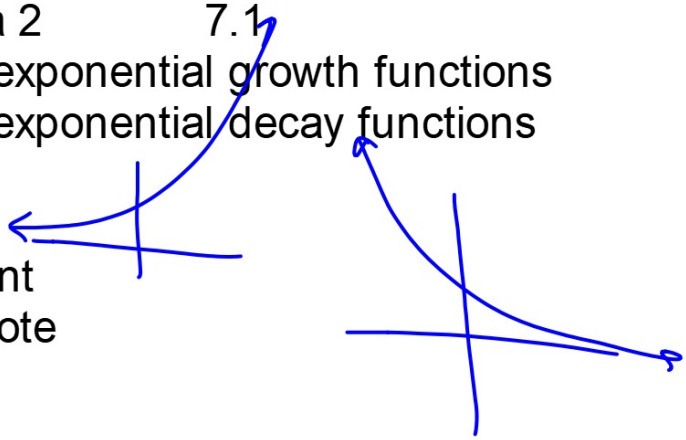
Algebra 2 7.1

Graph exponential growth functions

Graph exponential decay functions



base

exponent

asymptote

domain

range

growth factor

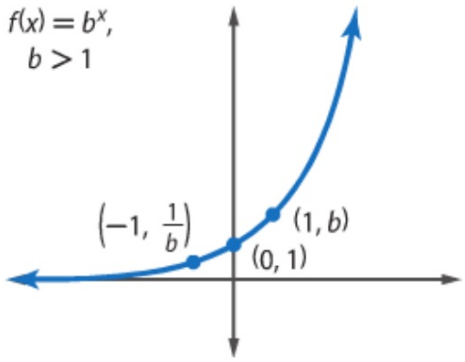
decay factor

whiteboards

graph matching

KeyConcept Parent Function of Exponential Growth Functions

Parent Functions:	$f(x) = b^x, b > 1$
Type of graph:	continuous, one-to-one, and increasing
Domain:	all real numbers
Range:	all positive real numbers
Asymptote:	x-axis
Intercept:	(0, 1)

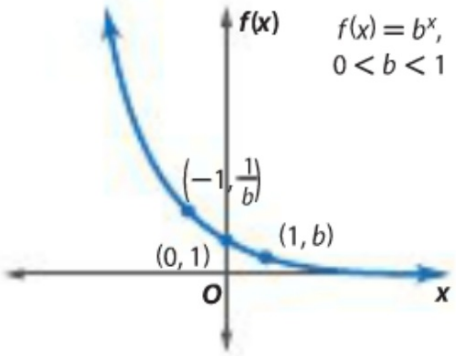


Decay or Decrease

KeyConcept Parent Function of Exponential Decay Functions

Parent Functions:	$f(x) = b^x, 0 < b < 1$
Type of graph:	continuous, one-to-one, and decreasing
Domain:	all real numbers
Range:	positive real numbers
Asymptote:	x-axis
Intercept:	(0, 1)

Model



KeyConcept Transformations of Exponential Functions

$$f(x) = ab^{x-h} + k$$

h – Horizontal Translation	k – Vertical Translation
h units right if h is positive $\lvert h \rvert$ units left if h is negative	k units up if k is positive $\lvert k \rvert$ units down if k is negative

a – Orientation and Shape

If $a < 0$, the graph is reflected in the x-axis.

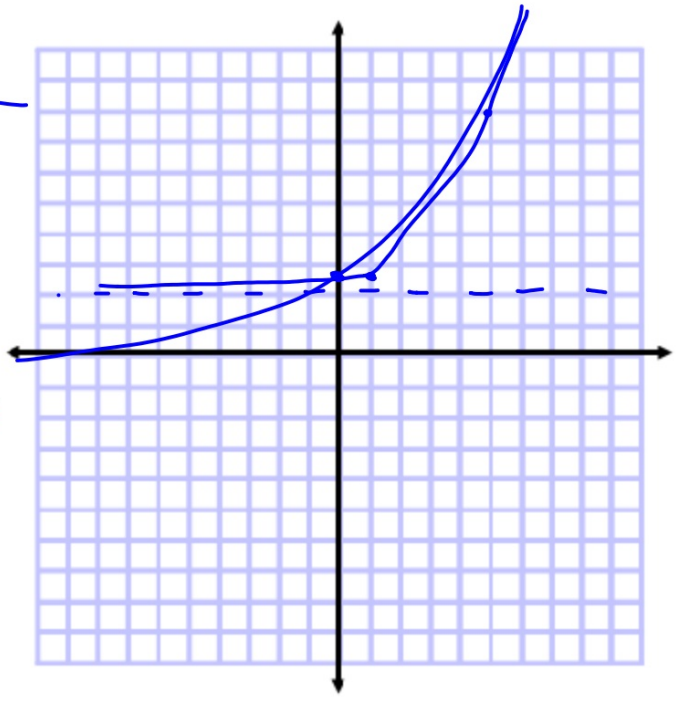
If $\lvert a \rvert > 1$, the graph is stretched vertically.
If $0 < \lvert a \rvert < 1$, the graph is compressed vertically.

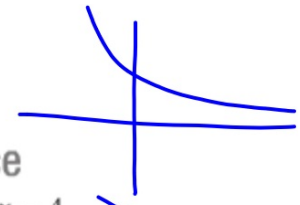
$y = 3(2^{(x-4)})+2$

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

0	$3(2^{-4})+2$
1	$3(2^{-3})+2$
5	$3(2^{1})+2$

Move left/right, up/down (axis…)
Consider steepness (parent)
Use (a few) ordered pairs if needed

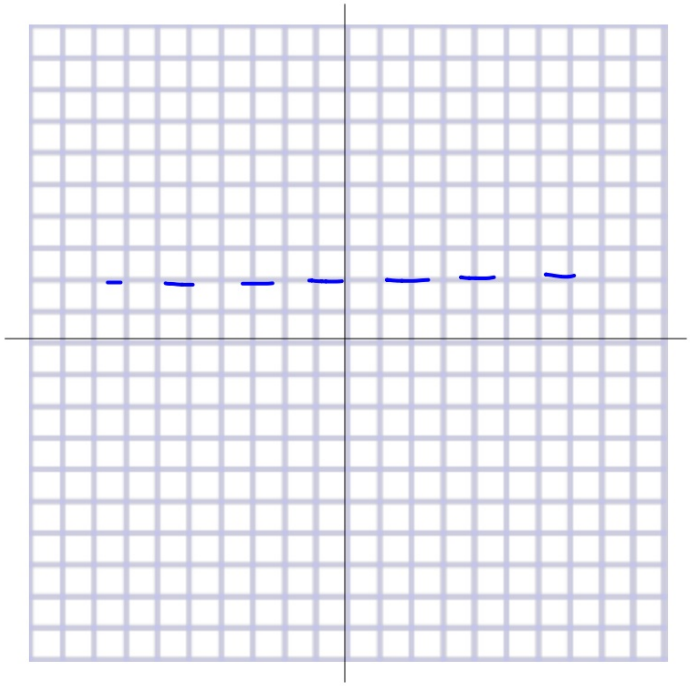


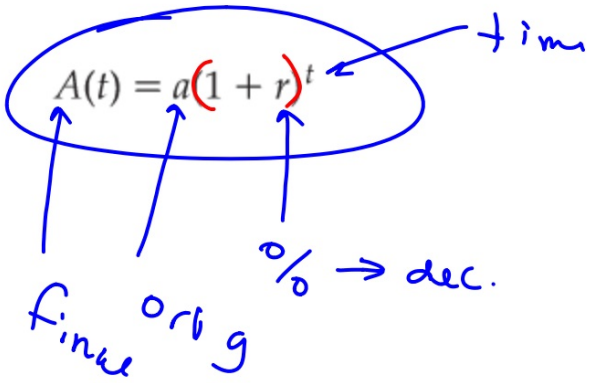


GuidedPractice

4A. $y = 3\left(\frac{2}{5}\right)^{x-4} + 2$

0
1
3





1+r growth factor

$$A(t) = a(1 - r)^t$$

1-r decay factor

GEMA

Exponential decrease...

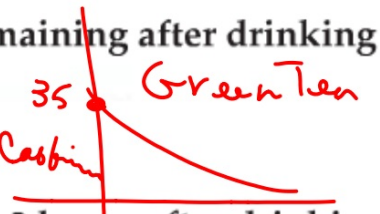
Real-World Example 5 Graph Exponential Decay Functions

TEA A cup of green tea contains 35 milligrams of caffeine. The average teen can eliminate approximately 12.5% of the caffeine from their system per hour.

a. Draw a graph to represent the amount of caffeine remaining after drinking a cup of green tea.

$35(1-0.125)^t$

0.875



b. Estimate the amount of caffeine in a teenager's body 3 hours after drinking a cup of green tea.

$35(0.875)^3 \approx 23.4$ mg

GuidedPractice

68 −12.5%

5. A cup of black tea contains about 68 milligrams of caffeine. Draw a graph to represent the amount of caffeine remaining in the body of an average teen after drinking a cup of black tea. Estimate the amount of caffeine in the body 2 hours after drinking a cup of black tea.

$68(1-0.125)^{\#}$

0.875