Question Number	Scheme	Marks
3. (a)	$x^2-5x+13=(x-2.5)^2-2.5^2+13=(x-2.5)^2+6.75$	M1 A1
	Coordinates $M=(2.5,6.75)$	A1
		(3)
(b)	Attempts the equation of l using their M $y=\frac{6.75}{2.5}x$ $(y=2.7x)$	M1
	Attempts to solve their $y=2.7x$ with $y=x^2-5x+13$	
	$\Rightarrow 2.7x=x^2-5x+13\Rightarrow x^2-7.7x+13=0\Rightarrow(x-2.5)(x-5.2)=0$	M1
	$x=5.2$ oe	A1
	Coordinates $N=(5.2,14.04)$	dM1 A1
		(5)
(c)	States two of $y<x^2-5x+13,\ y>2.7x,\ 0\leqslant x<2.5$	M1
	States all three of $y<x^2-5x+13,\ y>2.7x,\ 0\leqslant x<2.5$	A1ft
		(2)
		(10 marks)

(a)

M1 For attempting to complete the square. Look for $(x-2.5)^2$

A1 $(x-2.5)^2+6.75$ or for correctly extracting $x = 2.5$ as the x coordinate.

A1 $M=(2.5,6.75)$ or $\left(\frac{5}{2},\frac{27}{4}\right)$

(b)

M1 Uses their M to find an equation for l. Look for a correct attempt at the gradient, so $y=\frac{"6.75"}{"2.5"}x$ or $y-"6.75"=\frac{"6.75"}{"2.5"}(x-"2.5")$

M1 Depends on having made an attempt (not necessarily correct) to use O and M to find the equation of l. Attempts to solve their equation for l with $y=x^2-5x+13$ Look for a full attempt leading to x = ...

Correct answers following a correct simplified quadratic is fine for the method.

A1 $x=5.2$ or equivalent such as $x=\frac{26}{5}$

dM1 Depends on second M mark. Substitutes their $x=5.2$ into either equation to find y = ... If a y value follows an x value with no clearly incorrect working, then allow as an attempt.

A1 Coordinates $N=(5.2,14.04)$ oe such as $\left(\frac{26}{5},\frac{351}{25}\right)$. Allow this to be written separately.

(c)

M1 States any two of $y<x^2-5x+13,\quad y>"2.7"x,\quad 0\leqslant x<b$ where $"2.5"\leqslant b\leqslant"5.2"$

Also allow the first two combined, or with loose inequalities, e.g $"2.7"x\leqslant y\leqslant x^2-5x+13$

Also allow either $\leqslant$ or $<$ on the left hand end of $0\leqslant x<2.5$ due to the y- axis.

Use of *R* instead of *y* is M0

A1ft States all three inequalities. Same conditions as above, follow through on their $2.7x$ from (b) and 2.5

.....

Allow part (a) to be attempted via finding minimum point

M1 For setting $\frac{dy}{dx}=ax+b=0$ and finding a value for x, or for stating $x_{min}=-b/2a=\ldots$

A1 $x=2.5$

A1 $M=(2.5,6.75)$ Note: Answer with no working score M0A0A0

Question Number	Scheme	Marks
4. (a)	Area $ABCD$ is 40 cm^2 $\Rightarrow 40 = 6\times 10\times \sin\theta$ oe	M1
	$\sin\theta = \frac{2}{3} \Rightarrow \theta = 180° - 41.8°$	M1
	$\angle DAB =$ awrt $138.19°$	A1
		(3)
(b)	Attempts $DB^2 = 10^2 + 6^2 - 2\times 10\times 6\cos"138.19°"$	M1
	$DB =$ awrt 15.0 (cm)	A1
		(2)
		(5 marks)

(a)

M1 Scored for a correct attempt at using the area of $ABCD$ is 40 cm^2

Score for $40 = 6\times 10\times \sin\theta$ or $20 = \frac{1}{2}\times 6\times 10\times \sin\theta$ where θ is one of the corner angles.

M1 Score for $\sin\theta = k \Rightarrow \theta = 180° - \arcsin k$

A1 $\angle DAB =$ awrt $138.19°$

(b)

M1 Attempts $DB^2 = 10^2 + 6^2 - 2\times 10\times 6\cos"138.19°"$ - allow if the angle used is acute as long as it is clearly their attempt at angle DAB. So allow use of $41.8°$ unless they have correctly found angle DAB and chosen the wrong one here.

A1 $DB =$ awrt 15.0 (cm) Accept 15 in place of 15.0. Allow from attempts using awrt 138°

……

Alt for (a)

M1 Area $ABCD$ is 40 cm^2 $\Rightarrow h = \frac{40}{10} = ... \Rightarrow \sin\angle ABC = \frac{"4"}{6}$ OR $\cos\angle ABC = \frac{"4"}{6}$ oe

Essentially this mark is for using the area together with an appropriate trig identity to form an equation in the sine or cosine of one of the angles of the parallelogram. Attempts finding "DX" where X is where the perpendicular to DC through A meets DC are possible.

M1 $\angle DAB = 180° - \arcsin\left(\frac{"4"}{6}\right) = ...$ or may see $\angle DAB = 90° + \arccos\left(\frac{"4"}{6}\right) = ...$

This is for a complete correct method to find the angle DAB

A1 $\theta =$ awrt $138.19°$