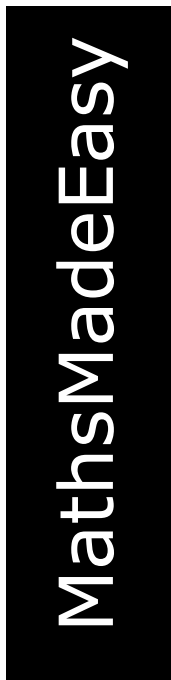


First Name	
Last Name	
Date	
Total Marks	/ 100 marks



**GCSE Mathematics**  
**Calculator**  
**Higher Tier**  
**Mock 2, paper 2**  
1 hour 45 minutes



**Instructions**

Write your name and other details in the boxes above.  
Answer all the questions  
Take  $\pi$  to be 3.142

**Information**

Marks are shown in brackets for each question (2)  
**Calculators may be used**

**Advice**

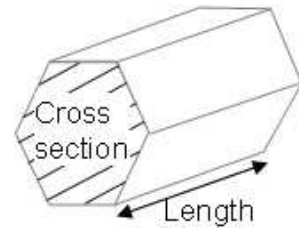
Don't spend too long on one question  
Show all your working in calculations for full marks  
You will get marks for method even if your answer is incorrect  
Leave a question until later if you cannot answer it

**Materials needed for examination**

Ruler marked in centimetres and millimetres, calculator  
protractor, compasses, pen, pencil, rubber  
Tracing paper may be used

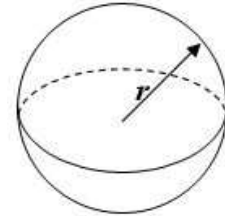
## Formulae sheet — Higher tier

**Volume of prism** = area of cross-section  $\times$  length



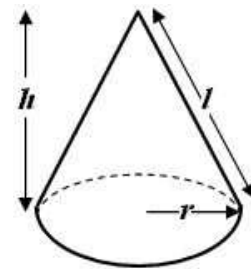
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

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



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

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

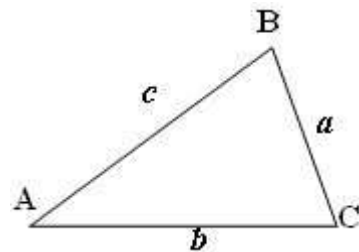


**In any triangle ABC**

**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 a triangle** =  $\frac{1}{2} ab \sin C$



**The Quadratic Equation**

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

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

### Authors Note

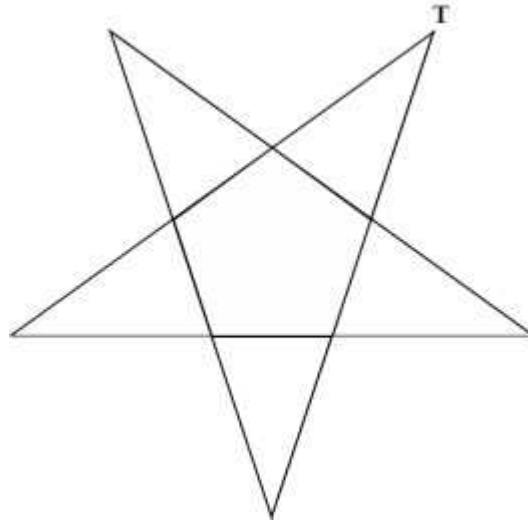
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1. a) A net of a 3-D shape is shown below. It folds together to make the 3-D shape. Four other vertices meet at T.

Mark these four vertices with a letter T



(2)

- b) A square is shown below with an area of  $441 \text{ cm}^2$

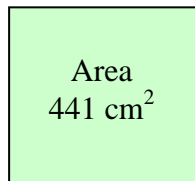


Diagram NOT drawn accurately

What is the length of one side of this square?

..... cm

(2)

2. Jane, David and Laura share 44 sticks of chewing gum in the ratio 2: 4: 5

Calculate how many sticks each received

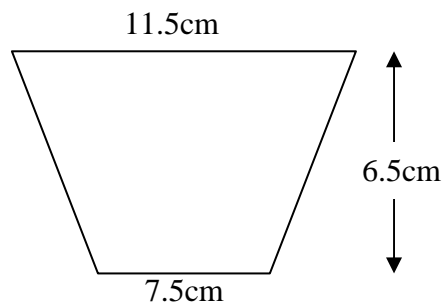
Jane.....sticks

David.....sticks

Laura.....sticks

(3)

3. Work out the area of the shape below.



shape not  
drawn accurately

..... cm<sup>2</sup>

(3)

4. The sales price of a coat was £112 in the sale.  
There was 25% off.  
Calculate the original price of the coat.

..... (3)

5. There are 800 pupils at Toddington School.  
The table shows information about the pupils.

Year	Boys	Girls
Year 7	96	86
Year 8	98	85
Year 9	86	74
Year 10	73	77
Year 11	65	60

An inspector is carrying out a survey into pupils' views about the school.  
He takes a sample, stratified both by Year group and by gender, of 50 of the 800 pupils.

Calculate the number of Year 7 boys to be sampled.

..... (3)

6.

WXY is a right angled triangle.

WX = 9 cm

XY = 11 cm

Calculate the length of WY to two decimal places.

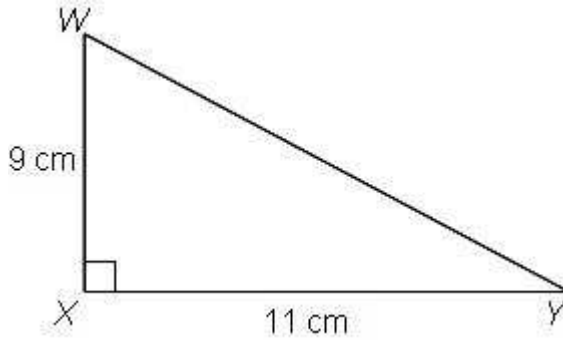


Diagram NOT drawn accurately

.....cm. (3)

7.

Work out  $\frac{\sqrt{3.46 + 4.78}}{7.659 - 4.67}$

Write down all the figures on your calculator display

..... (2)

Now give your answer to two decimal places

..... (1)

8. Jane recorded the time in minutes it took her to cook dinner for thirty two days  
She wrote her results in the following table.

Time (t mins)	Frequency	
$25 \leq t < 30$	2	
$30 \leq t < 35$	5	
$35 \leq t < 40$	6	
$40 \leq t < 45$	9	
$45 \leq t < 50$	10	

- a) Write down the class interval in which the median lies

..... (1)

- b) Work out an estimate of the mean time it took Jane to cook dinner.

.....  
minutes (4)

9. Cyril paid £100 into a bank.  
The rate of interest was 4% compound per year.  
How much was in the bank after 3 years.

.....

(3)



**10.**

Solve the simultaneous equation below:

$$6x + 5y = 15$$

$$5x - 5y = 40$$

x.....

y.....

**(3)**

11. a) Work out the size of angle  $x$  in the right angled triangle shown below.  
Give your answer correct to three significant figures

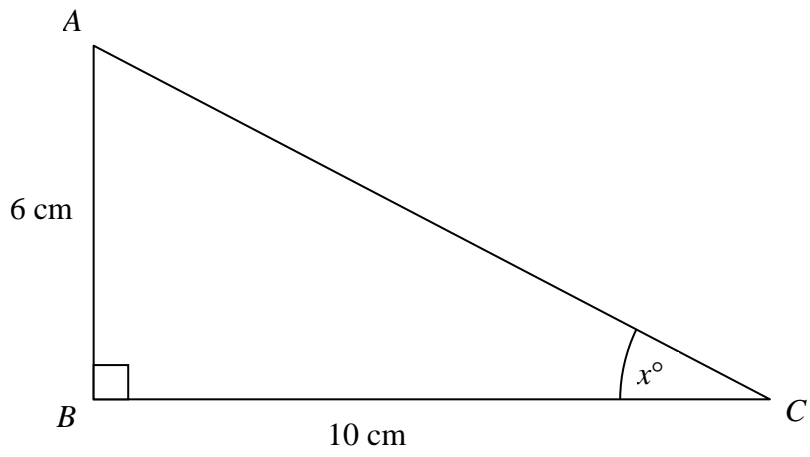
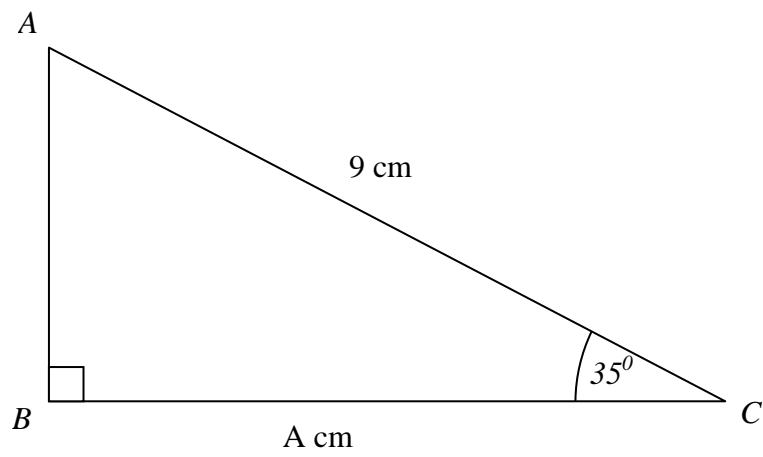


Diagram **NOT**  
accurately  
drawn

.....<sup>o</sup> (3)

- b) Work out the length of the side A in the right angled triangle below.  
Give your answer correct to 2 significant places.



.....cm (3)

12.

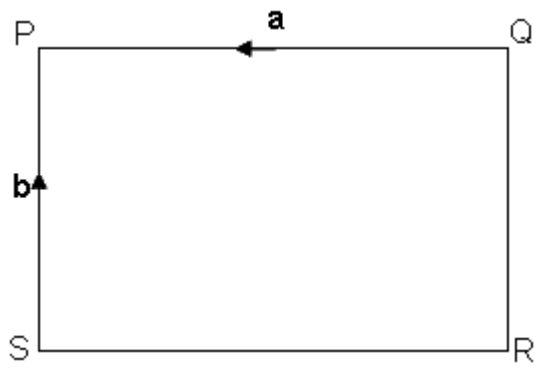


Diagram not drawn accurately

PQRS is a rectangle  
 PQ is parallel to SR  
 PS is parallel to QR

$$\vec{QP} = \mathbf{a}$$

$$\vec{SP} = \mathbf{b}$$

a) Express in terms of  $\mathbf{a}$  and  $\mathbf{b}$

i)  $\vec{PR}$

.....

ii)  $\vec{QS}$

.....

(2)

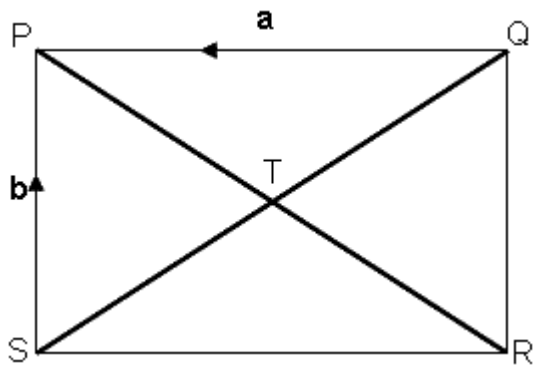


Diagram not drawn accurately

PR and SQ are diagonals of the square PQRS  
 PR and SQ intersect at T

b) Express  $\vec{PT}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$

.....

(1)

**13.** Matthew builds a model of an Audi TT car.

He uses a scale of 1:60

The area of the window screen on his model is  $4 \text{ cm}^2$ .

Work out the area of the window screen on the real car.

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

**14.** a) What are all the possible integer values of  $x$  such that

$$-3 \leq x < 4$$

..... **(2)**

b) Solve the inequality

$$5a - 16 < 8 - a$$

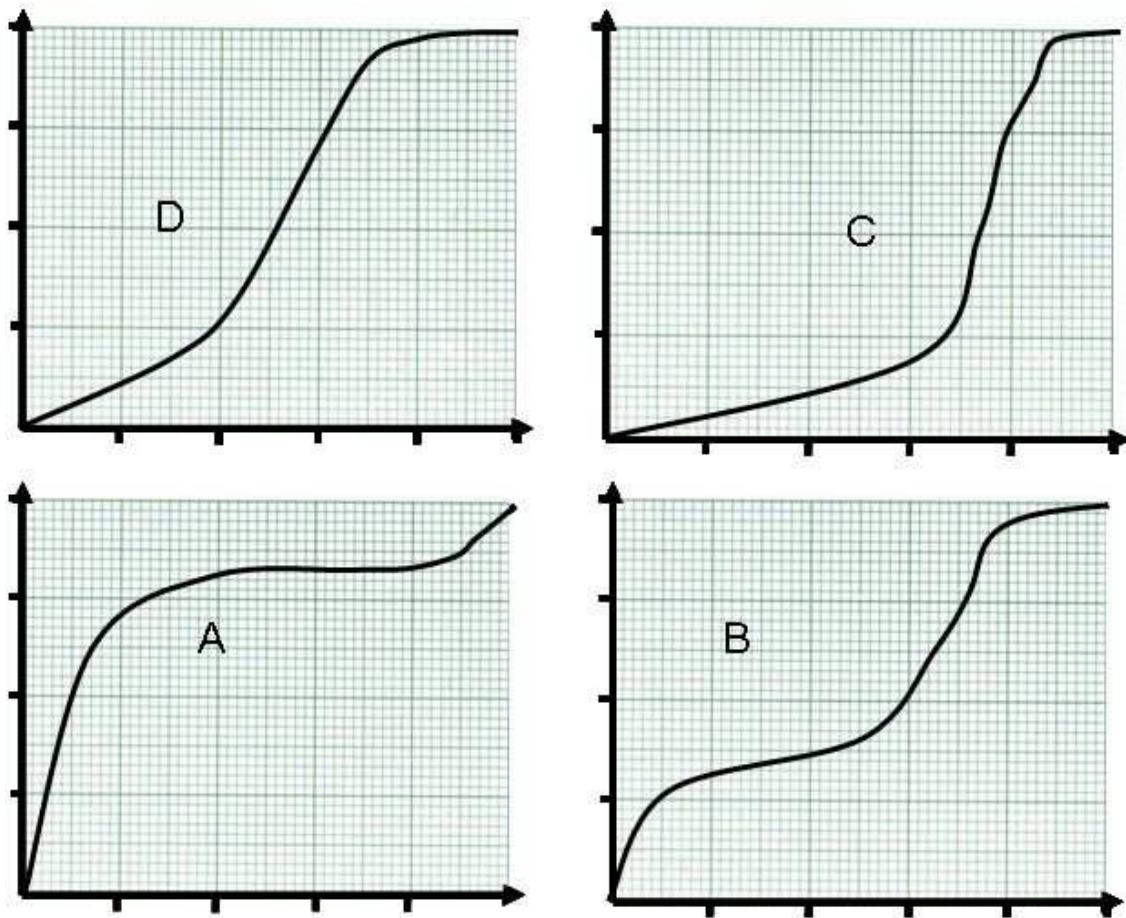
..... **(2)**

c) Factorise

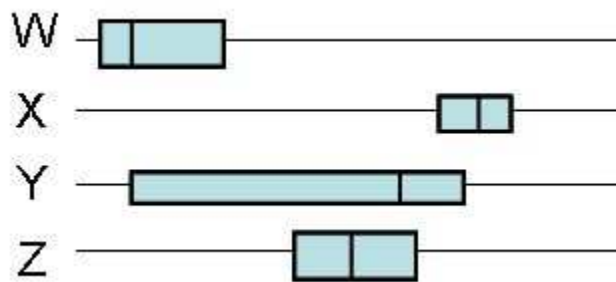
$$x^2 + 7x + 10$$

..... **(2)**

15. Below are four cumulative frequency diagrams



Below are four box plots



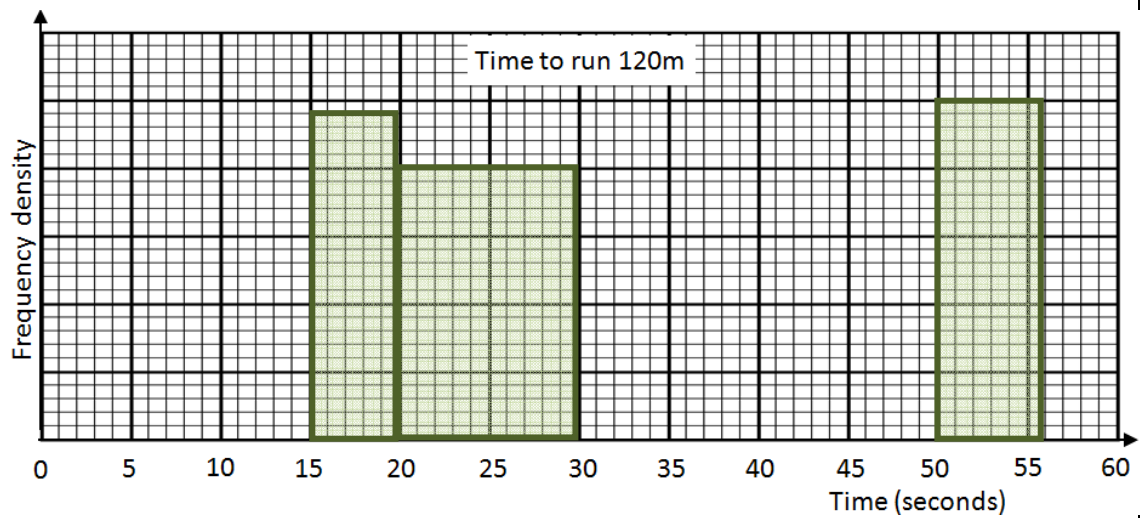
For each box plot write the letter of the appropriate cumulative frequency diagram

W and ..... (2)  
 X and .....  
 Y and .....  
 Z and .....

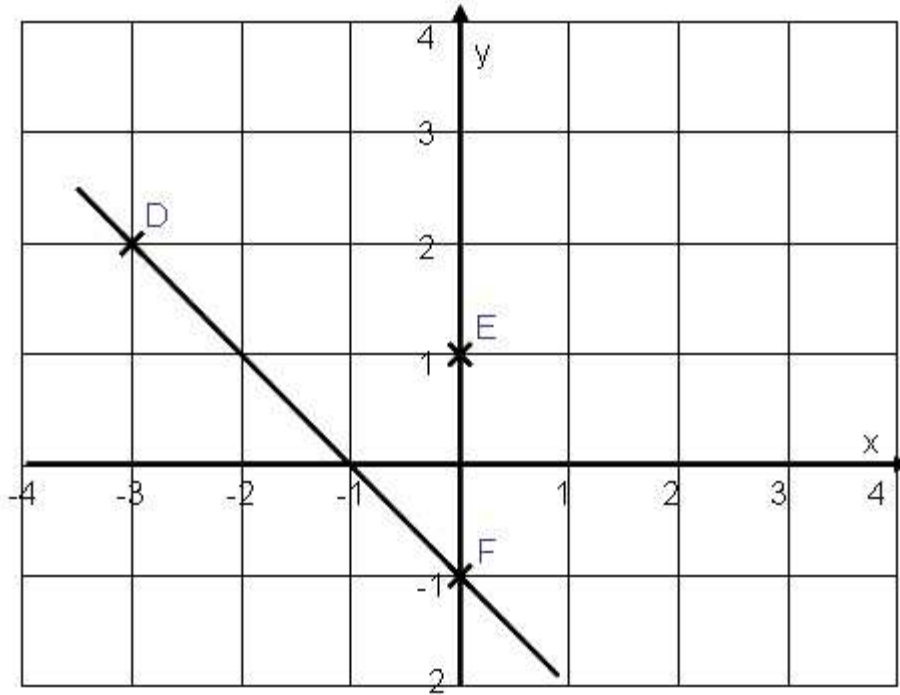
16. The table and histogram show information about the time it took some students to run 120 metres.

Time (t seconds)	Frequency
$0 < t \leq 15$	18
$15 < t \leq 20$	12
$20 < t \leq 30$	
$30 < t \leq 50$	12
$50 < t \leq 56$	
$56 < t \leq 60$	4

- a) Use the table to complete the histogram
- b) Use the histogram to complete the table



17.



In the diagram above

D is the point  $(-3, 2)$

E is the point  $(0, 1)$

F is the point  $(0, -1)$

There is a straight line that passes through E and is parallel to DF.  
Find the equation of this line.

..... (4)

**18.** A door has a height of 2.2m correct to 2 significant figures.

**a)** For the height of the door what is

i) the upper bound

.....m

ii) the lower bound

.....m **(2)**

The door has an area of 3.59 m<sup>2</sup> correct to 3 significant figures

**b)** Calculate

i) the Upper bound for the width of the door

Write down all the figures on your calculator display

.....m **(2)**



19. a) Expand and simplify  $(4a - 1)(4a + 1)$   
..... (2)
- b) Expand and simplify  $(3x + 6)(4x - 3)$   
..... (2)
- c) Factorise  $x^2 - 1$   
..... (2)
- d) Factorise  $29x - 6x^2 - 28$   
..... (2)
- e) Complete the square for  $x^2 - 6x + 7$   
..... (3)
- f) Hence solve  $x^2 - 6x + 7 = 3$   
Give your answer in surd form  
..... (2)
- $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  (2)

20.

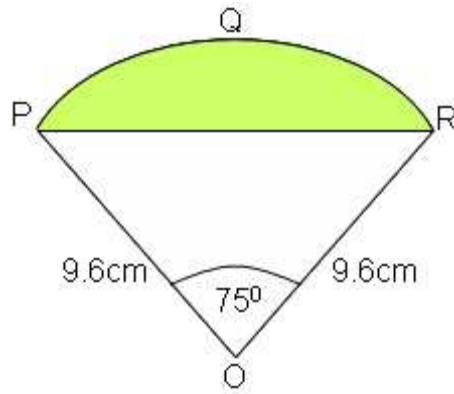


Diagram not drawn accurately

The diagram above shows a sector OPQR of a circle with centre O

PO = 9.6 cm

RO = 9.6 cm

Angle POR =  $75^\circ$

- a) Calculate the length of the arc PQR of the sector  
Give your answer correct to 3 significant figures

.....cm (3)

- b) Calculate the area of the shaded segment PQR  
Give your answer correct to 3 significant figures

.....cm<sup>2</sup> (4)

**21.** Solve this quadratic equation

$$x^2 - 7x - 9 = 0$$

Give your answer correct to 3 significant figures

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots \quad \mathbf{(4)}$$

22.

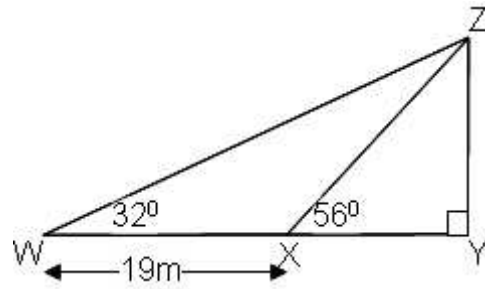


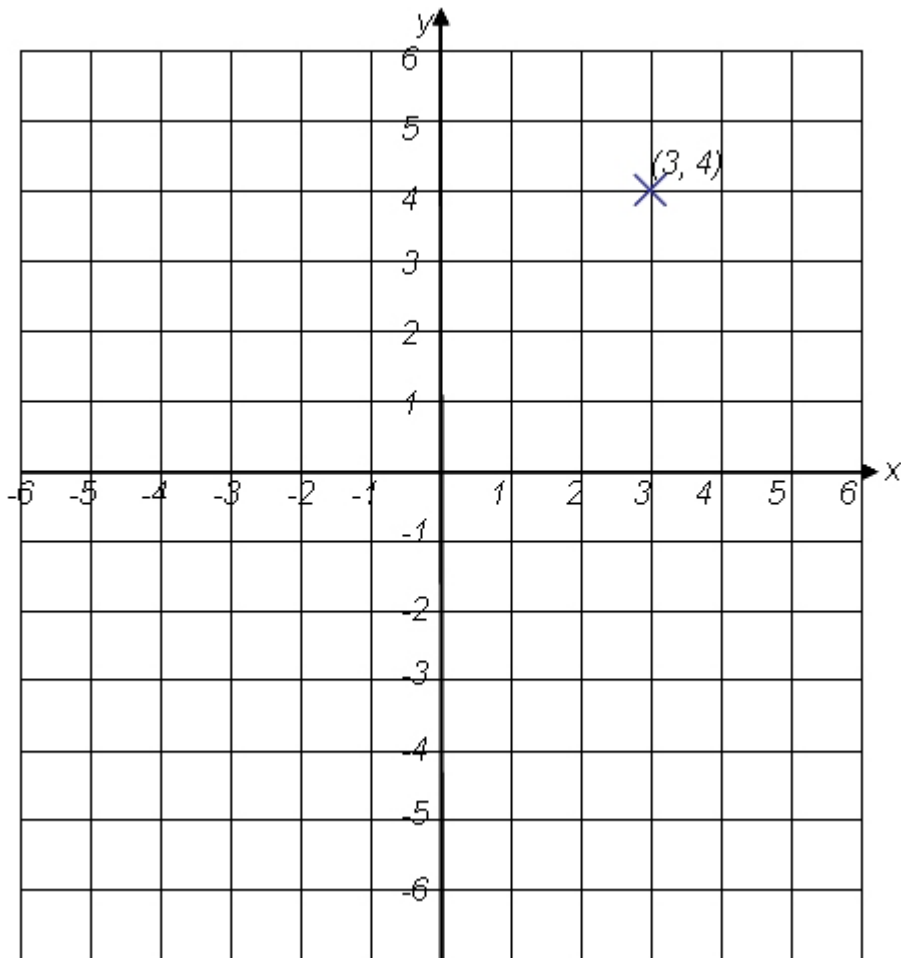
Diagram not accurately drawn

The diagram above shows two triangles.  
Triangle XYZ is a right angled triangle with  $\angle ZXY = 56^\circ$   
Triangle WXZ has side  $WX = 19\text{m}$  and  $\angle XWZ = 32^\circ$

Calculate YZ  
Give your answer correct to 3 significant figures

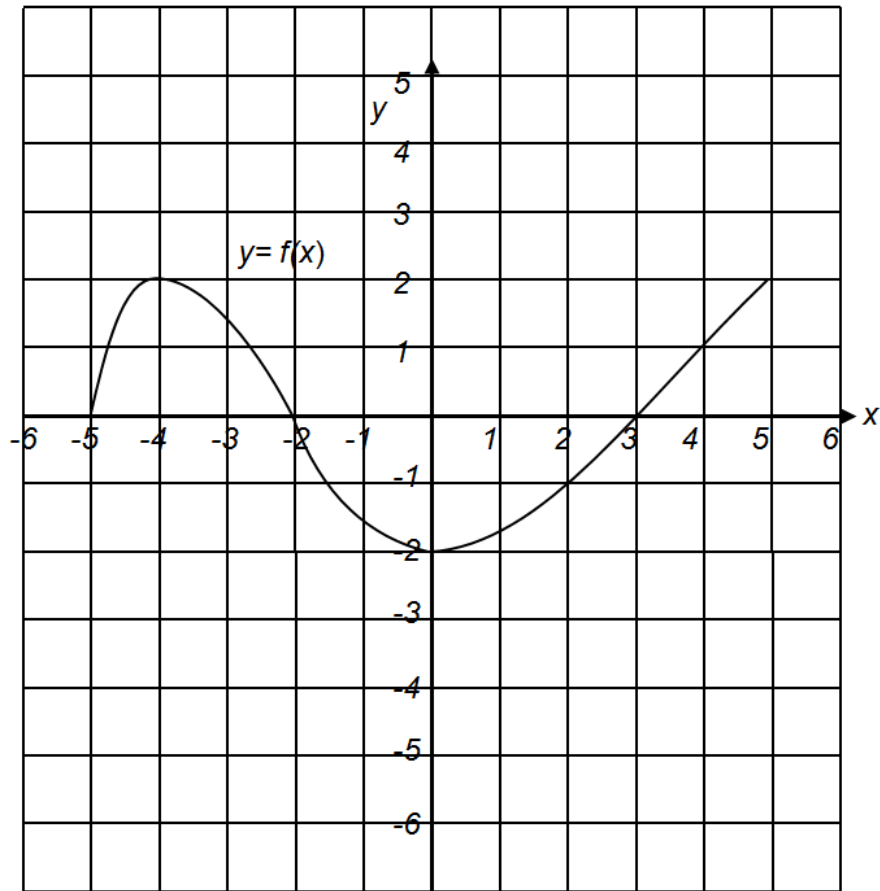
.....m (5)

23. Show that any straight line that passes through the point (3,4) must intersect the curve with the equation  $x^2 + y^2 = 36$  at two points.



(3)

24. The graph of  $y = f(x)$  is shown on the grid.



On this grid, sketch the graph of  $2f(x - 1)$

(3)

What are the co-ordinates of the highest point of  $2f(x - 1)$

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