

Algebra 1

7.5

$$\frac{2}{2}$$

Graph exponential functions

Identify exponential behavior

base

exponent

y-intercept

rate of change

linear

exponential growth

exponential decay

Activity: giant graphs

$$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^5$$

$$y = 2^x$$

$$a^{-3} = \frac{1}{a^3}$$

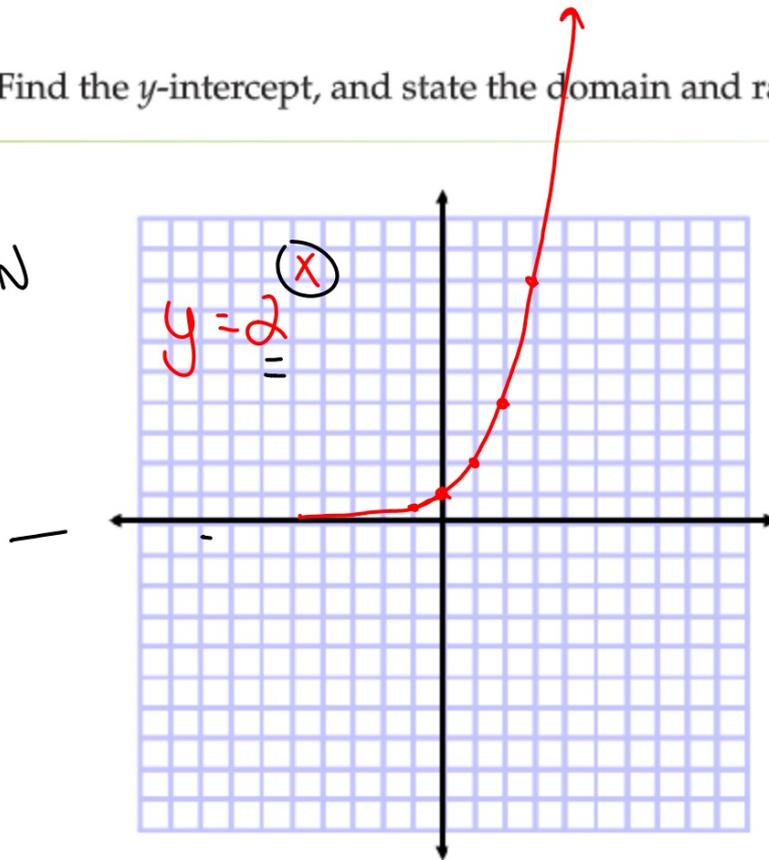
x	y
0	1
1	2
2	4
3	8
-1	1/2

Guided Practice

1. Graph $y = 7^x$. Find the y -intercept, and state the domain and range.

D: $x \in \mathbb{R}$

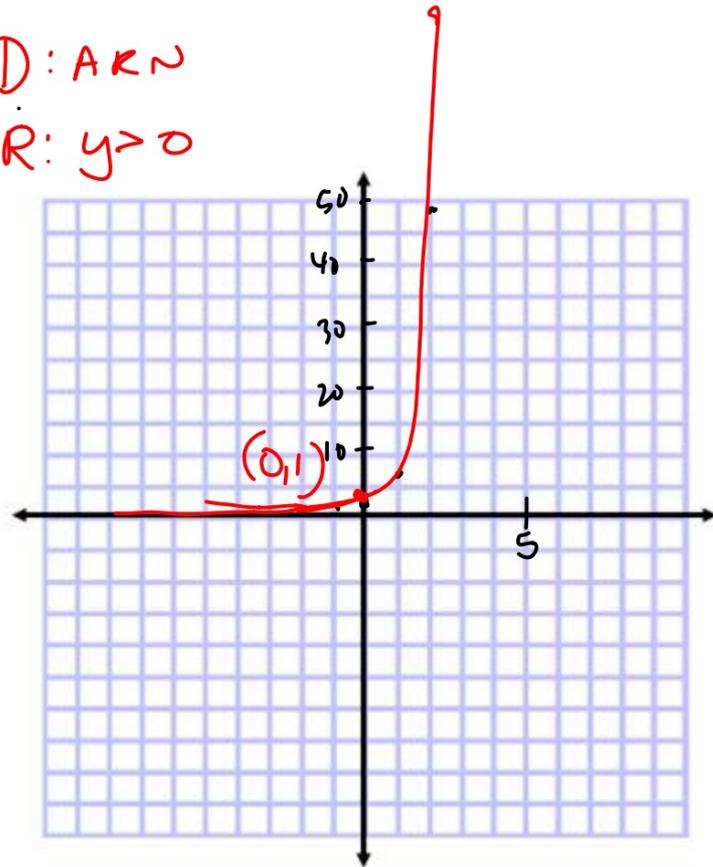
R: $y > 0$



$$y = 7^x$$

x		y
0	7^0	1
1	7^1	7
2	7^2	49
-1	7^{-1}	$\frac{1}{7}$

D: \mathbb{R}
R: $y > 0$



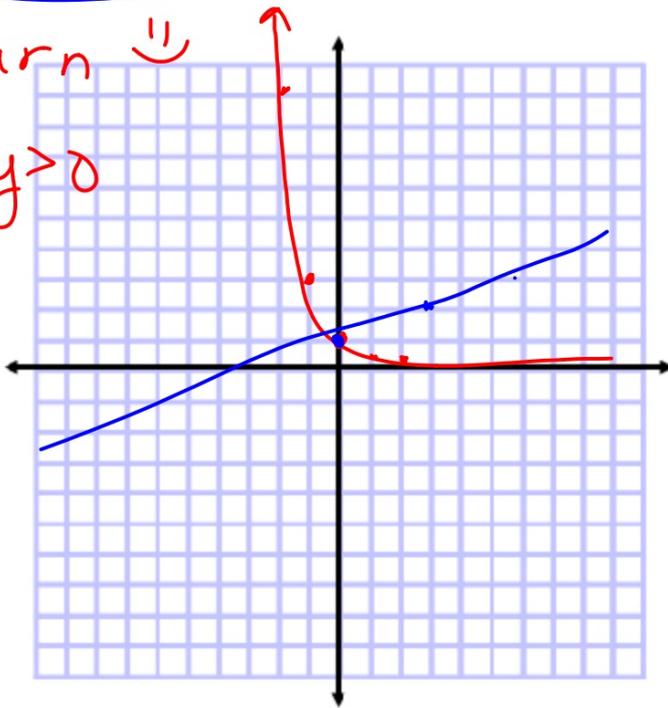
line $y = \frac{1}{3}x + 1$

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.

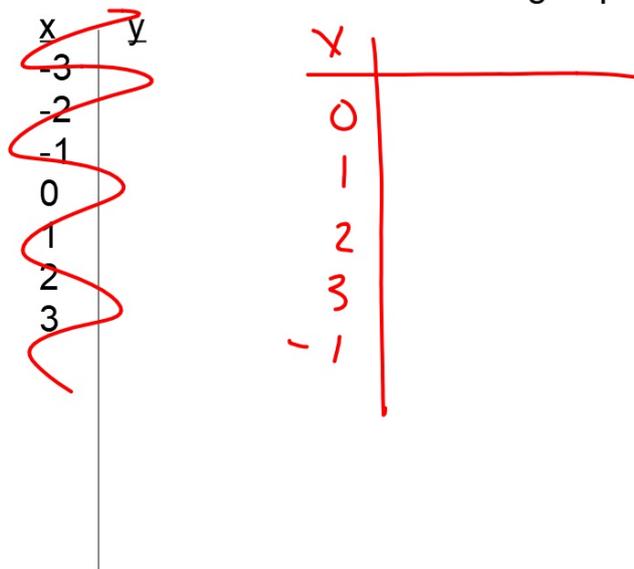
D: all x

R: $y > 0$



x		y
0	$\frac{1}{3^0}$	1
1	$\frac{1}{3^1}$	$\frac{1}{3}$
2	$\frac{1}{3^2}$	$\frac{1}{9}$
-1	$\frac{1}{3^{-1}}$	3
-2	$\frac{1}{3^{-2}}$	9

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



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

KeyConcept Graphs of Exponential Functions

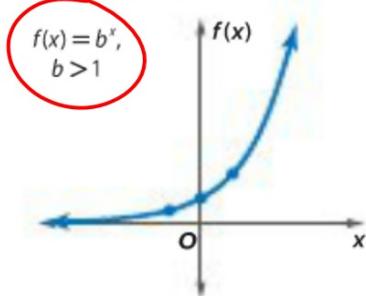
Exponential Growth Functions

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



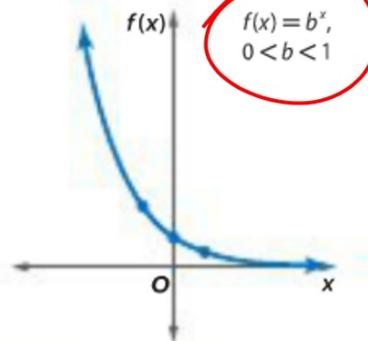
Exponential Decay Functions

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

$$y = b^x$$

$$y = mx + b$$

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