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

Wednesday 7 November 2007 – Afternoon

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

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
Check that you have the correct question paper.
Answer ALL the questions. Write your answers in the spaces provided in this question paper.
You must NOT write on the formulae page. Anything you write on the formulae page will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 26 questions in this question paper. The total mark for this paper is 100.
There are 20 pages in this question paper. Any blank pages are indicated.
You may use a calculator.

Advice to Candidates

Write your answers neatly and in good English.

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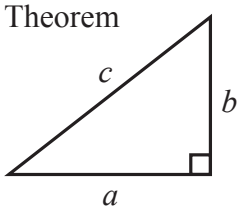
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

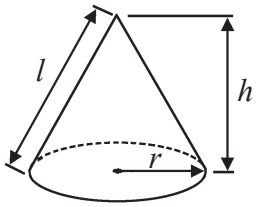
Pythagoras' Theorem



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

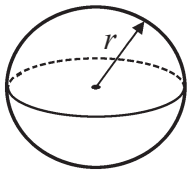
Volume of cone = $\frac{1}{3}\pi r^2 h$

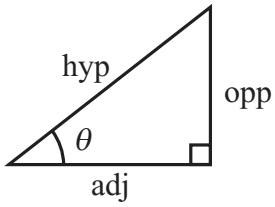
Curved surface area of cone = $\pi r l$



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

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





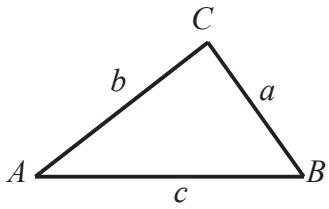
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

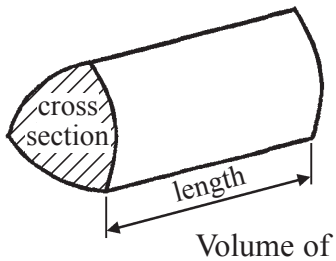
In any triangle ABC



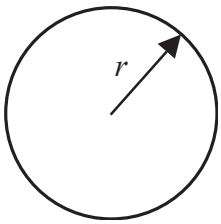
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



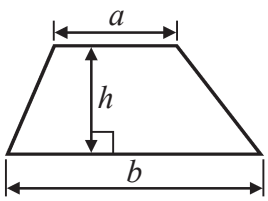
Volume of prism = area of cross section × length

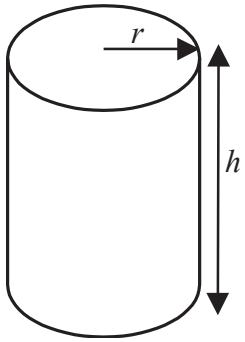


Circumference of circle = $2\pi r$

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

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

N 2 9 1 0 7 A 0 2 2 0

Leave blank

Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Work out $\dfrac{5.9-4.3}{1.3+1.2}$

.....

(Total 2 marks)

Q1

2. (a) Factorise $5x-20$

.....

(1)

(b) Factorise y^2+6y

.....

(2)

(Total 3 marks)

Q2

3.

£1 = 2.61 New Zealand dollars
£1 = 1.45 euros

Change 630 New Zealand dollars to euros.

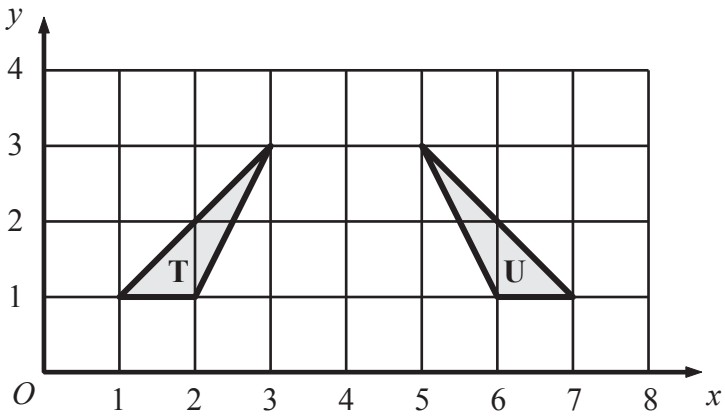
..... euros

(Total 2 marks)

Q3

Leave blank

4.



Describe fully the single transformation which maps triangle **T** onto triangle **U**.

.....

(Total 2 marks)

Q4

5. In 2004, the ratio of the number of planes in Air China's fleet to the number of planes in Malaysian Airlines' fleet was 6 : 7
There were 72 planes in Air China's fleet.

Work out the number of planes in Malaysian Airlines' fleet.

.....

(Total 2 marks)

Q5

Leave blank

6.

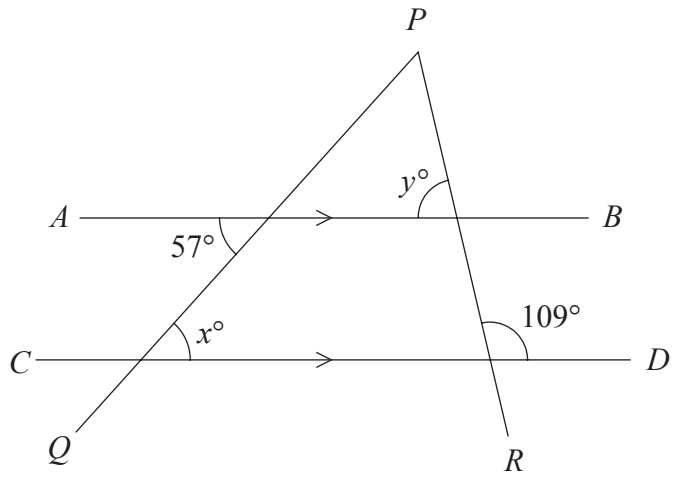


Diagram **NOT** accurately drawn

AB and *CD* are parallel straight lines.
PQ and *PR* are straight lines.

(a) (i) Find the value of *x*.

x = ...

(ii) Give a reason for your answer.

.....

(2)

(b) Find the value of *y*.
Give a reason for each step in your working.

y = ...

(2) **Q6**

(Total 4 marks)

Leave blank

7. There are four grades of egg.
The table shows how many eggs of each grade were laid by a hen last year.

Grade	Number of eggs
Extra large	55
Large	48
Medium	35
Small	12

(a) In the first four months of this year, the hen laid 60 eggs.

Work out an estimate for the number of Extra large eggs the hen laid in these four months.

.....

(3)

(b) The table below shows how the grade of an egg is related to its weight.

Grade	Weight (w grams)
Extra large	$w \geqslant 73$
Large	$63 \leqslant w < 73$
Medium	$53 \leqslant w < 63$
Small	$w < 53$

Work out an estimate for the total weight of 48 Large eggs and 35 Medium eggs.

..... g

(3)

(c) Jody wants to use the information in the table to work out an estimate for the total weight of all the eggs laid by the hen last year.

Explain why it is difficult to do this.

.....

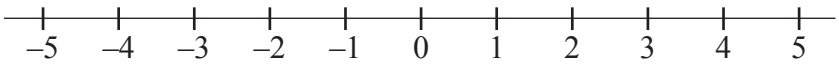
(1)

Q7

(Total 7 marks)

Leave blank

8. (a) On the number line, show the inequality $-2 < x \leqslant 3$



(2)

(b) n is an integer.

Write down all the possible values of n which satisfy the inequality

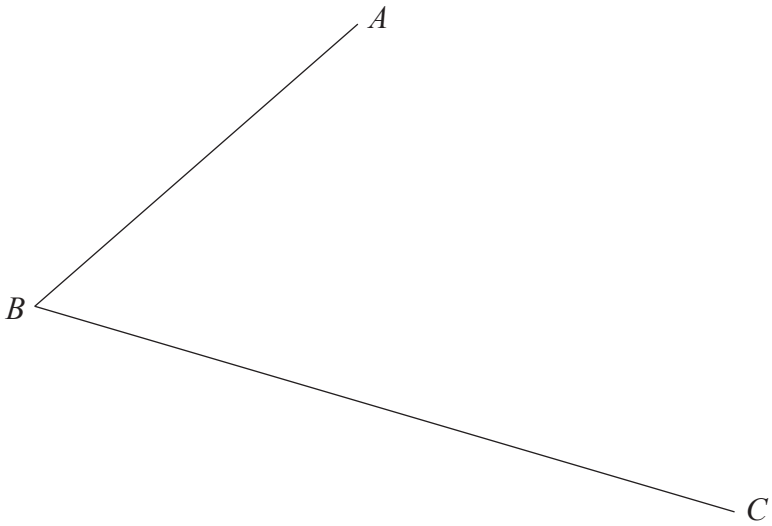
$$-1 \leqslant n < 4$$

.....

(2) **Q8**

(Total 4 marks)

9. Use ruler and compasses to construct the bisector of angle ABC.
You must show all construction lines.



Q9

(Total 2 marks)

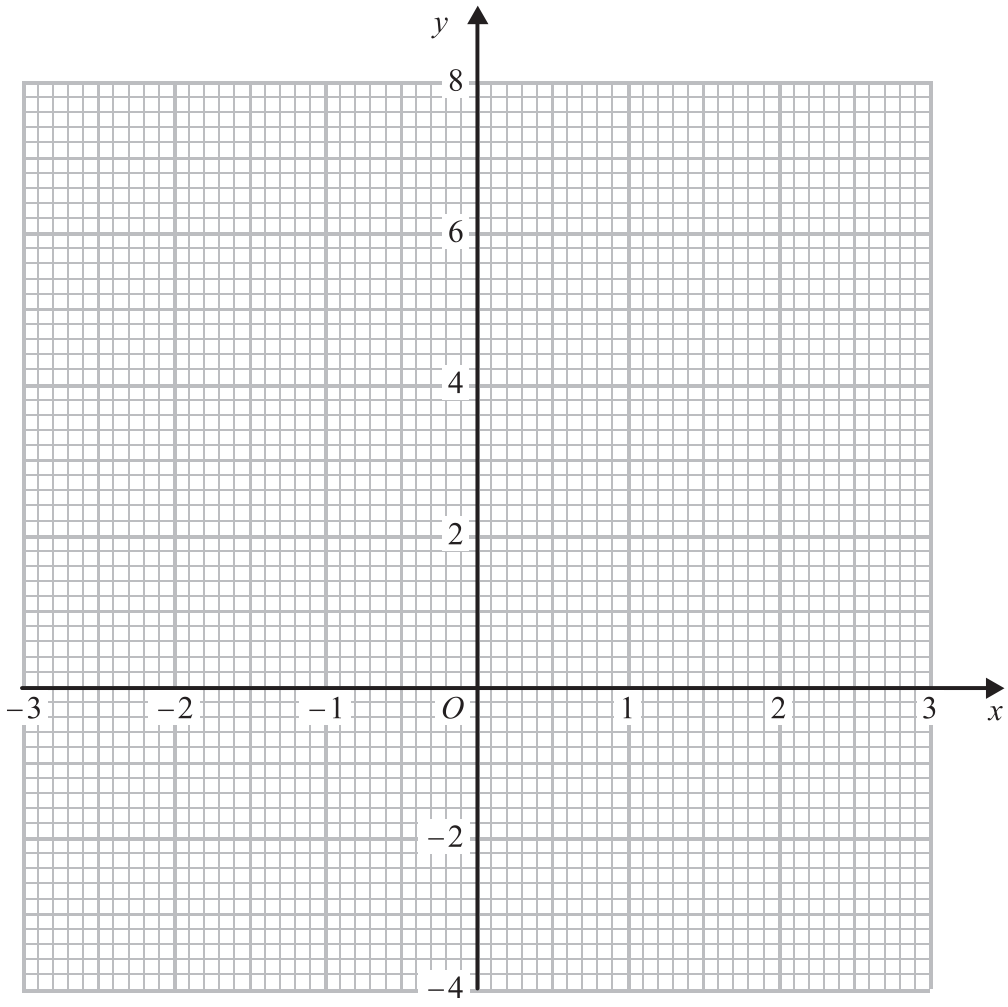
Leave blank

10. (a) Complete the table of values for $y = x^2 - 2$

x	−3	−2	−1	0	1	2	3
y			−1				

(2)

(b) On the grid, draw the graph of $y = x^2 - 2$



(2) **Q10**

(Total 4 marks)

Leave blank

11. 56% of the students in a school are girls.
There are 420 girl students in the school.

Work out the number of students in the school.

..... **Q11**

(Total 3 marks)

12.

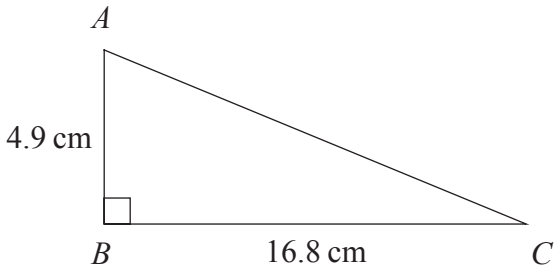


Diagram **NOT** accurately drawn

ABC is a triangle.
Angle *ABC* = 90°.
AB = 4.9 cm.
BC = 16.8 cm.

Calculate the length of *AC*.

..... cm **Q12**

(Total 3 marks)

Leave blank

13. The distance Jamila drove in 2006 was 14% more than the distance she drove in 2005
She drove 20 805 km in 2006
Calculate the distance she drove in 2005

..... km

(Total 3 marks)

Q13

14. (a) Simplify $2n \times 3n$

.....

(1)

(b) Simplify $\dfrac{3x^4y^5}{xy^3}$

.....

(2)

(c) Simplify $(t^3)^4$

.....

(1)

(d) Simplify $(2p^{-2})^{-3}$

.....

(2)

(Total 6 marks)

Q14

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15.

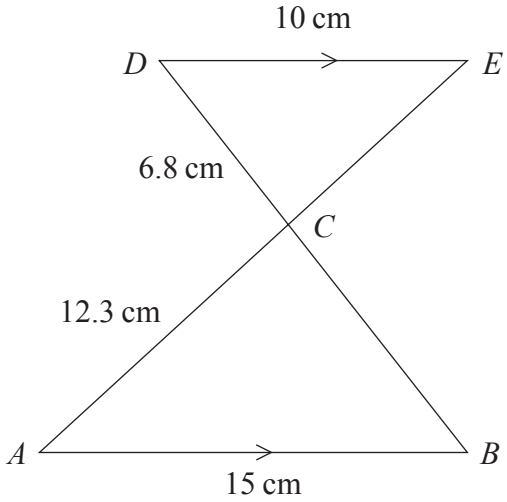


Diagram **NOT** accurately drawn

AB is parallel to *DE*.
The lines *AE* and *BD* intersect at the point *C*.
AB = 15 cm, *AC* = 12.3 cm, *CD* = 6.8 cm, *DE* = 10 cm.

(a) Work out the length of *BC*.

..... cm
(2)

(b) Work out the length of *CE*.

..... cm
(2)

(c) $\dfrac{\text{Area of triangle } ABC}{\text{Area of triangle } CDE} = k$

Work out the value of *k*.

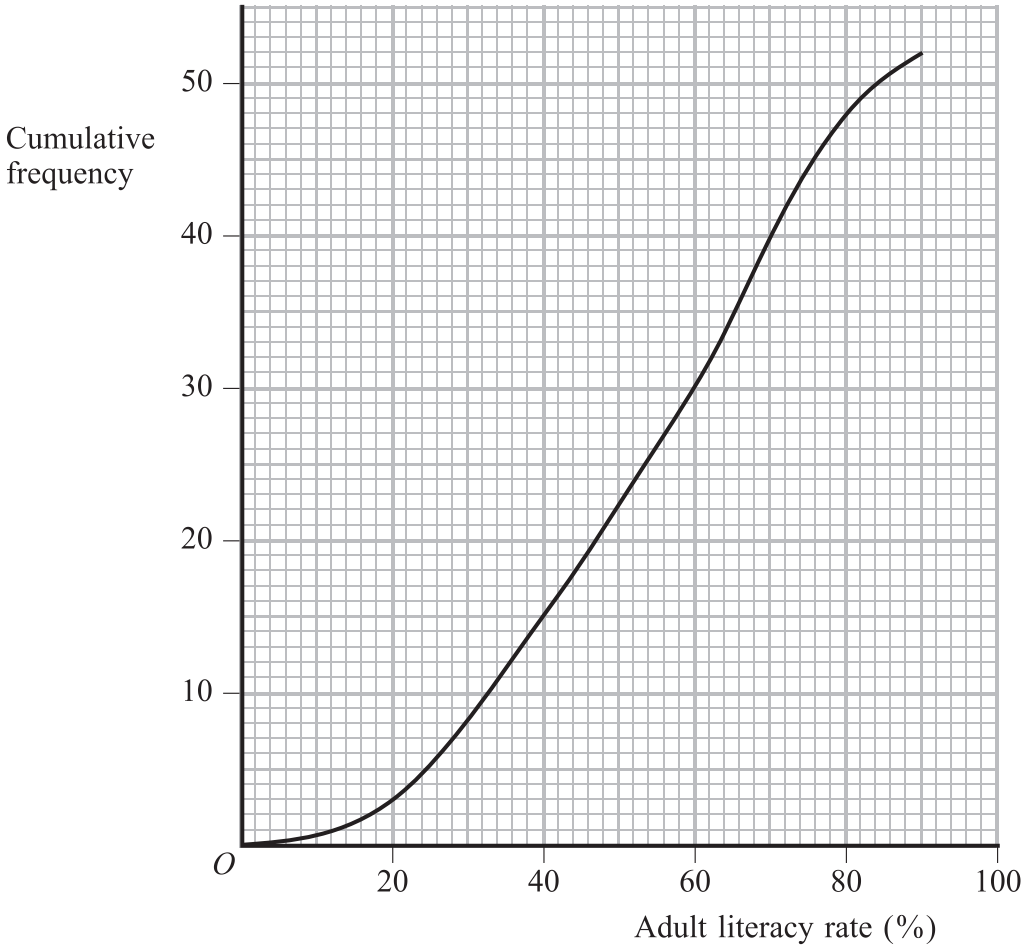
k = ...
(2)

Q15

(Total 6 marks)

Leave blank

16. The cumulative frequency graph gives information about the adult literacy rates of 52 countries in Africa. The adult literacy rates are expressed as percentages of the adults in the countries.



(a) Use the cumulative frequency graph to find an estimate for the number of these 52 countries which have an adult literacy rate of

(i) less than 40%,

.....

(ii) more than 75%.

.....

(2)

(b) Find an estimate for the median adult literacy rate for these 52 countries.

.....%

(2) **Q16**

(Total 4 marks)

Leave blank

17. (a) Find the Highest Common Factor of 72 and 90

.....

(2)

(b) Find the Lowest Common Multiple of 72 and 90

.....

(2) **Q17**

(Total 4 marks)

18. (a) The equation of a line **L** is $x + 2y = 6$
Find the gradient of **L**.

.....

(3)

(b) Write down the equation of the line which is parallel to **L** and which passes through the point (0, 5).

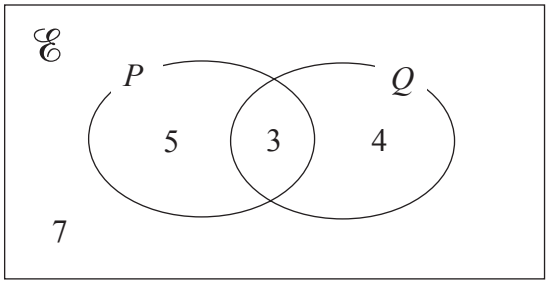
.....

(1) **Q18**

(Total 4 marks)

Leave blank

19.



The numbers are the **number** of elements in each part of the Venn Diagram.

(i) Find n(P)

.....

(ii) Find n(Q')

.....

(iii) Find n($P \cap Q \cap Q'$)

.....

(iv) Find n($P' \cup Q'$)

.....

(Total 4 marks)

Q19

20. A curve has equation $y = x^3 - 5x^2 + 8x - 7$

(a) Find the gradient of the curve at (2, –3).

.....

(4)

(b) What does your answer to part (a) tell you about the point (2, −3)?

.....

(1)

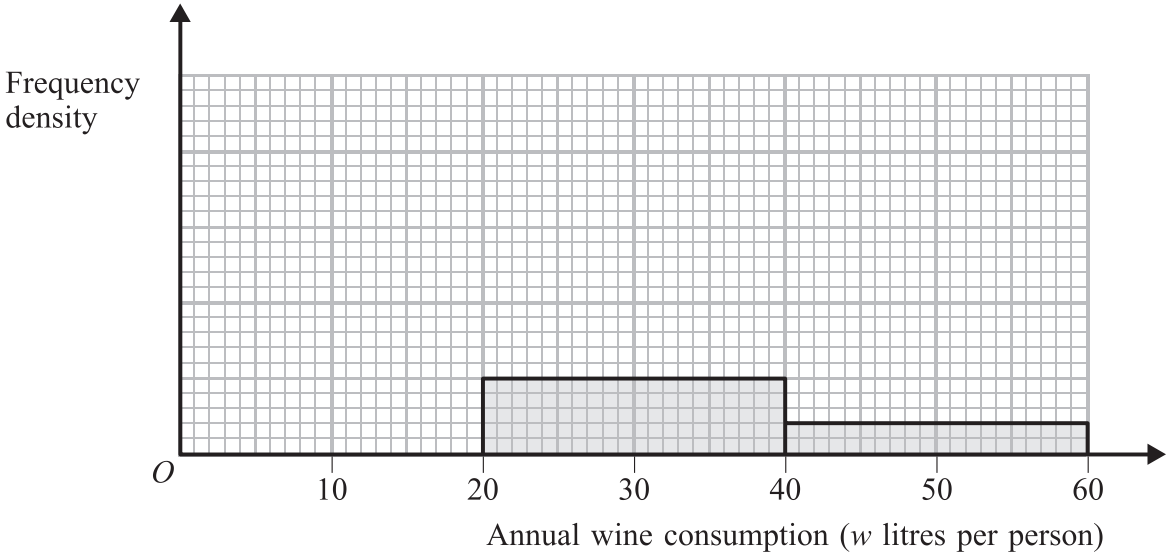
(Total 5 marks)

Q20

Leave blank

21. The unfinished table and histogram show information about the annual wine consumption, in litres per person, in some countries.

Annual wine consumption (w litres per person)	**Frequency**
$0 < w \leqslant 5$	21
$5 < w \leqslant 20$	18
$20 < w \leqslant 40$	20
$40 < w \leqslant 60$	



(a) Use the information in the table to complete the histogram.

(2)

(b) Use the information in the histogram to complete the table.

(1) **Q21**

(Total 3 marks)

Leave blank

22.

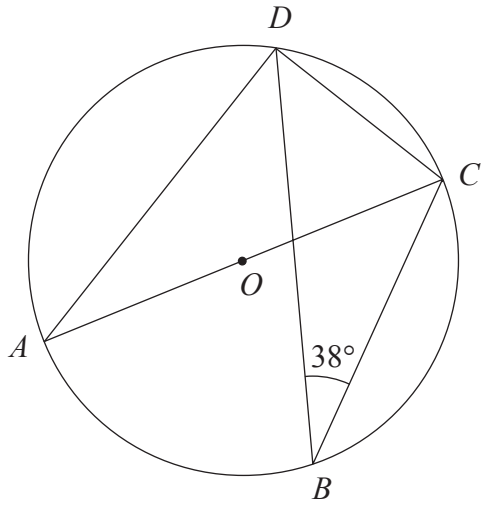


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
AC is a diameter of the circle.
Angle *CBD* = 38°.

(a) (i) Find the size of angle *DAC*.

°

.....

(ii) Give a reason for your answer.

.....

.....

(2)

(b) Find the size of angle *ACD*.

°

.....

(2)

Q22

(Total 4 marks)

Leave blank

23. $f : x \mapsto 3x + 2$ $g : x \mapsto 2x - 5$

(a) Express the composite function fg in the form $fg : x \mapsto ...$
Give your answer as simply as possible.

$fg : x \mapsto$ .....

(2)

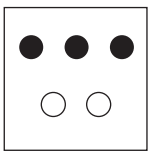
(b) Express the inverse function f^{-1} in the form $f^{-1} : x \mapsto \ldots$

$f^{-1} : x \mapsto$ .....

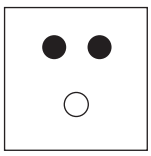
(2) **Q23**

(Total 4 marks)

24.



Box A



Box B

In Box A, there are 3 black counters and 2 white counters.
In Box B, there are 2 black counters and 1 white counter.

Farah takes at random a counter from Box A and puts it in Box B.
She then takes at random a counter from Box B.

Work out the probability that the counter she takes from Box B will be a black counter.

..... **Q24**

(Total 3 marks)

Leave blank

25.

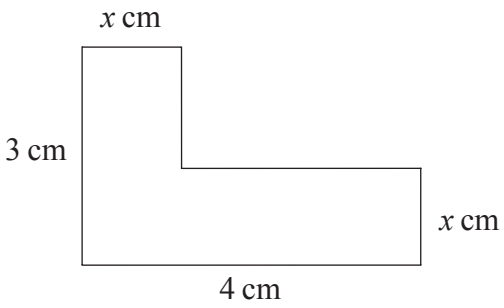


Diagram **NOT** accurately drawn

The diagram shows a shape.
All the corners are right angles.
The area of the shape is 11 cm^2.

(a) Show that $x^2 - 7x + 11 = 0$

(2)

Leave blank

(b) Solve $y^2 - 7y + 11 = 0$
Give your solutions correct to 3 significant figures.

.....

(3)

(c) (i) Use your answer to part (b) to find the value of x in the diagram.

.....

(ii) Give a reason for your answer to (i).

.....

.....

(2) **Q25**

(Total 7 marks)

PLEASE TURN OVER FOR QUESTION 26

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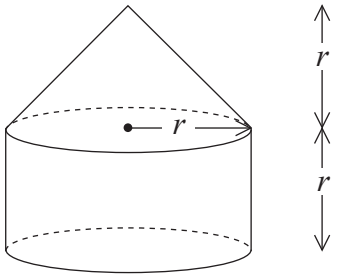
26.



The diagram shows a solid made from a cone and a cylinder.
The cylinder has radius r and height r.
The cone has base radius r and height r.

(a) Show that the total volume of the solid is equal to the volume of a sphere of radius r.

(2)

The curved surface area of a cylinder with base radius r and height h is $2\pi rh$.
The curved surface area of a cone with base radius r and slant height l is πrl.

(b) Show that the **total** surface area of the above solid is greater than the surface area of a sphere of radius r.

(3) **Q26**

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

END