Name: Date: Period:

Consider this…Many teenagers would like to persuade their parents to pay them an allowance in the following way. One cent (1¢) is paid on the first day of the month and doubled each successive day. The table shows the amount to be paid each day for the month of February.

Day	x	Amount	Day	x	Amount	Day	x	Amount	Day	x	Amount
1	0	$.01	8	7	$1.28	15	14	$163.84	22	21	$20,971.52
2	1	$.02	9	8	$2.56	16	15	$327.68	23	22	$41,943.04
3	2	$.04	10	9	$5.12	17	16	$655.36	24	23	$83,886.08
4	3	$.08	11	10	$10.24	18	17	$1,310.72	25	24	$167,772.16
5	4	$.16	12	11	$20.48	19	18	$2,621.44	26	25	$335,544.32
6	5	$.32	13	12	$40.96	20	19	$5,242.88	27	26	$671,088.64
7	6	$.64	14	13	$81.92	21	20	$10,485.76	28	27	$1,342,177.28

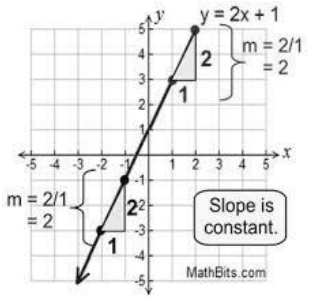
The amount due on the last day is OVER one million dollars, and it all started with just one penny!!!

This is an example of an Exponential Function. An **EXPONENTIAL FUNCTION** has an equation in which the variable is in the exponent.

For example: 3^x, -4^{2x}, 7^{-3x}

Linear Function

Rate of change is constant across the graph



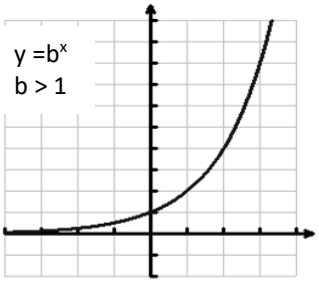
Standard Form:

$y = mx + b$

Exponential Growth Function

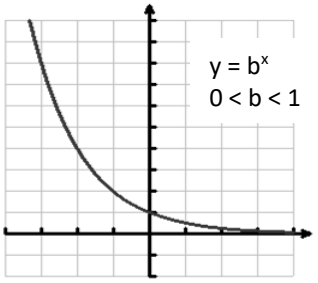
Curve rises from left to right

Rate of change increases (or decreases) across the graph



Exponential Decay Function

Curve falls from left to right



Standard Form:

y-intercept: Location where the graph of the equation will intersect the y-axis….Initial Value

$y = a(b^x)$

Growth Factor: The quantity that is increasing/decreasing at a growing rate

Let's start by Evaluating Exponential Functions. Evaluate each function at the given value.

1. $f(x) = \frac{1}{3} \cdot 6^x$ at x = 2

2. $f(n) = 10 \cdot 2^n$ at n = 5

3. $f(n) = 10 \cdot 2^n$ at n = -2

4. $g(x) = \frac{1}{5} \cdot (\frac{1}{3})^x$ at x = 3

Name: Date: Period:

Answer the following questions. Watch out for multiple choice questions that try to trick you with negative exponents. Remember that negative exponents mean fractions!

1. Which of the following is not an exponential function?

   (a) $y = 3^x$ (b) $y = 2(5^x)$ (c) $y = x^3$ (d) $y = (\frac{1}{4})^x$

2. If $a \neq 0$ and $y = a^x$, what value of x will result in a value of 1 for y?

   (a) $x = 1$ (b) $x = -1$ (c) $x = a$ (d) $x = 0$

3. The function $y = a(b^x)$ will represent exponential GROWTH when:

   (a) $a > 0$ and $b > 1$ (b) $a < 0$ and $b < 1$ (c) $a < 0$ and $b > 1$ (d) $a > 0$ and $b < 1$

4. Which of the following is not an exponential function?

   (a) $5^x - 3$ (b) $3(\frac{5}{2})^x$ (c) $5x^3$ (d) $(0.25)^x$

5. Which exponential equation represents exponential DECAY?

   (a) $y = 0.5(1.5)^x$ (b) $y = 1.5\ (3)^x$ (c) $y = \frac{7}{2}(2)^x$ (d) $y = 3(\frac{2}{7})^x$

6. Which of the following is not an exponential function?

   (a) $y = 0.2(8^x)$ (b) $y = 4x^2$ (c) $y = (\frac{1}{4})^x + 2$ (d) $y = 2^x$

7. Which of these could depict exponential growth?

   (a) $y = 2.5^{-x}$ (b) $y = 0.25^x$ (c) $y = 2^x$ (d) $y = x^2$

8. When an exponential function has a base that is > 1, does its graph rise or fall from left to right? Explain.

9. When an exponential function has a base that is < 1, does its graph rise or fall from left to right? Explain