Solutions by
Kenneth Stafford
MATHS TUTOR
ken@kennethstafford.co.uk

GCSE (9-1) Grade 8/9 Transforming Graphs

Instructions

Use **black** ink or ball-point pen.
Fill in the boxes at the top of this page with your name.
Answer **all** questions.
Answer the questions in the spaces provided
– there may be more space than you need.
Show all your working out

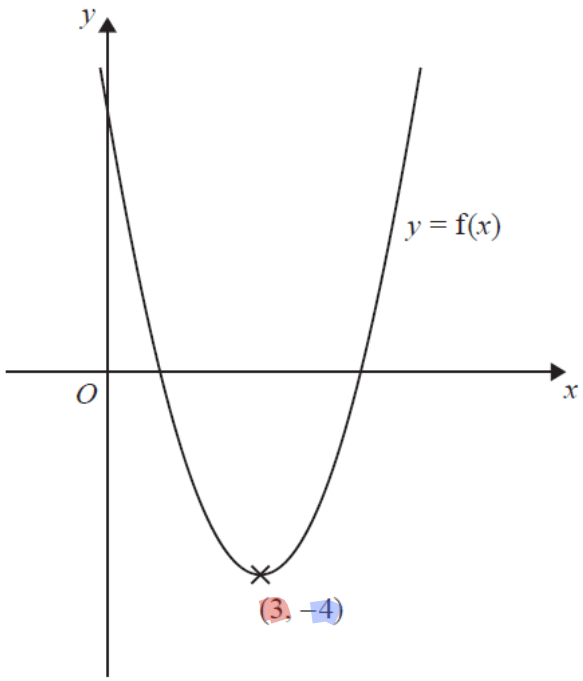
Information

The total mark for this paper is 40.
The marks for **each** question are shown in brackets.
use this as a guide as to how much time to spend on each question.
Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed

Advice

Read each question carefully before you start to answer it
Attempt every question
Check your answers if you have time at the end

1.



The diagram shows part of the curve with equation $y = f(x)$.
The coordinates of the minimum point of this curve are (3, –4).

Write down the coordinates of the minimum point of the curve with equation

(a) $y = f(x) + 2$ $-4 + 2 = -2$ (3, −2)

(b) $y = f(3x)$ $3 \div 3 = 1$ (1, −4)

(c) $y = f(-x)$ (−3, −4)

(d) $y = f(x - 3)$ $3 + 3 = 6$ (6, −4)

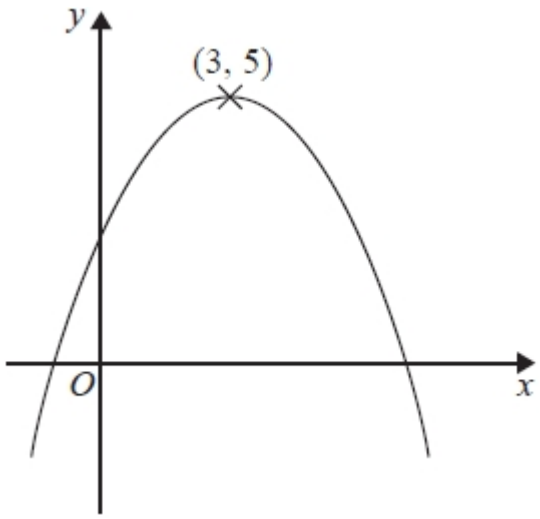
(e) $y = -f(x)$ $-4 \times (-1) = 8$ (3, 8)

(f) $y = 4f(x)$ $-4 \times 4 = -16$ (3, −16)

(g) $y = f(-x) - 1$ (−3, −5)

(Total 7 marks)

2.



The diagram shows part of the curve with equation $y = f(x)$.
The coordinates of the maximum point of the curve are (3, 5).

(*a*) Write down the coordinates of the maximum point of the curve with equation

(i) $y = f(x + 4)$ (-1 , 5)

(ii) $y = 3f(x)$ (3 , 15)

(iii) $y = f(\frac{1}{2}x)$ (6 , 5)

(iv) $y = \frac{1}{2}f(x) + 1$ (3 , 3.5)

(v) $y = -f(x - 2)$ (5 , -5)

(5)

The curve with equation $y = f(x)$ is transformed to give the curve with equation $y = f(x) - 4$

(*b*) Describe the transformation.

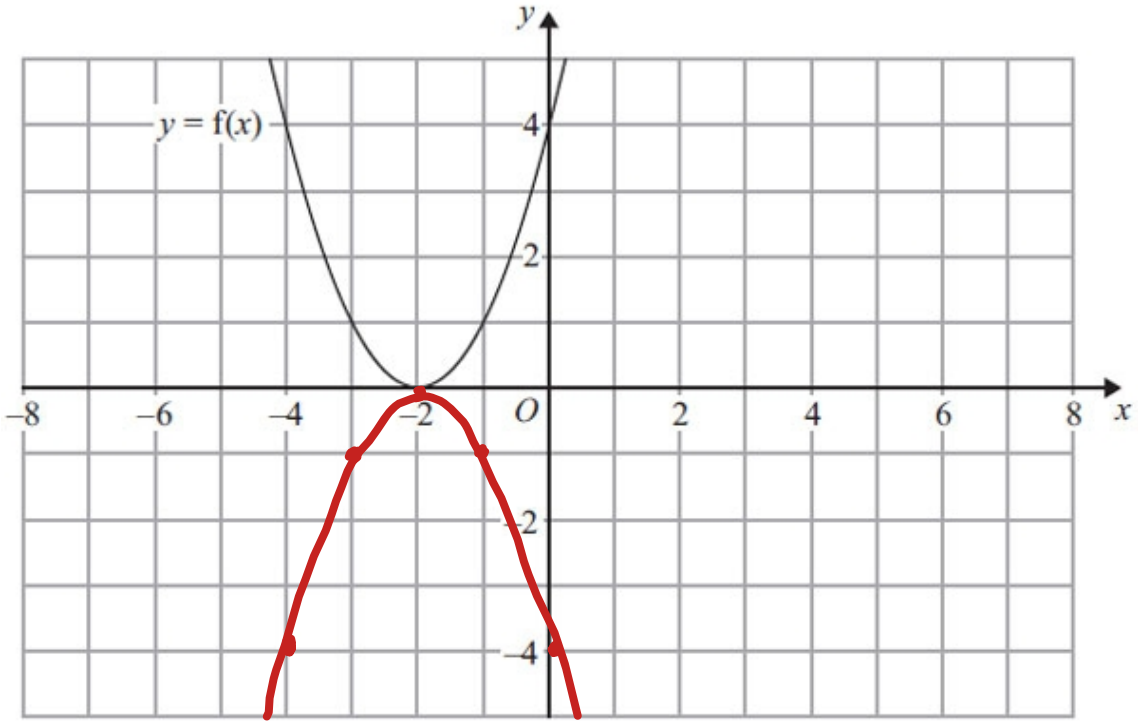
Translated $\begin{bmatrix} 0 \\ -4 \end{bmatrix}$

(1)

(Total 6 marks)

3. $y = f(x)$

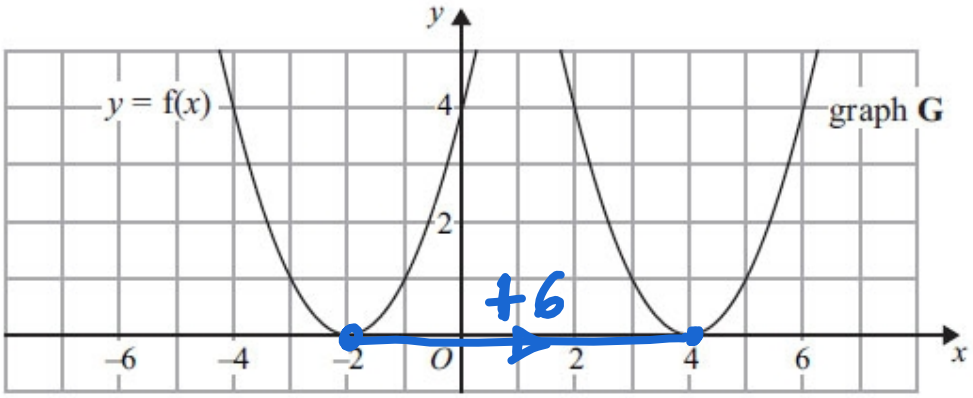
The graph of $y = f(x)$ is shown on the grid.



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

(2)

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**.

$y = f(x - 6)$

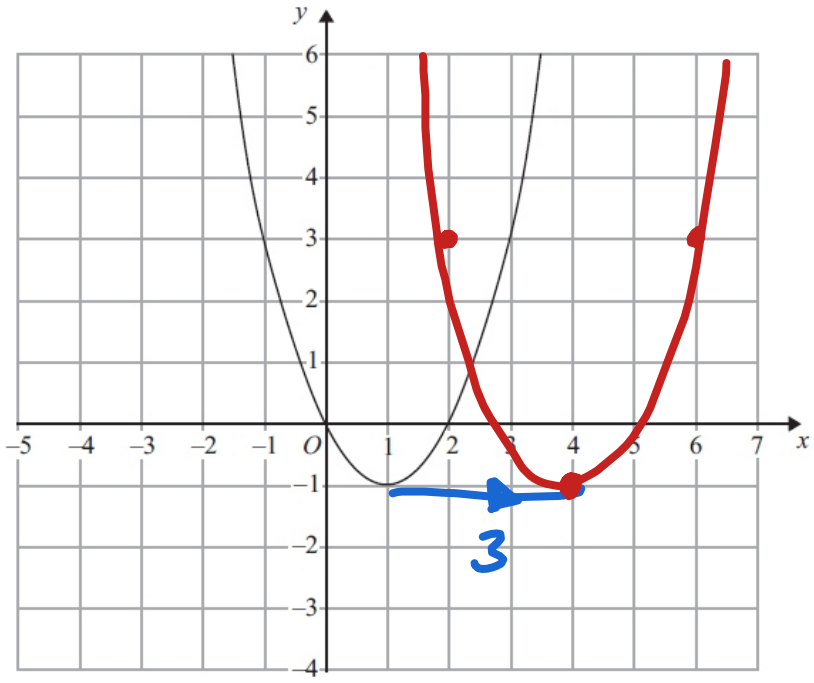
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(2)

(Total 3 marks)

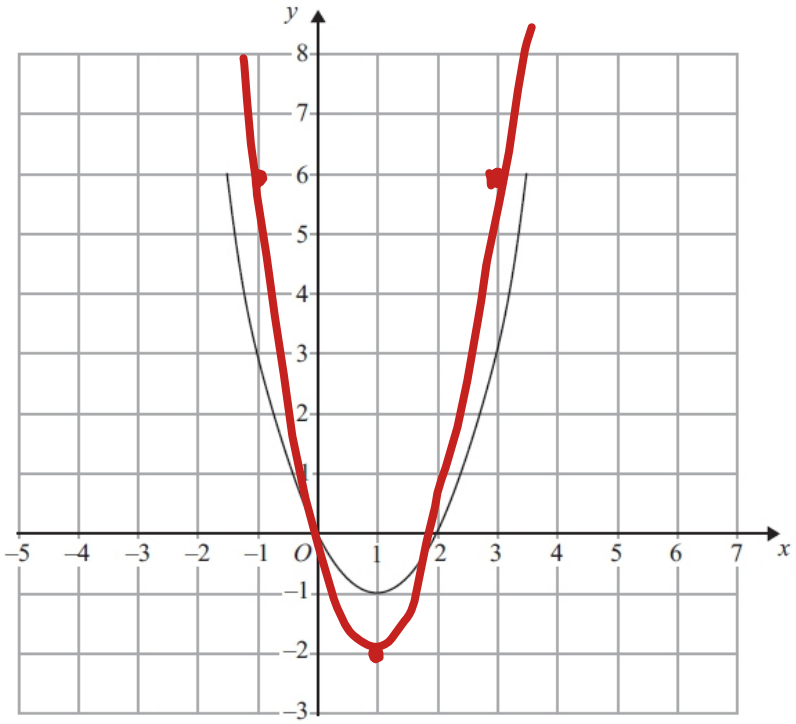
4. The graph of $y = f(x)$ is shown on each of the grids.

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



(2)

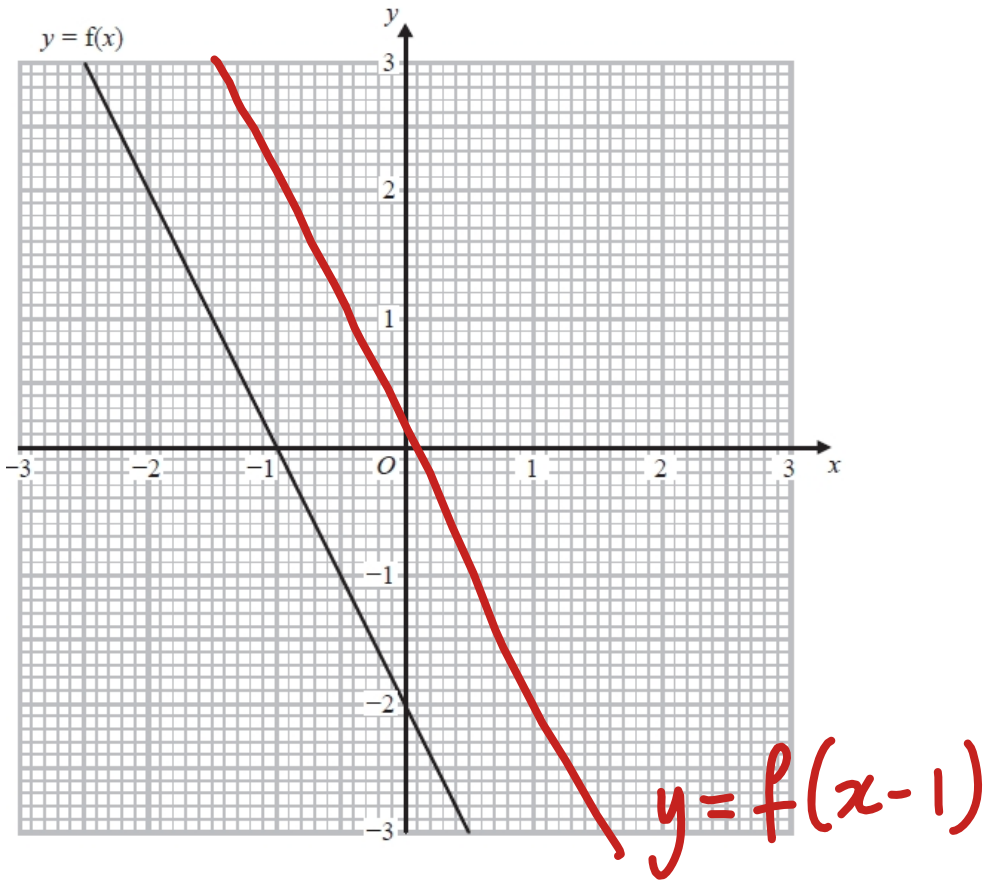
(b) On this grid, sketch the graph of $y = 2f(x)$



(2)

(Total 4 marks)

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



(a) Write down the coordinates of the point where the graph of $y = \frac{1}{2}f(x)$ meets the y-axis.

(0 , −1)

(1)

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

(2)

(Total 3 marks)

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6. The graph of $y = f(x)$ is transformed to give the graph of $y = -f(x + 2)$
The point A on the graph of $y = f(x)$ is mapped to the point P on the graph of $y = -f(x + 2)$

The coordinates of point A are (7, 3)
Find the coordinates of point P.

(5 , −2)

(Total 2 marks)

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7. The expression $x^2 - 6x + 13$ 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.

$(x-3)^2 = x^2 - 6x + 9$

$x^2 - 6x + 13 = (x-3)^2 + 4$

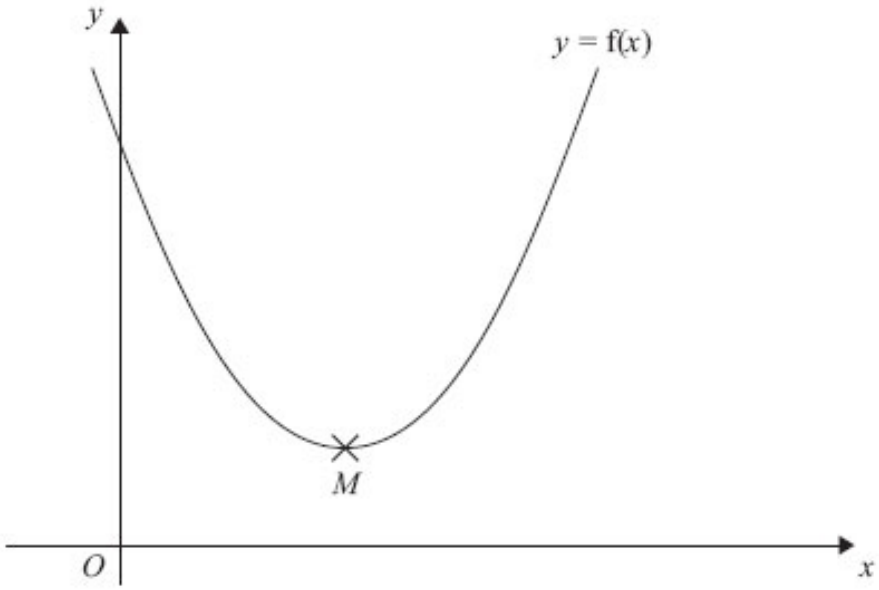
$a =$ 3

$b =$ 4

(3)

The equation of a curve is $y = f(x)$ where $f(x) = x^2 - 6x + 13$

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



The minimum point of the curve is M.

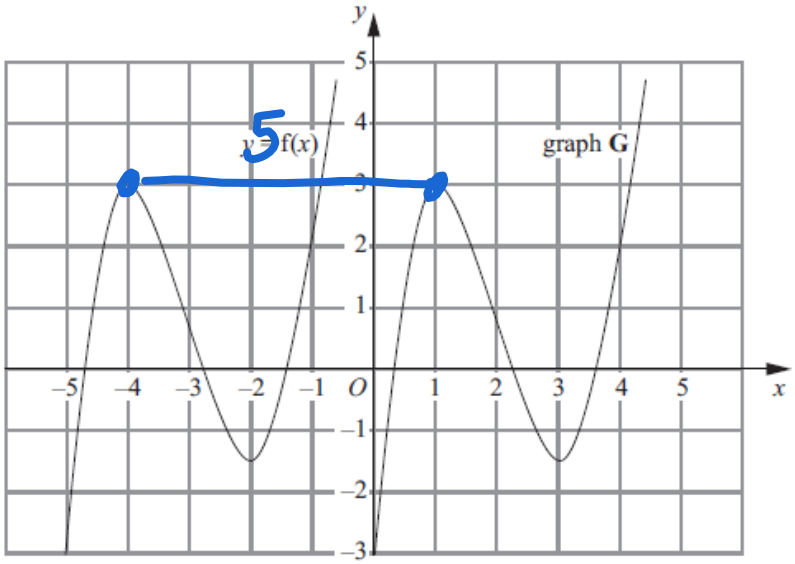
(b) Write down the coordinates of M.

(3 , 4)

(1)

(Total 4 marks)

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



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

(a) Write down, in terms of f, the equation of graph **G**.

$y =$ f(x − 5)

(1)

The graph of $y = f(x)$ has a maximum point at $(-4, 3)$.

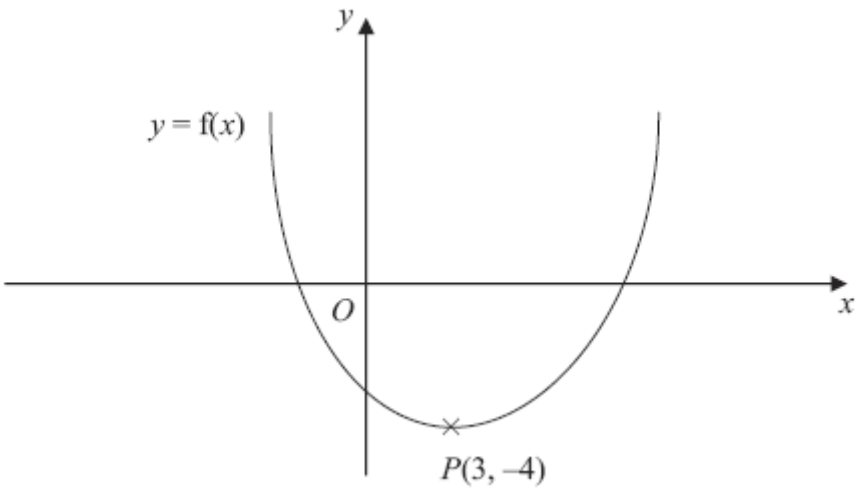
(b) Write down the coordinates of the maximum point of the graph of $y = f(-x)$.

(4 , 3)

(2)

(Total 3 marks)

9. This is a sketch of the curve with the equation $y = f(x)$.
The only minimum point of the curve is at $P(3, -4)$.



(a) Write down the coordinates of the minimum point of the curve with the equation $y = f(x - 3)$.

(6 , -4)

(2)

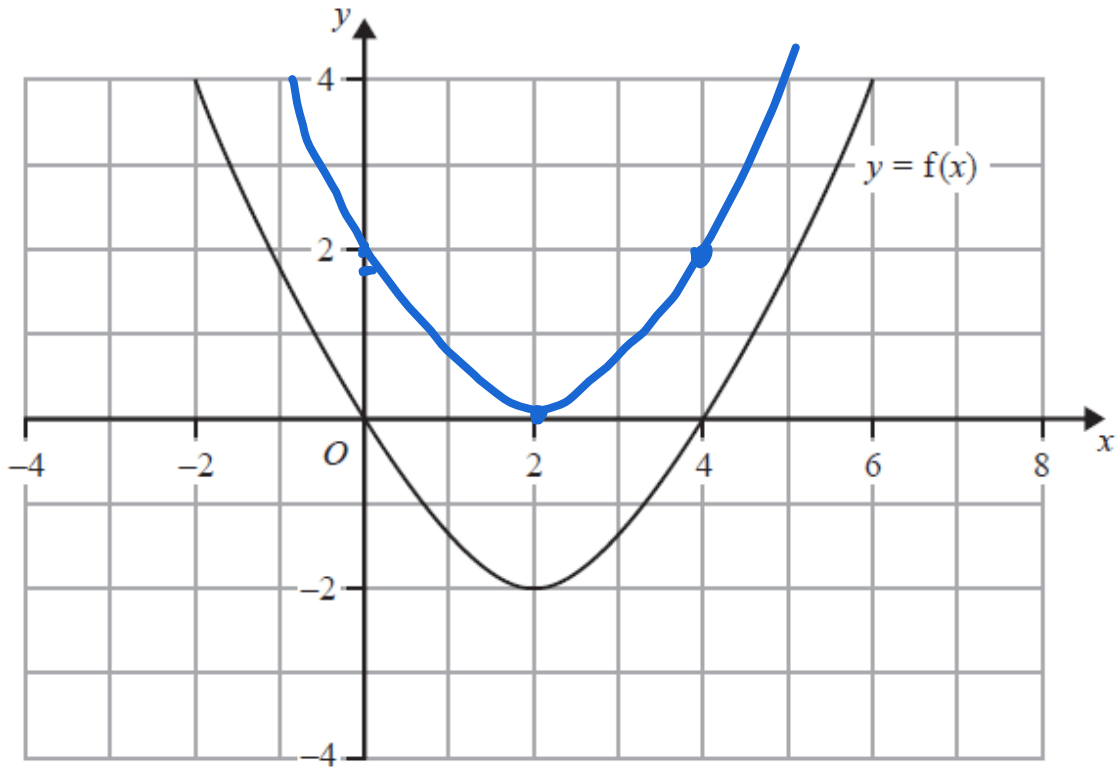
(b) Write down the coordinates of the minimum point of the curve with the equation $y = f(x + 5) + 6$

(-2 , 2)

(2)

(Total 4 marks)

10. The diagram shows part of the curve with equation $y = f(x)$.



(*a*) (i) Write down the coordinates of the points where the graph of $y = f(x - 3)$ crosses the x-axis.

(3 , 0) and (7 , 0)

(ii) Write down the coordinates of the point where the graph of $y = f(x - 1)$ crosses the y-axis.

(0 , 1·8)

(2)

(*b*) On the diagram above, sketch the graph of $y = f(x) + 2$

(2)

(Total 4 marks)

TOTAL FOR PAPER IS 40 MARKS