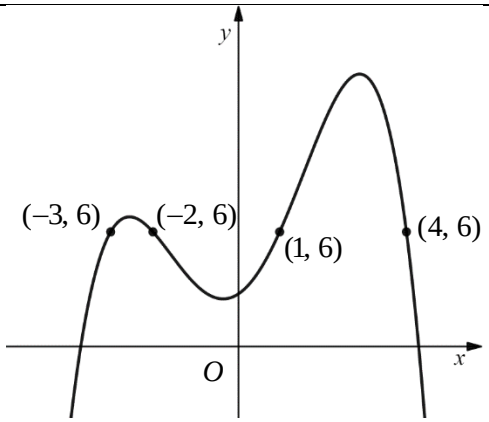
Question Number	Scheme	Marks
7(a)	$-1 < x < 2$ $x < -4,\ x > 3$	M1A1 B1
		(3)
(b)	$(x =)\ 1.5$	B1
		(1)
(c)(i)		B1B1B1
(ii)	$-3 \text{,,}\ x \text{,,}\ -2$	B1
		(4)
		(8 marks)

(a) Ignore any references to OR or AND (or equivalent use of set notation) between $-1 < x < 2,\ x > 3,\ x < -4$

M1 Requires one end of the inside region between -1 and 2. Score for $x > -1$ or $x < 2$, condoning use of ,, … Must be in terms of x

A1 $-1 < x < 2$ or any equivalent notation such as $-1 < x \cap x < 2$, $(-1,\ 2)$ and also score for $2 > x > -1$. Do not allow just two separate inequalities for this mark without AND or equivalent.

B1 $x > 3,\ x < -4$

(b)

B1 1.5 or $\frac{3}{2}$ Condone $(1.5,\ 6)$ or $x = 1.5,\ y = 6$ only (the y-coordinate must be correct if stated)

(c)(i) Check the figure at the start of the question. If there is a contradiction, then the sketch with labelled coordinates in the main body of working takes precedence. There must be a sketch to score any marks.

B1 Sketch reflected in the y-axis with the intention to have the higher maximum turning point in quadrant 1 and the lower maximum turning point in quadrant 2. Do not be concerned which side of the y-axis the minimum turning point is located.

B1 Either two correct pairs of coordinates **or** all x coordinates correct **or** all y coordinates correct. Do not be concerned with the relative locations of the coordinates in relation to each

other. The points must be in the correct quadrants, but may be stated separately. Do not be concerned with the labelling of *P*, *Q*, *R* and *S* and the associated coordinates if they are stated separately.

B1 All four correct coordinates (Do not penalise poor notation and may be listed as $x = ..., y = ...$) Do not be concerned with the relative locations of the coordinates in relation to each other. The points must be in the correct quadrants, but may be stated separately. Do not be concerned with the labelling of *P*, *Q*, *R* and *S* and the associated coordinates if they are stated separately.

(ii)

B1 $-3 \text{,,}\ x \text{,,}\ -2$ only or any equivalent notation such as $-3 \text{,,}\ x \cap x \text{,,}\ -2$, $-3 \text{,,}\ x$ AND $x \text{,,}\ -2$. $[-3, 2]$ but do not accept use of OR or $\cup$ if set notation is used.
Do not accept $(-3, -2)$ or $-3 \leqslant x < -2$ Must be in terms of x
There may be several inequalities. Mark what appears to be their final answer.

Question Number	Scheme	Marks
8(a)(i)	$2\pi - \frac{2\pi}{3} = \frac{4\pi}{3}$	B1
	Area of sector $= \frac{1}{2}\times 3^2 \times "\frac{4}{3}\pi" = 6\pi$ (m^2)	M1A1
	Length of arc $= 3\times "\frac{4}{3}\pi" \Rightarrow$ Perimeter $= 4\pi + 6$ (m)	M1A1
(ii)		**(5)**
(b)	$\frac{1}{2}\times 3^2 \times \sin\left(\frac{2}{3}\pi\right) = \frac{9\sqrt{3}}{4}$ (m^2)	M1A1
		(2)
(c)	Eg $AB^2 = 3^2 + 3^2 - 2\times 3\times 3\times \cos\left(\frac{2}{3}\pi\right) \Rightarrow AB^2 = 27 \Rightarrow AB = 3\sqrt{3}$ (m) *	M1A1*
		(2)
(d)	$\frac{\sin BAC}{8} = \frac{\sin\left(\frac{\pi}{6}\right)}{3\sqrt{3}} \Rightarrow \sin BAC = ...$ or $BAC = ...$	M1
	$\sin BAC =$ awrt $\frac{4\sqrt{3}}{9}$ or $BAC =$ awrt 0.88 $(0.8785\ldots)$	A1
	Area $ABC = \frac{1}{2}\times 3\sqrt{3}\times 8\times \sin(\pi - \frac{\pi}{6} - "0.88")$ $(= 20.4896....)$	M1
	Total area = "18.8"+"3.90"+"20.5"	dM1
	= awrt 43 (m^2)	A1
		(5)
		(14 marks)

If lengths or areas are found in other parts then credit can be awarded for these as long as they are referred to or used in the relevant part.

(a)(i)

B1 Finds the correct angle for the sector *AOBX*. They may find the minor sector first and then subtract from the area of the whole circle so may be implied from later work. They may also work in degrees. Sight of $\theta = \frac{4\pi}{3}$ on the diagram or within their working scores this mark.

M1 States or uses $\frac{1}{2}r^2\theta$ with $r = 3$ and $\theta = \frac{2\pi}{3}$ or $\theta = \frac{4\pi}{3}$ or the equivalent method working in degrees. May be implied by the correct answer, expression or awrt 9.42 or awrt 18.8

A1 6π (m^2) cao must be exact. Isw after a correct answer.

(ii)

M1 States or uses $r\theta$ with $r = 3$ and $\theta = \frac{2\pi}{3}$ or $\theta = \frac{4\pi}{3}$ or the equivalent method working in degrees. The addition of two radii to find the perimeter is not required for this mark. May be implied by the correct answer, expression or awrt 6.28 or awrt 12.6

A1 $4\pi + 6$ (m) cao must be exact. Isw after a correct answer.

(b)

M1 States or uses $\frac{1}{2}ab\sin C$ with $a = b = 3, \theta = \frac{2}{3}\pi$ (or may work in degrees). Alternatively, they may split the isosceles triangle into two right angled triangles including finding *AB*. Score for the overall method or awrt 3.90

A1 $\frac{9\sqrt{3}}{4}$ (m^2) or exact equivalent. Isw after a correct answer