Question	Answer	Marks	Guidance
9(c)	$\frac{d^2P}{dr^2} = \frac{40}{r^3}$ As r is positive, $\frac{d^2P}{dr^2}$ is also positive so minimum	**2**	**M1** for a complete method, allow valid alternatives, if differentiated, must be in the form of $\left[\frac{d^2P}{dr^2} = \right]\frac{k}{r^3}$ **A1** for a correct conclusion
9(d)	$\theta = 2$	**B1**	
10	$-1 = \tan\left(3p + \frac{\pi}{2}\right)$ $p = \frac{\pi}{12}$	**2**	**M1** for a complete method to find the value of p
	$\frac{dy}{dx} = 3\sec^2\left(3x + \frac{\pi}{2}\right)$	**2**	**M1** for $a\sec^2\left(3x + \frac{\pi}{2}\right)$ **A1** all correct
	When $x = \frac{\pi}{12}$, $\frac{dy}{dx} = 6$	**M1**	For attempt to find the gradient using *their p* from differentiation
	Equation of normal: $y + 1 = -\frac{1}{6}\left(x - \frac{\pi}{12}\right)$	**M1**	For attempt at normal equation using *their p* and $-\frac{1}{\textit{their}\text{ value for }\frac{dy}{dx}}$
	When $x = 0$, $y = \frac{\pi}{72} - 1$	**M1**	For attempt to find B using *their* normal equation (must be from differentiation)
	When $y = 0$, $x = \frac{\pi}{12} - 6$	**M1**	For attempt to find A using *their* normal equation (must be from differentiation)
	Mid-point $\left(\frac{\pi}{24} - 3,\ \frac{\pi}{144} - \frac{1}{2}\right)$	**2**	**A1** for x value (must be exact) **A1** for y value (must be exact)

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