Algebra 1 7.5

Graph exponential functions

Identify exponential behavior $y = 3^x$

base

exponent $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5 = 32$

y-intercept

rate of change

linear

exponential growth

exponential decay

Activity: giant graphs

$\frac{5}{5}$ $\frac{x^3}{x^5} = \frac{xxx}{xxxxx}$ $\frac{1}{x^2} = x^{-2}$

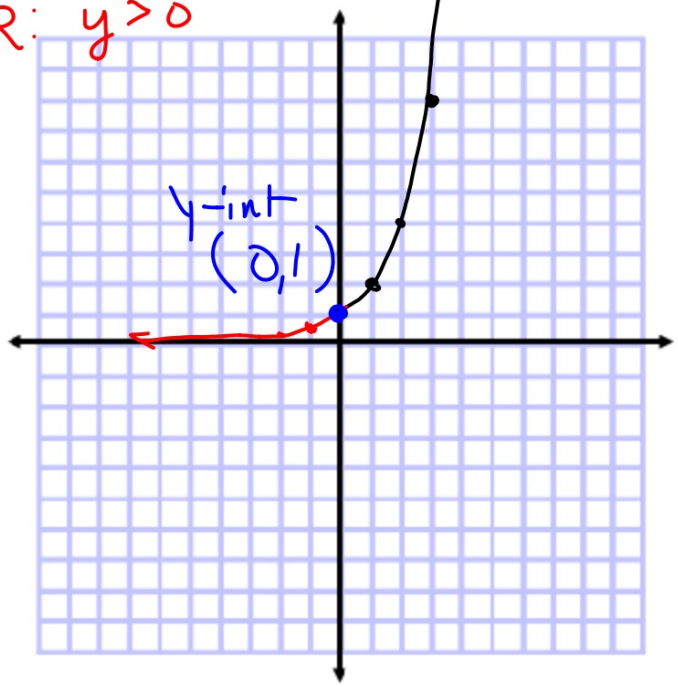
GuidedPractice

1. Graph $y = 2^x$. Find the y-intercept, and state the domain and range.

D: all

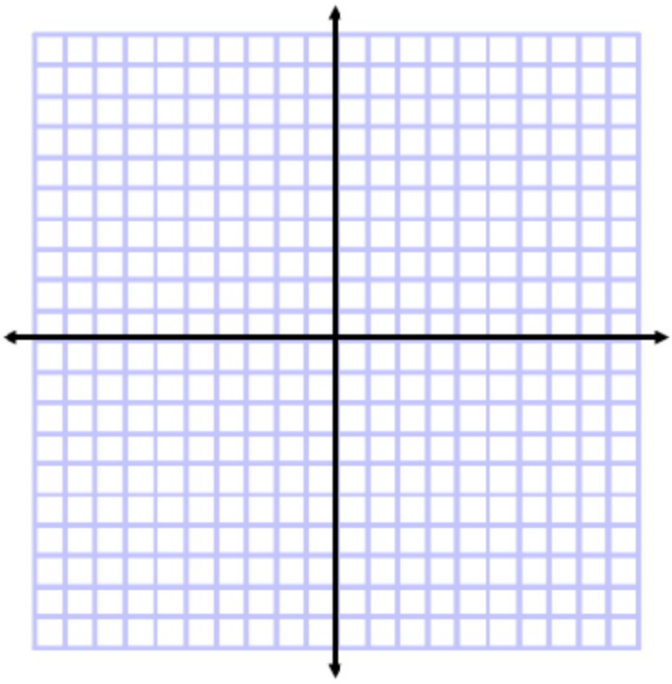
R: $y > 0$

x	2^x	
0	2^0	1
1	2^1	2
2	2^2	4
3	2^3	8
4	2^4	16
-1	2^{-1}	$\frac{1}{2}$
-2	2^{-2}	$\frac{1}{4}$



Example 2 Graph with $a > 0$ and $0 < b < 1$

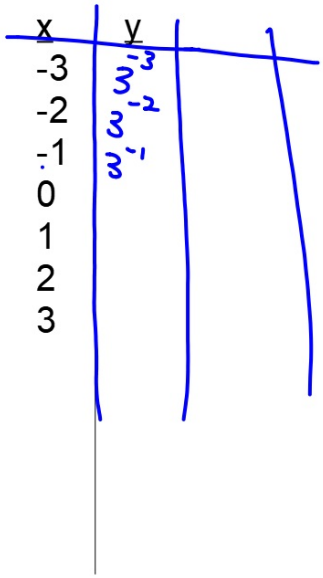
Graph $y = \left(\frac{1}{3}\right)^x$. Find the y-intercept, and state the domain and range.



$y = 3^x$

Each group choose an equation (cards)
Use a table of values to determine coordinates
Plot the coordinates on 1-inch grid paper

x	y
-3	3^{-3}
-2	3^{-2}
-1	3^{-1}
0	
1	
2	
3	



Gallery walk
What do you notice?
What do you wonder?

KeyConcept Graphs of Exponential Functions

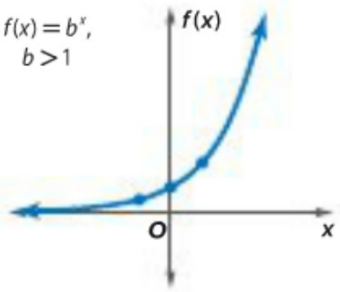
Exponential Growth Functions

Equation: $f(x) = ab^x$, $a > 0$, $b > 1$

Domain, Range: all reals; all positive reals

Intercepts: one y-intercept, no x-intercepts

End behavior: as x increases, $f(x)$ increases; as x decreases, $f(x)$ approaches 0



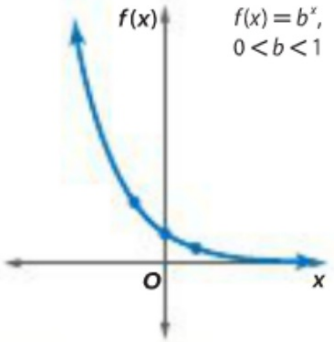
Exponential Decay Functions

Equation: $f(x) = ab^x$, $a > 0$, $0 < b < 1$

Domain, Range: all reals; all positive reals

Intercepts: one y-intercept, no x-intercepts

End behavior: as x increases, $f(x)$ approaches 0; as x decreases, $f(x)$ increases



Is it a multiplying rule?

Example 4 Identify Exponential Behavior

Determine whether the set of data shown below displays exponential behavior. Write *yes* or *no*. Explain why or why not.

x	0	5	10	15	20	25
y	64	32	16	8	4	2

Is it a multiplying rule?

4. Determine whether the set of data shown below displays exponential behavior. Write *yes* or *no*. Explain why or why not.

x	0	3	6	9	12	15
y	12	16	20	24	28	32