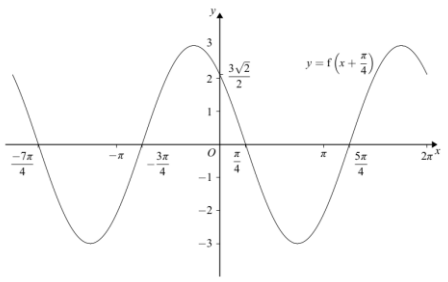
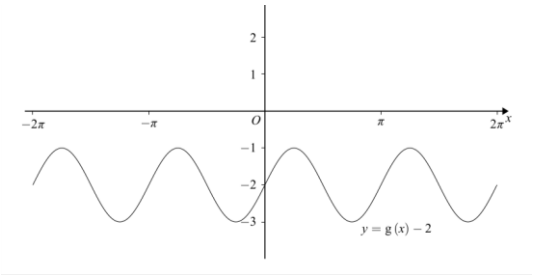
Question	Scheme		Marks
9(i)(a)	$\left(y=\right)3\cos\left(x\right)$		**M1 A1**
			(2)
(b)		Same shape translated left or right	**B1**
		All x intercepts labelled correctly.	**B1**
		Correct y intercept $\frac{3\sqrt{2}}{2}$	**B1**
			(3)
(ii)(a)	$\left(y=\right)\sin(2x)$		**M1 A1**
			(2)
(b)		Same shape translated down below the x-axis.	**B1**
		Correct y intercept -2 labelled.	**B1**
			(2)
			(9 marks)

Notes:

(i)(a) Remember to check the first page – (i)(a) is often attempted against the question.

M1: Identifies the curve as a cosine function of the form $\alpha\cos\left(\beta x\right)$.

Also allow for a sine function of the form $\alpha\sin\left(\beta x+\frac{\pi}{2}\right)$ oe.

A1: For a fully correct expression as shown or any equivalent. There is no requirement for $y = \ldots$ or f $(x) = \ldots$ Allow e.g. $3\cos\theta$

(b) There must be a sketch to score the marks in (i)(b) which may be done on Figure 3

B1: Applies a horizontal translation $y = f(x)$, either direction. The maximum at (0, 3) must have moved to the left or to the right of the y-axis. There should also be one minimum to the left of the y-axis and one minimum to the right of the y-axis. Ignore any scale on the y-axis.

B1: All x intercepts labelled correctly. These must be the only x intercepts and the curve must pass through these points. Allow even if there is still a maximum on the y-axis. Allow as shown or as coordinate pairs e.g. $\left(-\frac{7\pi}{4},0\right)$ and allow e.g. $\left(0,-\frac{7\pi}{4}\right)$ as long as the intercepts are in the correct positions. Condone 3sf decimal answers: Awrt –5.50(or –5.5), –2.36, 0.785, 3.93

Condone use of degrees: –315°, –135°, 45°, 225° (with or without the degrees symbol)

B1: Correct exact y intercept labelled. Allow as shown or as e.g. $\left(0,\frac{3\sqrt{2}}{2}\right)$ and allow e.g. $\left(\frac{3\sqrt{2}}{2},0\right)$ as long as it is in the correct position. It must not be a clear maximum.

(ii)(a) Remember to check the first page – (ii)(a) is often attempted against the question

M1: Identifies the curve as a sine function of the form $\alpha\sin\left(\beta x\right)$.

Allow also for a cosine function of the form $\alpha\cos\left(\beta x\pm\frac{\pi}{2}\right)$ oe

A1: Any correct expression. There is no requirement for $y = \ldots$ or $g(x) = \ldots$ Allow e.g. $\sin 2\theta$

(b) There must be a sketch to score the marks in (ii)(b) which may be done on Figure 4

B1: Applies a vertical translation down to $y = g(x)$. It must have the same number of cycles as $g(x)$ and look the same as $g(x)$ and must lie entirely below the x-axis. Do not allow a clear "zig-zag" shape with cusps. Ignore any scale on the x-axis, correct or otherwise.

B1: Correct y intercept. Allow as shown or as e.g. $(0,-2)$ and allow e.g. $(-2,0)$ as long as it is in the correct position and allow it to be shown by the intercept passing through the line with equation $y = -2$.

Question	Scheme	Marks
10(a)(i)	Equation is $y=\frac{1}{2}\left(x+2\right)$	B1
		(1)
(ii)	l_1 intersect parabola $\Rightarrow -\frac{1}{4}\left(x+2\right)\left(x-b\right)=\frac{1}{2}\left(x+2\right)\Rightarrow x=...$	M1
	$x=b-2$	A1
	$y=\frac{1}{2}b$	A1
		(3)
(b)	l_2 passes through (b, 0) and has gradient –2 $\Rightarrow y=...$	M1
	$y-0=-2\left(x-b\right)$	A1
		(2)
(c)	So equation is $y-"\frac{1}{2}b"="-2"\left(x-"b-2"\right)$	M1
	$y-\frac{1}{2}b=-2x+2b-4\Rightarrow y=-2x+\frac{5}{2}b-4$ *	A1*
		(2)
(d)	$y=-2x+2b=-2x+\frac{5}{2}b-4\Rightarrow 2b=\frac{5}{2}b-4\Rightarrow b=...$ or $y=-2x+\frac{5}{2}b-4,\ x=b,\ y=0\Rightarrow 0=-2b+\frac{5}{2}b-4\Rightarrow b=...$ or $-\frac{1}{4}\left(x+2\right)\left(x-b\right)=-2\left(x-b\right)\Rightarrow x=...\left(6\right)\Rightarrow b-2=6\Rightarrow b=...$	M1
	$b = 8$	A1
		(2)
		(10 marks)

Notes:

(a)(i)

B1: Correct equation in any form e.g. $y-0=\frac{1}{2}\left(x+2\right)$, $y=\frac{1}{2}x+1$, $y=\frac{1}{2}\left(x--2\right)$. Do not allow e.g. $l_1=\frac{1}{2}x+1$. Apply isw if necessary, so allow e.g. $y=\frac{1}{2}\left(x+2\right)$ if followed by $y=\frac{1}{2}x+2$

(a)(ii) Allow the marks for (a)(ii) to appear anywhere in their solution provided they are solving their l_1 with the given parabola.

Do not allow methods in (a)(ii) that assume that the *y* coordinate of *P* is the same as the *y* intercept of *C* unless this is justified by further work.

M1: Sets $-\frac{1}{4}\left(x+2\right)\left(x-b\right)=$their $\frac{1}{2}\left(x+2\right)$ and makes some attempt to solve for x (or y) however poor – e.g. allow if there is a slip in the use of the quadratic formula. Condone copying errors provided the intention is clear. Note that some candidates do not spot the cancelling of (x + 2) and end up solving a quadratic equation.

A1: Correct simplified x