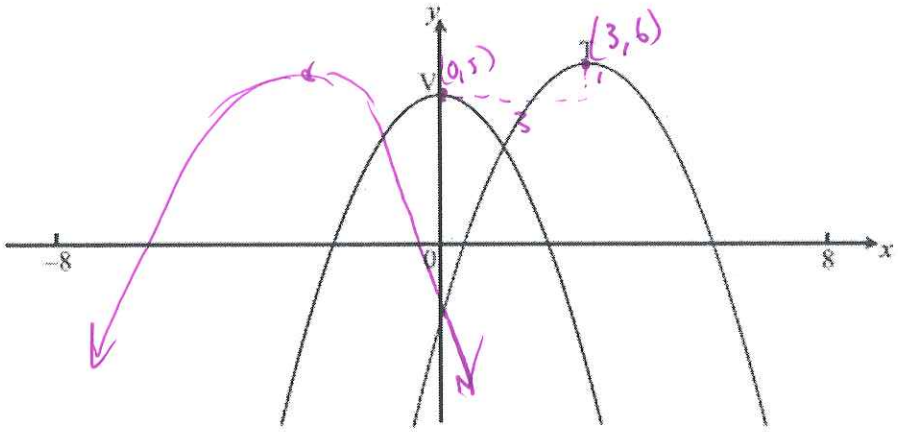
1. The following diagram shows part of the graph of $f(x) = 5 - x^2$ with vertex V (0, 5).

Its image $y = g(x)$ after a translation with vector $\begin{pmatrix} h \\ k \end{pmatrix}$ has vertex T (3, 6).



(a) Write down the value of

(i) h;

(ii) k.

(2)

(b) Write down an expression for $g(x)$.

(2)

(c) On the same diagram, sketch the graph of $y = g(-x)$.

(2)

a) $h = 3$

$k = 1$

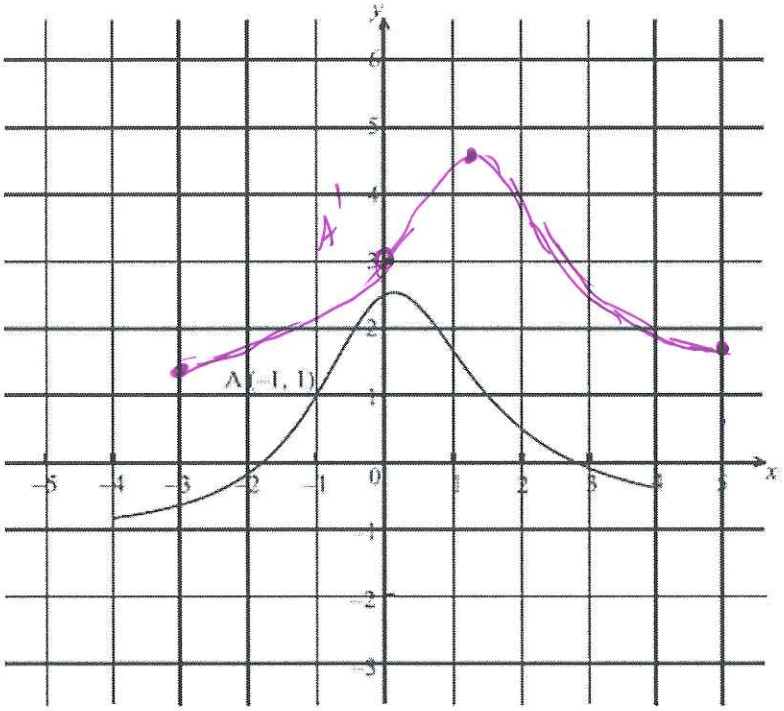
b) $f(x-3)+1 = 5-(x-3)^2+1$

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

c) ✓

(Total 6 marks)

2. The graph of a function f is shown in the diagram below. The point A $(-1, 1)$ is on the graph, and $y = -1$ is a horizontal asymptote.



(a) Let $g(x) = f(x-1) + 2$. On the diagram, sketch the graph of g. (3)

(b) Write down the equation of the horizontal asymptote of g. (1)

(c) Let A′ be the point on the graph of g corresponding to point A. Write down the coordinates of A′. (2)

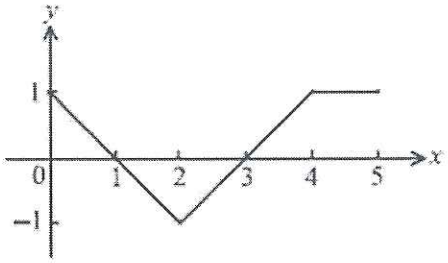
a) ✓

b) $y = 1$

c) $(0, 3)$

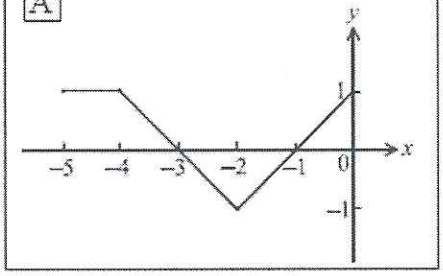
(Total 6 marks)

3. The following diagram shows part of the graph of $f(x)$.

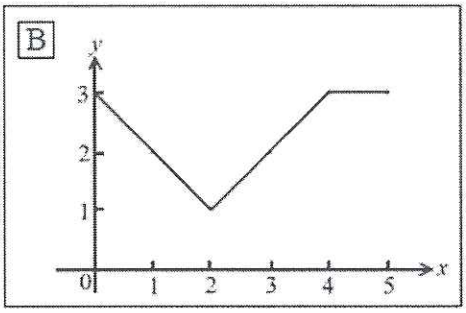


Consider the five graphs in the diagrams labelled A, B, C, D, E below.

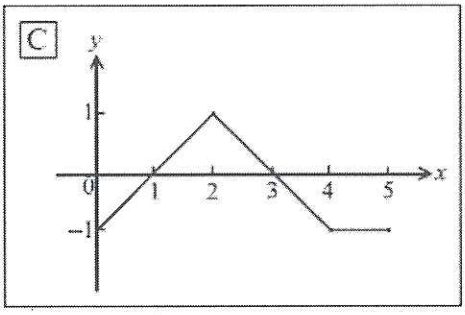
A



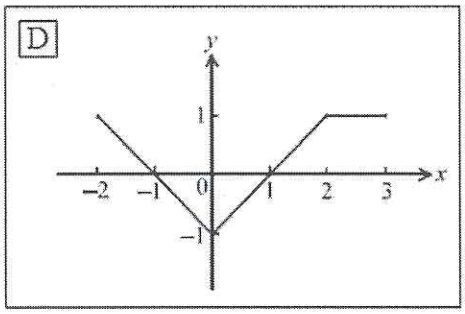
B



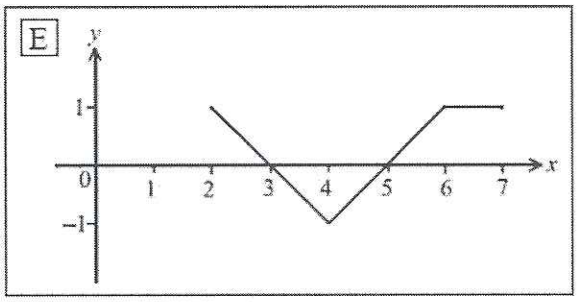
C



D



E



(a) Which diagram is the graph of $f(x+2)$?

(b) Which diagram is the graph of $-f(x)$?

(c) Which diagram is the graph of $f(-x)$

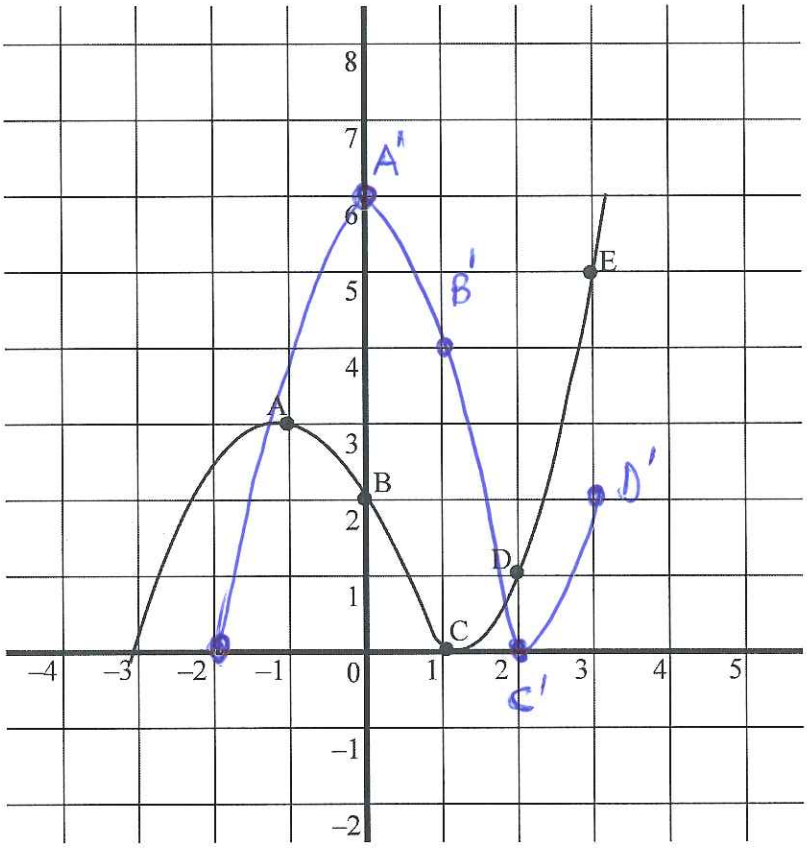
a) D

b) C

c) A

(Total 6 marks)

4. The sketch shows part of the graph of $y = f(x)$ which passes through the points A(–1, 3), B(0, 2), C(1, 0), D(2, 1) and E(3, 5).



A second function is defined by $g(x) = 2f(x - 1)$.

(a) Calculate $g(0)$, $g(1)$, $g(2)$ and $g(3)$.

(b) On the same axes, sketch the graph of the function $g(x)$.

Working:

$g(0) = 2 \cdot f(0-1)$
$= 2 \cdot f(-1)$
$= 2 \cdot 3$
$= 6$
$(0, 6)$

$g(1) = 2 \cdot f(1-1)$
$= 2 \cdot f(0)$
$= 2 \cdot 2$
$= 4$
$(1, 4)$

$g(2) = 2 \cdot f(2-1)$
$= 2 \cdot f(1)$
$= 2 \cdot 0$
$= 0$
$(2, 0)$

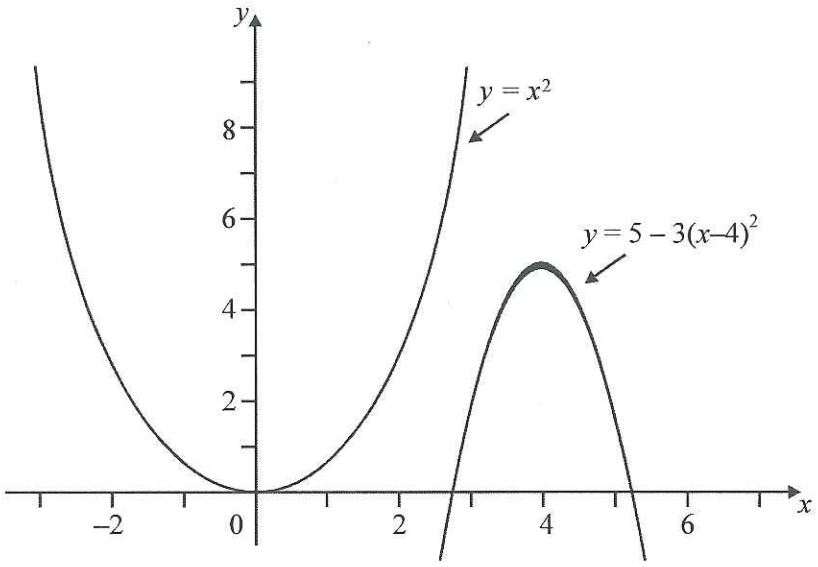
Answers:

(a) .....
.....

(Total 6 marks)

$g(3) = 2 \cdot f(3-1)$
$= 2 \cdot f(2)$
$= 2 \cdot 1$
$= 2$
$(3, 2)$

6. The diagram shows parts of the graphs of $y = x^2$ and $y = 5 - 3(x - 4)^2$.



The graph of $y = x^2$ may be transformed into the graph of $y = 5 - 3(x - 4)^2$ by these transformations.

A reflection in the line $y = 0$ **followed by**
a vertical stretch with scale factor k **followed by**
a horizontal translation of p units **followed by**
a vertical translation of q units.

$y = -3(x-4)^2 + 5$

Write down the value of

(a) k;

(b) p;

(c) q.

Working:

Answers:

(a) $k = 3$

(b) $p = 4$

(c) $q = 5$

(Total 4 marks)

EXTRA CREDIT

Given the graph of $y = f(x)$ below, sketch $y = -0.5f(x+2) - 3$

PEMDAS
↑ ↑↑