Algebra RH

Essential Question: How can we represent exponential relationships symbolically?

Do Now: Read the scenario below and answer the questions that follow.

When a piece of paper is folded in half, the total thickness doubles. Suppose an unfolded piece of paper is 0.1 millimeter thick. The equation $\boldsymbol{t(n) = 0.1(2)^n}$ represents the total thickness, $\boldsymbol{t(n)}$, as a function of the number of folds, $\boldsymbol{n}$.

a) The function $\boldsymbol{t(n) = 0.1(2)^n}$ is an explicit rule created from $\boldsymbol{t(n) = ab^n}$. In the explicit rule, what is the value of **a**? What does this number represent in the context of the problem?

b) What is the value of **b**? What does this number represent in the context of the problem?

c) Using the function, determine the thickness of the paper after 5 folds.

How do we write a function rule to represent an exponential relationship?

1. Identify the values of **a** and **b** in $\boldsymbol{f(x) = ab^x}$.
   - **a** represents the initial value (0, a)
   - **b** represents the common ratio
2. Write the function by substituting the values of **a** and **b** into $\boldsymbol{f(x) = ab^x}$.

1. The height $\boldsymbol{h(n)}$ of a dropped ball is an exponential function of the number of bounces $\boldsymbol{n}$. The ball was dropped from an initial height of 40 inches. On its first bounce, it reached a height of 30 inches and on its second bounce, it reached a height of 22.5 inches. Write an exponential function in the form of $\boldsymbol{h(n) = ab^n}$ that represents this scenario.

2. A pharmaceutical company is testing a new antibiotic. The number of bacteria present in a sample 1 hour after application of the antibiotic is 50,000. After another hour, the number of bacteria present in the sample is 25,000. The number of bacteria remaining, ***r*(*n*)**, is an exponential function of the number of hours, ***n***, since the antibiotic was applied.

   a) Complete the table below that describes the relationship.

Number of Hours ***n***	0 Initial Amount	1	2	3	4
Amount of Bacteria ***r*(*n*)**					

   b) Write an exponential function to represent the above scenario.

   c) Using your function, determine the amount of bacteria that will remain in the sample after the 7^{th} hour.

3. Suppose you invest some money in an interest bearing account. After the first month, the balance, including interest, is $10,500. Following the second month, the balance is $11,025. Following the 3rd month, the balance is $11,576.25. Write an exponential function in **f(x) = ab^x** form to represent the balance in the account after **x** months. Use the table below to help you.

Months x	0	1	2	3
Balance in Account f(x)				

In order to represent an exponential relationship as a function in the form of **f(x) = ab^x**,

identify **a**, _____(y-intercept),

and **b,** _____.