

- 11 A ball is dropped from a height of 100 feet. Each time it hits the floor, it rebounds to $\frac{2}{3}$ its previous height. Find the total distance the ball travels before coming to rest.

$$100 \downarrow \uparrow \frac{2}{3}(100) \downarrow \frac{2}{3}(100) \uparrow \left(\frac{2}{3}\right)^2 100 \downarrow \left(\frac{2}{3}\right)^2 (100)$$

$$\text{distance} = 100 + \frac{2}{3}(200) + \left(\frac{2}{3}\right)^2(200) + \left(\frac{2}{3}\right)^3(200) + \dots$$

I do not
fit in the
pattern

I am the geometric series
with $r = \frac{2}{3}$ and initial term $\frac{2}{3}(100)$.

sum is $\frac{\text{initial term}}{1-r}$

$$= 100 + \frac{\frac{400}{3}}{1 - \frac{2}{3}} = 100 + \frac{400}{3\left(\frac{1}{3}\right)} = 500 \text{ feet.}$$