

3. Using the laws of logarithms, solve the equation

$$\log_3(12y + 5) - \log_3(1 - 3y) = 2$$

$$\log a - \log b = \log\left(\frac{a}{b}\right) \Rightarrow \log_3\left(\frac{12y+5}{1-3y}\right) = 2 \quad (1 \text{ mark})$$

$$3^2 = 9 \Rightarrow \log_3(9) = 2 \Rightarrow \log_3\left(\frac{12y+5}{1-3y}\right) = \log_3 9$$

$$\Rightarrow \frac{12y+5}{1-3y} = 9$$

$$\Rightarrow 12y + 5 = 9(1 - 3y)$$

$$12y + 5 = 9 - 27y$$

$$39y = 4$$

$$y = \frac{4}{39}$$

(2 marks)