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For each problem: Identify initial value and ROC. Then write an equation. Give the y-intercept and its meaning in context, and give one more point AND its meaning in context.

1. A population of moths doubles every month. There are 25 moths to begin with. How many moths will there be after one year?

$$y = a(b)^x$$

$$y = 25(2)^{\frac{x}{1 \text{ month}}}$$

$$y = 25(2)^{12} = 102,400$$

2. The number of frogs in a pond triples every year. When the pond was filled, they put two frogs in. How many frogs will be in the pond after 15 years?

$$y = a(b)^x$$

$$y = 2(3)^{\frac{x}{1 \text{ yr}}}$$

$$y = 2(3)^{15} = 28,697,814$$

3. A 47 kg sample of radioactive carbon has a half-life of one year. How much of the sample will be left after 2 years?

$$y = a(b)^x$$

$$y = 47\left(\frac{1}{2}\right)^{\frac{x}{1 \text{ yr}}}$$

$$y = 47\left(\frac{1}{2}\right)^2 = 11.75$$

4. The number of amoeba in the green pond quadruples every week. The pond began with two amoeba. How much amoeba will be in the pond after a month?

$$y = a(b)^x$$

$$y = 2(4)^{\frac{x}{1 \text{ week}}}$$

$$y = 2(4)^4 = 512$$

5. A population of moths triples every 6 months. There are 23 moths to start with. How many moths will there be after 4 years?

$$y = a(b)^x$$

$$y = 23(3)^{\frac{x}{6 \text{ mos}}}$$

$$y = 23(3)^{\frac{48}{6}} = 150,903$$

6. The number of frogs in a pond doubles every 7 months. The pond started with 2 frogs. How many frogs will there be in 35 months?

$$y = a(b)^x$$

$$y = 2(2)^{\frac{x}{7 \text{ months}}}$$

$$y = 2(2)^{\frac{35}{7}} = 64$$

7. A 75 kg sample of a radioactive substance has a half-life of 175 days. How much of the sample will be left after 525 days?

$$y = a(b)^x$$

$$y = 75\left(\frac{1}{2}\right)^{\frac{x}{175 \text{ days}}}$$

$$y = 75\left(\frac{1}{2}\right)^{\frac{525}{175}} = 9.375$$

8. The number of amoeba in the green pond triples every 84 hours. The pond began with two amoeba. How much amoeba will there be in the pond at 50 hours?

$$y = a(b)^x$$

$$y = 2(3)^{\frac{x}{84 \text{ hrs}}}$$

$$y = 2(3)^{\frac{50}{84}} = 3.84$$