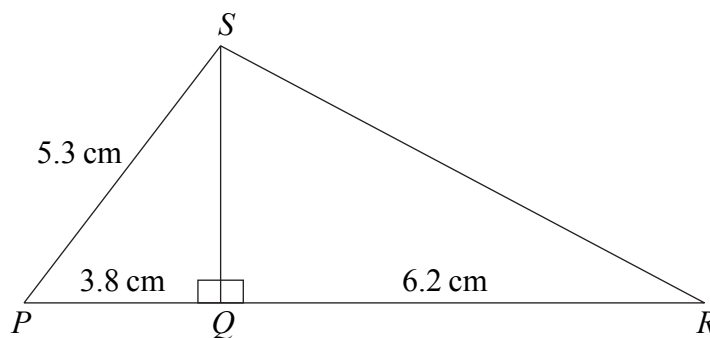


Diagram **NOT**  
accurately drawn

Angle  $PQS = 90^\circ$ .

Angle  $RQS = 90^\circ$ .

$PS = 5.3$  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)

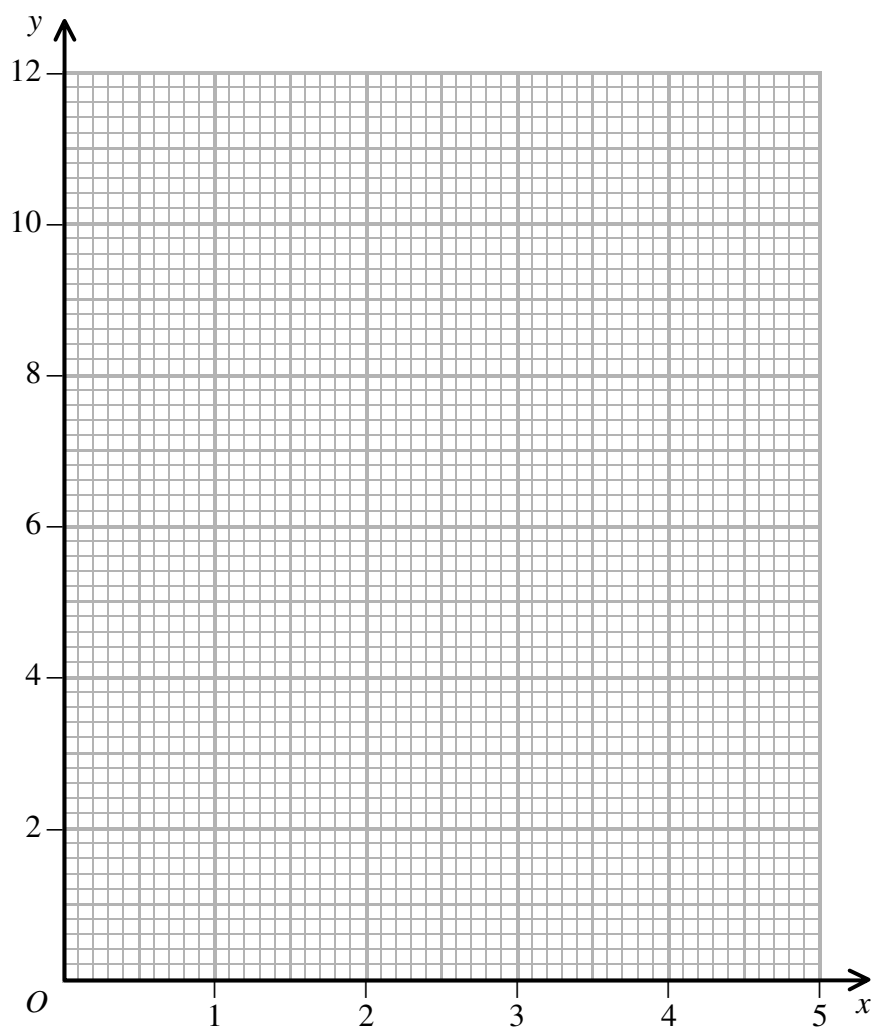
Q18

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)

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

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

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$   
(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**.

$\dots\dots\dots$   
(2)

(Total 8 marks)

Q19

20.

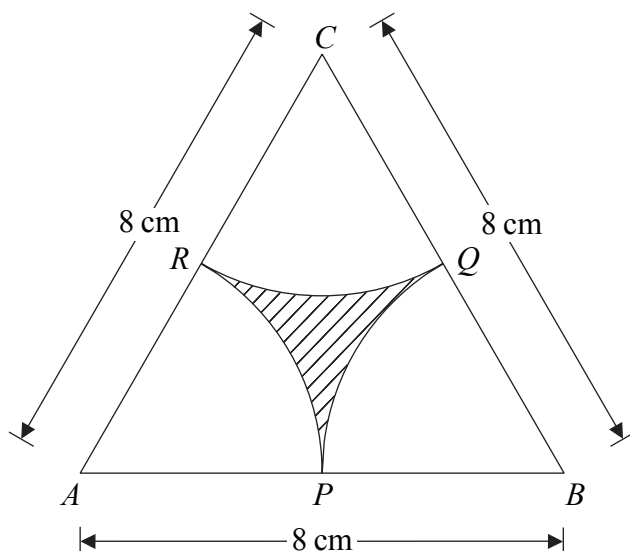


Diagram **NOT** accurately drawn

$ABC$  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)

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

..... cm<sup>2</sup>  
(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)

22.

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

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

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

Q22

.....  
(Total 5 marks)

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**

**END**

**BLANK PAGE**