Solutions to Summative Assessment version 8000

① $P = 8000$

$r = 7.2\%$ $r = 0.072$

$n =$ monthly

$n = 12$

$$\boxed{\text{Model } A(x) = 8000\left(1+\frac{0.072}{12}\right)^{12x}}$$

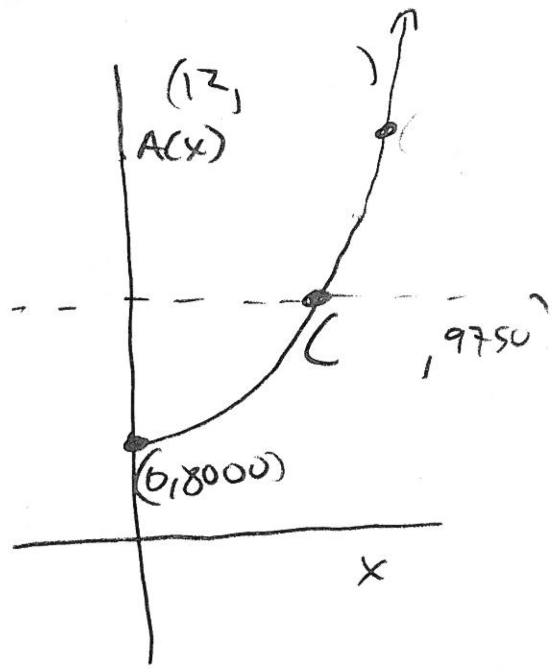
② Balance after 12 years $= A(12)$

$$A(12) = 8000\left(1+\frac{0.072}{12}\right)^{12(12)}$$

$$= 8000\left(1+\frac{0.072}{12}\right)^{144}$$

$$= 8000(1.006)^{144}$$

$A(12) \approx$



③ Balance of 9750 occurs when?

$$A(x) = 9750$$

$$9750 = 8000\left(1+\frac{0.072}{12}\right)^{12x}$$

$$9750 = 8000\left(1+\frac{0.072}{12}\right)^{12x}$$

$$\frac{9750}{8000} = \frac{8000\left(1+\frac{0.072}{12}\right)^{12x}}{8000}$$

$$\frac{9750}{8000} = \left(1+\frac{0.072}{12}\right)^{12x}$$

$$\log_{\left(1+\frac{0.072}{12}\right)}\left(\frac{9750}{8000}\right) = 12x$$

$$x = \frac{\log_{\left(1+\frac{0.072}{12}\right)}\left(\frac{9750}{8000}\right)}{12}$$

$\approx$

OR

$$\log\left(\frac{9750}{8000}\right) = \log\left(1+\frac{0.072}{12}\right)^{12x}$$

$$\log\left(\frac{9750}{8000}\right) = 12x\left(\log\left(1+\frac{0.072}{12}\right)\right)$$

$$\log\left(\frac{9750}{8000}\right) = 12x\log\left(1+\frac{0.072}{12}\right)$$

$$x = \frac{\log\left(\frac{9750}{8000}\right)}{12\log\left(1+\frac{0.072}{12}\right)}$$

$x \approx$

Solutions version 8000

Given Model $A(x) = 3600\left(1+\frac{0.072}{4}\right)^{4x}$

$P = 3600$

$r = 0.072 \rightarrow r\% = 7.2\%$

$n = 4 \rightarrow$ Quarterly

(4) $r = 0.072$ $r\% = 100r = 7.2\%$

(5) Amount of Investment 3600

(6) How often is interest compounded? $n = 4$ Quaterly

(7) $P = 3600$

$r = 0.072$

$n = \text{weekly} = 52$

$$\boxed{\begin{aligned} A(x) &= 3600\left(1+\frac{0.072}{4}\right)^{4x} \\ &= 3600(1.018)^{4x} \end{aligned}}$$

new model weekly

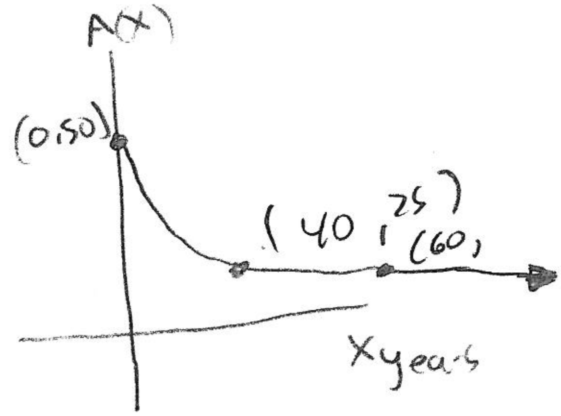
Solutions version 8000

Half Life 40 years

Initial Amount = 50 grams

Natural Decay Model

$A(x) = Pe^{rx}$



$\boxed{\frac{1}{2}\text{ life Population} = \frac{1}{2}50 = 25\text{ grams}}$

$A(x) = 25$ grams occurs at 40 years

So $A(40) = 25$ grams

$25 = 50e^{40r}$

$\frac{25}{50} = \frac{50e^{40r}}{50}$

$\frac{1}{2} = e^{40r}$

$\ln\frac{1}{2} = 40r$

9 $\boxed{r = \frac{\ln\frac{1}{2}}{40} \approx -0.0173}$

9 $\boxed{r\% = 100r = 1.73\%}$

8 $\boxed{\text{Model } A(x) = 50e^{\frac{\ln\frac{1}{2}}{40}x}}$

10 What is the amount after 60 years?

$x = 60$

$A(60) = 50e^{\frac{\ln\frac{1}{2}}{40}\cdot 60}$

$A(60) = 50e^{\frac{3}{2}\ln\frac{1}{2}}$

$\boxed{A(60) \approx}$

Solutions version 8000

$A(x) = 3.6e^{0.0078x}$

$A(x)$: measured in millions

3.6: 3.6 million

x: measured in years since 2015

$r = 0.0078$

$100r = r\% = 0.78\%$

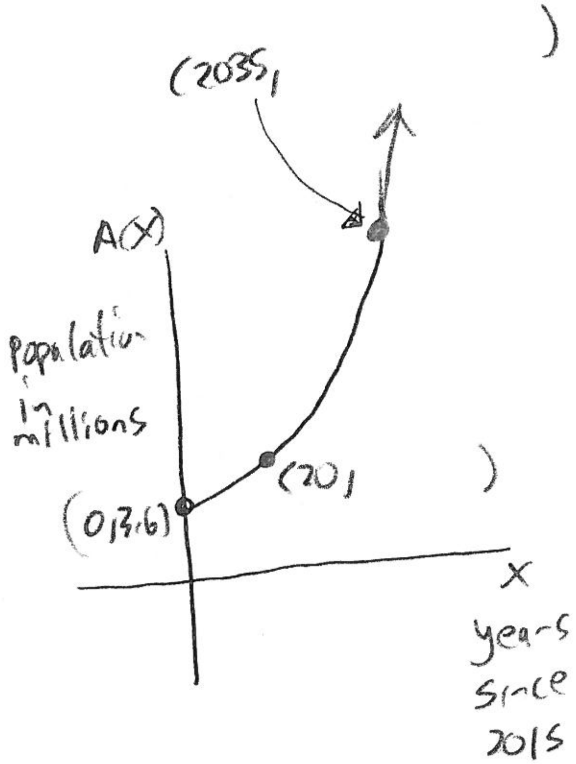
$x=0$ means 2015

$x=2035$ means year $2015+2035=4050$

$x=20$ means year $2015+20=2035$

(11) $r = 0.0078$

$r\% = 0.78\%$



(12) When will population reach 4500000?

$$\boxed{\text{Note } \frac{4500000}{1000000} = 4.5 \text{ million}}$$

$$\boxed{4.5 = 3.6e^{0.0078x}}$$

Why is $4500000 = 3.6e^{0.0078x}$ WRONG?

$4500000 = A(x)$

means $4,500,000 \cdot 1,000,000$

$$\boxed{4,500,000,000,000}$$

$A(x) = 3.6e^{0.0078x}$ years since 2015

Population in millions

X years after 2035

3.6 million Initial Population

$r = 0.0078$

$r\% = 0.78\%$

(13) $A(2035)$ = Population after 2035 years

or Population during 2015+2035 = 4050

Year 4050

$= 3.6e^{0.0078(2035)}$

$= 3.6e$

$\approx$

This is the population in the year 4050

(14) $A(20)$ = Population after 20 years

or Population during 2015+20 = 2035

$= 3.6e^{0.0078(20)}$

$= 3.6e^{0.}$

$\approx$

This is the population in the year 2035

(15) In the year 2035 Population growing and $\approx$ million