

and 1st term 16

$$\therefore \sum_{r=0}^{30} 2^r = \frac{a(1-r^n)}{1-r} = \frac{16(1-2^{27})}{1-2} \quad (3)$$

$$= 16(2^{27} - 1) = 2147483632$$

ii) Because the common ratio is greater than 1

6) a) $\frac{dy}{dx} = \frac{3}{3x-1}$ so at $x=2$, gradient

$$= \frac{3}{3 \times 2 - 1} = \frac{3}{5}$$

b) y coordinate at P = $\ln(3 \times 2 - 1)$
 $= \ln 5$

$$y - y_1 = m(x - x_1) \text{ at } (2, \ln 5)$$

$$y - \ln 5 = -\frac{5}{3}(x - 2)$$

Since normal has gradient $\frac{5}{3}$

$$y = -\frac{5}{3}x + \frac{10}{3} + \ln 5$$

at R, $y=0$ so $x = \frac{3}{5}(\frac{10}{3} + \ln 5)$
 $= 2 + \frac{3}{5} \ln 5$