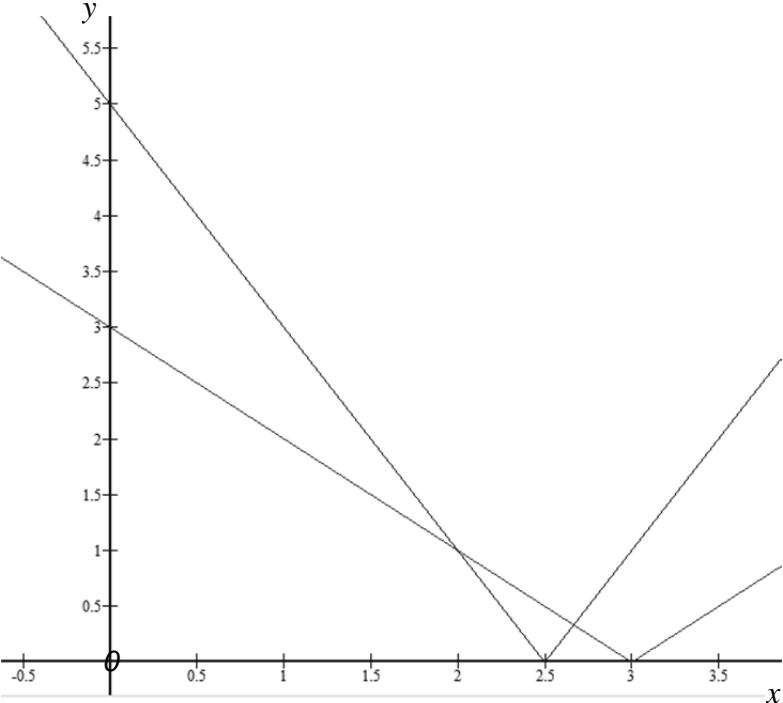


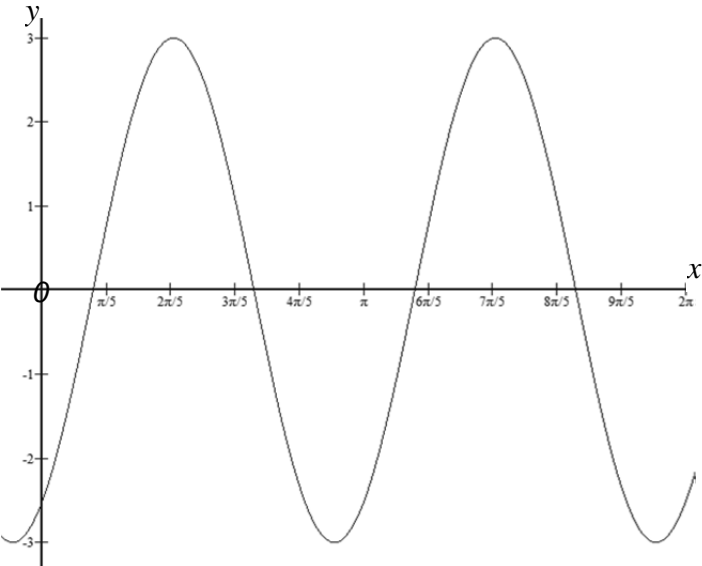
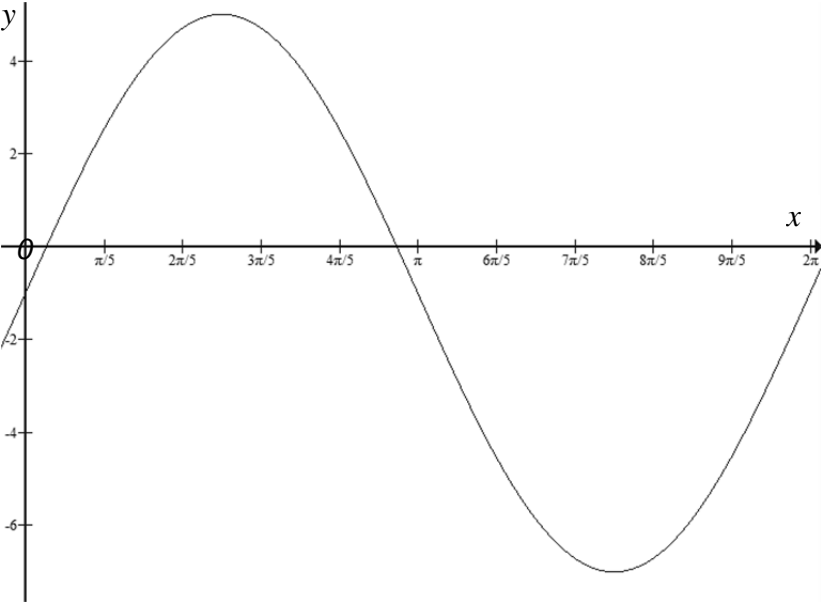
A-level MATHS

Functions and transformations Mark scheme

Specification content coverage: B6, B7, B8, B9

Question	Solutions	Mark
1	Quotient $2x^2 + 4x + 6$	1
		1
	Remainder = 6	1
	Total	3
2 (a)	$(2x + 3)(x - 4)$	1
	Total	1
2 (b)	$\frac{(2x + 3)(x - 4)}{(x + 3)(x - 4)}$	1
	$\frac{2x + 3}{x + 3}$	1
	Total	2
3	$a = 2$	1
	$b = 4$	1
	Total	2
4	$x = \frac{1}{1 - y}, 1 - y = \frac{1}{x}$	1
	$g^{-1}(x) = \frac{x - 1}{x}$ or $1 - \frac{1}{x}$	1
	$g^2(x) = \frac{1}{1 - \frac{1}{1 - x}}$	1
	$g^2(x) = \frac{x - 1}{x}$	1
	Total	4
5	$3x - 4 = 5 - x$ or $(3x - 4)^2 = (5 - x)^2$	1
	$4 - 3x = 5 - x$ or $9x^2 - 24x + 16 = 25 - 10x + x^2$	1
	$x = 2.25$ or $8x^2 - 14x - 9 = 0$	1
	$x = -0.5$ or $x = 2.25, -0.5$	1
	Total	4

6	$f^{-1}(x) = \frac{x+11}{3}$ $g^{-1}(x) = x^2 + 3$ $\frac{x+11}{3} = x^2 + 3$ $3x^2 + 9 = x + 11$ $3x^2 - x - 2 = 0$ $(3x+2)(x-1) = 0$ $x = -\frac{2}{3}, 1$	1 1 2
	Total	6
7	 <p> $2x - 5 = 3 - x$ and $2x - 5 = x - 3$ $x = \frac{8}{3}, 2$ $2 < x < \frac{8}{3}$ </p>	2 (1 mark for each correct graph including intersections with the axes) 1 1
	Total	4

8	<p>$fg(x) = 3\sin(2x-1)$</p>  <p>First maximum at $\left(\frac{\pi}{4} + \frac{1}{2}, 3\right)$ or $\left(\frac{\pi+2}{4}, 3\right)$</p> <p>$gf(x) = 6\sin x - 1$</p>  <p>First maximum at $\left(\frac{\pi}{2}, 5\right)$</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
	Total	6
	TOTAL	32