Question Number	Scheme	Marks
5 (a)	Attempts the gradient $\frac{\Delta y}{\Delta x}=\frac{9-6}{-2-10}=\left(-\frac{1}{4}\right)$	M1
	Uses the gradient and a point to form an eqn for l_1 $y-9=-\frac{1}{4}\left(x+2\right)$	dM1
	$y=-\frac{1}{4}x+\frac{17}{2}$	A1
		(3)
(b)	Eqn of l_2 is $y=4x$	B1ft
	Attempts to solve their $y=4x$ and their $y=-\frac{1}{4}x+\frac{17}{2}$ simultaneously	M1
	$R=(2,8)$	A1, A1
		(4)
(c)	Attempts $(OR)=\sqrt{"2"^2+"8"^2}$ or $(PQ)=\sqrt{3^2+12^2}$	M1
	Full attempt at area $OPQ=\frac{1}{2}\times\sqrt{3^2+12^2}\times\sqrt{2^2+8^2}$	dM1
	$=\frac{1}{2}\times3\sqrt{17}\times2\sqrt{17}=51$	A1
		(3)
		(10 marks)

This is a non-calculator question so the use of a calculator is penalised

(a)

M1: Attempts gradient. It must be the "correct way up" with $\Delta y/\Delta x$ and an attempt at differences (seen or implied at least once on either the numerator or denominator). It is implied by a correct answer.

dM1: Uses gradient and one of the points to form a straight line. The coordinates must be in the correct place in the unsimplified equation. It is dependent upon the previous M

A1: $y=-\frac{1}{4}x+\frac{17}{2}$ o.e. but it must be in the form $y=mx+c$. ISW after sight of a correct answer.

Alt (a) via simultaneous equations

M1: Attempts to form two simultaneous equations using both points and either $y=mx+c$ **or** $ax+by+c=0$

dM1: Solves the two simultaneous equations **via a non calculator method** to find both unknowns. It is important to see some working but it can be minimal. For example, $9=-2m+c$ and $6=10m+c$ must be followed by $12m=-3$ o.e before you see $m=-0.25$ oe.

A1: $y=-0.25x+8.5$ o.e. but it must be in the form $y=mx+c$.

Note that 101 is possible for candidates who don't show any working in solving their simultaneous equations but produce the correct equation (in the correct form)

(b)

B1ft: Correct follow through normal equation for their $y = -\frac{1}{4}x + \frac{17}{2}$. Implied by $y = 4x + 0$ following correct (a). So $y = -\frac{1}{m}x$ for their $y = mx + c$. It may be implied by a solution of $-\frac{1}{m}x = mx + c$

M1: Attempts to solve their $y = 4x$ and their $y = -\frac{1}{4}x + \frac{17}{2}$ simultaneously via a non-calculator route.

Look for a value for *x* or a value for *y* following an attempt at solving $\pm\frac{1}{m}x = mx + c$

There should be some working, allow as a minimum $"4"x = "-0.25x + 8.5" \Rightarrow ...x = ... \Rightarrow x = ...$

Don't be too concerned with accuracy here.....it is a method mark

A1: One correct coordinate, usually $x = 2$ but could be for $y = 8$ if solved differently

A1: $R = (2, 8)$. May be written separately

Solutions with no working, insufficient working and/ or via use of a calculator

(b)

For the M mark you should expect to see some working. As a minimum look for the two highlighted equations (or their equivalent) where the *x* terms have been collected

$y = 4x$ and $y = -\frac{1}{4}x + \frac{17}{2} \Rightarrow 4x = -\frac{1}{4}x + \frac{17}{2} \Rightarrow 4.25x = 8.5$ followed by (2, 8)

If (2, 8) follows the two correct equations without the highlighted working (o.e.) score SC 1011

(c)

M1: States or attempts $\sqrt{2^2 + 8^2}$ using their coordinates for *R* or $\sqrt{3^2 + 12^2}$ using the given *P* and *Q*. It can be implied by an exact answer or an answer to 3sf for their coordinates

If two right angled triangles are used to find the area, it would be for attempts at *OR*, or *PR* and *RQ*.

dM1: Full attempt at area of triangle *OPQ* using $\frac{1}{2} \times \textit{their } OR \times \textit{their } PQ$ o.e.

Both *PQ* and *OR* must be attempted via a correct method

This can be awarded for decimal work. It is dependent on the previous M

A1: Correct answer via a correct method with sufficient working to suggest a non-calculator method

Look for $\frac{1}{2} \times 2\sqrt{17} \times 3\sqrt{17}$ (or other correct and relevant work) before you see 51.

Don't allow this to be scored via decimals or from just $\frac{1}{2} \times \sqrt{153} \times \sqrt{68} = 51$ unless extra relevant lines are seen as above.

Alternatives to part (c) exist via the cosine rule, the shoelace method

ALT 1: the cosine rule.

One example shown using angle *POQ*

$\cos POQ = \frac{136 + 85 - 153}{2\sqrt{85}\sqrt{136}} = \frac{1}{\sqrt{10}}$ Area triangle $POQ = \frac{1}{2}\sqrt{85}\sqrt{136}\sin POQ = \frac{1}{2}\sqrt{85}\sqrt{136} \times \frac{3}{\sqrt{10}} = 51$

M1: As main scheme for length *PQ*

dM1: Full method. Likely to involve decimals here and the angle $71.6°$. If decimals are used it will be followed by A0

ALT 2: the shoelace method.

Note that the example below starts at (0, 0). It could start at any of the coordinates

$$\text{Area} = \frac{1}{2}\begin{vmatrix} 0 & -2 & 10 & 0 \\ 0 & 9 & 6 & 0 \end{vmatrix} = \frac{1}{2}\left|(0\times 9)+(-2\times 6)+(10\times 0)-(-2\times 0)-(10\times 9)-(0\times 6)\right| = \frac{1}{2}\times 102 = 51$$

M2: For a full attempt at the area. Score for $\frac{1}{2}\left|(0\times 9)+(-2\times 6)+(10\times 0)-(-2\times 0)-(10\times 9)-(0\times 6)\right|$

A1: 51

ALT 3: Trapezium minus two right-angled triangles

$$\frac{12}{2}(9+6)-\frac{1}{2}\times 10\times 6-\frac{1}{2}\times 2\times 9 = 90-30-9 = 51$$

M2: For a full attempt at area $\frac{12}{2}(9+6)-\frac{1}{2}\times 10\times 6-\frac{1}{2}\times 2\times 9$

A1: 51

ALT 4: Two scalene triangles, *OPC* & *OCQ* (where *C* is where intercept of l_1 with the *y* -axis)

$$\text{When } x=0, y=\frac{17}{2} \qquad \text{Area} = \frac{1}{2}\times\frac{17}{2}\times 10+\frac{1}{2}\times\frac{17}{2}\times 2 = \frac{85}{2}+\frac{17}{2} = 51$$

M1: Attempts the *y* intercept of l_1

dM1: For a full attempt at area

A1: 51

Question Number	Scheme	Marks
6. (a)	$(540°, -5)$	B1, B1 **(2)**
(b) (i)	$(360°, 3)$	B1, B1 **(2)**
(ii)	$(180°, 5)$	B1, B1 **(2)** **(6 marks)**

Notes applying to all parts:

Note 1

Score B1 for one correct coordinate, so B0 B1 is NOT possible

So for example (a) $(720°, -5)$ scores B1 B0

Note 2

Coordinates can be given separately

E.g. (a) $x = 540°$, $y = -5$

Note 3

Coordinates may appear within the question. Solutions to (b)(i) for example may well contain two sets of coordinates. E.g. $(360°, 5)$ followed by $(360°, 3)$. This will most likely be their working so in almost all cases you will mark their final set of coordinates

Note 4

Score B1 B0 for a **correct** solution but with the coordinates "flipped".

E.g. (b) (i) $(3, 360°)$ instead of $(360°, 3)$

Note 5

Condone omission of degrees

Note 6

If solutions are given in radians then withhold a mark the first time it happens

E.g. (a) $(3\pi, -5)$ (b)(i) $(2\pi, 3)$ (b)(ii) $(\pi, 5)$ scores (a) B1 B0 (b)(i) B1 B1 (b)(ii) B1 B1

Note 7

If solutions are not in brackets (and not stated as $x =$ $y =$) then withhold a mark the first time it happens

E.g. (a) $540°, -5$ (b)(i) $360°, 3$ (b)(ii) $180°, 5$ scores (a) B1 B0 (b)(i) B1 B1 (b)(ii) B1 B1