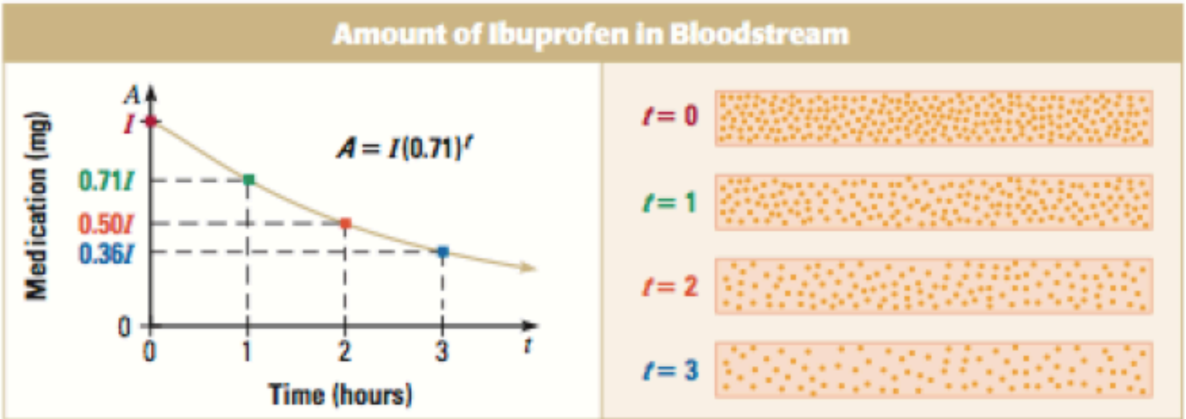
Precalculus Name ____________________________

3.1 Notes-Part 4: Application Problems

1\. **MEDICINE** When a person takes a dosage of I milligrams of ibuprofen, the amount A (in milligrams) of medication remaining in the person's bloodstream after t hours can be modeled by the equation $A = I(0.71)^t$.



Find the amount of ibuprofen remaining in a person's bloodstream for the given dosage and elapsed time since the medication was taken.

a. Dosage: 200 mg
Time: 1.5 hours

b. Dosage: 325 mg
Time: 3.5 hours

c. Dosage: 400 mg
Time: 5 hours

2\. **Bike Costs: You buy a new bike for \$200. The value of the bike decreases by 25% each year.**

a) Write a model giving the mountain bikes value in dollars after t years.

b) Graph the model.

c) Estimate when the value of the bike will be \$100.

3. **The value of a car can be modeled by $y = 24000(0.845)^t$ where t is the amount of years since the car was purchased.**

a) What was the original price of the car?

b) By what percent is the car depreciating each year?

c) Sketch a graph of the model. Estimate when the car will be worth $10,000.

d) Estimate the car's value in 50 years. Is this a reasonable value?

4. **When a plant or animal dies, it stops acquiring carbon-14 from the atmosphere. Carbon-14 decays over time with a ½ life of about 5,730 years. The percent P of the original amount of Carbon-14 that remains in a sample after t years is given by:** $P = 100\left(\frac{1}{2}\right)^{\left(t/5730\right)}$.

a) What percent of the original carbon-14 remains in a sample after:
2500 years? 5000 years? 10,000 years?

b) An archaeologist found a bison bone that contained about 37% of the carbon-14 present when the bison died. Make a graph and use your answers to part a to establish your windows. Estimate the age of the bone when it was found.