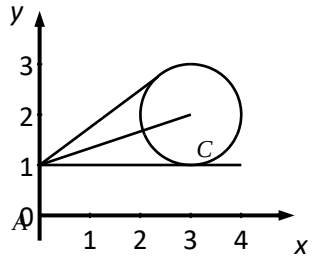
8			$(x-3)^2 + (y-2)^2 = (1)$	**M1**	**3.1a**	**DR** Attempt rearrange to this form
			Centre (3, 2), radius 1	**A1** **A1**	**1.1** **1.1**	soi but nfww soi but nfww
				**M1**	**2.1**	Attempt at a correct diagram seen (allow e.g. a slip in labelling) or geometrical understanding clearly implied (e.g. by giving gradient of AC or the gradient of the radius along AC as $\frac{1}{3}$ oe) Diagram must show the circle, tangents and either axes or labelled coordinates to be adequate on its own (but may be implied by later correct working).
			$(AC = \sqrt{10})$ $\sin\alpha = \frac{1}{\sqrt{10}}$	**B1**	**1.1**	or $\tan\alpha = \frac{1}{3}$
			$2 \times \sin^{-1}\frac{1}{\sqrt{10}}$	**M1**	**2.1**	or $\tan 2\alpha = \frac{2\times\frac{1}{3}}{1-\left(\frac{1}{3}\right)^2}$ $(=\frac{3}{4})$
			Angle between tangents = 36.9° (3 sf)	**A1**	**3.2a**	Angle between tangents = $\tan^{-1}\frac{3}{4}$ or 36.9° (3 sf)
			Alternative method $y = mx + 1$ $x^2 + (mx + 1)^2 - 6x - 4(mx + 1) + 12 = 0.$ $(1 + m^2)x^2 - (6 + 2m)x + 9 = 0$ $(6 + 2m)^2 - 36(1 + m^2) = 0$ $24m - 32m^2 = 0$	 **B1** **M1*** **A1** **dM1** **dM1**		 soi Substitute their line equation into circle equation (circle equation may be rearranged first) Attempt $b^2 - 4ac = 0$ (must be =0 or ≥ 0) Rearrange and attempt to solve quadratic equation in m (must reach a value for m)

			$m = 0$ or $\frac{3}{4}$ Angle between tangents = $\tan^{-1}\frac{3}{4}$ or 36.9^{o}	**A1** **A1**		Both needed or 0.644 (radians)
				[7]		(If two partial solutions given, apply whichever scheme gains the most marks)