Question Number	Scheme	Marks
3(a)	Uses $\frac{\sin\theta°}{12}=\frac{\sin 32°}{8}\Rightarrow \sin\theta°=....$	M1
	θ=awrt 52.64, awrt 127.36	A1, A1
		(3)
(b)	$\left(BC^2\right)=12^2+8^2-2\times12\times8\times\cos\left(180°-32°-"127.36"°\right)$	M1
	$\Rightarrow BC=$ awrt 5.32 (cm)	A1
		(2)
(c)	$A=\frac{1}{2}ab\sin C\Rightarrow A=\frac{1}{2}\times12\times"5.32"\times\sin 32°=$ awrt 16.9 (cm^2)	M1, A1
		(2)
		(7 marks)

Note that attempts working in radians can score a maximum of M1A0A0 M1A1 M1A1 provided there is not a mixture of angle units within the same equation or expression

(a)

M1: Correct application of the sine rule $\frac{\sin\theta°}{12}=\frac{\sin 32°}{8}\Rightarrow \sin\theta°=....$ Look for the angles and lengths to be in the correct positions within the formula but condone slips in rearranging. It cannot be implied by a correct angle (M0A0A0) but allow a correct angle to imply this mark following a correct equation.

A1: awrt 53 or awrt 127 Must be in degrees. M1 must have been scored.

A1: θ=awrt 52.64, awrt 127.36 Must be in degrees and no other angles. Must be seen in (a).

In parts (b) and (c) if their obtuse angle for angle *CBA* is (180-32-their acute angle from (a)) (="95.36") then (b)M0A0 (c) M0A0

(b) If they use angle *CBA* in part (b) it must be obtuse, which must be 180-their acute angle from (a) whether it is found in part (a) or part (b)

M1: For a full attempt to find BC or BC^2 which may be achieved by:

- an attempt to use the cosine rule (condone the omission of the lhs) to find BC or BC^2 with the sides and angle in the correct places.
- an attempt to use the sine rule with the sides and angles in the correct place.
  For example, $\frac{BC}{\sin(180-32-"127.4")°}=\frac{8}{\sin 32°}\Rightarrow BC=....$
- an attempt to form a 3TQ in BC and solves to find a value for BC
  Look for e.g. $8^2=BC^2+12^2-2\times12\times BC\times\cos 32\Rightarrow BC^2-(24\cos 32)BC+80=0\Rightarrow BC=...$ with the sides and angle in the correct places.
  You do not need to check the mechanics of the rearrangement provided a 3TQ is achieved and they proceed to find a root. You do not need to check this.

A1: $BC=$ awrt 5.32 (cm) Ignore units (Note via the quadratic in BC they would need to reject the other root if found)

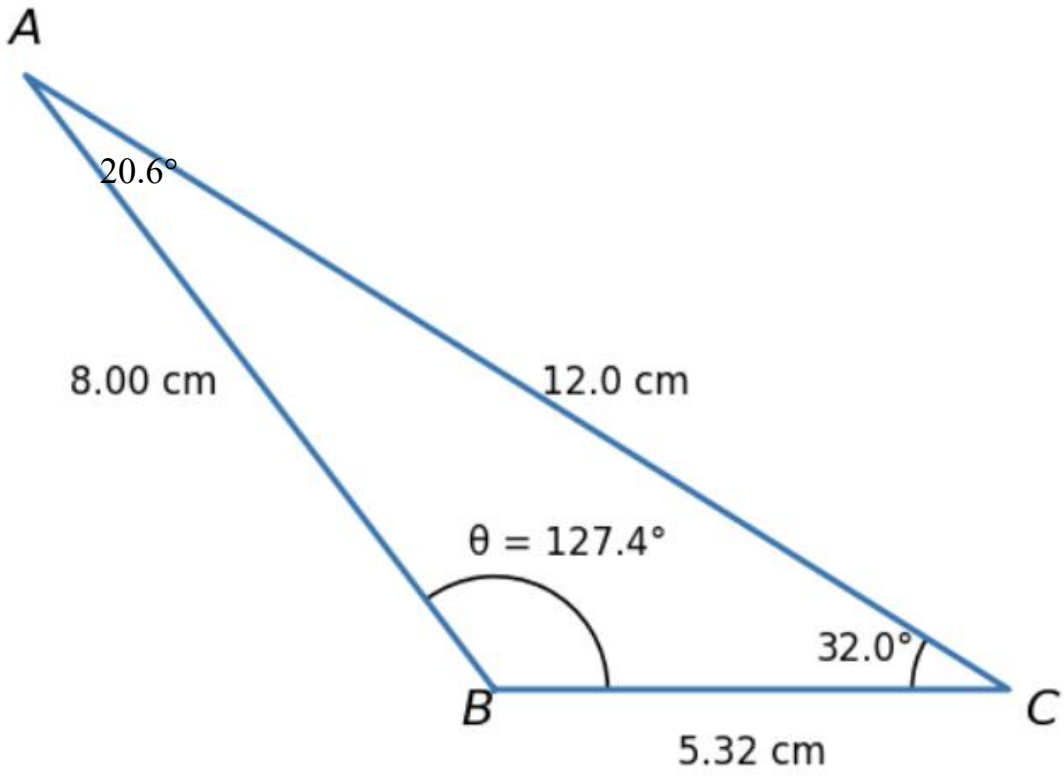
(c) Condone using their acute angle for angle *CBA* in this part

M1: Full attempt to find the area using a correct combination of sides and angles

Score for $A=\frac{1}{2}\times 12\times '5.32'\times \sin 32°$ or $A=\frac{1}{2}\times 12\times 8\times \sin\left(180°-32°-'127.4'\right)$

A1: awrt 16.9 (cm^2) Ignore units. Allow this to be scored if their length *BC* is awrt 5.3

The following diagram may help



Question Number	Scheme	Marks
4.(i)	Writes $\sqrt{128}$ as $2^{\frac{7}{2}}$ or 16 as 2^4	B1
	Attempts both powers of 2 and uses subtraction law $\Rightarrow \left(2^{3p-5} =\right) 2^{\frac{7}{2}-4}$	M1
	$\Rightarrow 3p-5=-\frac{1}{2} \Rightarrow p=\frac{3}{2}$	A1
		(3)
(ii)	$\left(x^2-2\right)^2 = x^2+18 \Rightarrow x^4-4x^2+4=x^2+18$	
	$\Rightarrow x^4-5x^2-14=0$	M1, A1
	$\Rightarrow \left(x^2-7\right)\left(x^2+2\right)=0 \Rightarrow x^2=...$	dM1
	$\Rightarrow x=\pm\sqrt{7}$	A1
		(4)
		(7 marks)

(i) Note B0M1A1 is possible
Note that they may rearrange the equation first. In such cases both the lhs and rhs will need to be written as powers of 2 (or e.g. 4)

B1: Correctly writes (not implied) either

- $\sqrt{128}$ as $2^{\frac{7}{2}}$ or $8\sqrt{2}$
- 16 as 2^4 (or may see $\frac{1}{16}$ written as 2^{-4})

Note they may write these numbers as e.g. $4^{...}$ which is an alternative method

M1: Proceeds to write $\frac{1}{16}\times\sqrt{128}$ as 2^n. The index does not need to be evaluated for this mark but must be correct e.g. $2^{\frac{7}{2}-4}$. This cannot be implied by $\left(3p-5=\right)-\frac{1}{2}$ but condone e.g. $3p-5=-4+\frac{7}{2}$ which shows they have added the powers and not relied on the use of a calculator.
May alternatively attempt to write both sides as powers of another number e.g. 4 or 8 which is acceptable.
Ignore the use of logs provided M1 is scored.

A1: $p=\frac{3}{2}$ oe provided M1 has been scored. If a calculator has clearly been relied on to solve then send to review.

(ii) Note they may work in another variable which is acceptable

M1: Multiplies out and simplifies to a 3TQ equation in x^2. The constant may be left on the other side of the equation. If terms are collected on one side then condone the omission of = 0

A1: Correct 3TQ equation in x^2 The constant may be left on the other side of the equation. The = 0 may be implied by further work.