Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						4	4	0	0	/	3	H	Signature	

Paper Reference(s)

4400/3H

Examiner's use only

Team Leader's use only

London Examinations IGCSE

Mathematics

Paper 3H

Higher Tier

Monday 18 May 2009 – 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, initials 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.
Without sufficient working, correct answers may be awarded no marks.
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 21 questions in this question paper. The total mark for this paper is 100.
There are 24 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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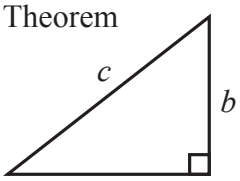
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

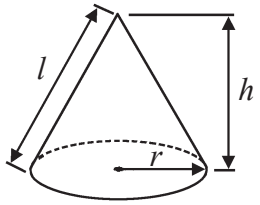
Pythagoras' Theorem



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

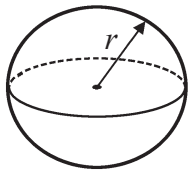
Volume of cone = $\frac{1}{3}\pi r^2 h$

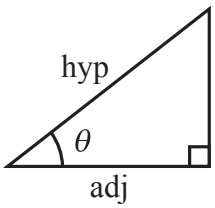
Curved surface area of cone = $\pi r l$



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

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





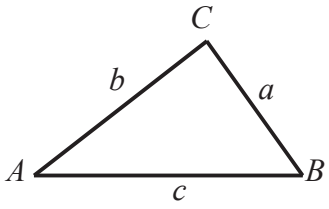
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

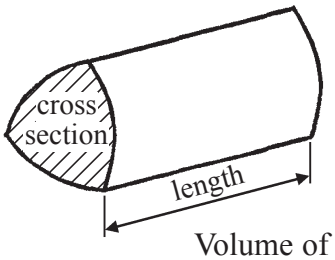
In any triangle ABC



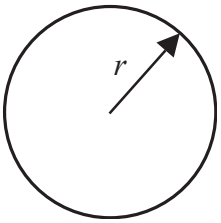
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



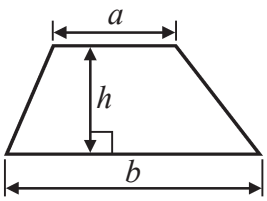
Volume of prism = area of cross section × length

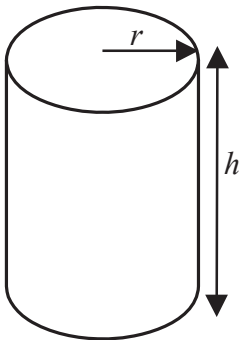


Circumference of circle = $2\pi r$

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

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

Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Last year in Mathstown High School, the ratio of the number of candidates for IGCSE mathematics to the number of candidates for IGCSE biology was 5 : 2
The number of candidates for IGCSE mathematics was 80

(a) Work out the number of candidates for IGCSE biology.

.....
(2)

The 80 mathematics candidates were divided between Foundation and Higher in the ratio 1 : 3

(b) Work out the number of Foundation candidates.

.....
(2)

(Total 4 marks)

Q1

2. Omar travelled from Nairobi to Mombasa by train.
The journey took 13 hours 15 minutes.
The average speed was 40 km/h.

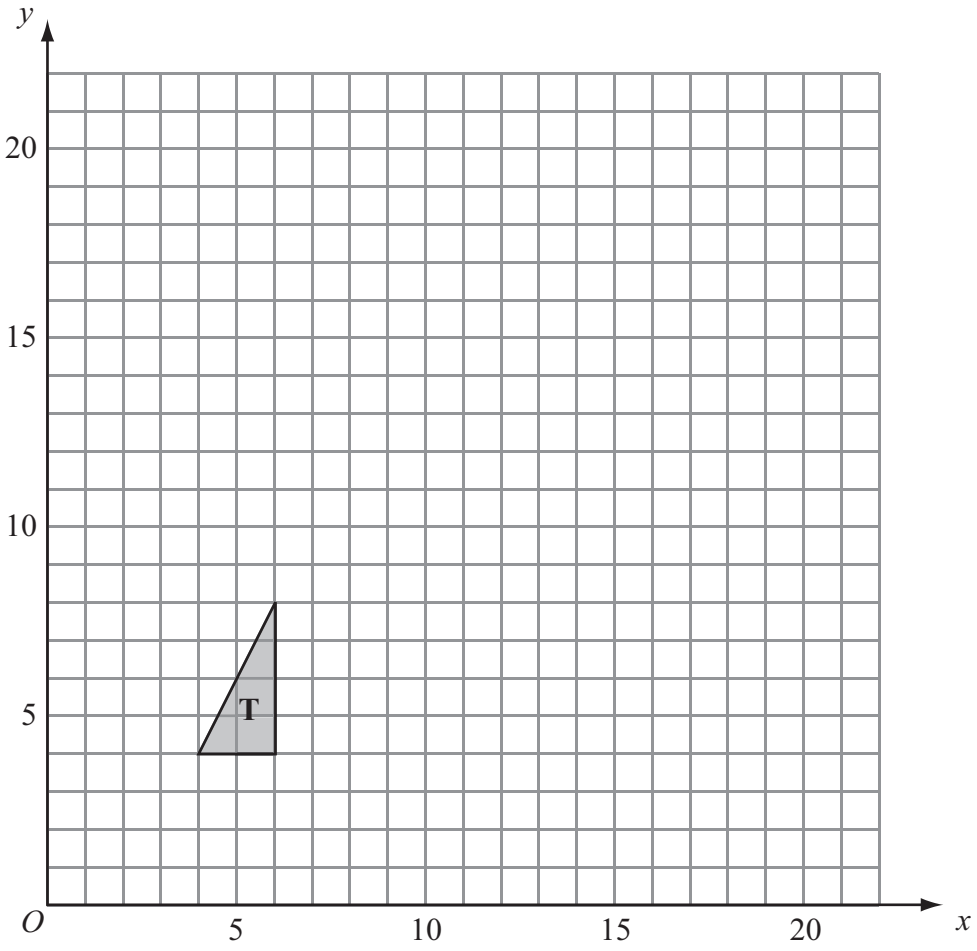
Work out the distance from Nairobi to Mombasa.

..... km
(Total 3 marks)

Q2

Leave blank

3.



On the grid, enlarge triangle **T** with a scale factor of $2\frac{1}{2}$ and centre (0, 0).

Q3

(Total 3 marks)

4. A bag contains 10 coloured beads.
Ella is going to take at random a bead from the bag.
She says, "The probability that I will take a red bead is 0.35"

Explain why Ella is wrong.
You must show working to justify your answer.

.....

.....

.....

Q4

(Total 2 marks)

Leave blank

5. (a) Factorise $p^2 + 7p$

.....

(2)

(b) Solve $4 - 5x = 2$

$x =$ .....

(3)

(c) Simplify $t^3 \times t^6$

.....

(1)

(d) Expand and simplify $3(4y + 5) - 5(2y + 3)$

.....

(2) **Q5**

(Total 8 marks)

Leave blank

6. Brett's weekly pay is $760
He spends $266 on rent.

(a) Express $266 as a percentage of $760

..... %
(2)

Kazia spends $204 a week on rent.
$204 is 30% of her weekly pay.

(b) Work out her weekly pay.

$ .....
(2)

Q6

(Total 4 marks)

Leave blank

7.

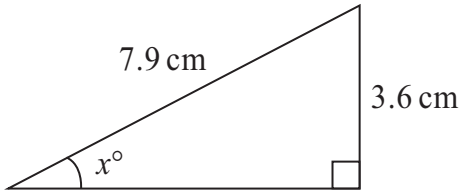


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 1 decimal place.

x = ...

(Total 3 marks)

Q7

Leave blank

8. $\mathscr{E}$ = {positive whole numbers}
A = {factors of 27}
B = {factors of 9}
C = {first four even numbers}

(a) List the members of $A \cup B$.

.....

(2)

(b) (i) Is it true that $A \cap C = \emptyset$?

Tick (✓) the appropriate box.

Yes	No
☐	☐

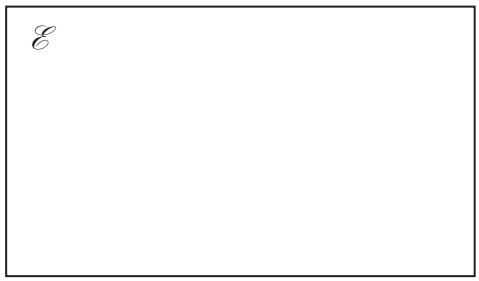
(ii) Explain your answer.

.....

.....

(1)

(c) Complete the Venn Diagram to show the relationship between the sets A, B and C.



(2) **Q8**

(Total 5 marks)

Leave blank

9.

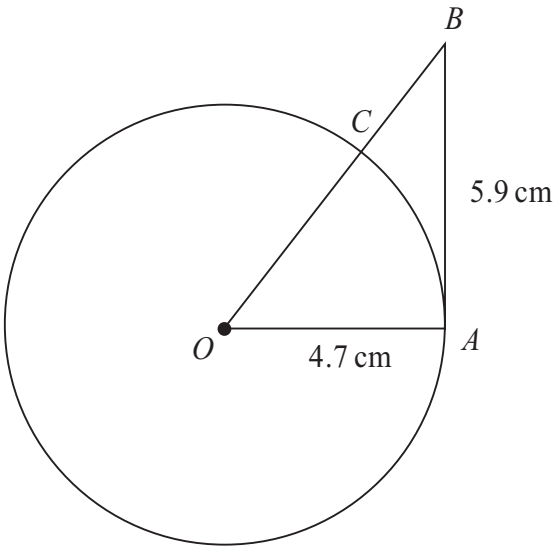


Diagram **NOT** accurately drawn

A is a point on a circle with centre *O* and radius 4.7 cm.
AB is the tangent to the circle at *A*.
AB = 5.9 cm.
OB intersects the circle at *C*.

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

..... cm

Q9

(Total 4 marks)

Leave blank

10. The table shows information about the distances walked in a week by 40 people.

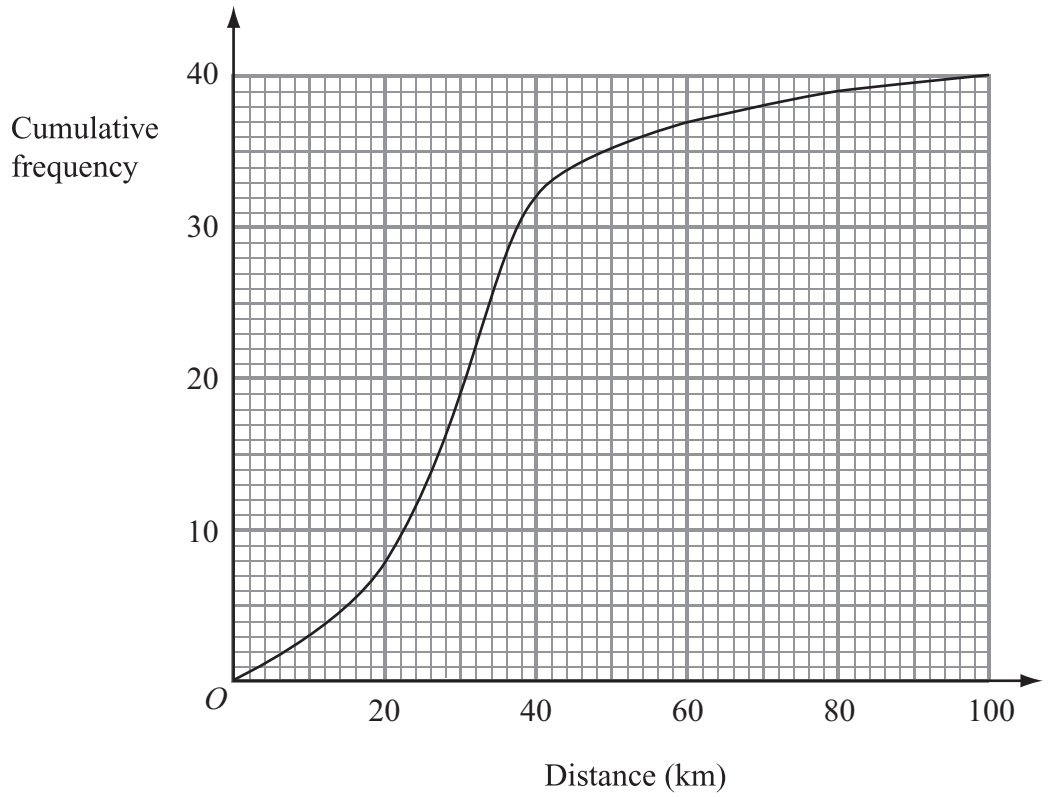
Distance (d km)	Frequency
$0 < d \leqslant 20$	8
$20 < d \leqslant 40$	24
$40 < d \leqslant 60$	5
$60 < d \leqslant 80$	2
$80 < d \leqslant 100$	1

(a) Work out an estimate for the mean distance walked in a week by the 40 people.

..... km
(4)

Leave blank

The information in the table was used to draw the cumulative frequency graph.



(b) Find an estimate for the number of people who walked less than 25 km.

.....

(2)

(c) Find an estimate for the interquartile range of the distances walked by the 40 people.

..... km

(2)

Q10

(Total 8 marks)

Leave blank

11. (a) Solve the simultaneous equations

$$2x - 3y = 9$$
$$5x + 4y = 11$$

$x =$ .....

$y =$ .....

(4)

(b) Write down the coordinates of the point of intersection of the two lines whose equations are $2x - 3y = 9$ and $5x + 4y = 11$

(..... , ...)

(1)

Q11

(Total 5 marks)

Leave blank

12. 1 astronomical unit = 150 million kilometres.

(a) Write the number 150 million in standard form.

.....

(2)

The distance from Venus to the Sun is 108 million kilometres.

(b) Express 108 million kilometres in astronomical units.
Give your answer in standard form.

..... astronomical units

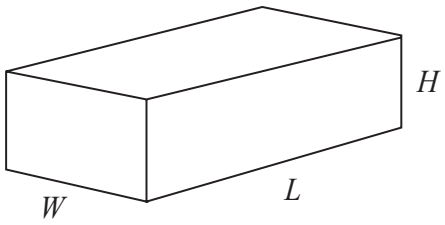
(2)

Q12

(Total 4 marks)

Leave blank

13. Here is a cuboid with length L, width W and height H.



The total surface area, A, of the cuboid is given by the formula

$$A = 2(LW + HW + HL)$$

(a) $A = 70$ $W = 4$ $H = 2$
Work out the value of L.

$L =$ .....
(3)

(b) Make W the subject of the formula $A = 2(LW + WH + HL)$

$W =$ .....
(4) **Q13**

(Total 7 marks)

Leave blank

14.

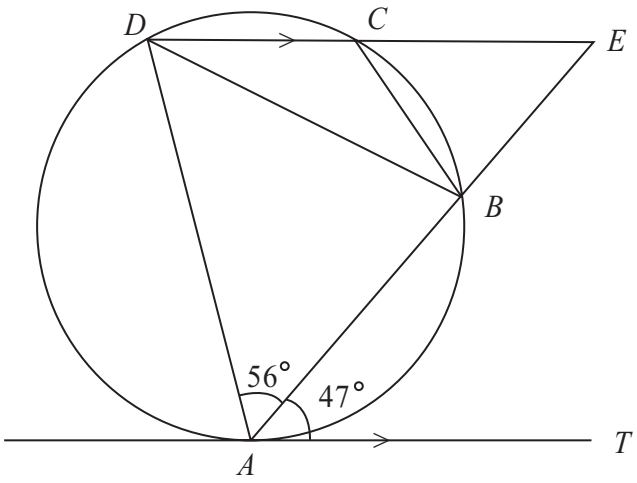


Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle.
ABE and *DCE* are straight lines.
AT is a tangent to the circle.
DCE is parallel to *AT*.
Angle *EAT* = 47°. Angle *BAD* = 56°.

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

.....°

(ii) Give a reason for your answer.

.....

(2)

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

.....°

(1)

(c) (i) Find the size of angle *ADB*.

.....°

(ii) Give a reason for your answer.

.....

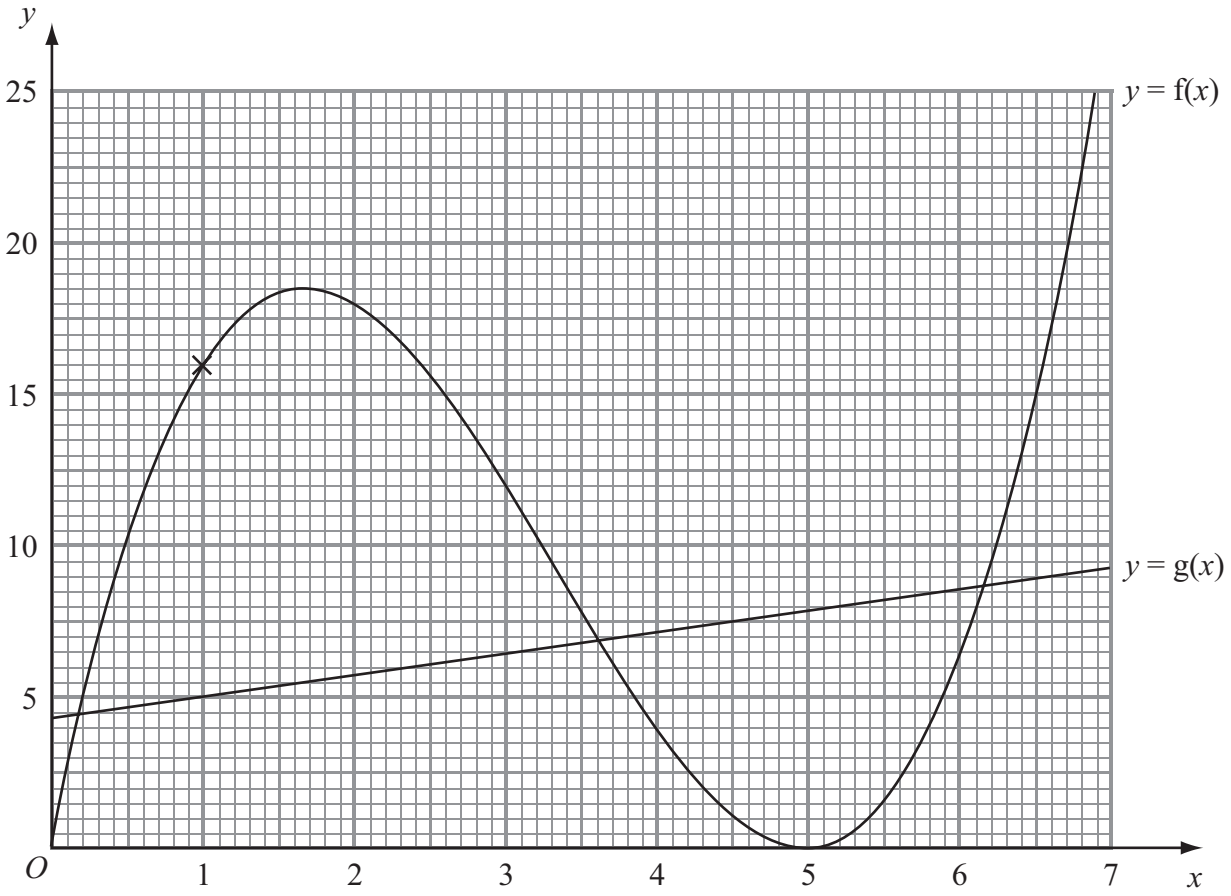
.....

(2) **Q14**

(Total 5 marks)

Leave blank

15. The diagram shows part of the graph of $y = f(x)$ and part of the graph of $y = g(x)$.



(a) Find f(3).

.....

(1)

(b) Solve $f(x) = g(x)$.
Give your answers correct to 1 decimal place.

.....

(2)

(c) Find fg(1).

.....

(2)

Leave blank

(d) Find an estimate for the gradient of the graph of $y = f(x)$ at the point (1, 16).

.....

(3)

Q15

(Total 8 marks)

16.

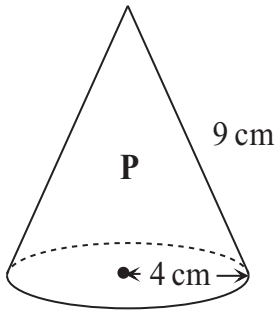


Diagram **NOT** accurately drawn

A solid cone, **P**, has a base radius of 4 cm and a slant height of 9 cm.

(a) Calculate the total surface area of the cone.
Give your answer correct to 3 significant figures.

..... cm^2

(2)

Another solid cone, **Q**, is similar to **P**.
The base radius of **Q** is 6 cm.
The volume of **Q** is k times the volume of **P**.

(b) Calculate the value of k.

$k =$ .....

(2)

Q16

(Total 4 marks)

Leave blank

17. Here are five counters.
Each counter has a number on it.

Layla puts the five counters in a bag.
She takes two counters at random from the bag without replacement.

Calculate the probability that

(i) **both** counters will have the number 3 on them,

.....

(ii) the sum of the numbers on the two counters will be 6

.....

Q17

(Total 5 marks)

Leave blank

18. Simplify fully $\dfrac{5x^2 + 14x - 3}{50x^2 - 2}$

.....

Q18

(Total 4 marks)

Leave blank

19.

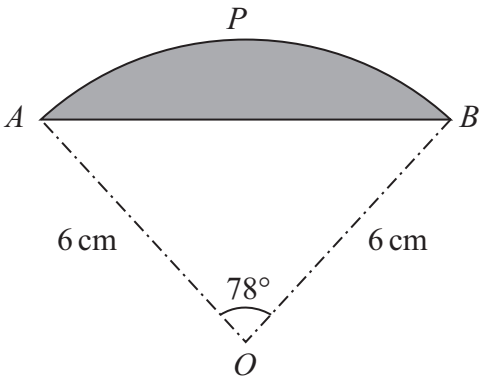


Diagram **NOT** accurately drawn

The diagram shows a sector $OAPB$ of a circle, centre O.
AB is a chord of the circle.
The radius of the circle is 6 cm.
Angle $AOB = 78°$.

Calculate the perimeter of the shaded **segment** APB.
Give your answer correct to 3 significant figures.

..... cm

(Total 6 marks)

Q19

Leave blank

20. Correct to 2 significant figures, the area of a square is 230 cm^2.

Calculate the lower bound for the perimeter of the square.

..... cm

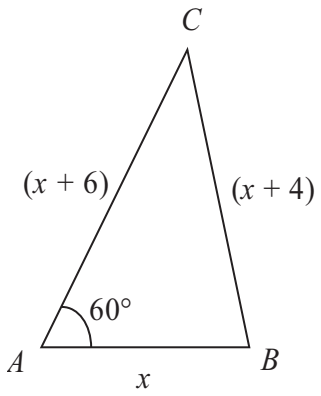
(Total 3 marks)

Q20

Leave blank

21.

Diagram **NOT** accurately drawn



The diagram shows the length, in centimetres, of each side of triangle ABC.
Angle $BAC = 60°$.

Find the value of x.

$x =$ .....

Q21

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

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