Precalc 11.1
Graph exponential functions and inequalities
Solve problems involving exponential growth and decay

exponent

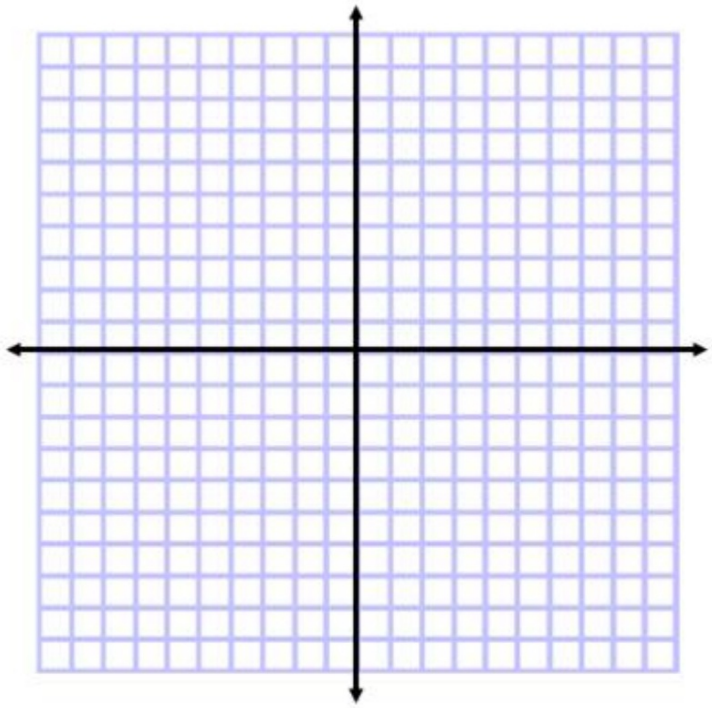
base

exponential change

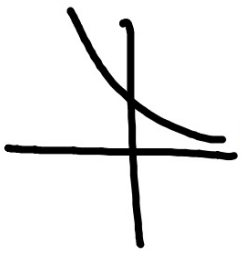
A_o N_o etc.

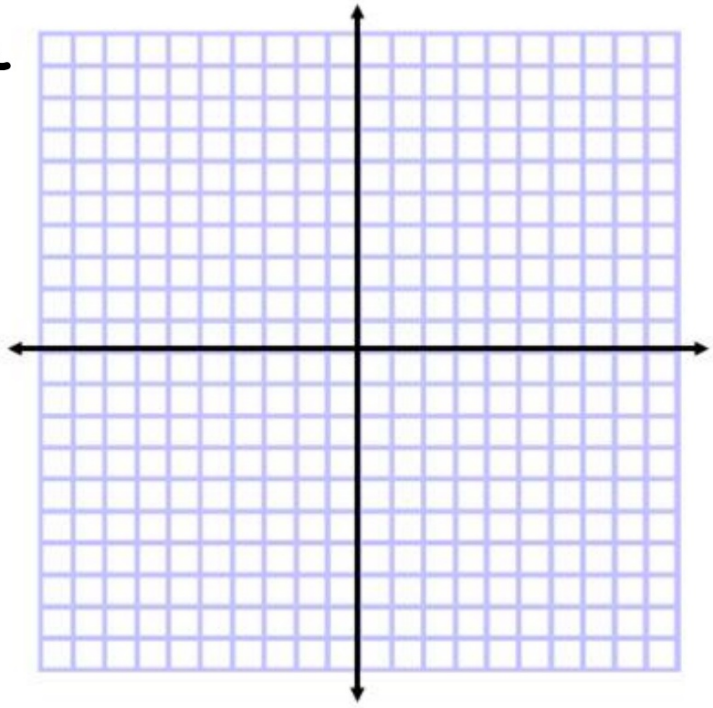
1 a. Graph the exponential functions $y = 4^x$, $y = 4^x + 2$, and $y = 4^x - 3$ on the same set of axes. Compare and contrast the graphs.

$y = 4^{(x-3)}$



b. Graph the exponential functions $y = \left(\frac{1}{5}\right)^x$, $y = 6\left(\frac{1}{5}\right)^x$, and $y = -2\left(\frac{1}{5}\right)^x$ on the same set of axes. Compare and contrast the graphs.



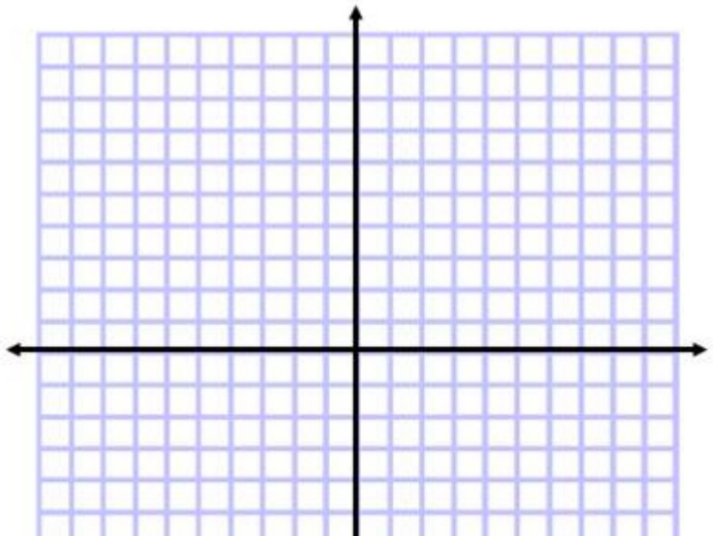


2 **PHYSICS** According to Newton's Law of Cooling, the difference between the temperature of an object and its surroundings decreases in time exponentially. Suppose a certain cup of coffee is 95°C and it is in a room that is 5°C. The cooling for this particular cup can be modeled by the equation $y = 90(0.875)^t$ where y is the temperature difference and t is time in minutes.

a. Find the temperature of the coffee after 15 minutes.

b. Graph the cooling function.

95
- 12.4



4 **FINANCE** Determine the amount of money in a money market account providing an annual rate of 5% compounded daily if Marcus invested $200 and left it in the account for 7 years.

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

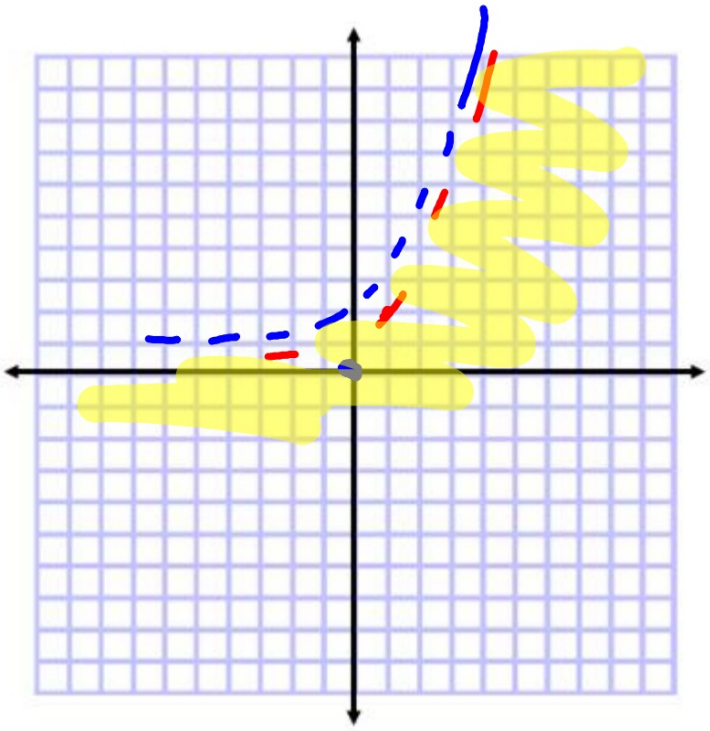
$$A = 200\left(1 + \frac{.05}{365}\right)^{2555}$$

$$= \$283.81$$

$0 < 2^0 + 1$

5 Graph $y < 2^x + 1$

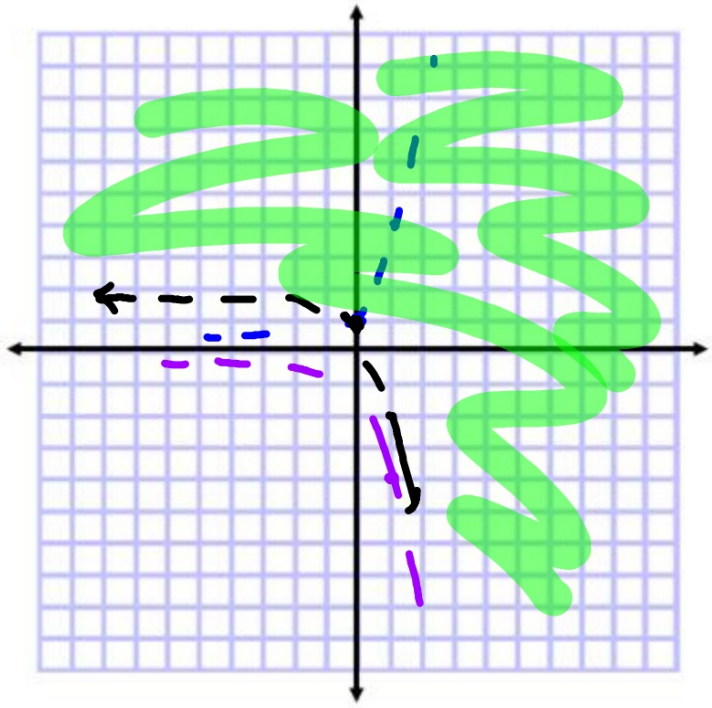
$y = 2^x + 1$



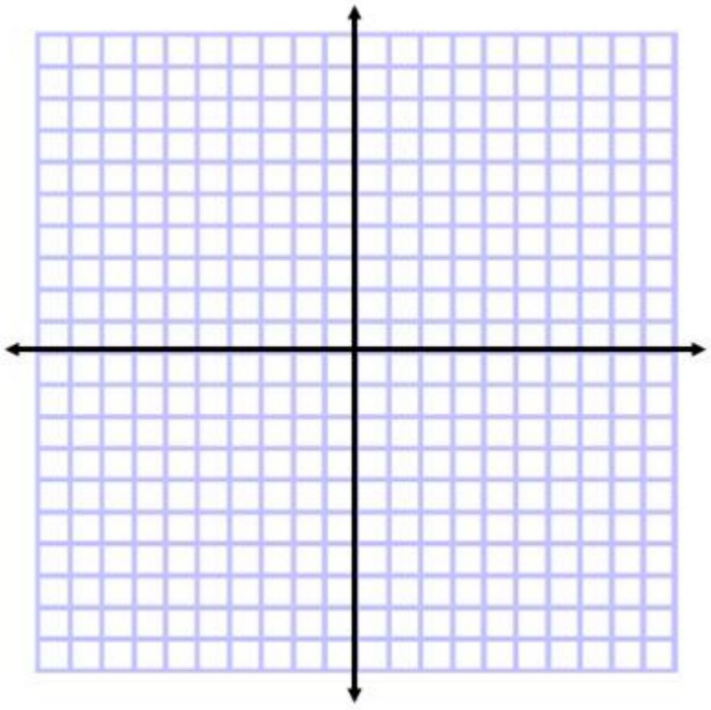
15. $y > -4^x + 2$

0 ? -1 + 2

0 > 1



17. $y \leq \left(\frac{1}{2}\right)^x$



$1000

Suppose your godmother invests some money for you on the day you are born.
The money earns an average rate of 14% per year in the stock market.
You never add any more, or take any out until your 65th birthday.
Your godmother wants you to be a millionaire at age 65.
How much is the initial investment?

$$? = 1000\left(1 + \frac{.14}{365}\right)^{365 \cdot 65} \quad (23725)$$

$$= 111.84$$

$$1{,}000{,}000 \overset{?}{=} \left(1 + \frac{.08}{365}\right)^{23725}$$

$$n(181.17)$$