

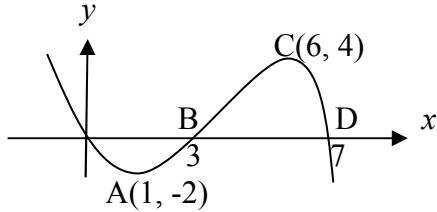
# Higher Functions.

1. Part of the graph of  $y = f(x)$  is shown in the diagram.  
On separate diagrams, sketch the graphs of

(i)  $y = f(x + 1)$

(ii)  $y = -2f(x)$

Indicate on the graphs the images of O, A, B, C and D.



(5)

2.  $f(x) = 3 - x$  and  $g(x) = \frac{3}{x}$ ,  $x \neq 0$

a) Find  $p(x)$  where  $p(x) = f(g(x))$

(2)

b) If  $q(x) = \frac{3}{3-x}$ ,  $x \neq 3$ , find  $p(q(x))$  in its simplest form

(3)

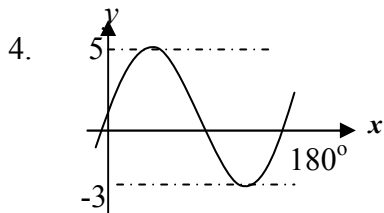
3. Functions  $f(x) = \frac{1}{x-4}$  and  $g(x) = 2x + 3$  are defined on suitable domains.

(a) Find an expression for  $h(x)$  where  $h(x) = f(g(x))$

(2)

(b) Write down any restriction on the domain of  $h$ .

(1)



The diagram shows part of the graph of  $y = a \sin(bx) + c$ . Determine the values of  $a$ ,  $b$  and  $c$ .

(3)

5. Functions  $f$  and  $g$ , defined on suitable domains, are given by  $f(x) = x^2 + 1$  and  $g(x) = 1 - 2x$ .

(a)  $g(f(x))$

(2)

(b)  $f(g(x))$

(2)

**TOTAL (20)**