

## Specimen Questions on Function Notation

1. Here are three functions.

$$f(x) = 3 - 2x \qquad g(x) = \frac{1}{x-2} \qquad h(x) = \sqrt{3x+1}$$

(a) Find (i)  $f(-1)$  (ii)  $f(\frac{3}{4})$  (iii)  $g(4.5)$  (iv)  $g(-2)$  (v)  $h(5)$  (vi)  $h(2\frac{2}{3})$

(b) (i) Given that  $f(x) = -7$ , find  $x$ .  
(ii) Given that  $g(x) = 2$ , find  $x$ .  
(iii) Given that  $h(x) = 5$ , find  $x$ .

2. Three functions,  $p$ ,  $q$  and  $r$ , are defined as follows.

$$p(x) = x^2 - 3x + 4 \qquad q(x) = \frac{2x-3}{x+1} \qquad r(x) = \sin x^\circ$$

(a) Find (i)  $p(-4)$  (ii)  $p(\frac{3}{4})$  (iii)  $q(4)$  (iv)  $q(-2)$  (v)  $r(45)$  (vi)  $r(180)$

(b) (i) Find the values of  $x$  for which  $p(x) = 2$ .  
(ii) Find the value of  $x$  for which  $q(x) = \frac{3}{4}$ .  
(iii) Find the values of  $x$ , in the domain  $0 \leq x \leq 180$ , for which  $r(x) = 0.5$

3. State which values of  $x$  cannot be included in the domain of these functions.

(i)  $f: x \mapsto \sqrt{5-x}$  (ii)  $g: x \mapsto \frac{5}{2x-7}$  (iii)  $h: x \mapsto \frac{1}{\sqrt{x+3}}$  (iv)  $j: x \mapsto \sqrt{(x^2-4)}$

(v)  $l: x \mapsto 2x + \frac{1}{x}$  (vi)  $k: x \mapsto \frac{1}{(3x+2)^2}$  (vii)  $l: x \mapsto \sqrt{\frac{x-3}{6-x}}$

4.  $f: x \mapsto x^3$        $g: x \mapsto \frac{1}{x+8}$

(a) Find (i)  $fg(-4)$ , (ii)  $gf(5)$ .  
(b) Find (i)  $gf(x)$ , (ii)  $fg(x)$ .  
(c) What value(s) must be excluded from the domain of (i)  $gf(x)$ , (ii)  $fg(x)$ ?  
(d) Find and simplify  $gg(x)$ .

5. Three functions are defined as follows.

$$\begin{aligned} p(x) &= (x+4)^2 \text{ with domain } \{x: x \text{ is any number}\} \\ q(x) &= 8-x \text{ with domain } \{x: x > 0\} \\ r(x) &= \cos x^\circ \text{ with domain } \{x: 0 \leq x \leq 180\} \end{aligned}$$

(a) Find the range of each of these functions.  
(b) Find the values of  $x$  such that  $p(x) = q(x)$ .

6. Find the inverse function of each of the following functions.

(a)  $f(x) = 2x - 3$  (b)  $g(x) = 5 - x$  (c)  $h(x) = \frac{1}{3x+4}$  (d)  $j(x) = 3 - \frac{2}{x}$

(e)  $k(x) = \frac{2x+1}{5-x}$

7. Find the inverse function of each of the following functions.

(a)  $p: x \mapsto \sqrt{3x-2}$  (for  $x \geq \frac{2}{3}$ ) (b)  $q: x \mapsto \frac{1}{\sqrt{x+2}}$  (for  $x > -2$ )

(c)  $r: x \mapsto x^2 + 5$  (for  $x \geq 0$ ) (d)  $s: x \mapsto (x-3)^2$  (for  $x \geq 3$ )

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