7			$6x^2 + 6y + 6x\frac{dy}{dx} - 6y\frac{dy}{dx} = 0$	**M1** **B1**	**1.1a** **1.1a**	Attempt implicit differentiation Use product rule correctly on middle term	Either of the two $\frac{dy}{dx}$ terms correct, allowing sign errors Condone $6x^2dx + 6ydx + 6xdy - 6ydy$ Both terms correct Must now be $6y + 6x\frac{dy}{dx}$, or implied in a correct expression for $\frac{dy}{dx}$

Question	Answer	Marks	AO	Guidance	
		A1	**1.1**	Obtain correct derivative on LHS	Condone missing or incorrect RHS Must now have $\frac{dy}{dx}$ and not just dy or dx in terms
	$6x^2 + 6y + 6x - 6y = 0$	**M1**	**3.1a**	Use $\frac{dy}{dx} = 1$ in their equation	Must now be equation, but RHS could be incorrect (eg '= 2')
	$x^2 + x = 0$ $x = 0$, $x = -1$	**B1**	**1.1a**	Solve correct quadratic in x to obtain two correct roots (possibly **BC**) Quadratic must come from correct implicit differentiation	**B0** if x 'cancelled' in quadratic to give $x = -1$ as only root, but **M1A1** still available
	$x = 0$ gives $3y^2 = -2$, but y^2 has to be ≥ 0, so no solutions	**B1**	**2.3**	Explicitly reject $x = 0$, with reasoning $x = 0$ must come from $x^2 + x = 0$	eg negative numbers cannot be square rooted or $y^2 \neq -\frac{2}{3}$ 2 as y is real (just $y^2 \neq -\frac{2}{3}$ is insufficient) Must be sensible reason and not just 'math error' or 'not possible' Could say that there are only imaginary (or not real) roots – condone 'complex' roots
	$x = -1$ gives $3y^2 + 6y + 4 = 0$ $b^2 - 4ac = 36 - 48 = -12$	**M1**	**2.1**	Attempt to determine the number of real roots of their 3 term quadratic in y	From substituting their x value into the equation of the curve Consider discriminant, or use quadratic formula, or attempt minimum value of function
	$-12 < 0$ hence no (real) roots	**A1**	**2.4**	Obtain correct discriminant from correct quadratic and conclude appropriately $x = -1$ must come from $x^2 + x = 0$	If using quadratic formula then it must be fully correct and attention drawn to why there are no real roots
		[8]			