Question	Scheme	Marks
4(a)	$x^2+kx-9=-3x^2-5x+k \Rightarrow 4x^2+kx+5x-9-k\,(=0)$	M1
	$b^2-4ac=0 \Rightarrow (k+5)^2-4\times4(-9-k)=0$	M1
	$k^2+26k+169=0*$	A1*
		(3)
(b)	$k^2+26k+169=0 \Rightarrow k=-13$	B1
	$k=-13 \Rightarrow 4x^2-8x+4=0 \Rightarrow x=...$	M1
	$(1,-21)$	A1
		(3)
		Total 6

Notes:

Mark (a) and (b) together

(a)

M1: Equates both curves and collects terms to one side. Allow slips but there must be some attempt to collect terms to one side. The " = 0" may be implied by their attempt at the discriminant.

M1: Attempts to find the discriminant "b^2-4ac" of a 3TQ. May be seen as an attempt at e.g. $b^2-4ac=0$ or equivalent e.g. $b^2=4ac$ or may be seen embedded in an attempt at the quadratic formula.
It requires *b* and *c* both of the form $pk+q,\quad p,q\neq0$ and requires *a* as a constant.
If clearly a wrong formula/expression is used e.g. "b^2+4ac" this scores M0

A1*: Achieves the printed answer with no errors and sufficient working shown.
The " = 0" must appear at least once before the printed answer unless they start with $b^2=4ac$.

(b)

B1: Correct value of *k*. Condone $x=-13$ if it is subsequently used as a value for *k*.

M1: Either:

- substitutes their value of *k* into their equation obtained by equating the curves and collecting terms from part (a) and solves a 3TQ for *x* by any correct method including a calculator **or**
- substitutes their *k* into the 2 given equations, equates, collects terms to one side and solves a 3TQ for *x* by any correct method including a calculator

A1: Correct coordinates. Allow as e.g. $x = 1,\quad y = -21$

Correct answer only in (b) scores 3/3

Question	Scheme	Marks
5(a)	$\frac{1}{2}\times 6^2\times 1.3=...$	M1
	$=23.4\,(\text{m}^2)$	A1
		(2)
(b)	$12.2^2=6^2+10.8^2-2\times 6\times 10.8\cos(ABE)$	M1
	$\cos(ABE)=\frac{6^2+10.8^2-12.2^2}{2\times 6\times 10.8}\left(=\frac{19}{648}\right)$ $ABE=1.54$	A1
		(2)
(c)	Area $ABE=\frac{1}{2}\times 10.8\times 6\sin(ABE)$	M1
	Area $BCD=\frac{1}{2}\times 6\cos(\pi-1.3-"1.54")\times 6\sin(\pi-1.3-"1.54")$ or e.g. Area $BCD=\frac{1}{2}\times 6\sin(\pi-1.3-"1.54")\times\sqrt{6^2-\left(6\sin(\pi-1.3-"1.54")\right)^2}$	M1
	Total area $=60.9\text{m}^2$	A1
		(3)
		Total 7

Notes:

(a) **Marks for part (a) must be seen in part (a)**

M1: Attempts to evaluate $\frac{1}{2}r^2\theta$ with $r = 6$ and $\theta = 1.3$ or equivalent e.g. $\frac{\theta}{360}\times\pi\times 6^2$ with $\theta=1.3\times\frac{180}{\pi}$ which may be implied by use of e.g. 74° or 75°

A1: Correct value. Allow equivalent values e.g. $\frac{117}{5}$, $23\frac{2}{5}$.

Condone lack of units but if any are given they should be correct. Correct answer only scores both marks.

(b)

M1: Correct numerical application of the cosine rule for the required angle.

A1: For awrt 1.54

(c) **Allow equivalent work in degrees.**

M1: Correct method for area *ABE* e.g. $\frac{1}{2}\times 10.8\times 6\sin(\text{their } ABE)$

M1: Correct method for area *BCD*

Must be a correct method including the ½

Note that *CD* may be found using the sine rule e.g. $\frac{6}{\sin\frac{\pi}{2}}=\frac{CD}{\sin(\pi-1.3-"1.54")}\Rightarrow CD=...$

Note that *BC* may be found using the sine rule e.g. $\frac{6}{\sin\frac{\pi}{2}}=\frac{BC}{\sin\left(1.3+"1.54"-\frac{\pi}{2}\right)}\Rightarrow BC=...$

Having found *CD* or *BC* as above, *BC* or *CD* may be found using Pythagoras.

In such cases the trigonometry must be correct for their values.

Do **not** allow mixing of degrees and radians e.g. $180-1.3-"1.54"$ for $\pi-1.3-"1.54"$

A1: Correct total area. Allow awrt 60.9 (Condone lack of units)

Some values for reference:

Angle *DBC* = 0.300…(17.1…°), Angle *BDC* = 1.27…(72.7…°),

Area *ABE* = 32.38…, Area *BCD* = 5.083…, *CD* = 1.77…, *BC* = 5.73…