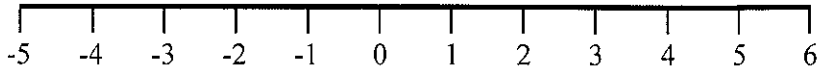


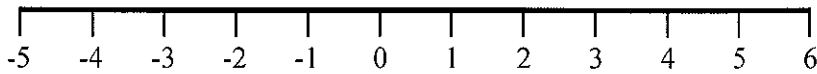
- 1) Represent this inequality on the number line

$$-3 < x \leq 2$$

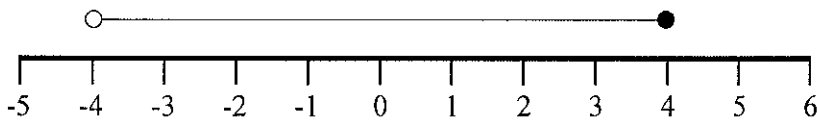


- 2) Represent this inequality on the number line

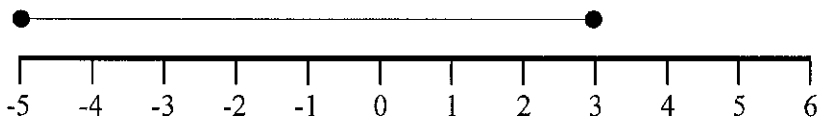
$$-1 \leq x < 5$$



- 3) Write down the inequality shown



- 4) Write down the inequality shown



- 5) If y is an integer, write down all the possible values of

$$-2 < y \leq 5$$

- 6) If x is an integer, write down all the possible values of

$$-9 < x < -5$$

1) Solve

a) $3x - 1 > 5$

b) $7y + 2 \leq 30$

c) $\frac{x}{2} - 3 \geq 2$

d) $5 + 2x > 7$

e) $8 < 5p - 2$

f) $\frac{y}{3} + 5 \geq 3$

g) $\frac{2x}{3} - 5 \geq -3$

h) $6x - 5 > 2x + 3$

i) $3p - 9 < 6 - 2p$

j) $5 - 3y < 2y - 10$

2) a) Solve the inequality

$$2z + 2 \geq 7$$

b) Write down the smallest **integer** value of z which satisfies the inequality

$$2z + 2 \geq 7$$

3) $5x + 2y < 10$

x and y are both integers.

Write down two possible pairs of values that satisfy this inequality.

$x = \dots\dots\dots, y = \dots\dots\dots$

and

$x = \dots\dots\dots, y = \dots\dots\dots$

$$(x+3)(x-2)(x+1)$$

Multiply out first two brackets

$$= x^2 - 2x + 3x - 6$$
$$= x^2 + x - 6$$
$$(x+1)$$

then simplify

$$(x^2 + x - 6)(x+1)$$

Multiply everything in first blue bracket by everything in 2nd

$$= x^3 + x^2 + x^2 + x - 6x - 6$$
$$= x^3 + 2x^2 - 5x - 6$$

Simplify - collect like terms!

$$(x-6)(x+1)(x-2)$$

$$(x+2)(x+3)(x+5)$$

$$(x-5)^3 = (\quad)(\quad)(\quad)$$

51 (1st term) 54, 59, 66, 75



$$\square n^2 + \square n + \square$$

Check with n=1

9, 19, 33, 51 (1st term)

$$\square n^2 + \square n + \square$$

Check (n=1)

2.5 (1st term) 4, 6.5, 10, 14.5

$$\square n^2 + \square n + \square$$

Check:

6, 13, 24, 39, 58

$$\square n^2 + \square n + \square$$

Check:

4 (1st term) 7, 12, 19, 28, 39, 52

First Diff. 1, 3, 5, 7, 9, 11, 13
Second Diff. 2, 2, 2, 2, 2

$$\square n^2$$

1. Half of the Second difference $2 \div 2 = 1$

3. Add the two you already have. The difference is now 1. The first term goes in front of 'n'

$$\square n$$

2. What would have come before the first term?

3. Set up 'skeleton' formula.

4. Check with n=1 gets 52

7, 10, 17, 28, 43

$$\square n^2 + \square n + \square$$

Check:

2.5, 5, 8.5, 13, 18.5

$$\square n^2 + \square n + \square$$

Check:

1. Find first differences

2. Find second differences

3. Set up 'skeleton' formula.

4. Check with n=1 gets 52

3, 1, -3, -9, -17

$$\square n^2 + \square n + \square$$

9, 20, 35, 54, 77

3, 13, 27, 45, 67

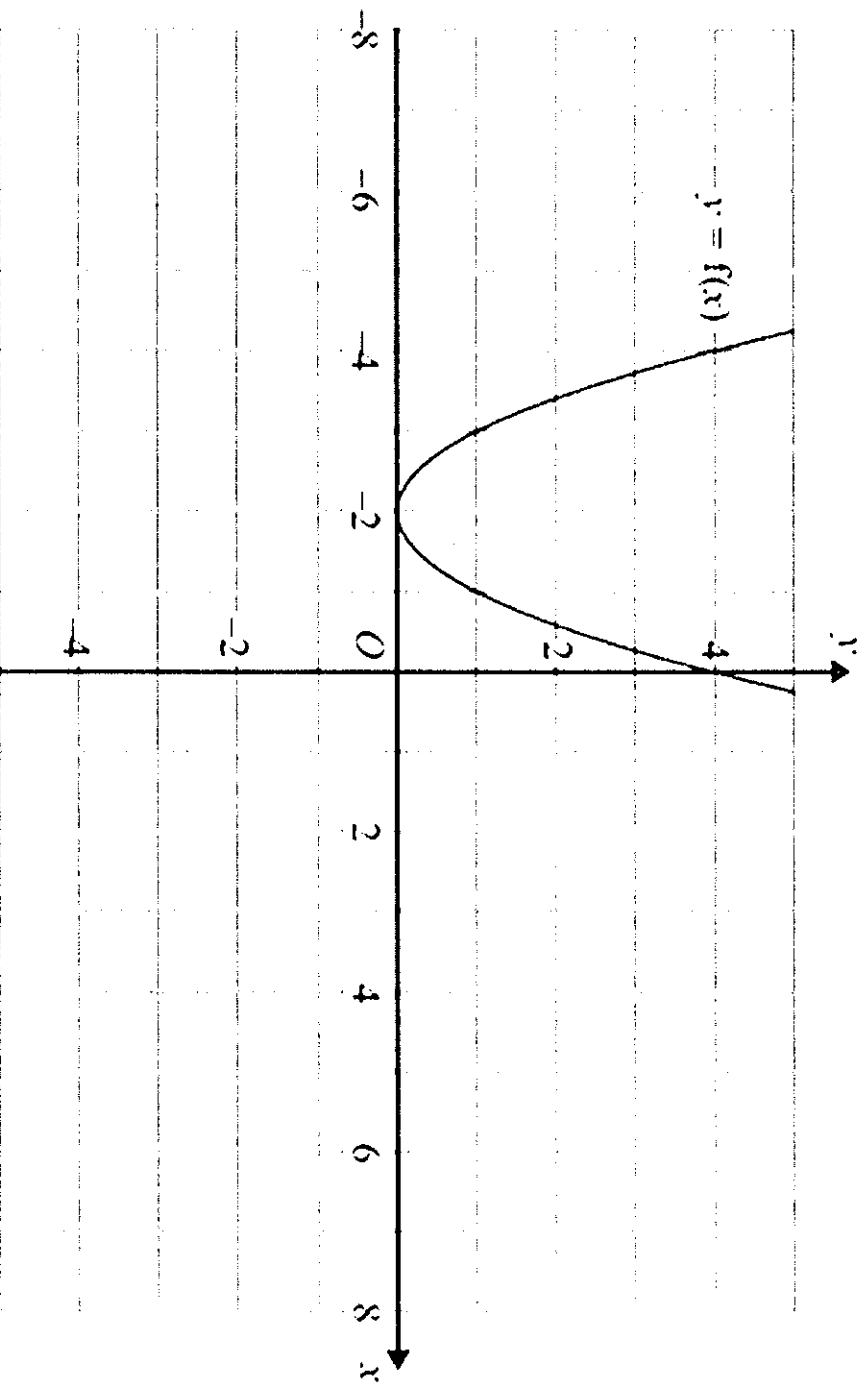
-4, -12, -24, -40, -60

Graph Transformations

Questions:

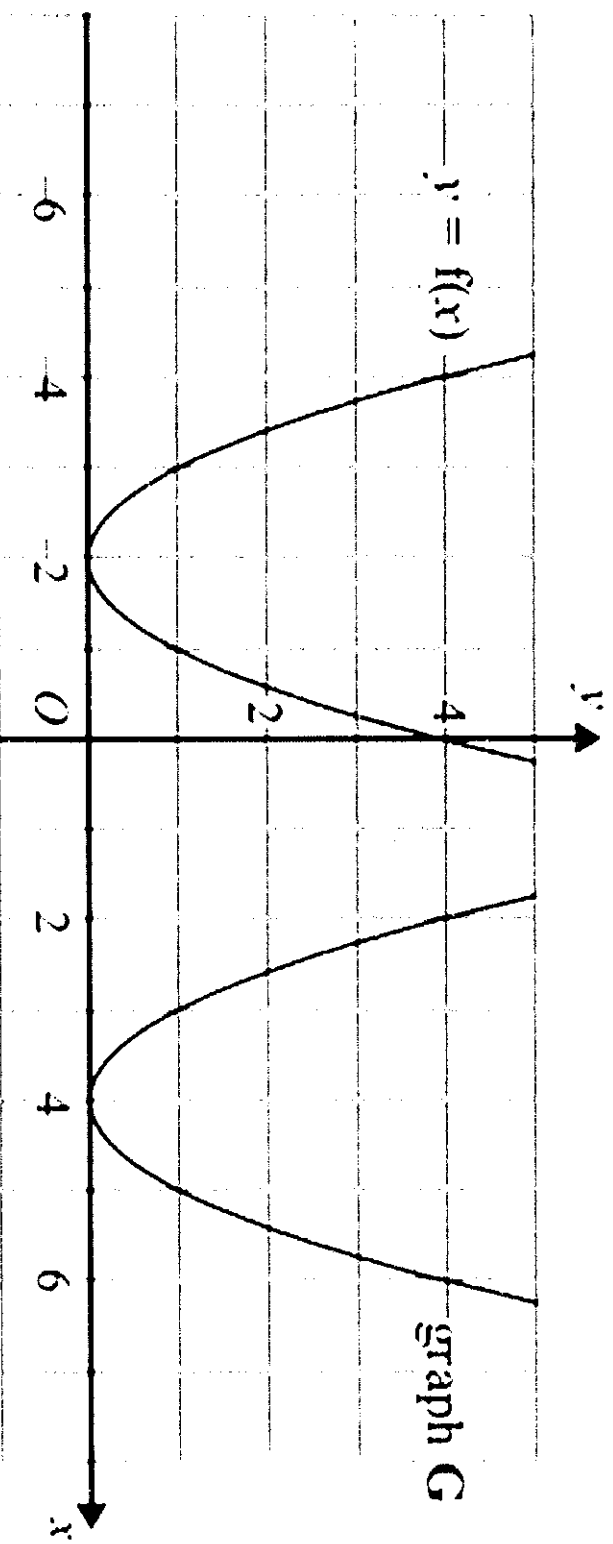
1. $y = f(x)$

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



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

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



The graph **G** is a translation of the graph of $y = f(x)$.

(b) Write down the equation of graph **G**.

Transformations of graphs

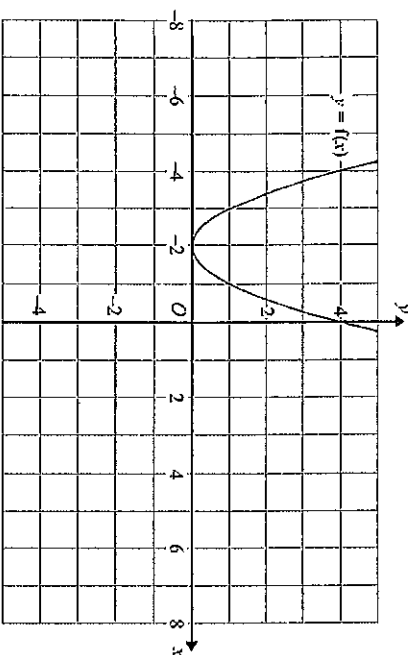
Things to remember:

- $f(x)$ means the function of x .
- $-f(x)$ is a reflection in the x -axis.
- $f(-x)$ is a reflection in the y -axis.
- $f(x - a)$ is a translation in the x -axis, a units.
- $f(x) + b$ is a translation in the y -axis, b units.
- $cf(x)$ is an enlargement in the y -axis, scale factor c .
- $f(dx)$ is an enlargement in the x -axis, scale factor $\frac{1}{d}$.

Questions:

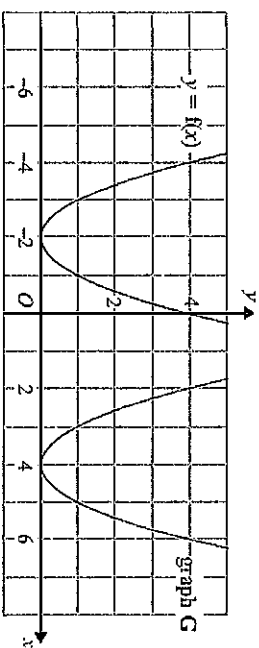
1. $y = f(x)$

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



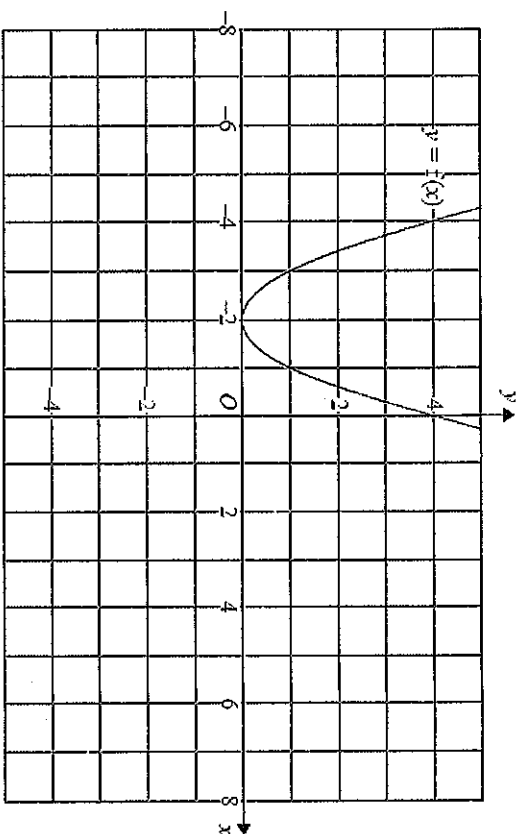
(a) On the grid above, sketch the graph of $y = -f(x)$.

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



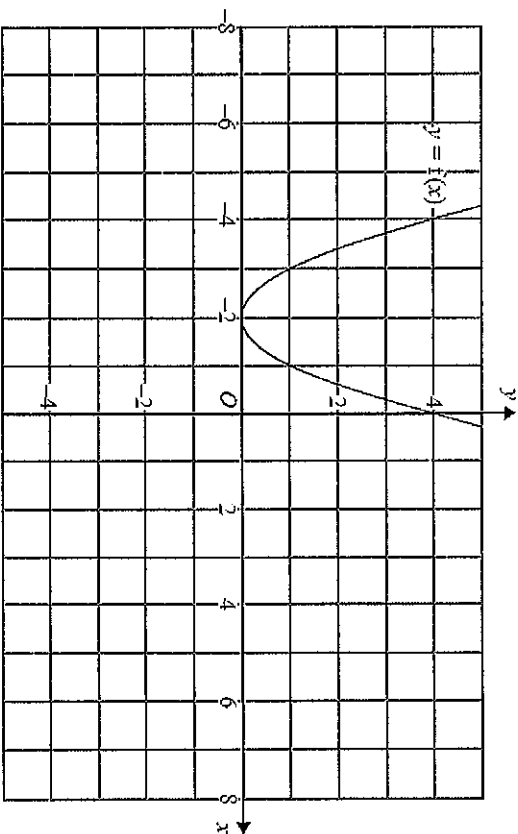
(b) The graph **G** is a translation of the graph of $y = f(x)$.
Write down the equation of graph **G**.

2. The graph of $y = f(x)$ is shown on both grids below.



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

(1)



(b) On this grid, sketch the graph of $y = -f(x) + 3$

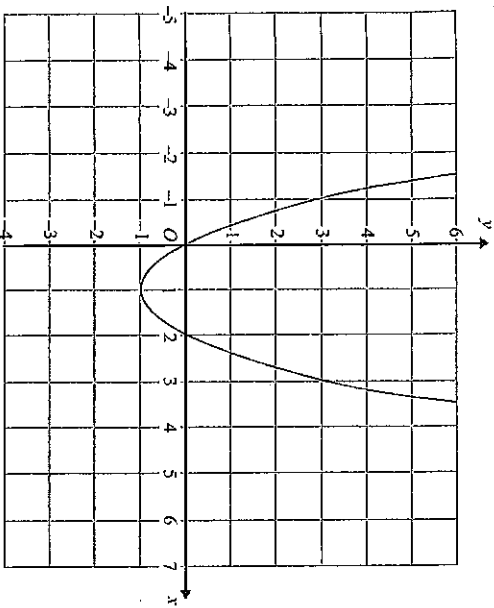
(1)

(Total for question = 2 marks)

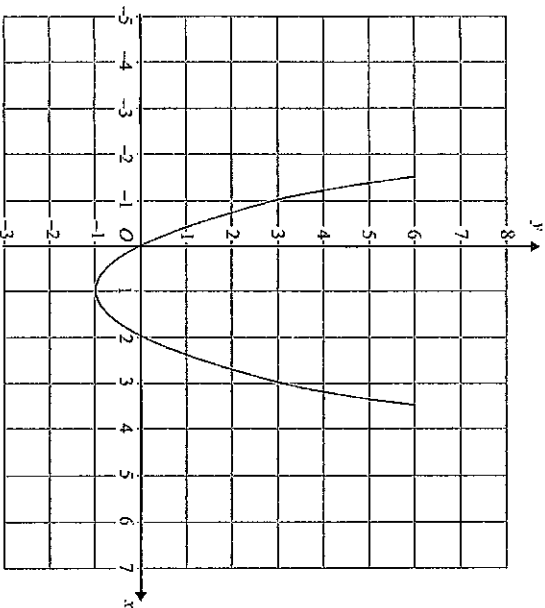
.....
(Total for Question is 3 marks)

3. The graph of $y = f(x)$ is shown on each of the grids.

(a) On this grid, sketch the graph of $y = f(x - 3)$.



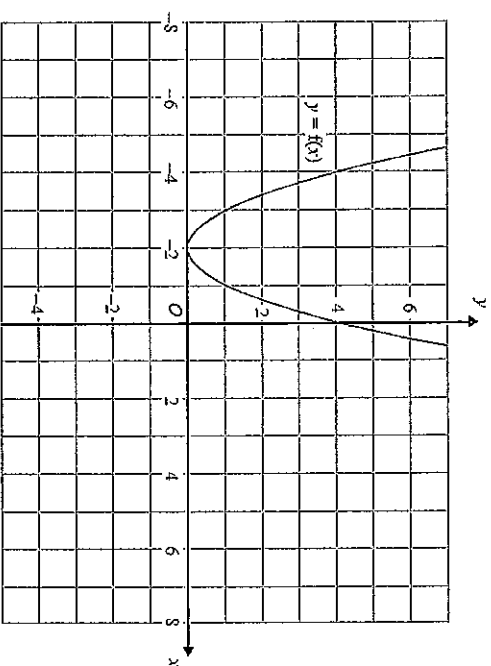
(b) On this grid, sketch the graph of $y = 2f(x)$.



(2)

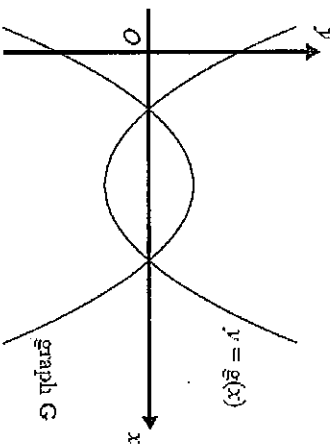
(Total for Question is 4 marks) (2)

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



(a) On the grid above, sketch the graph of $y = f(x + 3)$.

The graph of $y = g(x)$ is shown below.



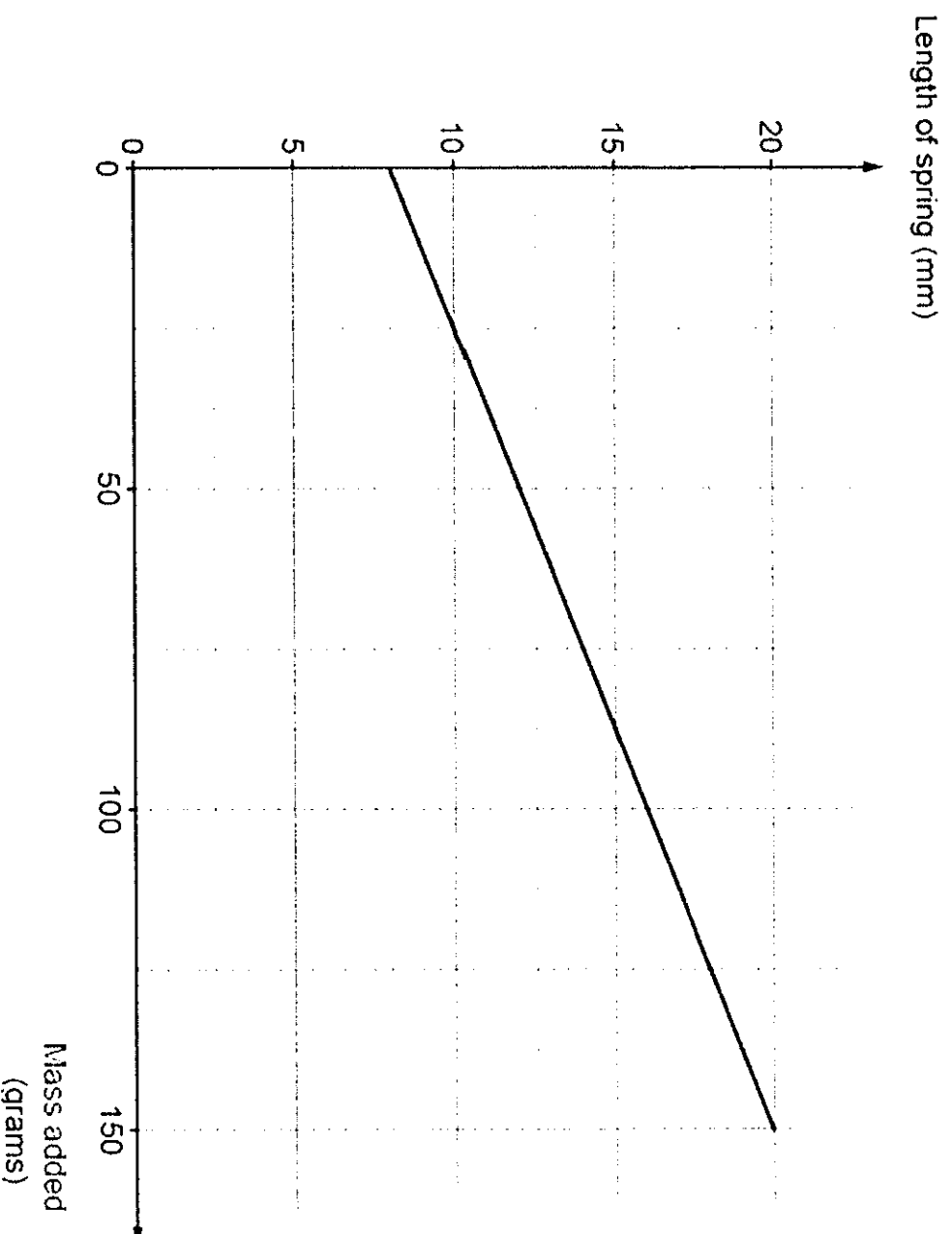
The graph G is the reflection of $y = g(x)$ in the x -axis.
 (b) Write down an equation of graph G .

(2)

(Total for question = 3 marks) (1)

$Y=mx+c$ in context

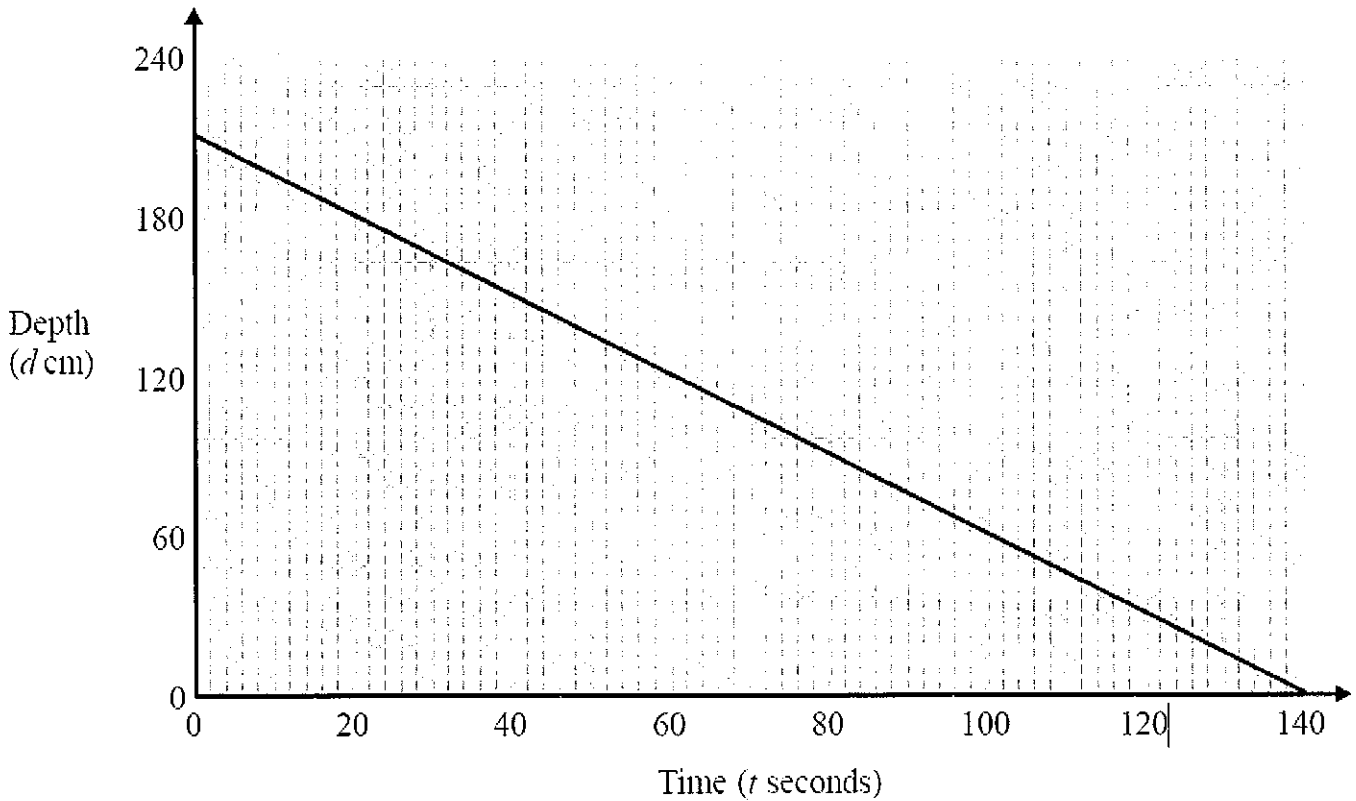
2. In an experiment, the mass added to the end of a vertical spring is gradually increased. At the end of the experiment, a computer produced the graph shown below.



- (a) Write down the length of the spring without any mass added.
- (b) (i) Calculate the gradient of the straight line drawn on the graph.
- (ii) Explain what the gradient of this graph tells you in relation to the experiment.
- (c) The straight line stops before the right-hand edge of the graph paper.
Why do you think this might be?

$y = mx + c$ in context

9. The graph shows the depth, d cm, of water in a tank after t seconds.



a) Find the gradient of this graph.

..... [2]

b) Explain what this gradient represents.

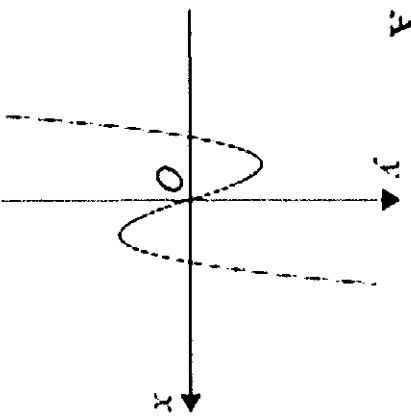
[1]

c) what does the y -intercept tell us about the water tank?

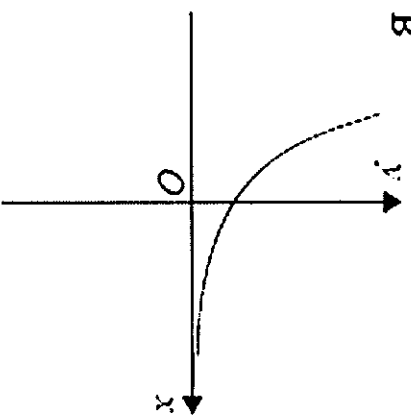
Identifying Graphs

Here are six graphs.

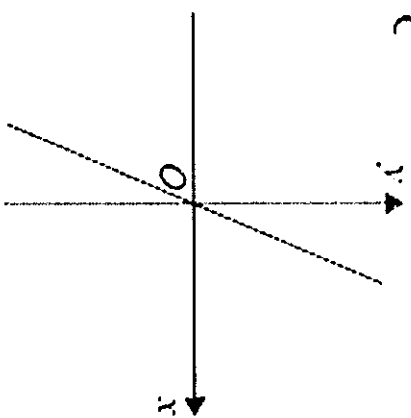
A



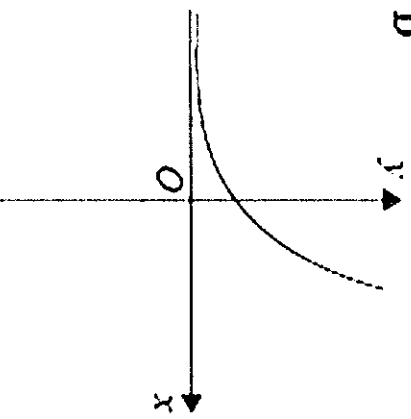
B



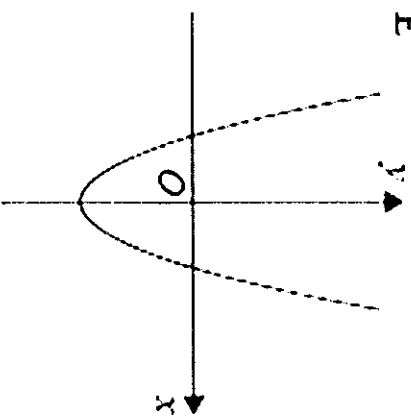
C



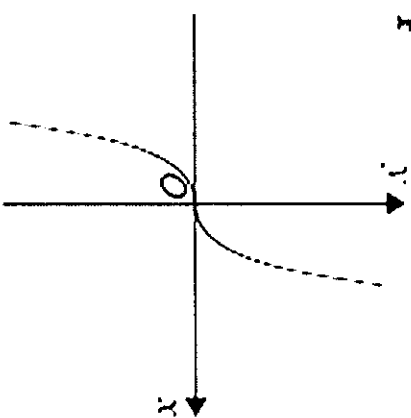
D



E

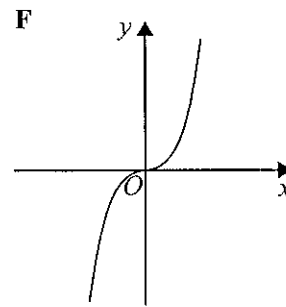
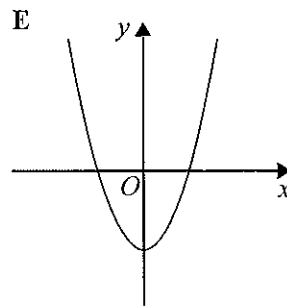
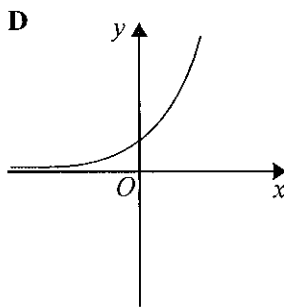
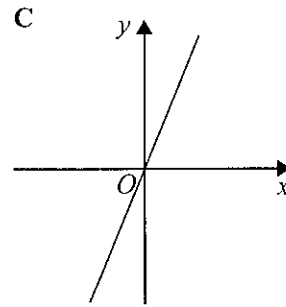
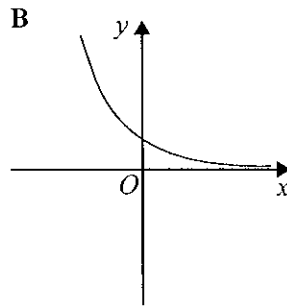
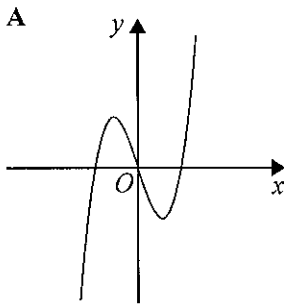


F



IDENTIFYING CUBIC, QUADRATIC AND EXPONENTIAL GRAPHS

9 Here are six graphs.



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

(i) $y = 2^x$

iii) $y = x^3$

v) $y = 6x$

(ii) $y = x^3 - 3x$

iv) $y = x^2 - 4$

vi) $y = 2^{-x}$

(Total for Question 9 is 2 marks)

10 Simplify $3m^2r \times 4m^3r^6$

(Total for Question 10 is 2 marks)



S 5 2 6 2 8 A 0 9 2 0

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Iteration

1a) Show that $x^2 - 4x - 9 = 0$ can be written in the form $x = \sqrt{9 + 4x}$.

b) Use the iteration formula $x_{n+1} = \sqrt{9 + 4x_n}$ to find x_3 to 2 decimal places.
Start with $x_0 = 2$.

Example

Iterations

1a) Show that $x^2 - 4x - 9 = 0$ can be written in the form $x = \sqrt{9 + 4x}$.

3a) Show that $x^2 + 4x - 29 = 0$ can be written in the form $x = \sqrt{29 - 4x}$.

b) Use the iteration formula $x_{n+1} = \sqrt{9 + 4x_n}$ to find x_3 to 2 decimal places.
Start with $x_0 = 2$.

b) Use the iteration formula $x_{n+1} = \sqrt{29 - 4x_n}$ to find x_3 to 2 decimal places.
Start with $x_0 = 1$.

2a) Show that $x^3 - x - 19 = 0$ can be written in the form $x = \sqrt[3]{x + 19}$.

4a) Show that $x^3 + 3x - 260 = 0$ can be written in the form $x = \sqrt[3]{260 - 3x}$.

b) Use the iteration formula $x_{n+1} = \sqrt[3]{x_n + 19}$ to find x_4 to 2 decimal places.
Start with $x_0 = 0$.

b) Use the iteration formula $x_{n+1} = \sqrt[3]{260 - 3x_n}$ to find x_4 to 2 decimal places. Start with $x_0 = 2$.