

## Function

**2019 M/J,O/N**

**0606/21/M/J/19**

1. a) Sketch the graph of  $y = |5x - 3|$ , showing the coordinates of the points where the graph meets the coordinate axes.

[3]

- b) Solve the equation  $|5x - 3| = 2 - x$ .

[3]

2. (i) Express  $5x^2 - 15x + 1$  in the form  $p(x + q)^2 + r$ , where  $p, q$  and  $r$  are constants.

[3]

- (ii) Hence state the least value of  $x^2 - 3x + 0.2$  and the value of  $x$  at which this occurs.

[2]

3. (a) The functions  $f$  and  $g$  are defined by

$$f(x) = 5x - 2 \quad \text{for } x > 1,$$

$$g(x) = 4x^2 - 9 \quad \text{for } x > 0$$

- (i) State the range of  $g$ .

[1]

- (ii) Find the domain of  $gf$ .

[1]

- (iii) Showing all your working, find the exact solutions of  $gf(x) = 4$ .

[3]

- (b) The function  $h$  is defined by  $h(x) = \sqrt{x^2 - 1}$  for  $x \leq -1$ .

- (i) State the geometrical relationship between the graphs of  $y = h(x)$  and  $y = h^{-1}(x)$ .

[1]

(ii) Find an expression for  $h^{-1}(x)$ .

[3]

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4. It is given that  $f: x \rightarrow \sqrt{x}$  for  $x \geq 0$ ,  
 $g: x \rightarrow x + 5$  for  $x \geq 0$

Identify each of the following functions with one of  $f^{-1}$ ,  $g^{-1}$ ,  $fg$ ,  $gf$ ,  $f^2$ ,  $g^2$ .

(i)  $\sqrt{x + 5}$

[1]

(ii)  $x - 5$

[1]

(iii)  $x^2$

[1]

(iv)  $x + 10$

[1]

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5. (i) Draw the graph of  $y = |2x - 3|$ .

[2]

(ii) Solve the equation  $7 - |2x - 3| = 0$ .

[3]

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6. Solve  $|3x + 2| = x + 4$ .

[3]

7. (i) Given that  $y = 2x^2 - 4x - 7$ , write  $y$  in the form  $a(x - b)^2 + c$ , where  $a$ ,  $b$  and  $c$  are constants.

[3]

- (ii) Hence write down the minimum value of  $y$  and the value of  $x$  at which it occurs.

[2]