



Q	Answer	Marks
1	a) 10 b) $9x^2 - 30x + 26$	4
2	a) $f^{-1}(x) = \frac{x+3}{x-2}$ b) $x > 2$	4
3	a) V shape, vertex (2, 0), meets y-axis at (0, 6) b) $x = -1$ or $x = 5$	5
4	a) $f(x) \geq 2$ b) $f^{-1}(x) = 3 + \sqrt{x-2}$, $x \geq 2$ c) $x = \frac{7 \pm \sqrt{5}}{2}$	7
5	a) (-1, -4) b) (-3, 0) and (1, 0) c) $x = -2.8$ or $x = 2$ d) $k > -4$	8
6	a) $f(x) > -3$ b) $f^{-1}(x) = \frac{1}{2} \ln(x+3)$, $x > -3$ c) $\ln(e^{2x} + 1)$ d) $x = \frac{1}{2} \ln(e^2 - 1)$	7
7	a) $y = 2x - 5 $: vertex (2.5, 0), meets y-axis at (0, 5); $y = x + 1 $: vertex (-1, 0), meets y-axis at (0, 1) b) $x \leq 6$	7
8	a) parts below the x-axis reflected in it; meets axes at (-1, 0), (3, 0), (0, 3); maximum (1, 4) b) right half reflected in the y-axis; maxima (-1, 4) and (1, 4); meets axes at (-3, 0), (3, 0), (0, 3) c) $3 < k < 4$ d) (0, 8)	8
9	a) h is many-to-one, e.g. $h(0) = h(4) = 5$ b) $13 - 2(x-2)^2$ c) $k = 2$ d) $g^{-1}(x) = 2 - \sqrt{\frac{13-x}{2}}$, $x \leq 13$	7
10	a) $gf(x) = \frac{3}{x+2}$ b) $f(x)$ must be in the domain of g : $2x+3 > -1$, so $x > -2$; range $gf(x) > 0$ c) the equation reduces to $(x+3)^2 = 0$, and $x = -3$ is not in the domain	8
11	a) inverted V, maximum (k, 2k), meets the axes at (-k, 0), (3k, 0) and (0, k) b) $x = -2k$ or $x = 2k$ c) $-2k < x < 2k$	9
12	a) $20 < f(t) \leq 90$ b) $f^{-1}(T) = 25 \ln\left(\frac{70}{T-20}\right)$, $20 < T \leq 90$; $f^{-1}(50) = 21.2$: the coffee cools to 50 °C after 21.2 minutes c) $gf(t) = 68 + 126e^{-0.04t}$; $t = 14.0$ minutes	9

Full worked solutions, written out by hand, are on the solutions sheet for this topic.