Question Number	Scheme	Marks
2.(a)	Uses $t = 2, H = 2.7 \Rightarrow \dfrac{2a+b}{6} = 2.7$ $t = 7, H = 4.5 \Rightarrow \dfrac{7a+b}{11} = 4.5$ (may be seen as $2a + b = 16.2$ AND $7a + b = 49.5$)	M1A1
	Solves $7a + b = 49.5$, $2a + b = 16.2 \Rightarrow a = 6.66$ OR $b = 2.88$	dM1
	$H = \dfrac{6.66t + 2.88}{t + 4}$	A1 **(4)**
(b)	Sets $t = 0, H = \dfrac{2.88}{4} = 0.72$ m	M1, A1ft **(2)**
		(6 marks)

Mark (a) and (b) together

(a)

M1: Attempts to use $t = 2, H = 2.7$ **OR** $t = 7, H = 4.5$ in the given model. Does not need to be simplified.

A1: Achieves two correct simultaneous equations in a and b
$2a + b = 16.2$ oe **AND** $7a + b = 49.5$ oe

They do not need to be simplified i.e. $\dfrac{2a+b}{6} = 2.7$ and $\dfrac{7a+b}{11} = 4.5$ scores M1A1

Look out for attempts where one correct equation is formed and they use the other information to directly substitute into this equation which can imply this mark.

e.g. $\dfrac{2a + (49.5 - 7a)}{6} = 2.7$ would score M1A1

dM1: Solves their simultaneous equations leading to values of a and b. It is dependent on the previous method mark.

Allow a solution via a calculator – you do not need to check this but **do not** allow

$\dfrac{2a+b}{6} = 2.7, \dfrac{7a+b}{11} = 4.5 \Rightarrow a = ..., b = ...$ without rearranging to simultaneous equations of the form $Pa + Qb = r$ first.

Note they can proceed from an equation in one variable $\dfrac{2a + (49.5 - 7a)}{6} = 2.7 \Rightarrow a = ..., b = ...$

A1: $H = \dfrac{6.66t + 2.88}{t + 4}$ Condone a and b to be written as fractions e.g. $H = \dfrac{\frac{333}{50}t + \frac{72}{25}}{t + 4}$.

Can only be scored provided all previous marks have been scored.

(b)

M1: Sets $t = 0$ leading to a value for H. You may need to check this if just a value is stated. i.e. $\dfrac{"2.88"}{4}$

A1ft: States 0.72m or 72 cm **including units** (condone a correct fraction for 0.72)
Follow through on their b provided $0 < H < 2.7$

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)