8 Algebra CC
Unit 12 Review – Exponential Functions

Important Terminology

exponential function	initial value	common ratio (growth/decay factor)
interval	exponential growth	exponential decay
growth rate	decay rate	

Exponential Function: $y = ab^x$ **Growth Model**: $y = a(1 + r)^t$ **Decay Model:** $y = a(1 – r)^t$

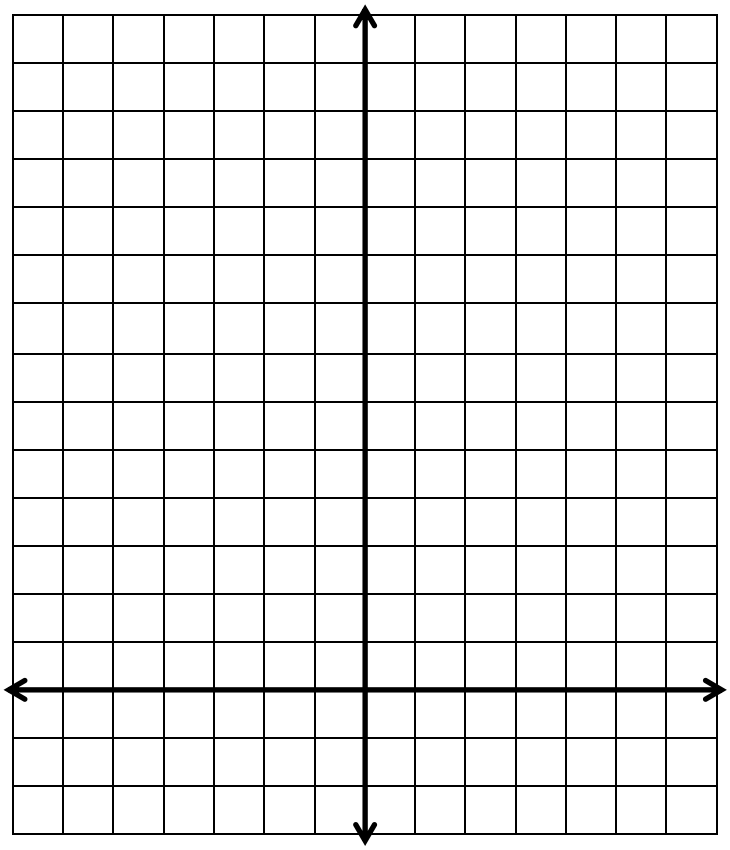
What should I be able to do?

1. Graph exponential functions with restricted and unrestricted domains.
2. Determine if an exponential function is increasing or decreasing from a table, graph and equation.
3. Identify the y-intercept and common ratio of an exponential function from a table, graph and equation.
4. Determine the average rate of change of a function over a specified interval.
5. Model situations/relationships with exponential functions.
6. Solve problems using an exponential growth or decay model.
7. Determine if a function is linear or exponential by examining a table, graph or equation.
8. Determine if a situation or set of data is best modeled by a linear or exponential function.

Practice Problem Set

1. Graph the exponential function $y = 2(¼)^x$ given the *domain* $-1 \leq x \leq 3$.

x	y

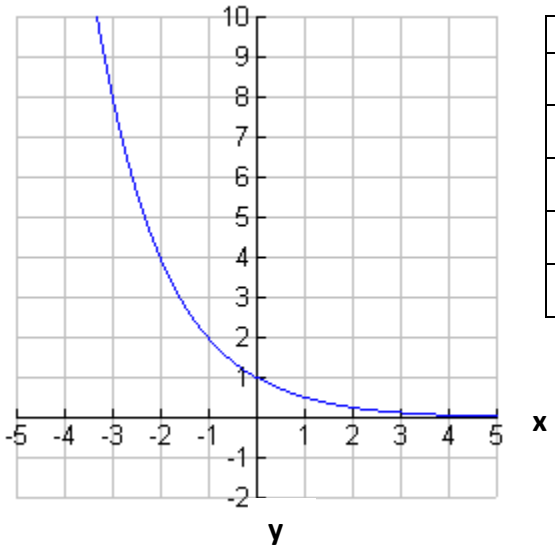


Remember to label everything!

2. Identify the **y-intercept** of each function below and state whether the function will ***increase*** or ***decrease*** when graphed.

a) $f(x) = 34(2.75)^x$ b) $f(x) = (0.25)^x$ c) $f(x) = \frac{2}{3}\left(\frac{3}{2}\right)^x$

3. Which function is decreasing at a faster rate over the interval $-3 \leq x \leq -1$?



x	y
-5	21.5
-4	18
-3	14.5
-2	11
-1	7.5

4. A pharmaceutical company has tested a new time-release cold pill. It finds that the amount of milligrams, ***f(n)***, of the active ingredients of the pill left in the bloodstream ***n*** hours after it is taken can be estimated using the function $f(n) = 35(0.87)^n$.

a) How many milligrams of cold medicine are in the pill before it is swallowed?

b) What percent of the drug leaves the body each hour?

c) How many milligrams, *to the nearest thousandth*, of the cold medicine remain in the body after 5 hours have passed?

5. Find the balance of an account after 5 years that pays 5.2% interest compounded yearly with an initial investment of $1250.

6. Between 1990 and 2000, the profits of a business decreased approximately 0.7% each year. In 1990, the business's profit was $1.4 million. What was the profit in 1996?

7. A construction company purchased a piece of equipment valued at $300,000. The value of the equipment depreciates at a rate of 14% per year.

   a) Write an equation that determines the approximate value of the equipment each year.

   b) What is the value of the equipment after 9 years?

   c) Estimate when the equipment will have a value of $50,000.

8. A business publication recently reported profit trends of four computer companies over the past decade. Each company's earnings can be summarized by the functions below labeled A – D where ***P(t)*** represents the profit over ***t*** years.

   A. $P(t) = 1{,}430{,}000(1.29)^t$ **B.** $P(t) = 2{,}345{,}000(0.76)^t$

   C. $P(t) = 1{,}987{,}000(1.095)^t$ **D.** $P(t) = 2{,}000{,}500(0.695)^t$

   I. Which companies are making money? _____

   II. Which companies are losing money?_____

   III. What are the ***growth rates*** of each company that is making money?

   IV. What are the ***decay rates*** of each company that is losing money?

   V. Which company is earning money the fastest? Which company is losing money the fastest?

9. What type of function best models the situation?

   A. Gregory plans to purchase a video game player. He has $500 in his savings account and plans to save $20 per week from his allowance until he has enough money to buy the player.

   B. City workers recorded the number of squirrels in a park over a period of time. At the first count, there were 15 pairs of male and female squirrels (*30 squirrels total*). After 6 months, the city workers recorded a total of 60 squirrels and after a year there were 120 squirrels.

10. According to the International Basketball Federation (FIBA), a basketball must be inflated to a pressure such that, when it is dropped from a height of 1,600 mm, it will rebound to a height of 1,200 mm. Maddie decides to test the rebound ability of her new basketball. She assumes that the ratio of each rebound height to the previous rebound height remains the same. Let ***f(n)*** be the height of the basketball after ***n*** bounces.

    a) Complete the chart below to reflect the heights Maddie expects to measure.

n	***f(n)***
0	1600
1	1200
2	
3	
4	

    b) Write an exponential function that models this situation.

    c) Graph the function on the grid below from 0 to 10 bounces. Using the curve created, estimate the bounce number at which the rebound height will drop below 200 mm.