

Exponential Functions

Objective: SWBAT Solve for missing values in Exponential Equations

Language Objective: SWBAT identify the missing value with a partner by reading the problems and writing the solution onto a their answer slip.

Agenda

- 1) Collect Projects
- 2) Do Now - Read Test Objective, Sketch, Answer
- 3) Answer Key Pages - on Whiteboard
Worksheet #6

HW: TEST next class!
Study- finish worksheet 6 & 4

Exponential Functions (Sections 6.1 – 6.5 in Algebra 2)

At the end of this unit, you should be able to...

- Identify a linear, quadratic, or exponential function
- Classify an exponential function as representing exponential growth or exponential decay
- Determine the multiplier for exponential growth and decay
- Write and evaluate exponential expressions to model growth and decay situations
- Use the compound interest formula
- Graph exponential functions

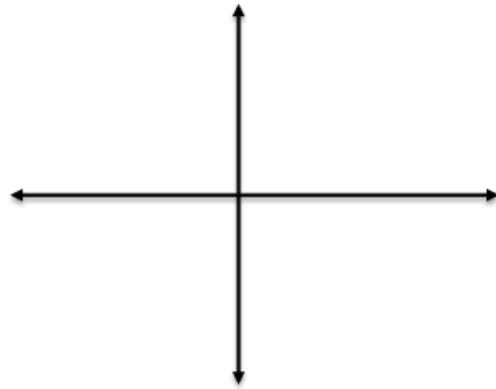
$$A(t) = P(1 \pm r)^t$$

$$A(t) = P\left(1 + \frac{r}{n}\right)^{(n \cdot t)}$$

DO NOW

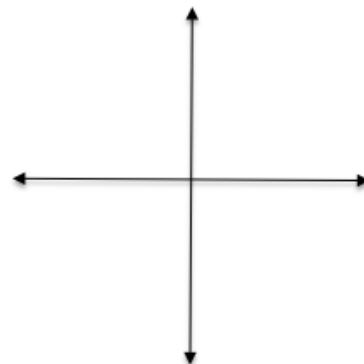
1. Use the grid to sketch the graph of $y = 2^x$. [4 pts]

- a) Domain _____
- b) Range _____
- c) Y-intercept (____, ____)



2. Use the grid to sketch the graph of $y = 5\left(\frac{1}{3}\right)^x$
[5 pts]

- a) Domain _____
- b) Range _____
- c) Y-intercept (____, ____)
- d) Will the graph ever cross the x-axis? Why or why not?



WORKSHEET #6
Exponential Function Review

Name _____

Test Date: _____

1. For the exponential function: $y = 80(1.5)^x$

a) What is the initial value?

b) What is the multiplier?

c) What is the rate?

d) Growth or decay?

2. A \$100 investment is in a savings account with an interest rate of 4.5% a compounded monthly.

a. Write the equations the models this.

b. Find amount in 3 years.

c. How long until it doubles? (Round to nearest 1st decimal.)

3. Your used car is worth \$5800. If the rate of depreciation is 13%,

a) Find the value of the car after 5 years.

b) If the car is eight years old, what was the new value?

4. An average price for a 1-gallon of gas in 1998 was about \$1.5, suppose if now the average price is \$3.14, then

a. Find the rate of inflation per year.

b. Write the equation that models the increasing price of gas.

c. Suppose the price keeps increasing at this rate, what is the average price in 5 more years?

5. Find the balance on a \$500 investment with an APR (this is the r) of 4% after 10 years, if

a. Compounded quarterly

b. Compounded monthly.

c. Compounded daily.

6. Determine if the functions are growth (g) or decay (d).

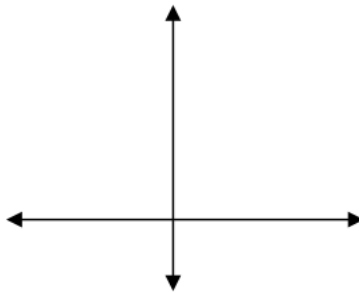
a) $y = 0.1 \cdot 2^x$ _____

b) $f(x) = 9(.25^x)$ _____

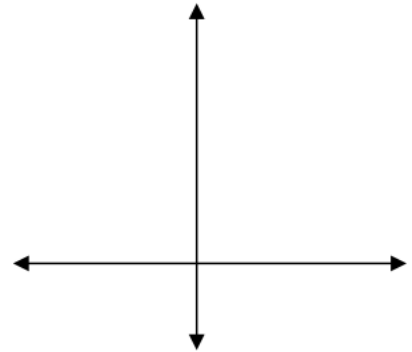
c) $y = \left(\frac{3}{2}\right)^x$ _____

d) $f(x) = 27 \cdot 3^{-x}$ _____

7. a) Sketch a graph that is an exponential growth.



b) Sketch a graph that represents an exponential decay.



8. A crazy growing germ found on the desks in room 469 doubles every day. Suppose on your desk today there is a population of 55 germ cells.

a) Write the equation that models this. Label your variables.

b) How many cells will there be in 3 days?

c) How many in 2 weeks?

d) How many 5 days **ago**?

9. You buy your first car for \$5000 in 2008. The average **rate** of depreciation for this particular car model is 16%.

a) What is the value of your car after 1 year?

b) What is the value of the car 3 years and 6 months from now?

c) If the car was already 7 years old when you bought it, then what was the value brand new?

10. In college you take out a \$1000 loan your freshmen year to buy books and things, the lender gives you the loan at a rate of 8.5% **compounded daily**. You will not make any payments on the loan until you graduate (*hopefully 4 years later.*) What is the amount you will owe in 4 years?

11. My computer 5 years ago was valued at \$2225, if now it is worth \$450.

a. Find the multiplier

b. Find the equation that models this.

c. What is the rate of depreciation?

d. How much will it be in 5 more years?

12. Find the balance on a \$500 investment with an APR (this is the r) of 3.75% after 5 years, if:

d. Compounded quarterly

e. Compounded monthly.

f. Compounded daily.

13. Using the graphs below, answer the following questions. There could be none to more than one answer.

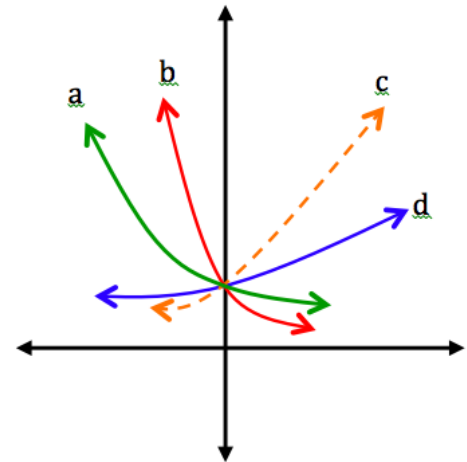
Which one(s) are/have:

i) A negative rate? _____

ii) The largest multiplier? _____

iii) Will eventually touch the x -axis? _____

iv) Could be the graph of $y = 2^{-x}$? _____



14. Fill in with correct response.

- a) If the rate of growth is 0.1% then what is the multiplier?___
- b) If something has half-life, then the rate (*circle one*) *growth / decay* is ___?
- c) If an interest rate is compounded quarterly then is it compounded how many times per year?___
- d) What is the **rate** of an exponential function that doubles?___

15. Suppose the number of rabbits found on university campus **doubles** every month. Suppose today there is a population of 24.

- e) Write the equation that models this. Label your variables.
- f) How many bugs will there be in 4 months?
- g) How many in a **year**?
- h) How many a 6 weeks **ago**?

16)

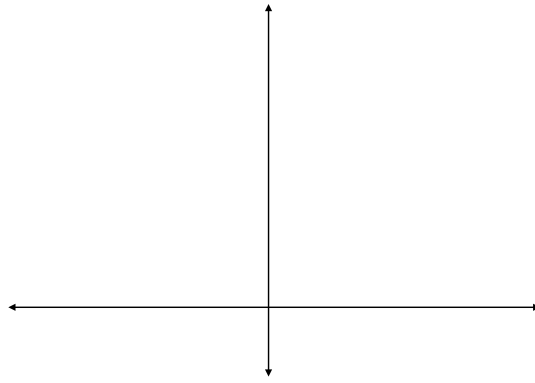
A) Sketch the graph of $f(x) = 3^x$

a. Domain:

b. Range:

c. y- intercept:

d. x -intercept:

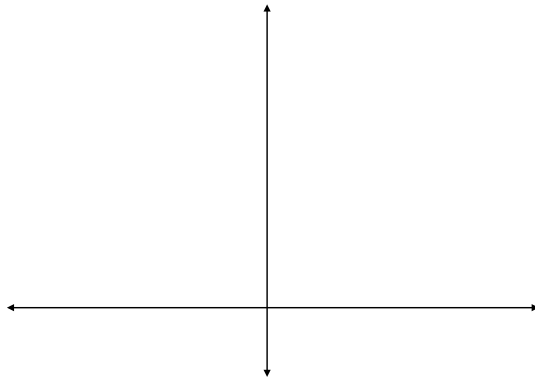
B) Sketch the graph of $f(x) = \frac{1}{3}^x$

a. Domain:

b. Range:

c. y- intercept:

d. x -intercept:

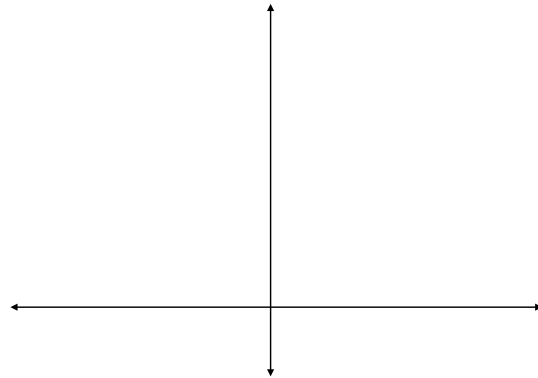
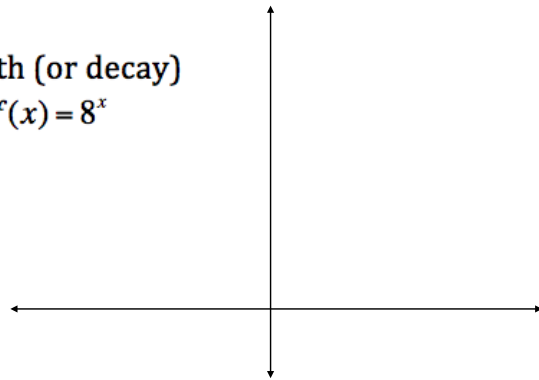
C) Sketch the graph of $f(x) = 4(3)^x$

a. Domain:

b. Range:

* c. y- intercept:

d. x -intercept:

D) Knowing how the base affects growth (or decay) of a function, sketch $f(x) = 2^x$ and $f(x) = 8^x$ 

WORKSHEET #4

Name _____

Setting up Exponential Scenarios and Solving for Different Values

Problem	Equation (what are you solving for?)	Solution/Answer
1) A ball falling from 30 feet up bounces back up to a height equal to 70% of the height from which it was dropped, and then bounces up to 70% of the height, etc. How high will the ball bounce on its 5 th bounce?		
2) The cost of public college tuition has been going up at the rate of 4% a year. If tuition your freshman year is \$12,000 a year, what will be the cost 4 years later now when you will be a senior?		
3) A house purchased for \$226,000 has lost 4% of its value each year for the past five years. What is it worth now?		
4) Suppose you invested \$375 into an account that earned .01% compounded semiannually. If you left the money in the account for 50 years, how much money will it be worth at the end of 50 years?		
5) Inflation is at a rate of 7% per year. Today Janelle's favorite bread costs \$3.79. What would it have cost ten years ago?		
6) A certain time-release medication decays in your blood stream at the rate of 12% an hour. After 24 hours, there is 1.4 gram left in your blood stream. What was the original dosage of the medication?		
7) You invest \$5000 and after 20 years you have \$28,000. What is the base of this exponential equation and what is the average yearly rate of interest of your investment?		
8) On day 9 of a flu outbreak, 300 cases were reported. 10 days later, 1000 cases were reported. Find the multiplier? What is the percent increase?		
9) Last year the principal's car was worth \$28,000. Next year it will be worth \$25,270. What is the annual rate of depreciation? What is the car worth now?		

14) Tanzania is one of the fastest growing countries in the world, with its population increasing at an annual rate of 2.75%

a) If Tanzania's population is now 46,000,000, what is the general equation showing Tanzania's population in x years, assuming that the country's growth remains the same?

b) What will be Tanzania's population 10 years from now, assuming it continues to grow at the same rate. Show the equation that you need to solve to answer this, and then solve it.

c) When will Tanzania's population triple in size, approximately? Show the equation you get and then solve that equation.

d) Suppose that instead of growing at a rate of 2.85% per year, Tanzania's growth rate decreased so that its population would double in 40 years. What annual rate of growth would lead to a doubled population in 40 years? Again, show the equation you would use and then solve it.

15) A concert has been sold out for weeks, and as the date of the concert draws closer, the price of the ticket increases. The cost of a pair of tickets was \$150 yesterday and is \$162 today. Assuming that the cost continues to increase at this rate:

a. What is the daily rate of increase? What is the multiplier?

b. What will be the cost one week from now, the day before the concert?

c. What was the cost two weeks ago?

16) Ms. D'Antonio tells you that she invested money in a stock a few years ago. After 2 years she is \$4,500, and after 7 years she has \$6,000.

a) What is the growth rate of the stock? (Percent increase)

b) What was the initial amount she invested in the stock?

c) Use your equation to determine how much money Ms. D will have after 20 years.