

① $y = ab^x$ $(3, 2)$ $(10, 156)$

a) $\begin{cases} 20 = ab^3 \\ 156 = ab^{10} \end{cases}$

b) $\left(\frac{156}{20}\right)^{1/7} = (b^7)^{1/7}$ $b = 1.341$

$20 = a(1.341)^3$ $a = 8.294$

$y = 8.294(1.341)^x$ or $f(x) = 8.294(1.341)^x$

c) $y = 8.294(1.341)^3 = 20$

$y = 8.294(1.341)^{10} = 156$

② $\begin{array}{c|c} x & y \\ \hline 1 & 15 \\ 4 & 405 \end{array}$

$b^{4-1} = \frac{405}{15}$

$\sqrt[3]{b^3} = \sqrt[3]{27}$

$b = 3$

$y = ab^x$
 $15 = a(3)^1$

$\frac{15}{3} = \frac{3a}{3}$

$a = 5$

$y = 5(3)^x$

③ a) $\begin{array}{c|c} \text{Weeks} & \text{Insects} \\ \hline x & y \\ \hline 4 & 170 \\ 6 & 320 \end{array}$

$b^{6-4} = \frac{320}{170}$
 $\sqrt{b^2} = \sqrt{\frac{320}{170}}$

$y = ab^x$

$170 = a(1.372)^4$ $b = 1.372$

1.372^4 1.372^4

$a = 47.979$

$y = 47.979(1.372)^x$

b) about 48 insects to start

c) $y = 47.979(1.372)^5$

$y = 233 \text{ insects}$

④ a) $y = 391.354(11.917)^x$

b) $y = 391.354(11.917)^2$

$y = 55,578.09$

⑤ a) $5 = 10(b)^{2.4}$

$\frac{10}{(0.5)^{1/2.4}} = \frac{10}{(b^{2.4})^{1/2.4}}$

$b = 0.766$

$y = 10(0.766)^x$

b) $y = 10(0.766)^{10}$

$y = 0.00001 \text{ units}$

⑥ $(0.5) = (b^7)^{1/2}$

$b = 0.966$

$\frac{18}{0.966^5} = \frac{a}{0.966^5}$

$a = 29.53 \text{ units}$

⑦ a) $y = 736(1.398)^x$

b) Model increases much more quickly than data in years after 1997, otherwise fits well.

c) 1985 $\rightarrow \frac{736.19 - 340}{340} = 117\%$ difference

⑧ $y = ab^x$

$131,000 = 1000(b)^{100}$

$(131)^{1/100} = (b^{100})^{1/100}$

$b = 1.05 \rightarrow \boxed{5\%}$

⑨ a)

| # Half Lives | 0 | 1 | 2 | 3 |
|---------------------------------|---|------|------|-------|
| t = years after start | 0 | 1620 | 3240 | 4860 |
| f(t) = amount of radium present | 3 | 1.5 | 0.75 | 0.375 |

b) $f(t) = 3(0.999572)^t$

$(0.5)^{1/1620} = (b^{1620})^{1/1620}$
 $b = 0.999572$

c) $f(4000) = 3(0.999572)^{4000}$

$\boxed{0.542 \text{ g after } 4000 \text{ yr}}$

⑩ a) on calculator

b) $y = 1.7083x - 3.139$ $r = 0.960$

c) $y = 1.186(1.2995)^x$ $r = .999$

d) Exp. better, stronger "r" value, graph fits scatter plot better \rightarrow passes thru all points.