$$F(t) = A_0 e^{Kt}$$

A_0 = STARTING VALUE

t = TIME

K = CONSTANT

"EXP. GROWTH AND DECAY MODELS"

① $A = 1080e^{.02t}$

$t = 0$

$A = 1080e^{.02(0)}$

$= 1080e^{0}$

$= 1080(1)$

$= 1080$

② $A = 1080e^{.02t}$

$1350 = 1080e^{.02t}$

$\frac{1350}{1080} = \frac{\cancel{1080}e^{.02t}}{\cancel{1080}}$

$\frac{1350}{1080} = e^{.02t}$

$\ln\left(\frac{1350}{1080}\right) = \ln_e e^{.02t}$

$\ln\left(\frac{1350}{1080}\right) = .02t$

$\frac{\ln\left(\frac{1350}{1080}\right)}{.02} = t$

$t = 11.2$ yrs

③ $A = A_0e^{Kt}$

$\boxed{A = 2.1e^{Kt}}$

a) FIND K

$3.2 = 2.1e^{K(20)}$

$\frac{3.2}{2.1} = e^{20K}$

$\ln\left(\frac{3.2}{2.1}\right) = \ln_e e^{20K}$

$\ln\left(\frac{3.2}{2.1}\right) = 20K$

$\frac{\ln\left(\frac{3.2}{2.1}\right)}{20} = K$

$K = .0210606733$

SO

$A = 2.1e^{.0210606733t}$

b) $9 = 2.1e^{.0210606733t}$

$\frac{9}{2.1} = e^{.0210606733t}$

$\ln\frac{9}{2.1} = \ln e^{.0210606733t}$

$\ln\frac{9}{2.1} = .0210606733t$

$\frac{\ln\left(\frac{9}{2.1}\right)}{.0210606733} = t$

$t = 69$ yrs

"2069"

④ $A = A_0e^{Kt}$

$A = 143.2e^{.0123t}$

$t = 2025 - 2007 = 18$

$A = 143.2e^{.0123(18)}$

$A = 178.7$

⑤ $A = A_0e^{Kt}$

$A = 19.1e^{Kt}$

SO AT $t = 18$, $A = 30.8$

$30.8 = 19.1e^{K(18)}$

$\frac{30.8}{19.1} = e^{18K}$

$\ln\left(\frac{30.8}{19.1}\right) = \ln e^{18K}$

$\ln\left(\frac{30.8}{19.1}\right) = 18K$

$\frac{\ln\left(\frac{30.8}{19.1}\right)}{18} = K$

$K = .0265$

⑥ $A = 16e^{-0.000121t}$

$t = 10000$

$A = 16e^{-.000121(10000)}$

$A = 4.77$

⑦ $A = A_0e^{Kt}$

HALF LIFE

$\frac{1}{2}A_0 = A_0e^{Kt}$

$\frac{\frac{1}{2}\cancel{A_0}}{\cancel{A_0}} = \frac{\cancel{A_0}e^{Kt}}{\cancel{A_0}}$

$\frac{1}{2} = e^{Kt}$

$\frac{1}{2} = e^{K(20000)}$

$\ln\frac{1}{2} = \ln e^{20000K}$

$\ln\frac{1}{2} = 20000K$

$\frac{\ln\frac{1}{2}}{20000} = K$

$K = -.0000347$

$A = A_0e^{-.0000347t}$

$A = 20e^{-.0000347t}$

$t = 20000$

$A = 20e^{-.0000347(20000)}$

$A = 10$

$t = 40000$

$A = 20e^{-.0000347(40000)}$

$A = 5$

$t = 60000$

$A = 20e^{-.0000347(60000)}$

$A = 2.5$