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…

Question	Scheme	Marks
6(a)	$y-5x=75,\ y=2x^2+x-21$ $\Rightarrow 2x^2+x-21=5x+75$ $\Rightarrow 2x^2-4x-96=0$ or e.g. $x^2-2x-48=0$ or $\Rightarrow y=2\left(\frac{y-75}{5}\right)^2+\frac{y-75}{5}-21$ $\Rightarrow 2y^2-320y+10350=0$ or e.g. $y^2-160y+5175=0$	M1
	$x^2-2x-48=0\Rightarrow (x-8)(x+6)=0\ \Rightarrow x=-6,\ 8$	dM1
	$x=-6\Rightarrow y=45$ or $x=8\Rightarrow y=115$	dM1
	$P(-6,\ 45)$ and $Q(8,\ 115)$	A1
		(4)
(b)	e.g. $y\leqslant 2x^2+x-21,\ y-5x\leqslant 75,\ y\geqslant 0,\ x\leqslant -3.5$ $x\leqslant a$ where $-3.5\leqslant a<3$ $(\text{or } a\leqslant x\leqslant b \text{ where } a\leqslant -15, -3.5\leqslant b\leqslant 3)$	M1A1A1
		(3)
		Total 7

Notes:

(a) **<u>Note that solutions relying on calculator technology are not acceptable so a complete method must be shown.</u>**

M1: Equates the line and the curve and rearranges to obtain a 3TQ in x
Alternatively eliminates x to obtain a 3TQ in y

dM1: Solves their 3TQ to obtain at least one value for x or y by an acceptable method e.g. factorisation, formula or completing the square. They cannot just state the roots without seeing a correct line of intermediate working.

We will condone e.g. $2x^2-4x-96=0\Rightarrow x=\dfrac{4\pm\sqrt{(-4)^2-4(2)(-96)}}{2\times 2}=-6,\ 8$

But e.g. $2x^2-4x-96=0\Rightarrow x=\dfrac{4\pm\sqrt{-4^2-4(2)(-96)}}{2\times 2}=-6,\ 8$ scores M0 as it suggests an incorrect formula but allow recovery e.g. $2x^2-4x-96=0\Rightarrow x=\dfrac{4\pm\sqrt{-4^2-4(2)(-96)}}{2\times 2}=\dfrac{4\pm\sqrt{784}}{4}=-6,\ 8$ and condone a missing trailing bracket e.g. $x=\dfrac{4\pm\sqrt{(-4)^2-4(2)(-96}}{2\times 2}=-6,\ 8$

If they factorise do **not** accept $2x^2-4x-96=0\Rightarrow (x+6)(x-8)=0\Rightarrow x=-6,\ 8$

Depends on the previous method mark.

dM1: Uses at least one x value to find at least one y value (or vice versa) using either of the given equations.
Depends on the <u>FIRST</u> method mark and depends on having solved a 3TQ in x or y.
May be implied by their values. You may need to check (for both equations).

A1: All correct. Must be correctly paired but ignore any labelling regarding P and Q, just look for the correct paired values. This may be explicit as a coordinate pair or implied by e.g. $x = 8$, $y = 115$.
Condone coordinates written without brackets e.g. $-6,\ 45$

Depends on all previous marks so 1011 is not possible.