



1. The figure below shows a sketch of the curve with equation  $f(x)$ . The curve has a maximum point  $A$  at  $(-2, 3)$  and a minimum point  $B$  at  $(3, -5)$ .

On separate diagrams sketch the curve with equation,

a.  $y = f(x + 3)$

**(3)**

b.  $y = 2f(x)$

**(3)**

On each diagram clearly show the coordinates of the maximum and minimum points.

The graph of  $y = f(x) + a$  has a minimum at  $(3, 0)$  where  $a$  is a constant.

c. Write down the value of  $a$ .

**(1)**

a.

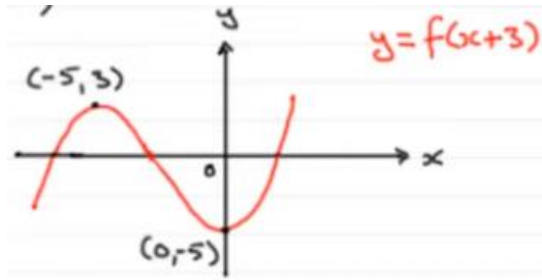
b.

c.

## Solutions

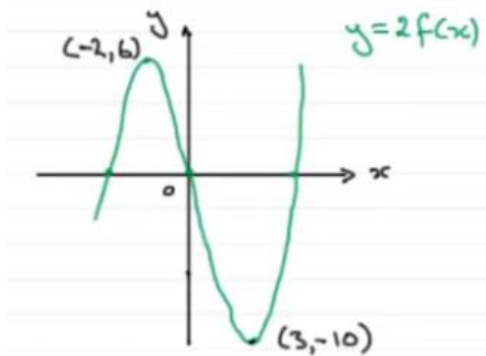
1a.

Shape **M1**  
 (-5, 3) **M1**  
 (0, -5) **M1**



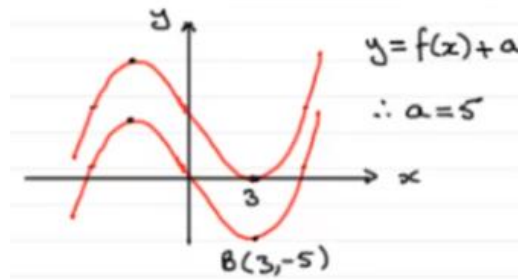
1b.

Shape **M1**  
 (-2, 6) **M1**  
 (3, -10) **M1**



1c.

Graphical representation **M1**  
 Transformation **M1**



$a = 5$

**M1**