Question Number	Scheme	Marks
4.	When ---- represents $<$ or $>$ and —— represents $\leq$ or $\geq$ Either $2y \leq x$ or $y \geq 2x - \frac{1}{8}x^2$	B1
	$2x - \frac{1}{8}x^2 = 0 \Rightarrow x = 16 \Rightarrow x < \ldots$ or $x \leq \ldots$	M1
	$x < 16$, $2y \leq x$ and $y \geq 2x - \frac{1}{8}x^2$	A1 (3) **(3 marks)**
Alt1	When ---- represents $\leq$ or $\geq$ and —— represents $<$ or $>$ Either $2y < x$ or $y > 2x - \frac{1}{8}x^2$	B1
	$2x - \frac{1}{8}x^2 = 0 \Rightarrow x = 16 \Rightarrow x < \ldots$ or $x \leq \ldots$	M1
	$x \leq 16$, $2y < x$ and $y > 2x - \frac{1}{8}x^2$	A1
		(3)

B1 Sight of $2y \leq x$ or $y \geq 2x - \frac{1}{8}x^2$. Either inequality is sufficient for B1 and they may be written in an equivalent correct form (see NB below)

NB Inequalities cannot be in terms of R

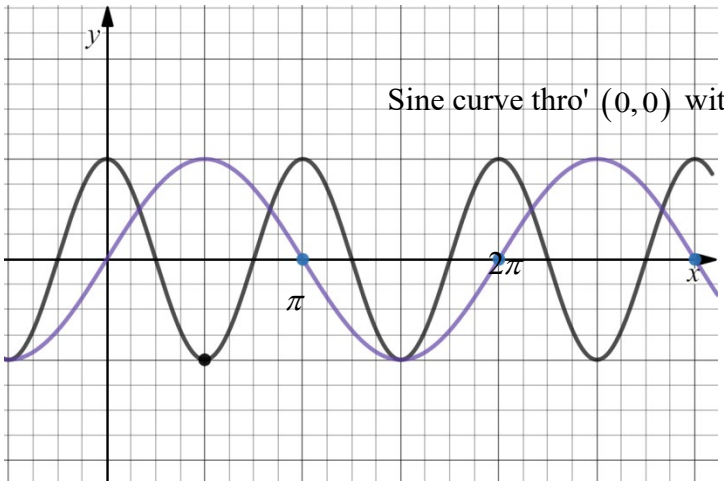
M1 Attempts to find the upper bound for x to define R. Solves to find where the quadratic intersects the x-axis and then uses their value to write $x <\ldots$ or $x \leq \ldots$. Use general principles for solving a quadratic equation (page 5). They do not need to find or state $x = 0$ and ignore any lower bound eg $0 < x < \ldots$

A1 $2y \leq x$, $y \geq 2x - \frac{1}{8}x^2$ and $x < 16$ (Allow $A \leq x < 16$ where $A \leq 12$).

Candidates may write more than one inequality for a particular boundary. In these cases mark the last one. Correct inequalities labelled on the graph are also acceptable, however, an inequality written below takes precedence.

NB You may see $y \leqslant \frac{x}{2}$ for $2y \leqslant x$ or even $2x - \frac{1}{8}x^2 \leq y \leq \frac{x}{2}$ oe

Alternatively, some candidates may express their inequalities involving a boundary for a dashed line using $\leq$ or $\geq$ and a boundary for a solid line using $<$ or $>$. It may not always be clear so mark positively. See Alt1

Question Number	Scheme	Marks
5. (a)	$\left(\frac{\pi}{2}, -1\right)$	B1 B1 (2)
(b)	 Sine curve thro' $(0,0)$ with max/min of ± 1	M1
	Fully correct	A1 (2)
(c)	(i) 30 but follow through on $10\times$ the number of their solutions $0 \to 2\pi$ (ii) 32	B1ft B1 (2)
		(6 marks)

(a)

B1 Either coordinate correct. They may state the coordinates separately or condone the lack of brackets for this mark. (Accept the x-coordinate as 90° or awrt 1.57 radians for this mark) If only one coordinate is stated, it must be clear if it is the x or y coordinate.

B1 For $\left(\frac{\pi}{2}, -1\right)$ or $x = \frac{\pi}{2}, y = -1$ Allow $\left[\frac{\pi}{2}, -1\right]$

SC $\left(-1, \frac{\pi}{2}\right)$ B1B0 (coordinates the wrong way round)

(b)

M1 For a sketch of a sine curve with at least one cycle starting at (or going through) the origin with the same maximum/minimum y-values as the $\cos 2x$ curve.
Condone poor/incorrect period and poor symmetry
Condone turning points appearing V shaped for this mark. If drawn on a separate diagram the maximum and minimum must appear to be ± 1 according to their axes and a complete cycle must be in the positive domain. Condone slight inaccuracies of the amplitude of their sine curve.