when ball hits 3rd time:

$$D = 10 + 2(10)(0.7) + 2(10)(0.7)^2$$

$$= \boxed{33.8 \text{ feet}}$$

when ball hits 12th time

$$D = 10 + 2(10)(0.7) + 2(10)(0.7)^2 + \dots + 2(10)(0.7)^{11}$$

$$= 10 + \underbrace{\left[2(10)(0.7) + \dots + 2(10)(0.7)^{11}\right]}_{\text{geo. series}}$$

$r = 0.7 \quad a = 2(10)(0.7)$

$$D = 10 + \frac{2(10)(0.7) - 2(0.7)^{12}(10)}{1-(0.7)} = \boxed{55.74 \text{ ft.}}$$

18.5

(#1) a) Future Value = (Present Value) $\left(1 + \frac{r}{n}\right)^{nt}$ $r = 0.04$, $n = 4$

$$M = M_0\left(1 + \frac{0.04}{4}\right)^{4t}$$

$$M_0 = \frac{M}{(1.01)^{4t}}$$

Award #1: Present Value: $\frac{10000}{(1.01)^{12}} + \frac{10,000}{(1.01)^{16}} + \frac{10,000}{(1.01)^{20}} + \frac{10,000}{(1.01)^{24}} + \frac{10,000}{(1.01)^{28}} + \frac{10,000}{(1.01)^{32}}$

$= \$48,315.21$

Award #2: $PV = \frac{20,000}{(1.01)^8} + \frac{20,000}{(1.01)^{16}} + \frac{20,000}{(1.01)^{24}}$

$= \$51,277.41$

Choose Award #2

b) putting payments into the bank immediately will give the same value in 8 years as putting the PV in immediately!