Exponent Law Quiz

a) $\frac{a^5}{a^2}$ $= a^3$

b) $(x^3y^2)^0$ $= 1$

c) x^3x^5 $= x^8$

d) $(2p^5)^3$ $= 2^3p^{15}$ $= 8p^{15}$

e) $\left(\frac{a^2}{b}\right)^{-3}$ $= \left(\frac{b}{a^2}\right)^3$ $= \frac{b^3}{a^6}$

f) $\frac{a^2 \times a^2}{a^3 \times a}$ $= \frac{a^4}{a^4}$ $= 1$

g) $\left(\frac{2x^2}{y^3}\right)^{-2}$ $= \left(\frac{y^3}{2x^2}\right)^2$ $= \frac{y^6}{2^2x^4}$ $= \frac{y^6}{4x^4}$

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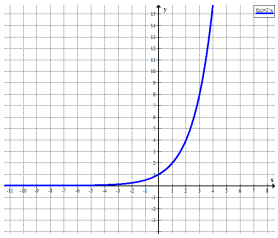
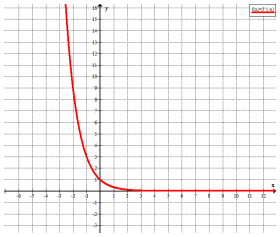
4.3 Exponential Relationships

The graph of an exponential relation is a smooth curve that is almost horizontal at one end and increases or decreases rapidly at the other end.

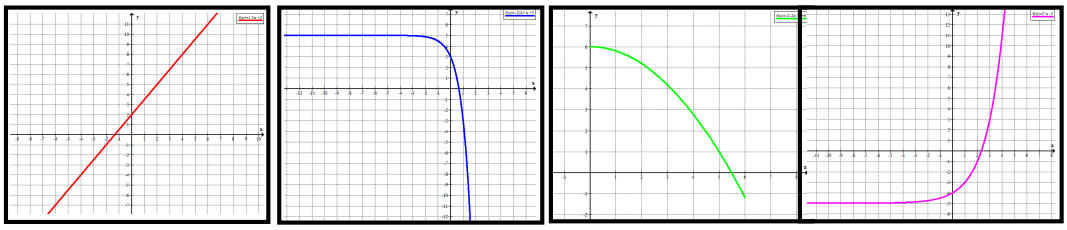


This function represents exponential growth ...it is increasing rapidly.



This function represents exponential decay ...it is decreasing rapidly.

Ex. 1 Which graph could represent an exponential function?



NO YES NO YES

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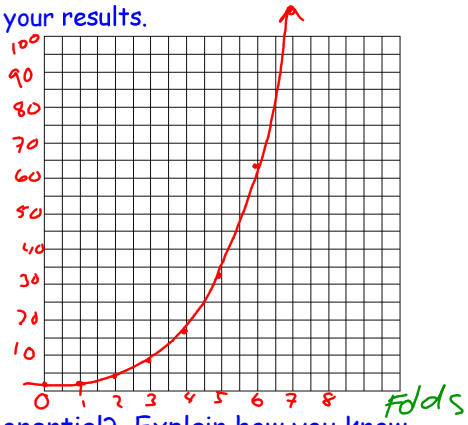
Example: Take a regular 8.5" x 11" piece of paper and fold it in half...then in half again...and so on. Record the # of rectangles created on the paper by each successive fold. Graph your results.

# folds	# rectangles
0	1
1	2
2	4
3	8
4	16
5	32
6	64
7	128



a) Is this relationship exponential? Explain how you know.

Yes; rapid increase, and constant ratio

b) Does the relation model growth forever? Explain.

Theoretically yes, but there are limits to how many times you can fold paper

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An **EXPONENTIAL FUNCTION** is a function with a variable in the exponent. $y = a^x$

Some examples would be $y = 2^x$ $y = 10^x$ $y = \left(\frac{2}{3}\right)^x$

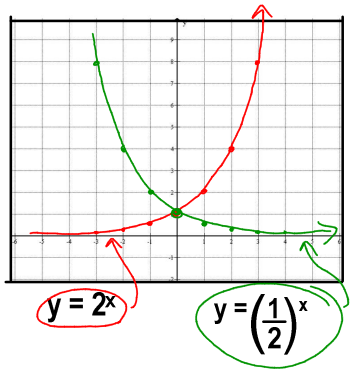
Complete the table of values and graph each

$y = 2^x$

x	y
-3	1/8
-2	1/4
-1	1/2
0	1
1	2
2	4
3	8
4	16

$y = \left(\frac{1}{2}\right)^x$

x	y
-3	8
-2	4
-1	2
0	1
1	1/2
2	1/4
3	1/8
4	1/16



What similarities do you notice between the two graphs?

- Same y-int
- Never touch x-axis
- Are exponential

What differences do you notice between the two graphs?

- Reflections
- One is growth
- One is decay

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Explore with desmos and note how the exponential function changes, as the base changes.

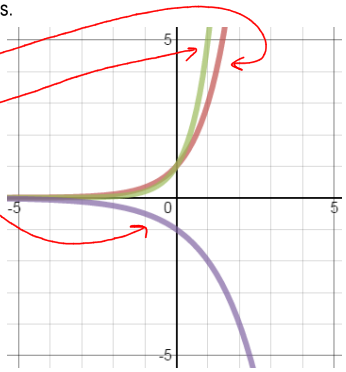
Graph the following:

$y = 3^x$

$y = 5^x$

$y = -2^x$

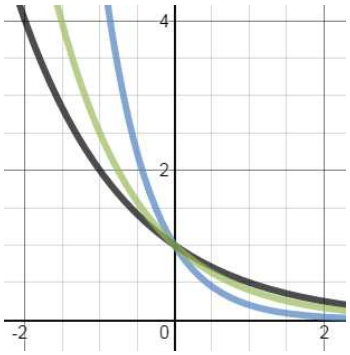
Notice the negative is not in brackets



$y = \left(\frac{1}{5}\right)^x$

$y = \left(\frac{2}{5}\right)^x$

$y = \left(\frac{1}{2}\right)^x$



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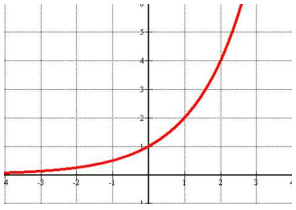
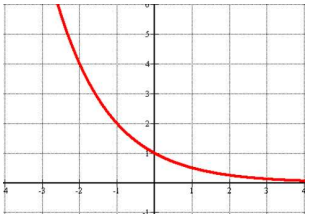
KEY IDEAS

- $y = b^x$ is an exponential function note $b>0$ and $b \neq 1$
- you can determine the value of b (the base) by looking at the value of y when x = 1
- When b >1, (from left to right) = exponential growth
- When 0 < b < 1,(from left to right) = exponential decay
- for $y = b^x$ the y-intercept is 1 ie when x = 0
- there are no x-intercepts





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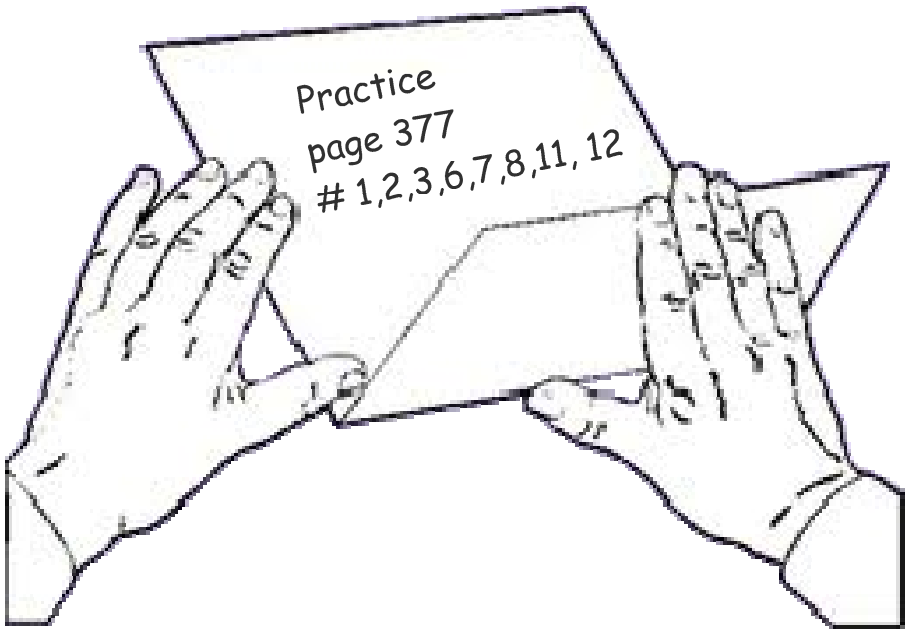

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