Question Number	Scheme	Marks
9. (a)	24π	B1 **(1)**
(b)	$(18\pi, -1)$	B1ft **(1)**
(c)(i)	$-12\pi - \alpha$	B1 ft
(ii)	$6\pi - \alpha$	B1 ft **(2)** **(4 marks)**

(a) Do not allow the mark if an inequality or coordinates are given, but you may assume if $0 < x < p$ or $(p, 0)$ is given that their period is p for the purposes of the remaining marks.

See above
Note that (b) and (c) are for (correct or) follow through and hence
(b) is scored for $\left(\frac{3p}{4}, -1\right)$ -- this may be seen on the graph but take clearly labelled part (b) as precedent.
Follow through on $p \neq 2\pi$
(c) (i) is scored for $-\frac{1}{2}p - \alpha$
(ii) is scored for $\frac{1}{4}p - \alpha$
where p is their period stated in (a) (which may be 2π)

For answers in degrees penalise the first mark due only, but allow if degree symbol is missing.
For reference (a) 4320° (b) (3240°, −1) (c)(i) −2160° − α (ii) 1080° – α

Note for example that (a) $0 < x < 4320°$ (b) (3240°, −1) (c)(i) −2160° − α (ii) 1080° – α would score B0 B0 B1ft B1ft

Question Number	Scheme	Marks
10 (a)	$f(x) \leqslant 0 \Rightarrow \quad x \leqslant -\frac{5}{2}, \quad x = 3$	M1 A1

Question Number	Scheme	Marks
		(2)
(b)	$f(x)=(2x+5)(x-3)^2=(2x+5)(x^2-6x+9)$	M1
	$=2x^3-12x^2+18x+5x^2-30x+45$	M1
	$=2x^3-7x^2-12x+45$	A1
		(3)
(c)	(i) $P(0,45)$	B1ft
	(ii) Gradient = -12	B1ft
		(2)
(d)	(i) $g(x)=(2(x-2)+5)(x-2-3)^2=(2x+1)(x-5)^2$	M1 A1
	(ii) 25	B1
		(3)
		(10 marks)

(a)

M1 For either $x \leqslant -\frac{5}{2}$ or $x=3$ Condone for this mark $x<-\frac{5}{2}$

A1 For both $x \leqslant -\frac{5}{2}$ and $x=3$ Accept answers given in set notation. Accept with "and" or "or" between – it is for both correct inequalities.

Note: Mark the final answer. Answers such as $-\frac{5}{2}\leqslant x\leqslant 3$ or $3\leqslant x\leqslant -\frac{5}{2}$ are M0A0.

(b)

M1 Attempts to multiply two of the brackets together, achieving x^2, x and constant terms.

M1 Multiplies the result by the third bracket to reach a four term cubic expression (not necessarily simplified).

A1 $2x^3-7x^2-12x+45$ Ignore any reference to "=0" or "<0" etc for this mark.

(c)(i)

B1ft $P(0,45)$ following through on their 'd' . Do not accept e.g. (45,0) or just 45.

(c)(ii)

B1 ft Gradient = -12 following through on their 'c'

(d)(i)

M1 Attempts to replace x with $(x-2)$ in $(2x+5)(x-3)^2$ or in their expansion of this.

Allow M1 for one correct bracket if no incorrect working is seen (bod). Condone invisible brackets

A1 $g(x)=(2x+1)(x-5)^2$ If substituting into the expand form, must factorise correctly to achieve A1.

(d)(ii)

B1 25 Accept (0,25).

Question Number	Scheme	Marks