Question Number	Scheme	Marks
4(a)	$x+y=6,\ y=6x-2x^2+1$ $\Rightarrow 6-x=6x-2x^2+1$ $\Rightarrow 2x^2-7x+5=0$ oe	M1
	$2x^2-7x+5=0\Rightarrow(2x-5)(x-1)=0$ $\Rightarrow x=\frac{5}{2},\ 1$	M1
	$x="\frac{5}{2}"\Rightarrow y=\frac{7}{2}$ or $x="1"\Rightarrow y=5$	dM1
	$(1,\ 5)$ and $(2.5,\ 3.5)$	A1
		(4)
(b)	$y\geqslant 6x-2x^2+1$ oe	M1
	$x+y\leqslant 6$ oe	
	$x\geqslant a$ where $1\leqslant a\leqslant 2.5$	A1
	$(\text{or } a\leqslant x\leqslant b \text{ where } 1\leqslant a\leqslant 2.5,\ b\geqslant 6)$	A1
	$y\geqslant 0$ (or $0\leqslant y\leqslant c$ where $c\geqslant 3.5$)	
	Allow strict or non-strict inequalities	
		(3)
		Total 7

Note solutions relying on calculator technology are not acceptable so a complete method must be shown

(a) **Answers only 0/4**

M1: Uses the line and the curve to obtain a 3TQ in x or y equal to zero (may be implied by solving their 3TQ). Condone slips in their rearrangement.

M1: Solves their 3TQ which must be different to $6x-2x^2+1=0$ by an acceptable method (factorising, formula or completing the square). They cannot state the roots without seeing a correct line of intermediate working. Allow recovery and condone lack of $3TQ=0$
If they use the quadratic formula, the values must be embedded in the formula before proceeding to the roots.
If they factorise then do not accept $2x^2-7x+5=0\Rightarrow(x-\frac{5}{2})(x-1)=0\Rightarrow x=...$
Condone $-2x^2+7x-5=0\Rightarrow(2x-5)(x-1)=0\Rightarrow x=...$

dM1: Solves for y for at least one of their values of x or alternatively solves for x for at least one of their values of y. It is dependent on the previous method mark.

A1: $(1,\ 5)$ and $(2.5,\ 3.5)$ which do not need to be paired. May be seen as $x=...,\ y=...$. But cannot be awarded if they are incorrectly paired in their final answer. Condone omission of brackets around the coordinates. Ignore if they have assigned coordinates as P and Q. Cannot be awarded if x and y are the wrong way round or if given as $(1,\ 3.5)$ and $(2.5,\ 5)$

(b) **Allow strict or non-strict inequalities and does not need to be consistent.**
Use of *R* instead of *x* or *y* will score 0 marks.
Note that $6x - 2x^2 + 1 \leqslant y \leqslant 6 - x$ counts as two inequalities.

M1: Any 2 of the inequalities.

A1: Any 3 of the inequalities. Ignore any reference to and/or or equivalent.

A1: All 4 correct. Withhold the final mark for use of "or" or $\cup$ is used between the different inequalities.

Question Number	Scheme	Marks
5(a)	$\angle BOD = \pi - 2\times 0.7 = 1.742*$	B1*
		(1)
(b)	Area of $BOD = \frac{1}{2}\times 3^2 \sin 1.742 \quad (= \text{awrt } 4.43)$	M1
	Area of R is: $\frac{1}{2}\times 3^2 \times 1.742 - \frac{1}{2}\times 3^2 \sin 1.742$ or $\frac{1}{2}\times \pi \times 3^2 - \frac{1}{2}\times 3^2 \sin 1.742 - 2\times \frac{1}{2}\times 3^2 \times 0.7$	dM1
	= awrt 3.4 (m^2)	A1
		(3)
(c)	$BD = \sqrt{3^2+3^2-2\times 3\times 3\cos 1.742} \qquad (= \text{awrt } 4.59)$ or $BD = 2\times 3\sin\left(\frac{1.742}{2}\right)$ or $BD = 2\times 3\cos 0.7$ or $BD = \frac{3\sin 1.742}{\sin\left(\frac{\pi - 1.742}{2}\right)}$ or arc $BCD = 3\times 1.742 \quad (= 5.226)$	M1
	Perimeter of R is: $3\times 1.742 + "BD"$	dM1
	= awrt 9.8 (m)	A1
		(3)
		Total 7

They may work in degrees which is acceptable

(a)

B1*: Correct working to achieve 1.742 (or better). Alternatively, they may use $\angle BOD$ and add this to 2×0.7 to achieve π. They must write a minimal conclusion that $\angle BOD = 1.742$

May work in degrees: $180 - 2\times\frac{0.7}{\pi}\times 180 = \text{awrt } 99.8° \Rightarrow \frac{\text{awrt } 99.8}{180}\times\pi = 1.742$

(b)

M1: Correct strategy for the area of triangle BOD using $\angle BOD = 1.742$. May be implied by awrt 4.43

May work in degrees (1.742 radians as awrt 99.8)

eg. $\frac{1}{2}\times 3^2 \sin 99.8$