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GCSE MATHS

Algebra

Edexcel 1MA1 | Subtopic collection Topic 24

Graphs of functions

Higher tier

Past paper question booklet

131	2003-2025	Higher
question groups	available papers	tier

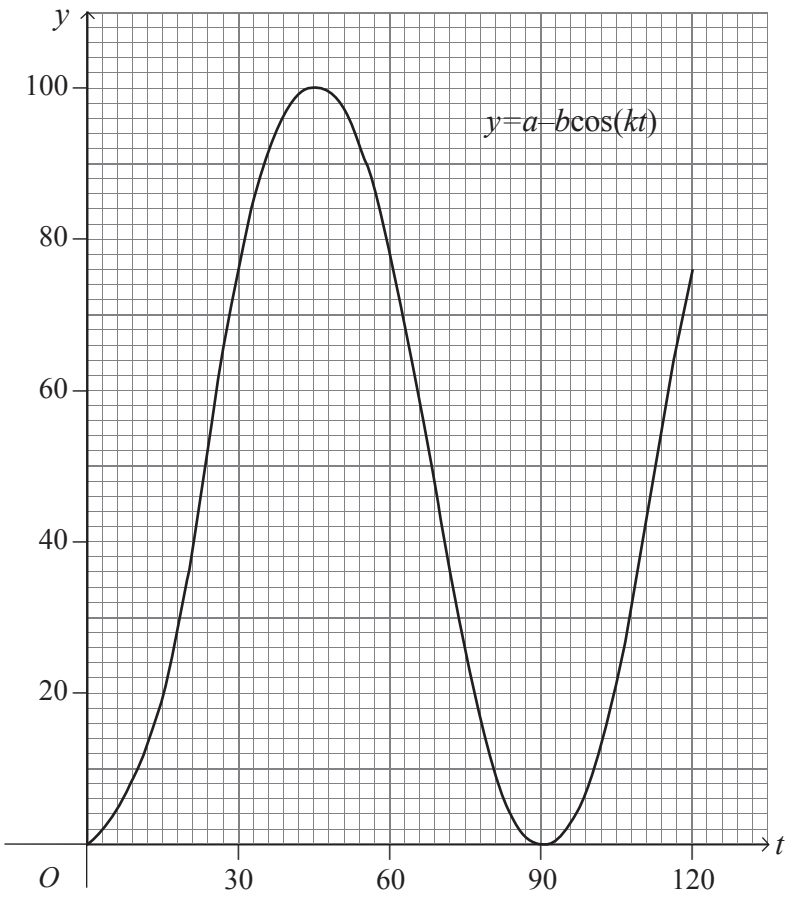
Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

20.



Leave blank

The graph of $y = a - b\cos(kt)$, for values of t between 0° and 120°, is drawn on the grid.

Use the graph to find an estimate for the value of

(i) a,

.....

(ii) b,

.....

(iii) k.

.....

(3)

20. The expression $x^2 - 6x + 14$ can be written in the form $(x - p)^2 + q$, for all values of x.

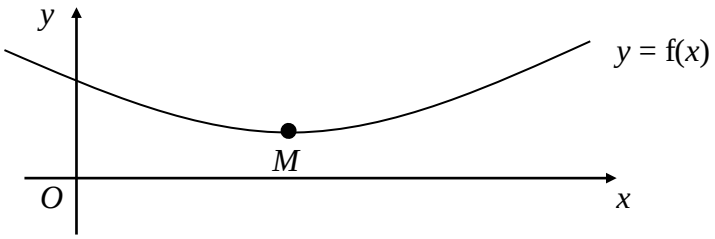
(a) Find the value of (i) p, (ii) q.

(i) $p =$ .....

(ii) $q =$ .....

(3)

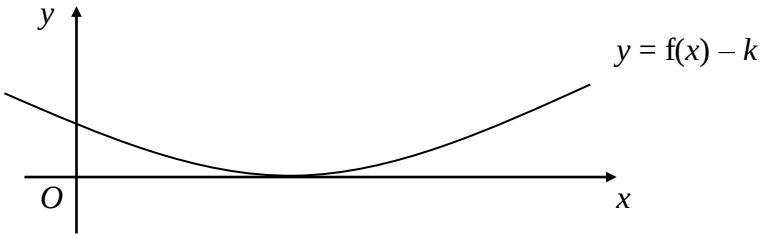
The equation of a curve is $y = f(x)$, where $f(x) = x^2 - 6x + 14$.
Here is a sketch of the graph of $y = f(x)$.



(b) Write down the coordinates of the minimum point, M, of the curve.

.....
(1)

Here is a sketch of the graph of $y = f(x) - k$, where k is a positive constant.
The graph touches the x-axis.



(c) Find the value of k.

$k =$ .....
(1)

(d) For the graph of $y = f(x - 1)$,

(i) write down the coordinates of the minimum point,

.....

(ii) find the coordinates of the point where the curve crosses the y-axis.

.....
(3)

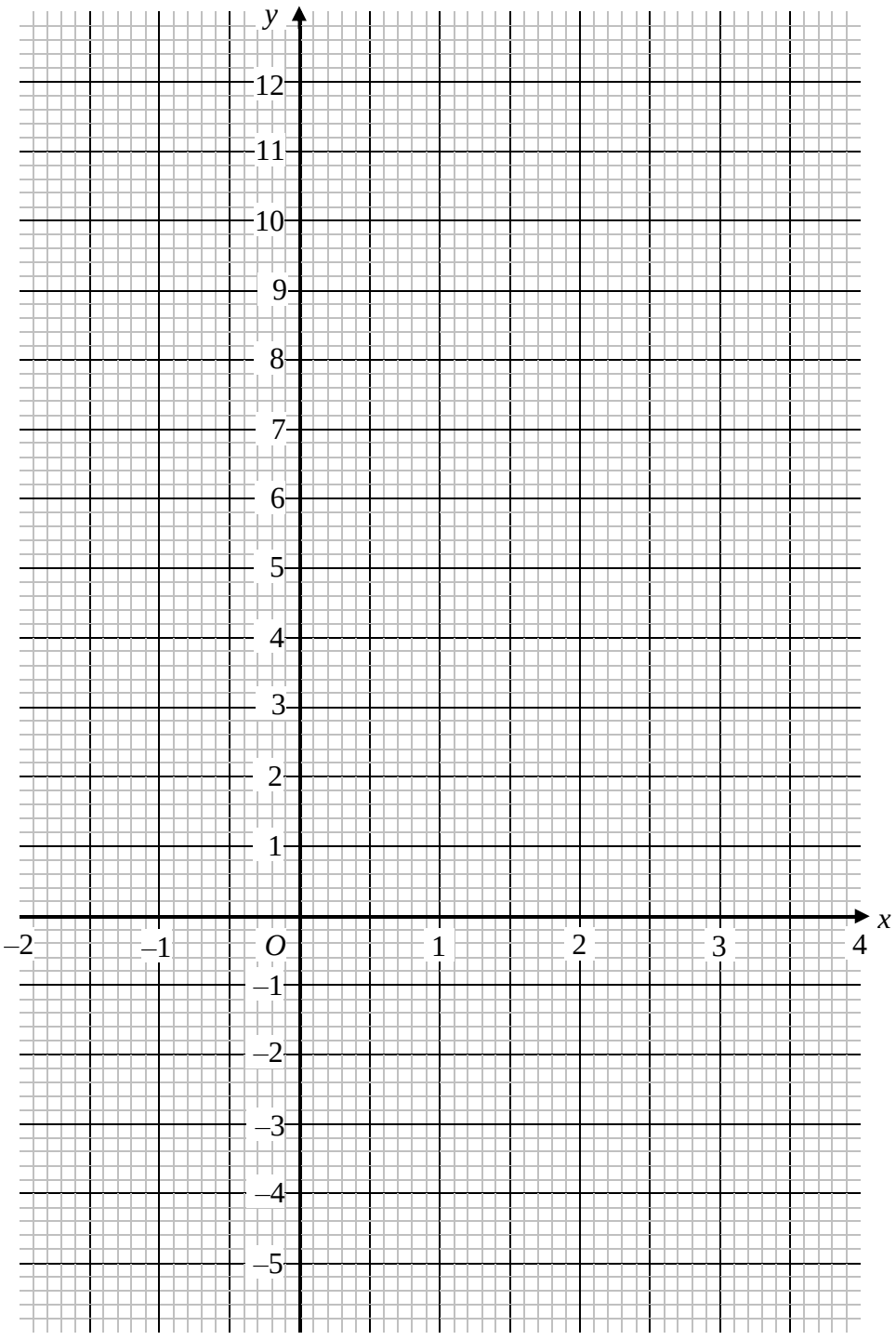
7. (a) Complete the table for $y = x^2 - 3x + 1$

x	–2	–1	0	1	2	3	4
y	11		1	–1		1	5

(2)

(b) On the grid, draw the graph of $y = x^2 - 3x + 1$

(2)



(c) Use your graph to find an estimate for the minimum value of y.

$y =$ .....

(1)

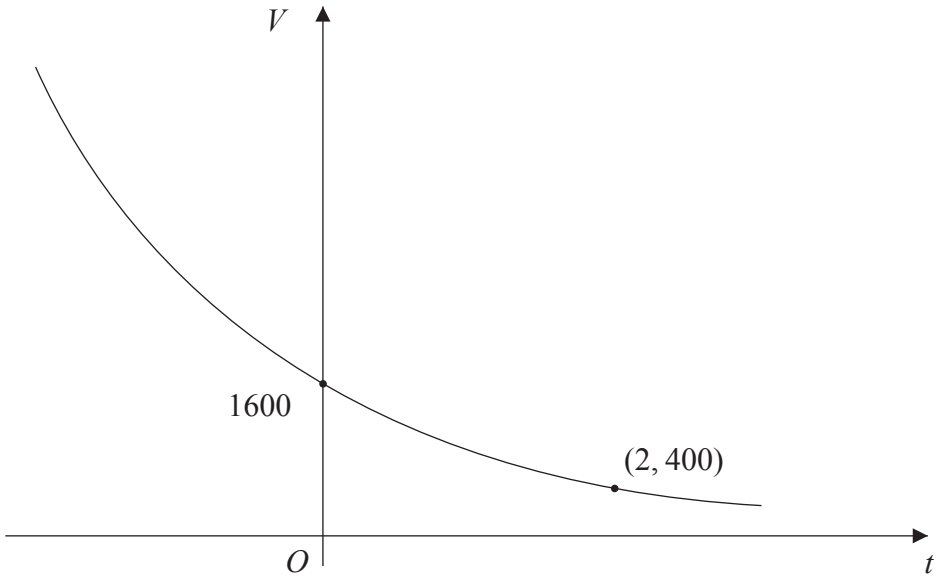
(d) Use a graphical method to find estimates of the solutions to the equation

$$x^2 - 3x + 1 = 2x - 4$$

$x =$ ..... or $x =$ .....

(3)

15. Mr Patel has a car.



The value of the car on January 1st 2000 was £1600
The value of the car on January 1st 2002 was £400

The sketch graph shows how the value, £V, of the car changes with time.
The equation of the sketch graph is

$$V = pq^t$$

where t is the number of years after January 1st 2000.
p and q are positive constants.

(a) Use the information on the graph to find the value of p and the value of q.

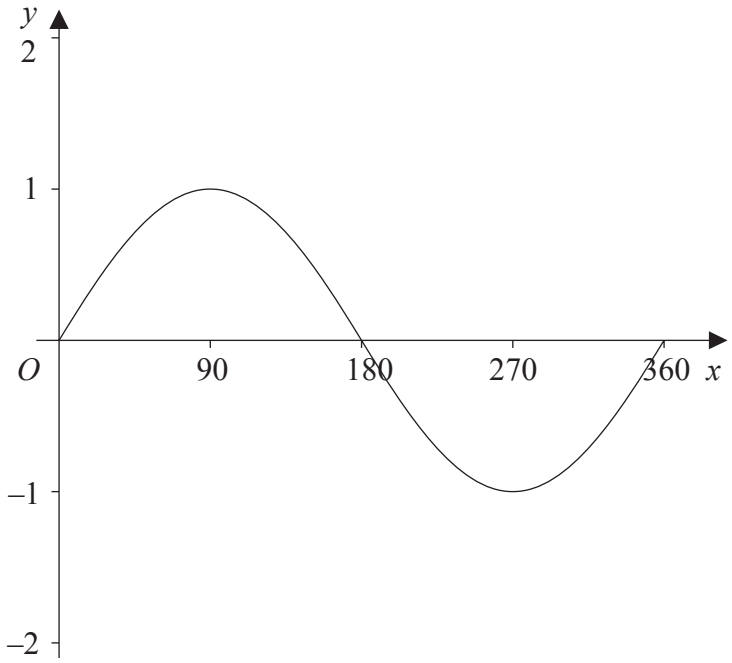
$p =$ ..... $q =$ .....
(3)

(b) Using your values of p and q in the formula $V = pq^t$ find the value of the car on January 1st 1998.

£ .....
(2)

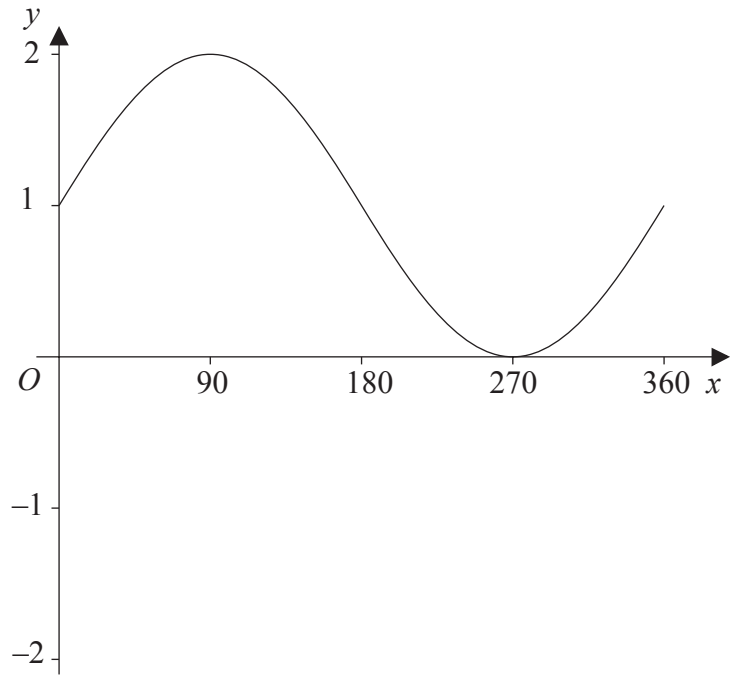
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20. A sketch of the curve $y = \sin x°$ for $0 \leqslant x \leqslant 360$ is shown below.



(a) Using the sketch above, or otherwise, find the equation of each of the following two curves.

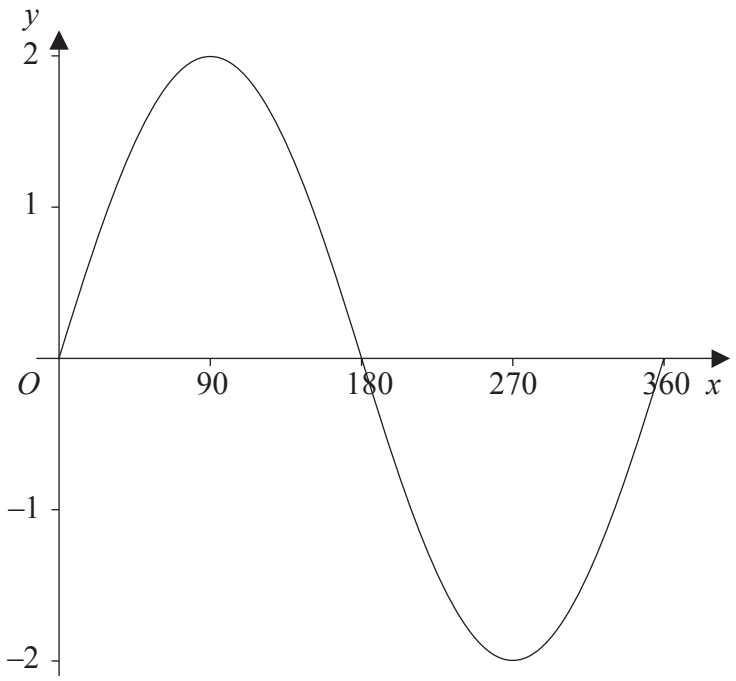
(i)



(i) Equation $y =$ .....

blank

(ii)



(ii) Equation $y =$ .....

(2)

(b) Describe fully the sequence of two transformations that maps the graph of $y = \sin x°$ onto the graph of $y = 3 \sin 2x°$.

.....

.....

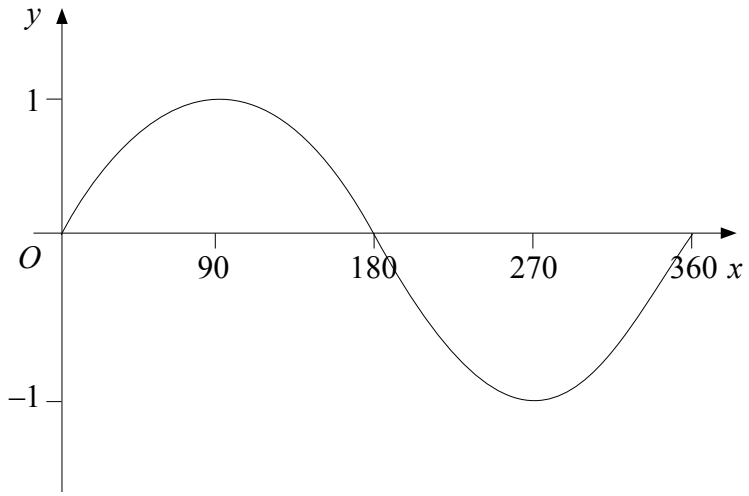
.....

.....

(3)

blank

19. Here is a sketch of the curve $y = \sin x^\circ$ for $0 \leqslant x \leqslant 360$.



(a) Given that $\sin 30^\circ = \frac{1}{2}$, write down the value of

(i) $\sin 150^\circ$

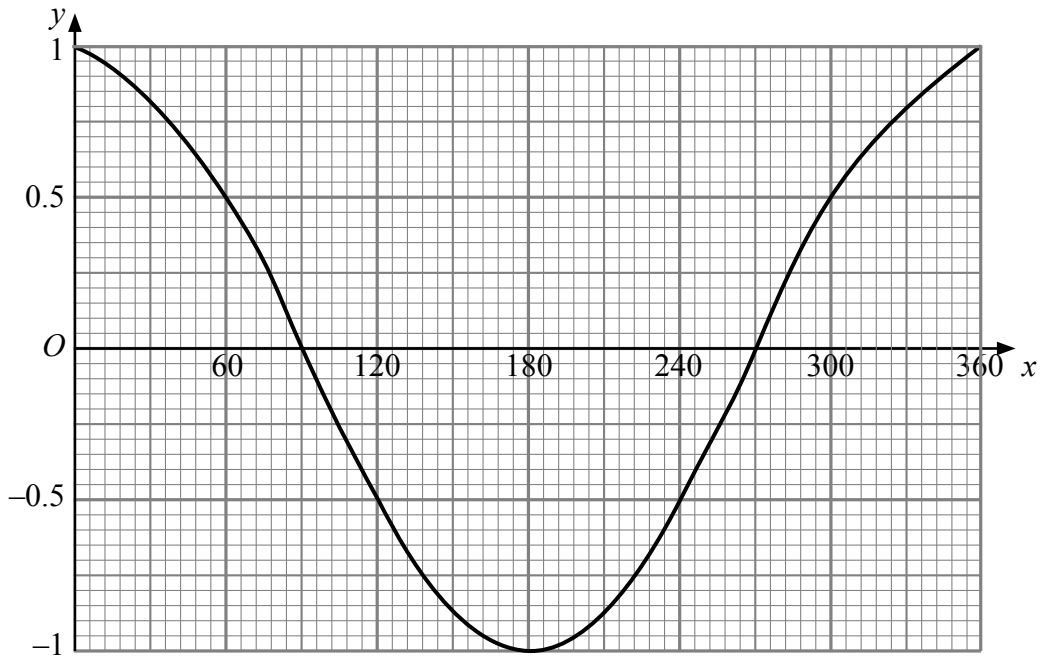
.....

(ii) $\sin 330^\circ$

.....

(2)

The graph of $y = \cos x^\circ$ for $0 \leqslant x \leqslant 360$ is drawn below.



blank

(b) Use the graph to find estimates of the solutions, in the interval $0 \leqslant x \leqslant 360$, of the equation

(i) $\cos x^{\circ} = -0.4$

.....

(ii) $4\cos x^{\circ} = 3$

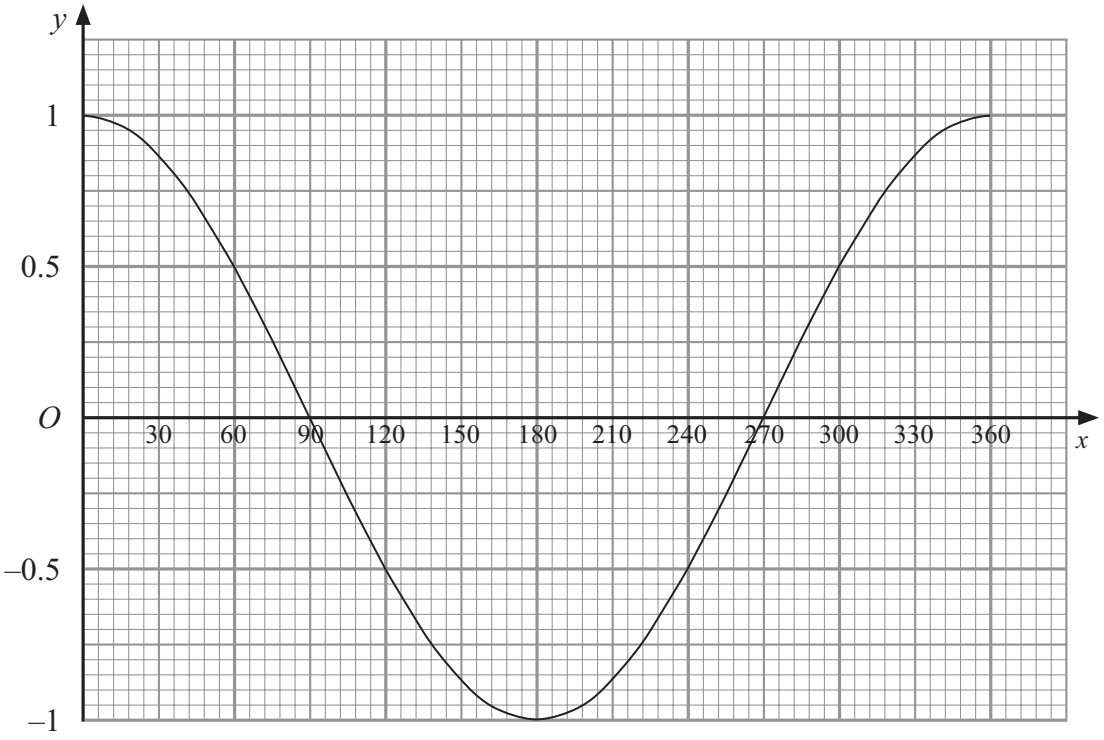
.....

(4)

(Total 6 marks)

Q19

25. Here is a graph of the curve $y = \cos x°$ for $0 \leqslant x \leqslant 360$



Use the graph to solve $\cos x° = 0.75$ for $0 \leqslant x \leqslant 360$

Q25

.....

(Total 2 marks)

26. For all values of x,

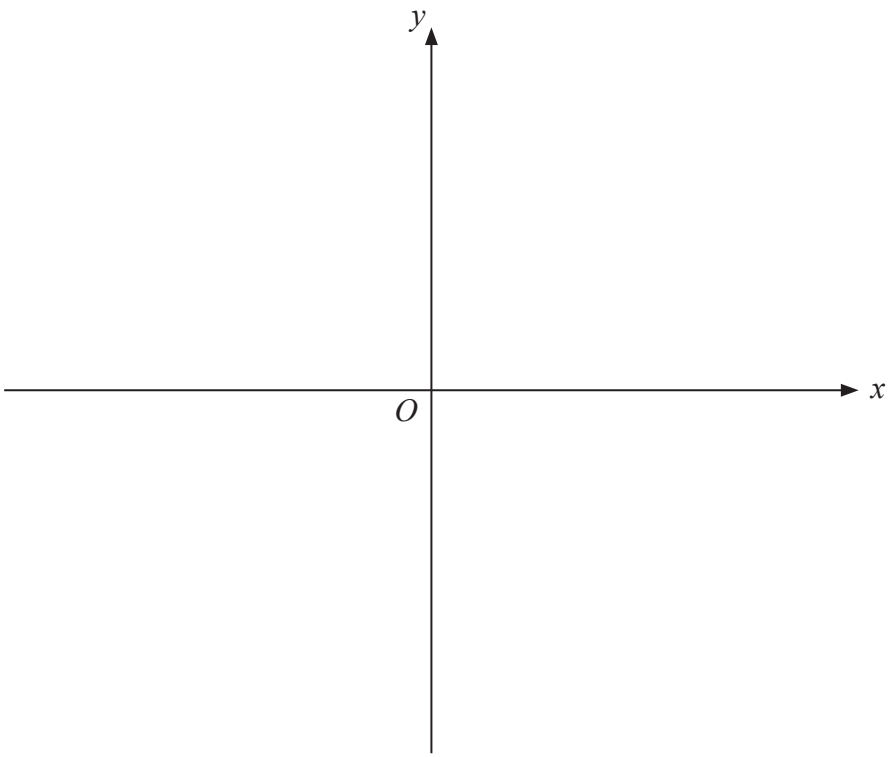
$$x^2 - 6x + 15 = (x - p)^2 + q$$

(a) Find the value of p and the value of q.

$p =$ ..... , $q =$ .....

(2)

(b) On the axes, draw a sketch of the graph $y = x^2 - 6x + 15$

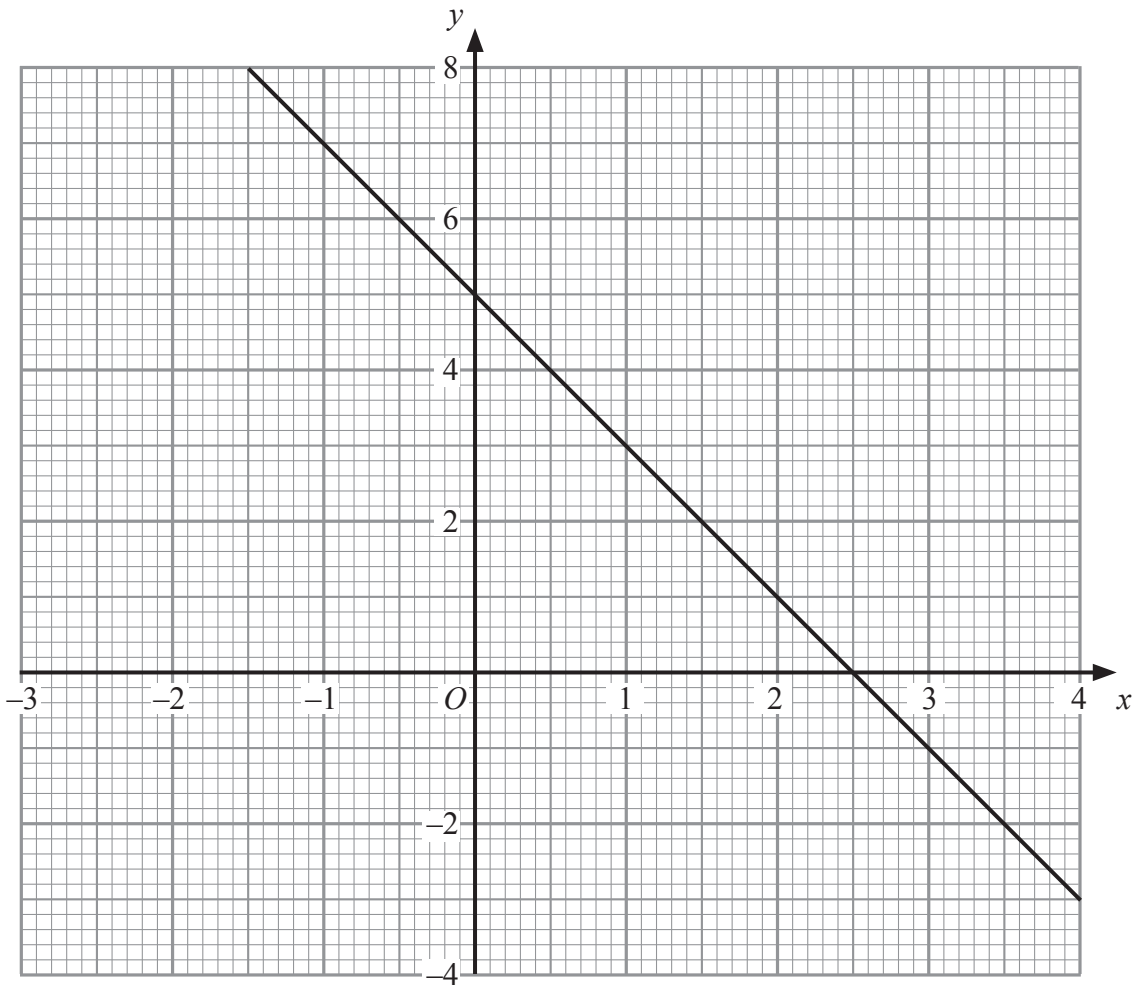


(2) **Q26**

(Total 4 marks)

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8. The straight line $y + 2x = 5$ has been drawn on the grid.



(a) Complete this table of values for $y = 2x - 1$

x	–1	0	1	2	3	4
y		–1		3	5	

(2)

(b) On the grid, draw the graph of $y = 2x - 1$

(2)

(c) Use your diagram to solve the simultaneous equations

$y + 2x = 5$

$y = 2x - 1$

$x =$ .....

$y =$ .....

(2)

(Total 6 marks)

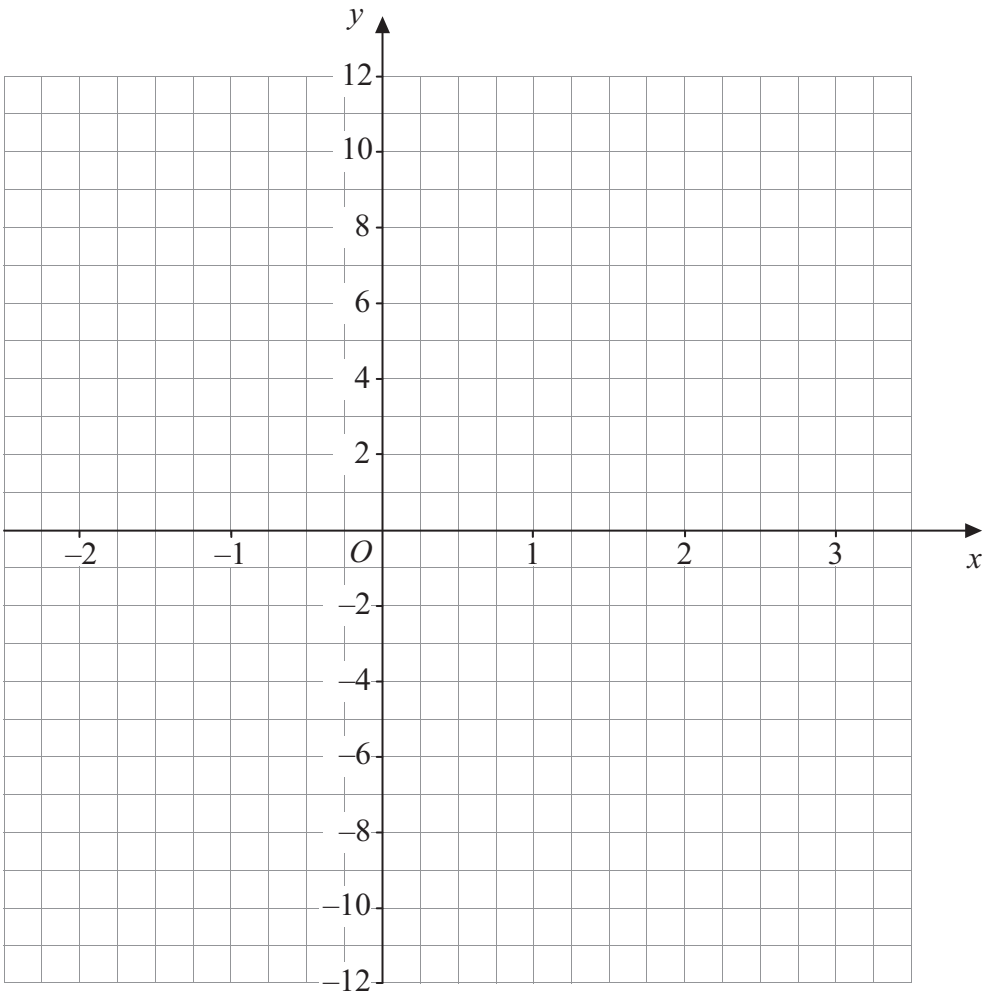
Q8

3. (a) Complete the table of values for $y = 4x - 3$

x	−2	−1	0	1	2	3
y	−11		−3			9

(2)

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

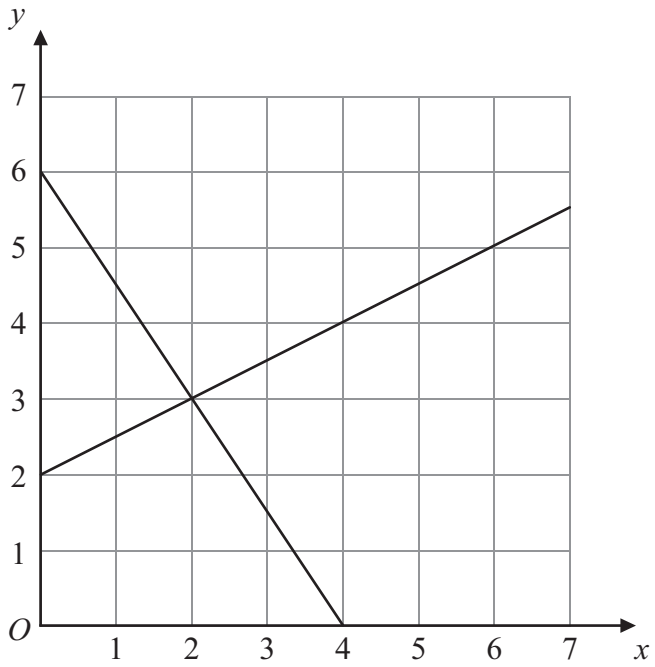


(2)

(Total 4 marks)

Q3

19.



The diagram shows graphs of $y = \frac{1}{2}x + 2$

and $2y + 3x = 12$

(a) Use the diagram to solve the simultaneous equations

$$y = \frac{1}{2}x + 2$$

$$2y + 3x = 12$$

$x =$ ..... $y =$ .....

(1)

(b) Find an equation of the straight line which is parallel to the line $y = \frac{1}{2}x + 2$ and passes through the point (0, 4).

.....

(2)

(Total 3 marks)

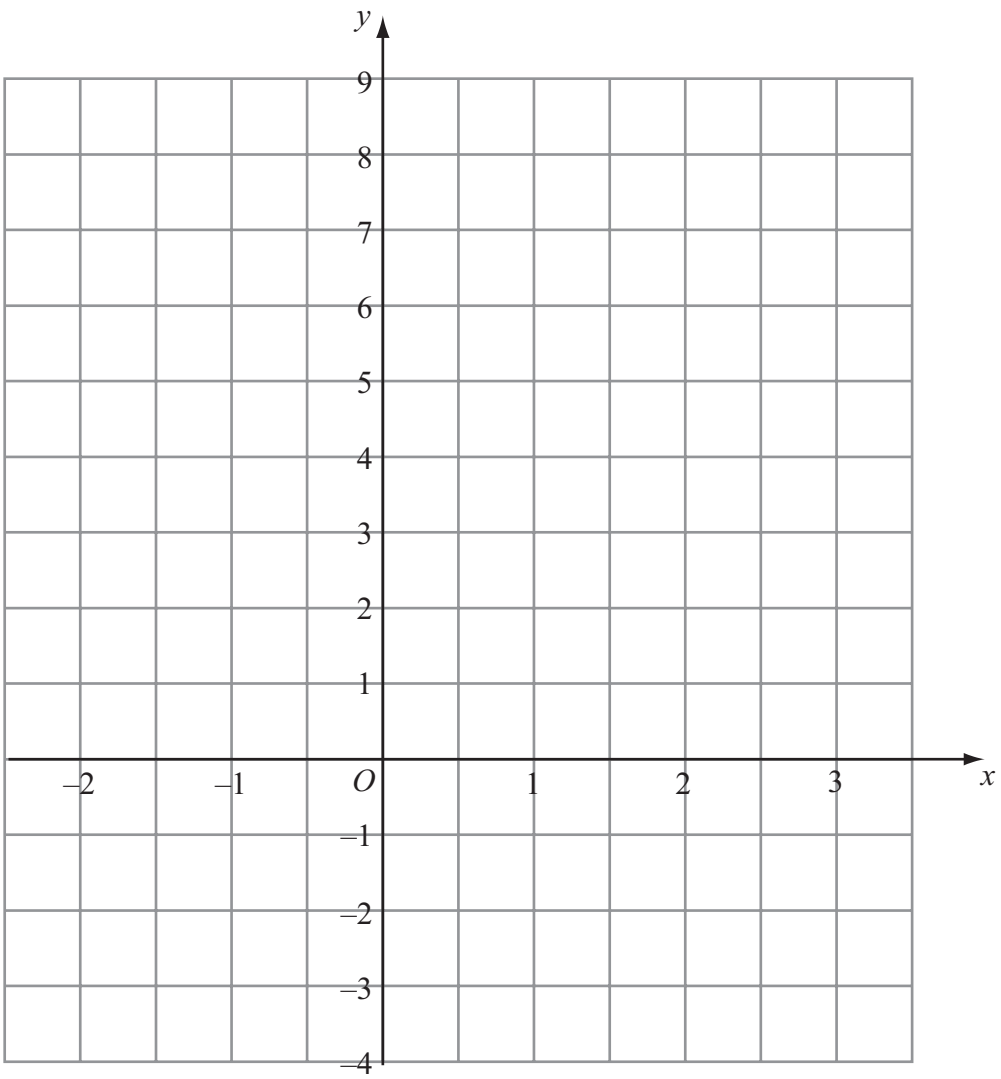
Q19

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

x	–2	–1	0	1	2	3
y		0	2			

(2)

(b) On the grid, draw the graph of $y = 2x + 2$



(2)

(c) Use your graph to find

(i) the value of y when $x = –1.5$

$y =$ .....

(ii) the value of x when $y = 7$

$x =$ **Q3**

(2)

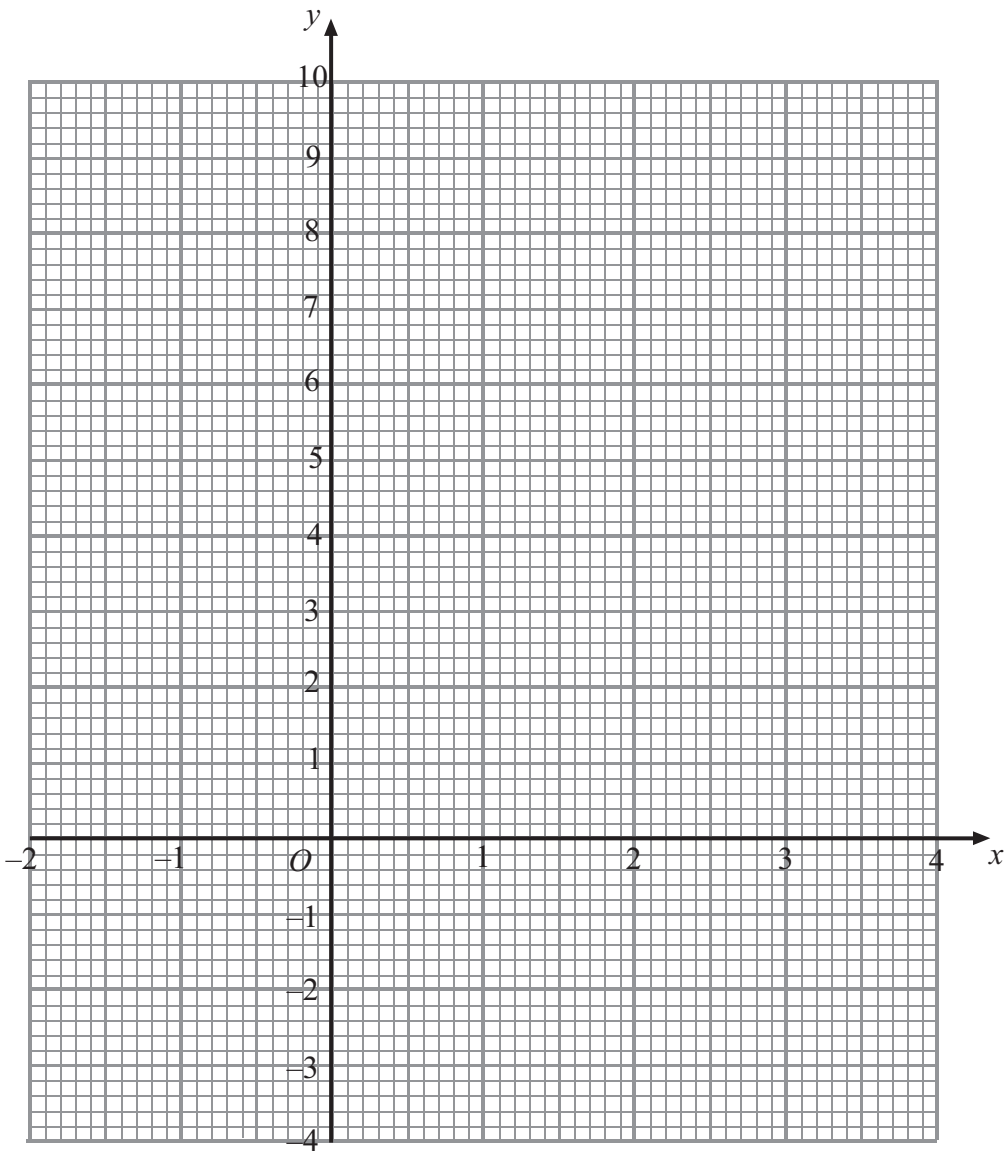
(Total 6 marks)

17. (a) Complete the table of values for $y = x^2 - 3x - 1$

x	–2	–1	0	1	2	3	4
y		3	–1	–3		–1	

(2)

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

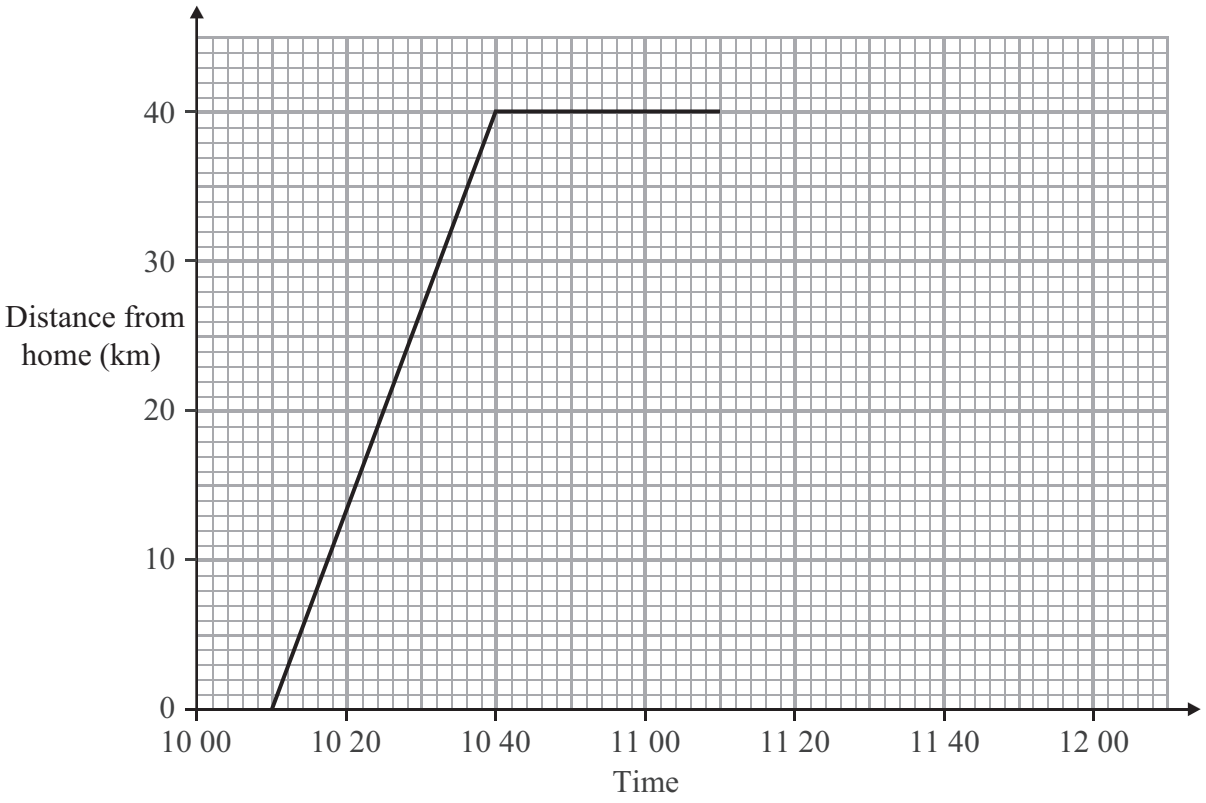


(2) **Q17**

(Total 4 marks)

4. Nigel travelled from his home to his friend's house 40 km away.
He stayed at his friend's house for 30 minutes.
Nigel then travelled home.

Here is part of the distance-time graph for Nigel's journey.



(a) At what time did Nigel leave home?

.....
(1)

(b) How far was Nigel from home at 10 20?

..... km
(1)

Nigel arrived home at 11 50

(c) Complete the distance-time graph.

(1)

(Total 3 marks)

Q4

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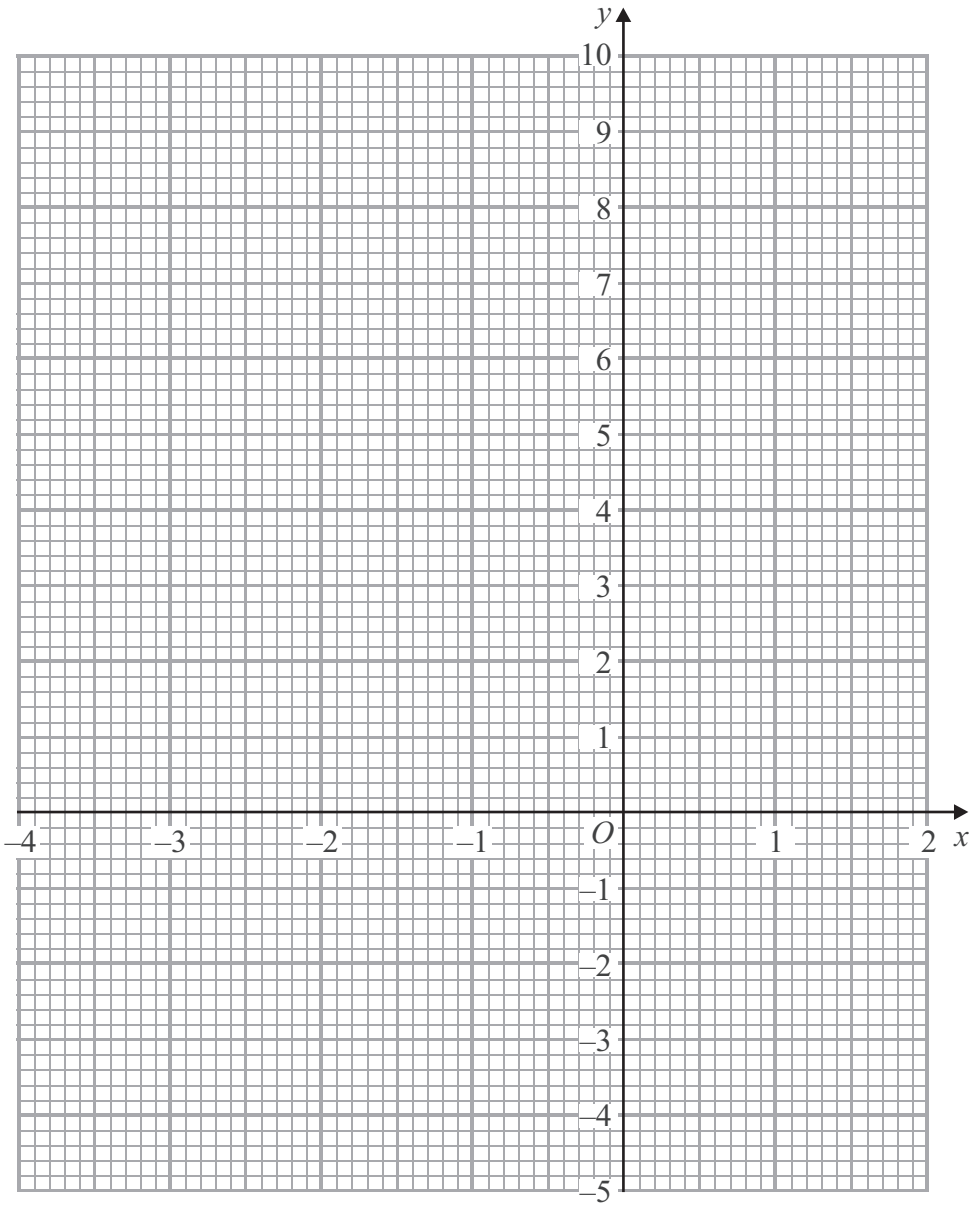
14. (a) Complete the table of values for $y = x^2 + x - 3$

x	–4	–3	–2	–1	0	1	2
y	9		–1	–3			3

(2)

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

(2)



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(c) Use your graph to find estimates for the solutions of $x^2 + x - 3 = 0$

$x =$ .....

$x =$ .....

(1)

(Total 5 marks)

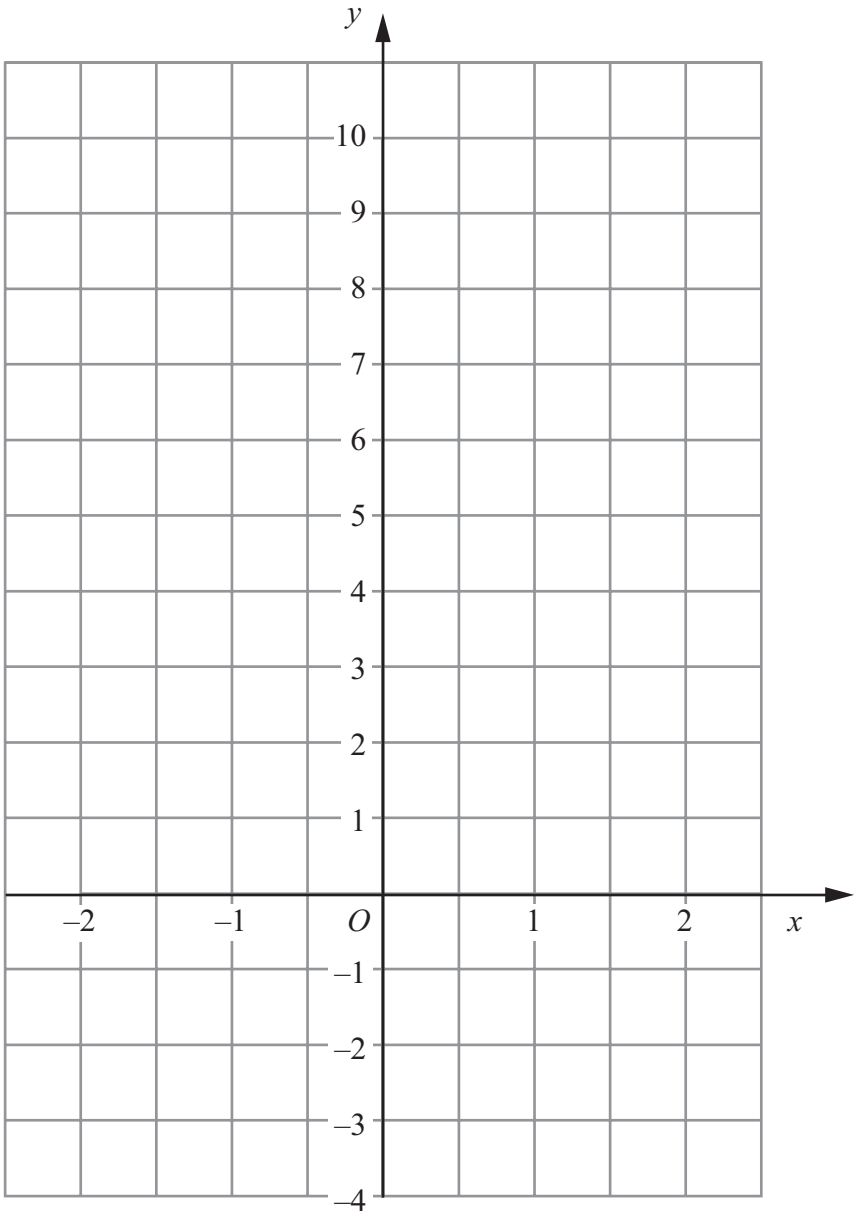
Q14

4. (a) Complete the table of values for $y = 3x + 4$

x	–2	–1	0	1	2
y		1			10

(2)

(b) On the grid, draw the graph of $y = 3x + 4$



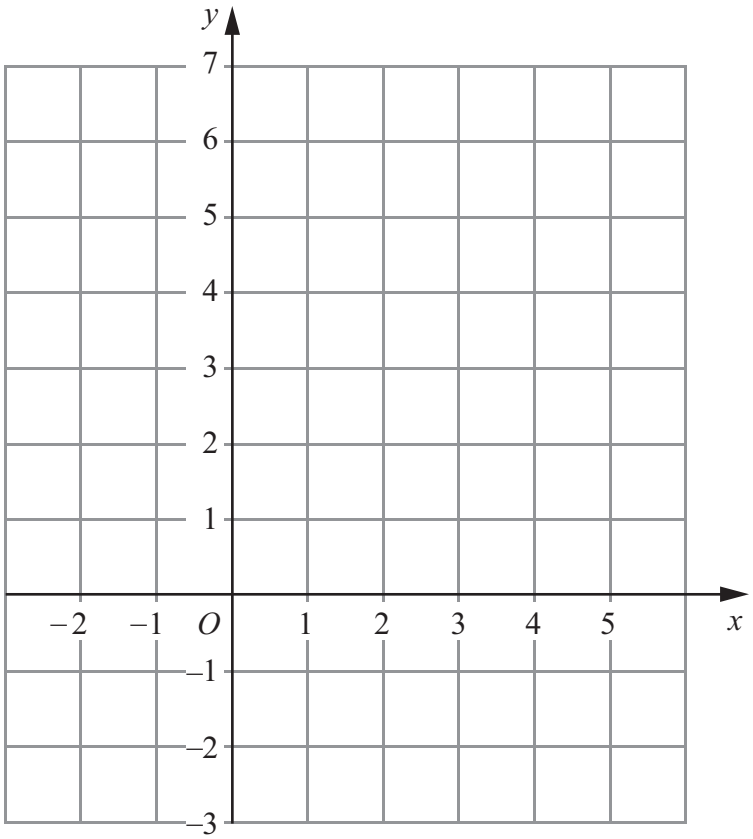
(2)

(Total 4 marks)

Q4

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8. On the grid draw the graph of $x + y = 4$ for values of x from -2 to 5

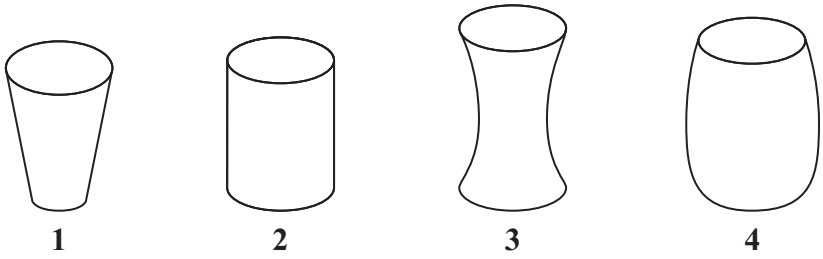


Q8

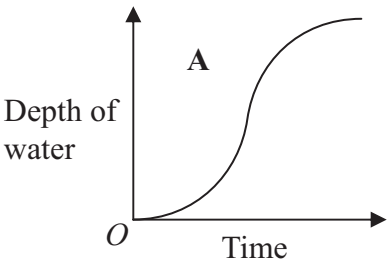
(Total 3 marks)

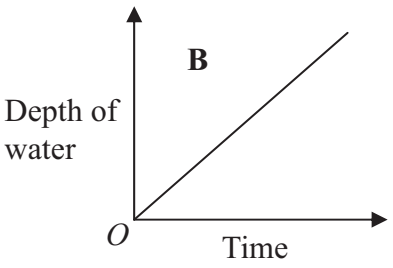
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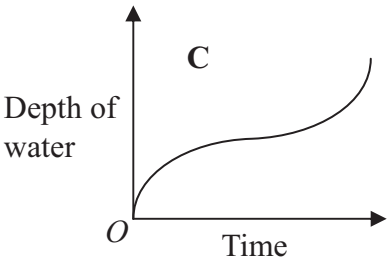
11. Here are four containers.
Water is poured into each container at a constant rate.

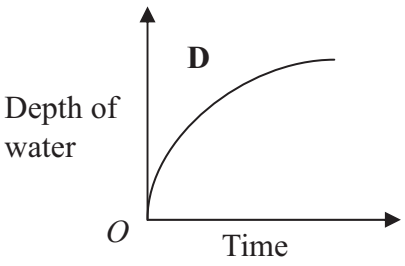


Here are four graphs.
The graphs show how the depth of the water in each container changes with time.









Match each graph with the correct container.

A and .....

B and .....

C and .....

D and **Q11**

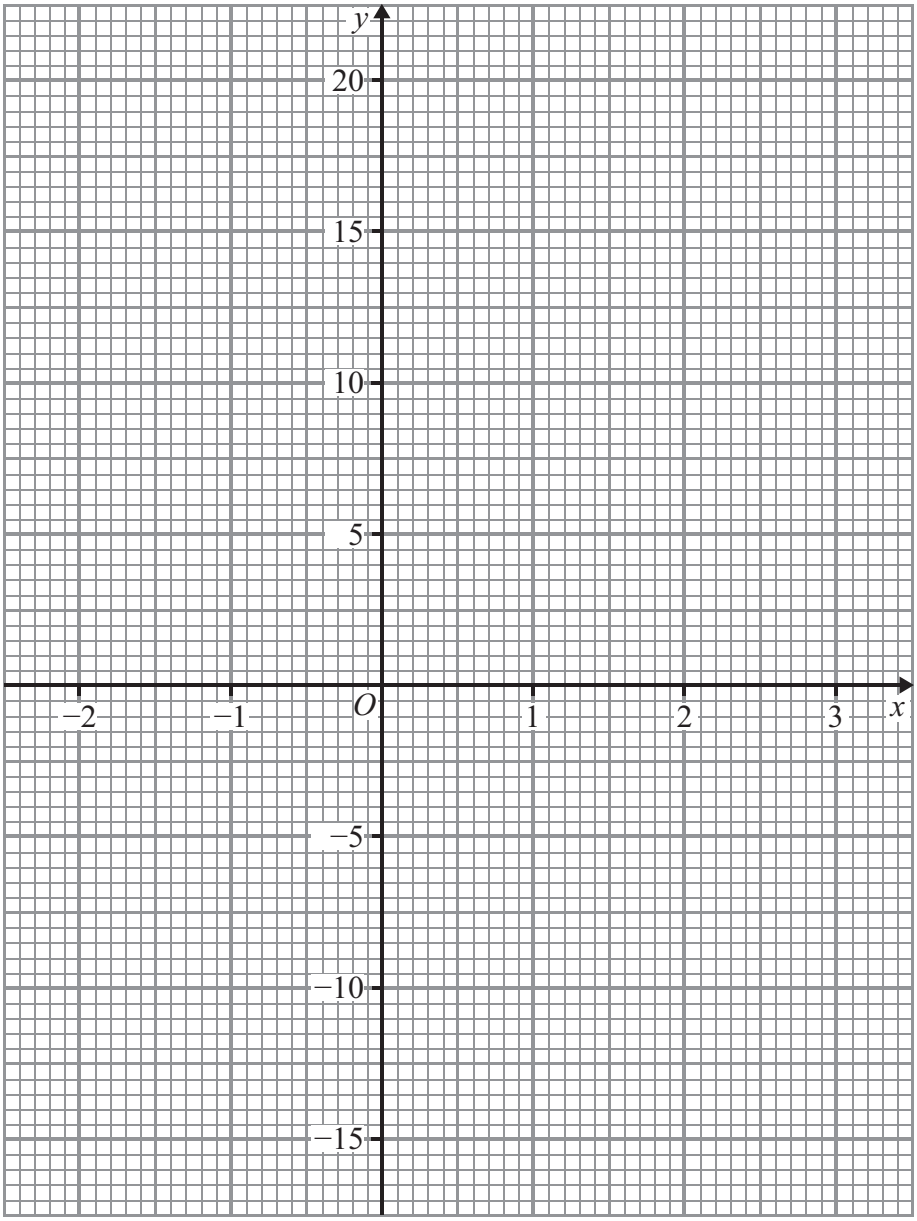
(Total 2 marks)

22. (a) Complete the table of values for $y = x^3 - 7$

x	−2	−1	0	1	2	3
y		−8				20

(2)

(b) On the grid, draw the graph of $y = x^3 - 7$ for values of x from −2 to 3



(2)

(Total 4 marks)

Q22

7 You can use this formula to change a temperature C, in °C, to a temperature F, in °F.

$$F = 1.8C + 32$$

(a) Use the formula to change 20°C into °F.

..... °F

(2)

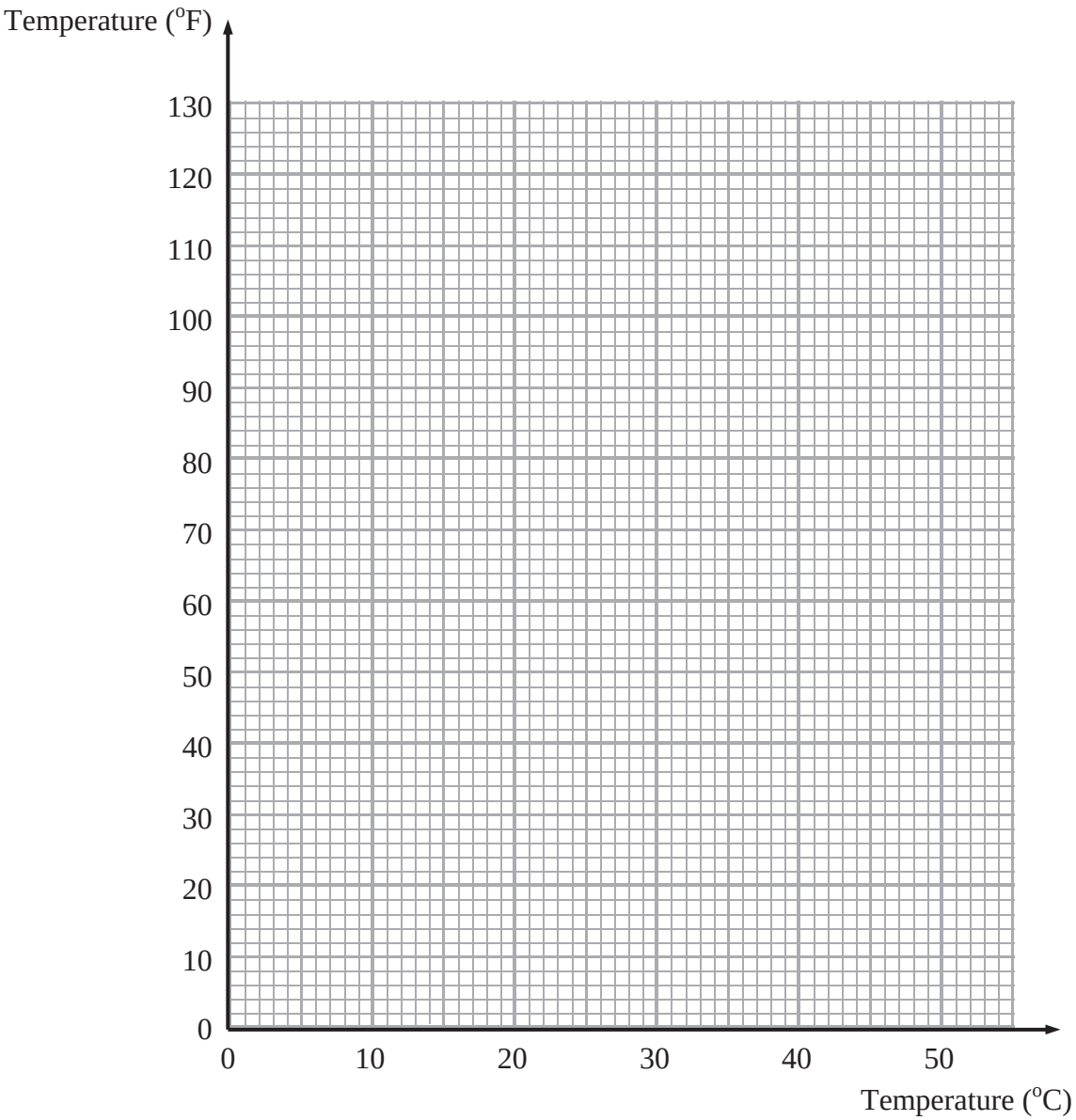
(b) On the grid opposite, draw a conversion graph that can be used to change between temperatures in °C and temperatures in °F.

(3)

(c) Use your graph to change 100 °F into °C.

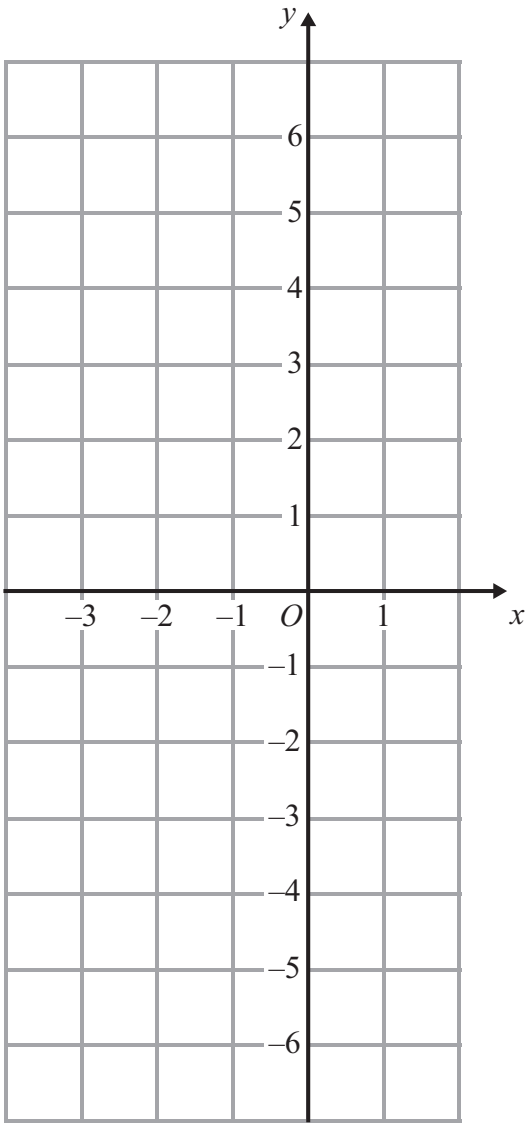
..... °C

(1)



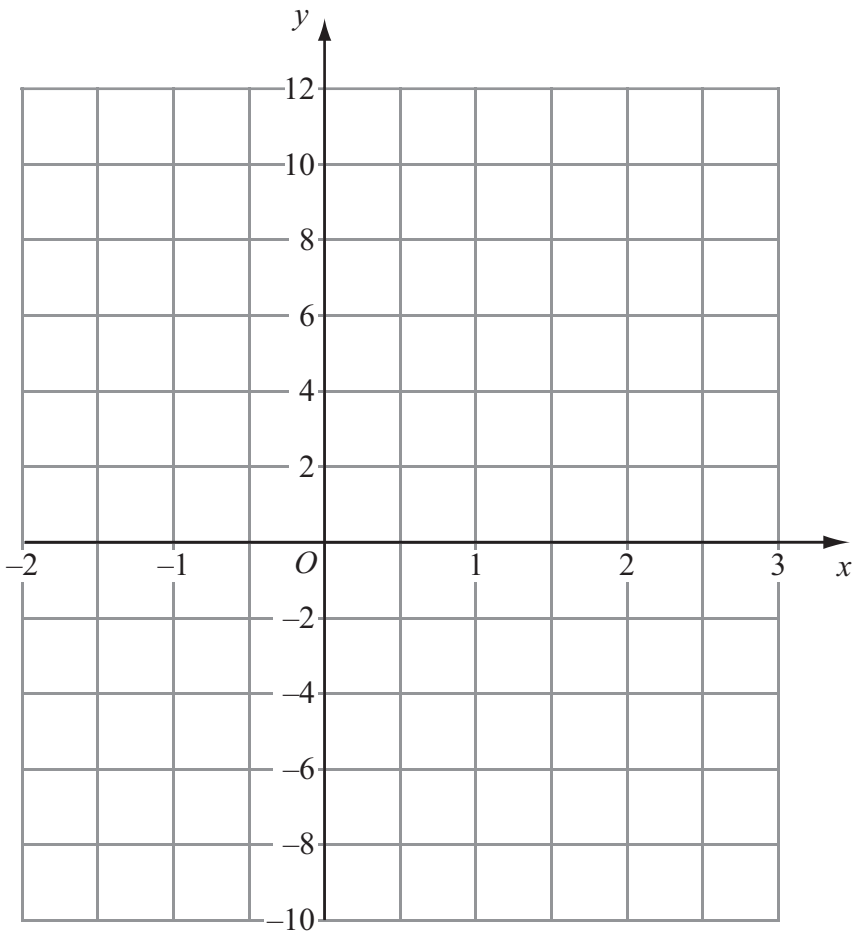
(Total for Question 7 is 6 marks)

3 On the grid, draw the graph of $y = 2x + 3$ for values of x from $x = -3$ to $x = 1$



(Total for Question 3 is 3 marks)

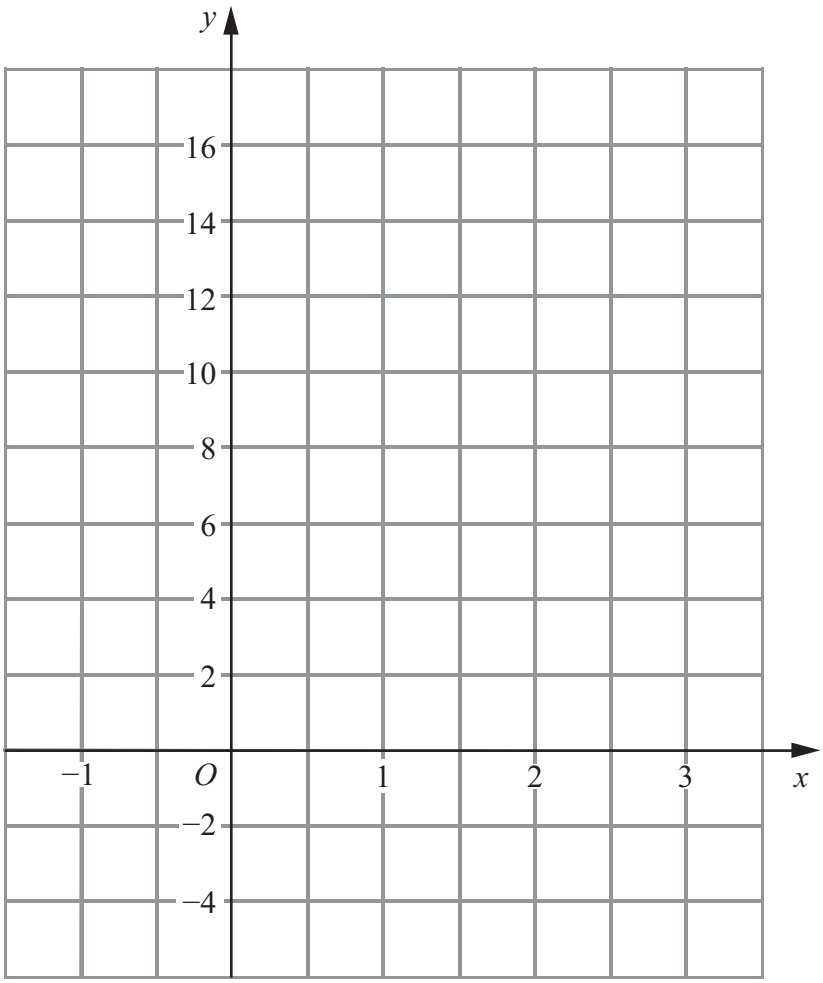
4. On the grid, draw the graph of $y = 4x - 2$



Q4

(Total 3 marks)

5 (a) On the grid, draw the graph of $y = 4x + 2$ from $x = -1$ to $x = 3$



(3)

(b) (i) Write down the equation of a straight line that is parallel to $y = 4x + 2$

.....

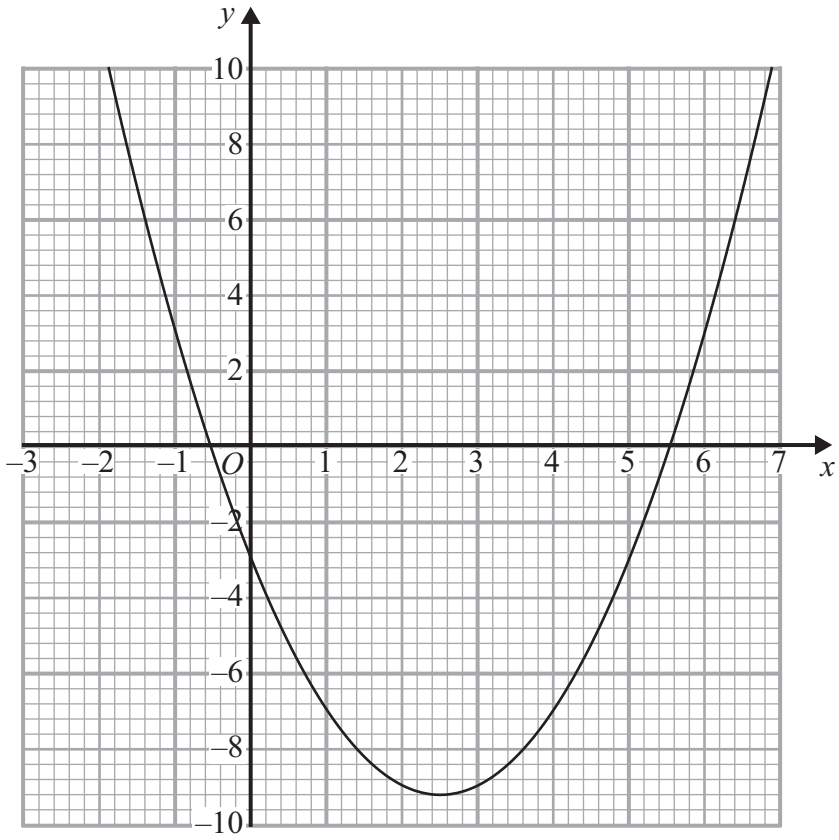
(ii) Write down the gradient of a straight line that is perpendicular to $y = 4x + 2$

.....

(2)

(Total for Question 5 is 5 marks)

14. The diagram shows the graph of $y = x^2 - 5x - 3$



(a) Use the graph to find estimates for the solutions of

(i) $x^2 - 5x - 3 = 0$

.....

(ii) $x^2 - 5x - 3 = 6$

.....

(3)

(b) Use the graph to find estimates for the solutions of the simultaneous equations

$$y = x^2 - 5x - 3$$

$$y = x - 4$$

.....

(3) **Q14**

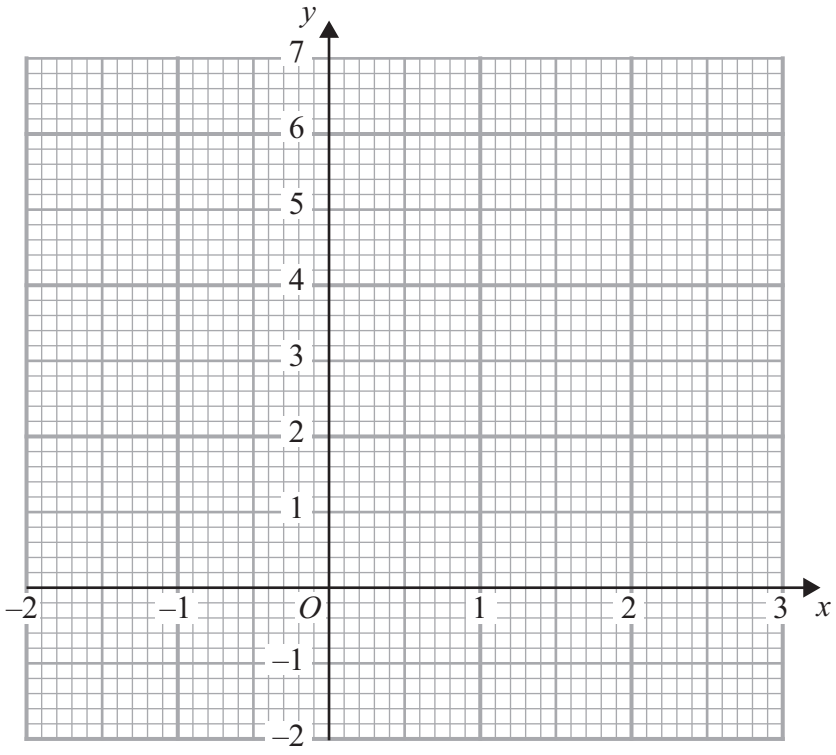
(Total 6 marks)

13. (a) Complete the table of values for $3x + 2y = 6$

x	-2	-1	0	1	2	3
y		4.5	3			-1.5

(2)

(b) On the grid, draw the graph of $3x + 2y = 6$



(2)

(c) Find the gradient of the graph of $3x + 2y = 6$

.....

(2) **Q13**

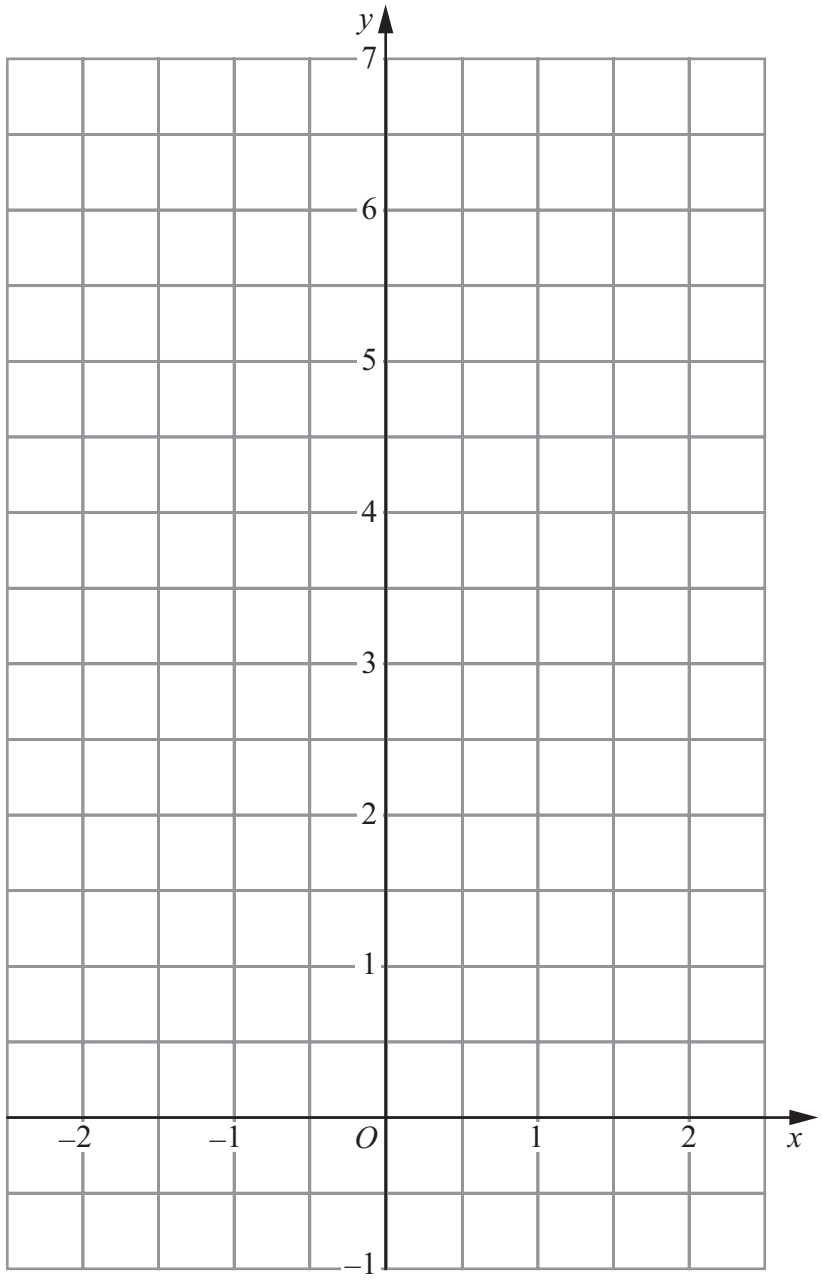
(Total 6 marks)

8 (a) Complete the table of values for $y = \frac{1}{2}x + 4$

x	–2	–1	0	1	2
y	3		4		

(2)

(b) On the grid, draw the graph of $y = \frac{1}{2}x + 4$



(2)

(c) (i) On the grid, draw the line that is perpendicular to $y = \frac{1}{2}x + 4$ and passes through the point with coordinates (0, 4).

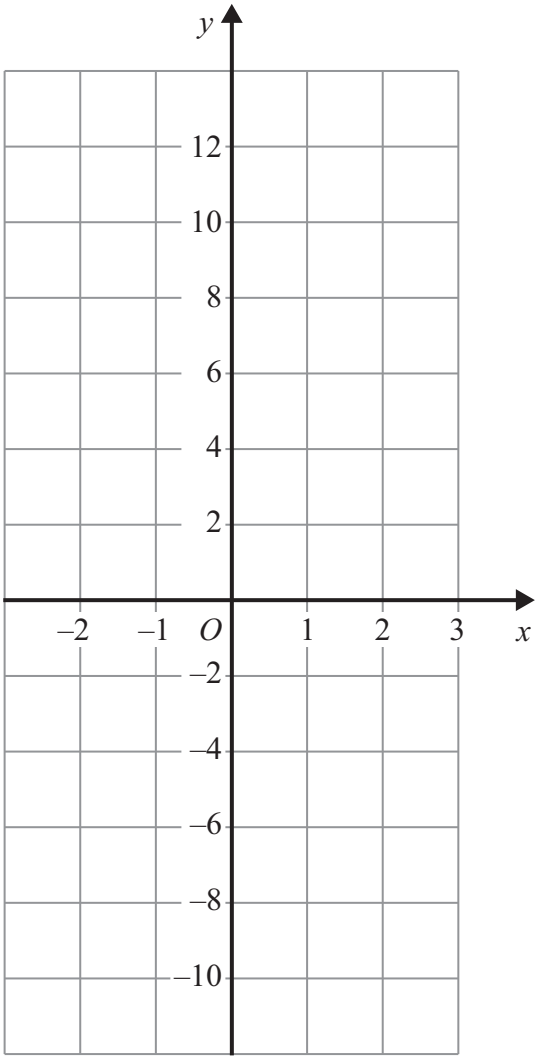
(ii) Find the equation of this line.

.....

(3)

(Total for Question 8 is 7 marks)

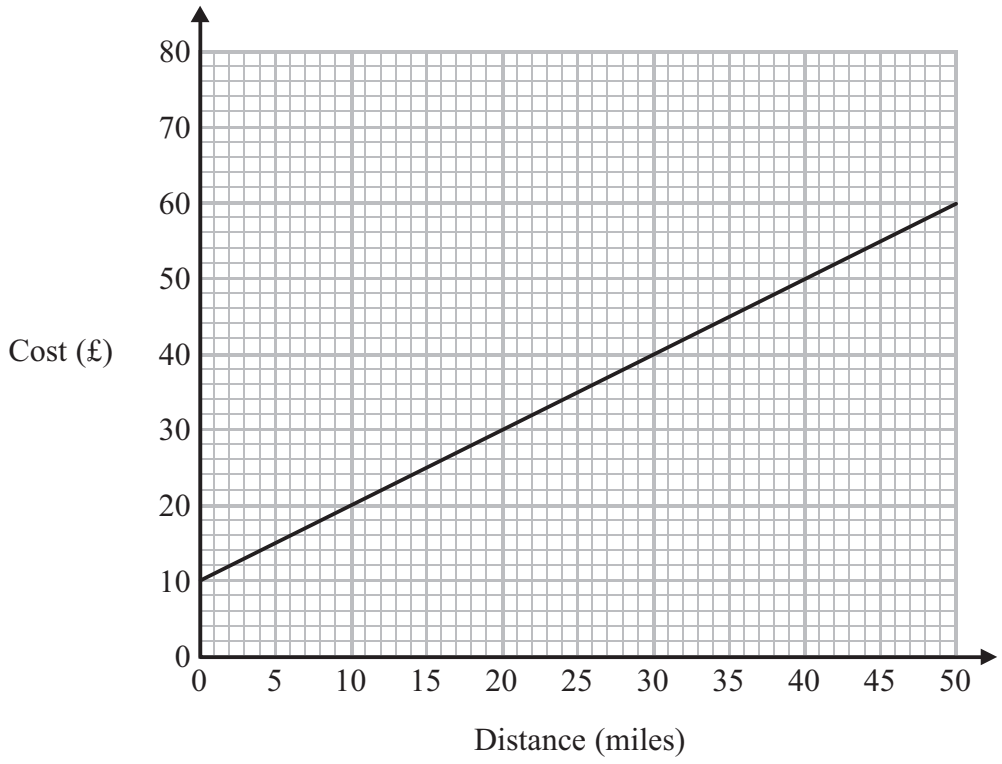
8 On the grid, draw the graph of $y = 4x - 2$ for values of x from $x = -2$ to $x = 3$



(Total for Question 8 is 3 marks)

***3** Bill uses his van to deliver parcels.
For each parcel Bill delivers there is a fixed charge plus £1.00 for each mile.

You can use the graph to find the total cost of having a parcel delivered by Bill.



(a) How much is the fixed charge?

£ .....

(1)

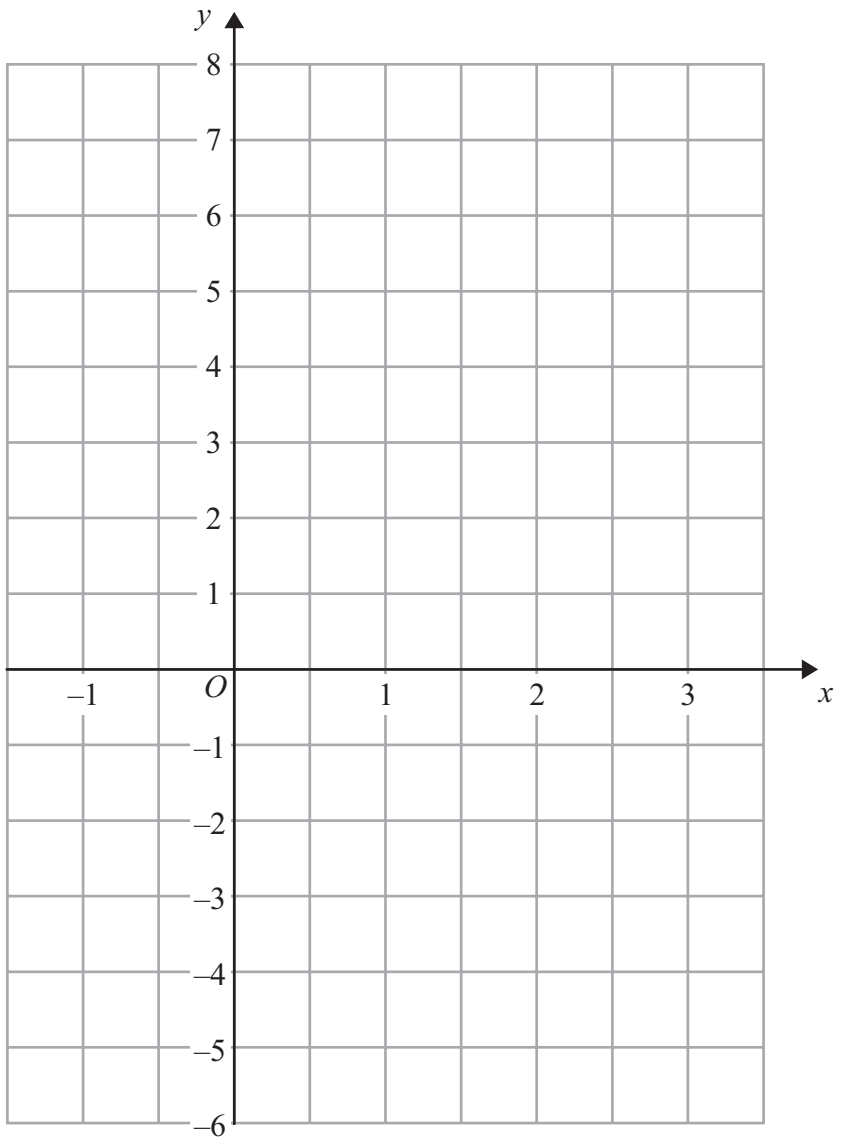
Ed uses a van to deliver parcels.
For each parcel Ed delivers it costs £1.50 for each mile.
There is **no** fixed charge.

(b) Compare the cost of having a parcel delivered by Bill with the cost of having a parcel delivered by Ed.

(3)

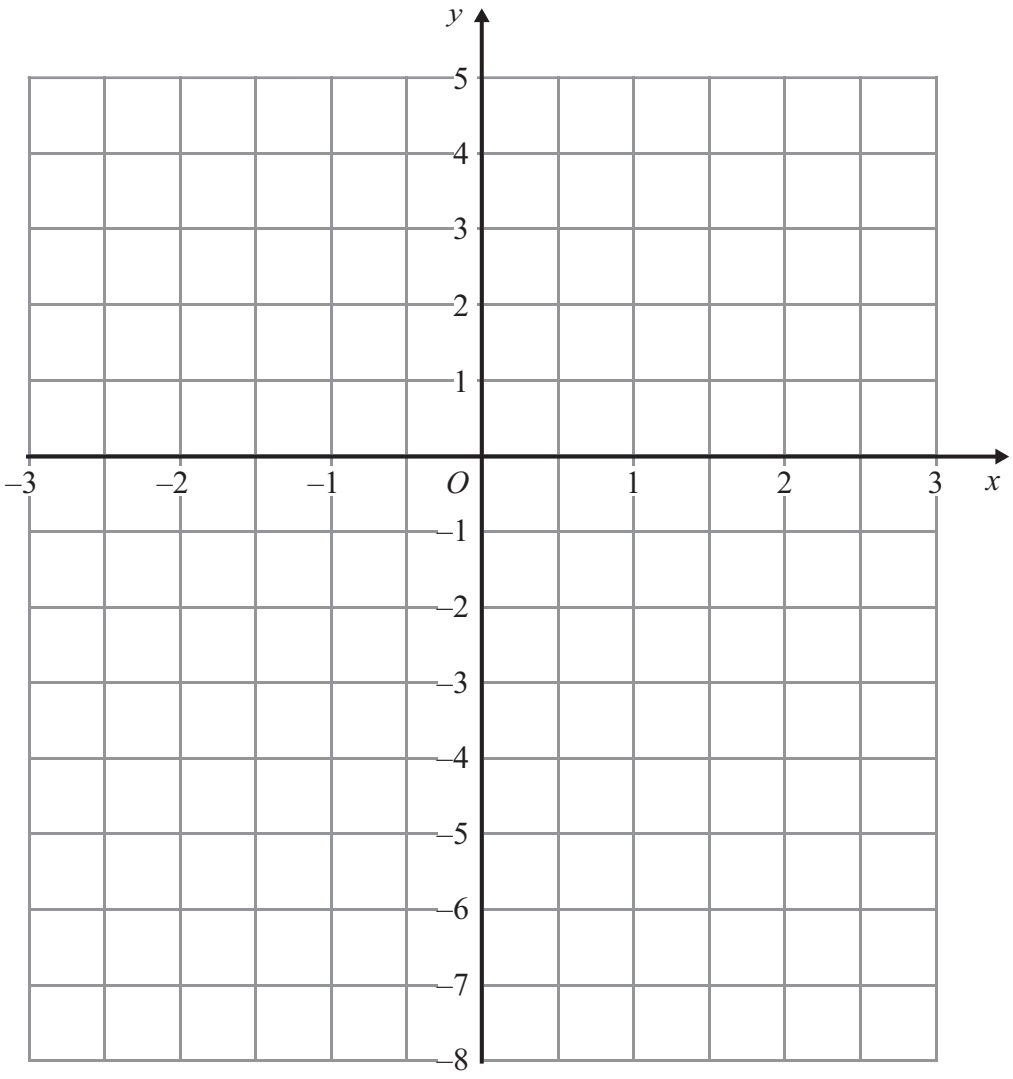
(Total for Question 3 is 4 marks)

4 On the grid, draw the graph of $y = 3x - 2$ for values of x from -1 to 3



(Total for Question 4 is 3 marks)

9 On the grid, draw the graph of $y = 2x - 3$ for values of x from –2 to 2



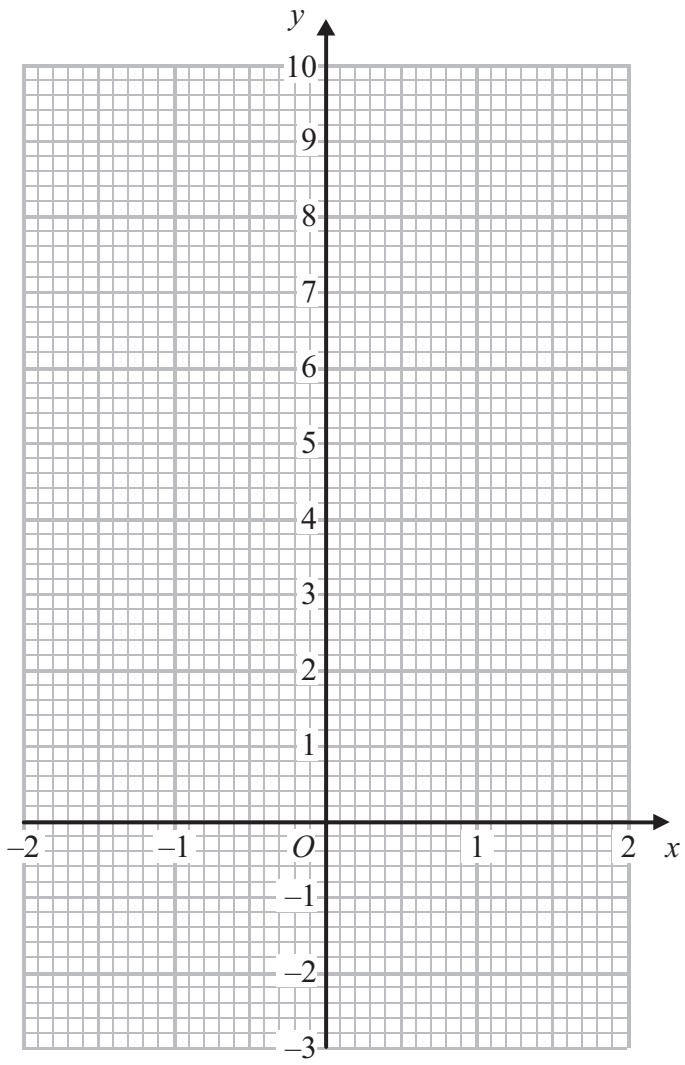
(Total for Question 9 is 3 marks)

11 (a) Complete the table of values for $y = 2x^2 - 1$

x	–2	–1	0	1	2
y	7			1	

(2)

(b) On the grid below, draw the graph of $y = 2x^2 - 1$ for values of x from $x = -2$ to $x = 2$



(2)

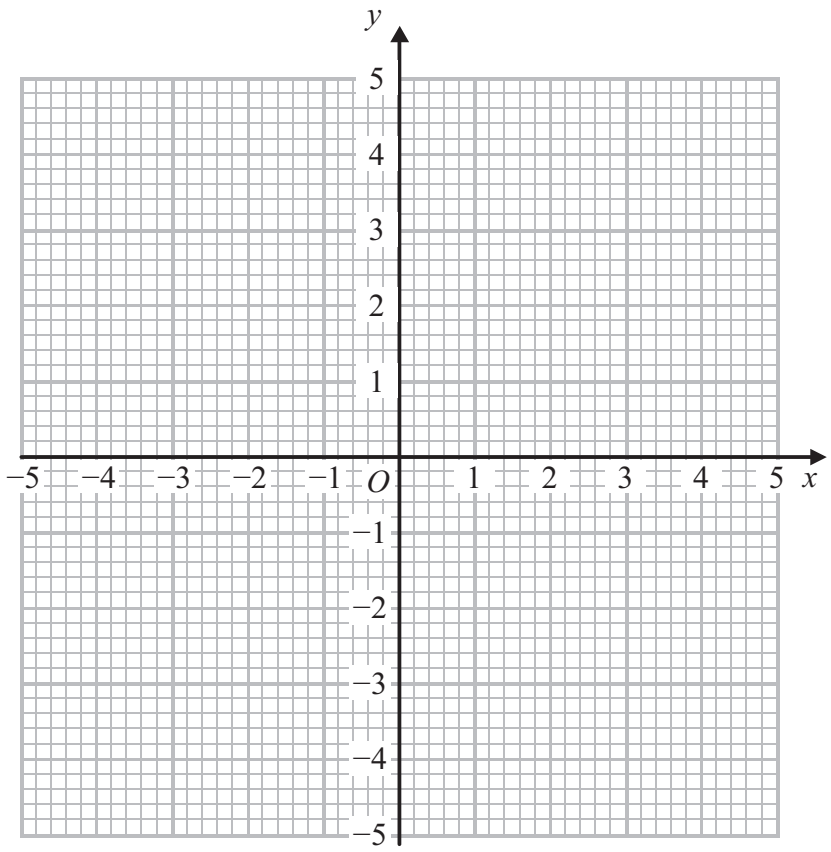
(c) Use your graph to write down estimates of the solutions of the equation $2x^2 - 1 = 0$

.....

(2)

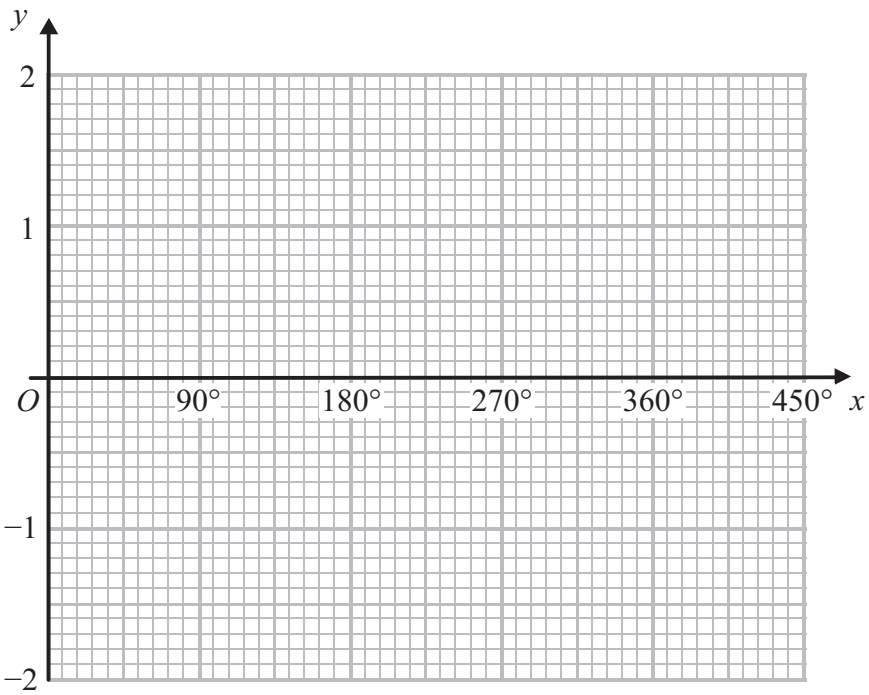
(Total for Question 11 is 6 marks)

27



(a) On the grid, draw the graph of $x^2 + y^2 = 4$

(2)



(b) On the grid, sketch the graph of $y = \cos x$ for $0° \leqslant x \leqslant 360°$

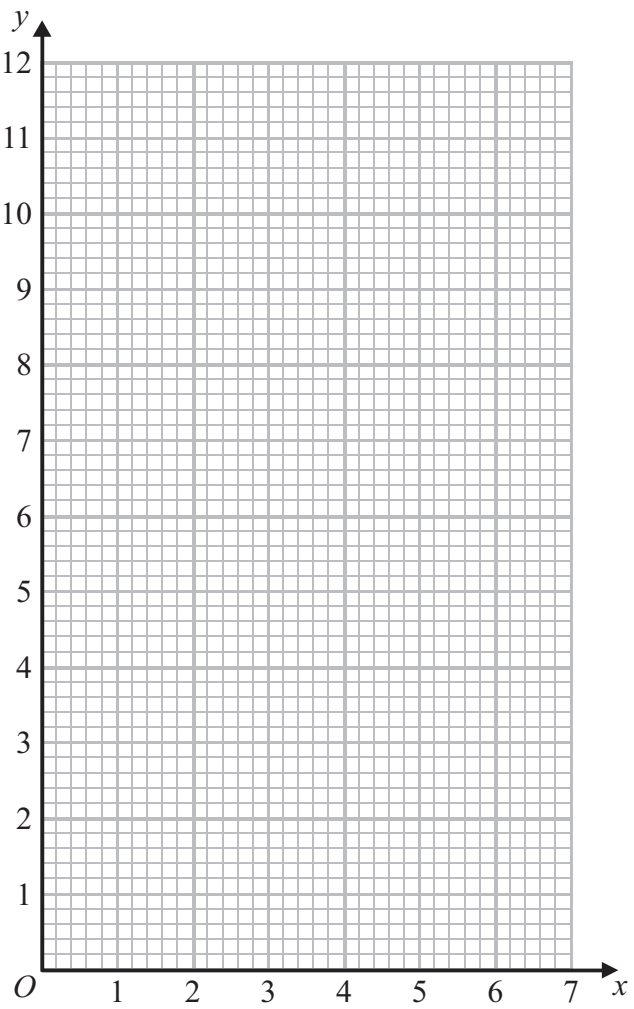
(2)

(Total for Question 27 is 4 marks)

18 (a) Complete the table of values for $y = \frac{6}{x}$

x	0.5	1	2	3	4	5	6
y		6	3		1.5		1

(2)



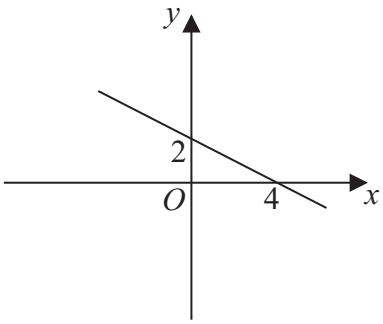
(b) On the grid, draw the graph of $y = \frac{6}{x}$ for $0.5 \leqslant x \leqslant 6$

(2)

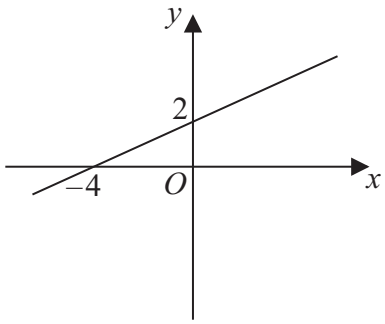
(Total for Question 18 is 4 marks)

12 Here are the graphs of 6 straight lines.

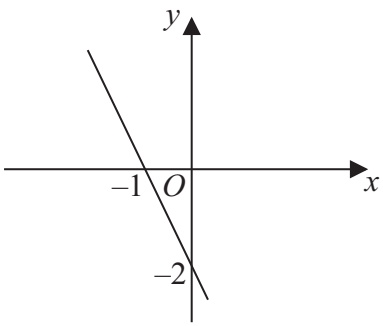
Graph **A**



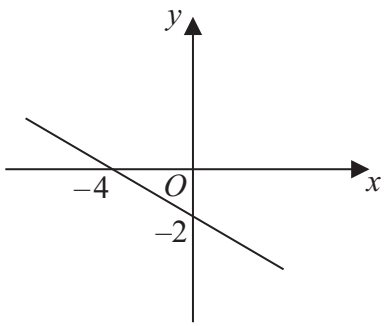
Graph **B**



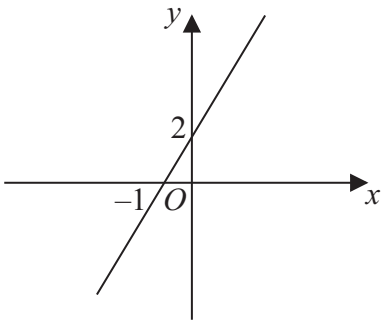
Graph **C**



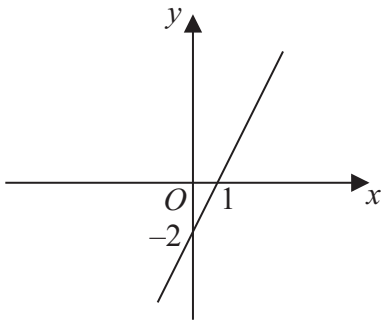
Graph **D**



Graph **E**



Graph **F**



Match each of the graphs **A**, **B**, **C**, **D**, **E** and **F** to the equations in the table.

Equation	$y = \frac{1}{2}x + 2$	$y = 2x - 2$	$y = -\frac{1}{2}x + 2$	$y = -2x - 2$	$y = 2x + 2$	$y = -\frac{1}{2}x - 2$
Graph						

(Total for Question 12 is 3 marks)

Question 35

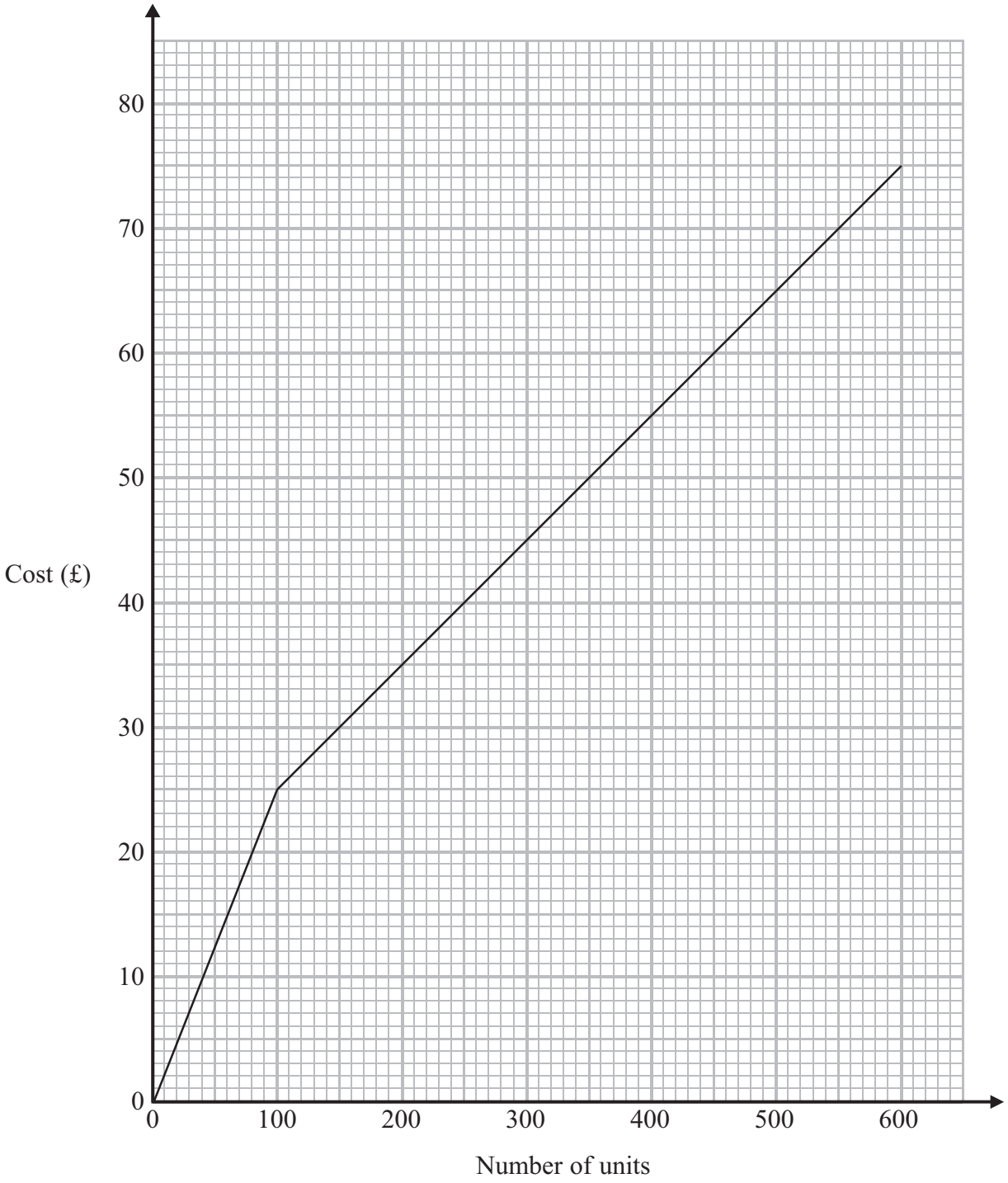
5 You can use the graph opposite to find out how much Lethna has to pay for the units of electricity she has used.

Lethna pays at one rate for the first 100 units of electricity she uses.
She pays at a different rate for all the other units of electricity she uses.

Lethna uses a total of 900 units of electricity.

Work out how much she must pay.

£.....



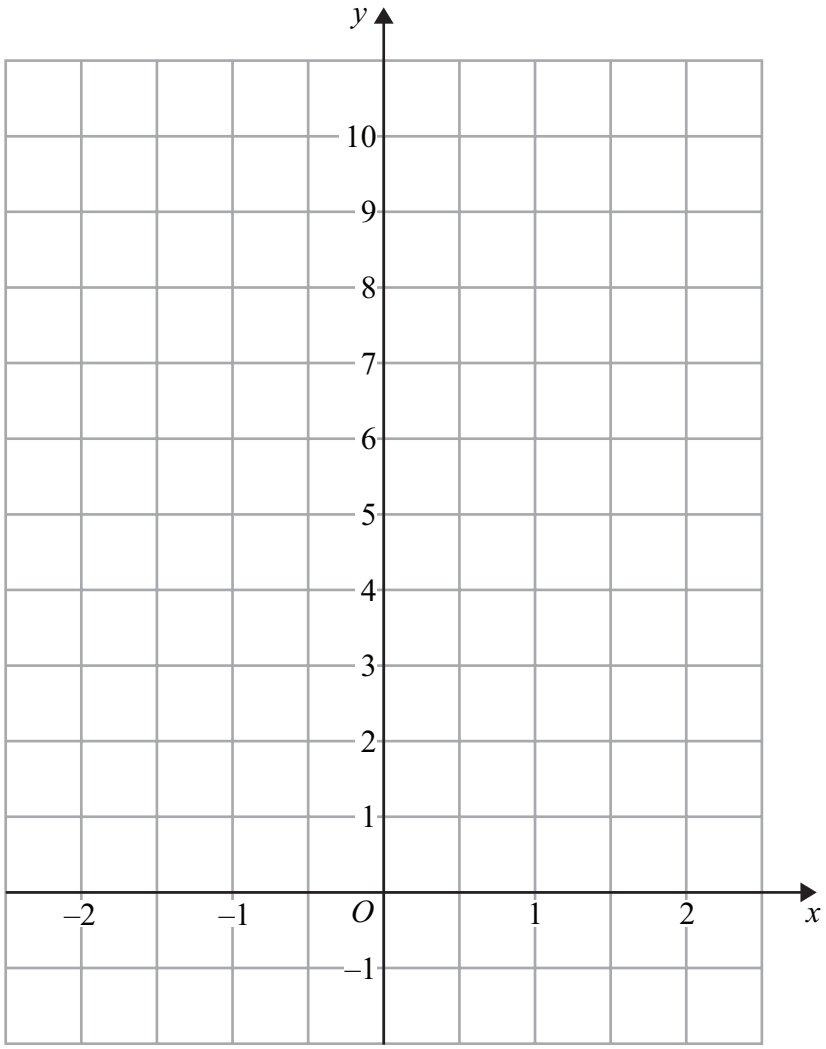
(Total for Question 5 is 3 marks)

4 (a) Complete the table of values for $y = 2x + 5$

x	–2	–1	0	1	2
y	1		5		

(2)

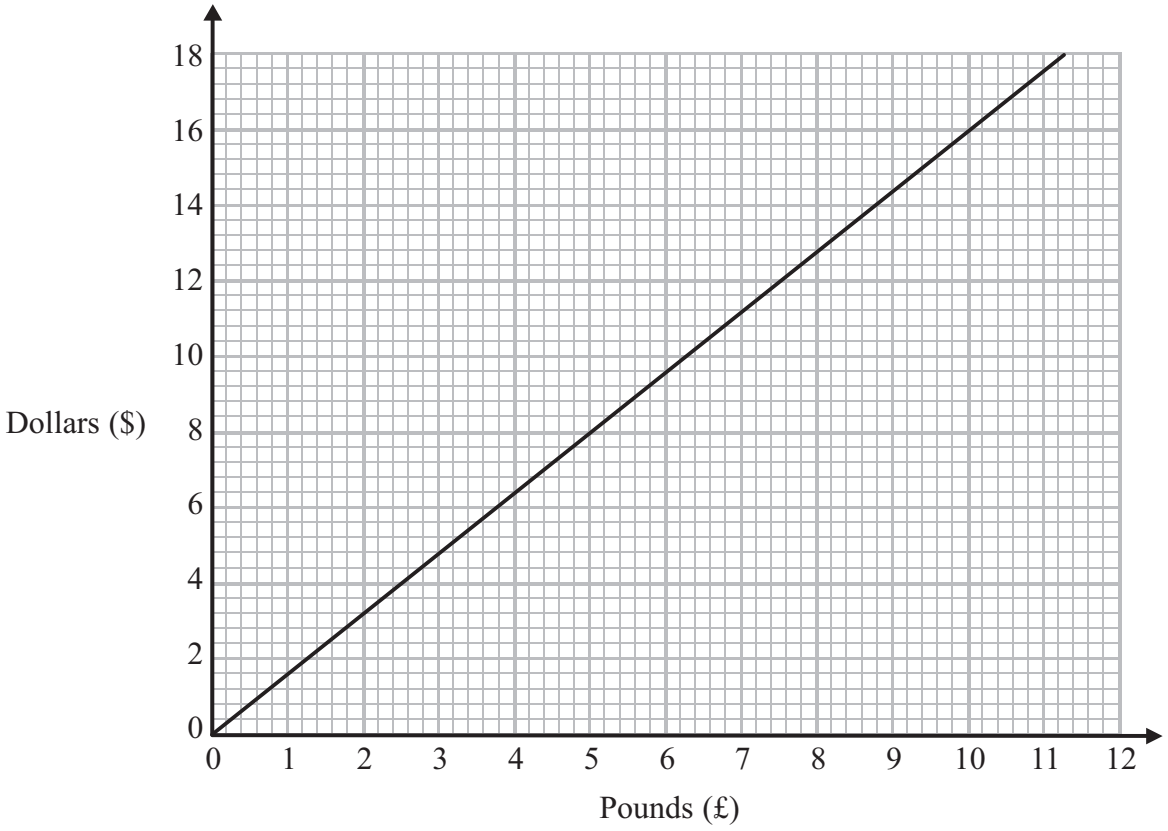
(b) On the grid, draw the graph of $y = 2x + 5$ for values of x from $x = –2$ to $x = 2$



(2)

(Total for Question 4 is 4 marks)

6 You can use this conversion graph to change between pounds (£) and dollars ($).



(a) Use the conversion graph to change £5 to dollars.

$ .....

(1)

Ella has $200 and £800
Her hotel bill is $600

Ella pays the bill with the $200 and some of the pounds.

(b) Use the conversion graph to work out how many pounds she has left.

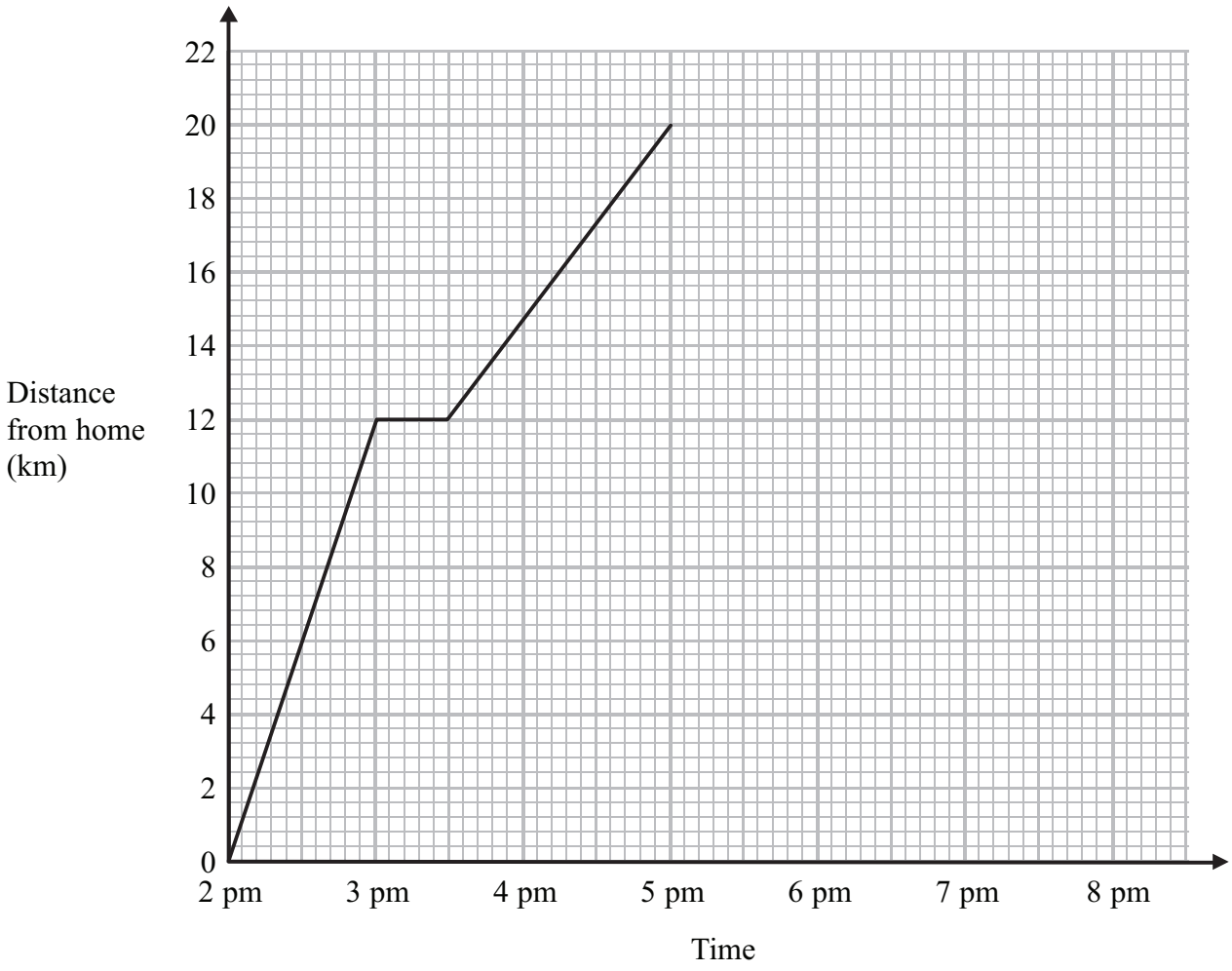
£ .....

(4)

(Total for Question 6 is 5 marks)

3 Simon went for a cycle ride.
He left home at 2 pm.

The travel graph represents part of Simon's cycle ride.



At 3 pm Simon stopped for a rest.

(a) How many minutes did he rest?

..... minutes
(1)

(b) How far was Simon from home at 5 pm?

..... km
(1)

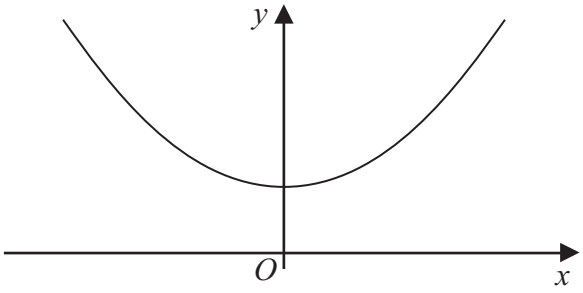
At 5 pm Simon stopped for 30 minutes.
Then he cycled home at a steady speed.
It took him 1 hour 30 minutes to get home.

(c) Complete the travel graph.

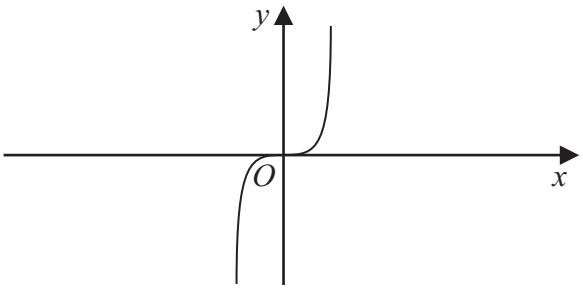
(2)

(Total for Question 3 is 4 marks)

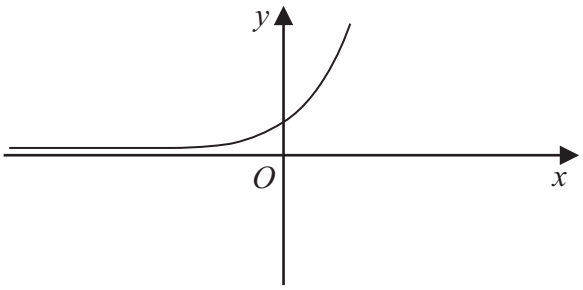
14 Here are three graphs.



A



B



C

Here are four equations of graphs.

$y = x^3$ $y = x^2 + 4$ $y = \frac{1}{x}$ $y = 2^x$

Match each to the correct equation.

A and $y =$ .....

B and $y =$ .....

C and $y =$ .....

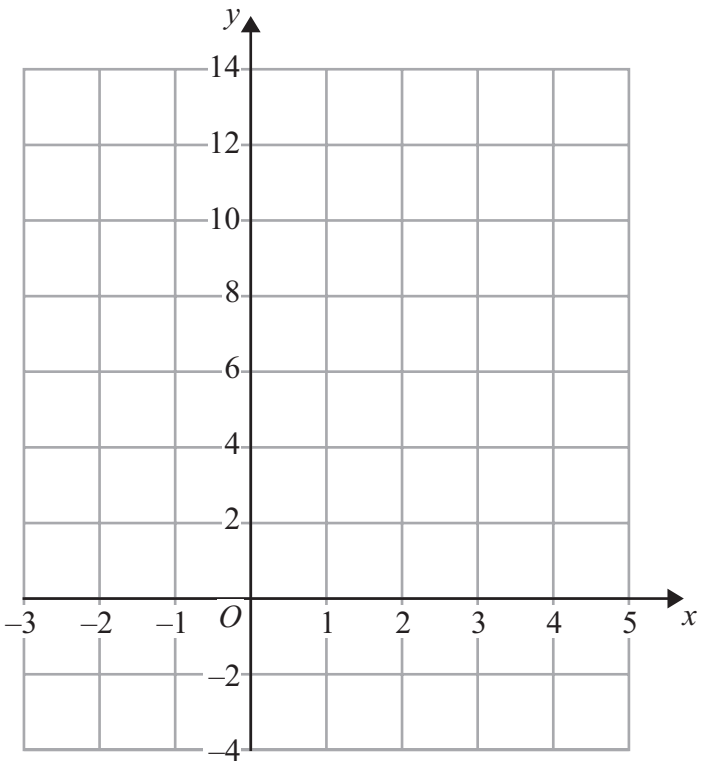
(Total for Question 14 is 3 marks)

1 (a) Complete the table of values for $y = 2x + 2$

x	−2	−1	0	1	2	3	4
y	−2				6		

(2)

(b) On the grid, draw the graph of $y = 2x + 2$



(2)

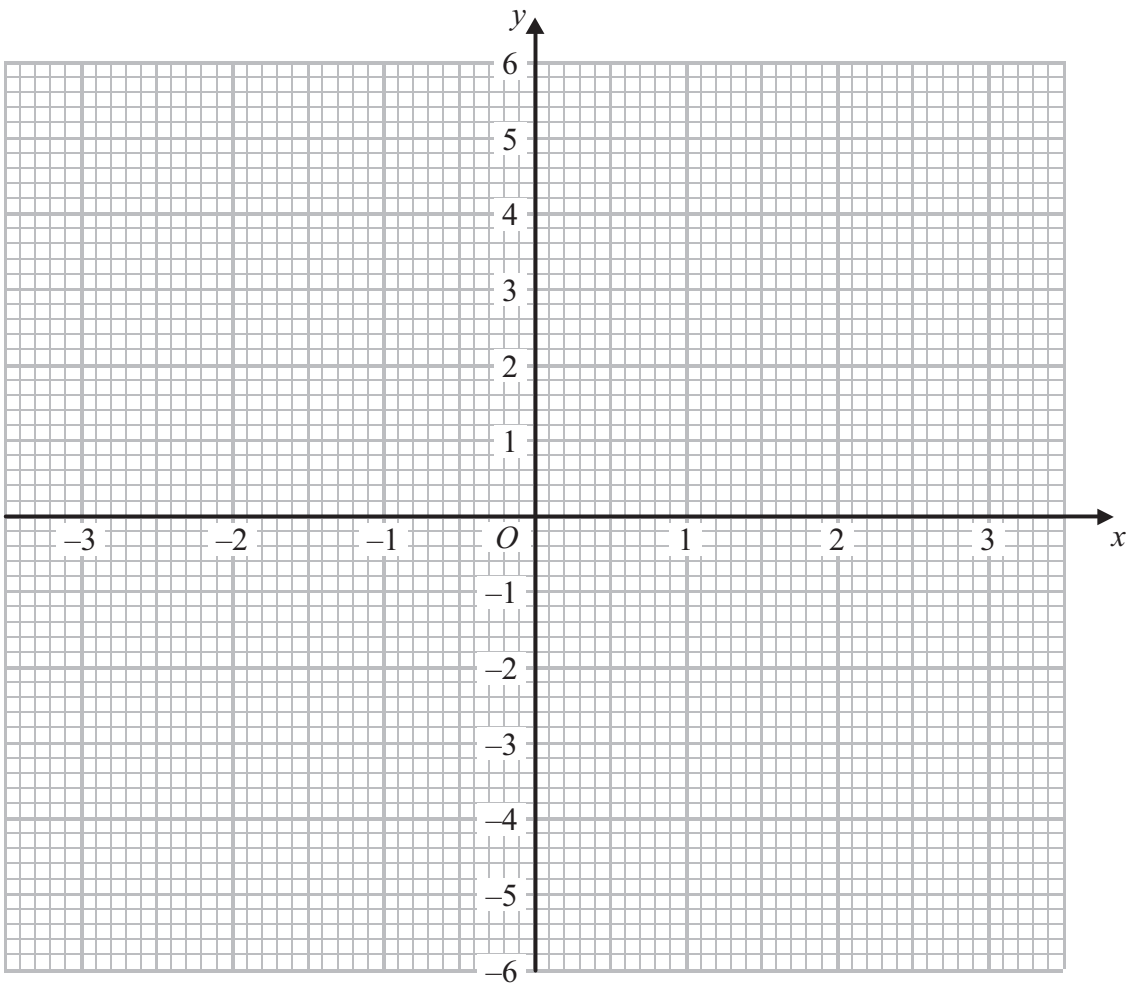
(Total for Question 1 is 4 marks)

6 (a) Complete the table of values for $y = x^2 - 4$

x	−3	−2	−1	0	1	2	3
y		0	−3			0	5

(2)

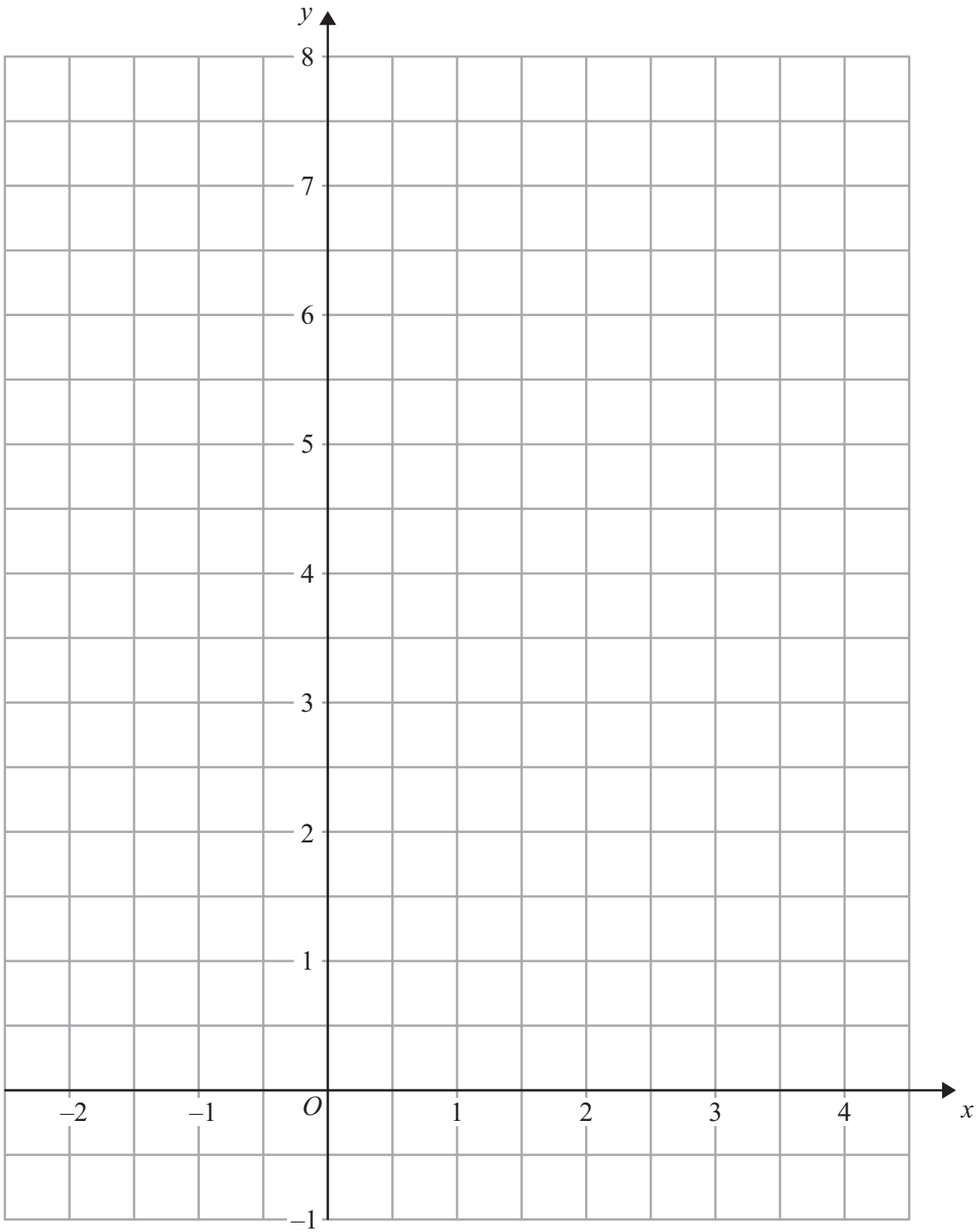
(b) On the grid, draw the graph of $y = x^2 - 4$ for $x = -3$ to $x = 3$



(2)

(Total for Question 6 is 4 marks)

12 On the grid, draw the graph of $y = \frac{1}{2}x + 5$ for values of x from –2 to 4



(Total for Question 12 is 3 marks)

25 The expression $x^2 - 8x + 21$ can be written in the form $(x - a)^2 + b$ for all values of x.

(a) Find the value of a and the value of b.

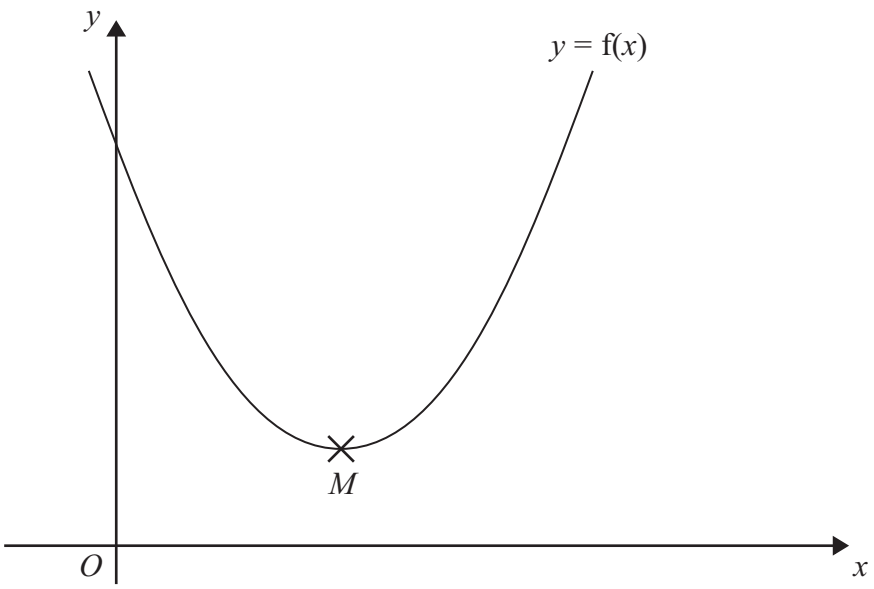
$a =$ .....

$b =$ .....

(3)

The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 8x + 21$

The diagram shows part of a sketch of the graph of $y = f(x)$.



The minimum point of the curve is M.

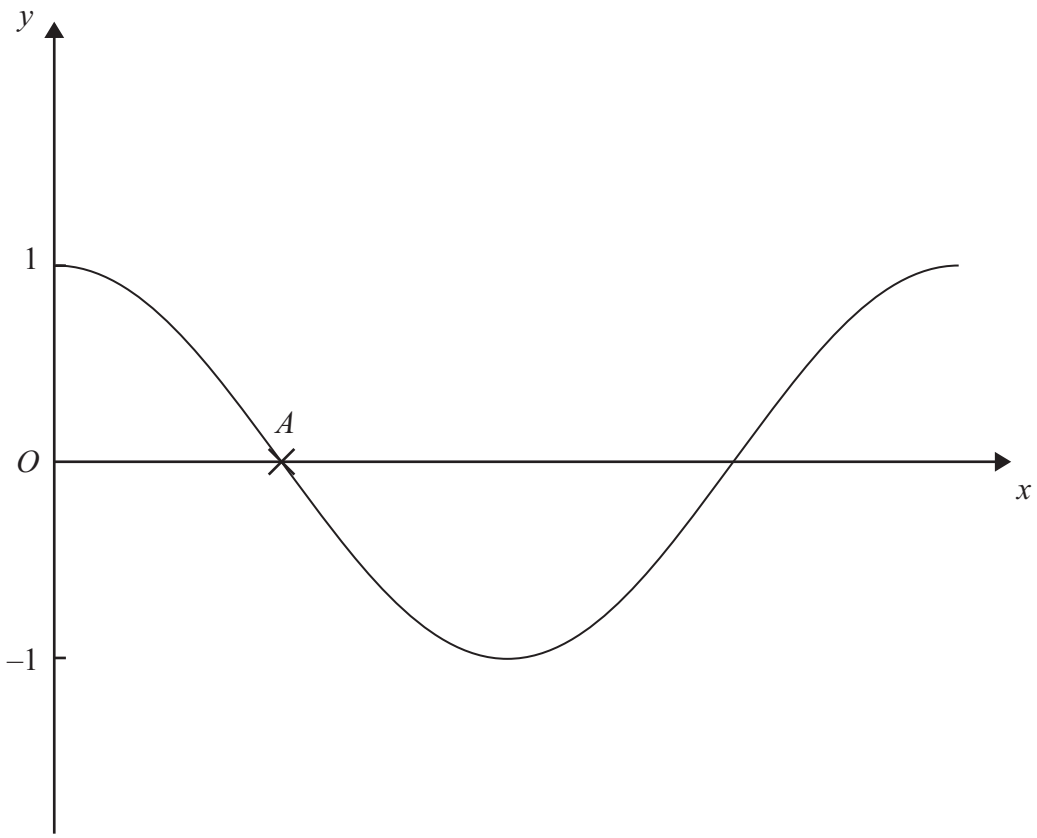
(b) Write down the coordinates of M.

(..... , ...)

(1)

(Total for Question 25 is 4 marks)

28 The diagram shows a sketch of the graph of $y = \cos x°$



(a) Write down the coordinates of the point A.

(..... , ...)

(1)

(b) On the same diagram, draw a sketch of the graph of $y = 2 \cos x°$

(1)

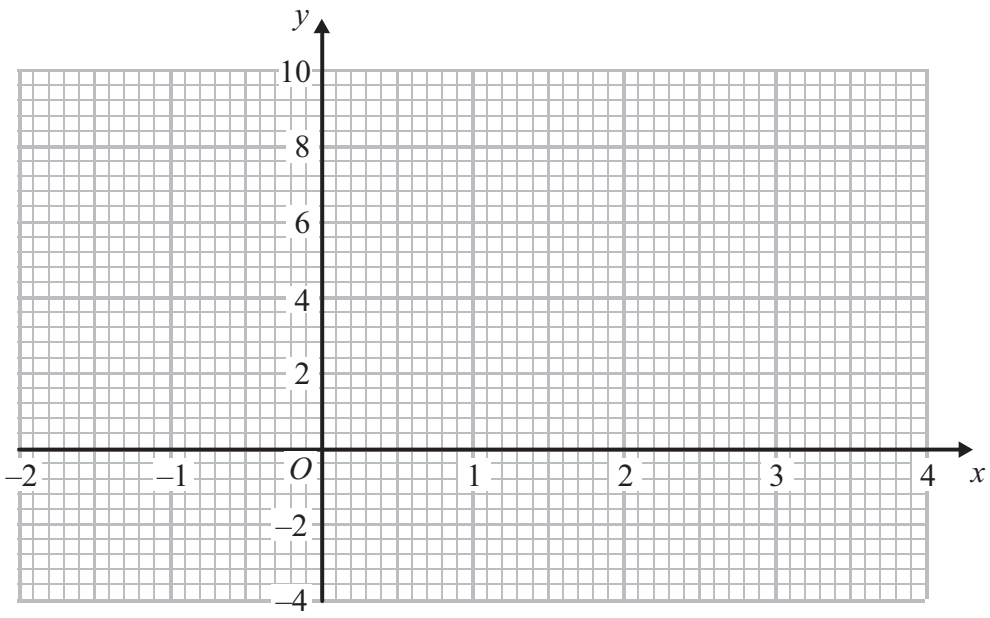
(Total for Question 28 is 2 marks)

15 (a) Complete the table of values for $y = x^2 - 2x$

x	–2	–1	0	1	2	3	4
y		3	0			3	

(2)

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



(2)

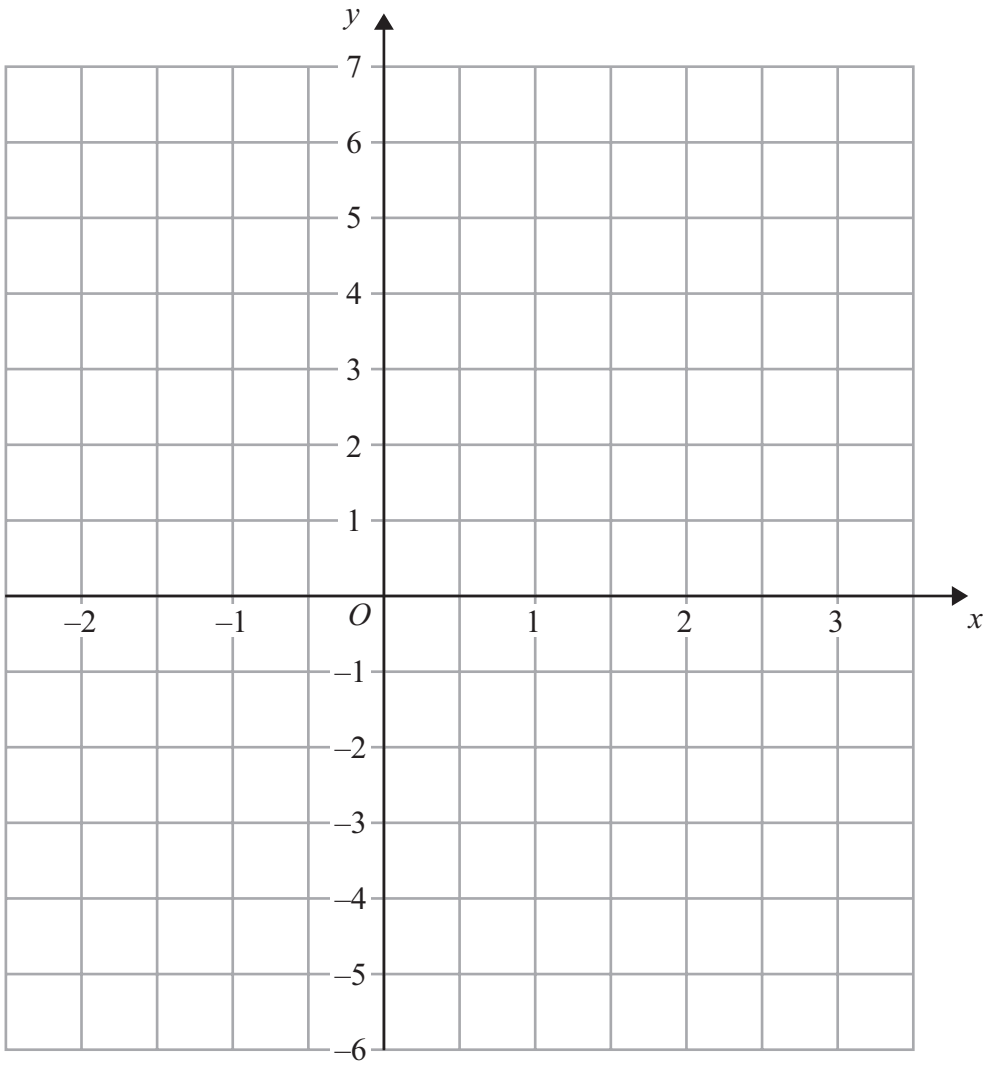
(c) Solve $x^2 - 2x - 2 = 1$

.....

(2)

(Total for Question 15 is 6 marks)

6 On the grid, draw the graph of $y = 2x - 1$ for values of x from -2 to 3



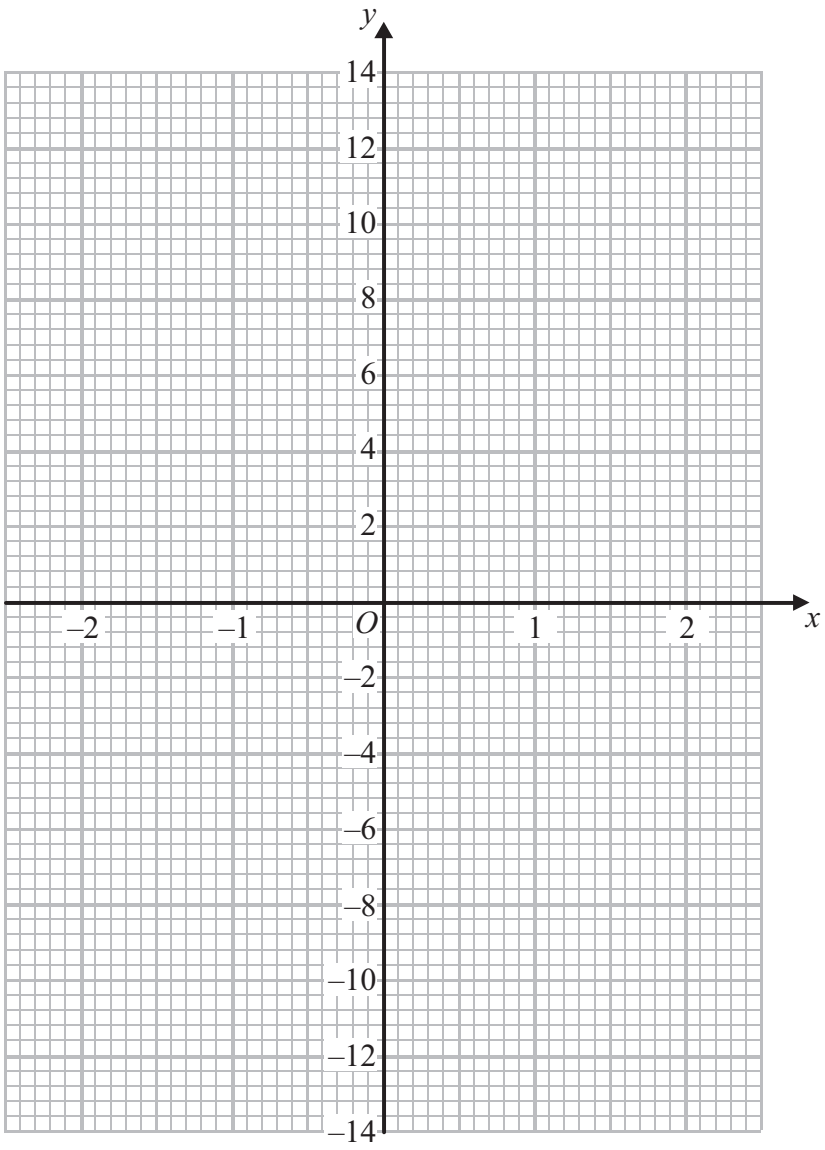
(Total for Question 6 is 3 marks)

12 (a) Complete this table of values for $y = x^3 + 2x - 1$

x	-2	-1	0	1	2
y		-4			11

(2)

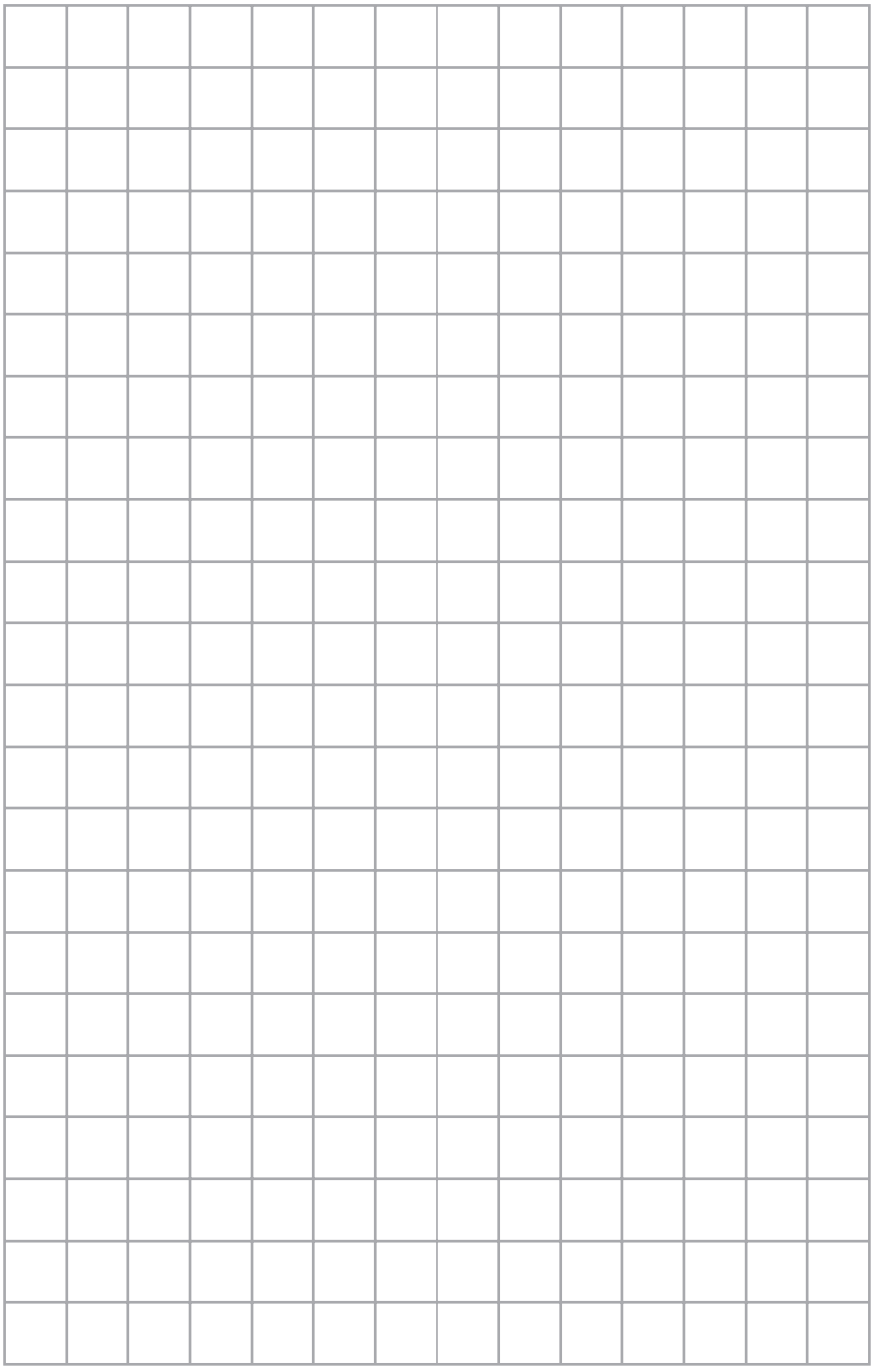
(b) On the grid, draw the graph of $y = x^3 + 2x - 1$



(2)

(Total for Question 12 is 4 marks)

12 On the grid, draw the graph of $y = 3x + 2$ for values of x from -2 to 2



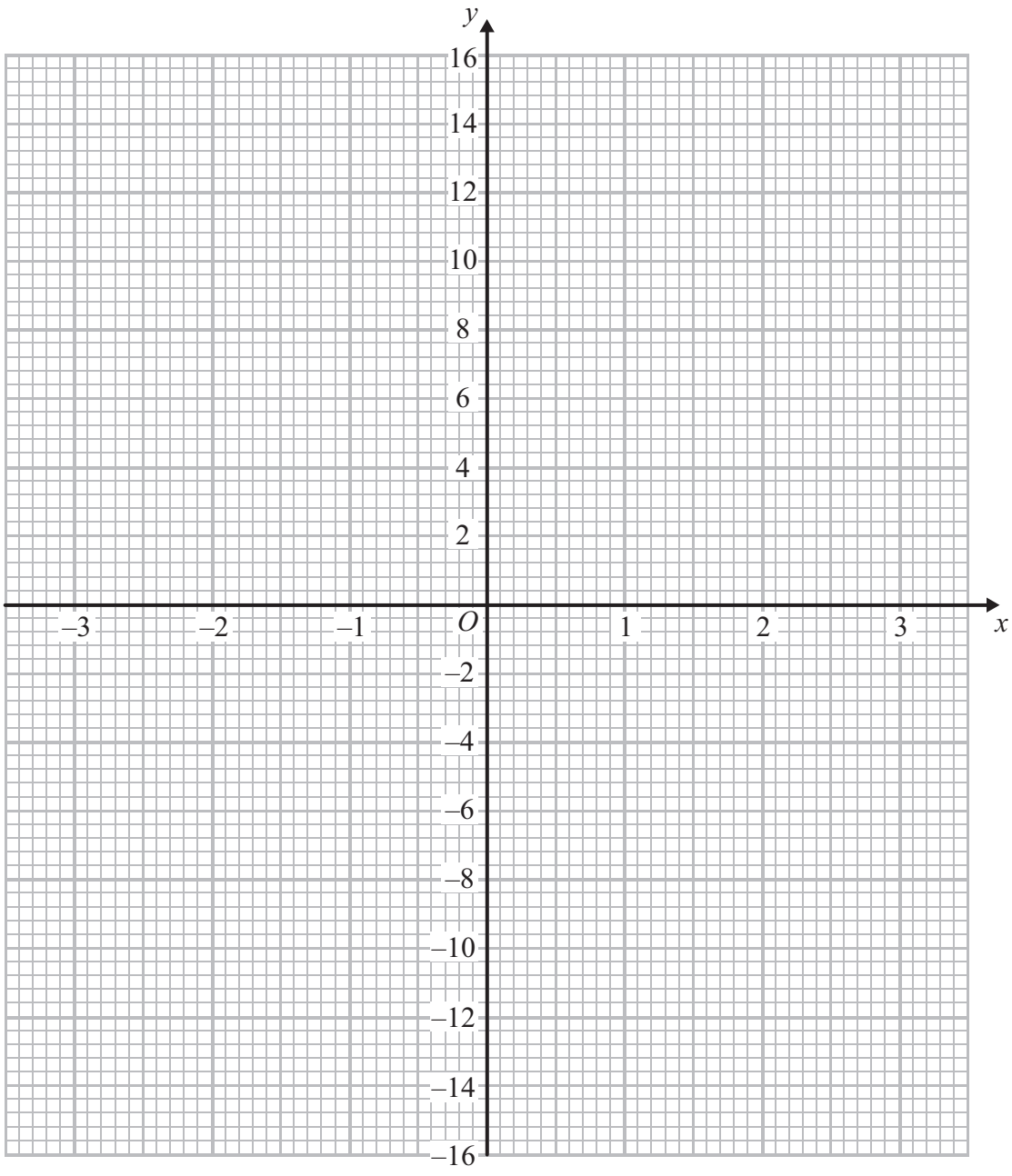
(Total for Question 12 is 4 marks)

17 (a) Complete the table of values for $y = x^3 - 4x$

x	−3	−2	−1	0	1	2	3
y			3	0			15

(2)

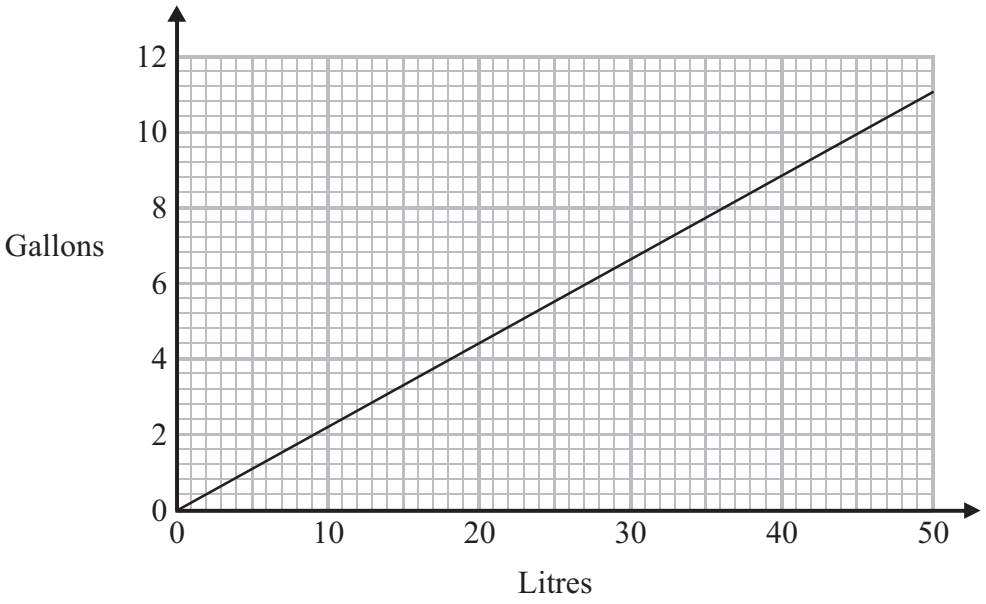
(b) On the grid, draw the graph of $y = x^3 - 4x$ from $x = -3$ to $x = 3$



(2)

(Total for Question 17 is 4 marks)

*4 You can use this graph to convert between litres and gallons.



Jack buys 8 gallons of diesel.
He pays £52

Francoise buys 40 litres of diesel.
She pays £58

Who got the better value for their money, Jack or Francoise?
You must show your working.

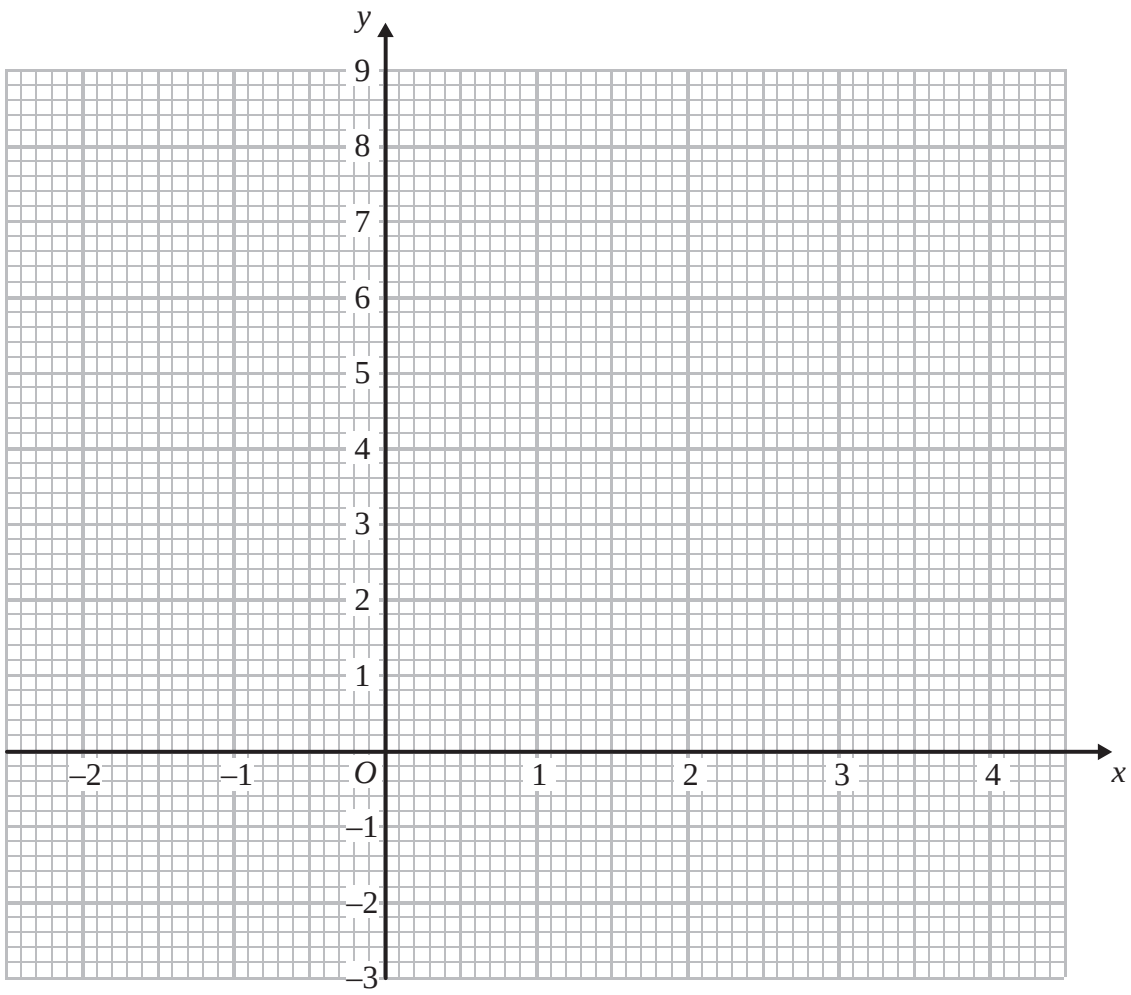
(Total for Question 4 is 3 marks)

15 (a) Complete the table of values for $y = x^2 - 2x - 1$

x	–2	–1	0	1	2	3	4
y	7			–2	–1		

(2)

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



(2)

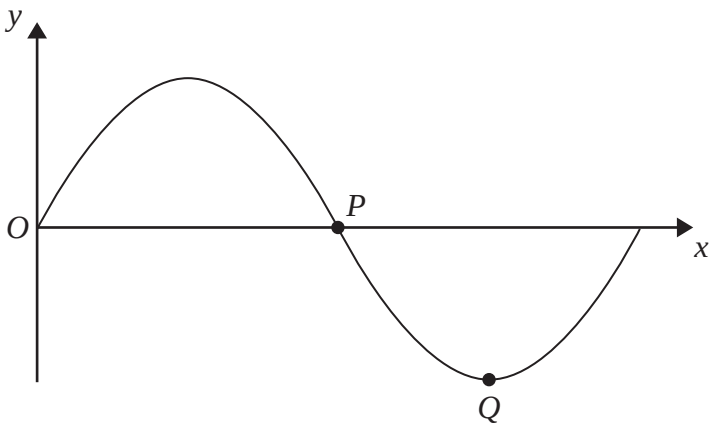
(c) Solve $x^2 - 2x - 1 = x + 3$

.....

(2)

(Total for Question 15 is 6 marks)

26 The diagram shows part of a sketch of the curve $y = \sin x°$.



(a) Write down the coordinates of the point P.

(..... , ...)

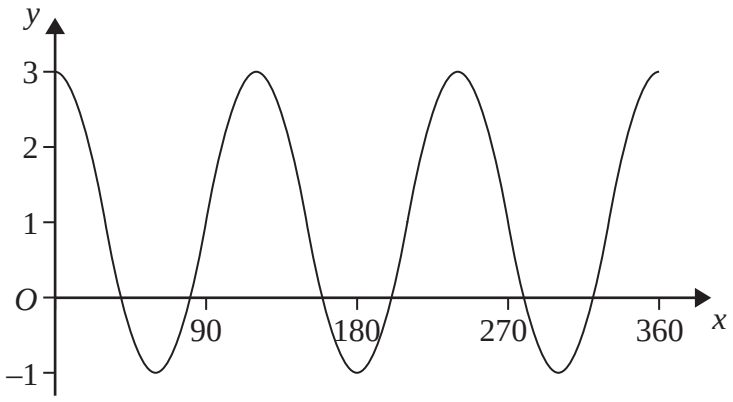
(1)

(b) Write down the coordinates of the point Q.

(..... , ...)

(1)

Here is a sketch of the curve $y = a\cos bx° + c, \quad 0 \leqslant x \leqslant 360$



(c) Find the values of a, b and c.

a = ...

b = ...

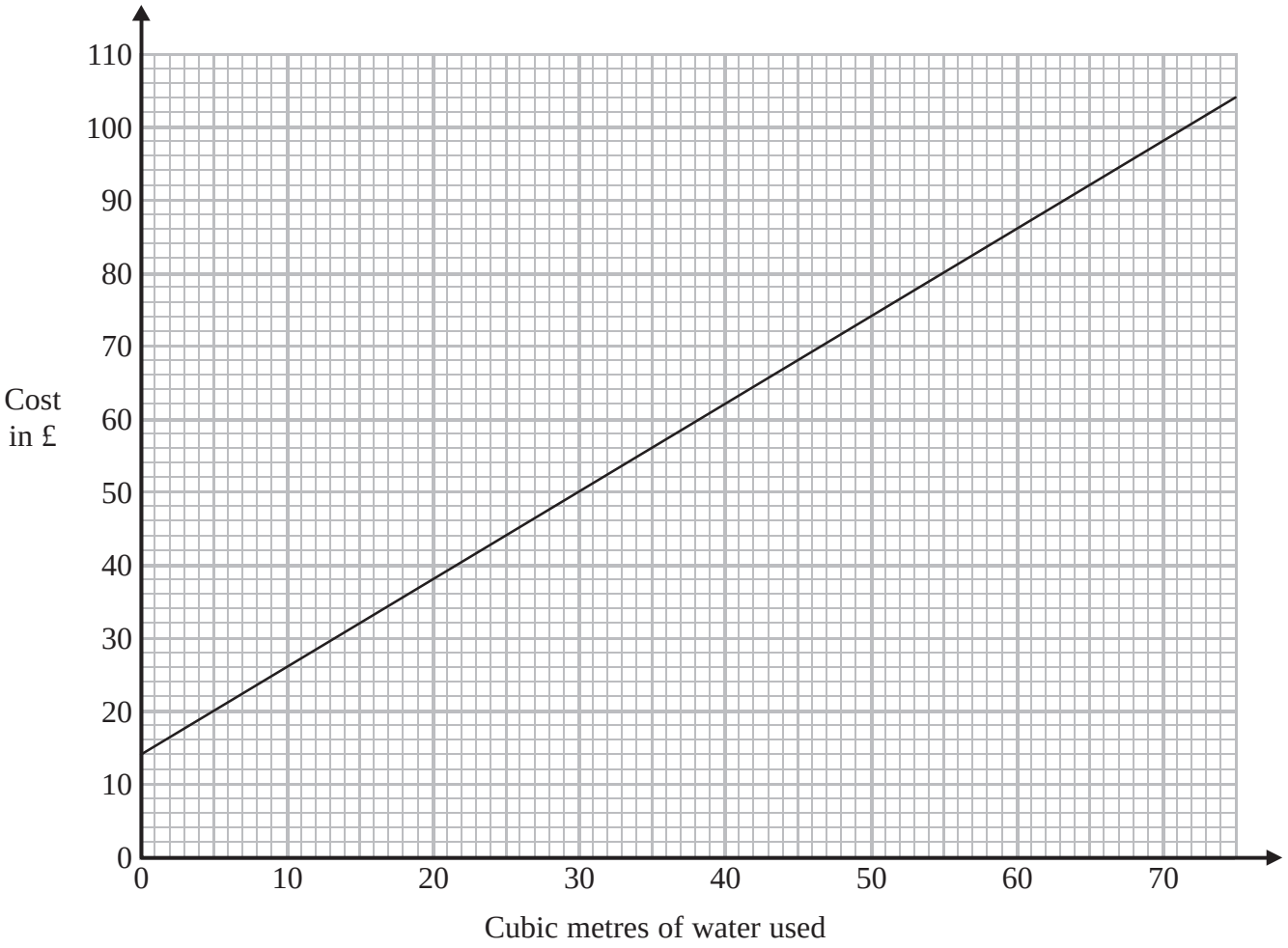
c = ...

(3)

(Total for Question 26 is 5 marks)

13 A water company charges customers a fixed standing charge plus an additional cost for the amount of water, in cubic metres, used.

The graph shows information about the total cost charged.



(a) Write down the fixed standing charge.

£ .....

(1)

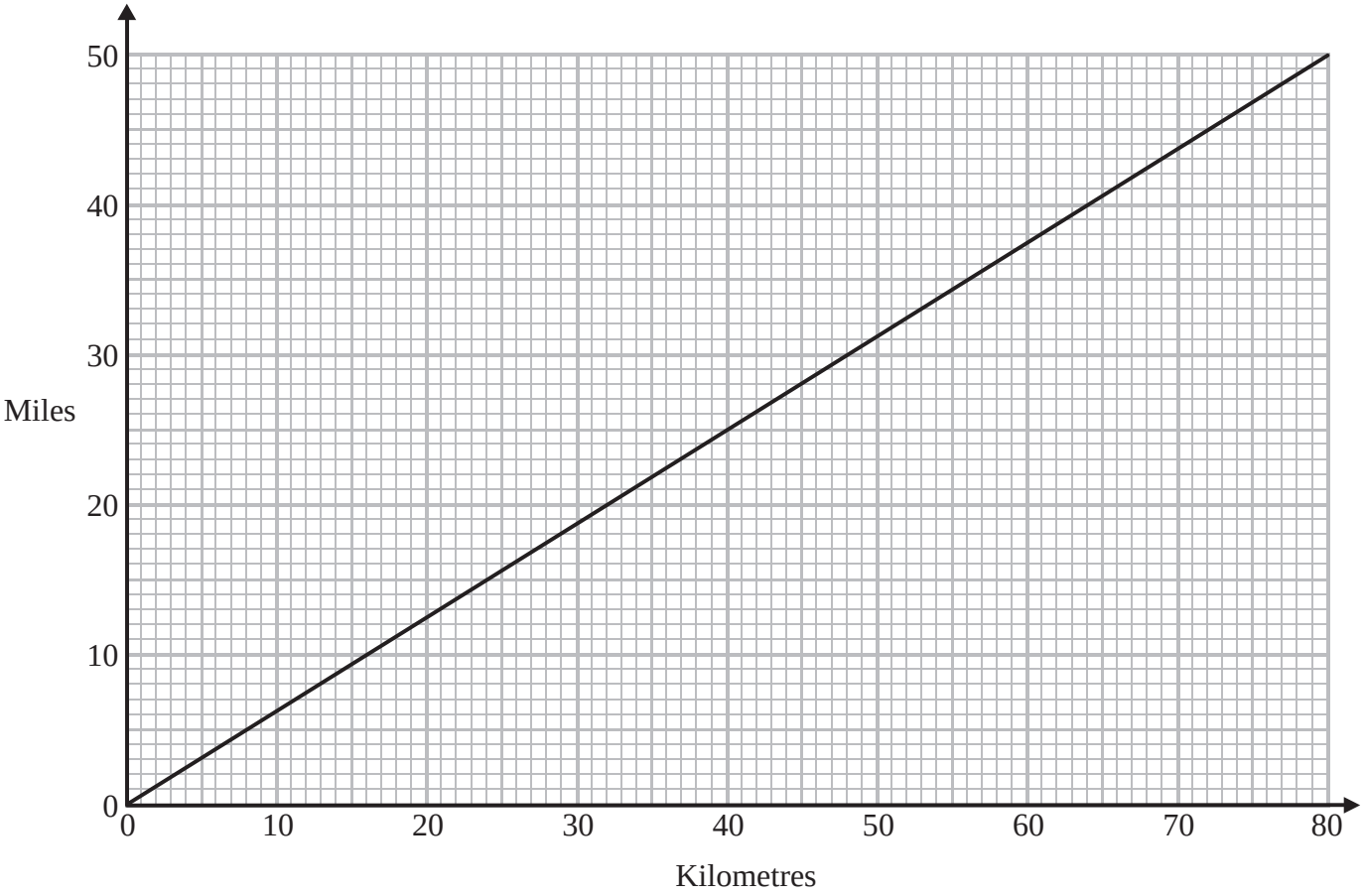
(b) Work out the additional cost for each cubic metre of water used.

£ .....

(2)

(Total for Question 13 is 3 marks)

***4** You can use this conversion graph to change between miles and kilometres.



Mary has to drive from Paris to Calais, and then from Dover to Sheffield.
The total distance she has to drive is 350 miles.

Mary has already driven 240 km from Paris to the ferry at Calais.
She goes on a ferry to Dover.
She now has to drive from Dover to Sheffield.

Mary has enough petrol to drive 180 miles.

Will Mary have to stop for petrol on the way to Sheffield?

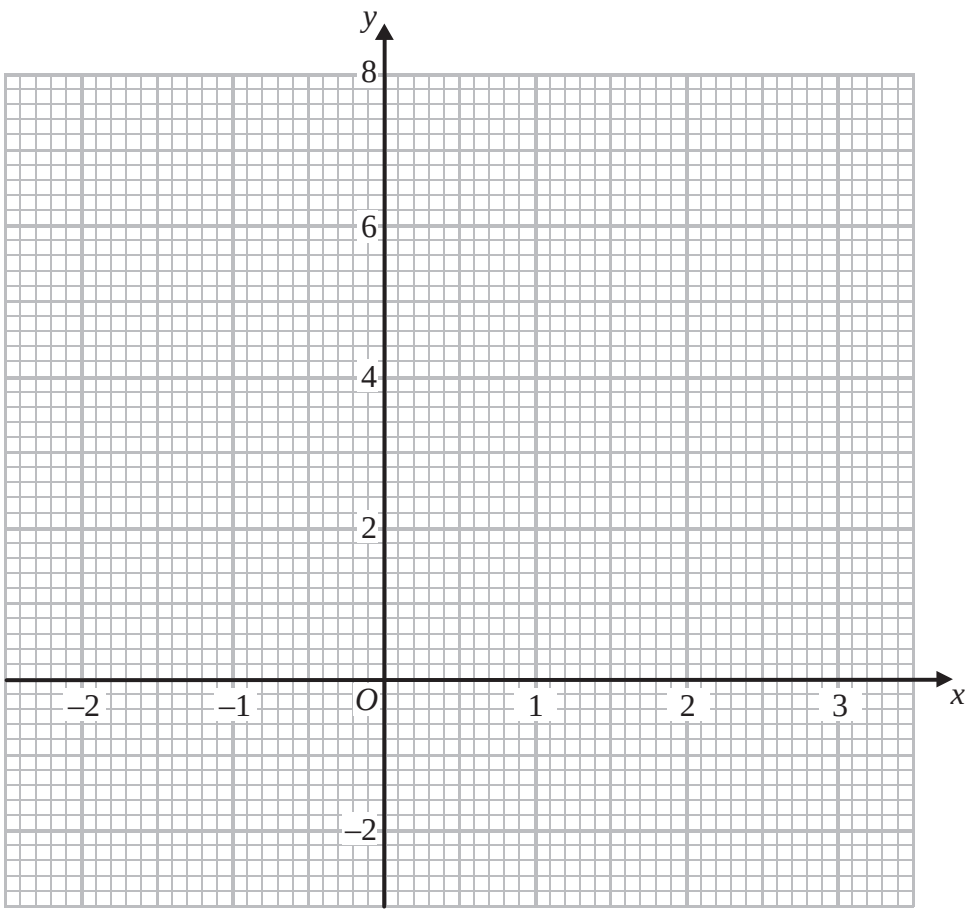
(Total for Question 4 is 4 marks)

10 (a) Complete the table of values for $y = x^2 - 2x - 1$

x	−2	−1	0	1	2	3
y	7			−2	−1	

(2)

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



(2)

(c) Find estimates for the solutions of the equation $x^2 - 2x - 1 = 0$

.....

(2)

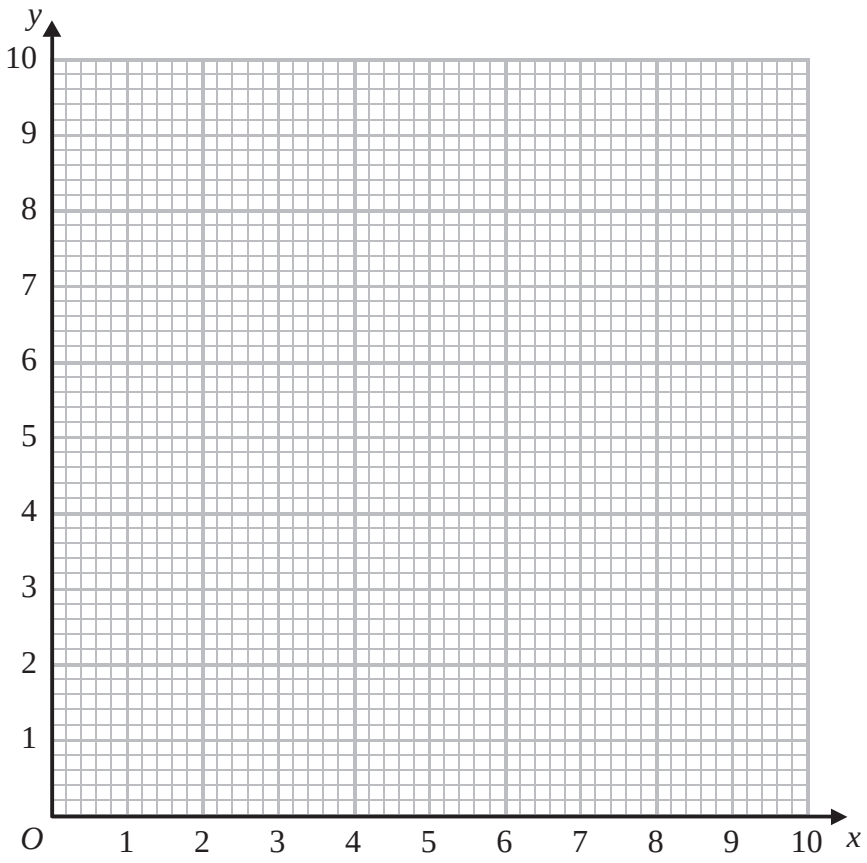
(Total for Question 10 is 6 marks)

19 (a) Complete the table of values for $y = \frac{4}{x}$

x	0.5	1	2	4	5	8
y		4	2			

(2)

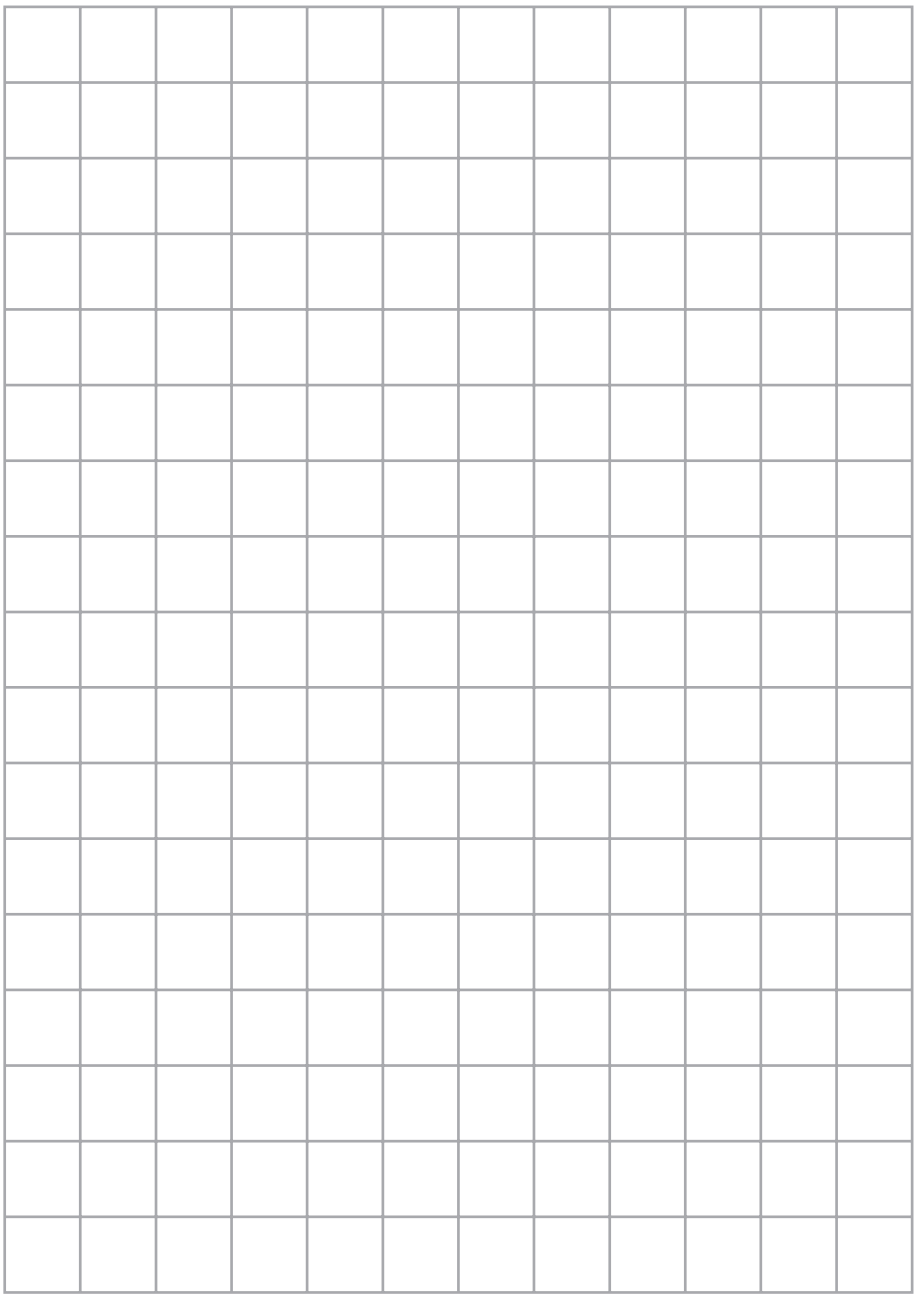
(b) On the grid, draw the graph of $y = \frac{4}{x}$ for $0.5 \leqslant x \leqslant 8$



(2)

(Total for Question 19 is 4 marks)

12 On the grid, draw the graph of $y = 2x - 3$ for values of x from -2 to 3



(Total for Question 12 is 4 marks)

13 The diagram shows a swimming pool in the shape of a prism.

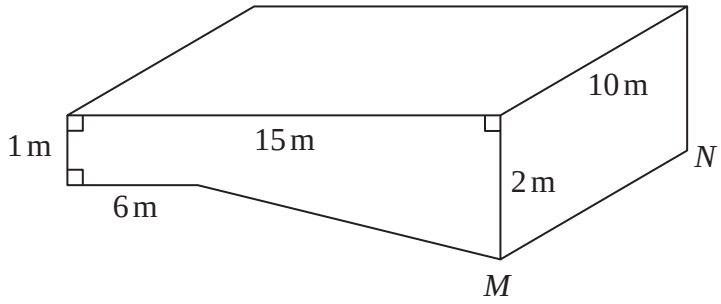


Diagram **NOT** accurately drawn

The swimming pool is empty.

The swimming pool is filled with water at a constant rate of 50 litres per minute.

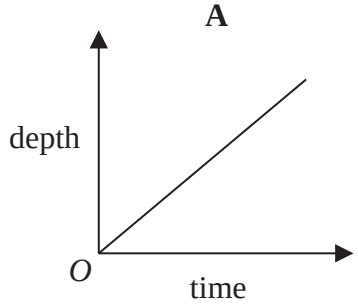
(a) Work out how long it will take for the swimming pool to be completely full of water.
Give your answer in hours.
($1\,m^3 = 1000$ litres)

..... hours

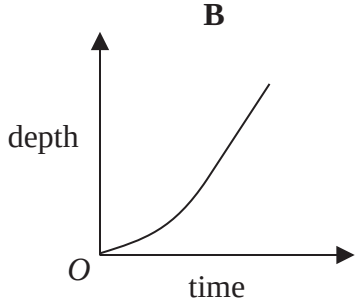
(5)

Here are four graphs.

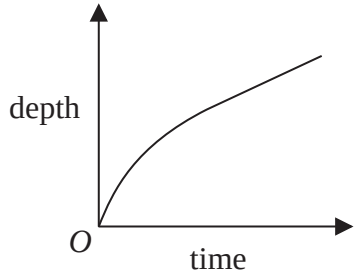
A



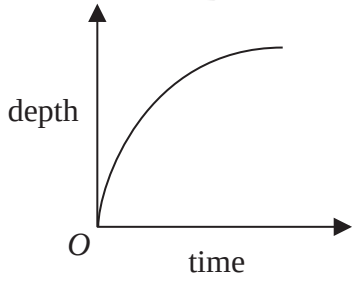
B



C



D



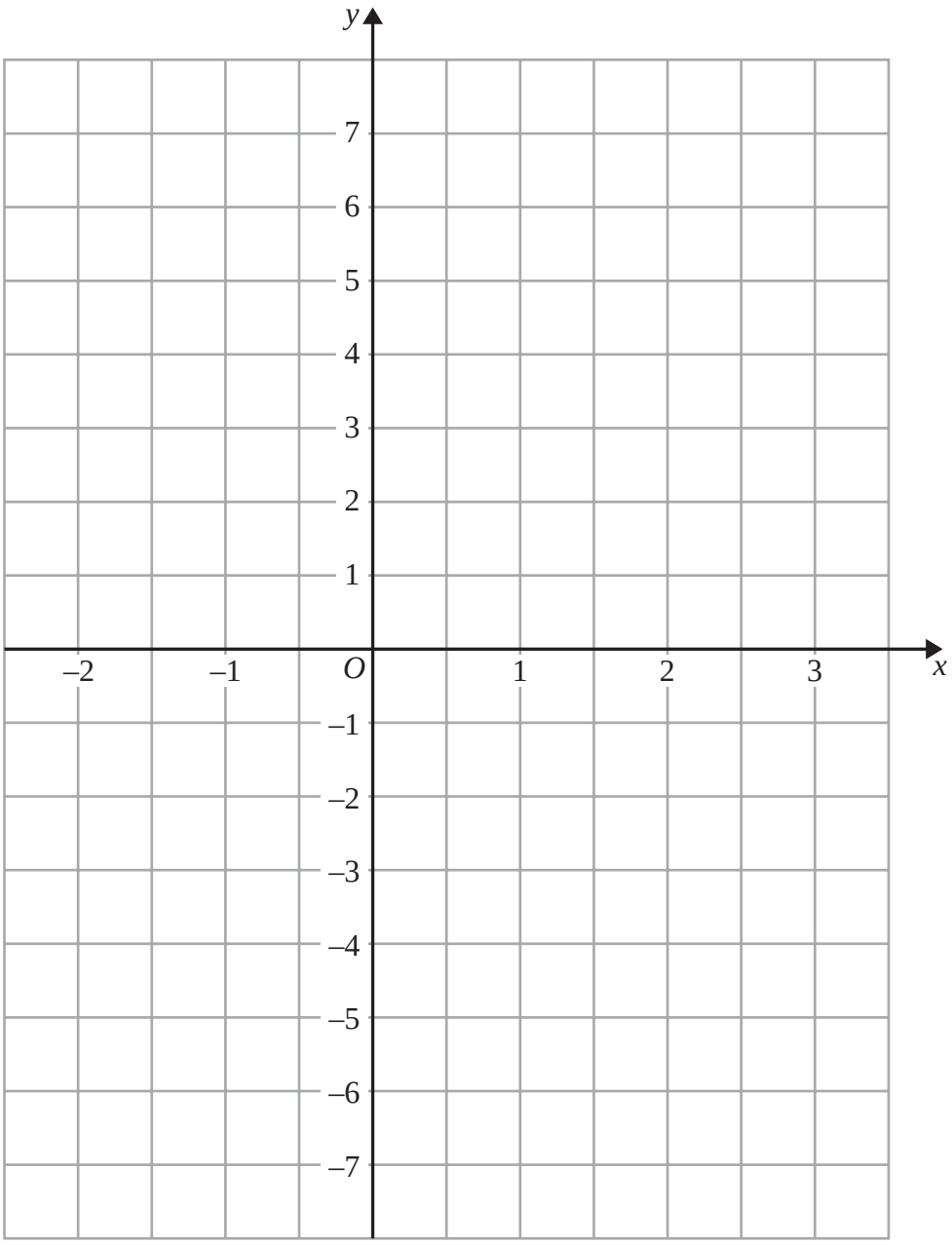
(b) Write down the letter of the graph that best shows how the depth of the water in the pool above the line *MN* changes with time as the pool is filled.

.....

(1)

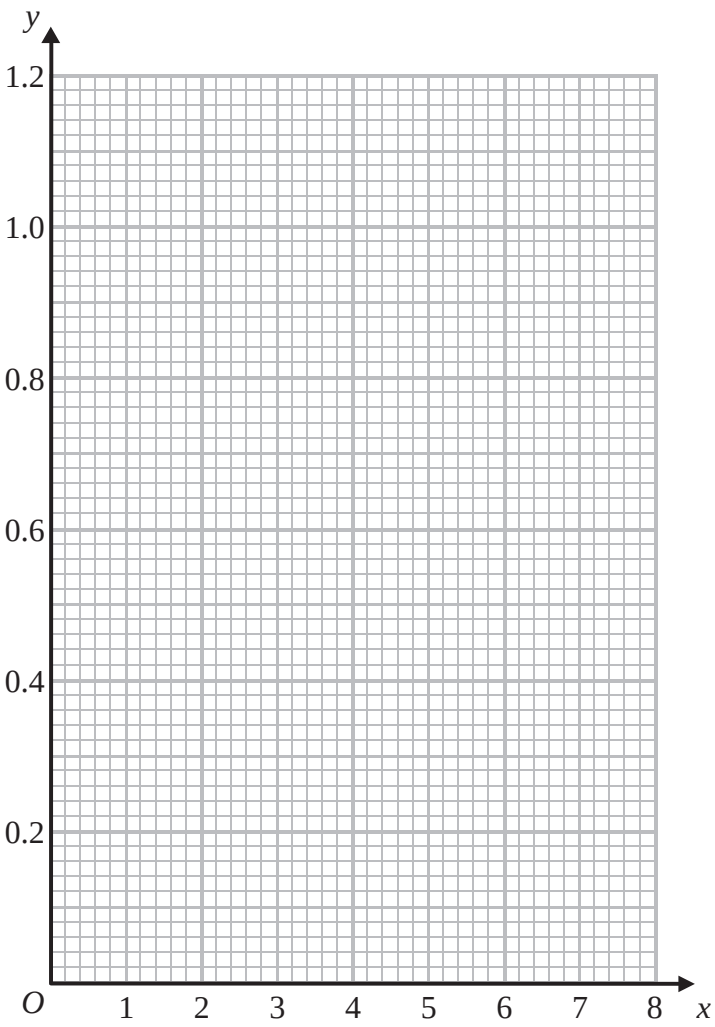
(Total for Question 13 is 6 marks)

4 On the grid, draw the graph of $y = 2x - 3$ for values of x from -2 to 3



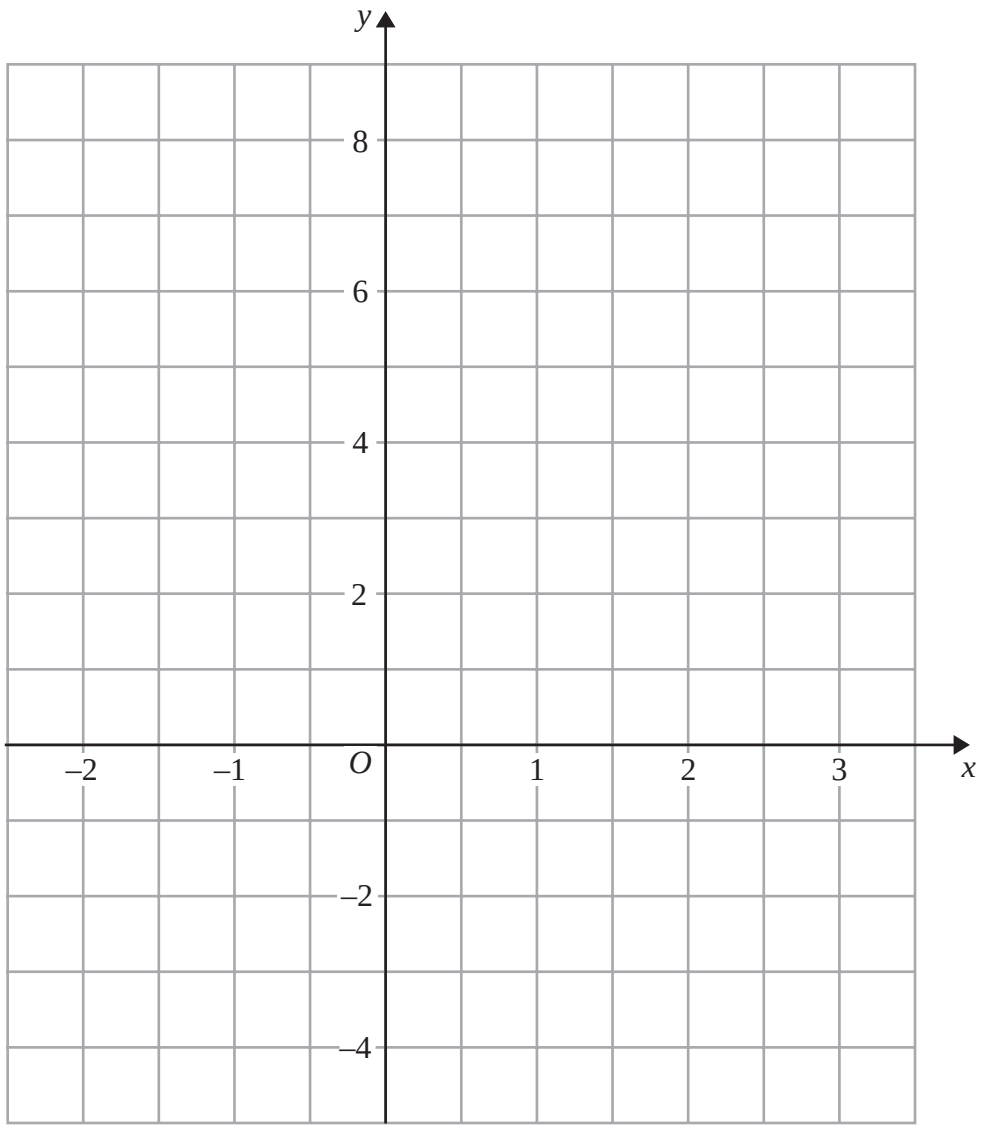
(Total for Question 4 is 3 marks)

17 On the grid, draw the graph of $y = \frac{1}{x}$ for values of x from 1 to 7



(Total for Question 17 is 3 marks)

2 On the grid, draw the graph of $y = 3 - 2x$ for values of x from -2 to 3



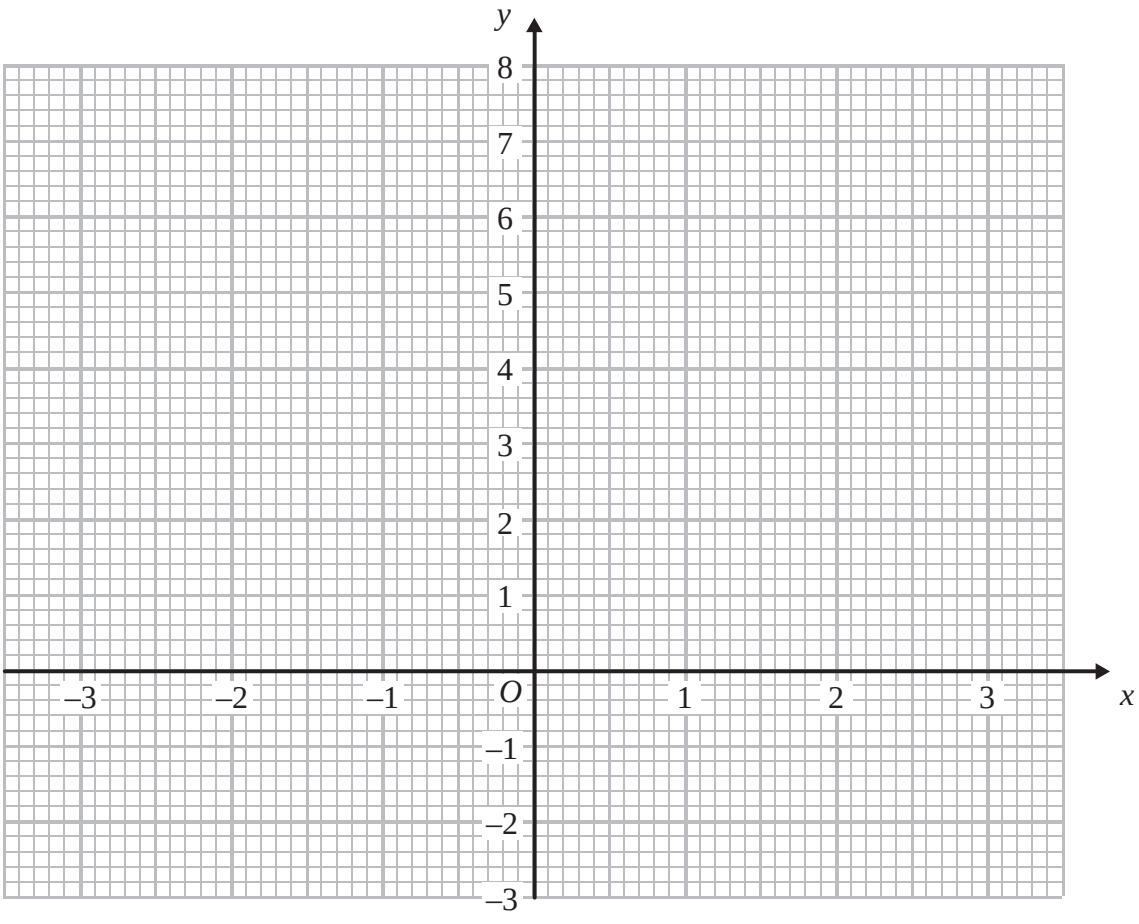
(Total for Question 2 is 3 marks)

5 (a) Complete the table of values for $y = x^2 - 2$

x	–3	–2	–1	0	1	2	3
y		2	–1			2	7

(2)

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



(2)

(Total for Question 5 is 4 marks)

20 The expression $x^2 - 8x + 6$ can be written in the form $(x - p)^2 + q$ for all values of x.

(a) Find the value of p and the value of q.

$p =$ .....

$q =$ .....

(3)

The graph of $y = x^2 - 8x + 6$ has a minimum point.

(b) Write down the coordinates of this point.

(..... , ...)

(1)

(Total for Question 20 is 4 marks)

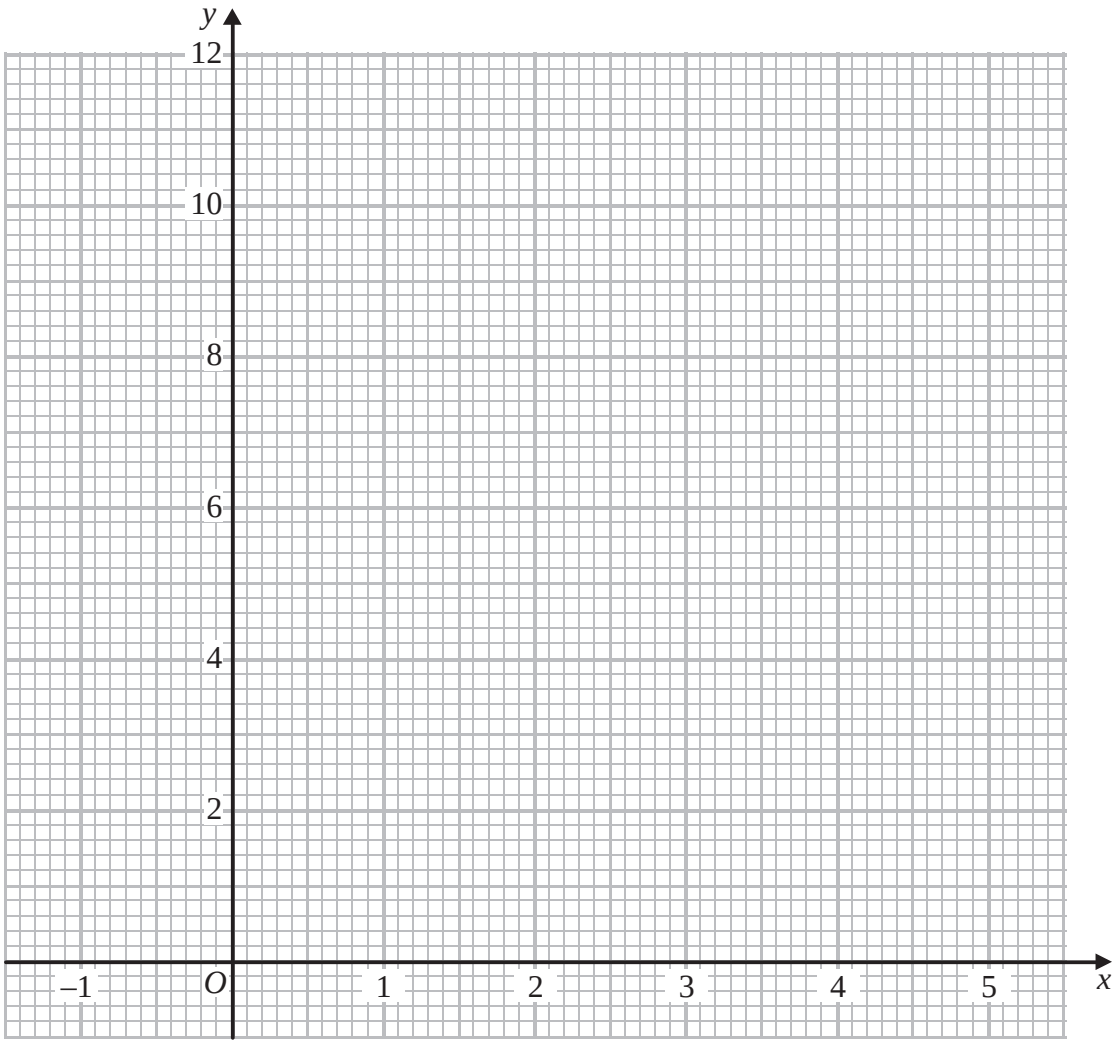
12 (a) Complete the table of values for $y = x^2 - 3x + 2$

x	−1	0	1	2	3	4	5
y	6				2		12

(2)

(b) On the grid, draw the graph of $y = x^2 - 3x + 2$ for values of x from –1 to 5

(2)



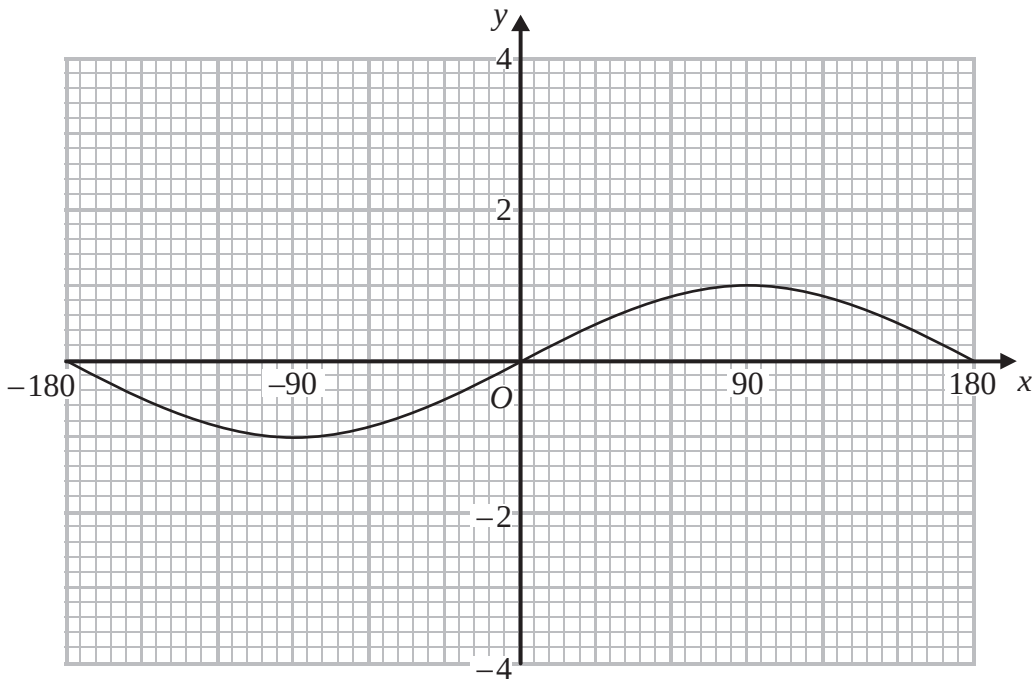
(c) Find estimates for the solutions of the equation $x^2 - 3x + 2 = 4$

.....

(2)

(Total for Question 12 is 6 marks)

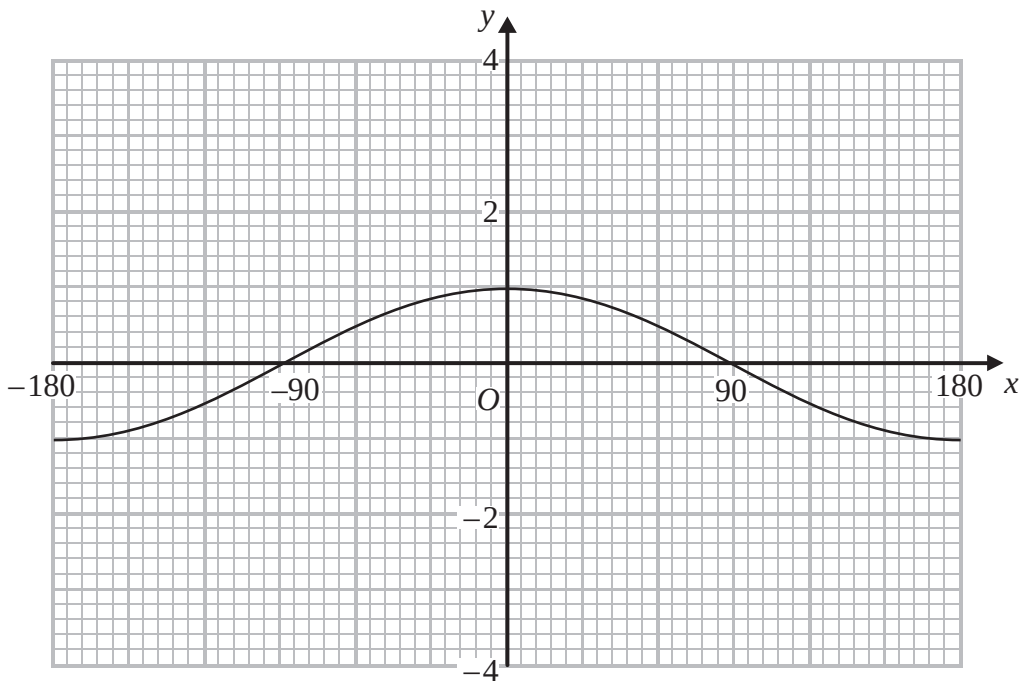
23 Here is the graph of $y = \sin x°$ for $-180 \leqslant x \leqslant 180$



(a) On the grid above, sketch the graph of $y = \sin x° + 2$ for $-180 \leqslant x \leqslant 180$

(2)

Here is the graph of $y = \cos x°$ for $-180 \leqslant x \leqslant 180$

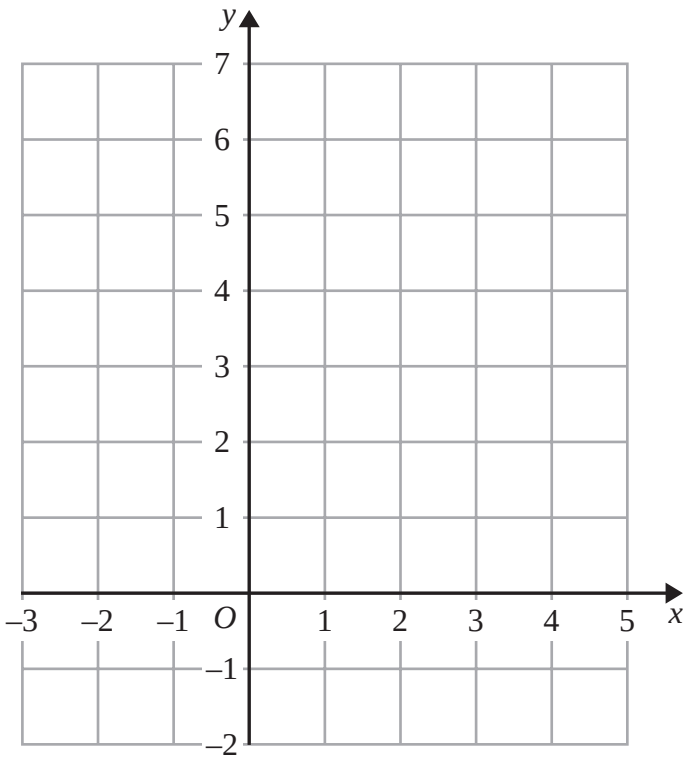


(b) On the grid above, sketch the graph of $y = -2 \cos x°$ for $-180 \leqslant x \leqslant 180$

(2)

(Total for Question 23 is 4 marks)

4 On the grid, draw the graph of $y = \frac{1}{2}x + 3$ for values of x from –2 to 4



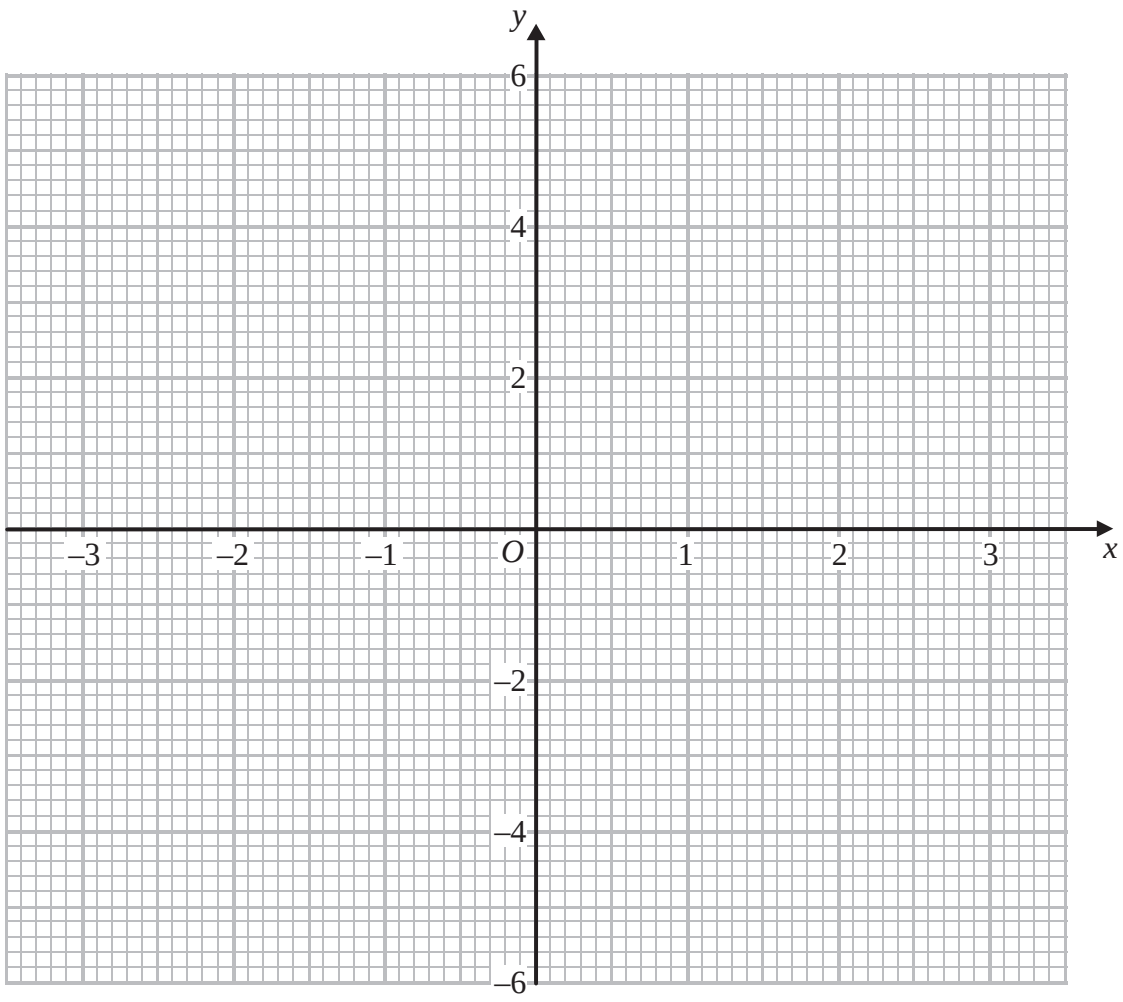
(Total for Question 4 is 3 marks)

9 (a) Complete the table of values for $y = 4 - x^2$

x	−3	−2	−1	0	1	2	3
y	−5		3			0	

(2)

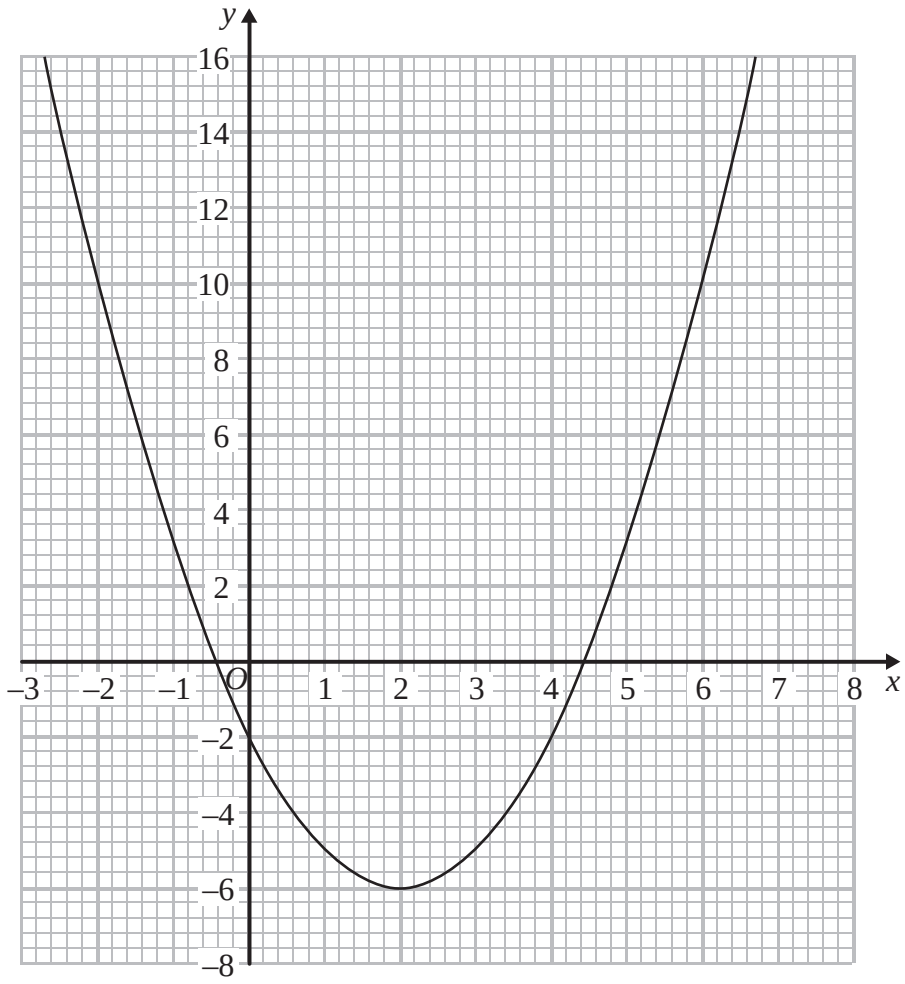
(b) On the grid, draw the graph of $y = 4 - x^2$ for values of x from –3 to 3



(2)

(Total for Question 9 is 4 marks)

19 The diagram shows the graph of $y = x^2 - 4x - 2$



(a) Use the graph to find estimates for the solutions of

(i) $x^2 - 4x - 2 = 0$

.....

(ii) $x^2 - 4x - 6 = 0$

.....

(3)

(b) Use the graph to find estimates for the values of x that satisfy the simultaneous equations

$$y = x^2 - 4x - 2$$

$$x + y = 6$$

.....

(3)

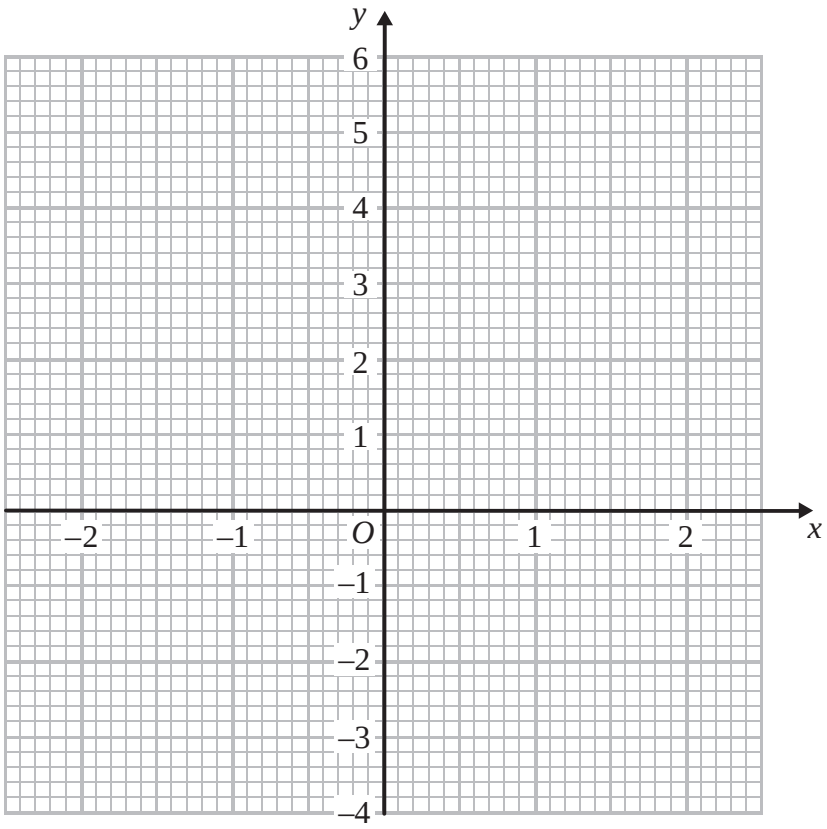
(Total for Question 19 is 6 marks)

13 (a) Complete the table of values for $y = x^3 - 3x + 1$

x	–2	–1	0	1	2
y		3			3

(2)

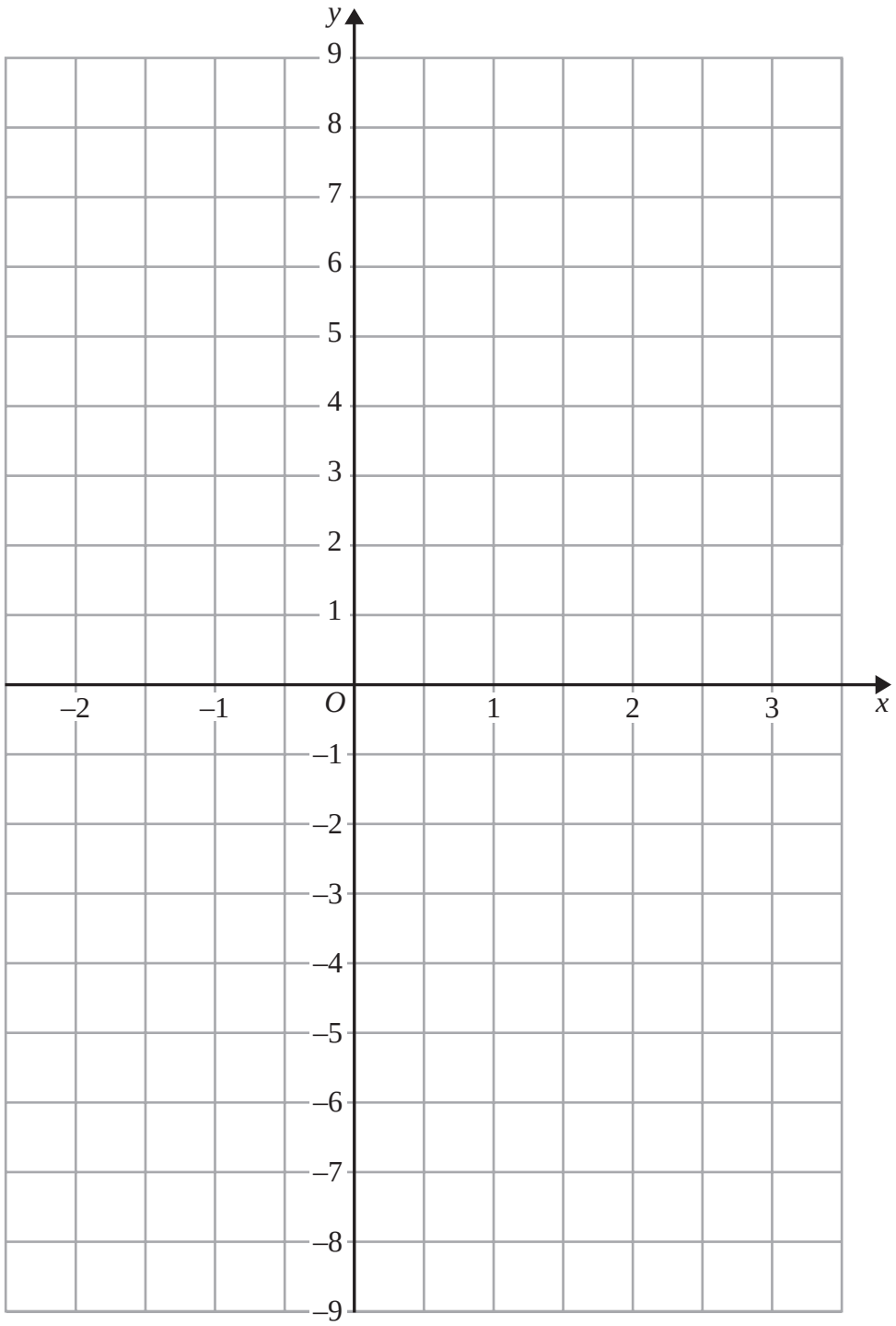
(b) On the grid, draw the graph of $y = x^3 - 3x + 1$ for values of x from –2 to 2



(2)

(Total for Question 13 is 4 marks)

6 On the grid, draw the graph of $y = 3x - 2$ for values of x from -2 to 3



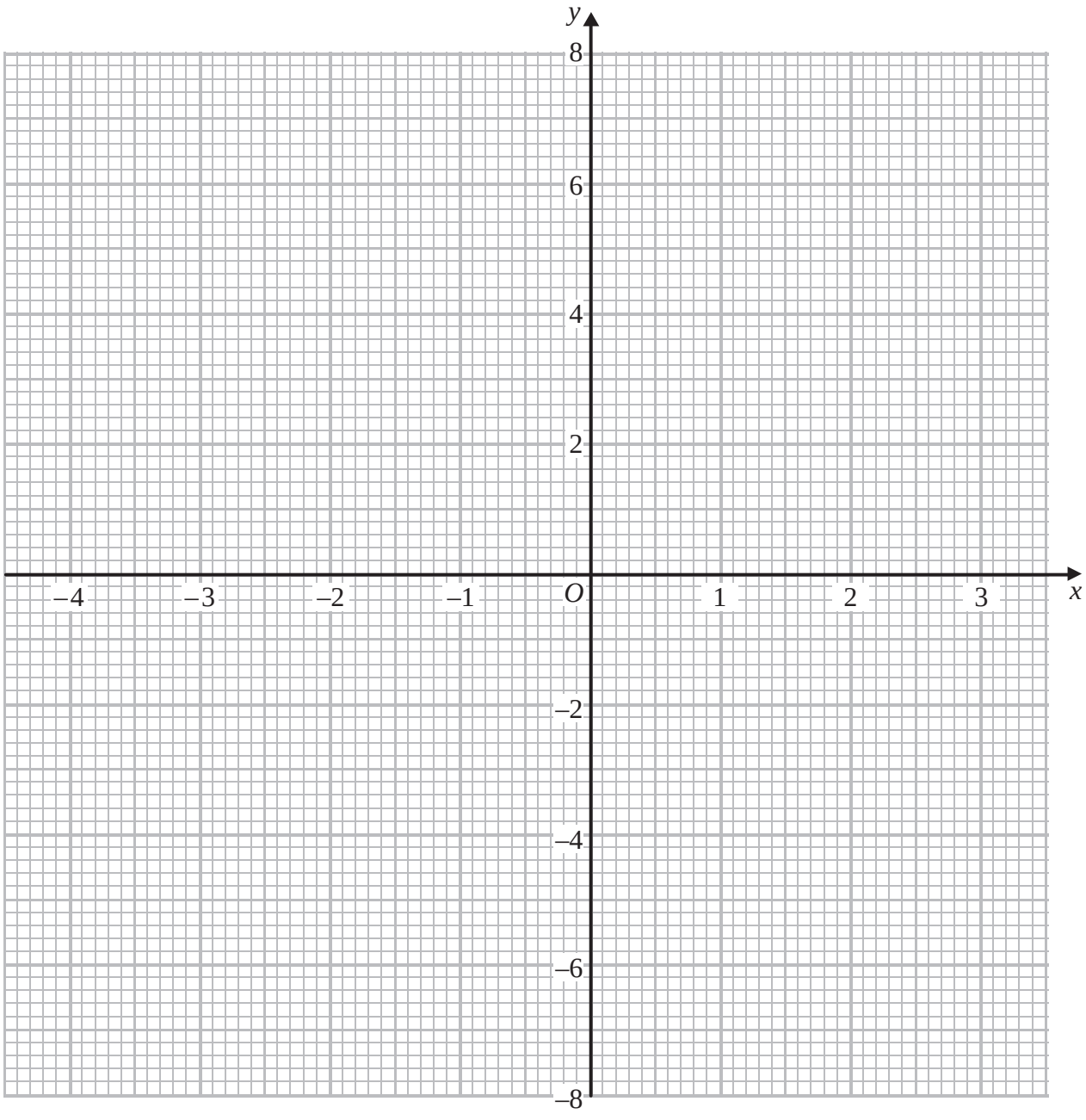
(Total for Question 6 is 3 marks)

13 (a) Complete the table for the values for $y = 6 - x - x^2$

x	−4	−3	−2	−1	0	1	2	3
y	−6		4	6			0	

(2)

(b) On the grid, draw the graph of $y = 6 - x - x^2$ for values of x from −4 to 3



(2)

(c) Find estimates for the solutions of the equation $6 - x - x^2 = 2$

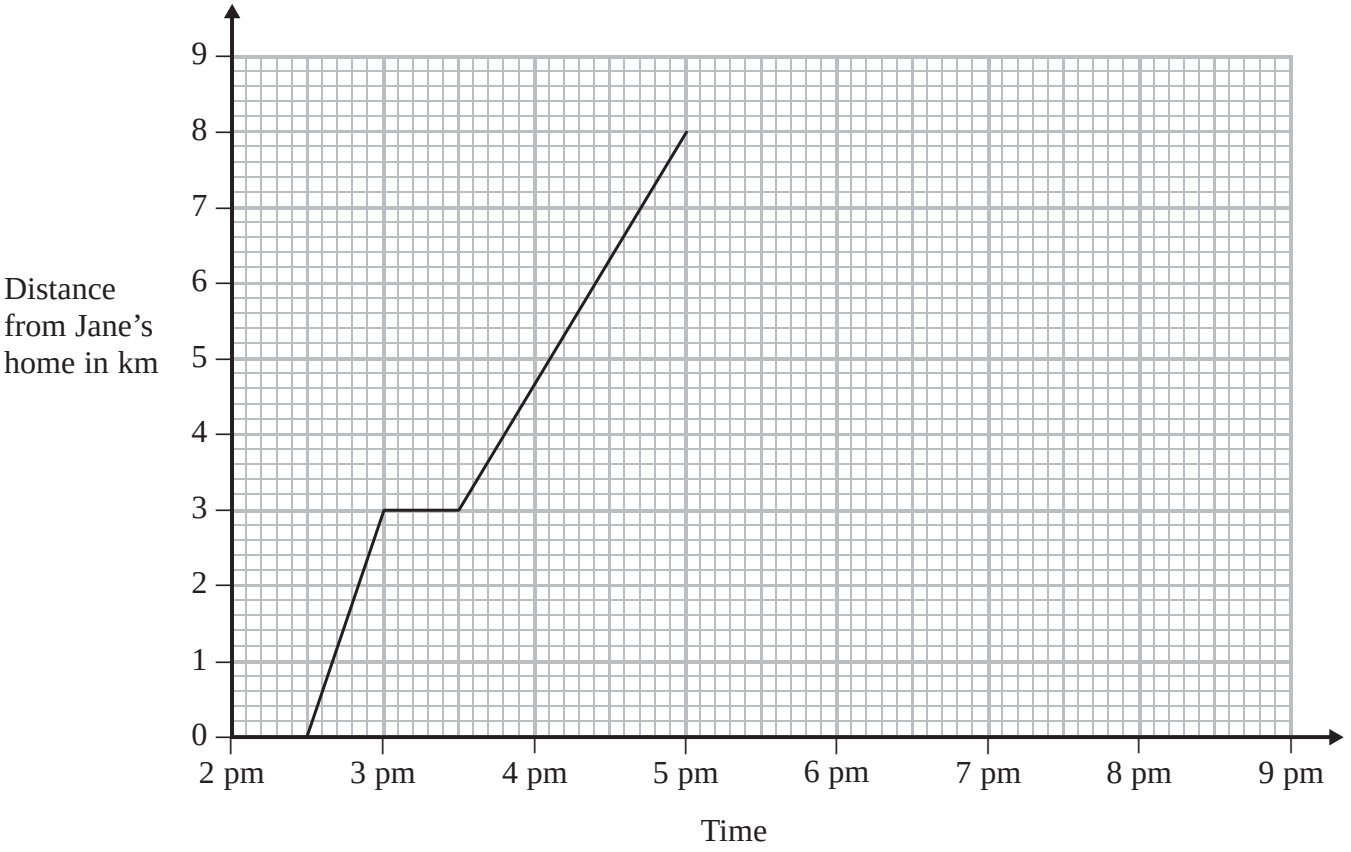
.....

(2)

(Total for Question 13 is 6 marks)

4 Jane walked from her home to the ice rink.

The travel graph for Jane's journey to the ice rink is shown below.



On the way to the ice rink Jane stopped at her friend's house.

(a) How far is it from her friend's house to the ice rink?

..... km

(1)

Jane was at the ice rink for 1 hour 30 minutes.
She then walked home at a steady speed.
Jane took 2 hours to walk home.

(b) Complete the travel graph for this information.

(2)

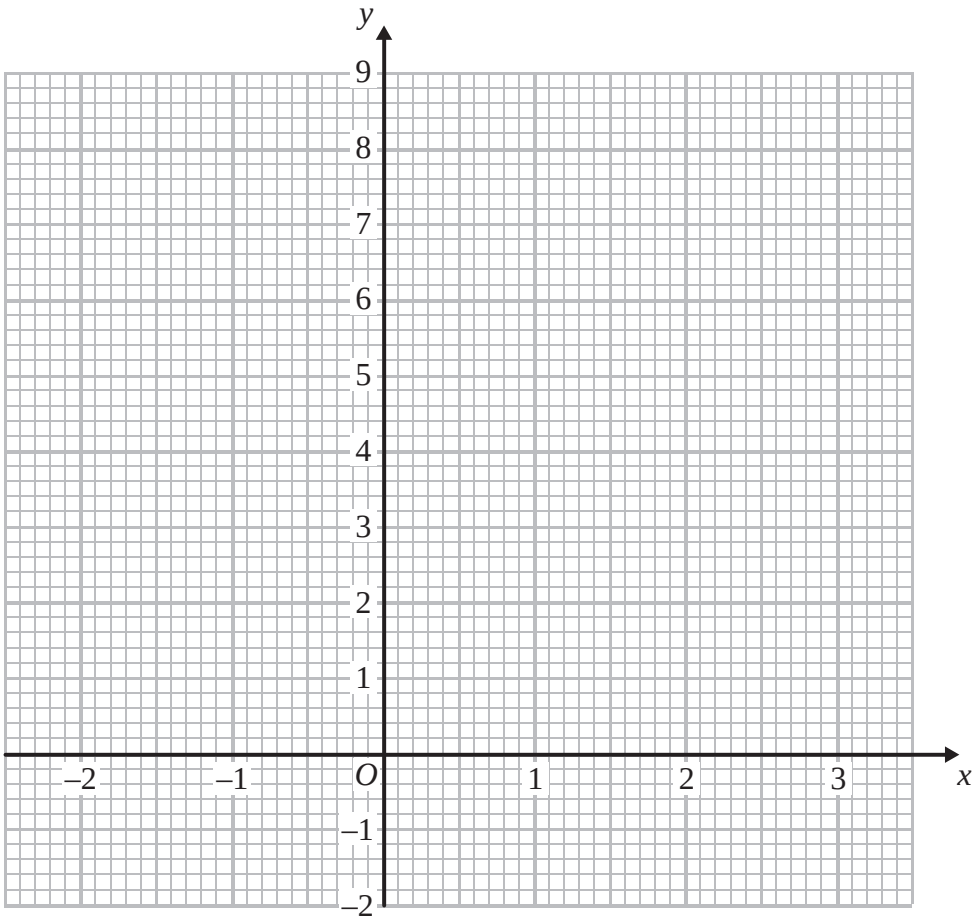
(Total for Question 4 is 3 marks)

17 (a) Complete the table of values for $y = 2^x$

x	–2	–1	0	1	2	3
y	0.25			2		

(2)

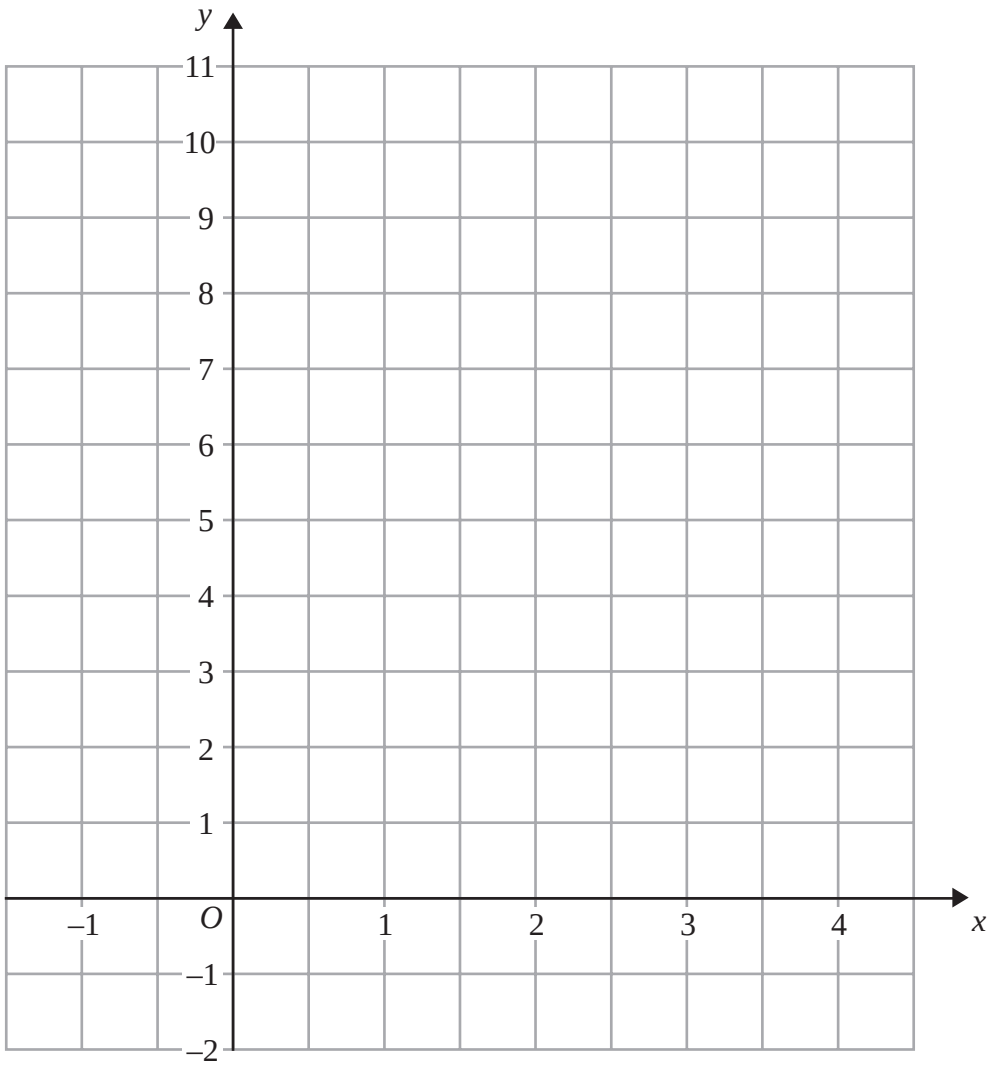
(b) On the grid, draw the graph of $y = 2^x$ for values of x from –2 to 3



(2)

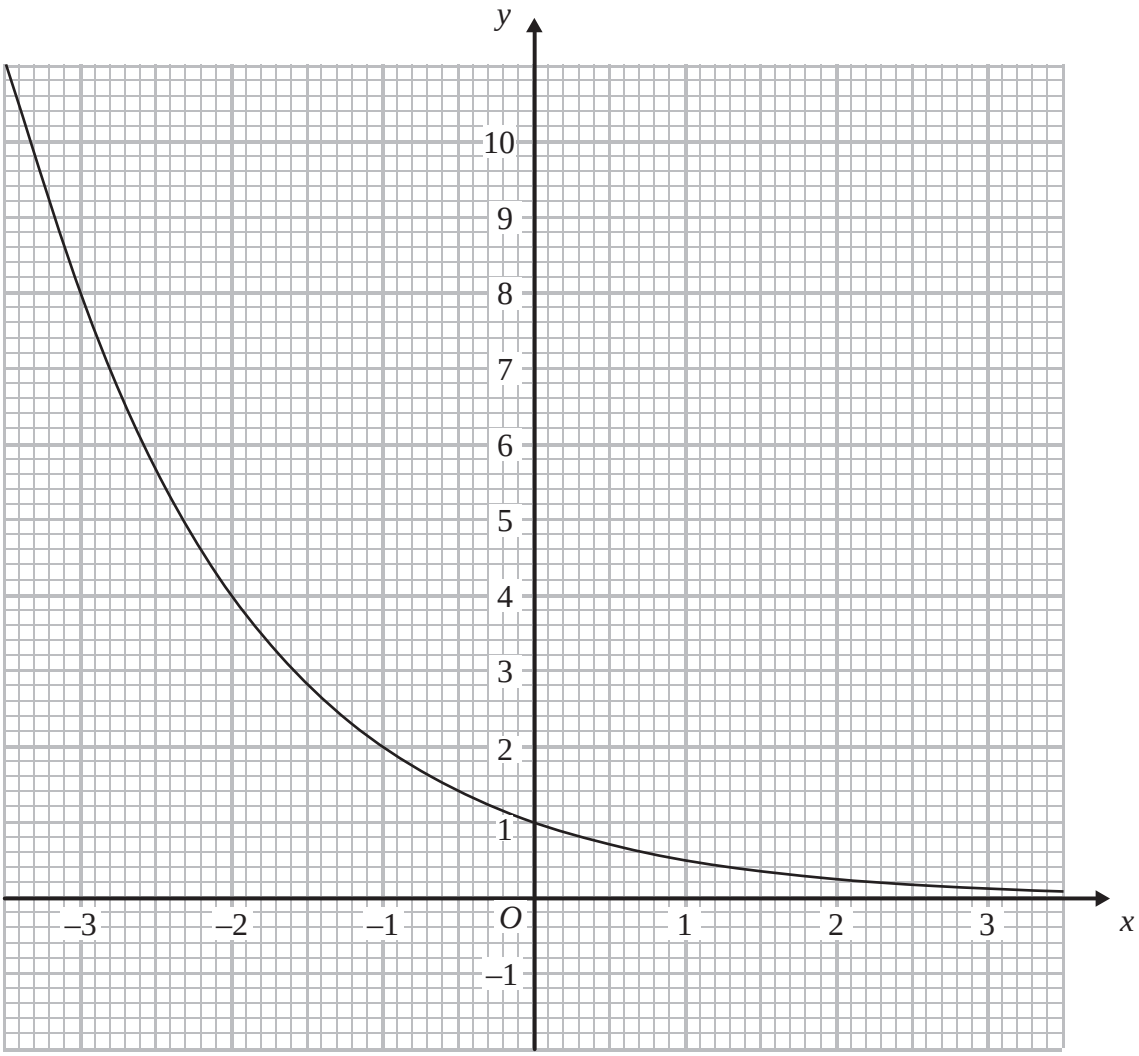
(Total for Question 17 is 4 marks)

7 On the grid, draw the graph of $y = 8 - 2x$ for values of x from -1 to 4



(Total for Question 7 is 3 marks)

22

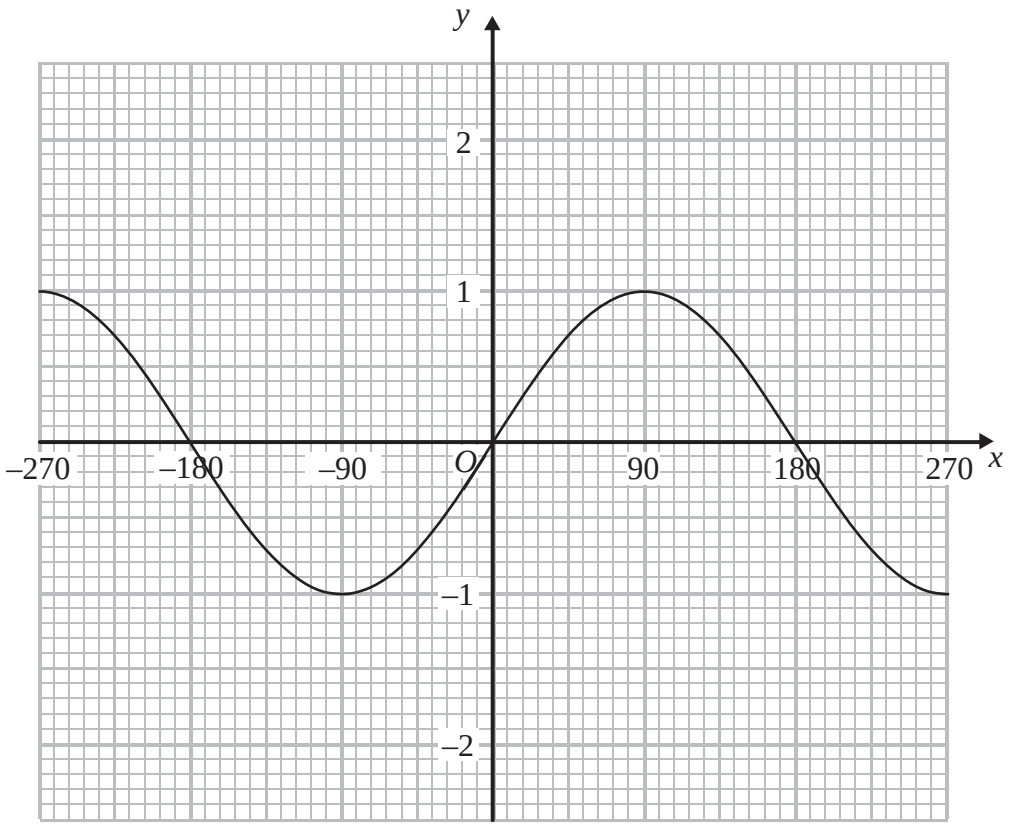


The graph of $y = k^x$, where k is a positive constant, is shown above.

(a) Find the value of k.

$k =$ .....

(2)



The graph of $y = \sin x°$ for values of x from –270 to +270 is shown above.

(b) On the same axes, draw the graph of $y = 1 - \sin x°$ for values of x from –270 to +270

(2)

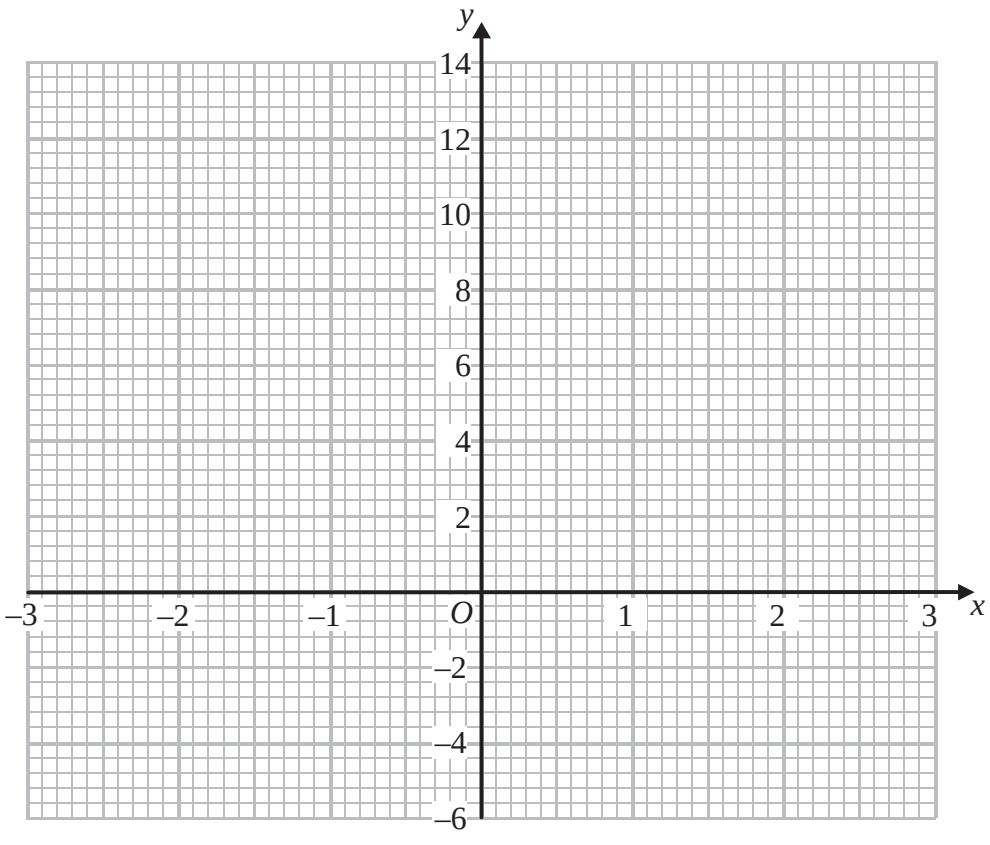
(Total for Question 22 is 4 marks)

13 (a) Complete the table of values for $y = x^3 - 6x + 4$

x	−3	−2	−1	0	1	2	3
y	−5		9			0	13

(2)

(b) On the grid, draw the graph of $y = x^3 - 6x + 4$ for values of x from −3 to 3



(2)

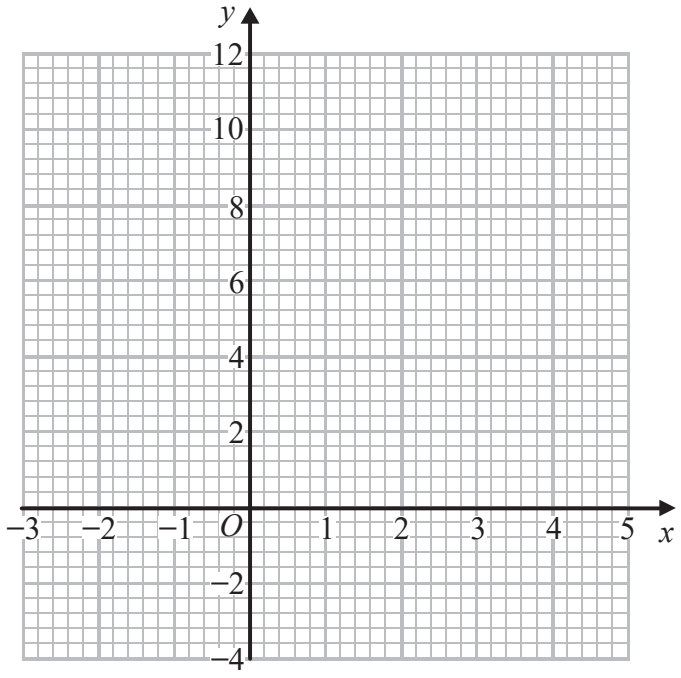
(Total for Question 13 is 4 marks)

13 (a) Complete the table of values for $y = x^2 - 3x + 1$

x	-2	-1	0	1	2	3	4
y	11		1	-1		1	

(2)

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



(2)

(c) By drawing a suitable straight line on the grid, find estimates for the solutions of

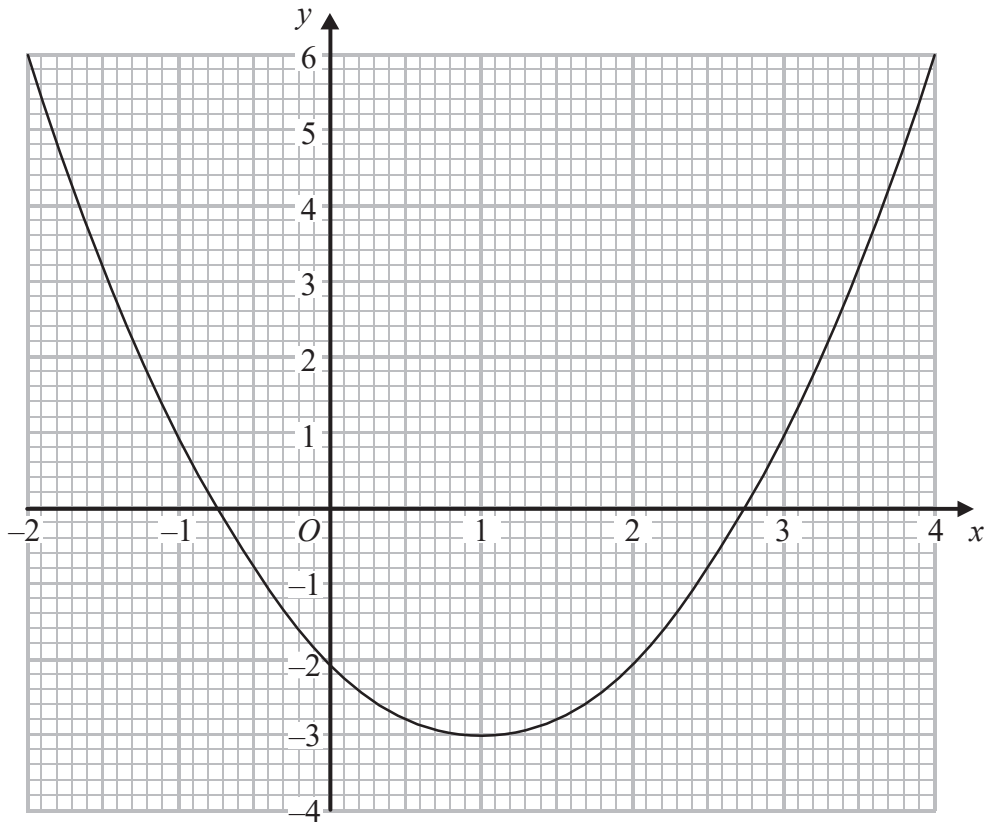
$$x^2 - 3x + 1 = 3$$

.....

(2)

(Total for Question 13 is 6 marks)

11 The graph of $y = f(x)$ is drawn on the grid.



(a) Write down the coordinates of the turning point of the graph.

(..... , ...)

(1)

(b) Write down estimates for the roots of $f(x) = 0$

.....

(1)

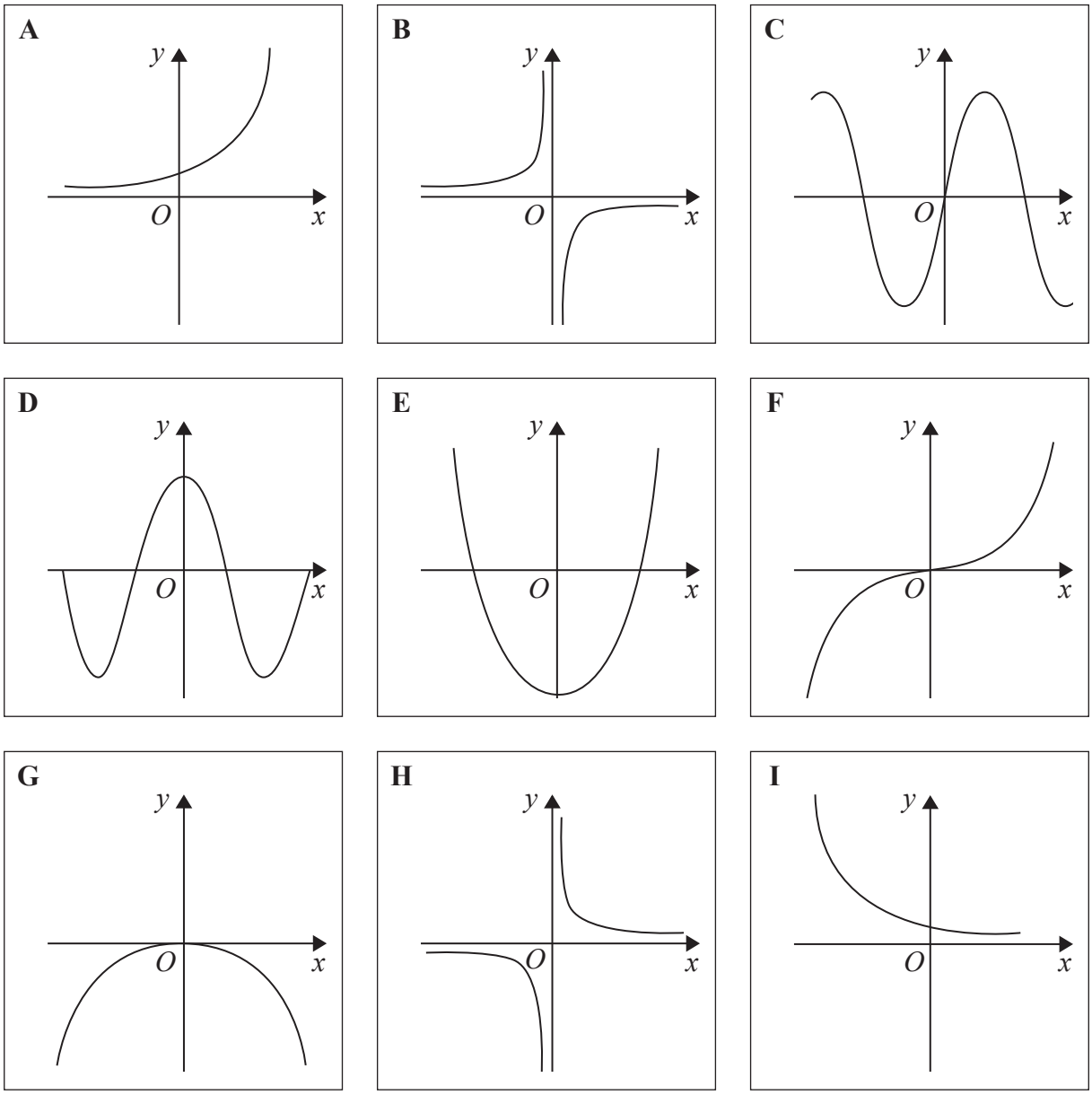
(c) Use the graph to find an estimate for $f(1.5)$

.....

(1)

(Total for Question 11 is 3 marks)

14 Here are some graphs.

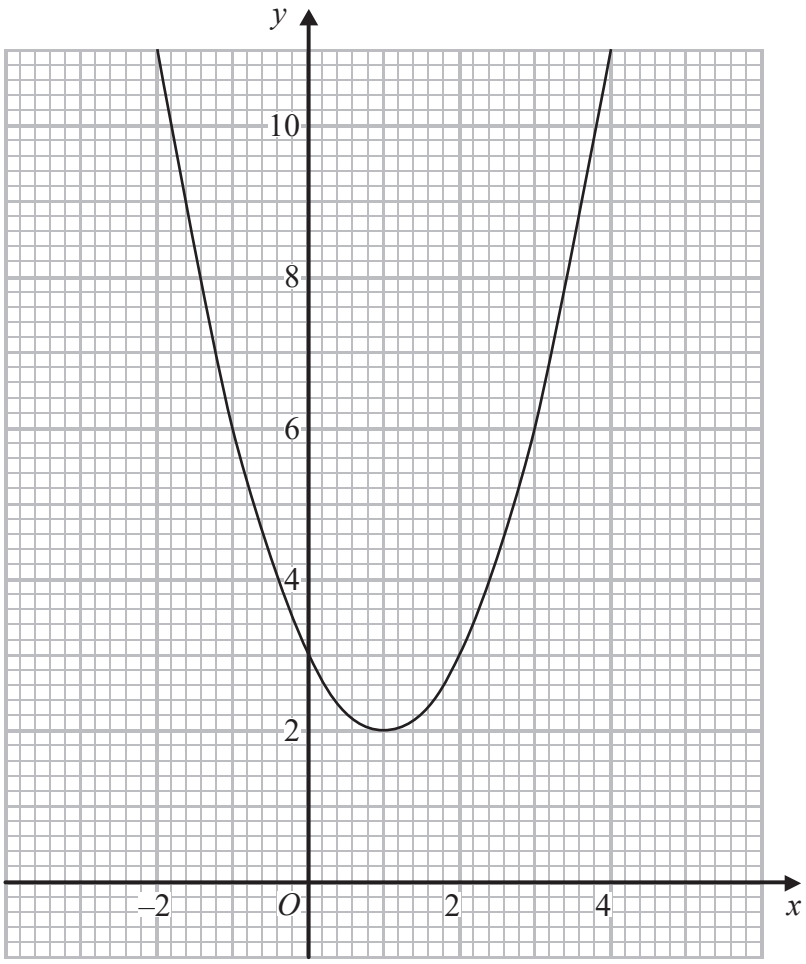


In the table below, match each equation with the letter of its graph.

Equation	Graph
$y = \sin x$	
$y = x^3 + 4x$	
$y = 2^x$	
$y = \frac{4}{x}$	

(Total for Question 14 is 3 marks)

20 The diagram shows part of the graph of $y = x^2 - 2x + 3$



(a) By drawing a suitable straight line, use your graph to find estimates for the solutions of $x^2 - 3x - 1 = 0$

.....

(2)

P is the point on the graph of $y = x^2 - 2x + 3$ where $x = 2$

(b) Calculate an estimate for the gradient of the graph at the point P.

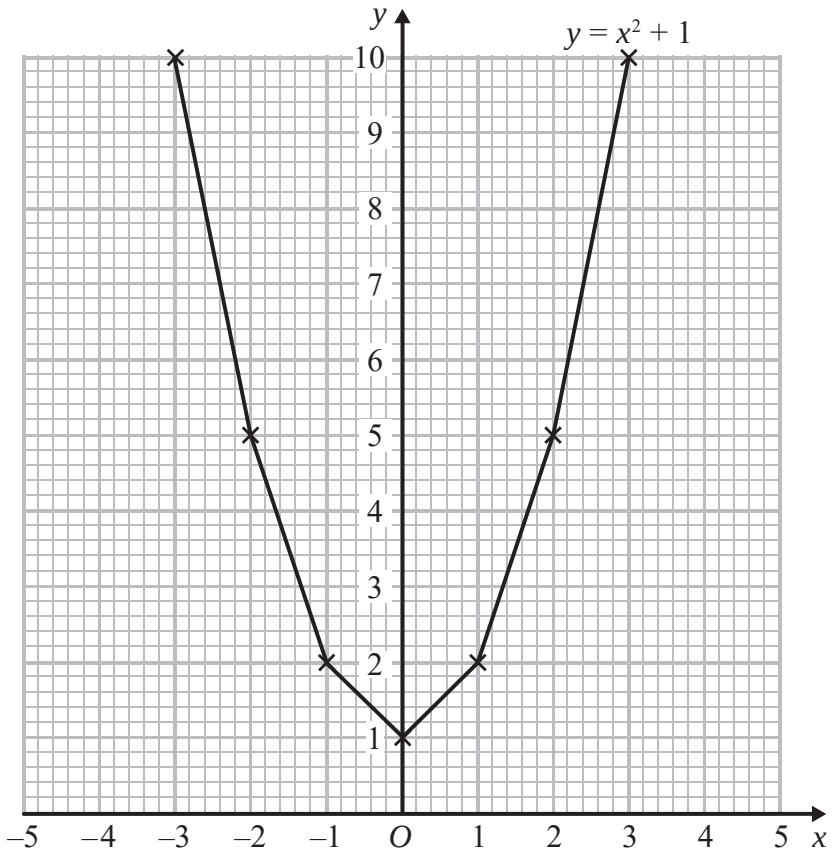
.....

(3)

(Total for Question 20 is 5 marks)

7 Brogan needs to draw the graph of $y = x^2 + 1$

Here is her graph.



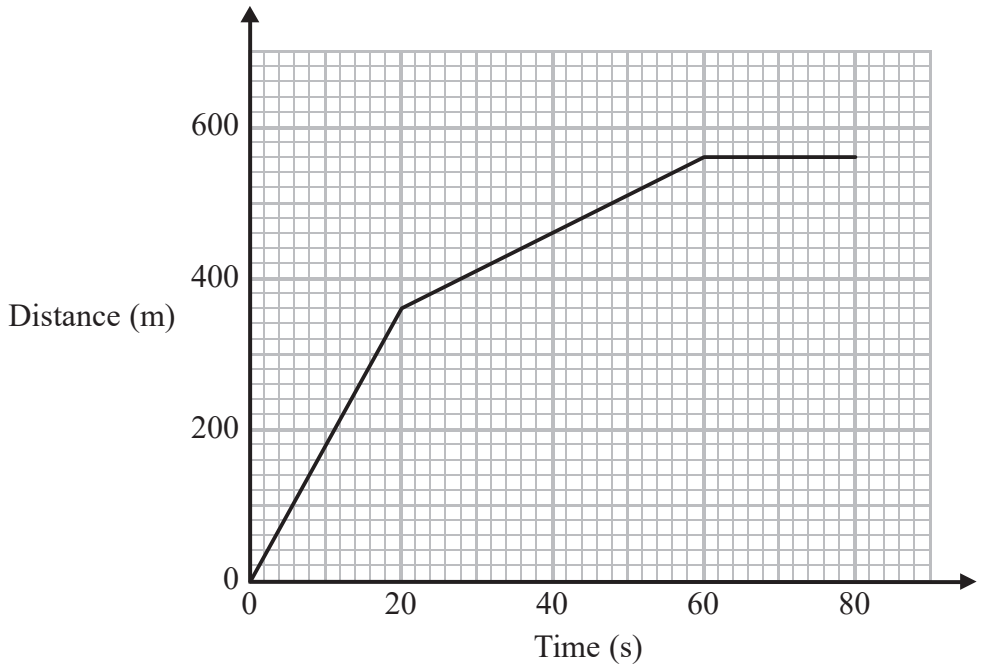
Write down one thing that is wrong with Brogan's graph.

.....

.....

(Total for Question 7 is 1 mark)

10 Here is part of a distance-time graph for a car's journey.



(a) Between which two times does the car travel at its greatest speed?
Give a reason for your answer.

.....

.....

(2)

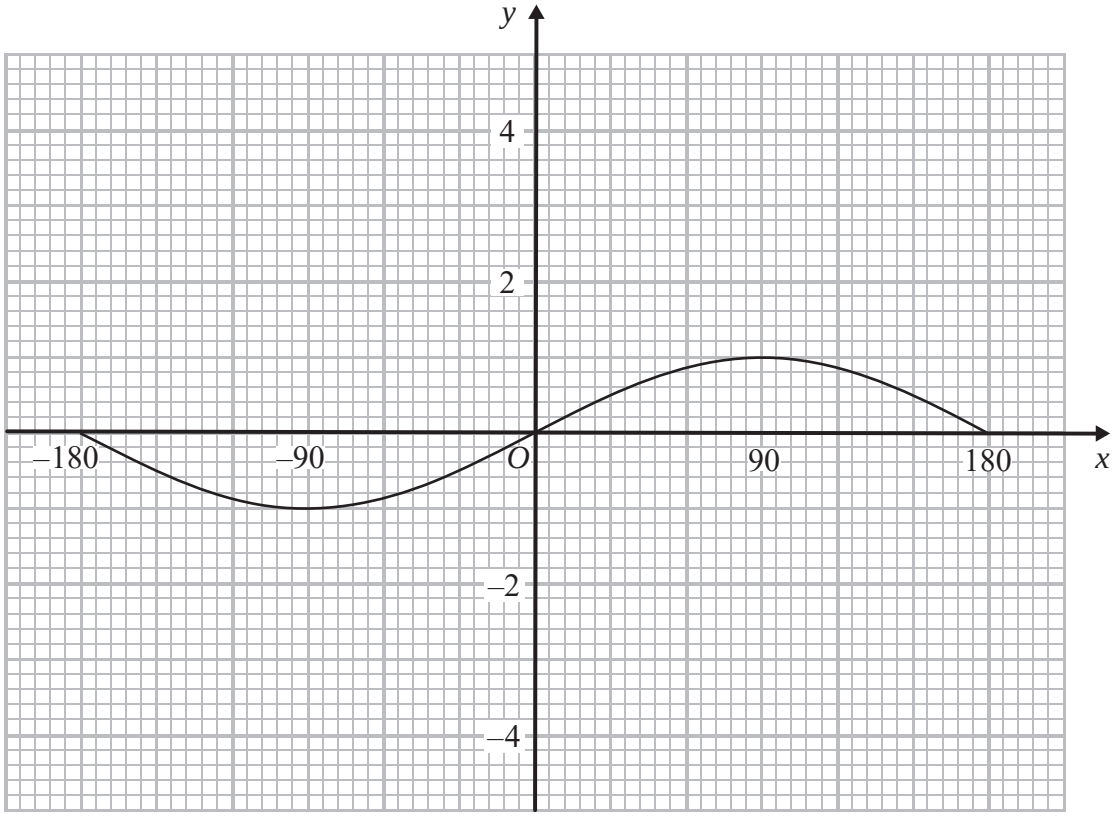
(b) Work out this greatest speed.

..... m/s

(1)

(Total for Question 10 is 3 marks)

18 Here is the graph of $y = \sin x°$ for $-180 \leqslant x \leqslant 180$



On the grid, sketch the graph of $y = \sin x° - 2$ for $-180 \leqslant x \leqslant 180$

(Total for Question 18 is 2 marks)

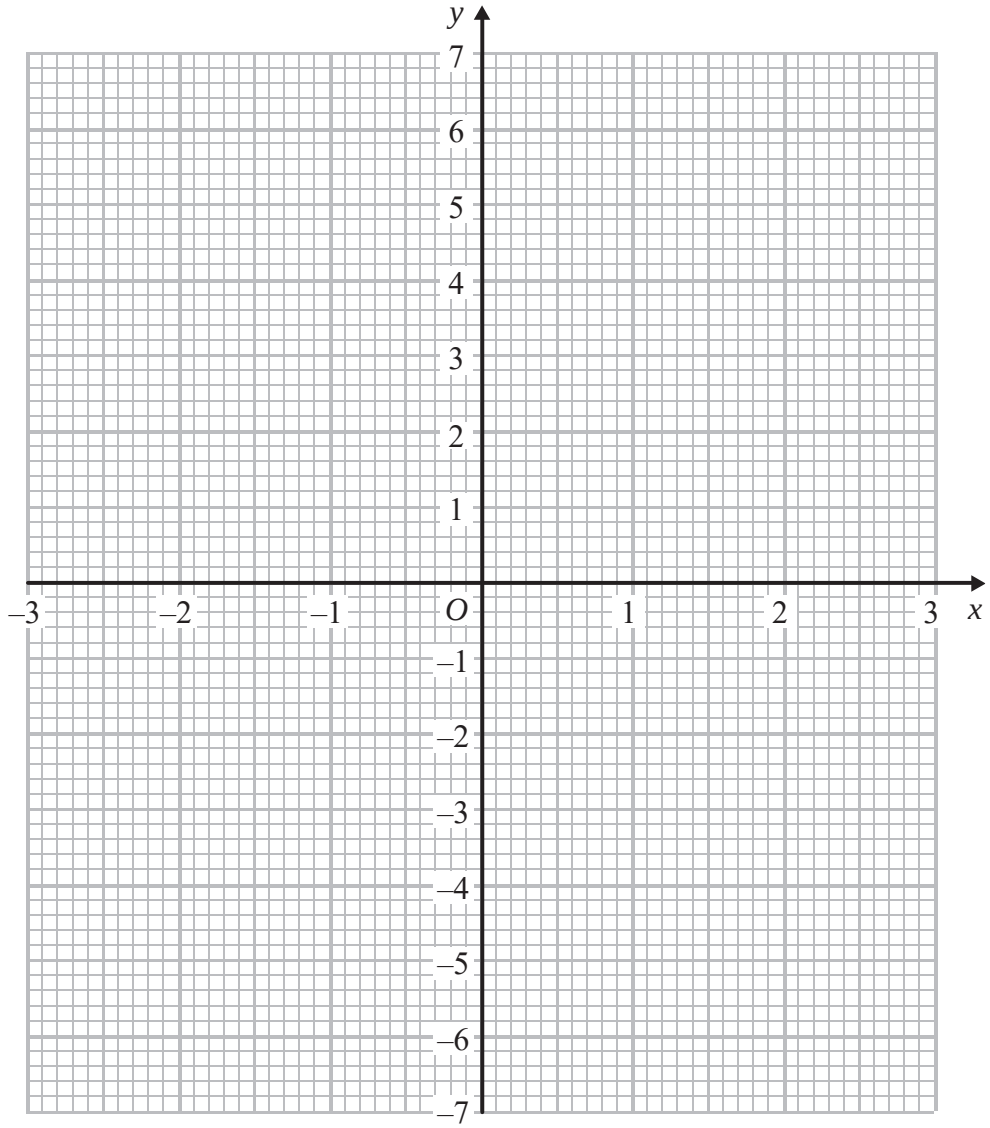
5 (a) Complete the table of values for $y = x^2 - x - 6$

x	–3	–2	–1	0	1	2	3
y	6			– 6			

(2)

(b) On the grid, draw the graph of $y = x^2 - x - 6$ for values of x from –3 to 3

(2)



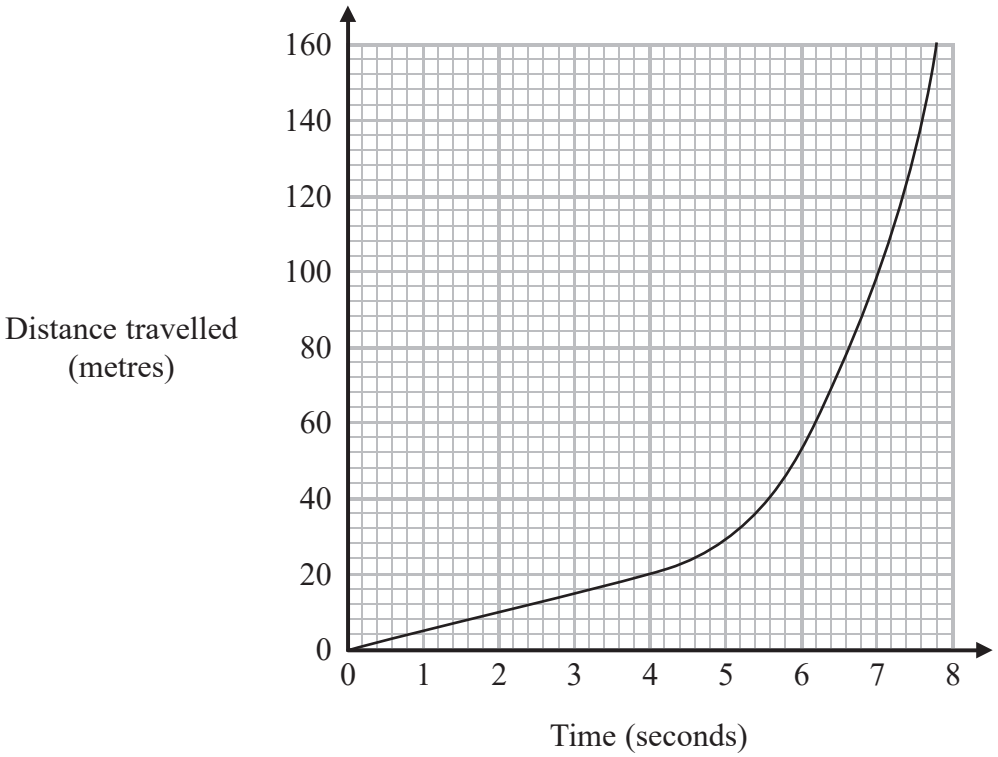
(c) Use your graph to find estimates of the solutions to the equation $x^2 - x - 6 = -2$

.....

(2)

(Total for Question 5 is 6 marks)

14 The distance-time graph shows information about part of a car journey.

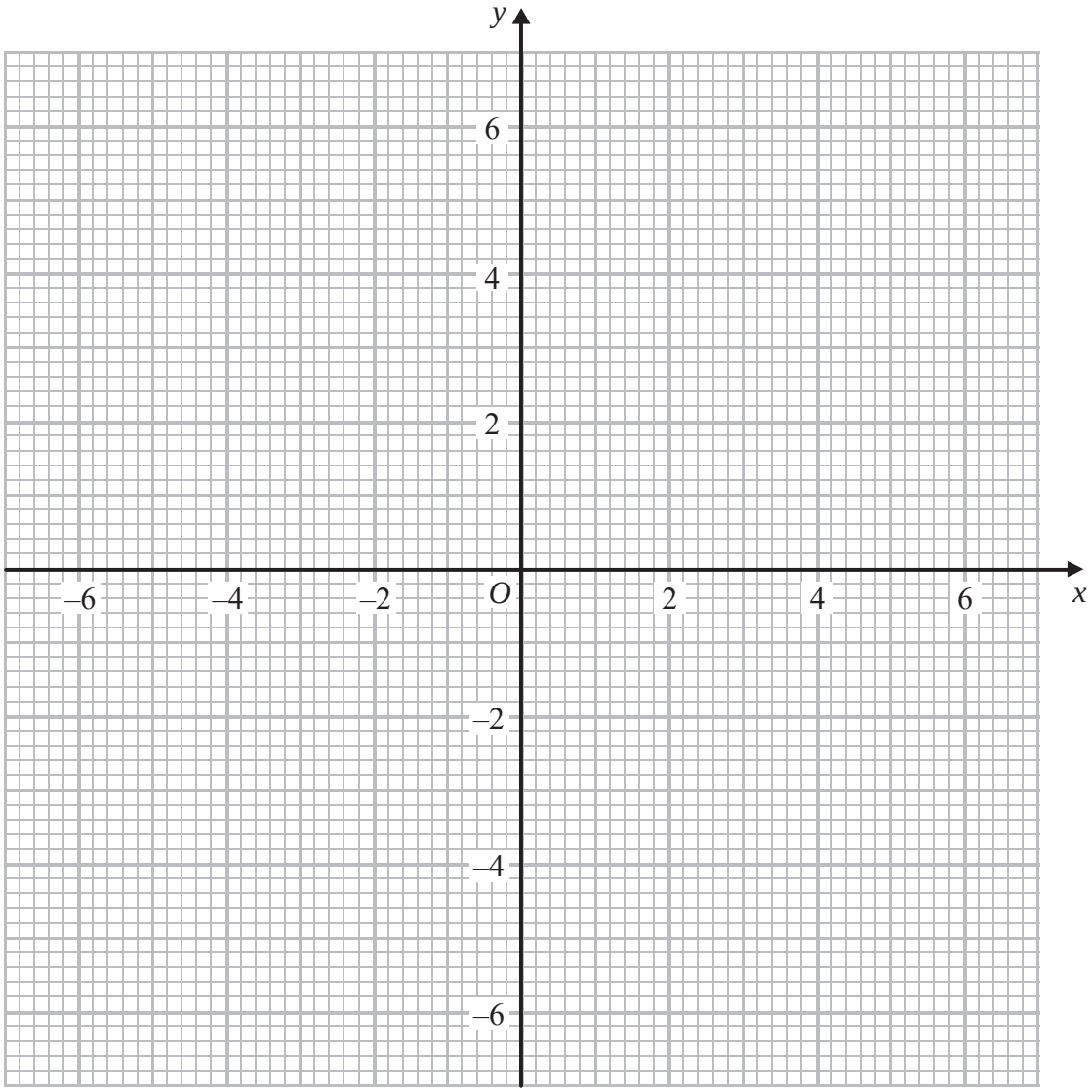


Use the graph to estimate the speed of the car at time 5 seconds.

..... m/s

(Total for Question 14 is 3 marks)

16 (a) On the grid, draw the graph of $x^2 + y^2 = 12.25$



(2)

(b) Hence find estimates for the solutions of the simultaneous equations

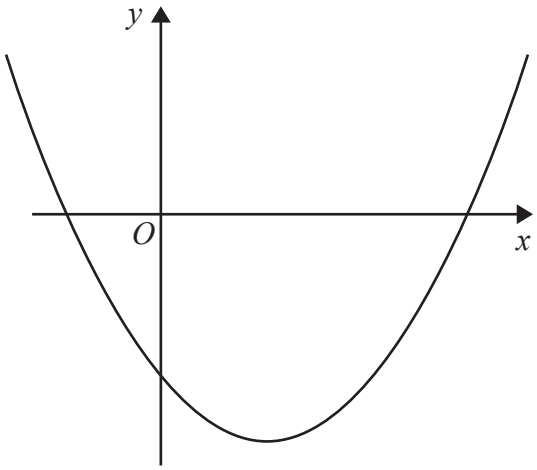
$$x^2 + y^2 = 12.25$$
$$2x + y = 1$$

.....

(3)

(Total for Question 16 is 5 marks)

17 Here is a sketch of a curve.



The equation of the curve is $y = x^2 + ax + b$ where a and b are integers.

The points $(0, -5)$ and $(5, 0)$ lie on the curve.

Find the coordinates of the turning point of the curve.

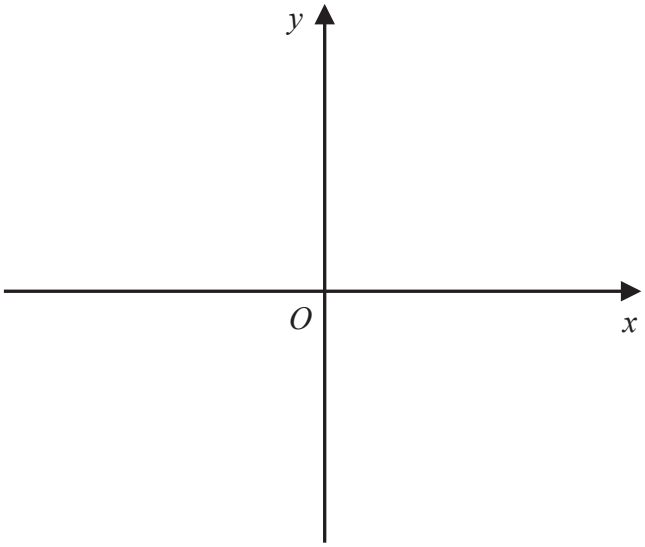
(..... , ...)

(Total for Question 17 is 4 marks)

Question 88

November 2018 | 1MA1/2H | Original Q14

14 On the grid, sketch the curve with equation $y = 2^x$
Give the coordinates of any points of intersection with the axes.



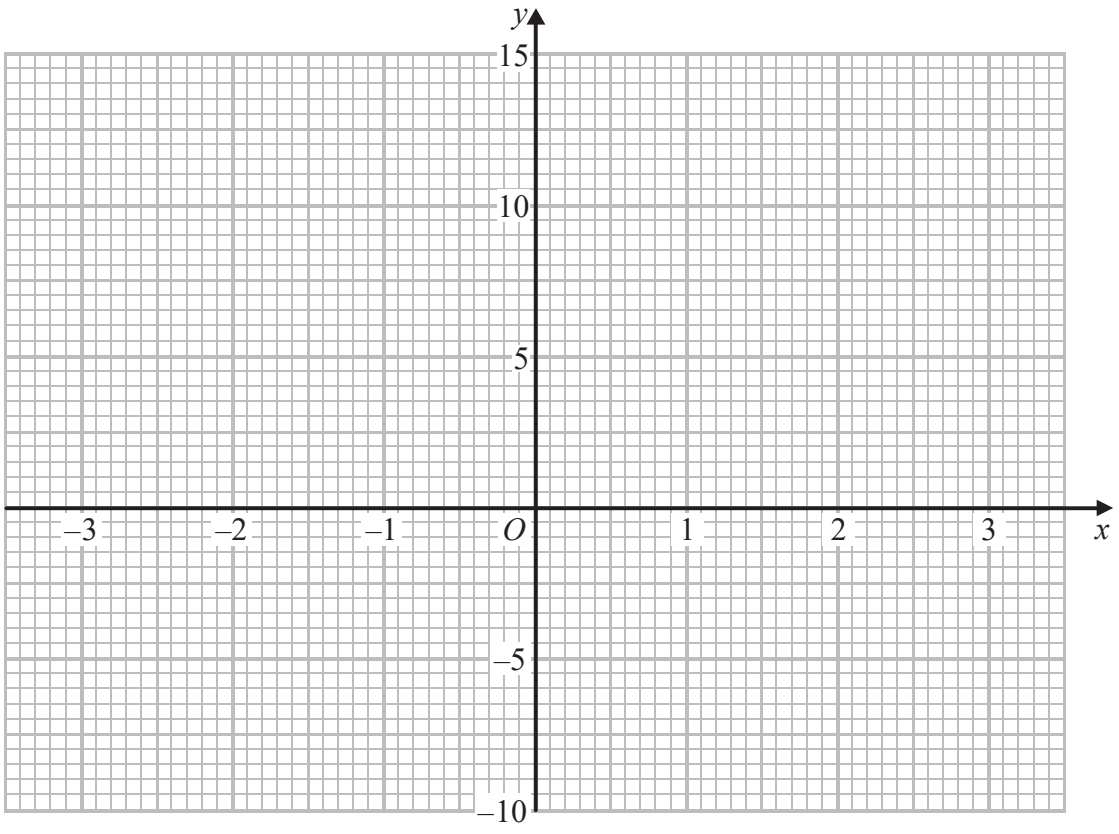
(Total for Question 14 is 2 marks)

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

x	–3	–2	–1	0	1	2	3
y		–2	–4		–2		

(2)

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



(2)

(c) Use the graph to estimate a solution to $x^2 + x - 4 = 0$

.....

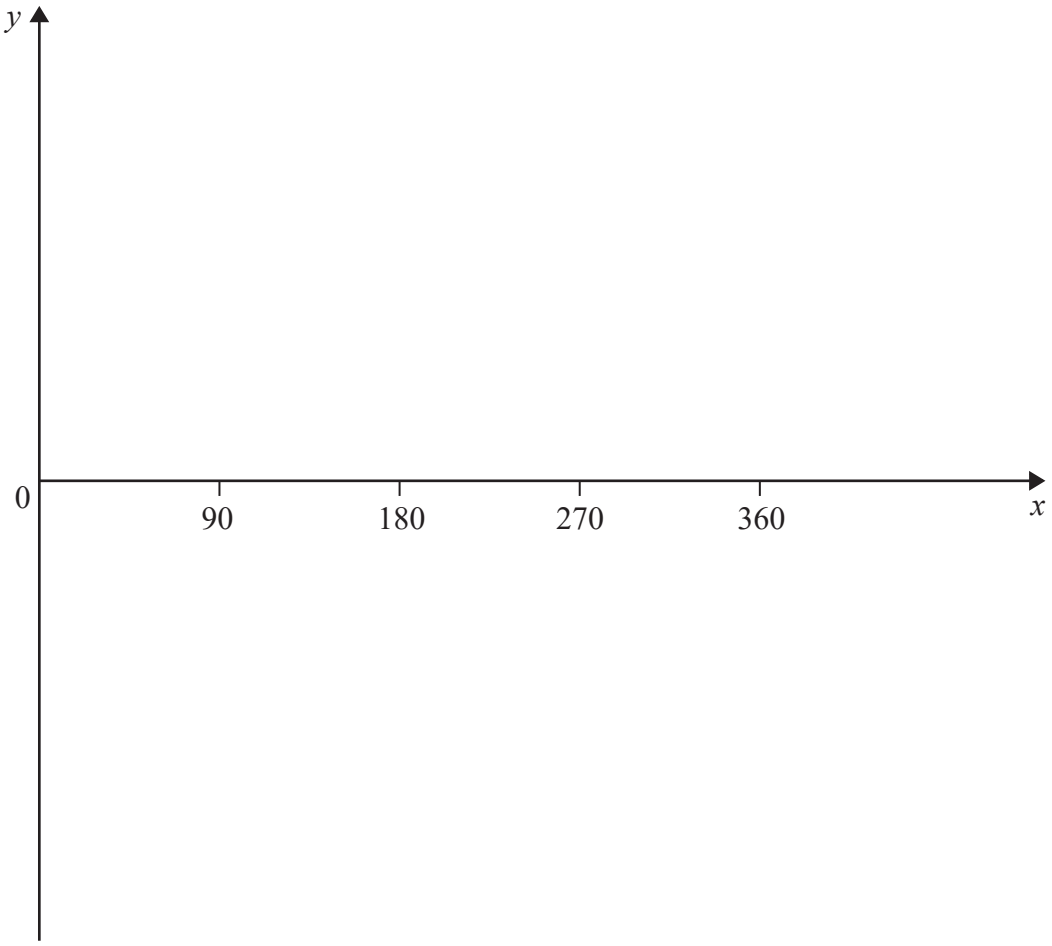
(1)

(Total for Question 3 is 5 marks)

Question 90

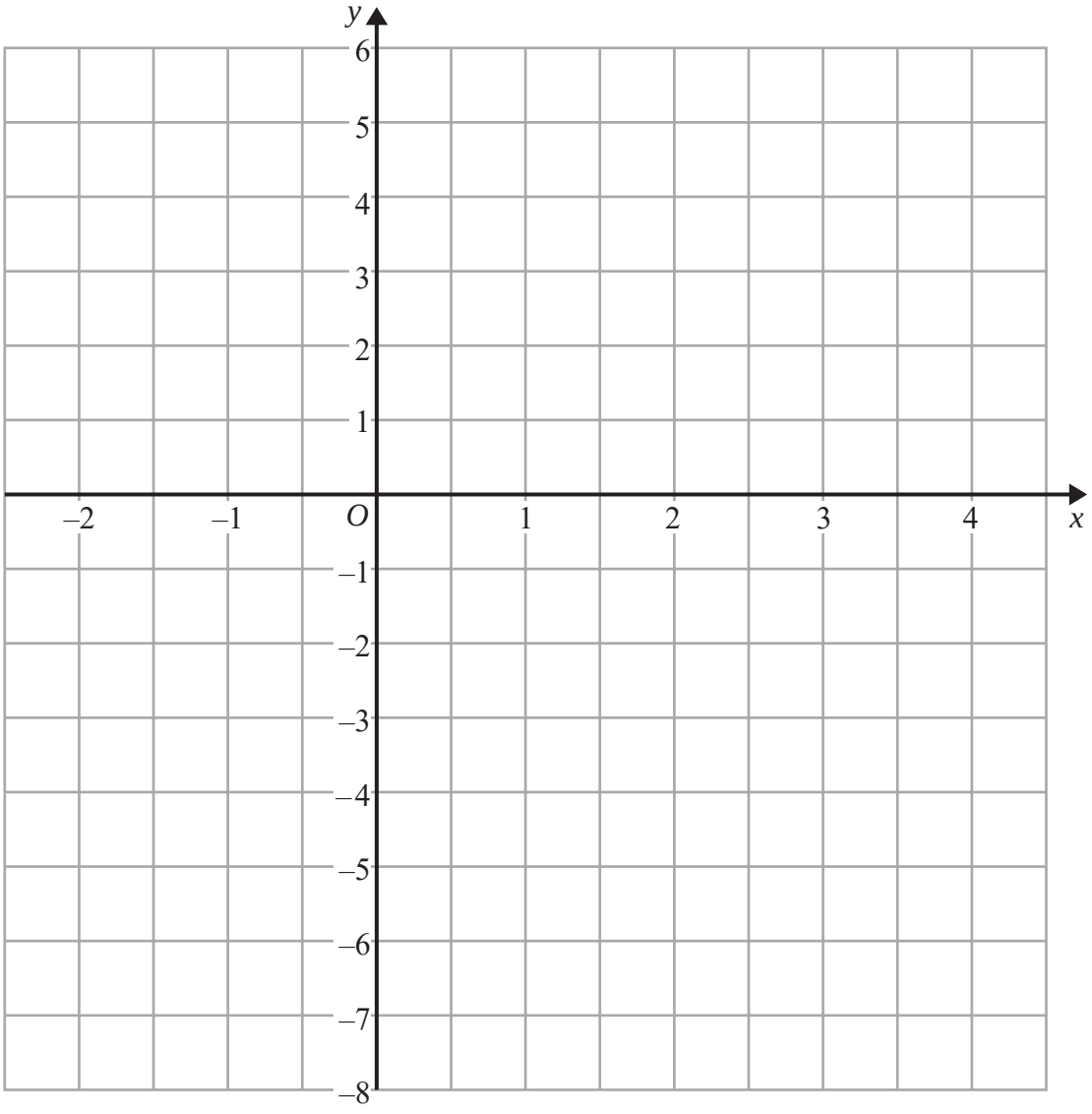
November 2018 | 1MA1/3H | Original Q11

11 Sketch the graph of $y = \tan x°$ for $0 \leqslant x \leqslant 360$



(Total for Question 11 is 2 marks)

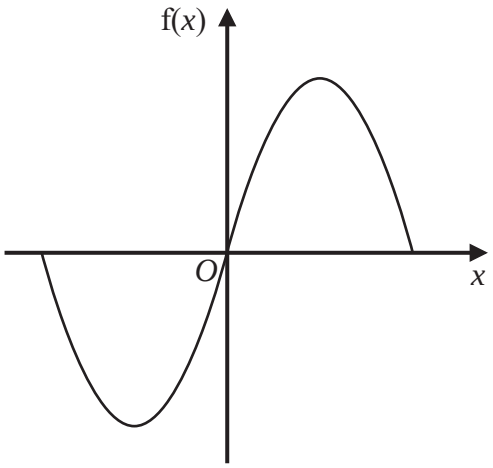
2 On the grid below, draw the graph of $y = 2x - 3$ for values of x from -2 to 4



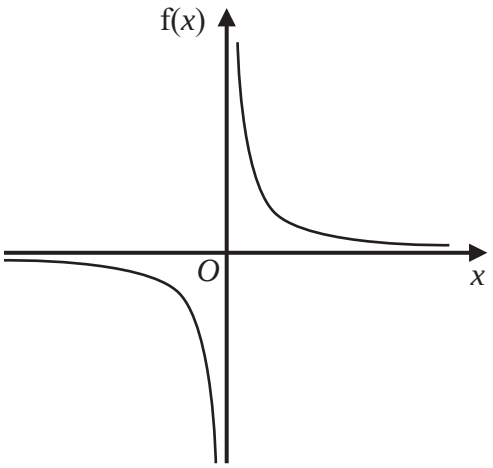
(Total for Question 2 is 3 marks)

17 Here are four graphs.

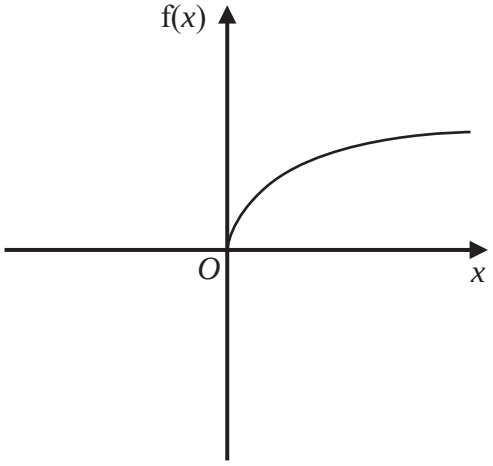
Graph A



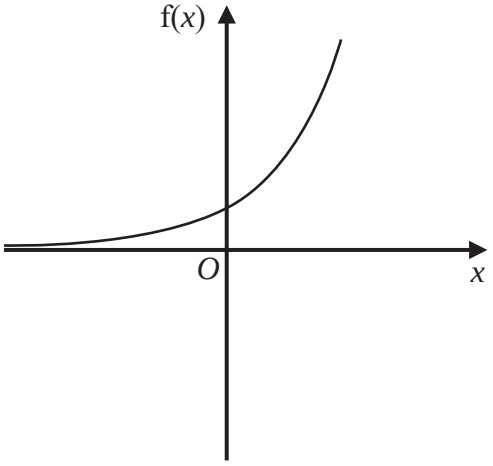
Graph B



Graph C



Graph D



The graphs represent four different types of function f.

Match each description of the function in the table to the letter of its graph.

Description of function	Graph
f(x) is inversely proportional to x	
f(x) is a trigonometrical function	
f(x) is an exponential function	
f(x) is directly proportional to $\sqrt{x}$	

(Total for Question 17 is 2 marks)

21 Sketch the graph of

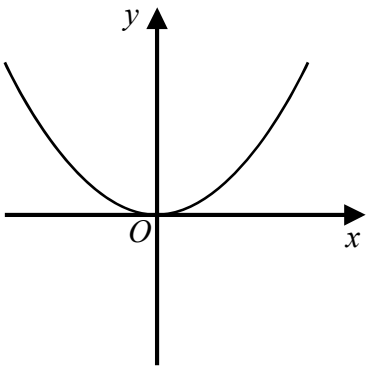
$$y = 2x^2 - 8x - 5$$

showing the coordinates of the turning point and the exact coordinates of any intercepts with the coordinate axes.

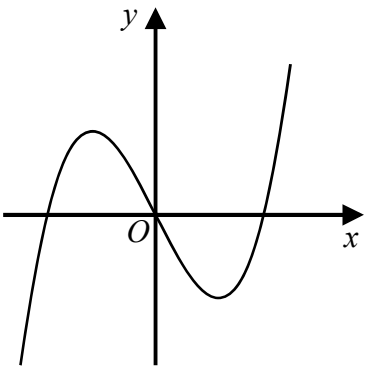
(Total for Question 21 is 5 marks)

5 Here are six graphs.

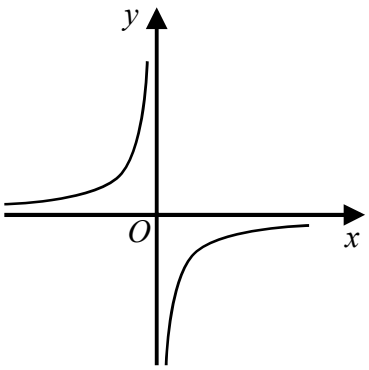
A



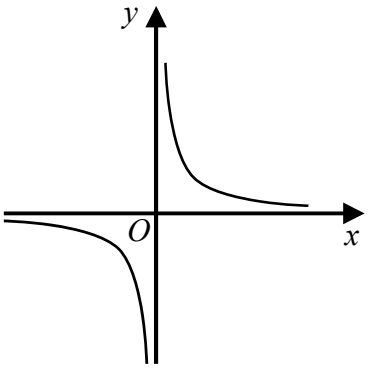
B



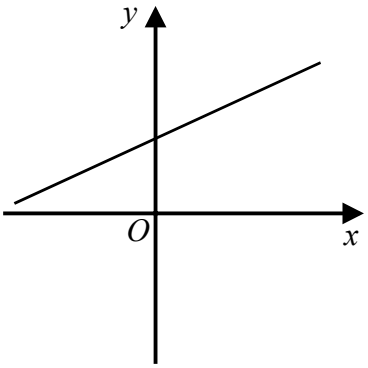
C



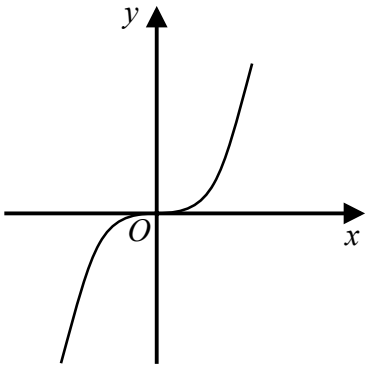
D



E



F



Write down the letter of the graph that could have the equation

(a) $y = x^3$

.....

(1)

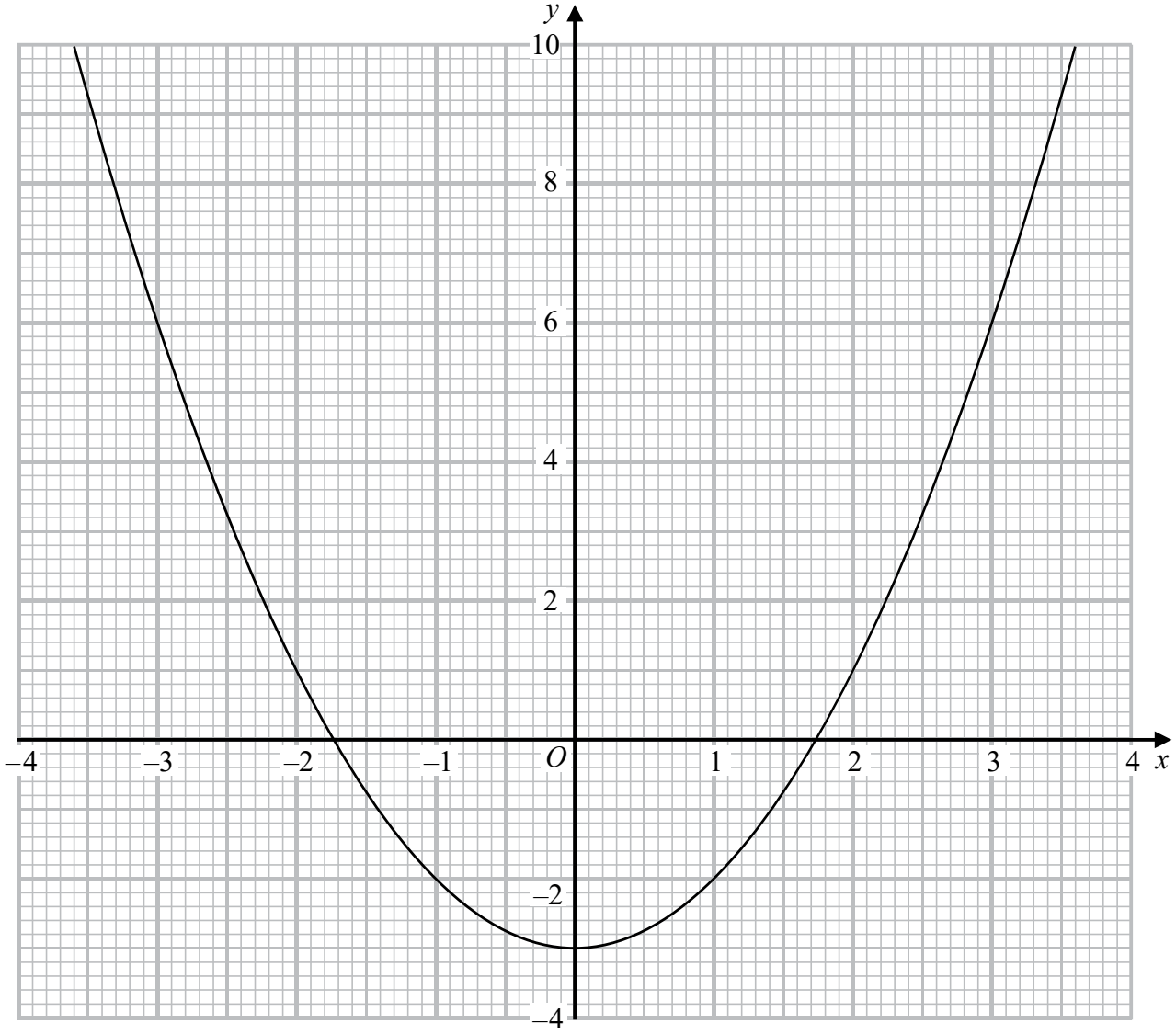
(b) $y = \frac{1}{x}$

.....

(1)

(Total for Question 5 is 2 marks)

17 Here is the graph of $y = x^2 - 3$



Use the graph to find estimates for the solutions to the equation $x^2 - 2x - 2 = 0$
You must show how you get your solutions.

.....

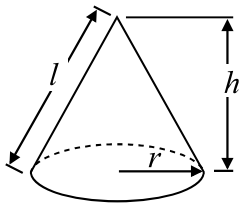
(Total for Question 17 is 4 marks)

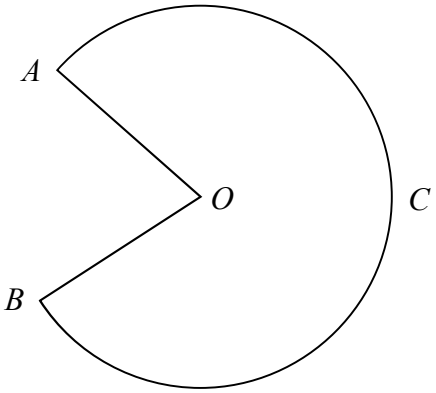
23 The diagram shows a sector $OACB$ of a circle with centre O.
The point C is the midpoint of the arc AB.

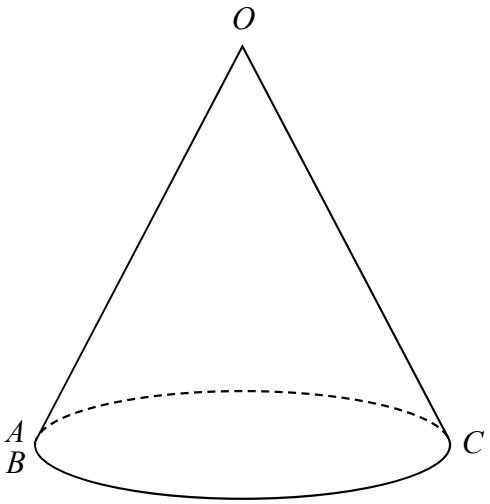
The diagram also shows a hollow cone with vertex O.
The cone is formed by joining OA and OB.

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

Curved surface area of cone $= \pi rl$







The cone has volume $56.8\,\text{cm}^3$ and height $3.6\,\text{cm}$.

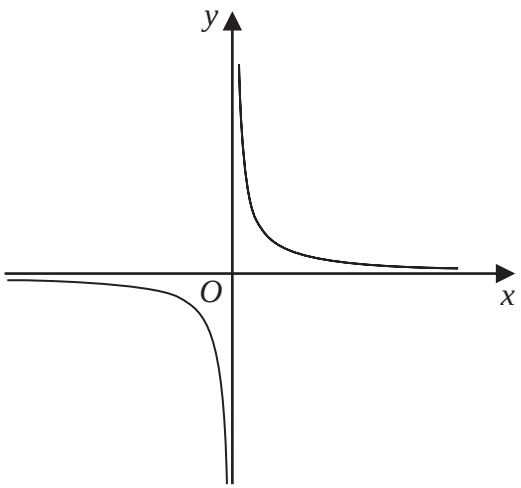
Calculate the size of angle AOB of sector $OACB$.
Give your answer correct to 3 significant figures.
You must show all your working.

°

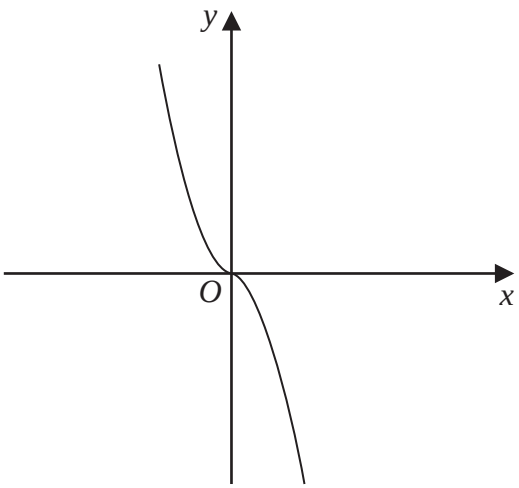
.....

(Total for Question 23 is 5 marks)

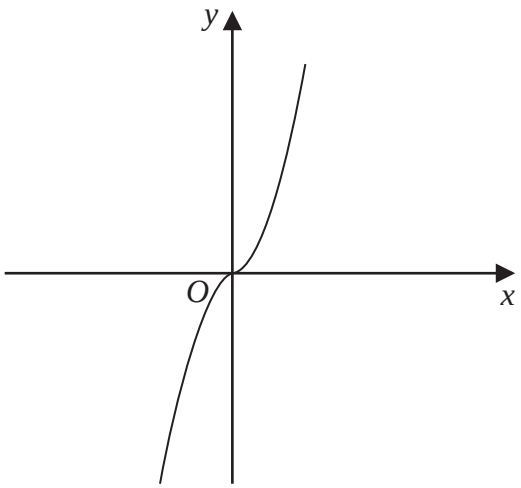
3 The diagram shows four graphs.



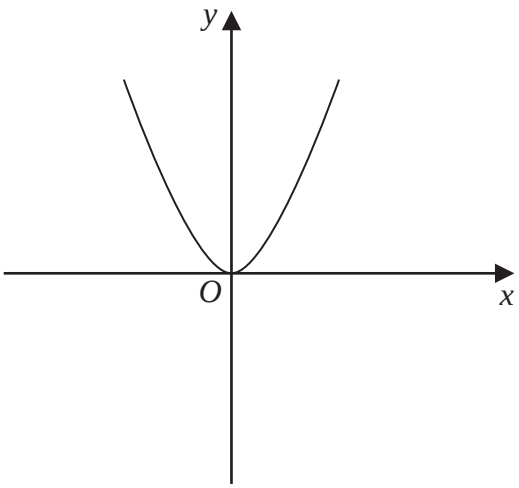
Graph **A**



Graph **B**



Graph **C**



Graph **D**

Each of the equations in the table is the equation of one of the graphs.

Complete the table.

Equation	Letter of graph
$y = -x^3$	
$y = x^3$	
$y = x^2$	
$y = \frac{1}{x}$	

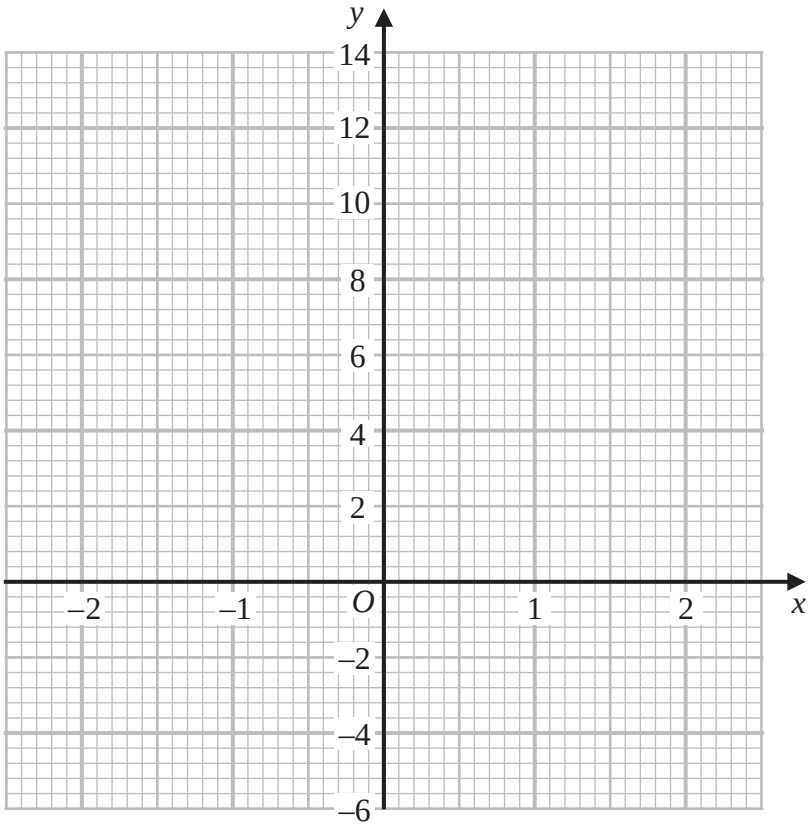
(Total for Question 3 is 2 marks)

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

x	–2	–1	0	1	2
y		6			

(2)

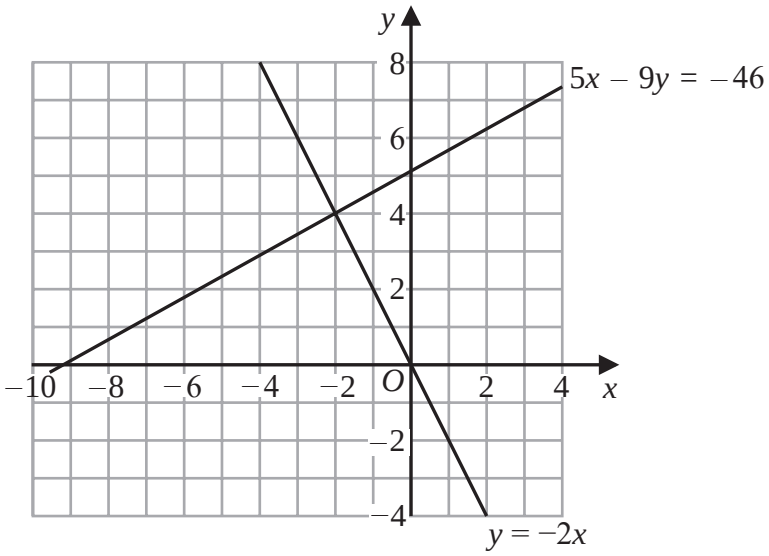
(b) On the grid below, draw the graph of $y = 5 - x^3$ for values of x from –2 to 2



(2)

(Total for Question 4 is 4 marks)

6



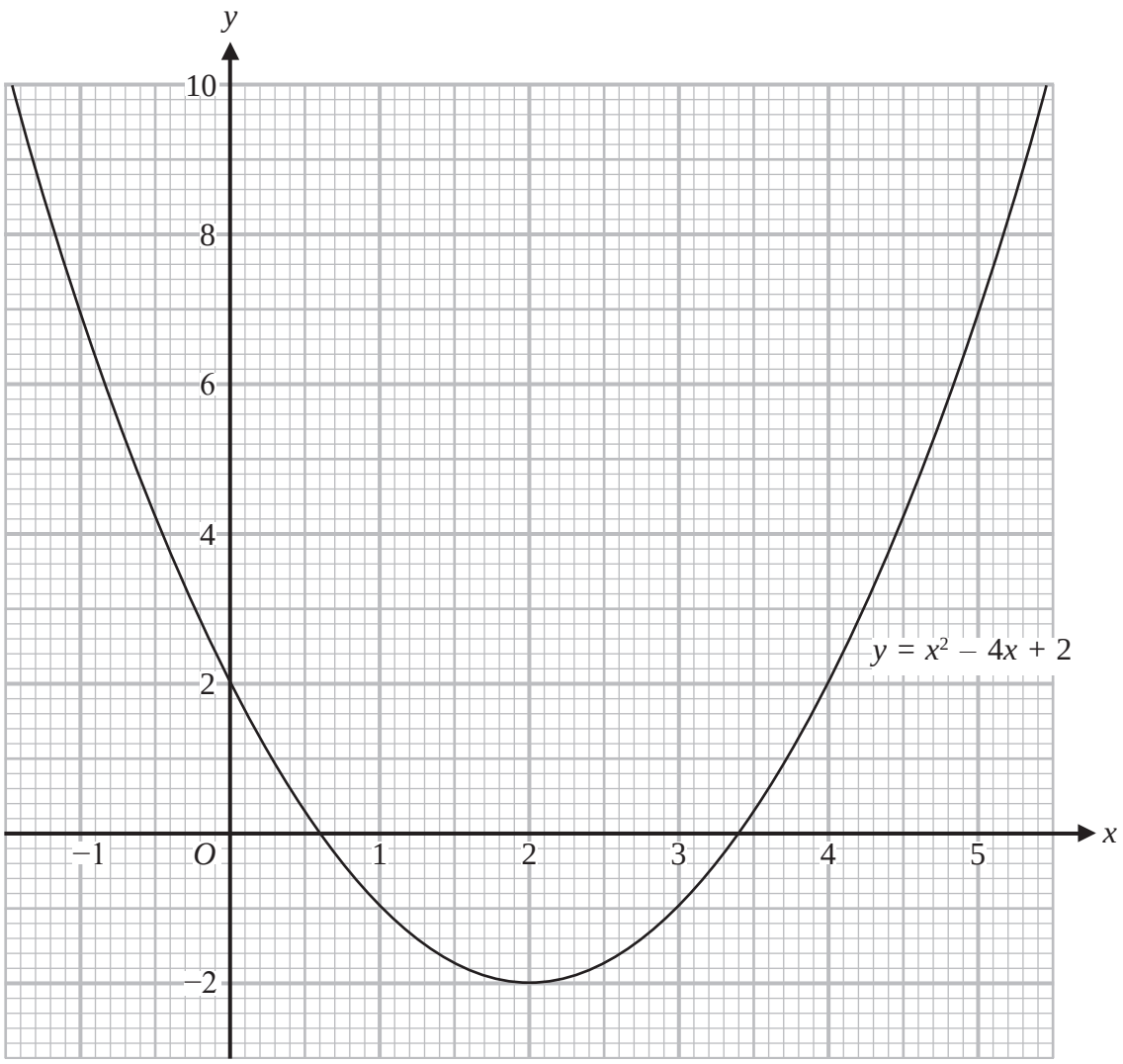
(a) Use these graphs to solve the simultaneous equations

$$5x - 9y = -46$$
$$y = -2x$$

$x =$ .....

$y =$ .....

(1)



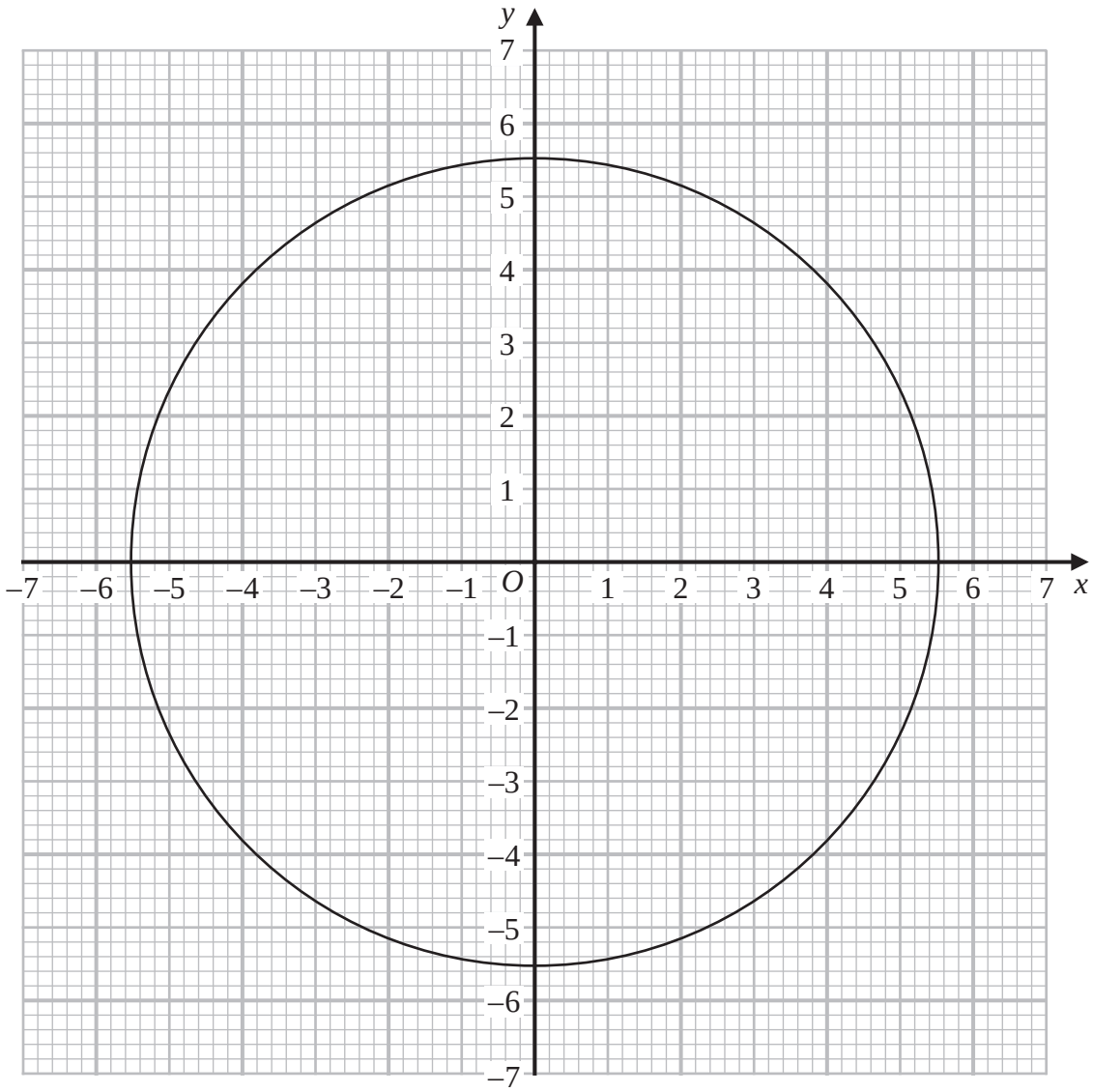
(b) Use this graph to find estimates for the solutions of the quadratic equation $x^2 - 4x + 2 = 0$

.....

(2)

(Total for Question 6 is 3 marks)

20 The diagram shows the graph of $x^2 + y^2 = 30.25$



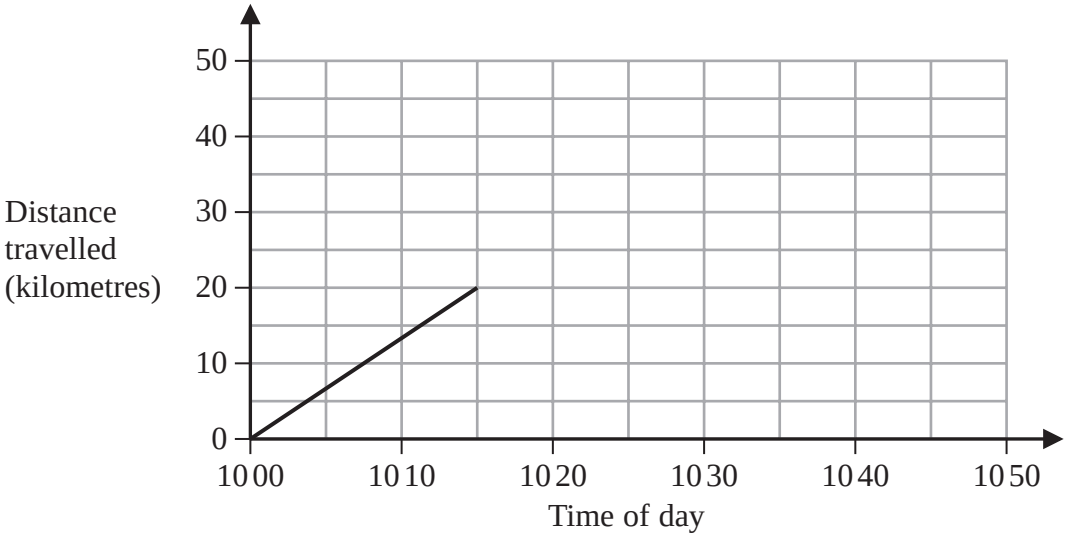
Use the graph to find estimates for the solutions of the simultaneous equations

$$x^2 + y^2 = 30.25$$
$$y - 2x = 1$$

.....

(Total for Question 20 is 3 marks)

3 Sam drives his car on a journey.
Here is the travel graph for the first 15 minutes of his journey.



(a) Work out Sam's speed, in km/h, for the first 15 minutes of his journey.

..... km/h
(2)

At 10 15 Sam stops for 10 minutes and then drives for 20 minutes at a speed of 75 km/h.

(b) On the grid, complete the travel graph for Sam's journey.

(3)

(Total for Question 3 is 5 marks)

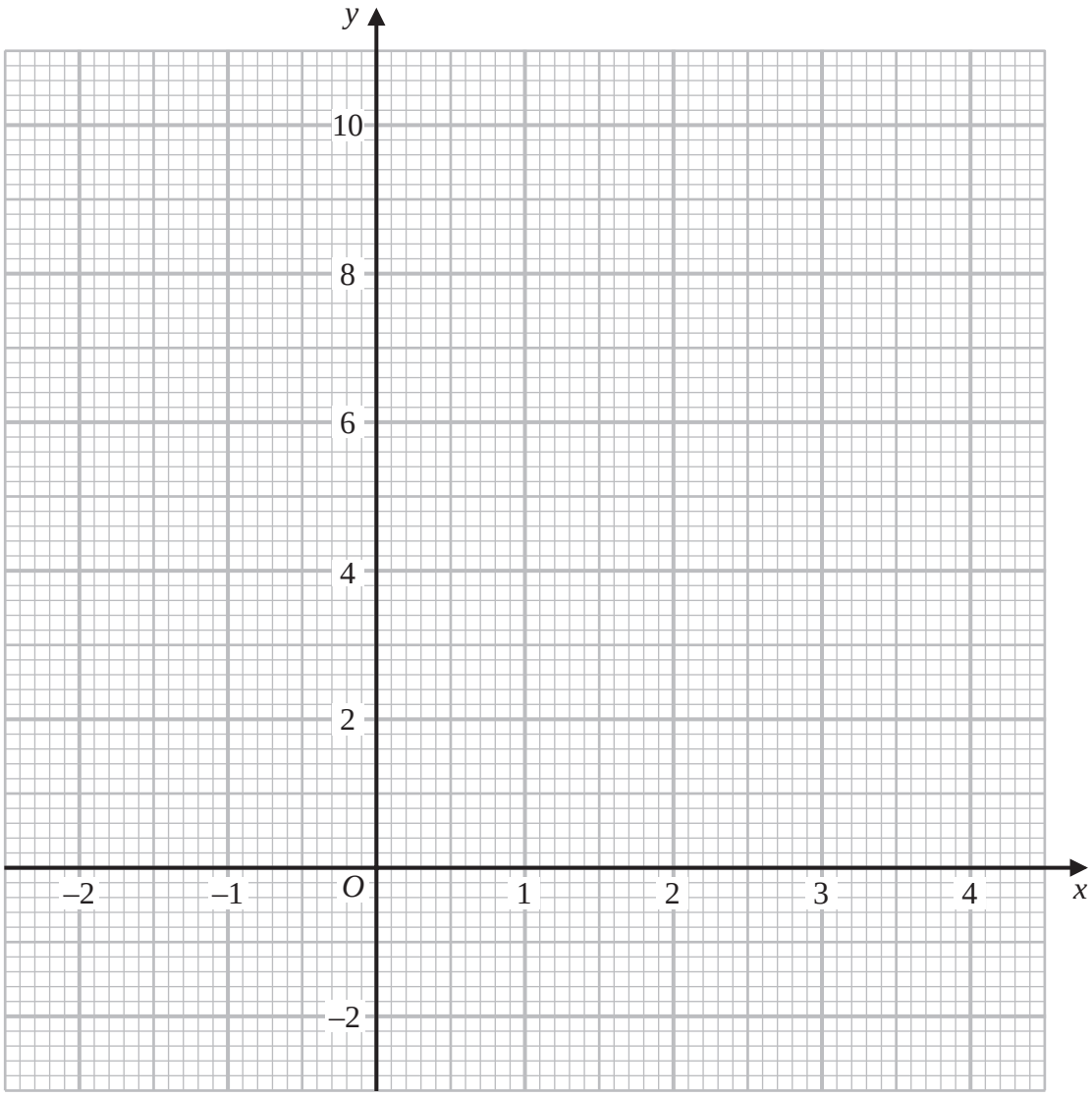
4 (a) Complete the table of values for $y = x^2 - 2x + 2$

x	–2	–1	0	1	2	3	4
y	10		2			5	

(2)

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

(2)



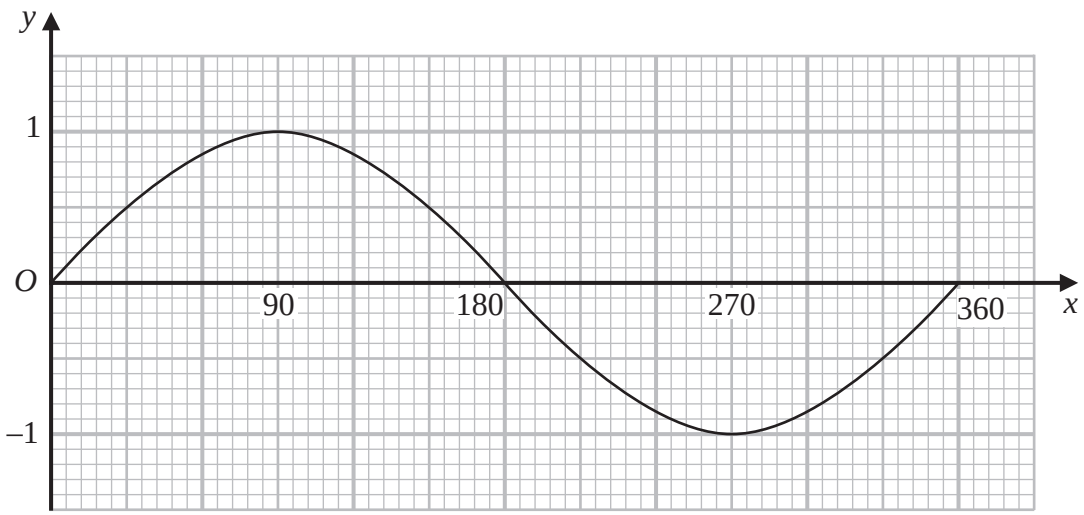
(c) Use your graph to find estimates of the solutions of the equation $x^2 - 2x + 2 = 4$

.....

(2)

(Total for Question 4 is 6 marks)

18 Here is a graph of $y = \sin x°$ for $0 \leqslant x \leqslant 360$



(a) Using this graph, find estimates of all **four** solutions of

$$\sin x° = 0.6 \quad \text{for } 0 \leqslant x \leqslant 720$$

.....

(2)

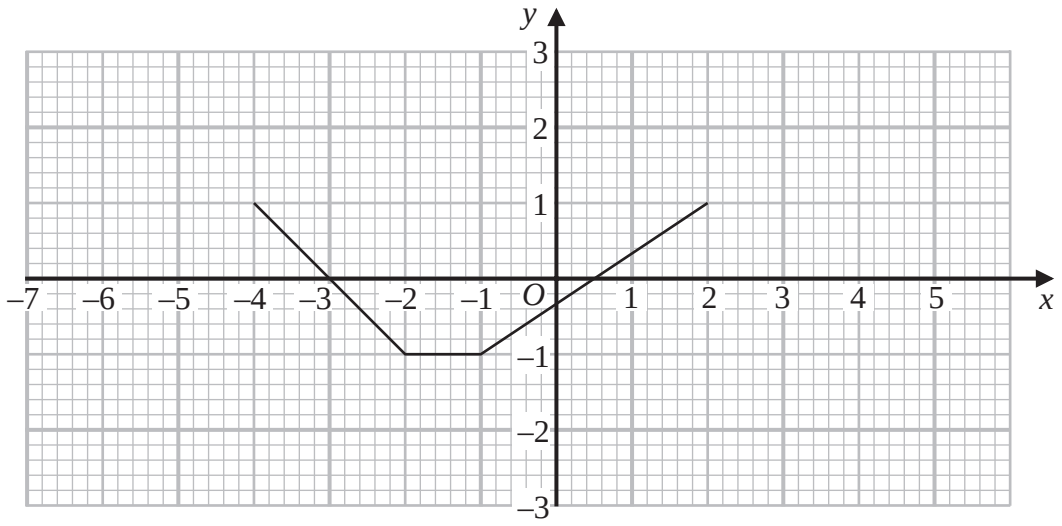
The graph of $y = \sin x°$ is reflected in the x-axis.

(b) Write down an equation of the reflected graph.

.....

(1)

Here is a graph of $y = f(x)$



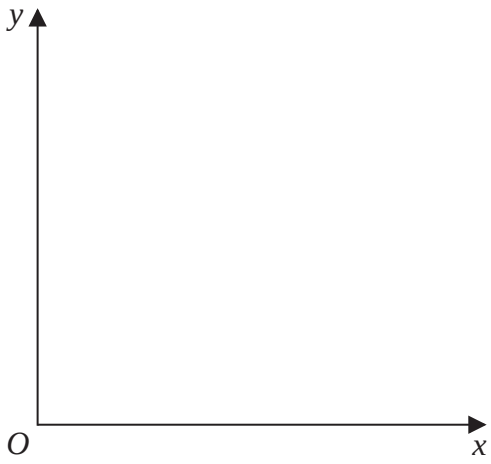
(c) On the grid, draw the graph of $y = f(x – 2)$

(1)

(Total for Question 18 is 4 marks)

8 (a) Using the axes below, sketch a graph to represent the statement

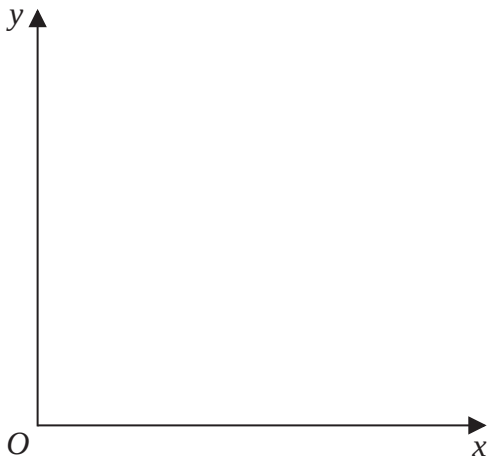
y is directly proportional to x



(1)

(b) Using the axes below, sketch a graph to represent the statement

y is inversely proportional to x



(1)

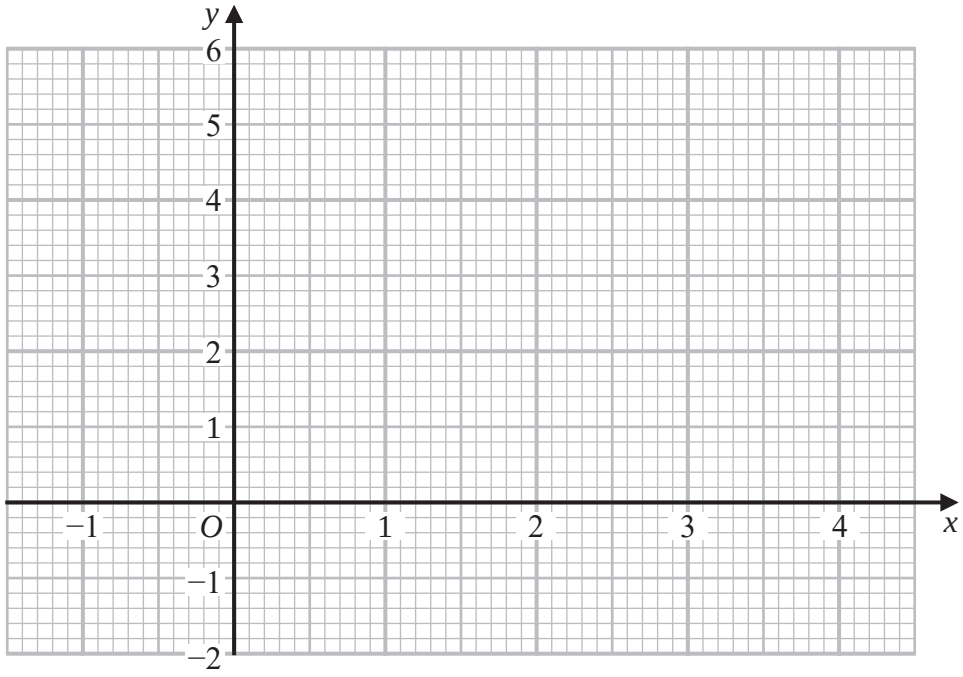
(Total for Question 8 is 2 marks)

6 (a) Complete the table of values for $y = x^2 - 3x + 1$

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

(2)

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



(2)

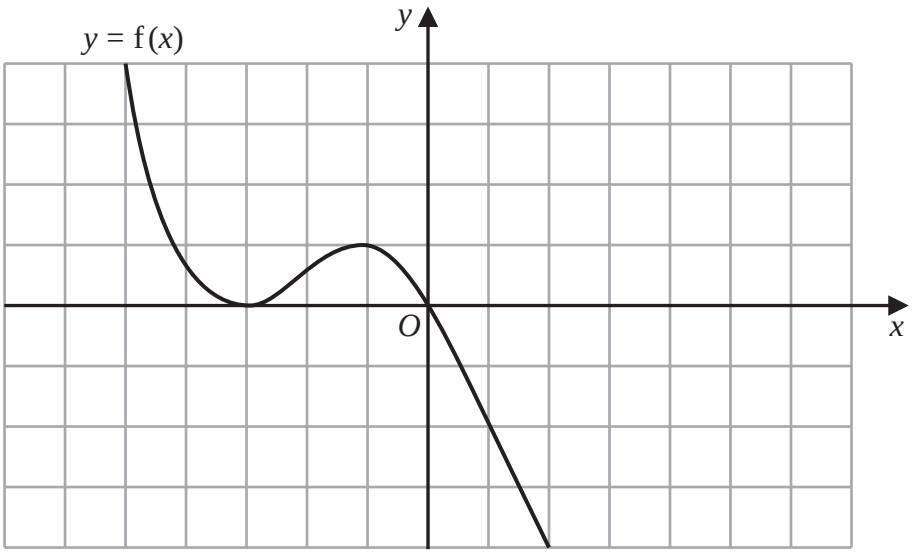
(c) Using your graph, find estimates for the solutions of the equation $x^2 - 3x + 1 = 0$

.....

(2)

(Total for Question 6 is 6 marks)

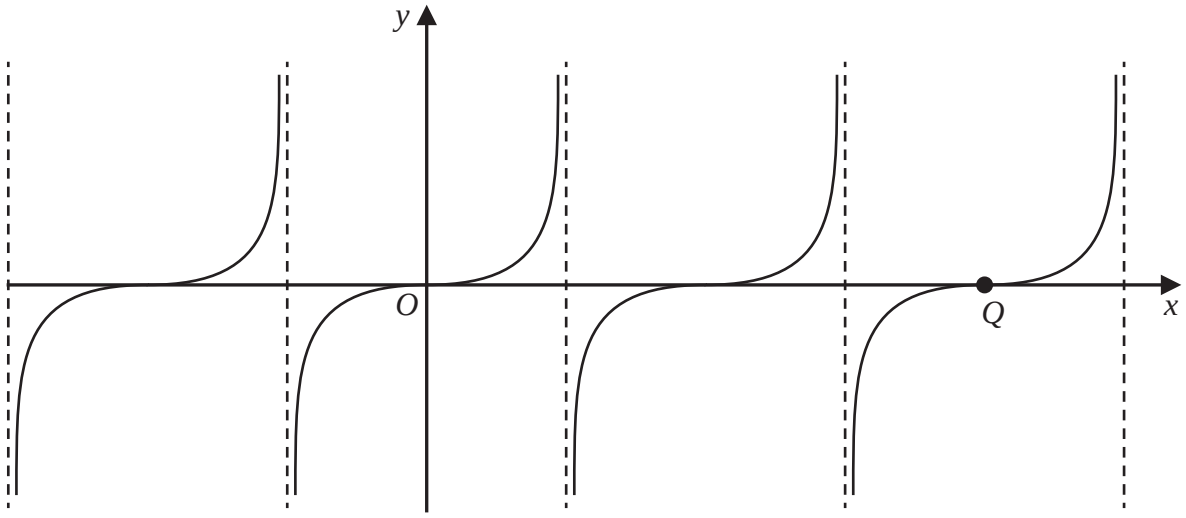
21 The graph of $y = f(x)$ is shown on the grid below.



(a) On the grid above, sketch the graph of $y = f(-x)$

(1)

Here is a sketch of the graph of $y = \tan x°$



The graph of $y = \tan x°$ is translated to give the graph of $y = g(x)$

Following the translation the point Q, shown on the graph above, moves to point R.
Point R has coordinates $(90, -5)$

(b) Find an expression for $g(x)$ in terms of x.

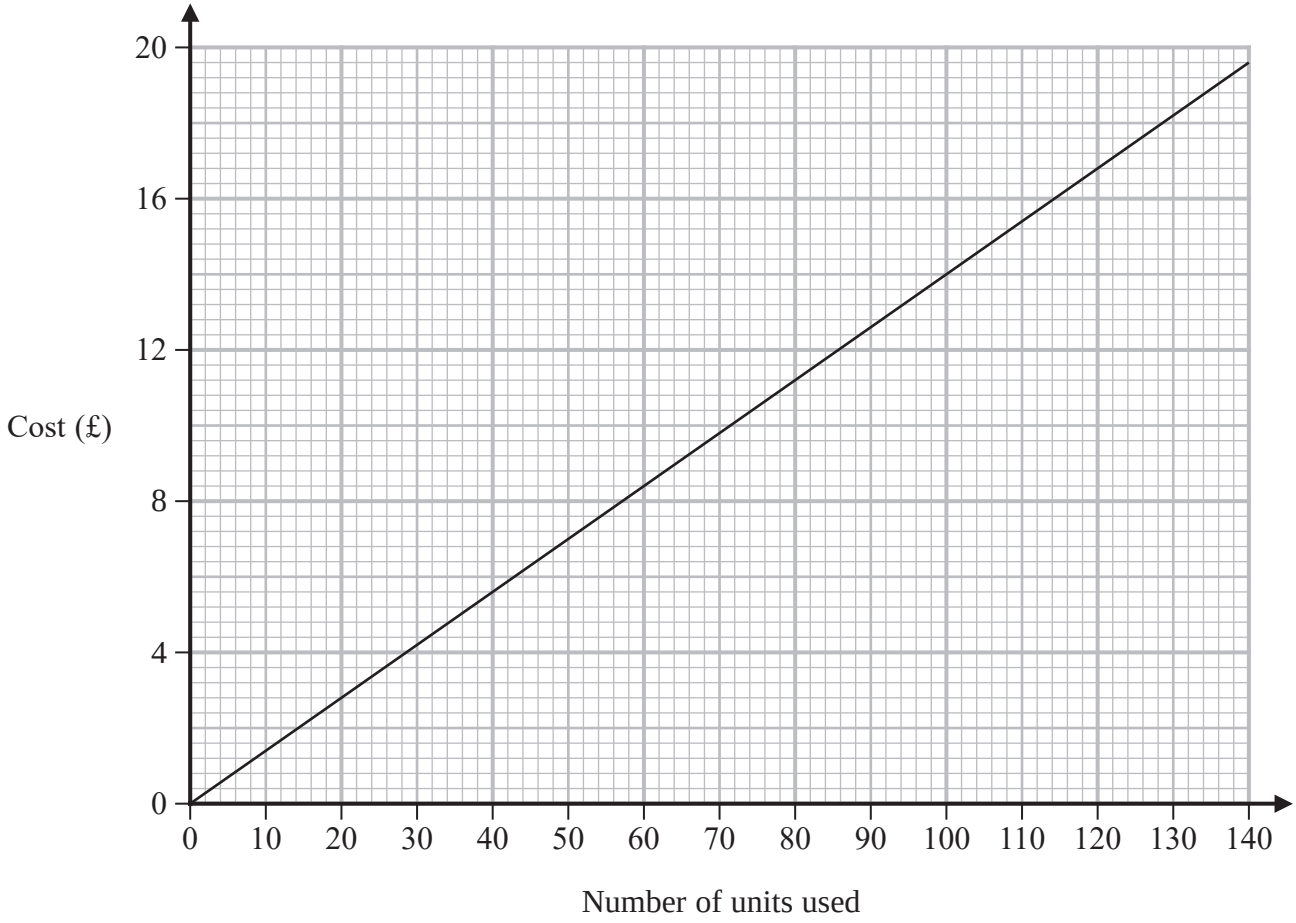
.....

(2)

(Total for Question 21 is 3 marks)

8 An electricity company charges the same fixed amount for each unit of electricity used.

David uses this graph to work out the total cost of the electricity he has used.



(a) Work out the gradient of the straight line.

.....

(2)

(b) What does the gradient of this line represent?

.....

.....

.....

(1)

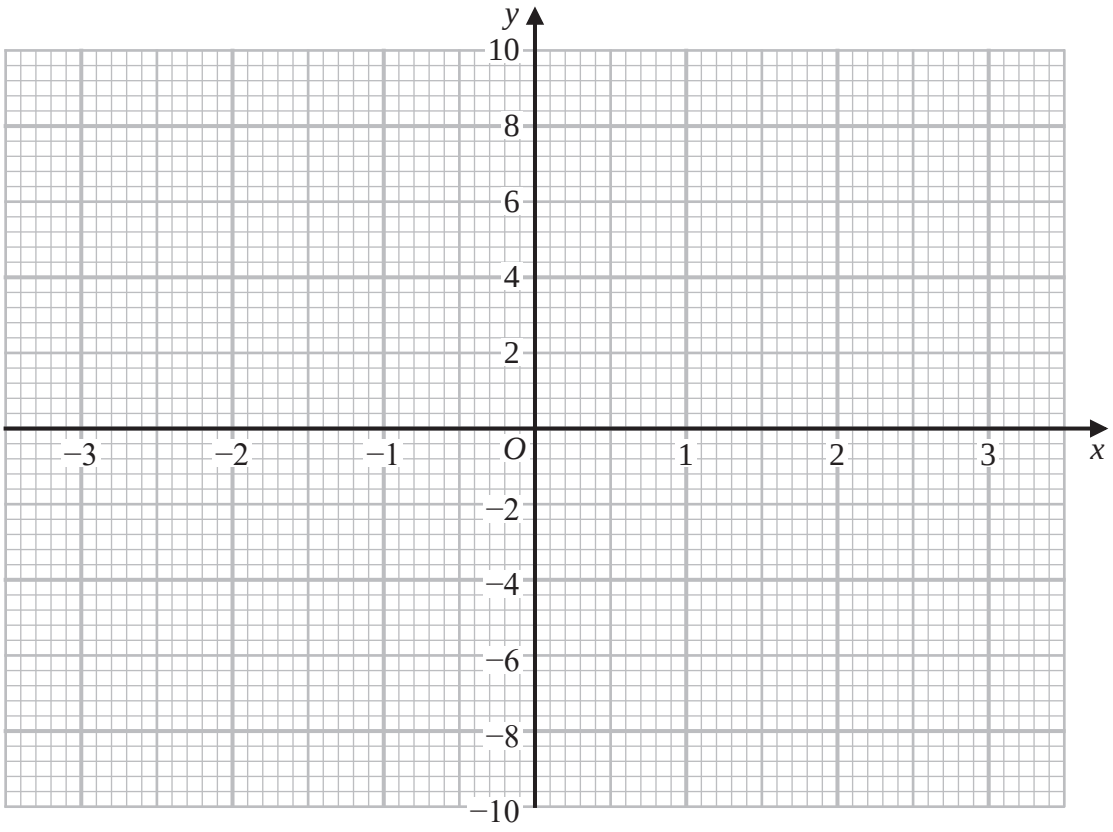
(Total for Question 8 is 3 marks)

9 (a) Complete the table of values for $y = 6x - x^3$

x	−3	−2	−1	0	1	2	3
y	9					4	−9

(2)

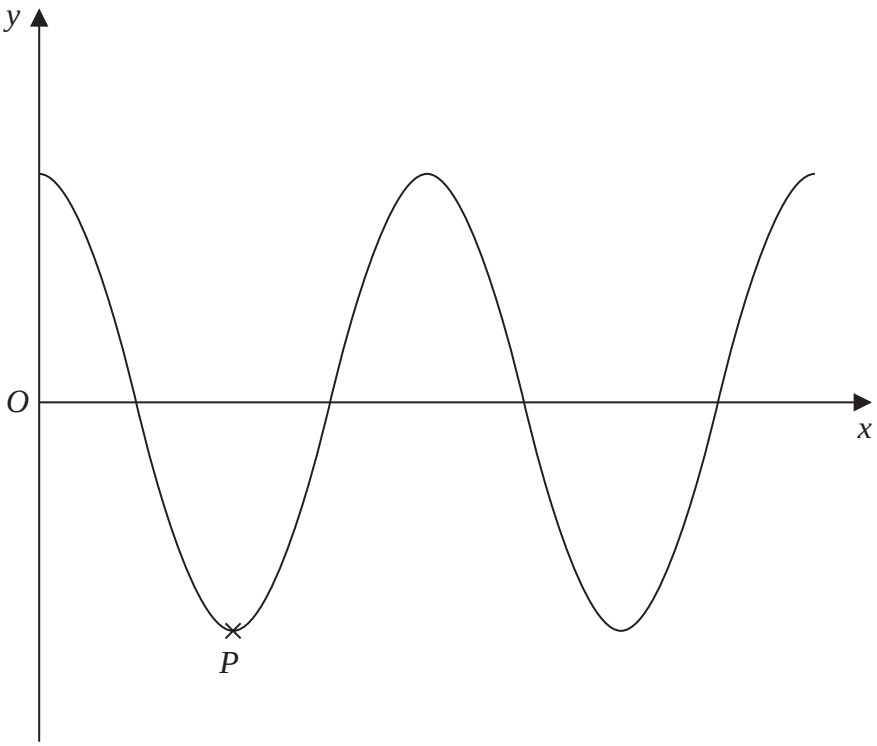
(b) On the grid, draw the graph of $y = 6x - x^3$ for values of x from −3 to 3



(2)

(Total for Question 9 is 4 marks)

21



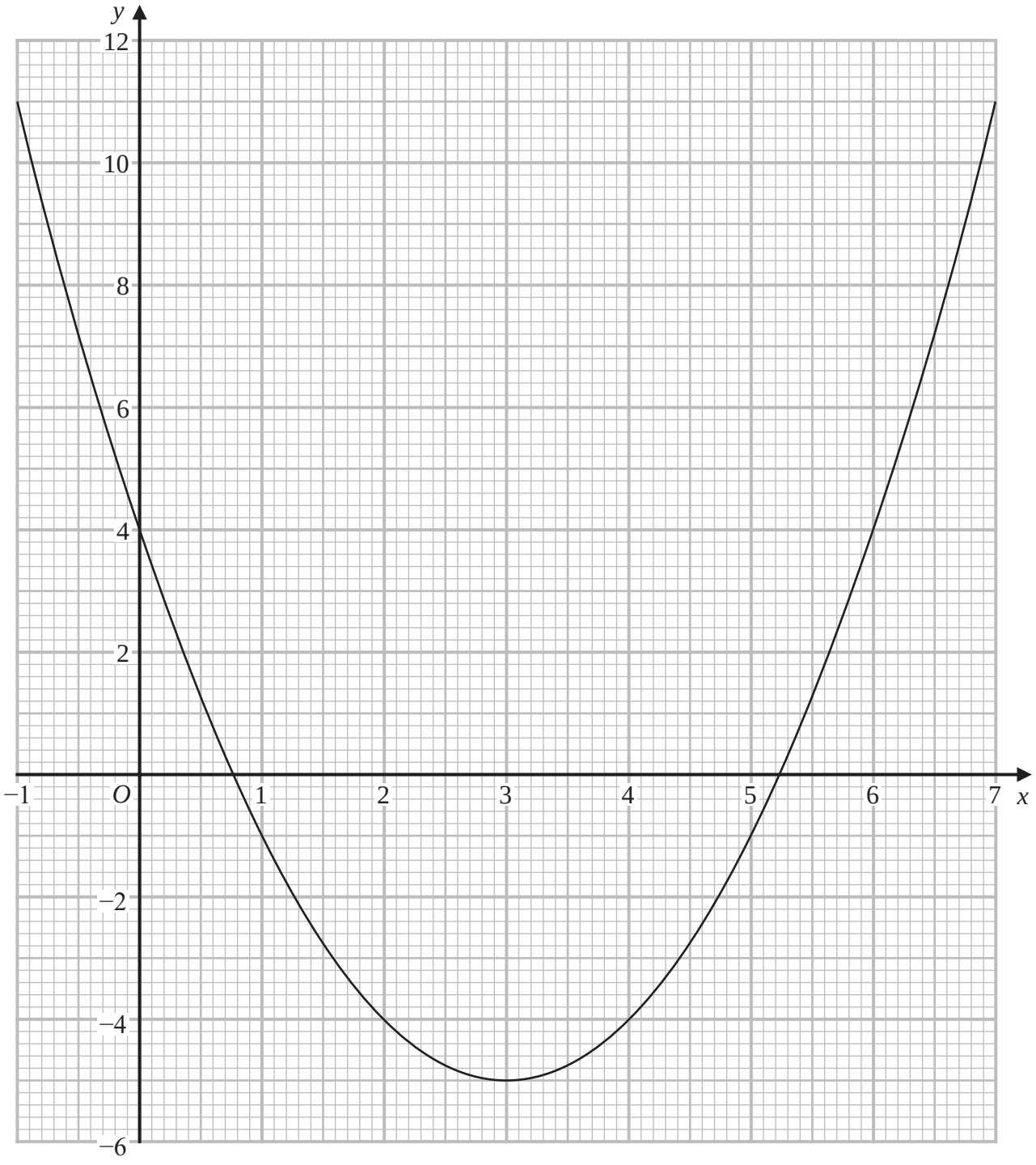
The diagram shows a sketch of part of the curve with equation $y = \cos x°$
P is a minimum point on the curve.

Write down the coordinates of P.

(..... , ...)

(Total for Question 21 is 2 marks)

7 Here is the graph of $y = x^2 - 6x + 4$



(a) Write down the y intercept of the graph of $y = x^2 - 6x + 4$

.....

(1)

(b) Write down the coordinates of the turning point of the graph of $y = x^2 - 6x + 4$

(..... , ...)

(1)

(c) Use the graph to find estimates for the roots of $x^2 - 6x + 4 = 0$

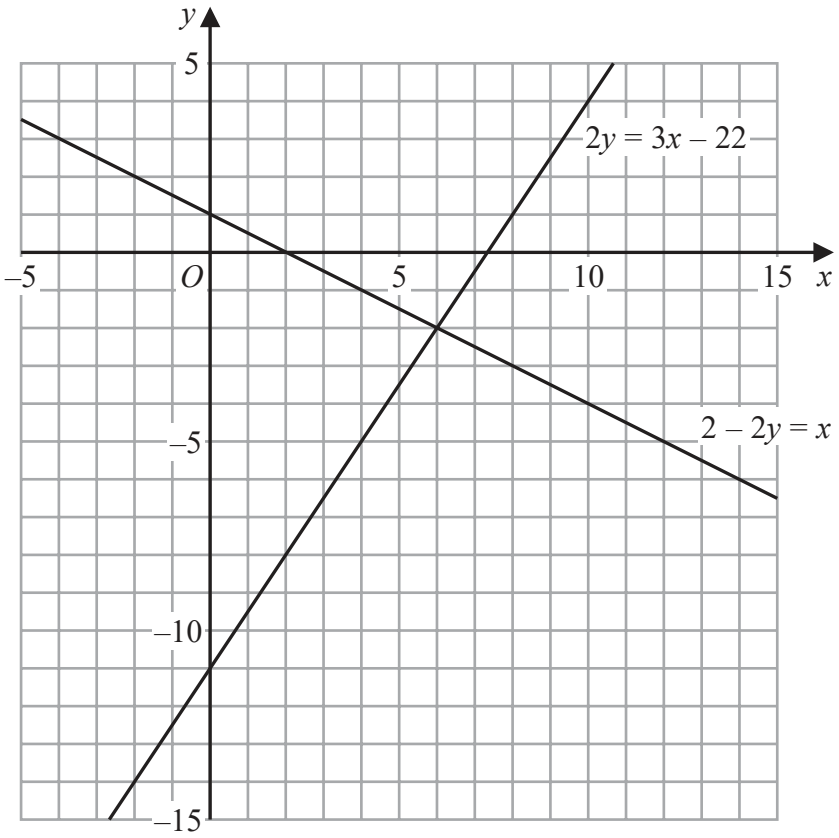
.....

(2)

(Total for Question 7 is 4 marks)

Question 111

9



Use these graphs to solve the simultaneous equations

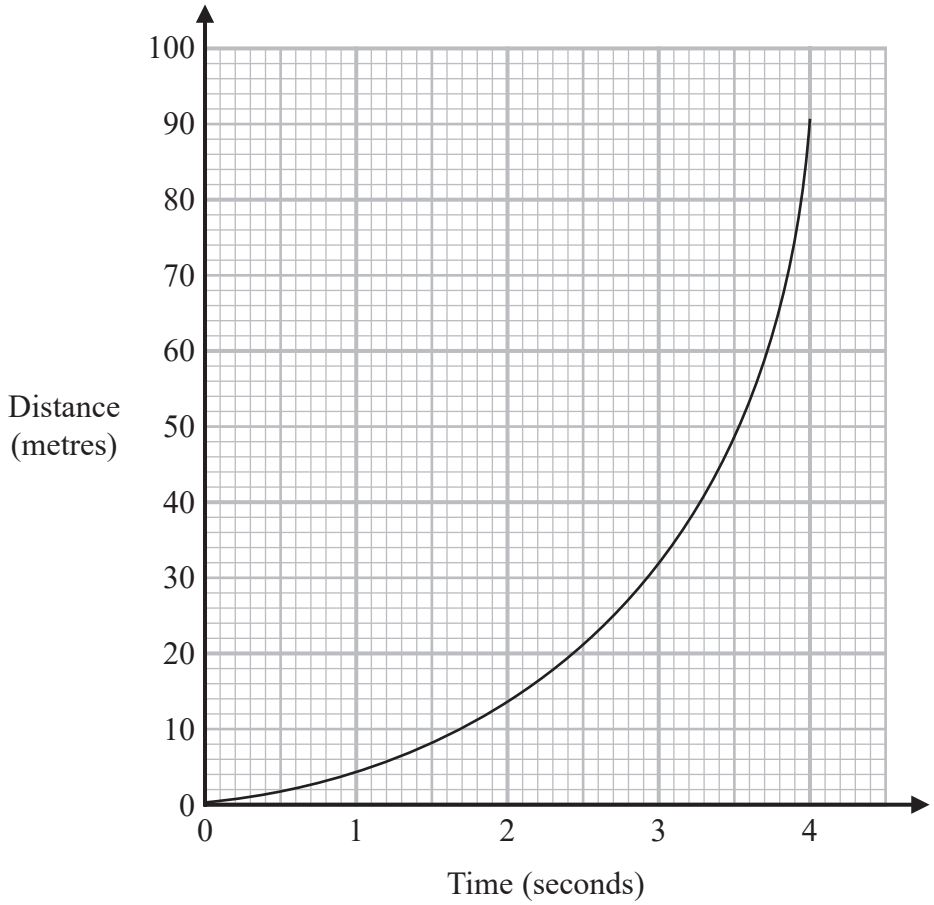
$$2 - 2y = x$$
$$2y = 3x - 22$$

$x =$ .....

$y =$ .....

(Total for Question 9 is 1 mark)

17 Here is a distance-time graph.



(a) Find an estimate of the gradient of the graph at time 2.5 seconds.
You must show how you get your answer.

.....

(3)

(b) What does the gradient of the graph represent?

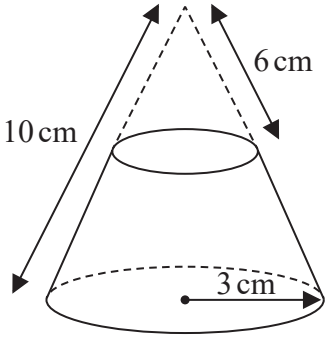
.....

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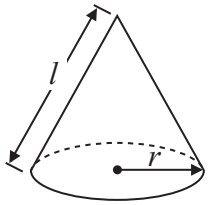
(1)

(Total for Question 17 is 4 marks)

18 A solid frustum is made by removing a small cone from a large cone as shown in the diagram.



Curved surface area of cone = πrl



The slant height of the small cone is 6 cm.
The slant height of the large cone is 10 cm.
The radius of the base of the large cone is 3 cm.

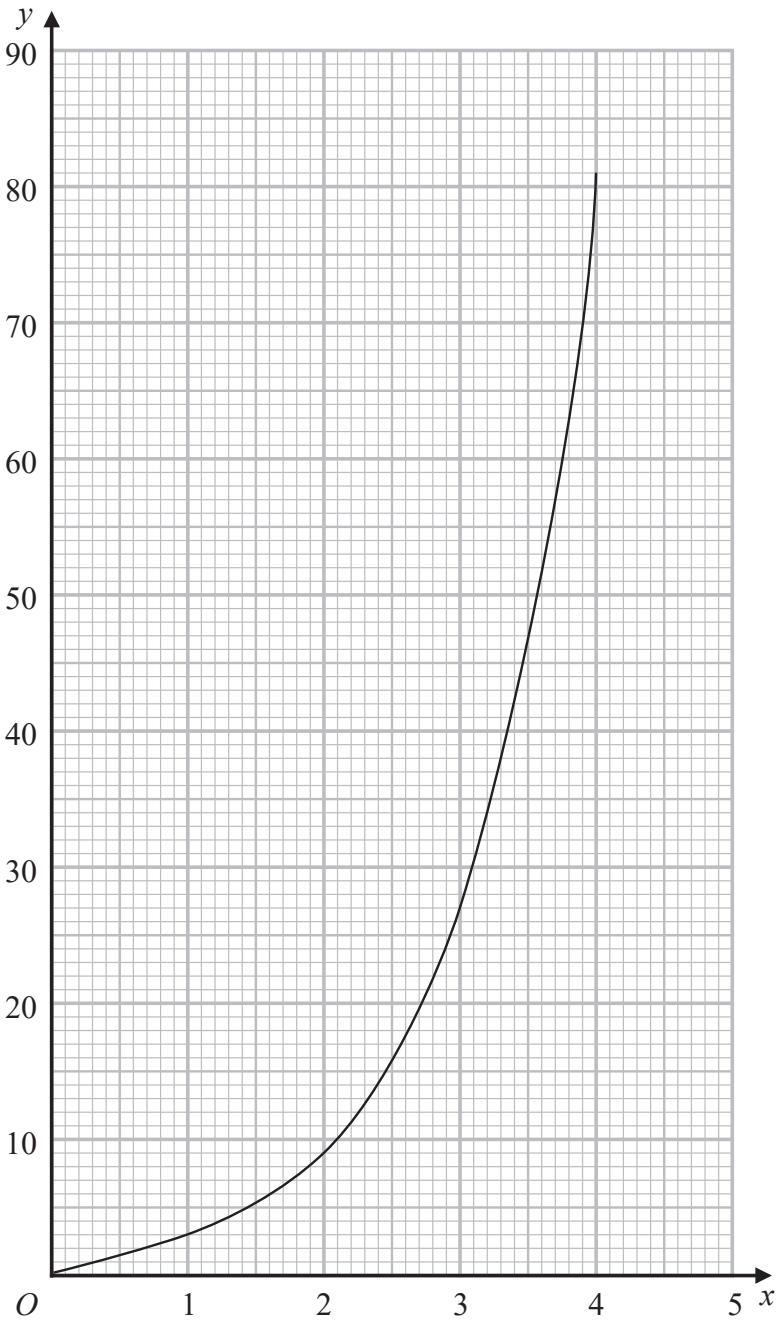
Calculate the total surface area of the frustum.
Give your answer correct to 3 significant figures.

..... cm^2

(Total for Question 18 is 5 marks)

19 Sana needs to draw the graph of $y = 3^x$ for $0 \leqslant x \leqslant 4$

She draws the graph shown on the grid.



Write down one thing Sana has done wrong.

.....

.....

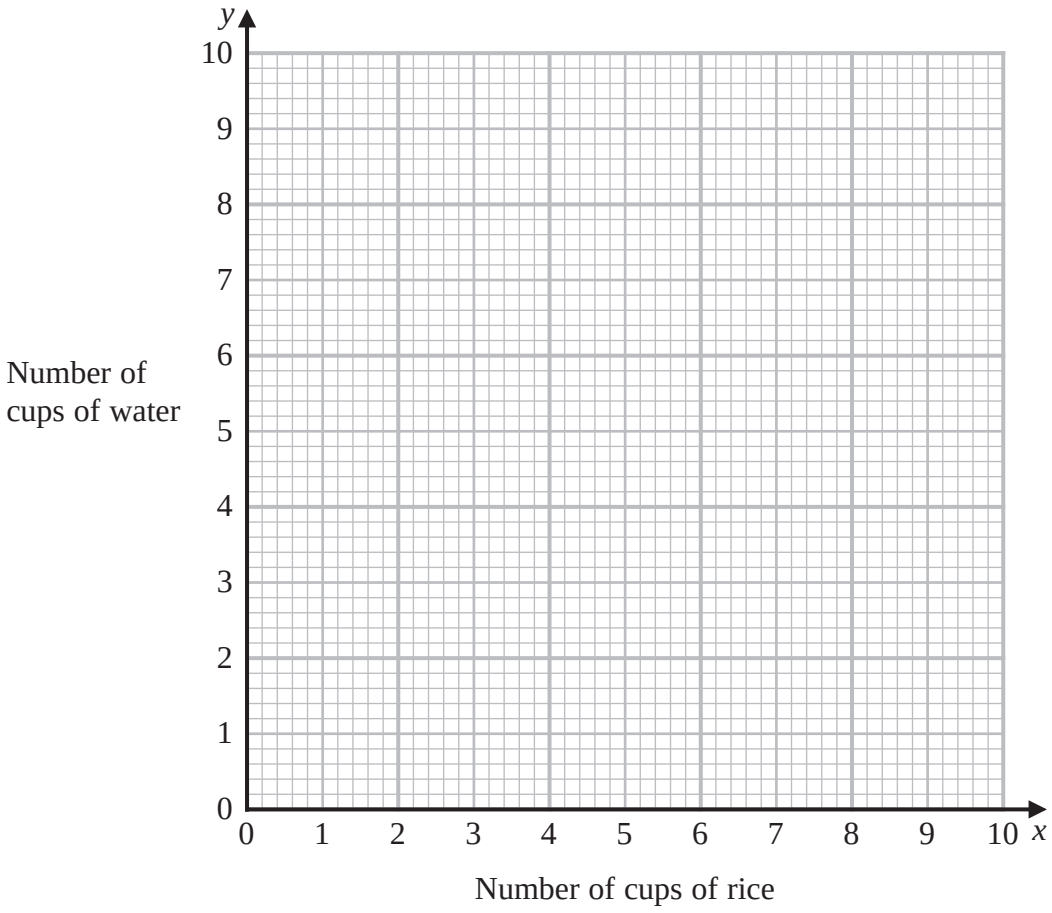
.....

(Total for Question 19 is 1 mark)

9 To cook rice

the number of cups of rice (x) : the number of cups of water (y) = 4 : 5

(a) Use this information to draw a graph to show the relationship between the number of cups of rice and the number of cups of water needed to cook rice.



(2)

(b) (i) Find the gradient of the line drawn in part (a).

.....

(1)

(ii) Explain what this gradient represents.

.....

.....

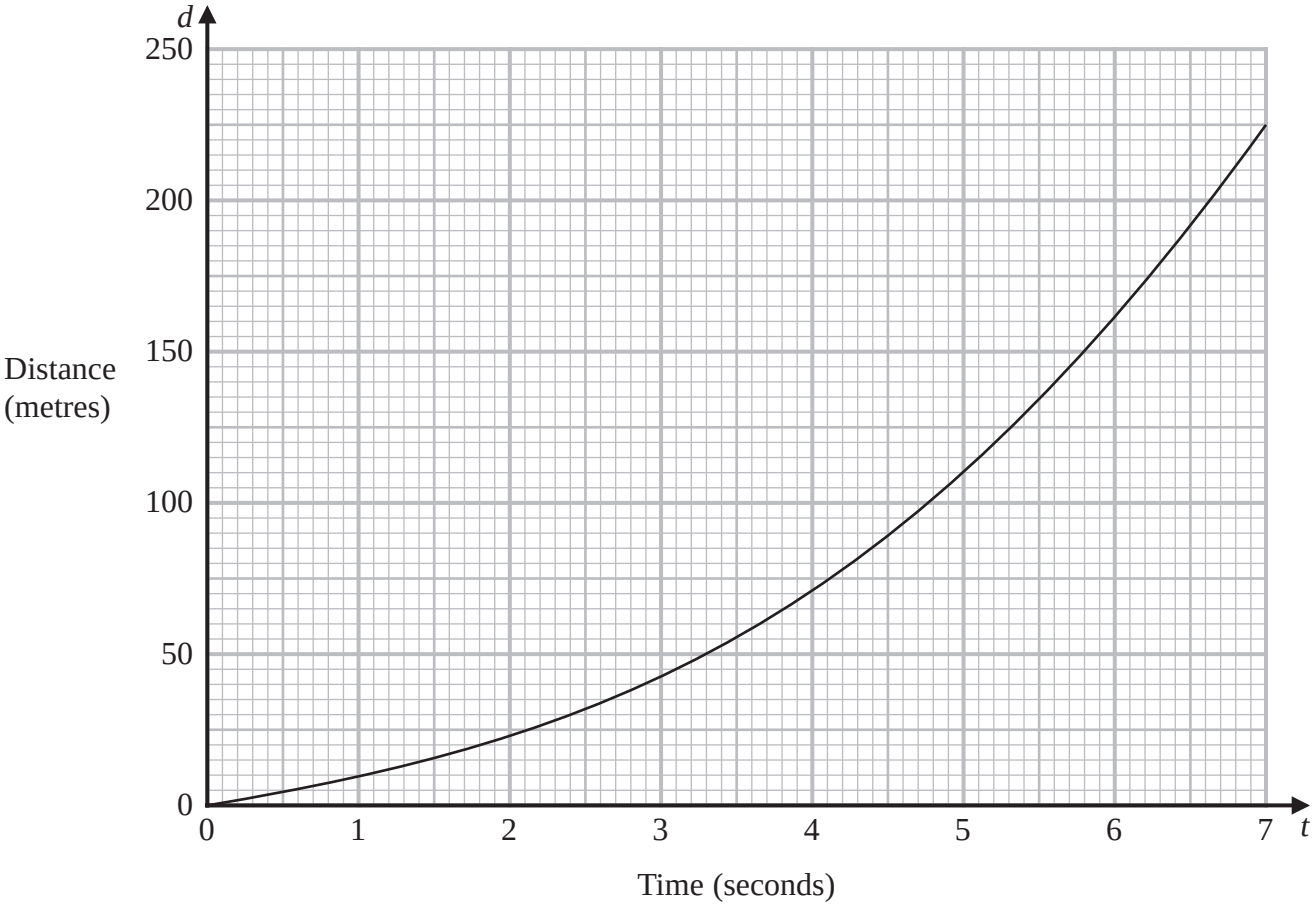
.....

(1)

(Total for Question 9 is 4 marks)

15 An object falls from rest.

Here is the distance-time graph for the distance (d metres) fallen by the object t seconds after it starts to fall.

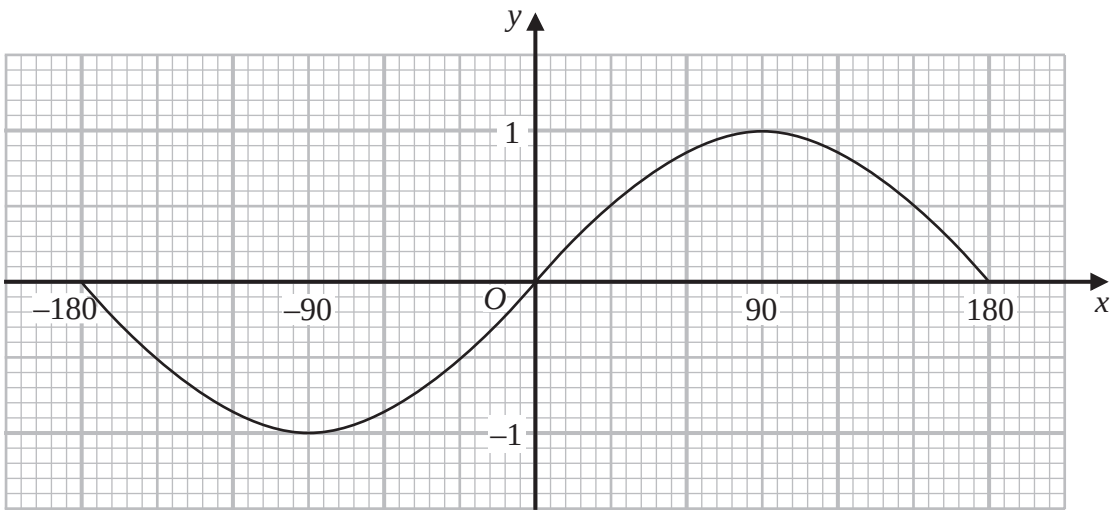


Work out an estimate for the gradient of the graph at $t = 3$
You must show how you get your answer.

.....

(Total for Question 15 is 3 marks)

19 Here is the graph of $y = \sin x°$ for $-180 \leqslant x \leqslant 180$



(a) Use the graph to find estimates for the solutions of

$$\sin x° = 0.3 \quad \text{for } -180 \leqslant x \leqslant 180$$

.....

(2)

(b) Write down a value of x such that

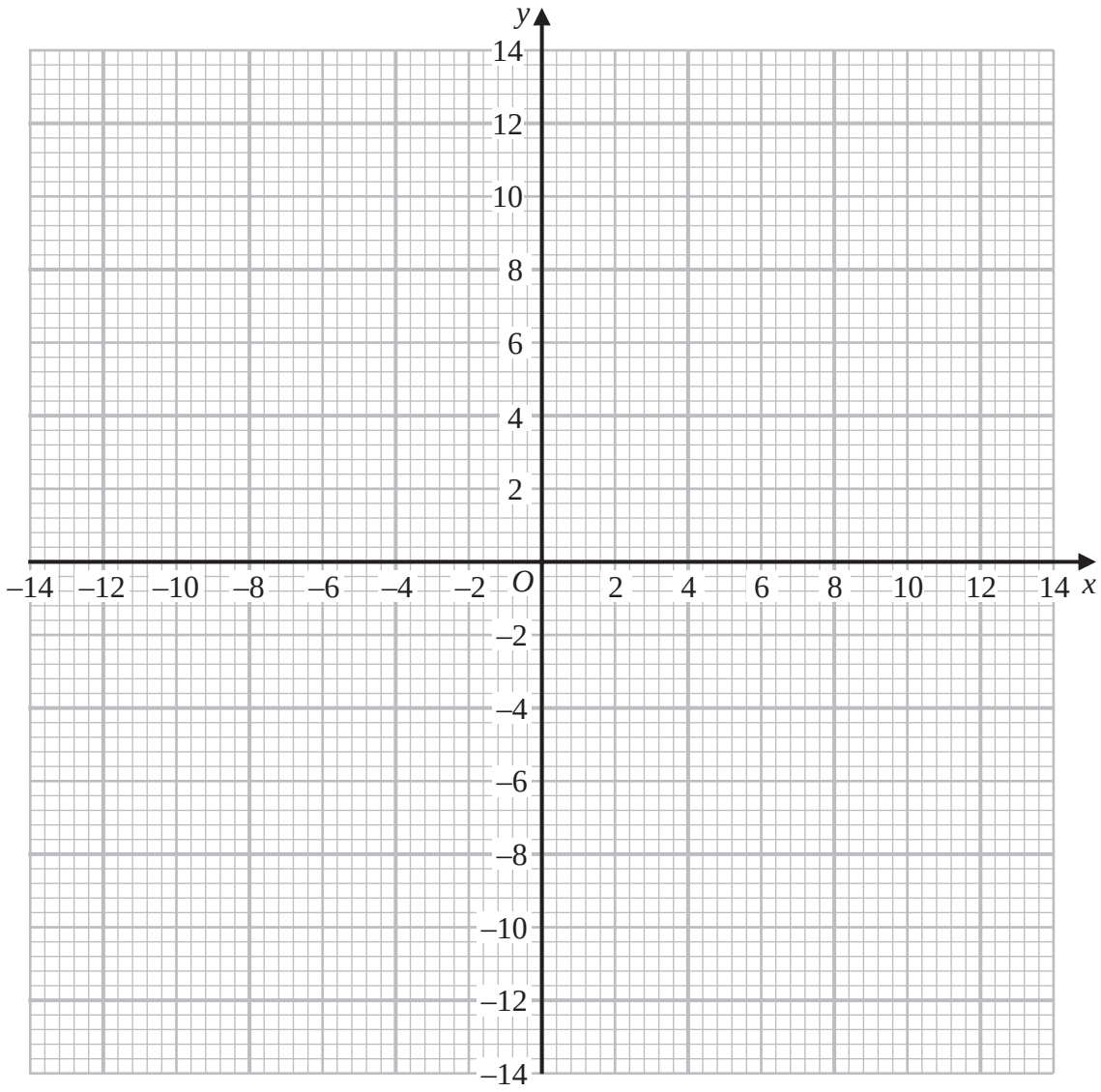
$$\sin(x + 20)° = 0 \quad \text{for } -180 \leqslant x \leqslant 180$$

$x =$ .....

(1)

(Total for Question 19 is 3 marks)

21 (a) On the grid, draw the graph of $x^2 + y^2 = 169$



(2)

(b) Use your graph to find estimates for the solutions of the simultaneous equations

$$x^2 + y^2 = 169$$
$$2y = 3x$$

.....

(3)

(Total for Question 21 is 5 marks)

17 (a) (i) Write $x^2 - 8x + 3$ in the form $(x - a)^2 - b$ where a and b are integers.

.....

(2)

(ii) Hence, write down the coordinates of the turning point on the graph of $y = x^2 - 8x + 3$

(..... , ...)

(1)

(b) Solve $7x^2 + 8x - 5 = 0$
Give your solutions correct to 3 significant figures.

.....

(3)

Alex has to find the solutions of the quadratic equation $3k^2 + 10k - 8 = 0$
Here is his working and answer.

$(3k - 2)(k + 4) = 0$

$k = 2$ or $k = -4$

(c) What mistake has Alex made?

.....

.....

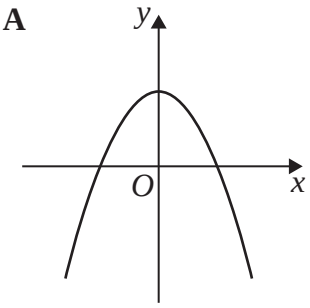
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(1)

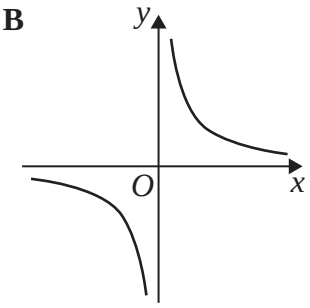
(Total for Question 17 is 7 marks)

12 Here are some graphs.

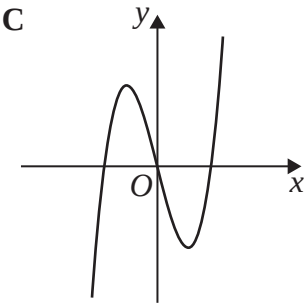
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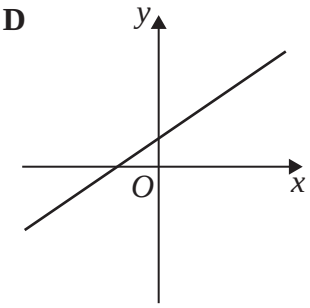
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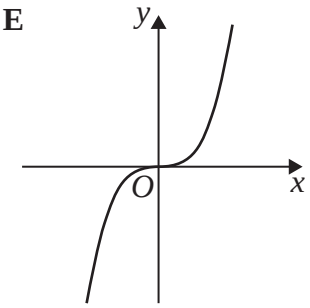
C



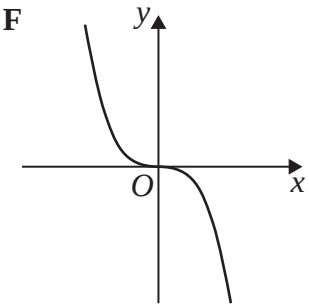
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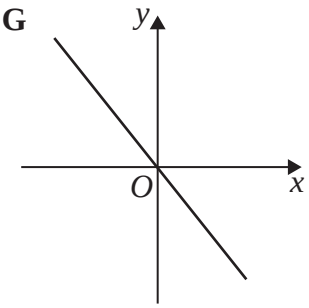
E



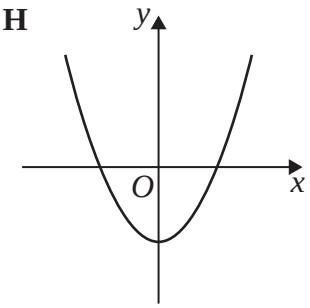
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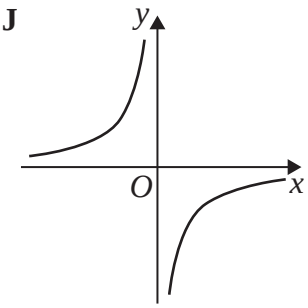
G



H



J



Write down the letter of the graph that could have the equation

(i) $y = x^2 - 4$

.....

(1)

(ii) $y = -x^3$

.....

(1)

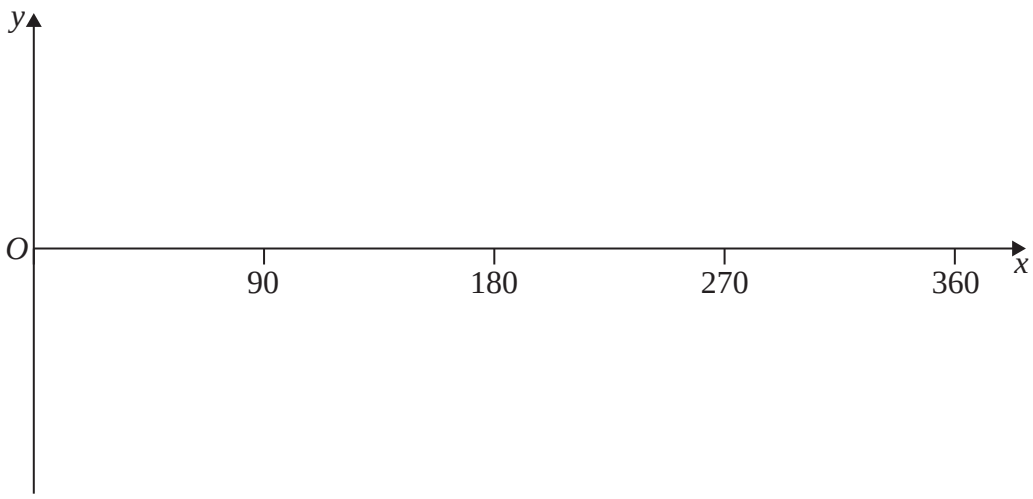
(iii) $y = -\frac{5}{x}$

.....

(1)

(Total for Question 12 is 3 marks)

22 (a) Sketch the graph of $y = \sin x°$ for $0 \leqslant x \leqslant 360$



(2)

(b) Solve the equation $2\sin x° = -1$ for $0 \leqslant x \leqslant 360$

.....

(2)

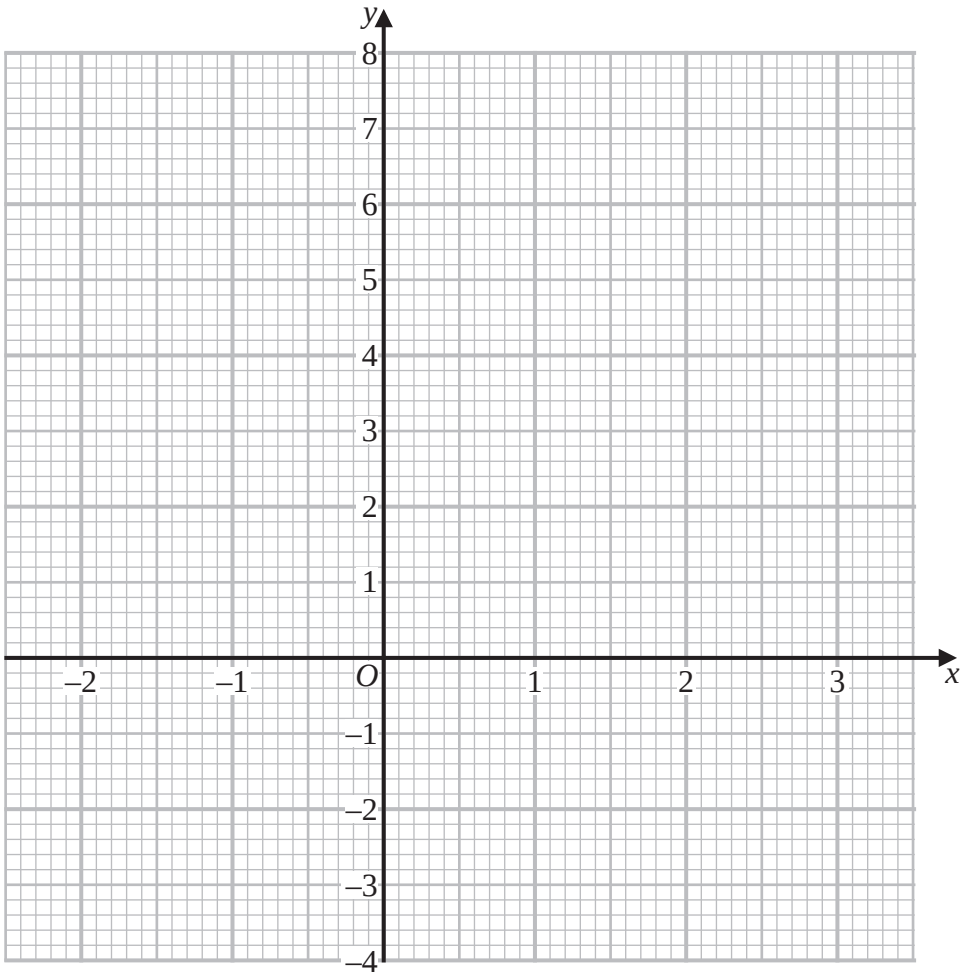
(Total for Question 22 is 4 marks)

5 (a) Complete the table of values for $y = x^2 - x$

x	–2	–1	0	1	2	3
y	6		0		2	

(2)

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



(2)

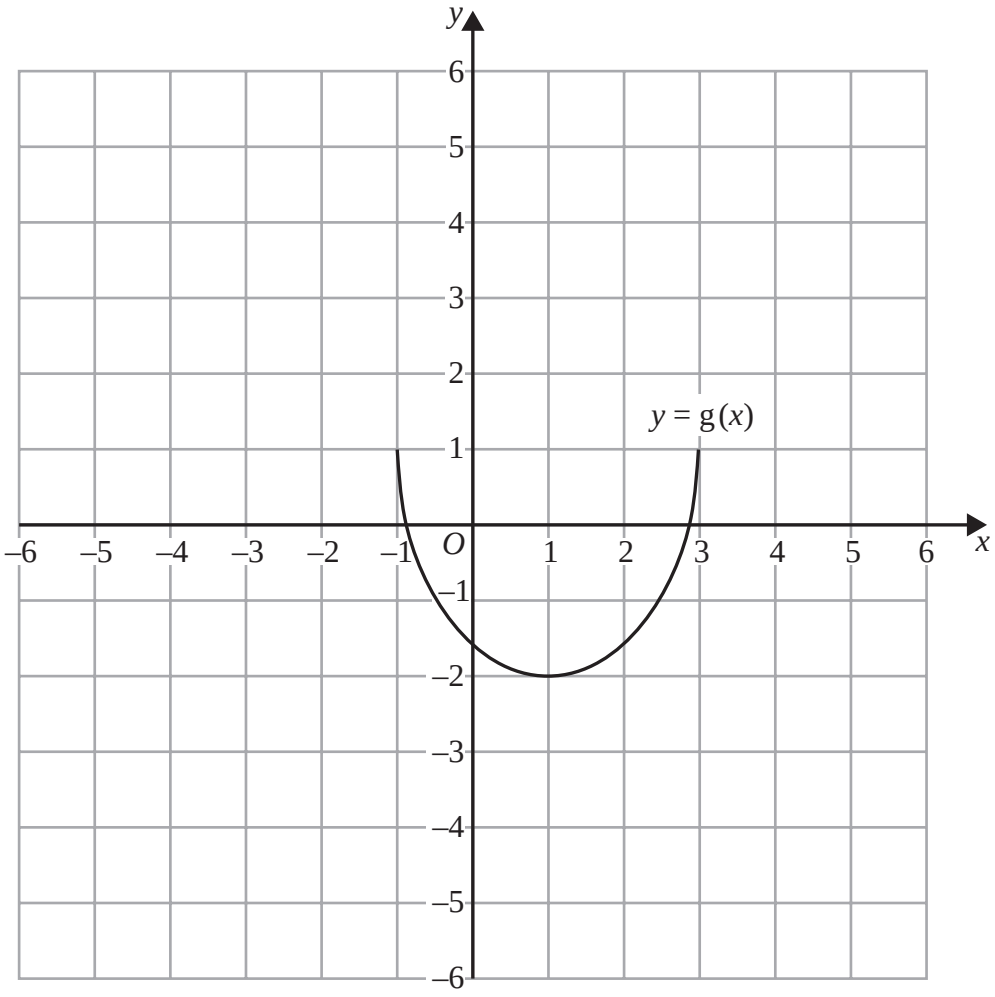
(c) Use your graph to find estimates for the solutions of the equation $x^2 - x = 4$

.....

(2)

(Total for Question 5 is 6 marks)

21 The graph of $y = g(x)$ is shown on the grid.



On the grid, draw the graph of $y = g(-x) + 2$

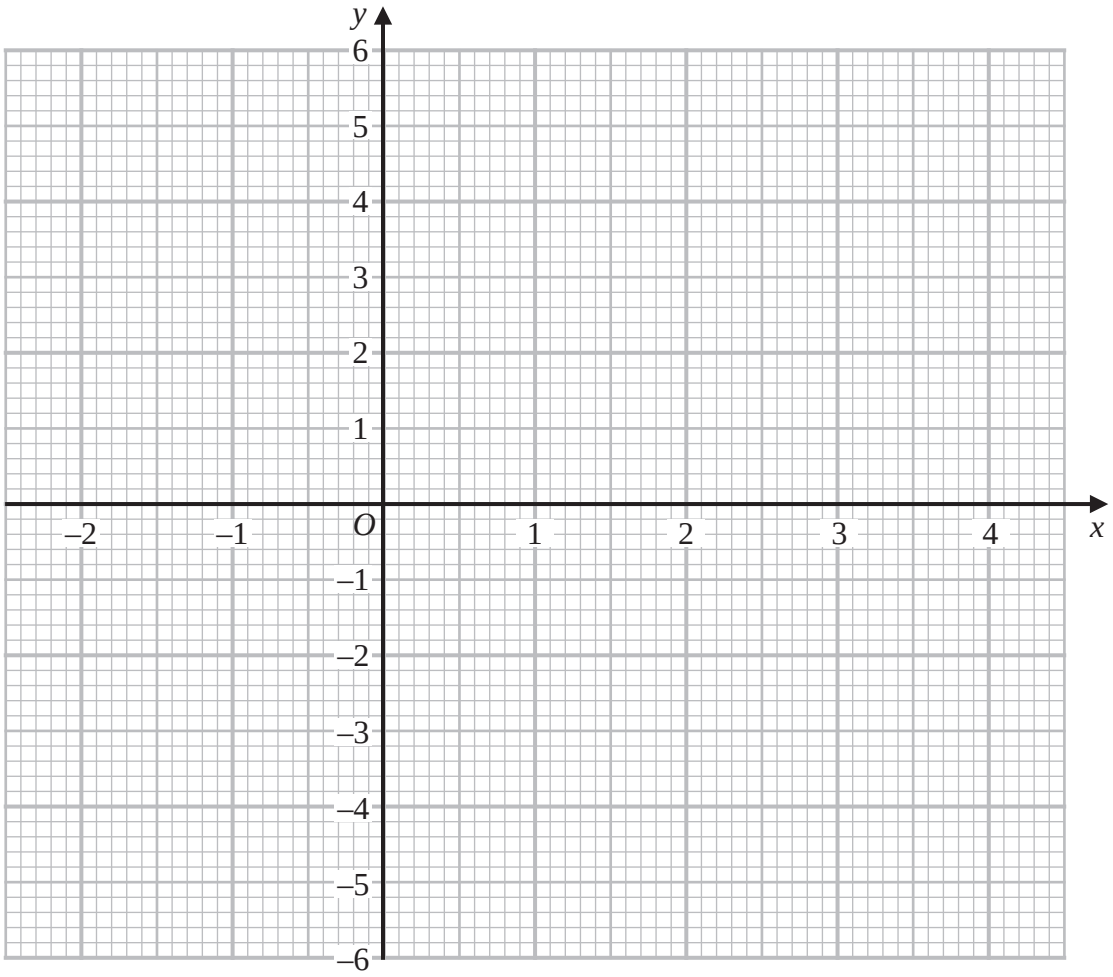
(Total for Question 21 is 2 marks)

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

x	–2	–1	0	1	2	3	4
y		0			–3		

(2)

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



(2)

(Total for Question 5 is 4 marks)

13 Here is a table of values of x and y.

x	2	4	6	8
y	0	4	8	12

Nadia says that y is directly proportional to x because the value of y increases by 4 as the value of x increases by 2

(a) Is Nadia correct?
You must give a reason for your answer.

.....

.....

.....

(1)

w is directly proportional to the square root of t.

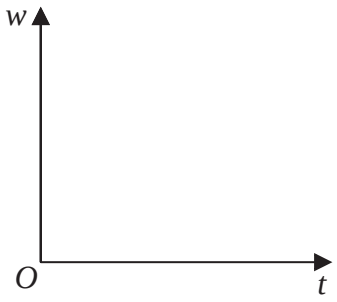
$w = 140$ when $t = 64$

(b) (i) Calculate the value of w when $t = 7.84$

$w =$ .....

(3)

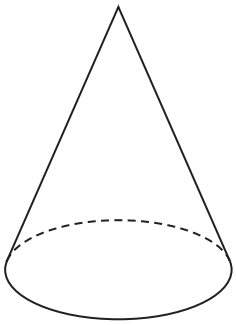
(ii) On the axes below, sketch a graph to show the relationship between w and t.



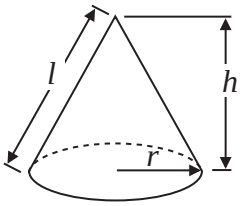
(1)

(Total for Question 13 is 5 marks)

19 The diagram shows a cone.



Curved surface area of cone $= \pi rl$



The radius of the base of the cone is $\frac{3}{4}$ of the height of the cone.

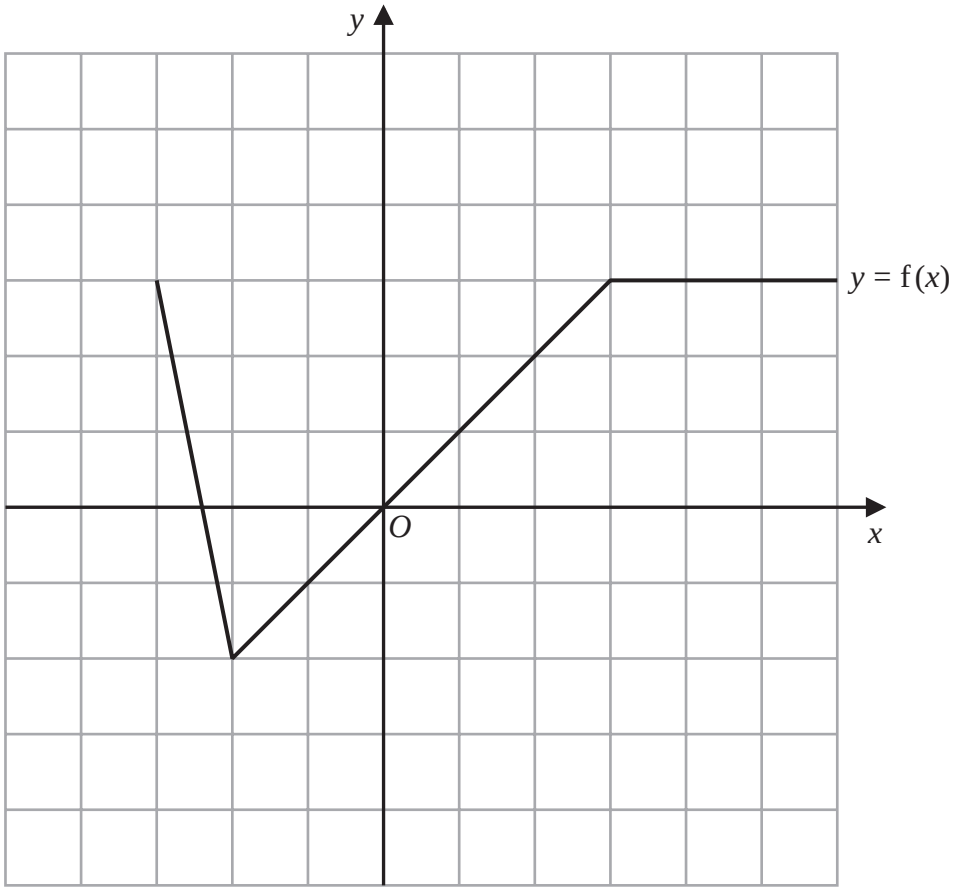
The total surface area of the cone is $54\pi\,\text{cm}^2$

Work out the height of the cone.

..... cm

(Total for Question 19 is 4 marks)

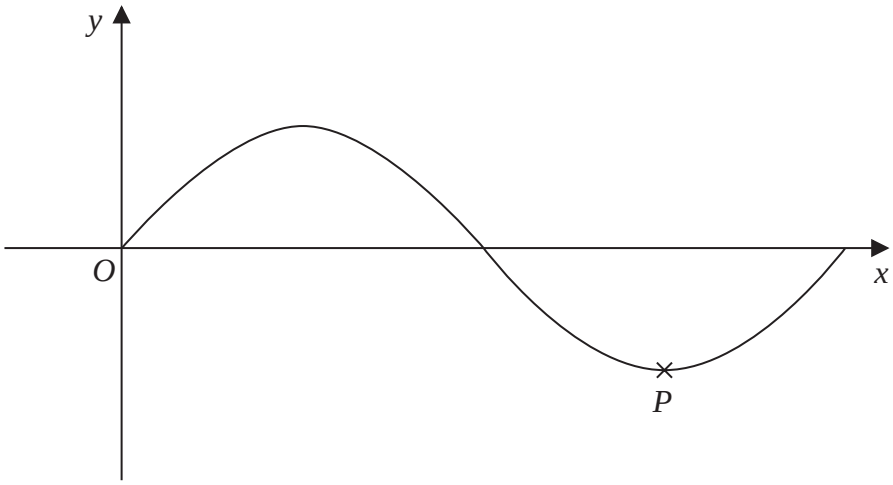
21 Here is the graph of $y = f(x)$



(a) On the grid, draw the graph of $y = -f(x)$

(1)

Here is a sketch of the graph of $y = \sin x°$



The point marked P is a turning point on the graph.

The graph of $y = \sin x°$ is translated to give the graph of $y = \sin(x + 180)° + 4$

Following the translation the point P, shown on the graph above, moves to point R.

(b) Find the coordinates of R.

(..... , ...)

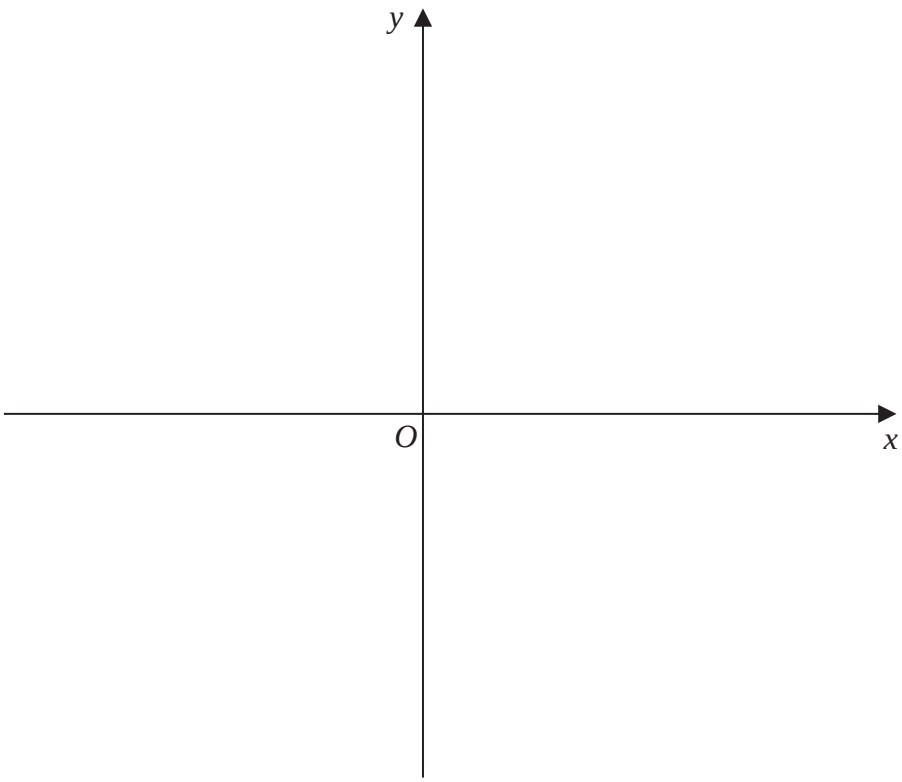
(3)

(Total for Question 21 is 4 marks)

23 Sketch the graph of

$$y = x^2 - 6px - 7 \quad \text{where} \quad p > 0$$

showing the coordinates of the turning point, in terms of p, and the coordinates of the intercept with the y-axis.
You must show all your working.



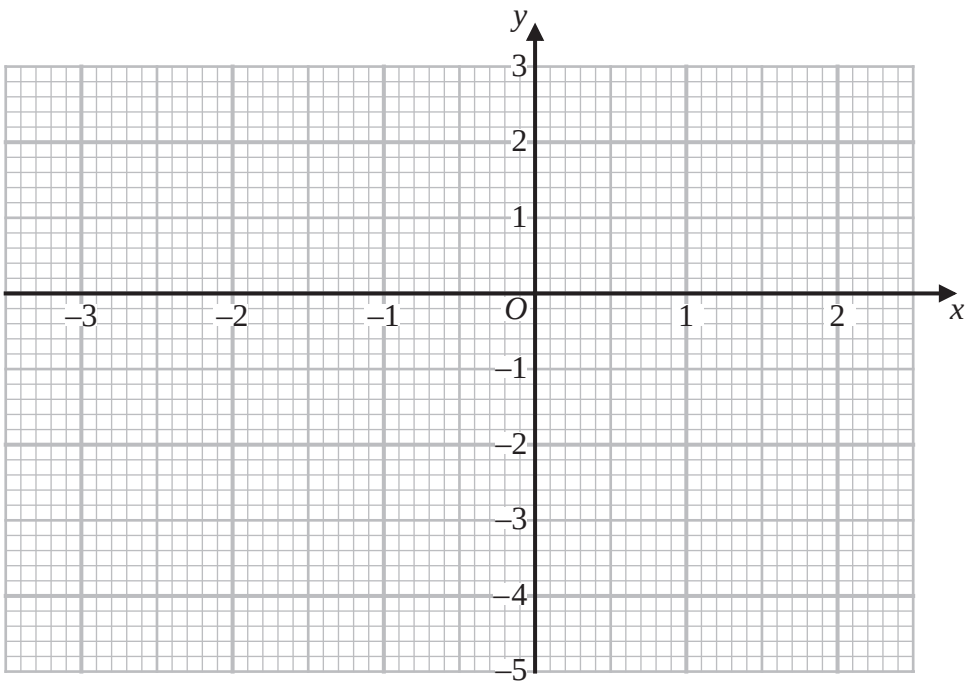
(Total for Question 23 is 5 marks)

3 (a) Complete the table of values for $y = x^2 + x - 4$

x	–3	–2	–1	0	1	2
y	2		–4			

(2)

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



(2)

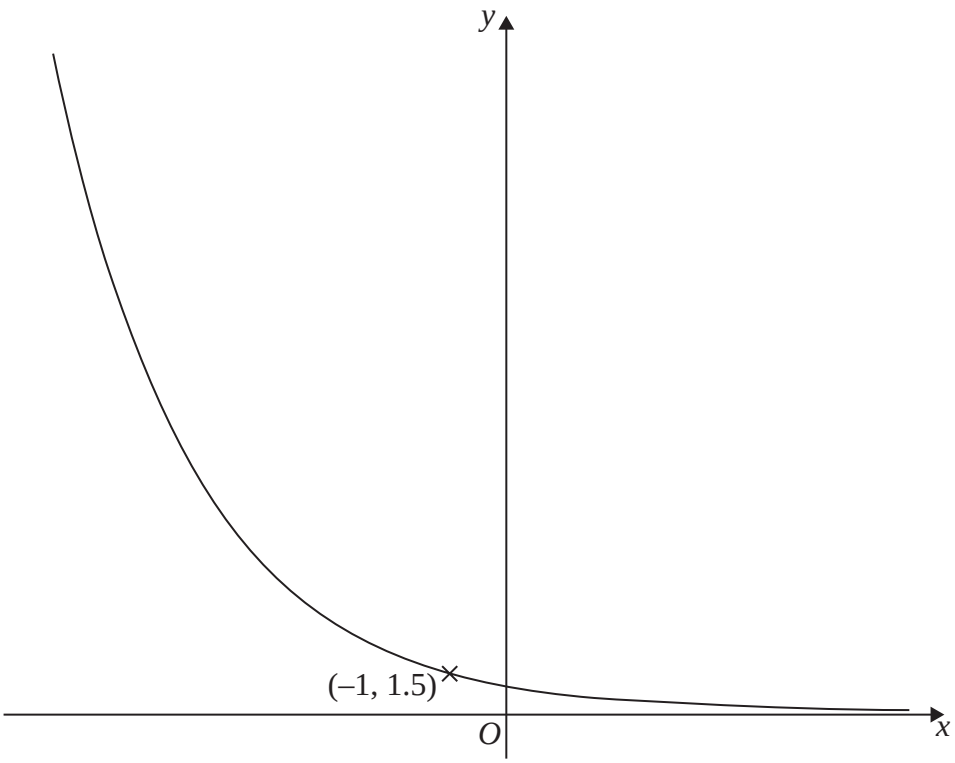
(c) Write down the coordinates of the turning point of the graph of $y = x^2 + x - 4$

(..... , ...)

(1)

(Total for Question 3 is 5 marks)

17 Here is a sketch of part of the graph of $y = k^x$ where k is a positive constant.



The graph passes through the point with coordinates (–1, 1.5)

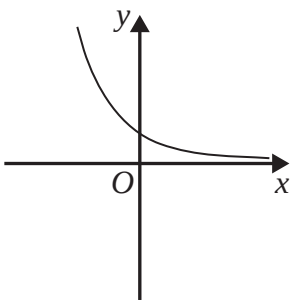
Find the value of k.

$k =$ .....

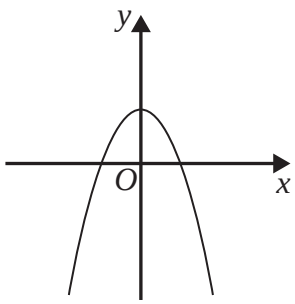
(Total for Question 17 is 2 marks)

13 Here are some graphs.

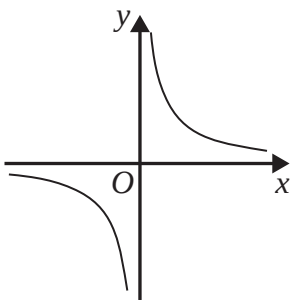
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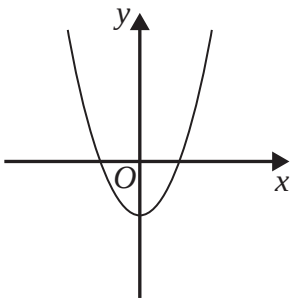
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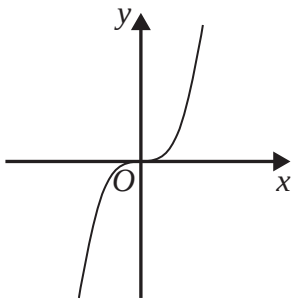
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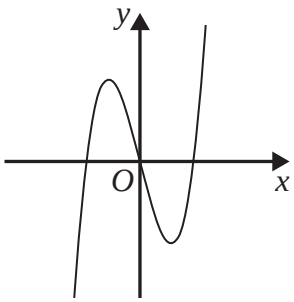
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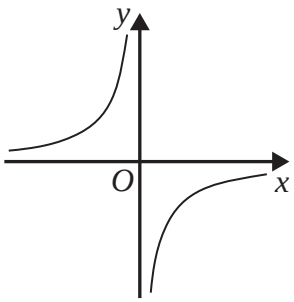
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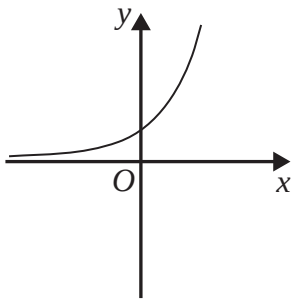
F



G



H



Each equation in the table is the equation of one of the graphs.

Complete the table.

Equation	Letter of graph
$y = x^3$	
$y = \frac{2}{x}$	
$y = 5 - x^2$	
$y = 3^x$	

(Total for Question 13 is 3 marks)