

Y9 HT3

ASSESSMENT

Calculator allowed

Time allowed: 55 mins

WORKED SOLUTIONS

Name:..... **Form:**.....

1

Sally made a table showing the number of siblings people had in her class.

Siblings x	Frequency f	fx
0	4	0
1	10	10
2	12	24
3	3	9
4	0	0
5	1	5

30

48

Calculate the mean number of siblings in in Sally's class.

(M) For attempt to find fx [3 marks]

$$\text{Mean} = \frac{48}{30} \text{ (M)}$$

Answer

1.6 (A)

2.

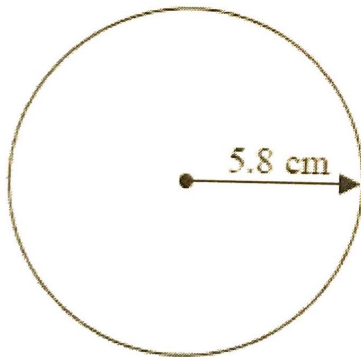


Diagram NOT accurately drawn

This circle has a radius of 5.8 cm.

Work out the area of the circle.

Give your answer to 1 decimal place.

$$\pi \times 5.8^2 \text{ (M)}$$

..... 105.7 cm² (A)

(Total for question = 2 marks)

3

Ben catches a train to work in a morning.

This table shows the time in minutes the train was late over a period of 20 days.

Time (t) in minutes	Frequency f	Midpoint (x)	$f \times x$
$0 \leq t < 5$	12	2.5	30
$5 \leq t < 10$	5	7.5	37.5
$10 \leq t < 15$	1	12.5	12.5
$15 \leq t < 20$	2	17.5	35
	<u>20</u>		<u>115</u>

Estimate the mean number of minutes the train was late.

[4 marks]

$$\text{Estimated mean} = \frac{115}{20} \quad (M1)$$

Answer

5.75 (A1)

minutes

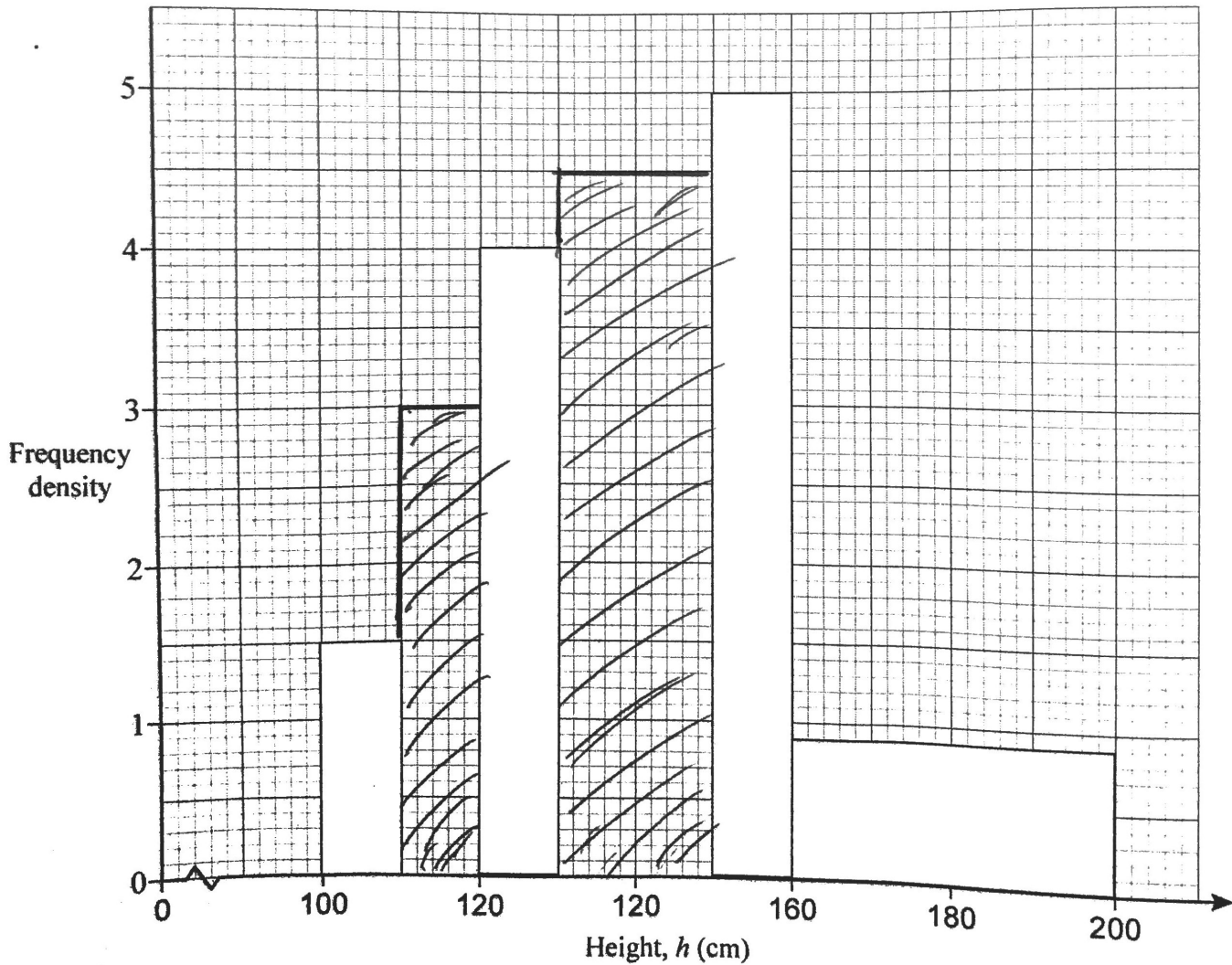
$$\text{Frequency Density (FD)} = \frac{\text{Frequency}}{\text{class width}}$$

$$\text{Frequency} = \text{FD} \times \text{class width}$$

The table and the histogram shows some information about the heights of 260 sunflowers.
Complete the histogram and table

[4 marks]

Height, h (cm)	Frequency	FD
$100 < h \leq 110$	15	1.5
$110 < h \leq 120$	30	3
$120 < h \leq 130$	$4 \times 10 = 40$	4
$130 < h \leq 150$	90	4.5
$150 < h \leq 160$	50	5
$160 < h \leq 200$	35	0.875
Total	260	



5 Jess measures the height of each student in her year.

5 (a) Which **two** words describe the data she collects?

Circle your answers.

Primary

Secondary

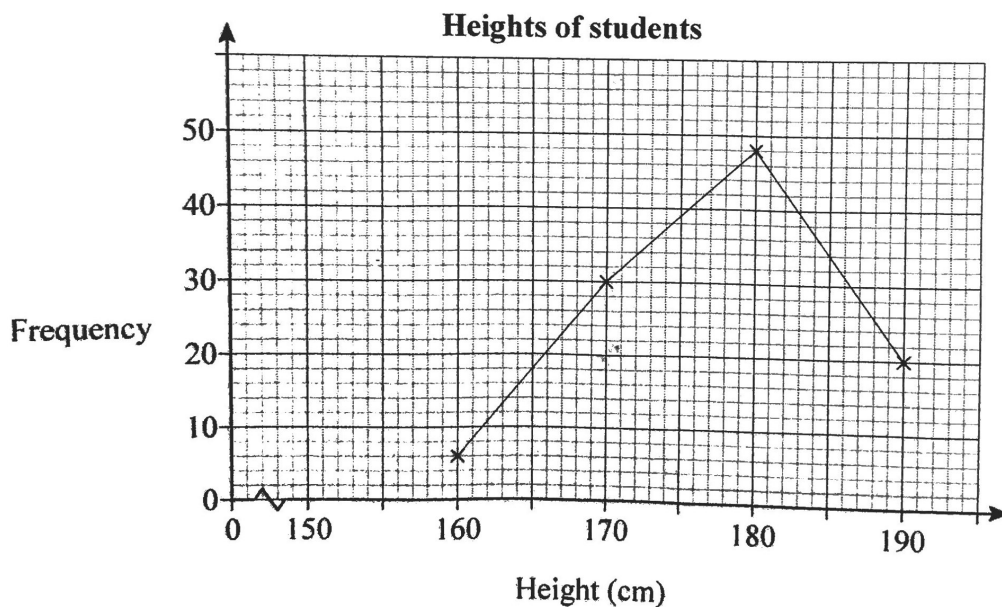
Discrete

Continuous

[2 marks]

5 (b) Jess records the data in this table and draws a frequency polygon.

Height, h (cm)	Frequency
$150 \leq h < 160$	6
$160 \leq h < 170$	30
$170 \leq h < 180$	44
$180 \leq h < 190$	20



Write down two mistakes that she has made.

[2 marks]

Points not plotted at midpoints of groups
Frequency wrong at 180

6 The table shows information about the distances travelled to make 500 deliveries.

Distance, d (miles)	Frequency	Cumulative frequency
$0 < d \leq 10$	0	0
$10 < d \leq 40$	60	60
$40 < d \leq 60$	240	300
$60 < d \leq 80$	125	425
$80 < d \leq 100$	75	500

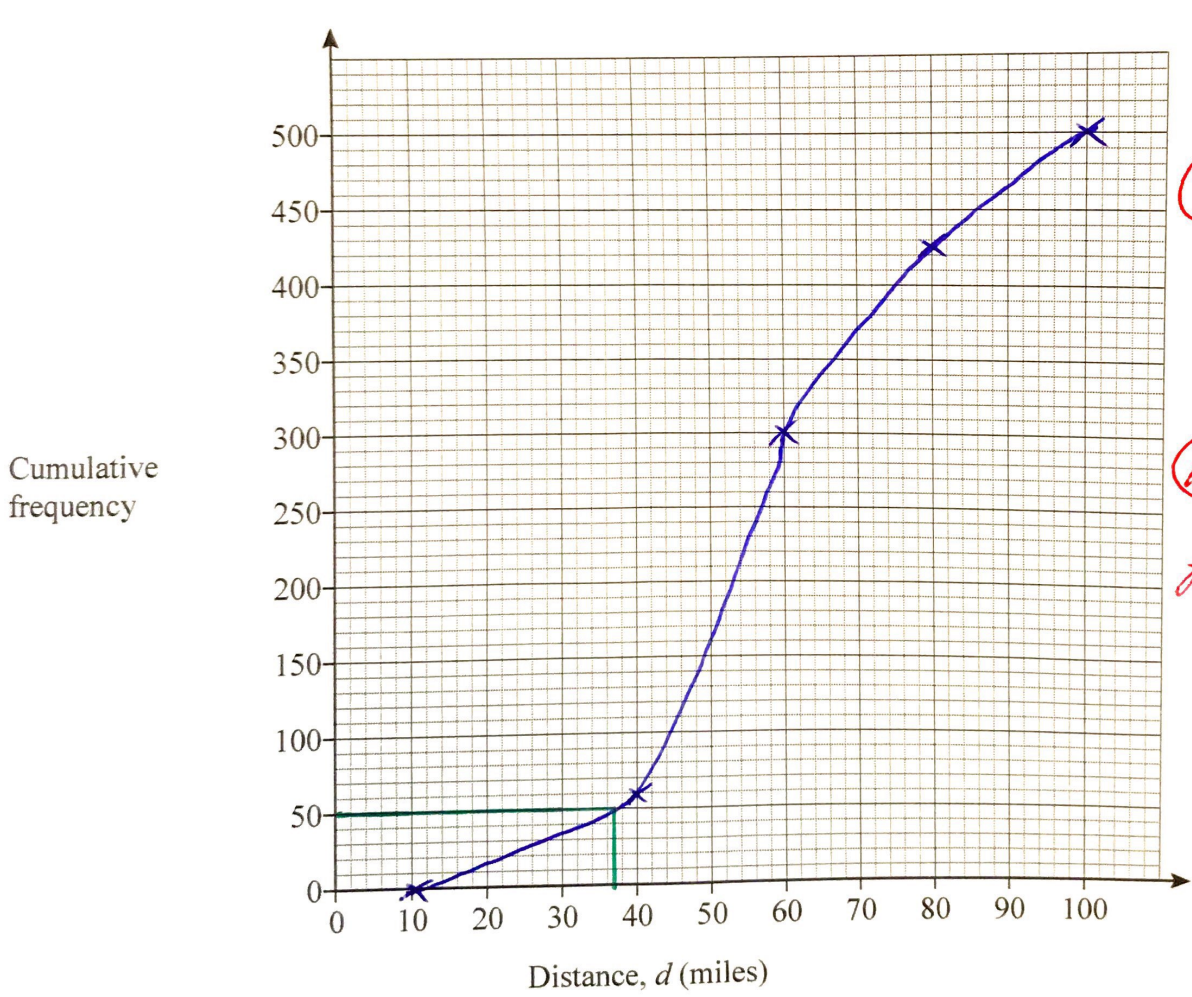
(A1)

6 (a) Complete the cumulative frequency column.

[1 mark]

6 (b) Show the information on a cumulative frequency graph.

[3 marks]



-1 not at endpoint
 ↓
 (A2) All points correct

(A1) All points joined up dot to dot

6 (c) Deliveries under x miles are free.
 50 of the deliveries were free.
 Use your graph to estimate x .

[1 mark]

Answer 37 (A1) From graph

Match each graph to an equation.

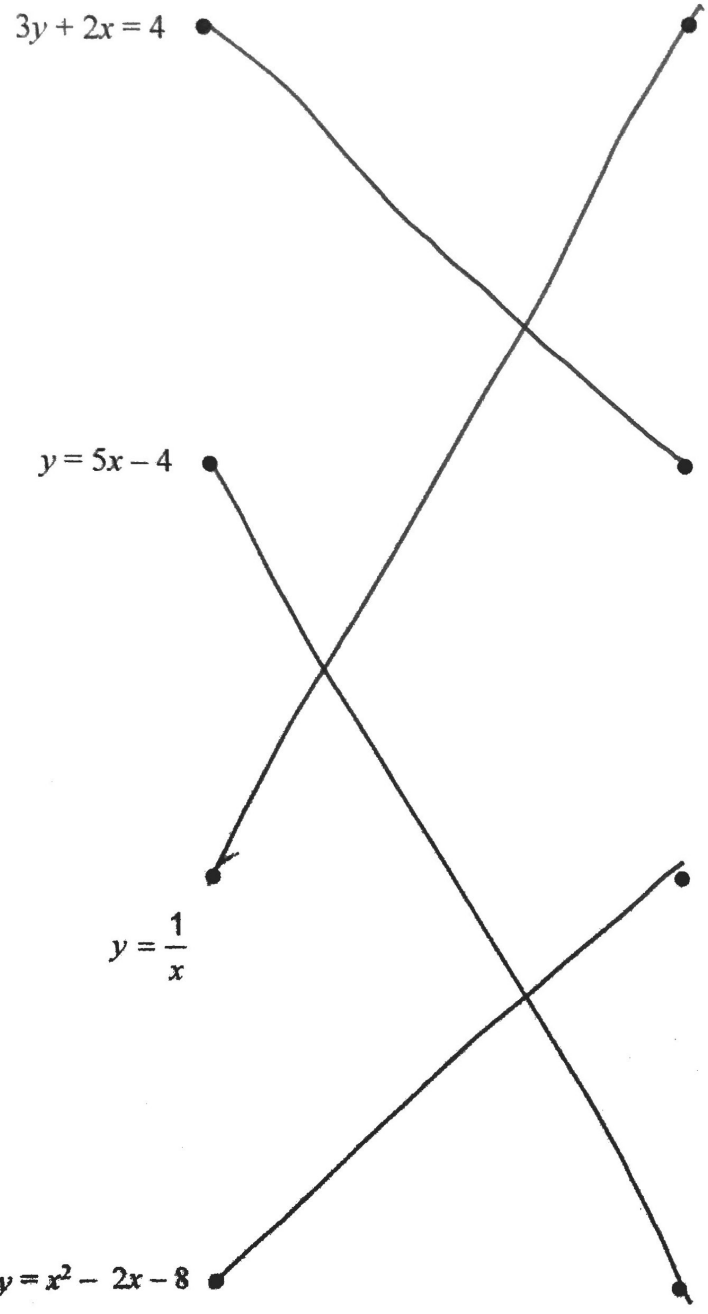
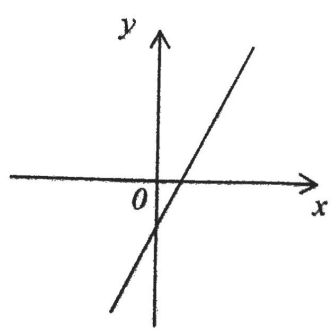
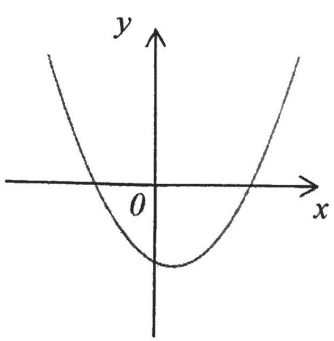
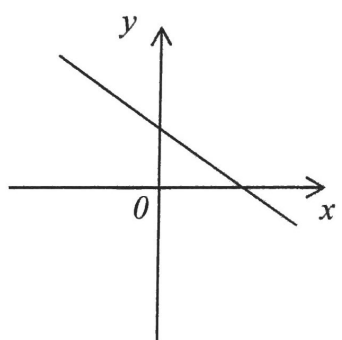
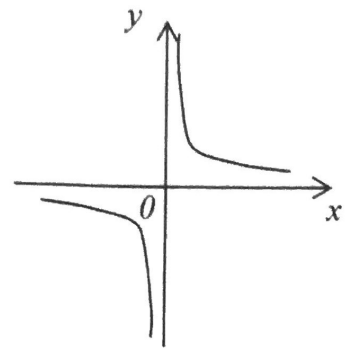
[2 marks]

$3y + 2x = 4$

$y = 5x - 4$

$y = \frac{1}{x}$

$y = x^2 - 2x - 8$



8 (a) Complete this table of values for $y = x^2 + 3x - 1$ for values of x from -4 to 2

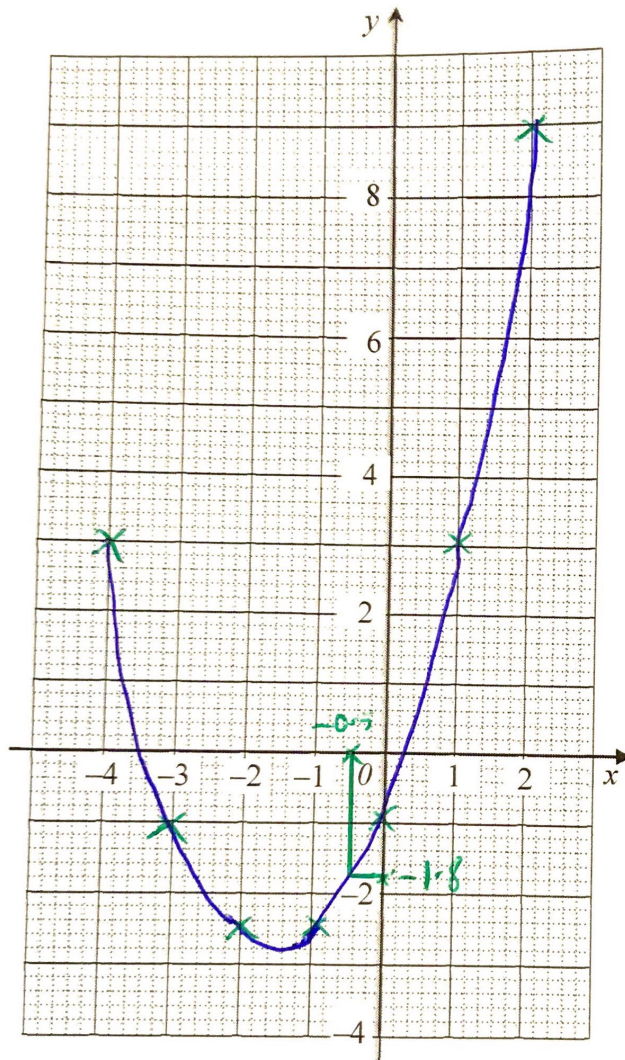
[1 mark]

x	-4	-3	-2	-1	0	1	2
y	3	-1	-3	-3	-1	3	9

(A1)

8 (b) On the grid draw the graph of $y = x^2 + 3x - 1$ for values of x from -4 to 2

[2 marks]



(A1) All points correct
(allow one error if in table)

8(c) Use the graph to estimate the value of y when $x = -0.5$

[1 mark]

Answer -1.8 (A1) From graph

8(d) Use the graph to estimate the solutions to $x^2 + 3x - 1 = 0$

Look at where it crosses the x -axis.

[2 marks]

Answer -3.5 and 0.2 (A2) From graph

9 (a) Solve the quadratic equation $x^2 + 6x + 9 = 0$

[2 marks]

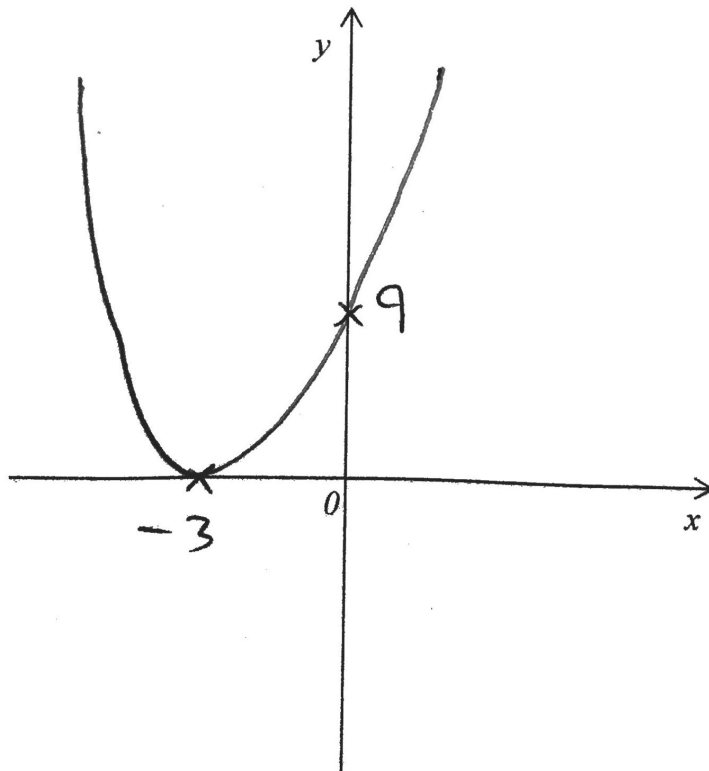
$$(x+3)(x+3) = 0$$

Answer $x = -3$

9 (b) Sketch the graph of $y = x^2 + 6x + 9$ on the axes.

Clearly mark the values of the points where the graph crosses the axes.

[3 marks]

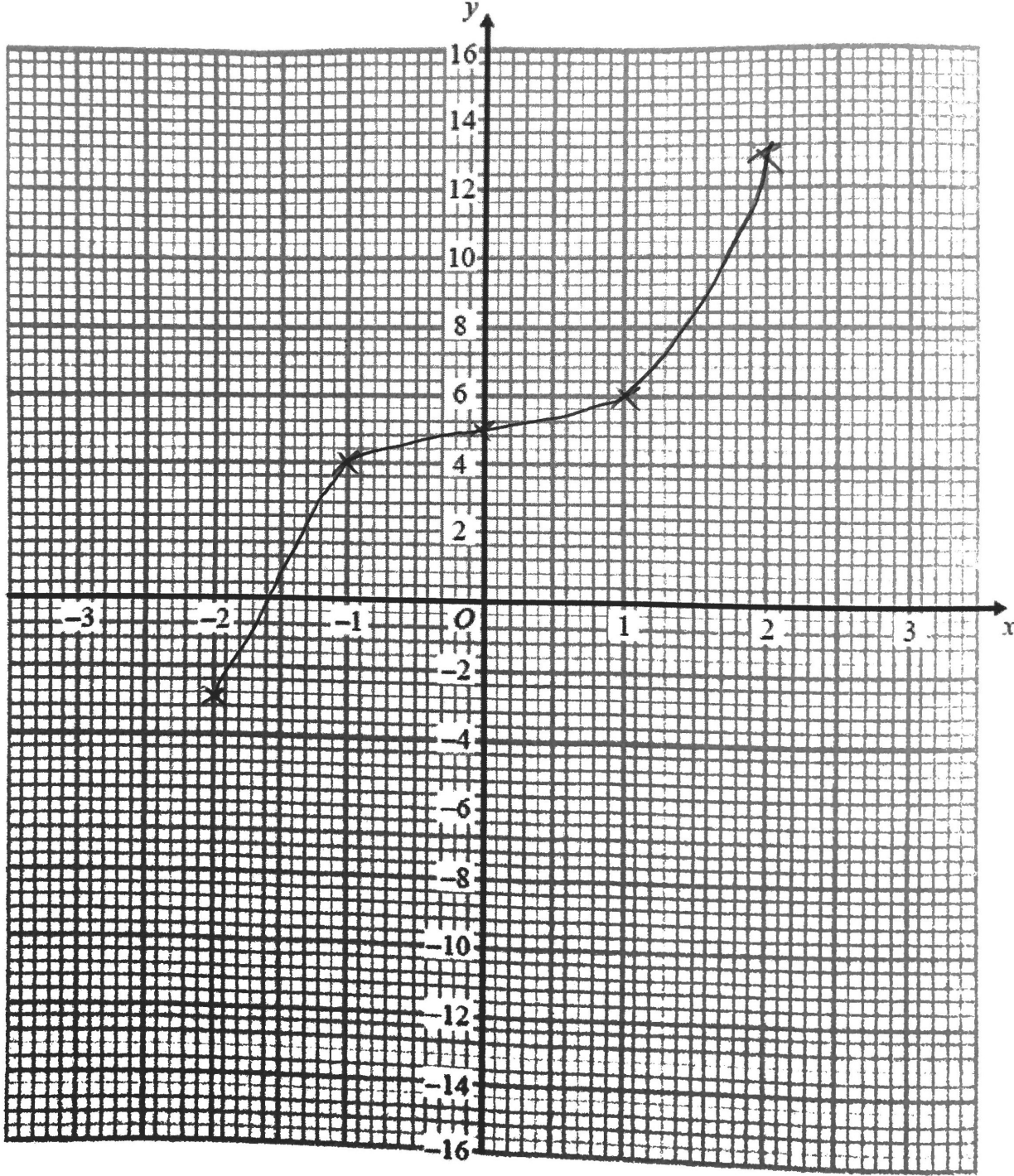


Q10.

(a) Complete the table of values for $y = x^3 + 5$

x	-2	-1	0	1	2
y	-3	4	5	6	13

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



(Total for Question is 4 marks)

Q11.

y is directly proportional to x .

When $x = 600$, $y = 10$

(a) Find a formula for y in terms of x .

$$y = kx$$

$$10 = k \times 600$$

$$k = \frac{10}{600} = \frac{1}{60}$$

$$y = \frac{1}{60}x \dots \dots \dots (3)$$

(b) Calculate the value of y when $x = 540$

$$y = \frac{1}{60} \times 540$$

$$y = \dots 9 \dots \dots \dots (1)$$

(Total for Question is 4 marks)

Q12.

y is directly proportional to the square of x .

When $x = 3$, $y = 36$

Find the value of y when $x = 5$

$$y = kx^2$$

$$36 = k \times 3^2$$

$$36 = 9k$$

$$4 = k$$

$$y = 4x^2$$

$$\text{When } x = 5, y = 4 \times 5^2$$

$$y = 100$$

$$\dots \dots \dots 100 \dots \dots \dots$$

(Total for Question is 4 marks)

Q13.

d is inversely proportional to c

When $c = 280$, $d = 25$

Find the value of d when $c = 350$

$$d = \frac{k}{c}$$

$$25 = \frac{k}{280}$$

$$k = 25 \times 280$$

$$k = 7000$$

$$d = \frac{7000}{c}$$

When $c = 350$,

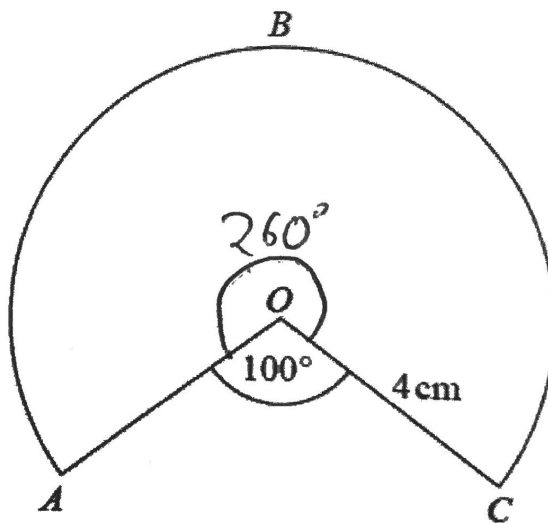
$$d = \frac{7000}{350}$$

$$d = \dots 20 \dots$$

(Total for question = 3 marks)

Q14.

The diagram shows a sector of a circle of radius 4 cm.



Work out the length of the arc ABC.

Give your answer correct to 3 significant figures.

$$\frac{260}{360} \times \pi d$$

$$= \frac{260}{360} \times \pi \times 8$$

$$\dots 18.2 \dots \text{ cm}$$

(Total for question = 2 marks)

Q15.

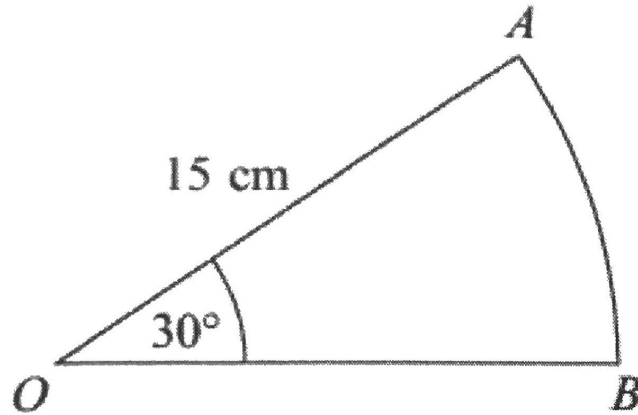


Diagram **NOT**
accurately drawn

OAB is a sector of a circle, centre O .
The radius of the circle is 15 cm.
The angle of the sector is 30° .

Calculate the area of sector OAB .
Give your answer correct to 3 significant figures.

$$\text{Area} = \frac{30}{360} \times \pi r^2$$

$$= \frac{1}{12} \times \pi \times 15^2 = 58.9$$

~~58.9~~

58.9... ~~6~~ cm²

(Total for Question is 2 marks)