Question	Scheme	Marks	AOs
3(a)	Because the upper limit is infinite	B1	2.4
		(1)	
(b)	$\displaystyle\int \frac{1}{9x^2+16}\,\mathrm{d}x = \frac{1}{12}\arctan\left(\frac{3x}{4}\right)$	M1 A1	3.1a 1.1b
	$\displaystyle\int_{\frac{4}{3}}^{\infty} \frac{1}{9x^2+16}\,\mathrm{d}x = \frac{1}{12}\lim_{t\to\infty}\left[\arctan\left(\frac{3x}{4}\right)\right]_{\frac{4}{3}}^{t}$ $\displaystyle= \frac{1}{12}\left(\lim_{t\to\infty}\arctan\left(\frac{3t}{4}\right) - \arctan(1)\right)$	dM1	1.1b
	$\displaystyle= \frac{1}{12}\left(\frac{\pi}{2}-\frac{\pi}{4}\right) = \frac{\pi}{48}$	A1	2.1
		(4)	
		(5 marks)	

Notes

(a)

B1: Suitable explanation stating that one of the bounds/limits is infinite oe isw
e.g. "one of the limits is unbounded" or "the integral is unbounded"

Do not allow this mark if they only say the limit or integral is undefined, unless they go on to say it is undefined at infinity.
Commenting that the **function** is undefined at infinity is not enough to award this mark on its own, this question concerns the **limits.**
If the candidates state any extra incorrect comments about the **limits** withhold this mark e.g. not defined at $\frac{4}{3}$

(b)

M1: Integrates to obtain $\alpha\arctan(\beta x)$ where $\beta \neq 1$

A1: Correct integration, unsimplified or simplified.

dM1: Applies correct limits, "t" and $\frac{4}{3}$ with evidence of applying the infinite limit to obtain a non-zero value.

Allow with ∞ used as the limit (which may be implied by $\frac{\pi}{2}$)

A1: Correct value obtained with evidence of use of limiting process on the upper bound.
Withhold this mark if there is no evidence of using the limiting process. We must see as a minimum $\lim\limits_{t\to\infty}$ oe at some stage in their work.

e.g. $\left[\frac{1}{12}\arctan\left(\frac{3x}{4}\right)\right]_{\frac{4}{3}}^{\infty} = \frac{1}{12}\left(\frac{\pi}{2}-\frac{\pi}{4}\right) = \frac{\pi}{48}$ would score dM1A0