

$$3^x=4 \quad \dots\dots\dots \text{equation 1}$$

Multiply by 3 for both side

$$3 \times 3^x = 3 \times 4$$

$$3^{x+1}=12$$

Take logarithm in base of 3 for both side

$$\text{Log}_3 3^{x+1} = \text{Log}_3 12$$

$$x+1 = \text{Log}_3 12 \dots\dots\dots \text{eq}^n \text{ A}$$

$$4^y = 12 \dots\dots\dots \text{equation 2}$$

Substitute eqⁿ 1 in eqⁿ 2

$$(3^x)^y = 12$$

Take logarithm in base of 3 for both side

$$\text{Log}_3 (3^x)^y = \text{Log}_3 12$$

$$y \text{Log}_3 (3^x) = \text{Log}_3 12 \dots\dots\dots \text{eq}^n \text{ B}$$

$$\text{but } \text{Log}_3 (3^x) = x \dots\dots\dots \text{eq}^n \text{ C}$$

Substitute eqⁿ C in eqⁿ B

$$xy = \text{Log}_3 12 \dots\dots\dots \text{eq}^n \text{ D}$$

Substitute eqⁿ A and eqⁿ D in $\frac{1+x}{2xy}$

$$\frac{1+x}{2xy} = \frac{\text{Log}_3 12}{2 \text{Log}_3 12} = \frac{1}{2}$$