Paper Reference(s)

5525/06

Edexcel GCSE

Mathematics A – 1387

Paper 6 (Calculator)

Higher Tier

Monday 12 June 2006 – Morning

Time: 2 hours

Materials required for examination	**Items included with question papers**
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.	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 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 24 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.
Calculators may be used.
If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

Turn over

edexcel

Volume of a prism = area of cross section × length
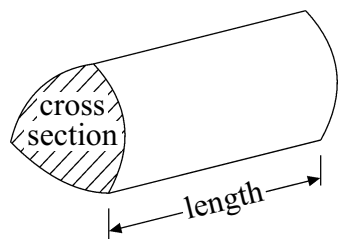
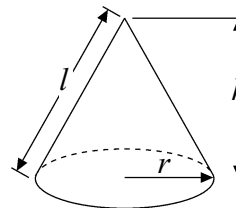**Volume of sphere** $= \frac{4}{3}\pi r^3$
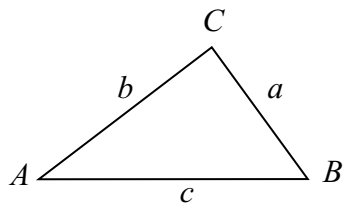
Surface area of sphere $= 4\pi r^2$
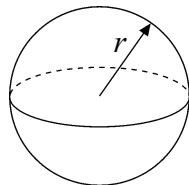
Volume of cone $= \frac{1}{3}\pi r^2 h$

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

In any triangle ABC

The Quadratic Equation

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

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$
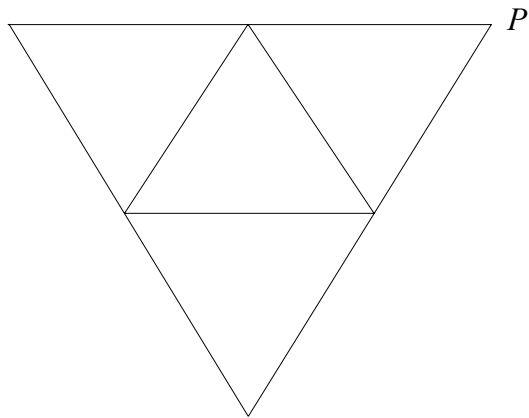
Sine Rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

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

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

Answer ALL TWENTY FOUR questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1. Here is the net of a 3-D shape.

The net is folded to make the 3-D shape.
Two other vertices meet at *P*.

Mark each of these vertices with the letter *P*.

Q1

(Total 2 marks)

2. Amy, Beth and Colin share 36 sweets in the ratio 2 : 3 : 4

Work out the number of sweets that each of them receives.

Amy .... sweets

Beth .... sweets

Colin .... sweets

Q2

(Total 3 marks)

3.

Diagram **NOT** accurately drawn

A

8 cm   6 cm

B 10 cm C
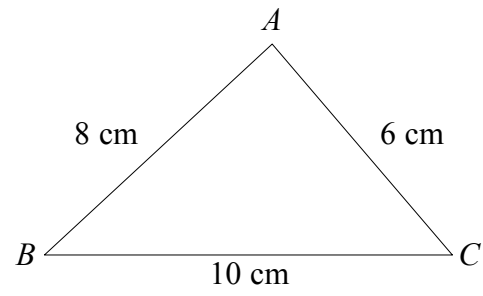
ABC is a triangle.
$AB = $ 8 cm.
$AC = $ 6 cm.
$BC = $ 10 cm.

(a) Use ruler and compasses to construct an accurate drawing of triangle *ABC*.
    The line *BC* has been drawn for you.
    You must show all your construction lines.

B ——————————————————————— C

(2)

(b) Use ruler and compasses to construct the perpendicular bisector of the line *PQ*.
You must show all your construction lines.

P ——————————————————— *Q*

(2)

(Total 4 marks)

Turn over

4. Sophie says, 'For any whole number, *n*, the value of $6n - 1$ is always a prime number'.

Sophie is wrong.
Give an example to show that Sophie is wrong.

(Total 2 marks)

5. This item appeared in a newspaper.

> **Cows produce 3% more milk**
>
> A farmer found that when his cow listened to classical music the milk it produced increased by 3%.
>
> This increase of 3% represented 0.72 litres of milk.

Calculate the amount of milk produced by the cow when it listened to classical music.

.... litres

(Total 3 marks)

6. (a) Simplify

(i) $x^4 \times x^5$

....

(ii) $\dfrac{p^8}{p^3}$

....

(iii) $3s^2t^3 \times 4s^4t^2$

....

(iv) $(q^3)^4$

....

(5)

(b) Expand $\quad\quad\quad 3(2g - 1)$

....

(1)

(c) Expand $\quad\quad\quad 2d(d + 3)$

....

(2)

(d) Expand and simplify $(x + 2)(x + 3)$

....

(2)
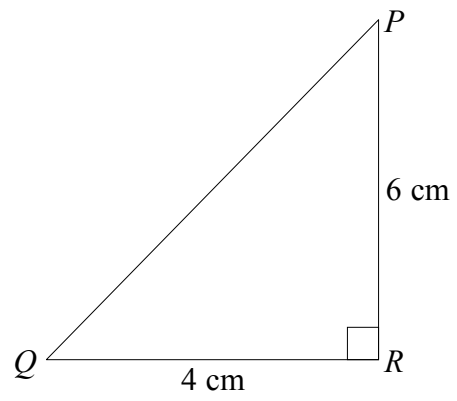
(Total 10 marks)

Q6

7.

Diagram **NOT** accurately drawn

PQR is a right-angled triangle.

PR = 6 cm.
QR = 4 cm.

Work out the length of *PQ*.
Give your answer correct to 3 significant figures.

.... cm

(Total 3 marks)

Q7

8. Bill recorded the times, in minutes, taken to complete his last 40 homeworks.

This table shows information about the times.

Time (t minutes)	Frequency	
$20 \leqslant t < 25$	8	
$25 \leqslant t < 30$	3	
$30 \leqslant t < 35$	7	
$35 \leqslant t < 40$	7	
$40 \leqslant t < 45$	15	

(a) Find the class interval in which the median lies.

....
(1)

(b) Calculate an estimate of the mean time it took Bill to complete each homework.

.... minutes
(4)

(Total 5 marks)

Q8

9. Work out $\dfrac{\sqrt{2.56} + 3.50}{8.765 - 6.78}$

(a) Write down all the figures on your calculator display.

....
(2)

(b) Give your answer to part (a) to an appropriate degree of accuracy.

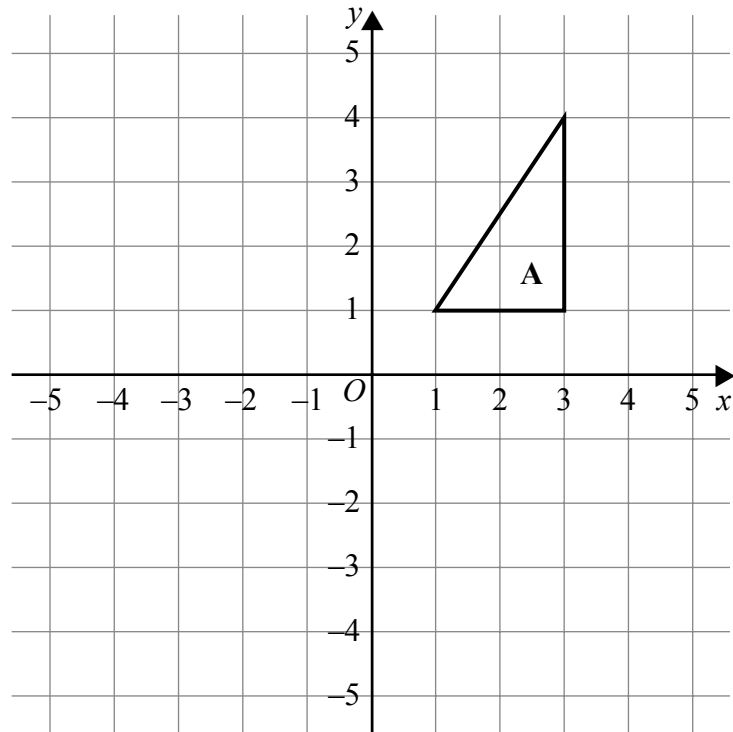.......................................
(1)

(Total 3 marks)

Q9

10.

Triangle **A** is reflected in the *y* axis to give triangle **B**.
Triangle **B** is then reflected in the *x* axis to give triangle **C**.

Describe the **single** transformation that takes triangle **A** to triangle **C**.

....

(Total 3 marks)

11. Solve the simultaneous equations.

$$5a + 3b = 9$$
$$2a - 3b = 12$$

$a = $ ....

$b = $ ....

(Total 3 marks)

12. (a) Calculate the size of angle a in this right-angled triangle.
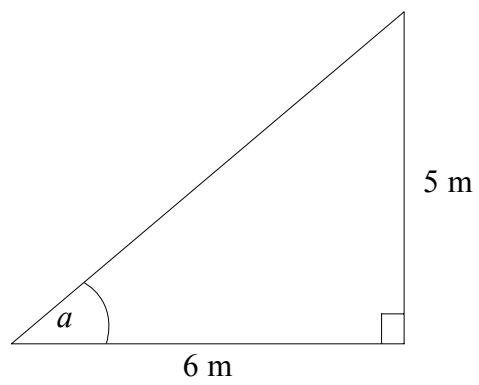Give your answer correct to 3 significant figures.

Diagram **NOT**
accurately drawn

5 m

a

6 m

.....................................°

(3)

(b) Calculate the length of the side x in this right-angled triangle.
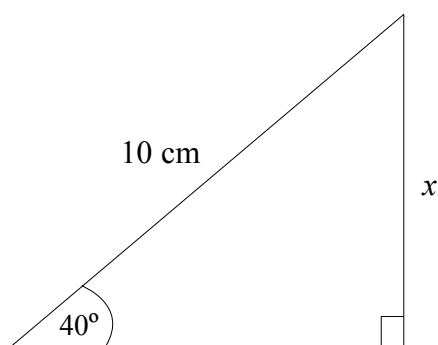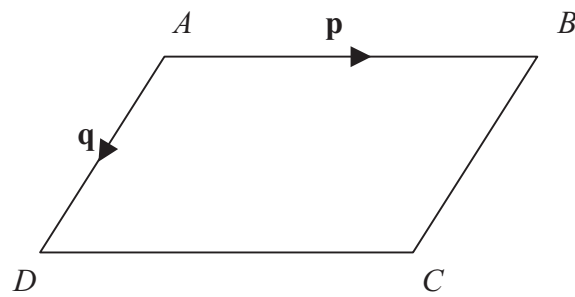Give your answer correct to 3 significant figures.

Diagram **NOT**
accurately drawn

10 cm

x

40°

.... cm

(3)

(Total 6 marks)

Q12

13.

Diagram **NOT** accurately drawn

ABCD is a parallelogram.
AB is parallel to *DC*.
AD is parallel to *BC*.

$\overrightarrow{AB}$ = **p**

$\overrightarrow{AD}$ = **q**

(a) Express, in terms of **p** and **q**

(i) $\overrightarrow{AC}$

(i)...............................

(ii) $\overrightarrow{BD}$

(ii)...............................

(2)
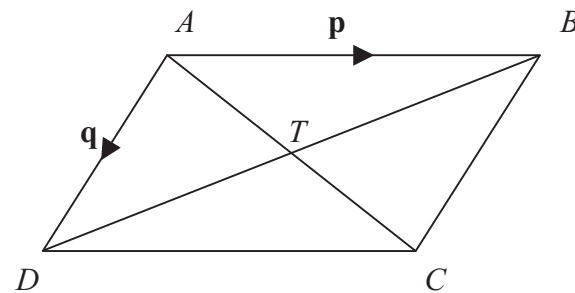
Diagram **NOT** accurately drawn

AC and *BD* are diagonals of parallelogram *ABCD*.
AC and *BD* intersect at *T*.

(b) Express $\overrightarrow{AT}$ in terms of **p** and **q**.

....

(1)

Q13

(Total 3 marks)

14. Jim makes a model of his school.

He uses a scale of 1 : 50

The area of the door on his model is 8 cm².

Work out the area of the door on the real school.

.... cm^2

Q14

(Total 2 marks)

15. (a) List all the possible integer values of n such that

$$-2 \leqslant n < 3$$

....

(2)

(b) Solve the inequality

$$4p - 8 < 7 - p$$

....

(2)

Q15

(Total 4 marks)

16. Here are four cumulative frequency diagrams.

A

B

C

D
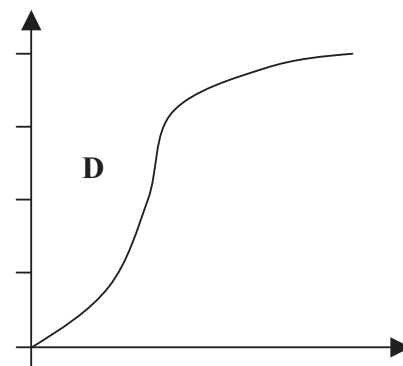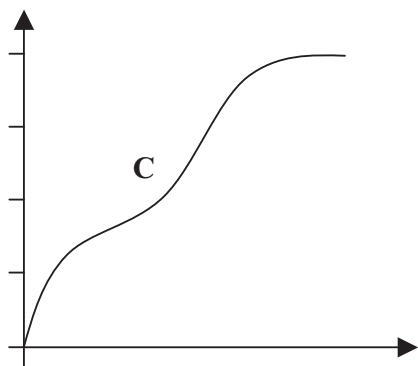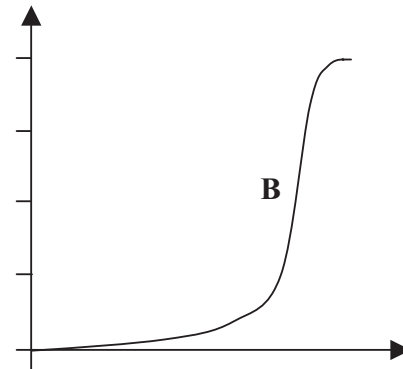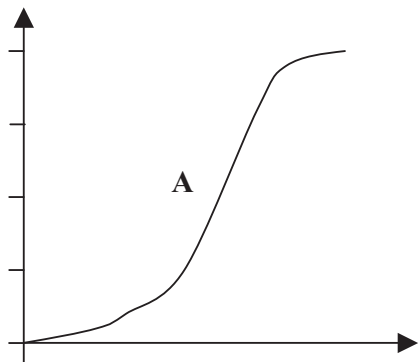
Here are four box plots.

P

Q

R

S

For each box plot, write down the letter of the appropriate cumulative frequency diagram.

P and ....
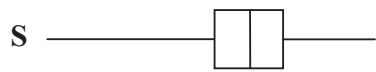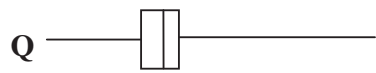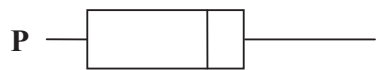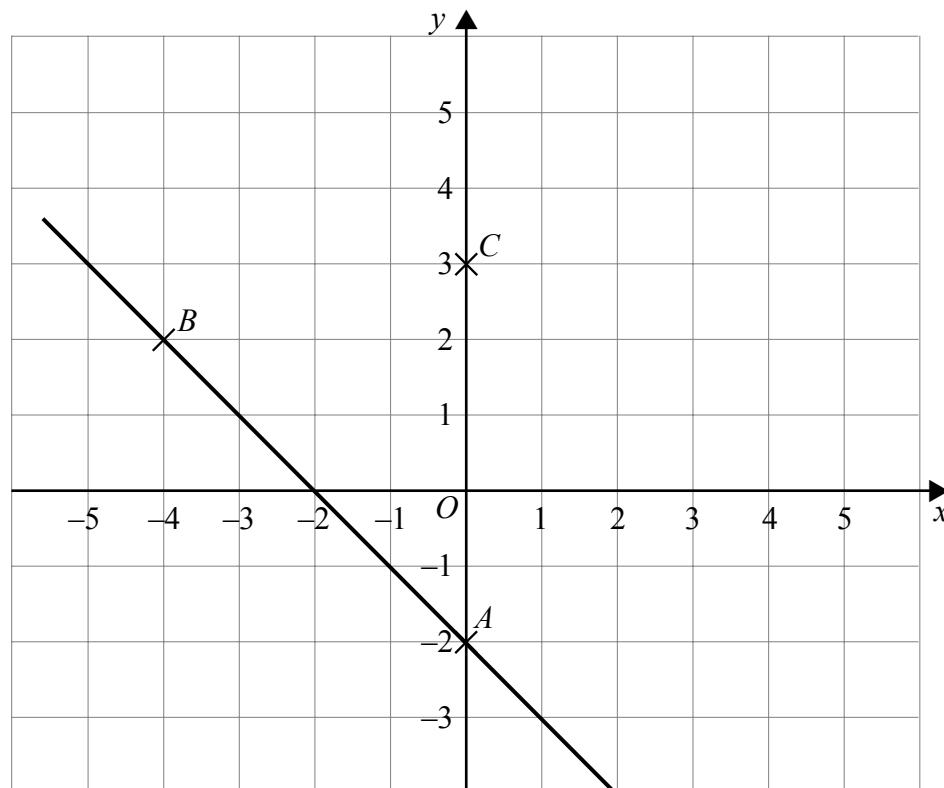
Q and ....

R and ....

S and ....

(Total 2 marks)

17.

In the diagram   *A* is the point (0, –2),
                  B is the point (–4, 2),
                  C is the point (0, 3).

Find an equation of the line that passes through *C* and is parallel to *AB*.

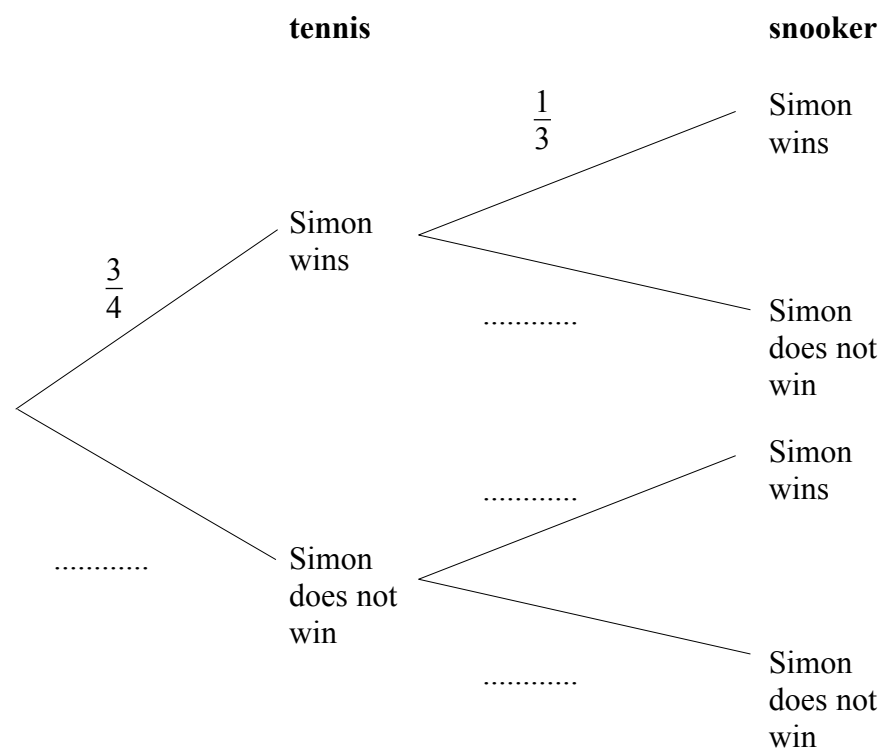... **Q17**

(Total 4 marks)

18. Simon plays one game of tennis and one game of snooker.

The probability that Simon will win at tennis is $\frac{3}{4}$

The probability that Simon will win at snooker is $\frac{1}{3}$

(a) Complete the probability tree diagram below.

tennis　　　　　　　　　**snooker**

$\frac{3}{4}$ — Simon wins

$\frac{1}{3}$ — Simon wins

.... — Simon does not win

.... — Simon does not win

.... — Simon wins

.... — Simon does not win

(2)

(b) Work out the probability that Simon wins both games.

....

(2)

(c) Work out the probability that Simon will win only one game.

....

(3)

(Total 7 marks)

19. The length of a rectangle is 6.7cm, correct to 2 significant figures.

(a) For the length of the rectangle write down

(i) the upper bound,

.... cm

(ii) the lower bound.

.... cm

(2)

The area of the rectangle is 26.9 cm², correct to 3 significant figures.

(b) (i) Calculate the upper bound for the width of the rectangle.
Write down all the figures on your calculator display.

.... cm

(ii) Calculate the lower bound for the width of the rectangle.
Write down all the figures on your calculator display.

.... cm

(3)

(c) (i) Write down the width of the rectangle to an appropriate degree of accuracy.

.... cm

(ii) Give a reason for your answer.

....

(2)

(Total 7 marks)

Q19

20. (a) Simplify fully $(3x^2y^4)^3$

....
(2)

(b) Expand and simplify $(2x + 5)(3x - 2)$

....
(2)

(c) Simplify fully $\dfrac{x^2 + 5x + 6}{x^2 + 2x}$

....
(2)

(Total 6 marks)

21. Solve this quadratic equation.

$x^2 - 5x - 8 = 0$

Give your answers correct to 3 significant figures.

x = ... or x = ...

(Total 3 marks)

22.
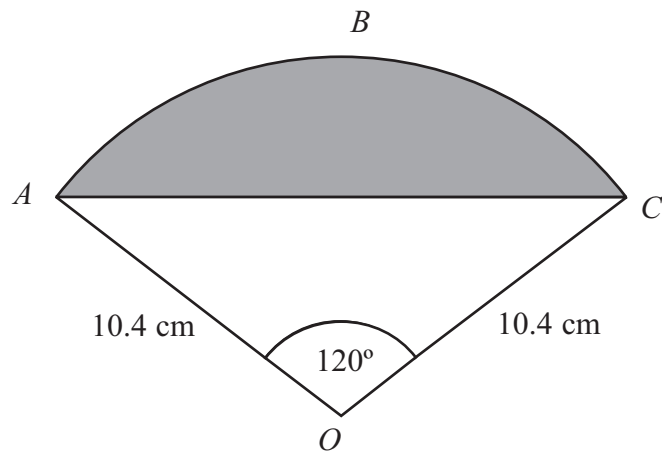

Diagram **NOT** accurately drawn

The diagram shows a sector *OABC* of a circle with centre *O*.
OA = *OC* = 10.4 cm.
Angle *AOC* = 120°.

(a) Calculate the length of the arc *ABC* of the sector.
Give your answer correct to 3 significant figures.

.... cm

(3)

(b) Calculate the area of the shaded segment *ABC*.
Give your answer correct to 3 significant figures.

.... cm^2
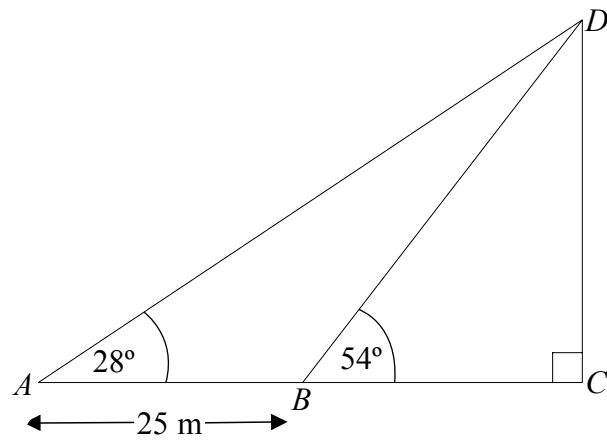
(4)

(Total 7 marks)

23.

Diagram **NOT** accurately drawn

The diagram shows a vertical tower *DC* on horizontal ground *ABC*. *ABC* is a straight line.

The angle of elevation of *D* from *A* is 28º. The angle of elevation of *D* from *B* is 54º.

AB = 25 m.

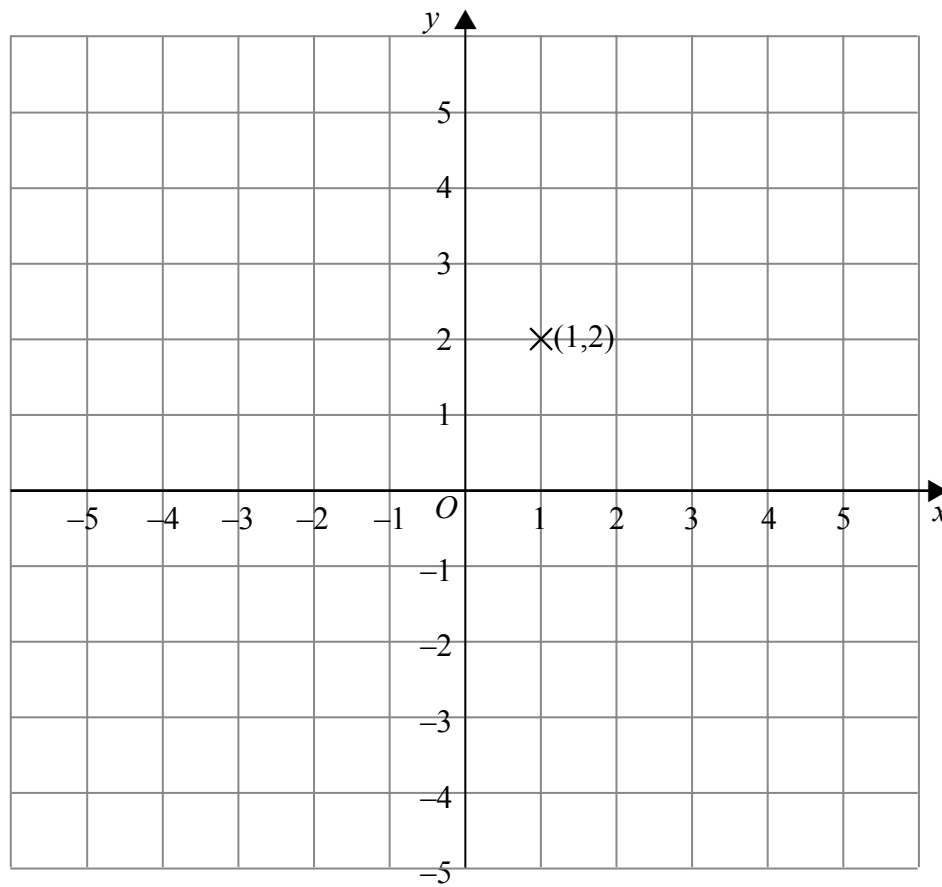Calculate the height of the tower. Give your answer correct to 3 significant figures.

.... m

(Total 5 marks)

Q23

24. Show that any straight line that passes through the point (1, 2) must intersect the curve with equation $x^2 + y^2 = 16$ at two points.

TOTAL FOR PAPER: 100 MARKS

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