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**DR**

Gradient of normal = 2  $\Rightarrow$  gradient of tangent = -0.5

$$2y \frac{dy}{dx} + y + x \frac{dy}{dx} = 0$$

eg  $-y + y - 0.5x = 0 \Rightarrow x = 0$

$$y^2 = 8$$

$$(0, \sqrt{8}) \text{ and } (0, -\sqrt{8})$$

**M1****3.1a**

$$\frac{-y}{x+2y} = -\frac{1}{2}$$

**1.1****M1**

Attempt at implicit differentiation with one algebraic term differentiated correctly

**A1****1.1****A1****2.2a**

Correct implicit expression

**M1****1.1**

Implied by at least one  $y$ -value

**A1****1.1**

**Or M1** for correct expression for  $x$  in terms of  $y$  and attempt to differentiate

For one step solving their equation in  $x$  and/or  $y$  with original equation

**Alternative method**

$$\frac{dx}{dy} = \frac{-8 - y^2}{y^2} \text{ oe}$$

$$\frac{8 + y^2}{y^2} = 2 \text{ oe}$$

$$y^2 = 8$$

$$(0, \sqrt{8}) \text{ and } (0, -\sqrt{8})$$

**M1**

**M1**

**A1**

**M1**

**M1**

**A1**

**[6]**

Rearranging to  $x = \frac{8 - y^2}{y}$  and  
attempting differentiation

Differentiation by dividing first or  
quotient rule – allow one error

Correct differentiation

Using negative reciprocal

Implied by at least one y-value