Question Number	Scheme	Marks
4 (a)	Grad $AB = \dfrac{8-2}{-1-7} = \left(-\dfrac{3}{4}\right)$	M1
	$y-2=-\dfrac{3}{4}(x-7) \Rightarrow 3x+4y-29=0$	dM1, A1
		(3)
(b)	Equation line L_2 $y-8=\dfrac{4}{3}(x+1)$	M1
	Substitutes $y=0$ $0-8=\dfrac{4}{3}(x+1) \Rightarrow x=-7$ So $(-7, 0)$	dM1, A1
		(3)
(c)	Attempts one required length. E.g. $AB^2=8^2+6^2 \Rightarrow AB=10$	M1
	Area $ABC = \dfrac{1}{2}AB \times AC = \dfrac{1}{2}10\times 10 = 50$	dM1, A1
		(3) **(9 marks)**

(a)

M1: Correct attempt at gradient.

It must be an attempt at $\dfrac{\Delta y}{\Delta x}$ with attempt at subtraction at least once

dM1: Correct attempt at equation of line L_1 using their found gradient and either of the points.

It is dependent upon the previous M mark. Look for an attempted application of $y-y_1 = "-\frac{3}{4}"(x-x_1)$.

You may well see $\dfrac{y-8}{x+1}=\dfrac{8-2}{-1-7}$ o.e. which would score M1, dM1

If they use the form $y=mx+c$ it must lead as far as c = …

A1: $3x+4y-29=0$ but accept any integer multiple of this. Accept terms in a different order

……

Alt (a)

M1: Attempts to substitute BOTH $A(-1, 8)$ and $B(7, 2)$ into $ax+by+c=0$ or $y=mx+c$

dM1: And solves using non calculator methods to find values of a, b and c or m and c.

The solution is not unique if using $ax+by+c=0$ so they may start by stating a value for c, e.g. $c = 2$

A1: $3x+4y-29=0$ but accept any integer multiple

……

(b)

M1: Uses the negative reciprocal of their gradient in (a) with $A(-1, 8)$ to form equation of L_2

dM1: Substitutes $y = 0$ in a correctly attempted L_2 and finds x = ...

It is dependent upon the previous M so L_2 must have been formed correctly

Condone slips where L_2 has been incorrectly adapted and $y = 0$ is substituted into this to find x.

A1: $(-7, 0)$ but condone $x=-7$ following substitution of $y = 0$

This is a non calculator question so this must follow M1, dM1

……..

Alternatives in (b) are possible: For example via similar triangles or methods without fully forming the equation of L_2

Note that it is possible to find the coordinates of C without fully forming the equation of L_2

For example, letting the coordinates of C to be $(k, 0)$ and using gradient AC leads to the equation $\frac{8}{-1-k} = "\frac{4}{3}" \Rightarrow k = -7$. Score M1 for using the negative reciprocal of their gradient in (a) with $A(-1, 8)$ to set up an equation in k. Score dM1 for solving it.

……..

(c)

M1: Attempts one required length. E.g. $AB^2 = 8^2 + 6^2 \Rightarrow AB = ...$ OR $AC^2 = '8'^2 + '6'^2 \Rightarrow AC = ...$
It is acceptable to award this from a diagram where you see the lengths 6 and 8 followed by AB or AC as 10. **There must be some evidence for this award**.

dM1: Correct attempt at area triangle ABC. It is dependent upon the previous M

A1: 50

……

Alternatives for part (c) exist so look carefully at what is attempted.

Alt I: Area of rectangle – area of three triangles

M1: Correct attempt at 3 of the 4 necessary shapes

Area rectangle = $14 \times 8 = (112)$ Area triangles = $\frac{1}{2} \times 8 \times 6 = (24)$, $\frac{1}{2} \times 8 \times 6 = (24)$, $\frac{1}{2} \times 14 \times 2 = (14)$

dM1: Complete area = $14 \times 8 - \left\{ \frac{1}{2} \times 8 \times 6 + \frac{1}{2} \times 8 \times 6 + \frac{1}{2} \times 14 \times 2 \right\}$

A1: 50

Alt II Let point D be the point at which L_1 crosses the x-axis (which is $\frac{29}{3}$ for a correctly found eqn)

M1: Correct attempt to find the area of triangle $ACD = \frac{1}{2} \times \left(7 + \frac{29}{3}\right) \times 8$ or triangle $BCD = \frac{1}{2} \times \left(7 + \frac{29}{3}\right) \times 2$

dM1: Attempts area triangle ACD − triangle $BCD = \frac{1}{2} \times \left(7 + \frac{29}{3}\right) \times 8 - \frac{1}{2} \times \left(7 + \frac{29}{3}\right) \times 2$

A1: 50

Alt III: If the coordinates of C are correct, triangle ABC is isosceles with AB and AC equal.

Therefore, only allow this method to score marks if they have a correct answer to part (b)

Let the mid- point of CB be M.

In a correct calculation $M = (0, 1)$ and area $ABC = \frac{1}{2} \times BC \times AM = \frac{1}{2} \times 10\sqrt{2} \times 5\sqrt{2}$

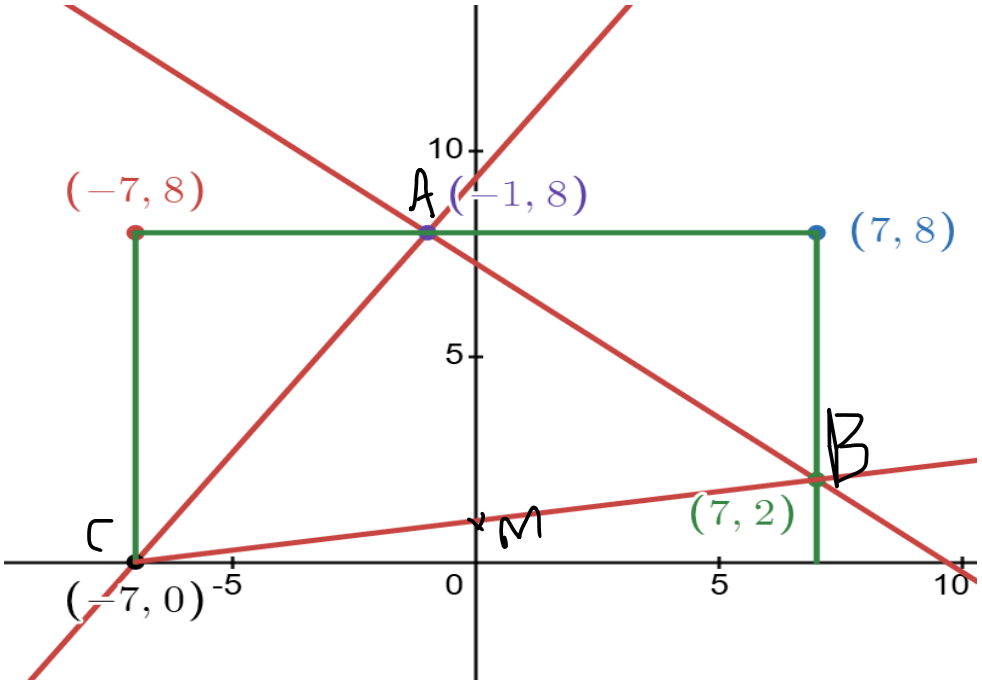
M1: Correct attempt at one length, e.g. $BC = \sqrt{14^2 + 2^2} = \left(10\sqrt{2}\right)$ dM1: Complete attempt

Alt IV: The shoelace method

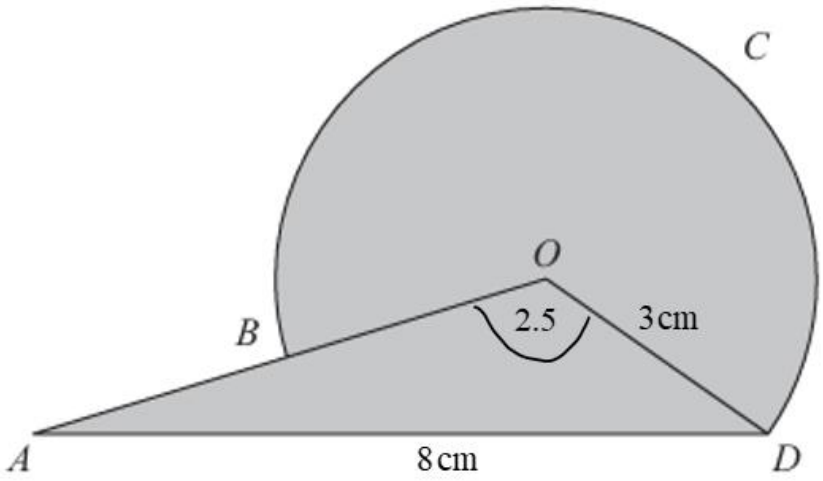
$-7 \quad 0$
$-1 \quad 8$
$7 \quad 2$
$-7 \quad 0$

$$\frac{1}{2}\left|(-7 \times 8 - 1 \times 2 + 7 \times 0) - (0 \times -1 + 8 \times 7 + 2 \times -7)\right| = 50$$

If you are unaware of this method, please look it up. You require the coordinates of the vertices


10
5
0
5
10
-5
(−7, 8)
A
(−1, 8)
(7, 8)
B
C
M
(7, 2)
(−7, 0)

Question Number	Scheme	Marks
5 (a)	$\frac{\sin(OAD)}{3}=\frac{\sin 2.5}{8}\Rightarrow \sin(OAD)=0.2244...$	M1
	(Angle (ODA)) $=\pi-2.5-\arcsin(0.2244...)=\pi-2.5-0.226355...=0.415$ *	dM1, A1*
		(3)
(b)	Attempts either $\frac{1}{2}\times 3^2\times(2\pi-2.5)=(17.02)$ or $\frac{1}{2}\times 3\times 8\times\sin 0.415=(4.838...)$	M1
	Complete attempt at area $=\frac{1}{2}\times 3^2\times(2\pi-2.5)+\frac{1}{2}\times 3\times 8\times\sin 0.415$	dM1
	$=$ awrt 21.9 cm^2	A1
		(3)
(c)	Attempts either $3(2\pi-2.5)=(11.349..)$ or $AO^2=3^2+8^2-2\times 3\times 8\cos(0.415)=(29.07.)$	M1
	Complete attempt at perimeter $=3(2\pi-2.5)+8+\sqrt{3^2+8^2-2\times 3\times 8\cos(0.415)}-3=11.35+8+5.39-3$	dM1
	$=$ awrt 21.7 cm	A1
		(3)
		(9 marks)



Be aware that it is possible that the whole question could be done in degrees with 2.5 radians converted to $143.23°$**,** $143.24°$ **or better. Provided this accuracy is used full marks are possible, but the final conversion from** $23.79°$ **to 0.415 must be shown. If less accuracy is used, e.g** $143.2°$ **or** $143°$ **only the method marks are available in part (a), BUT full marks are possible in parts (b) and (c)**

FYI. Angle *AOD* = $143.23°$ **or** $143.24°$**, Angle *OAD* =** $12.96°$ **or** $12.97°$ **Angle *ODA* =** $23.79°$ **or** $23.80°$

(a) **This is a given answer and it is important that a full method is shown.**

Candidates will NOT gain credit in part (a) when starting with or using angle *ODA* = 0.415

M1: Attempts to use the sine rule with the angles and lengths in the correct position.

Allow $OAD=\theta$ or any other variable. Condone slips in the labelling of the angle.

The calculation must lead at least as far as $\sin OAD=...$

E.g. $\frac{3}{\sin x}=\frac{8}{\sin 2.5}\Rightarrow \sin x=(0.2244...)$ OR $x=\arcsin(0.2244...)=(0.22635...)$

dM1: Full attempt at finding angle *ODA*. It is dependent upon the previous M1