$$\mu = \sum_{x=1}^{\infty} x\, p(1-p)^{x-1} \qquad (1)$$

Where μ is mean number of trial. According to the rule of geometric progression in series,

$$\sum_{m=1}^{\infty} y^m = \frac{1}{1-y} \quad , \quad |y| < 1$$

Treat y as variable and m as constant. By differentiating both sides of the equation with respect y.

$$\sum_{m=1}^{\infty} m\, y^{m-1} = \frac{1}{(1-y)^2} \quad , \quad |y| < 1 \qquad (2)$$

Equation (1) is analogous to **Equation (2).** Rewrite **Equation (a)**

$$\mu \;=\; p\sum_{x=1}^{\infty} x(1-p)^{x-1} \;=\; \frac{p}{(1-(1-p))^2} \;=\; \frac{1}{p}$$

Eventually

$$\mu = \frac{1}{p}$$