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 7 June 2010 – 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 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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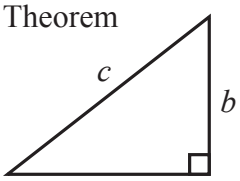
IGCSE MATHEMATICS 4400
FORMULA SHEET – HIGHER TIER

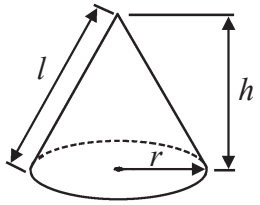
Pythagoras' Theorem



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

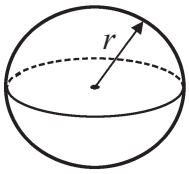
Volume of cone = $\frac{1}{3}\pi r^2 h$

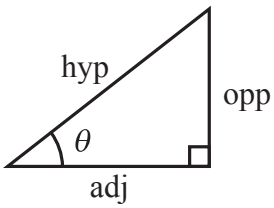
Curved surface area of cone = $\pi r l$



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

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





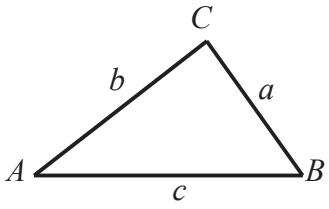
adj = hyp × cos θ
opp = hyp × sin θ
opp = adj × tan θ

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

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

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

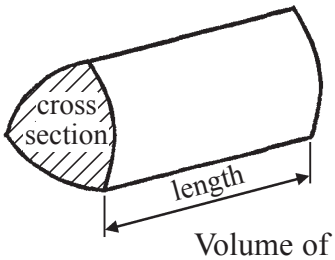
In any triangle ABC



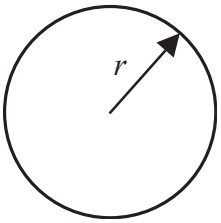
Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

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



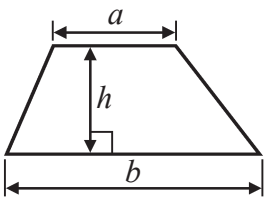
Volume of prism = area of cross section × length

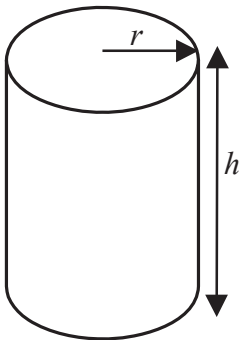


Circumference of circle = $2\pi r$

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

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

Leave blank

Answer ALL TWENTY ONE questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Here are the ingredients needed to make Apple Fool for 6 people.

Apple Fool Ingredients for 6 people
900 g cooking apples 100 g sugar 300 m*l* double cream

(a) Work out the amount of sugar needed to make Apple Fool for 15 people.

..... g
(2)

(b) Work out the amount of cooking apples needed to make Apple Fool for 5 people.

..... g
(2)

Q1

(Total 4 marks)

Leave blank

2.

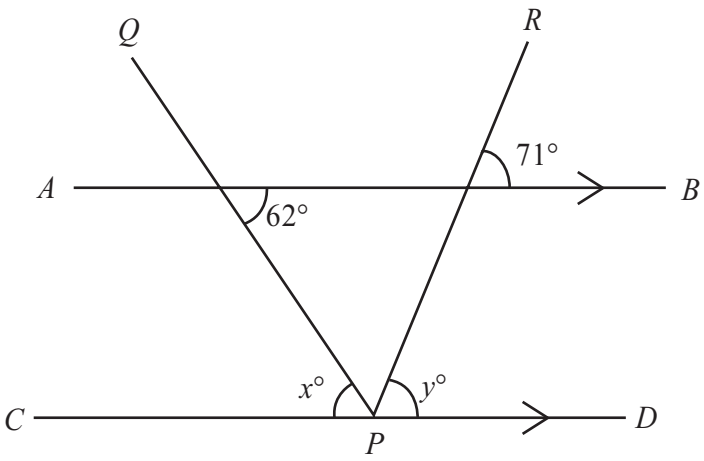


Diagram **NOT** accurately drawn

AB and *CPD* 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) (i) Find the value of y.

$y =$ .....

(ii) Give a reason for your answer.

.....

(2) **Q2**

(Total 4 marks)

3. Three numbers a, b and c have a median of 4 and a range of 7

(a) Find the median of the three numbers $a + 2$, $b + 2$ and $c + 2$

.....

(1)

(b) Find the range of the three numbers $a + 2$, $b + 2$ and $c + 2$

.....

(1) **Q3**

(Total 2 marks)

Leave blank

4. (a) Multiply out $5(n + 6)$

.....

(1)

(b) Simplify $y \times y \times y \times y \times y \times y$

.....

(1)

(c) Solve $4(x - 2) = 3$

$x =$ .....

(3)

Q4

(Total 5 marks)

5. (a) $\frac{3}{10}$ of the members of a tennis club are men.

$\frac{5}{6}$ of these men are right-handed.

Work out the fraction of the members of the tennis club who are right-handed men.

.....

(2)

(b) $\frac{7}{12}$ of the members of a badminton club are women.

$\frac{3}{8}$ of the members of the badminton club wear glasses.

Work out the smallest possible number of members of the badminton club.

.....

(2)

Q5

(Total 4 marks)

Leave blank

6. The table shows information about the volume of water, in m^3, used by each of 80 families in one year.

Volume of water (V m^3)	**Frequency**
$0 < V \leqslant 100$	2
$100 < V \leqslant 200$	4
$200 < V \leqslant 300$	6
$300 < V \leqslant 400$	18
$400 < V \leqslant 500$	44
$500 < V \leqslant 600$	6

(a) Write down the modal class.

.....

(1)

(b) Work out an estimate for the mean volume of water used by the 80 families.

..... m^3

(4)

Leave blank

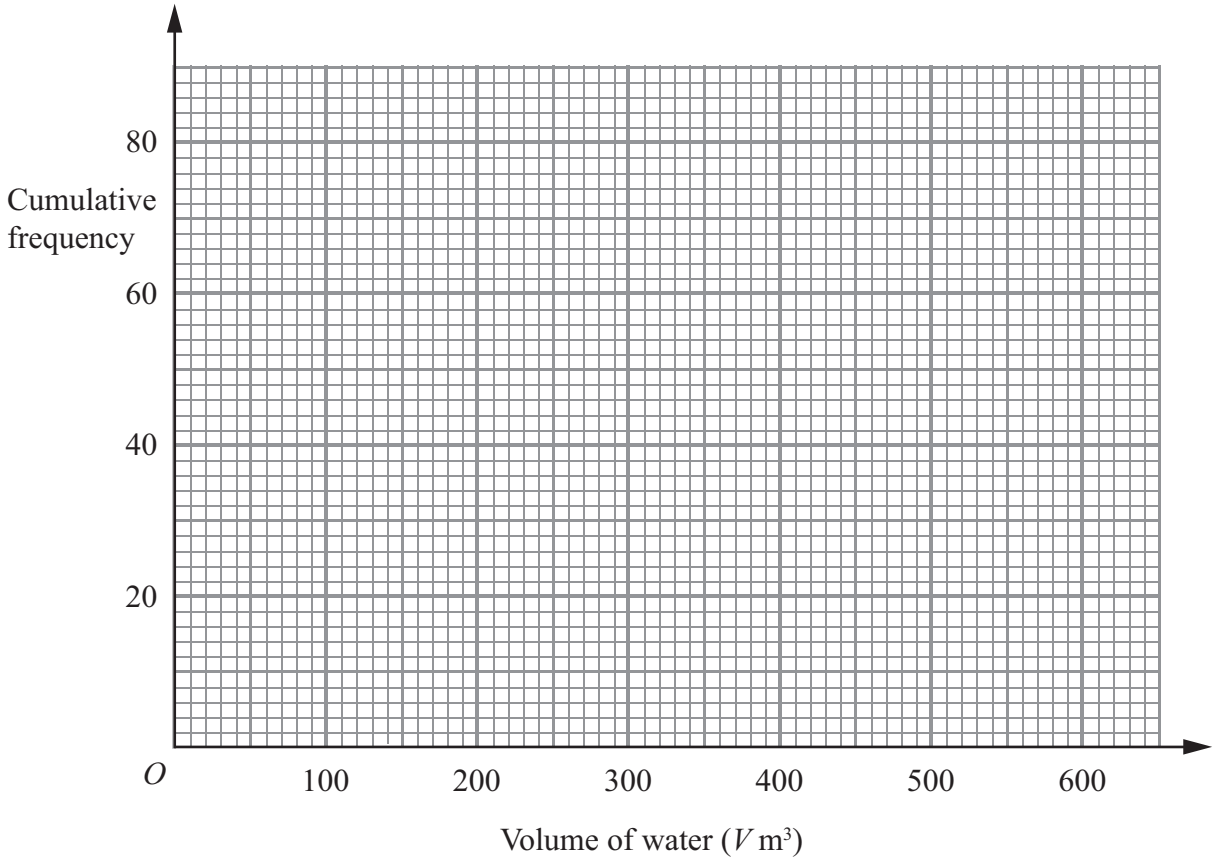
(c) Complete the cumulative frequency table.

Volume of water (V m^3)	**Cumulative frequency**
$0 < V \leqslant 100$	
$0 < V \leqslant 200$	
$0 < V \leqslant 300$	
$0 < V \leqslant 400$	
$0 < V \leqslant 500$	
$0 < V \leqslant 600$	

(1)

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

(2)



(e) Use your graph to find an estimate for the median volume of water used by the 80 families.

..... m^3

(2)

Q6

(Total 10 marks)

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7.

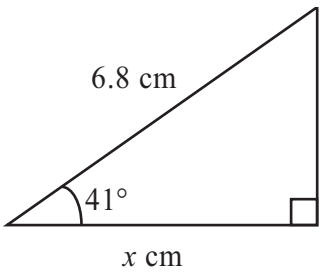


Diagram **NOT** accurately drawn

Work out the value of x.
Give your answer correct to 3 significant figures.

x = ...

Q7

(Total 3 marks)

8. Jade has tax deducted from her income at the rate of 24%.
Last month, after tax had been deducted, \$1786 of her income remained.
Calculate her income last month before the tax was deducted.

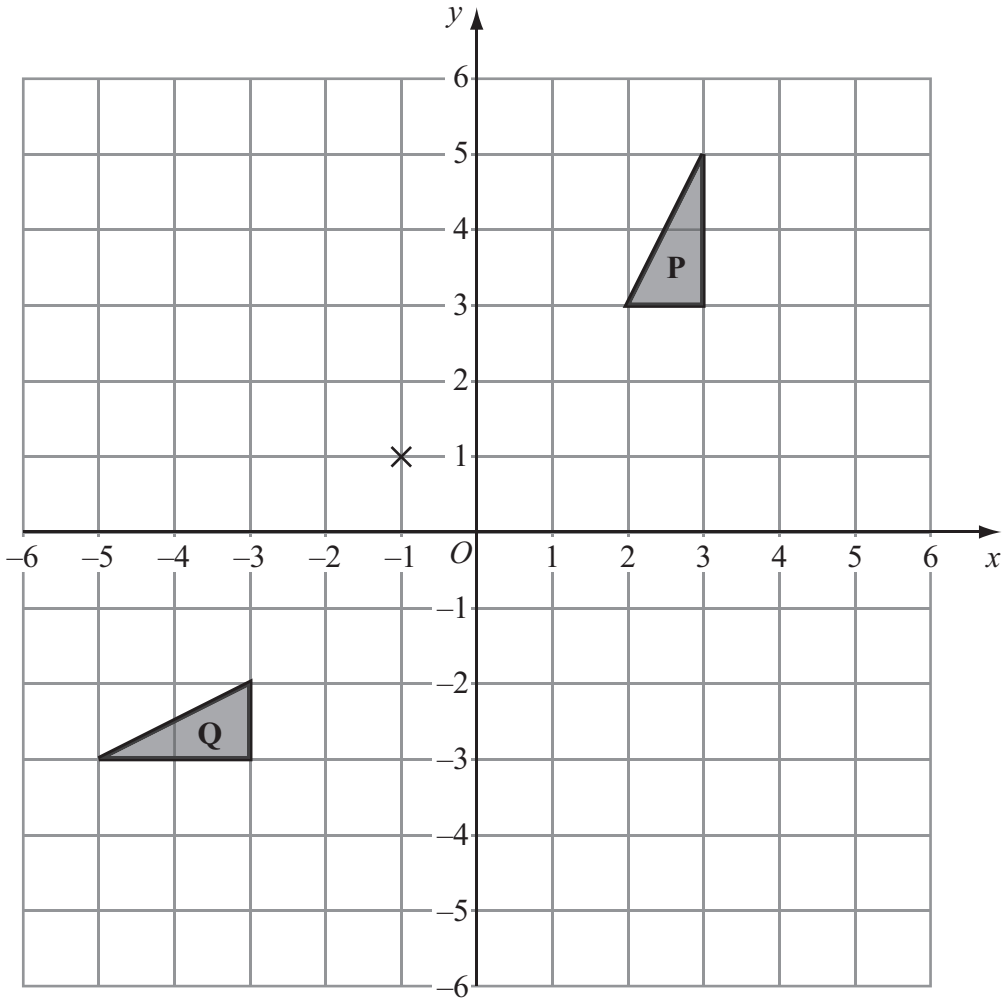
\$ .....

Q8

(Total 3 marks)

Leave blank

9.



(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

.....

(2)

(b) Rotate triangle **Q** through 90° anti-clockwise about the point (−1, 1).
Label the new triangle **R**.

(2)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

.....

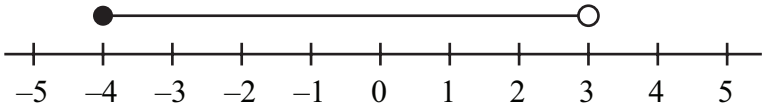
(2)

Q9

(Total 6 marks)

Leave blank

10. (a)



An inequality is shown on the number line.

Write down this inequality.

.....

(2)

(b) (i) Solve the inequality $2x + 9 > 1$

.....

(ii) n is a **negative** integer.

Write down all the values of n which satisfy $2n + 9 > 1$

.....

(4) **Q10**

(Total 6 marks)

Leave blank

11.

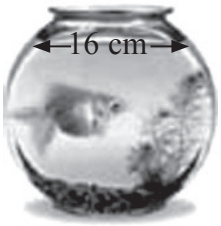


Diagram **NOT** accurately drawn

The diagram shows a fish bowl.
The water surface is a circle with a diameter of 16 cm.

(a) Work out the area of a circle with a diameter of 16 cm.
Give your answer correct to 3 significant figures.

..... cm^2
(2)

(b) The volume of water, V cm^3, in the fish bowl may be found using the formula

$$V = \frac{1}{6}\pi h(3x^2 + 3y^2 + h^2)$$

Find the value of V when $h = 16.4$
$x = 6.5$
and $y = 8$

Give your answer correct to 3 significant figures.

V = ...
(2)

Q11

(Total 4 marks)

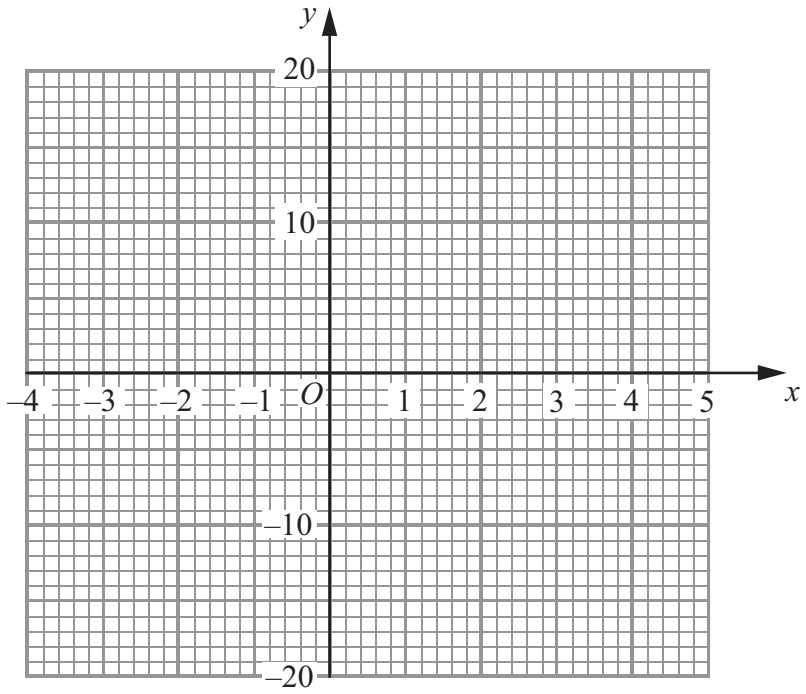
Leave blank

12. (a) Complete the table of values for $y = x^3 - 12x + 2$

x	−3	−2	−1	0	1	2	3	4
y	11						−7	18

(2)

(b) On the grid, draw the graph of $y = x^3 - 12x + 2$ for values of x from −3 to 4



(2)

Leave blank

(c) For the curve with equation $y = x^3 - 12x + 2$

(i) find $\frac{dy}{dx}$

.....

(ii) find the gradient of the curve at the point where $x = 5$

.....

(4) **Q12**

(Total 8 marks)

13.

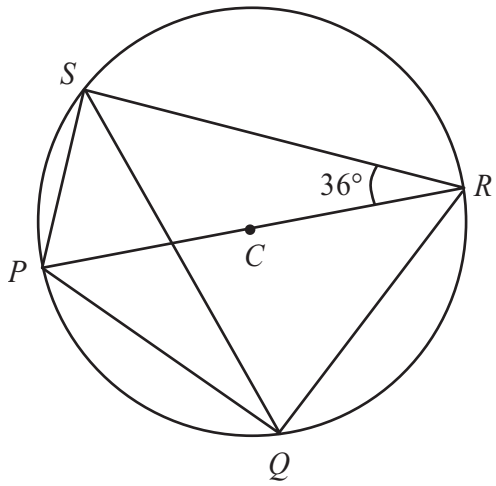


Diagram **NOT** accurately drawn

P, *Q*, *R* and *S* are points on a circle, centre *C*.
PCR is a straight line.
Angle *PRS* = 36°.

Calculate the size of angle *RQS*.
Give a reason for each step in your working.

.....°

Q13

(Total 4 marks)

Leave blank

14.

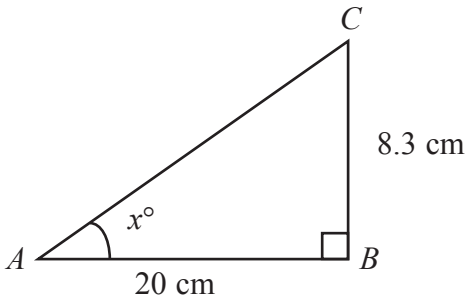


Diagram **NOT** accurately drawn

Triangle ABC is right-angled at B.
$AB = 20$ cm, correct to 1 significant figure.
$BC = 8.3$ cm, correct to 2 significant figures.

(a) Write down the lower bound for the length of

(i) AB,

..... cm

(ii) BC.

..... cm
(2)

(b) Calculate the lower bound for the area of triangle ABC.

..... cm^2
(2)

(c) Calculate the lower bound for the value of $\tan x°$.

.....
(3)

Q14

(Total 7 marks)

Leave blank

15. The light intensity, E, at a surface is inversely proportional to the square of the distance, r, of the surface from the light source.

$E = 4$ when $r = 50$

(a) Express E in terms of r.

$E =$ .....

(3)

(b) Calculate the value of E when $r = 20$

$E =$ .....

(1)

(c) Calculate the value of r when $E = 1600$

$r =$ .....

(2)

Q15

(Total 6 marks)

16. Show that $(3-\sqrt{5})^2 = 14-6\sqrt{5}$

Q16

(Total 2 marks)

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17.

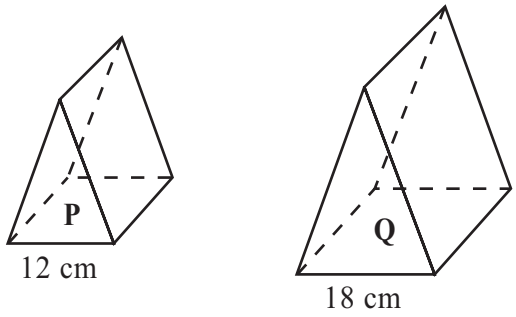

Diagram **NOT** accurately drawn

Two prisms, **P** and **Q**, are similar.
The cross-section of prism **P** is a triangle with a base of length 12 cm.
The cross-section of prism **Q** is a triangle with a base of length 18 cm.
The total surface area of prism **P** is 544 cm^2.

Calculate the total surface area of prism **Q**.

..... cm^2 **Q17**

(Total 3 marks)

18. Simplify fully $\dfrac{x^2+6x}{x^2-36}$

..... **Q18**

(Total 3 marks)

Leave blank

19.

Ashok has six coins in his pocket.
He has one 5 cent coin, two 10 cent coins and three 20 cent coins.
He takes at random a coin from his pocket.
He records its value and puts the coin back into his pocket.
He then takes at random a second coin from his pocket and records its value.

(a) Calculate the probability that he takes two 20 cent coins.

.....
(2)

(b) Calculate the probability that the second coin he takes has a higher value than the first coin he takes.

.....
(3) **Q19**

(Total 5 marks)

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20.

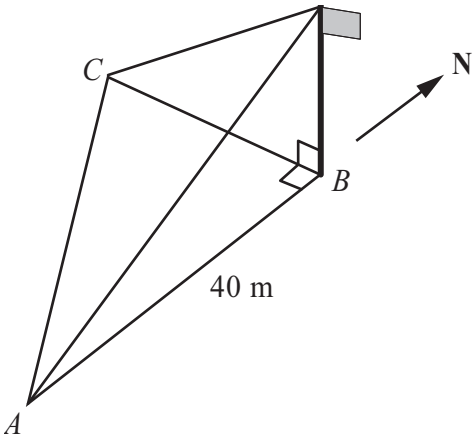

Diagram **NOT** accurately drawn

A, *B* and *C* are points on horizontal ground.
C is due West of *B*.
A is due South of *B* and *AB* = 40 m.
There is a vertical flagpole at *B*.
From *A*, the angle of elevation of the top of the flagpole is 13°.
From *C*, the angle of elevation of the top of the flagpole is 19°.

Calculate the distance *AC*.
Give your answer correct to 3 significant figures.

..... m

Q20

(Total 6 marks)

Leave blank

21. Solve the simultaneous equations

$$y = 2x^2$$
$$y = 3x + 14$$

.....

Q21

(Total 5 marks)

TOTAL FOR PAPER: 100 MARKS

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