Algebra 2 **Properties of Exponential Functions** DATE:

Graphing: $y = a \cdot b^x$ (when $a < 0$)

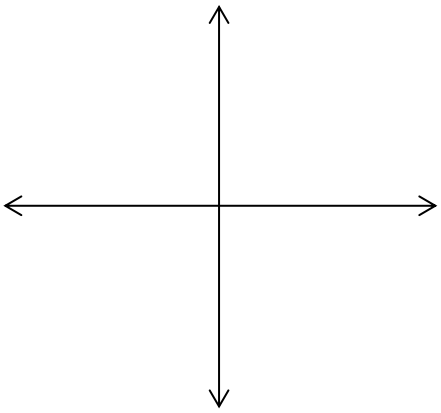
label: exponent = 0 and =1

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

reflection over *x*-axis

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

asymptote: $y = 0$

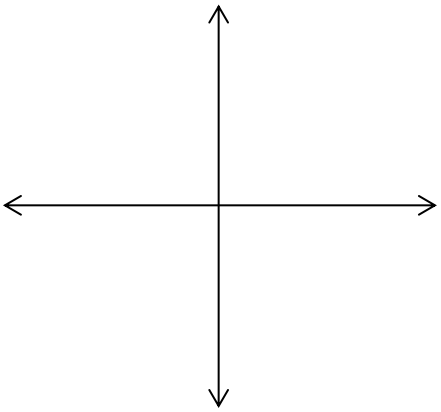


Translating: $y = a \cdot b^x$

$y = 6 \cdot \left(\frac{1}{2}\right)^x$

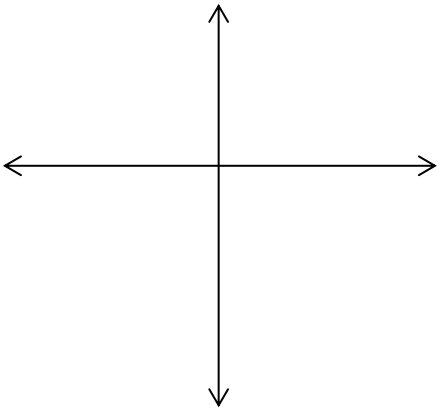
$y = 6 \cdot \left(\frac{1}{2}\right)^{x-3} - 2$

(right 3 and down 2)



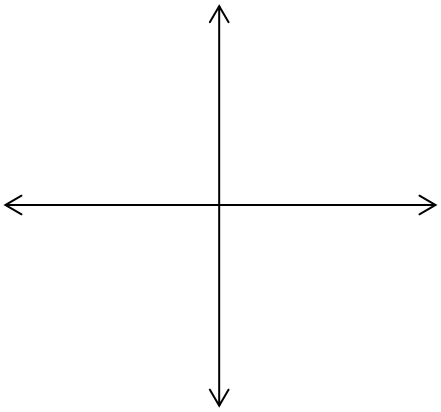
Example:

$y = 2 \cdot (4)^{x-1} + 3$



Example:

$y = -3 \cdot (0.8)^{x+2}$



Application: *Using the fact that Technetium-99 has a half-life of 6 hours, find the amount of Technetium-99 that remains from a 50 mg supply after 25 hours.*

Number of hours	0	6	12	18	24	30
Number of 6 hour intervals	0	1	2	3	4	5
mg of Technetium-99	50	25	12.5	6.25	3.125	1.5625

y = amount of Technetium-99

x = number of hours

$\left(\frac{1}{6}x\right)$ = number of half-life periods

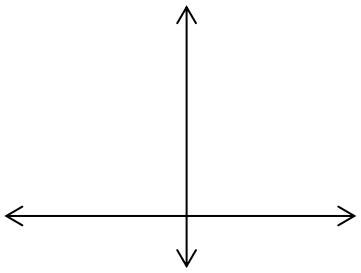
$$y = 50\left(\frac{1}{2}\right)^{\frac{1}{6}x}$$

$$y = 50\left(\frac{1}{2}\right)^{\frac{1}{6}(25)}$$

$$y = 2.784 \text{ mg}$$

How much Technetium-99 will remain after 15 hours?

Graph of $y = e^x$



estimate e^3 to 4 decimal places

$e^3 \approx 20.0855$

Continuously Compounded Interest Formula

$$A = Pe^{rt}$$

Example: *Suppose you invest $100 at an annual interest rate of 4.8% compounded continuously. How much will you have in the account after 3 years?*