1. **a.** Let b stand for the base of $f(x)$. Then $f(5) = b^3 \cdot f(2)$, and $f(8) = b^3 \cdot f(5)$.
Substitute the given information into the first equation to get $b^3 = k/4$.
Then the second equation gives $f(8) = (k/4) \cdot k = k^2/4$.

b. From part **a**, $b^3 = k/4$, so $b = \sqrt[3]{k/4}$. So the model is $f(x) = a \cdot (\sqrt[3]{k/4})^x$, and there remains only to find a. To do so, substitute the given point $f(2) = 4$, and solve for a:

$$4 = a \cdot \left(\sqrt[3]{k/4}\right)^2$$

$$a = \frac{4}{\left(\sqrt[3]{k/4}\right)^2}$$

So the final answer is:

$$f(x) = \frac{4}{\left(\sqrt[3]{k/4}\right)^2} \cdot \left(\sqrt[3]{k/4}\right)^x \quad \text{or more simply} \quad f(x) = 4(k/4)^{\frac{x-2}{3}}.$$

2. Set $n \cdot e^{-0.0001216\ t} = \frac{n}{2}$. Simplify by dividing by n, which gives $e^{-0.0001216\ t} = \frac{1}{2}$.
Solve the equation graphically on your calculator to get $t \approx 5700$ years.

3. Your answer could be anything of the form $g(t) = a \cdot 3^{\frac{x}{2}}$ or $g(t) = a \cdot (\sqrt{3})^2$.
You may have chosen a specific number for a; easiest is $a = 1$.

4. **a.** The range is $20 \le t < 200$. If you thought the minimum was 0, note that $P(0) = 20$.

b. The maximum population is 200; 90% would be 180.
Solve $180 = \dfrac{200}{1 + 9e^{(-0.1)t}}$ graphically on your calculator to get $t \approx 43.94$ years.