Algebra 1 7.5

Graph exponential functions

Identify exponential behavior

base

exponent

y-intercept

rate of change

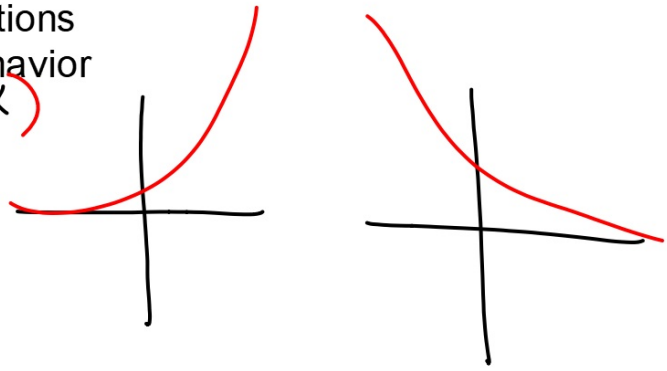
linear

exponential growth

exponential decay

nonlinear

$y = -2^{(x)}$



exponential (0, 1)

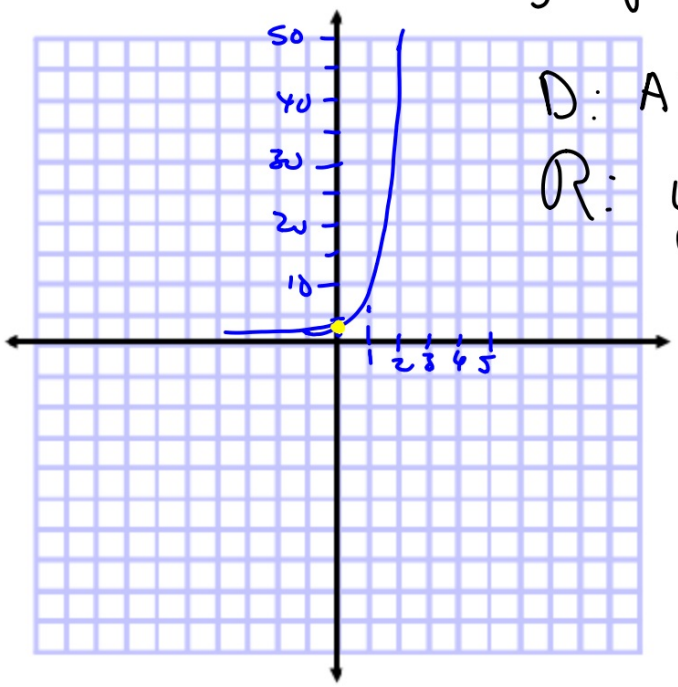
GuidedPractice

x y

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

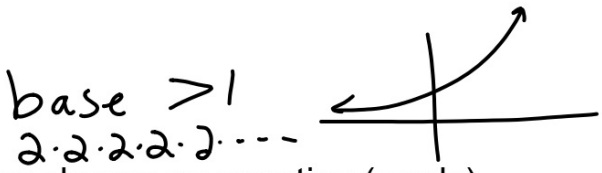
(graph first)

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



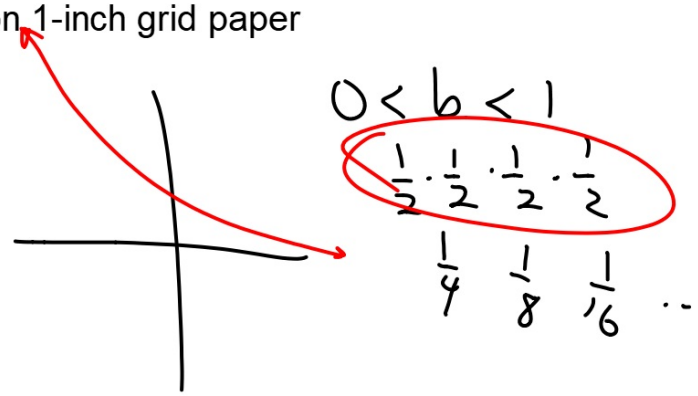
D: ARN

R: $y > 0$



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

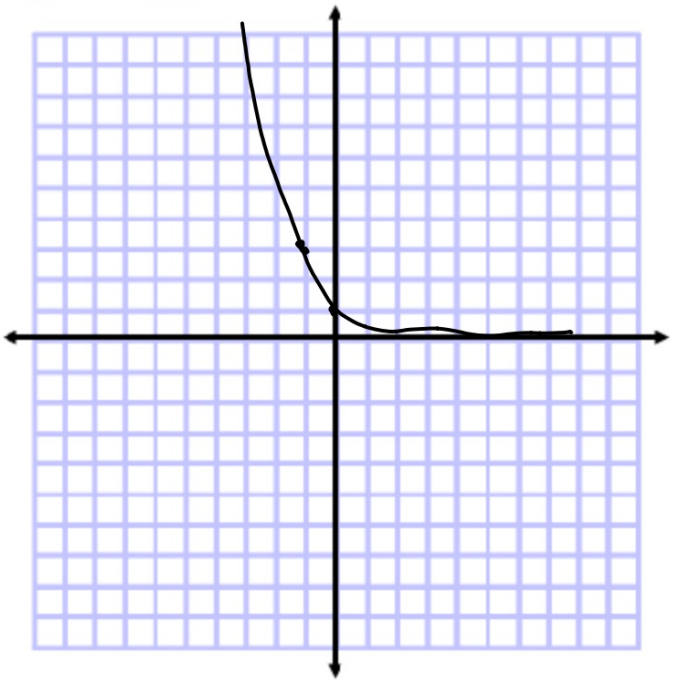
x	y
-3	
-2	
-1	
0	
1	
2	
3	



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

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.



x	$\left(\frac{1}{3}\right)^x$	
-1	3	
0	1	
2	$\frac{1}{9}$	

KeyConcept Graphs of Exponential Functions

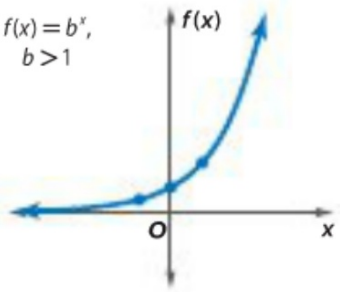
Exponential Growth Functions

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



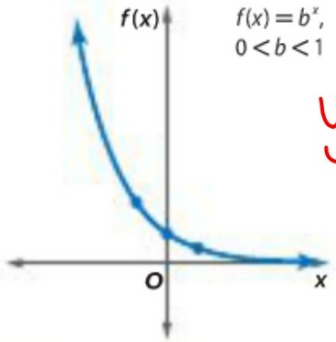
Exponential Decay Functions

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

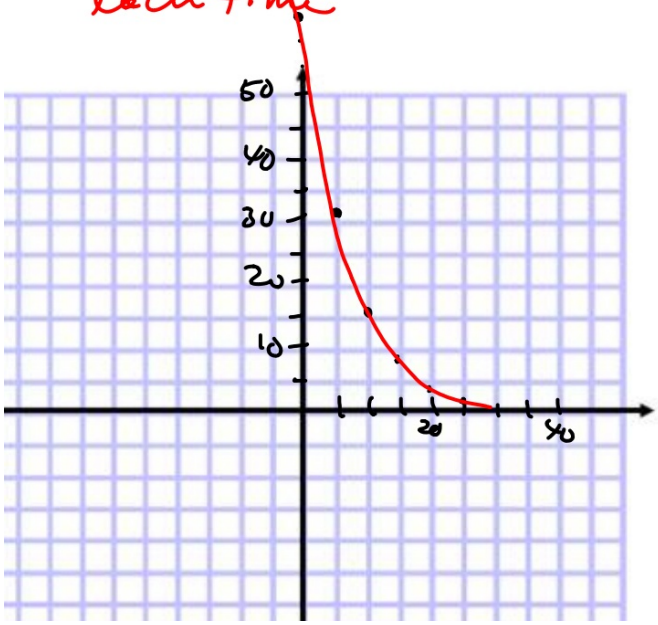
Determine whether the set of data shown below displays exponential behavior. Write *yes* or *no*. Explain why or why not.

yes

mult $\times \frac{1}{2}$ each time

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

$\times \frac{1}{2}$ $\times \frac{1}{2}$ $\times \frac{1}{2}$



$3^5 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$

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

+4 +4 +4

no
adding instead
of x

p. 427
11-33odd

-1
0
1
2

$y = 2^x + 1$

D: ARN

R: $y > 1$

x	$2^x + 1$	
-1	$2^{-1} + 1$	1.5
0	$2^0 + 1$	2
1	$2^1 + 1$	3
2	$2^2 + 1$	5