2010 P1	**11.** Functions f and g are defined on suitable domains by $f(x) = \cos x$ and $g(x) = x + \frac{\pi}{6}$. What is the value of $f\left(g\left(\frac{\pi}{6}\right)\right)$? A $\frac{1}{2} + \frac{\pi}{6}$ B $\frac{\sqrt{3}}{2} + \frac{\pi}{6}$ C $\frac{\sqrt{3}}{2}$ D $\frac{1}{2}$	2
Ans	D	
2009 P1	**14.** If $f(x) = 2\sin\left(3x - \frac{\pi}{2}\right) + 5$, what is the range of values of $f(x)$? A $-1 \leq f(x) \leq 11$ B $2 \leq f(x) \leq 8$ C $3 \leq f(x) \leq 7$ D $-3 \leq f(x) \leq 7$	2
Ans	C	
2009 P2	**2.** Functions f and g are given by $f(x) = 3x + 1$ and $g(x) = x^2 - 2$. (*a*) (i) Find $p(x)$ where $p(x) = f(g(x))$. (ii) Find $q(x)$ where $q(x) = g(f(x))$. (*b*) Solve $p'(x) = q'(x)$.	3 3
Ans	(a) i) $3(x^2 - 2) + 1$ ii) $(3x+1)^2 - 2$ (b) x = -0.5	
2008 P1	**17.** A function f is given by $f(x) = \sqrt{9 - x^2}$. What is a suitable domain of f? A $x \geq 3$ B $x \leq 3$ C $-3 \leq x \leq 3$ D $-9 \leq x \leq 9$	2
Ans	C	

2008 P1	**23.** Functions f, g and h are defined on suitable domains by $f(x) = x^2 - x + 10$, $g(x) = 5 - x$ and $h(x) = \log_2 x$. (*a*) Find expressions for $h(f(x))$ and $h(g(x))$.	3
Ans	(*a*) $h(f(x)) = \log_2(x^2 - x + 10)$ $h(g(x)) = \log_2(5 - x)$	
2007 P1	**3.** Functions f and g, defined on suitable domains, are given by $f(x) = x^2 + 1$ and $g(x) = 1 - 2x$. Find: (*a*) $g(f(x))$; (*b*) $g(g(x))$.	2 2
Ans	(*a*) $g(f(x)) = -2x^2 - 1$ (*b*) $(g(g(x)) = 4x - 1$	
2006 P1	**3.** Two functions f and g are defined by $f(x) = 2x + 3$ and $g(x) = 2x - 3$, where x is a real number. (*a*) Find expressions for: (i) $f(g(x))$; (ii) $g(f(x))$. (*b*) Determine the least possible value of the product $f(g(x)) \times g(f(x))$.	3 2
Ans	(*a*) $f(g(x)) = 2(2x - 3) + 3$ $g(f(x)) = 2(2x + 3) - 3$ (*b*) $16x^2 - 9$ minimum value = -9	
2005 P1	**4.** Functions $f(x) = 3x - 1$ and $g(x) = x^2 + 7$ are defined on the set of real numbers. (*a*) Find $h(x)$ where $h(x) = g(f(x))$. (*b*) (i) Write down the coordinates of the minimum turning point of $y = h(x)$. (ii) Hence state the range of the function h.	2 2
Ans	(*a*) $(3x - 1)^2 + 7$ (*b*) (i) $\left(\frac{1}{3}, 7\right)$ (ii) $y \geq 7$	

2003 P1	**9.** 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 $h(x) = f(g(x))$. (*b*) Write down any restriction on the domain of h.	2 1
Ans	(*a*) $\frac{1}{2x-1}$ (*b*) $x \neq \frac{1}{2}$	
2002W P1	**9.** The function f, defined on a suitable domain, is given by $f(x) = \frac{3}{x+1}$. (*a*) Find an expression for $h(x)$ where $h(x) = f(f(x))$, giving your answer as a fraction in its simplest form. (*b*) Describe any restriction on the domain of h.	3 1
Ans	(*a*) $\frac{3(x+1)}{x+4}$ (*b*) $x \neq -4$	
2002 P1	**3.** Functions f and g are defined on suitable domains by $f(x) = \sin(x°)$ and $g(x) = 2x$. (*a*) Find expressions for: (i) $f(g(x))$; (ii) $g(f(x))$.	2
Ans	(*a*) (i) $\sin(2x°)$ (ii) $2\sin(x°)$	
2001 P1	**7.** Functions $f(x) = \sin x$, $g(x) = \cos x$ and $h(x) = x + \frac{\pi}{4}$ are defined on a suitable set of real numbers. (*a*) Find expressions for: (i) $f(h(x))$; (ii) $g(h(x))$.	2
Ans	(*a*) (i) $\sin\left(x + \frac{\pi}{4}\right)$; (ii) $\cos\left(x + \frac{\pi}{4}\right)$	
2000 P2	**3.** $f(x) = 3 - x$ and $g(x) = \frac{3}{x}$, $x \neq 0$. (*a*) Find $p(x)$ where $p(x) = f(g(x))$. (*b*) If $q(x) = \frac{3}{3-x}$, $x \neq 3$, find $p(q(x))$ in its simplest form.	2 3
Ans	(*a*) $3 - \frac{3}{x}$ (*b*) x	

Specimen 2 P1	**8.** Functions f and g are defined on the set of real numbers by $f(x) = x - 1$ $g(x) = x^2$. (a) Find formulae for (i) $f(g(x))$ (ii) $g(f(x))$.	3
	(a) $f(g(x)) = x^2 - 1,\ g(f(x)) = (x-1)^2$	