18.1

#21 $2e + 2e^2 + 2e^3 \ldots + 2e^{12}$

$r = e$

$S = 2e + 2e^2 + \ldots + 2e^{12}$

$-e(S) = 2e^2 + 2e^3 + \ldots + 2e^{13}$

$S - eS = 2e - 2e^{13}$

$(1-e)S = 2e - 2e^{13}$

$$\boxed{S = \frac{2e - 2e^{13}}{1-e}} \approx 514945.41$$

#29 $-\frac{5}{2} + \frac{5}{V} - \frac{10}{V^2} + \ldots + \frac{5 \cdot 2^n}{V^{n+1}}$

$$r = \frac{\frac{5}{V}}{-\frac{5}{2}} = \frac{-2}{V}$$

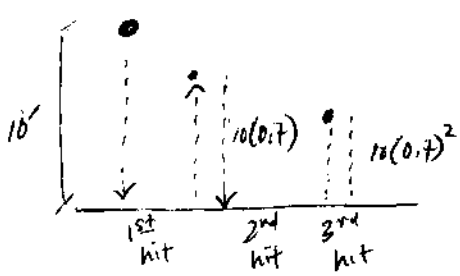
$$S = \frac{-\frac{5}{2} - \left(-\frac{2}{V}\right)\left(\frac{5 \cdot 2^n}{V^{n+1}}\right)}{1 - \left(-\frac{2}{V}\right)} = \boxed{\frac{-\frac{5}{2} + \frac{5 \cdot 2^{n+1}}{V^{n+2}}}{1 + \frac{2}{V}}}$$

#31 $mq + m^2q^4 + m^3q^7 + \ldots + m^{11}q^{31}$

$$r = \frac{m^2q^4}{mq} = mq^3$$

$$S = \frac{mq - (mq^3)(m^{11}q^{31})}{1 - mq^3} = \boxed{\frac{mq - m^{12}q^{34}}{1 - mq^3}}$$

#33



geometric series starts here

Distance traveled $= 10 + 2(10)(0.7) + 2(10)(0.7)^2 + \ldots$

@ 1st hit : $D = 10$

2nd hit : $D = 10 + 2(10)(0.7)$

3rd hit : $D = 10 + 2(10)(0.7) + 2(10)(0.7)^2$