Question Number	Scheme	Marks
2.(a)	Attempts $A=\frac{1}{2}ab\sin C \Rightarrow 100=\frac{1}{2}\times 25\times 15\sin BAC$	M1
	$\sin\theta^\circ=\frac{8}{15}$	A1
		(2)
(b)	$\left(BC^2\right)=15^2+25^2-2\times 15\times 25\times\cos"\theta^\circ"$ where $\theta^\circ=\arcsin"\frac{8}{15}"$	M1
	$BC^2=15^2+25^2-2\times 15\times 25\times\cos\left(180-\text{their }'32.2'\right)\Rightarrow BC=...$	dM1
	$BC^2=1484.4...\Rightarrow BC=\text{awrt }38.5\text{ cm}$ cso	A1
		(3)
		(5 marks)

(a)

M1: Attempts to use the area formula $"A=\frac{1}{2}ab\sin C"$ with the given information (condoning slips)

The angle used **should** be θ, BAC, CAB or A with or without any degrees symbol but condone, for this mark only, a direct substitution into the formula to achieve $100=\frac{1}{2}\times 25\times 15\sin C$

A1: Achieves $\sin\theta^\circ=\frac{8}{15}$ or **exact** equivalent fraction such as $\frac{200}{375}, \frac{100}{187.5}$ in the form $\frac{a}{b}$ or $0.5\dot{3}$

Condone answers such as $\theta=\arcsin\frac{8}{15}$ or $\sin\theta^\circ=\frac{8\text{ cm}^2}{15\text{ cm}^2}$

Allow θ to be BAC , CAB or $A\rightarrow a$ with or without any degrees symbol.

Allow C to be just "changed" to θ or any of the above for both marks. E.g.

$100=\frac{1}{2}\times 25\times 15\sin C\Rightarrow\sin\theta^\circ=\frac{8}{15}$ ISW after sight of $\sin\theta^\circ=\frac{8}{15}$

Note that finishing with $\underset{=}{\sin C}=\frac{8}{15}$ is A0 but allow all marks to be scored in (b) following this.

(b)

M1: Attempts to use the cosine rule. Ignore the lhs and allow using an acute angle found using part (a)

Look for $15^2+25^2-2\times 15\times 25\times\cos"\theta^\circ"$ where $\cos\theta^\circ$ is found using their $\sin\theta^\circ$ from part (a)

So allow for $15^2+25^2-2\times 15\times 25\times\cos"32.2^\circ"$ It can be implied by an answer for *BC* of 14.7 cm

Their angle must be correct to the nearest degree for their $\sin\theta^\circ=\frac{8}{15}$. Hence marks can only be achieved in part (b) if their $-1\leqslant\sin\theta^\circ\leqslant 1$.

You may see sight of an exact $\cos\theta^\circ$ being used. E.g. if $\sin\theta^\circ=\frac{8}{15}$ look for $\cos\theta^\circ=\left(\pm\right)\frac{\sqrt{161}}{15}$

dM1: Full use of the cosine rule (with lhs correct) and an obtuse angle used (correct to the nearest degree) leading to a value for *BC*. The obtuse angle must be correct for their part (a), that is $\left(180-\text{their }'32.2'\right)$

A1: CSO $BC=\text{awrt }38.5\text{ cm}$. Condone missing units

SPECIAL CASE

Solutions using radians are possible. So a "correct" solution would be

$BC^2=15^2+25^2-2\times 15\times 25\times\cos\left(\pi-0.5625\right)\Rightarrow BC=38.5$ for M1 dM1 A0

The angle θ given in this question is measured in degrees so this is not a <u>completely</u> correct solution.

Question Number	Scheme	Marks
3.(a)	$y=\dfrac{5x^3-8}{2x^2}=\dfrac{5}{2}x-4x^{-2}$	M1
	$\dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{5}{2}+8x^{-3}$	dM1 A1 A1 **(4)**
(b)	Substitutes $x=2$ into their $\dfrac{\mathrm{d}y}{\mathrm{d}x}=\text{"}\dfrac{5}{2}+\dfrac{8}{2^3}\text{"}\Rightarrow\dfrac{\mathrm{d}y}{\mathrm{d}x}=\text{"}\dfrac{7}{2}\text{"}$	M1
	Uses their $\dfrac{7}{2}$ and (2, 4) $\Rightarrow y-4=\text{"}\dfrac{7}{2}\text{"}\left(x-2\right)$	M1
	$\Rightarrow 7x-2y-6=0$	A1 **(3)**
		(7 marks)

(a)

M1: Attempts to write *y* as **a sum of two terms** and achieves at least one term with the correct index.

Award for $Px+Qx^k$ or Px^k+Qx^{-2}. Condone $Qx^{-2}\leftrightarrow\dfrac{Q}{x^2}$

dM1: Requires both

- the given expression to be written as a sum of two terms with both indices correct
- correct differentiation applied to the indices $Px+Qx^{-2}\rightarrow A+Bx^{-3}$ o.e

A1: One correct term which need not be simplified. Condone $\dfrac{5}{2}x^0$

Note that 1010 is possible where candidates only form one of the two correct terms and differentiate that correctly

A1: $\left(\dfrac{\mathrm{d}y}{\mathrm{d}x}\right)=\dfrac{5}{2}+8x^{-3}$ or simplified equivalent such as $\dfrac{1}{2}\left(5+\dfrac{16}{x^3}\right)$. There is no need to have the $\dfrac{\mathrm{d}y}{\mathrm{d}x}$

(b)

M1: Substitutes $x=2$ into their $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ and attempts its value. Their $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ cannot be the same as their "*y*"

Score for sight of embedded 2's in their $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ followed by a value or it may be implied for a correct value for their $\dfrac{\mathrm{d}y}{\mathrm{d}x}$

M1: Correct method for finding the equation of a tangent.

Look for a correct use of their $\left.\dfrac{\mathrm{d}y}{\mathrm{d}x}\right|_{x=2}$ and the point (2, 4) to form equation $y-4=\text{"}\dfrac{7}{2}\text{"}\left(x-2\right)$.

If the form $y=mx+c$ is used it must proceed as far as *c* = ...

Award this mark if they achieve $\dfrac{\mathrm{d}y}{\mathrm{d}x}=\dfrac{5}{2}$ in part (a) and correctly form the equation using $m=\dfrac{5}{2}$ and (2, 4). They cannot score the previous mark.

A1: $7x-2y-6=0$ or any multiple thereof

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