6. In a laboratory, an organism doubles every 8 hours.

    a. Approximately how many organisms will there be in 312 hours?

    b. Approximately how many *days* will pass before there are 400 organisms?

7. Strontium 90 has a half life of 29 years. There are 1000 grams of Strontium 90 currently.

    a. How much Strontium 90 will be left after 184 years?

    b. When will there be approximately 431 grams of Strontium 90 left?

    c. A scientist found an artifact that contained 25% as much Strontium 90 as it had originally. How old is the artifact?

HW + BOOK WORK!   **Round to the nearest hundredth unless discussing living things**

1. How many days will it take a culture of bacteria to increase from 2000 to 50,000 if the growth rate per day is 93.2%?

$$50{,}000 = 2000(1 + .932)^x$$
$$25 = 1.932^x$$
$$\log_{1.932} 25 = x$$

$$\approx 4.89 \text{ days}$$

2. How many hours will it take a culture of bacteria to increase from 20 to 2000 if the growth rate per hour is 85%?

$$2000 = 20(1 + .85)^x$$
$$100 = 1.85^x$$
$$\log_{1.85} 100 = x$$

$$\approx 7.49 \text{ hours}$$

3. Louisa read that the population of her town has increased steadily at a rate of 2% each year. Today, the population of her town has grown to 68,735. Based on this information, what was the population of her town 100 years ago?

$$68735 = x(1+.02)^{100} \quad \text{OR} \quad x = 68735(1.02)^{-100}$$

$$x \approx 9,487 \text{ people}$$

4. A population of 8,000 people depreciates every decade at the rate of 4.5%.

a. How many people will be in the town in 3 decades?

$$x = 8000(1-.045)^3 \qquad x \approx 6,967 \text{ people}$$

b. How many people were in the town 50 years ago?

$$x = 8000(1-.045)^{-5} \qquad x \approx 10,071 \text{ people}$$

5. A piece of machinery valued at $250,000 depreciates at a fixed rate of 12% per year. After how many years will the value have depreciated to $100,000?

$$100,000 = 250,000(1-.12)^x$$
$$.4 = .88^x$$
$$\log_{.88} .4 = x \qquad x \approx 7.17 \text{ years}$$

6. Suppose you decide to plant asparagus in your garden. You first harvest 10 stalks in 1995. By 1997, you produce 30 stalks. Assume your harvest increases exponentially. How long will it take to grow 100 stalks?

$(0, 10)$
$(2, 30)$

$$y = 10 \cdot 1.732^x$$

x	y
0	10
1	?
2	30

$10b^2 = 30$

$$100 = 10 \cdot 1.732^x$$
$$10 = 1.732^x$$
$$\log_{1.732} 10 = x \qquad x \approx 4.19 \text{ years}$$

7. In a healthy adult, caffeine has a half life of about 5 hours. If an adult consumes 100 mg of caffeine, how long will it take for the body to *metabolize* 35 mg?

$$65 = 100(\tfrac{1}{2})^{t/5}$$
$$.65 = (.5)^{t/5}$$
$$\log_5 .65 = t/5$$

$$.62 = t/5$$

$$t = 3.11 \text{ hours}$$