



Name: _____

Date: _____

Period: _____

4A-1: Graphing Exponential Functions

Definition

An **exponential function** is of the form

$$f(x) = a(b^x)$$

Where a is nonzero, b is positive, and $b \neq 1$. The constant a is the initial value and b is the base.

Try These:

Which of the following are exponential functions?

a) $f(x) = 2.5^x$

b) $g(x) = 2(-3)^x$

c) $h(x) = .5(2^{-x})$

d) $j(x) = 2(x^3)$

Exploring Exponential Functions and Graphs

Legend has it...

There once was a peasant in India who invented the game of chess. The ruler of the land was so pleased the game, that he wanted to reward the peasant for his creation. So, he asked the man what he would like for his reward. After thinking for a few minutes he said, "I don't need much. How about if you take my 8×8 chess board and put 1 grain of rice on the first square, 2 grains on the second square, 4 on the third, and continuing doubling the grains of rice on each square

- 1) Write an exponential function to model the number of grains of rice g that would be placed on square x .
- 2) How many grains of rice were needed to put on the last square?
- 3) If a grain of rice has a volume of $1 \text{ grain} = .03 \text{ cm}^3$, what is the volume of the rice that would be on the last square?
- 4) The world production of rice is approximately 686,385 liters per year (source: www.fao.org/rice2004/en/kids.htm). How does the amount of rice *on the last square* compare to the amount of rice produced in a year?
($1 \text{ liter} = 1000 \text{ ml} = 1000 \text{ cm}^3$)
- 5) *Extra Challenge:* How many liters of rice would there be on the entire board?

Graph it

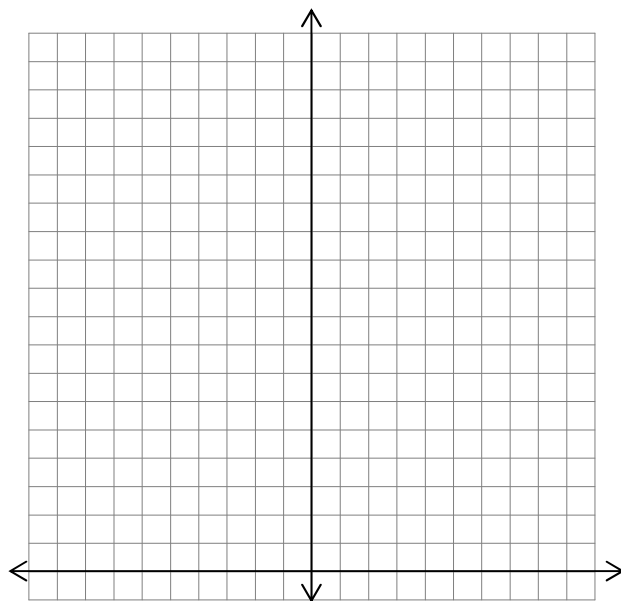
Graph the following functions by hand on the same axes:

$$y = 2^x$$

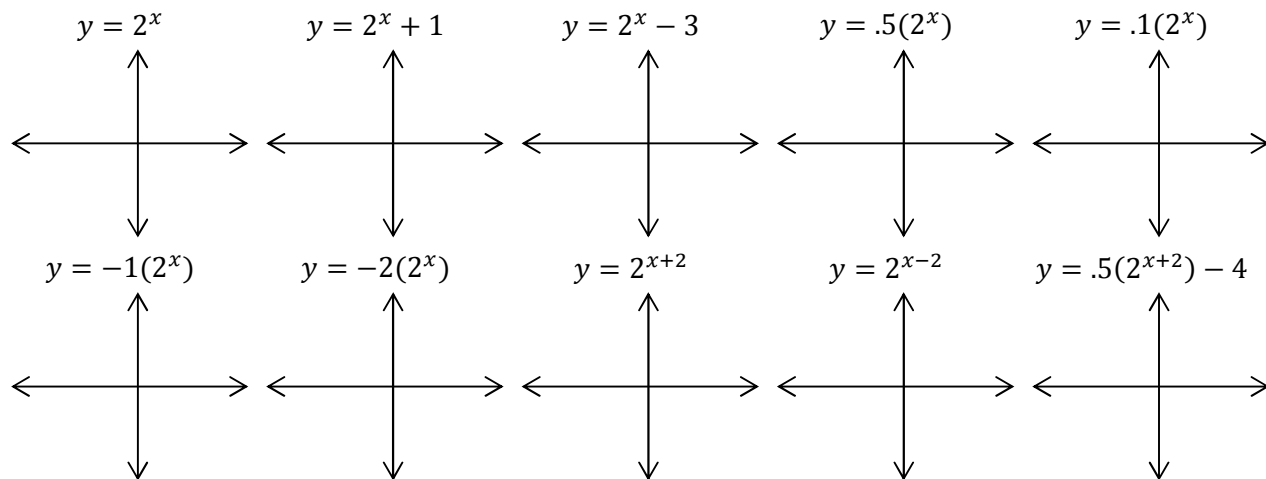
$$y = 3^x$$

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

$$y = \left(\frac{1}{3}\right)^x$$



Now let's explore some translations. Graph the following on your calculator and sketch the graph.



Describe how the values of a , b , c and d affect the graph of $y = a(b^{x+c}) + d$

a :

b :

c :

d :