

1	(a)		Sketch	P1	Parabola passes through all three of the points (0, 4), (2,0), (4, 4)
	(b)		Sketch	P1	Parabola passes through all three of the points (-4, -1), (-2,2), (0, -1)

2	(a)	sketch	B1	for appropriate sketch which crosses the x axis at (2,0) and (4,0), minimum point at (3,-1) and end points at (1,3) and (5,3)	Allow some tolerance on the points if the intention is clear.
	(b)	$y = g(-x)$	B1	cao	

3		(-7, -1)	M1	for a method which shows understanding of the type of transformation eg reflection in the y axis or translation $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$ or "(0 units right and) 3 units down" or for x coordinate as -7 or y coordinate as -1	"Reflection" or "Translation" alone is insufficient. Note that the -7 or the -1 may appear in the working space, not necessarily in the final answer.
			A1	for (-7, -1)	

4	(a)	graph	C2	for a translation of the graph by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$	Condone graph of $y = f(-x)$ also being drawn on the grid Correct vector gets 1 mark
			(C1)	for a translation of the graph by the vector $\begin{pmatrix} -1 \\ b \end{pmatrix}$ where $b \neq -3$ or $\begin{pmatrix} a \\ -3 \end{pmatrix}$ where $a \neq -1$ or for a translation by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$ of 3 or 4 critical points)	
	(b)	2, 1	B1	cao	

5	(a)	Graph drawn	C2	for graph reflected in the y -axis	Key points: (0, 0), (1, 2), (2, 1), (3, 0), (4, 2) Award C1 if line segments but goes through all key points
			(C1)	for a graph reflected in the x -axis or for a correct graph through four of the five key points	
	(b)	$y = 5 + 2(x - 3) - (x - 3)^2$	C2	for $y = 5 + 2(x - 3) - (x - 3)^2$ oe eg $y = -x^2 + 8x - 10$, $y = -[(x-4)^2 - 6]$	For either C mark accept equivalent expressions If a correct answer for C2 is given and is then incorrectly simplified, award C1 a need not be positive
			(C1)	for $y = 5 + 2(x + 3) - (x + 3)^2$ or $y = 5 + 2(x - a) - (x - a)^2$, $a \neq 3$, $a \neq 0$ or $y = f(x - 3)$ or $y = (x - 4)^2 + 6$ or correct expression missing "y ="	

6	(a)	37, 143, 397, 503	M1	for any two correct angles within the ranges below or for a correct method to find a solution beyond 360, eg. "angle read from 0 to 360" + 360	Accept given as coordinates for M1 only
			A1	for all 4 angles in the range, 35 to 40, 140 to 145, 395 to 400 and 500 to 505	
	(b)	$y = -\sin x^\circ$	B1	for any acceptable equations, eg. $y = -\sin x^\circ$ or $y = \sin(-x^\circ)$ or $-y = \sin x^\circ$ or $y = \cos(x^\circ + 360n + 90)$ or for any positive integer n , $y = \sin(x^\circ - (2n - 1)180)$ or $y = \cos(x^\circ + 360n)$	
(c)	graph	C1	for correct graph shown translated 2 in the positive x -direction		