

Algebra 1      7.5

Graph exponential functions

Identify behavior that displays exponential behavior

base

exponent

y-intercept

rate of change

linear

exponential growth

exponential decay

whiteboards

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## KeyConcept Graphs of Exponential Functions

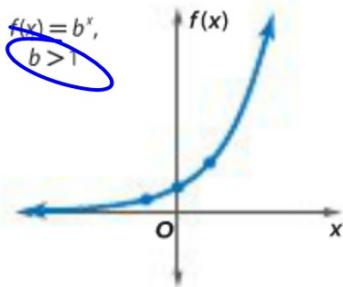
### Exponential Growth Functions

**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



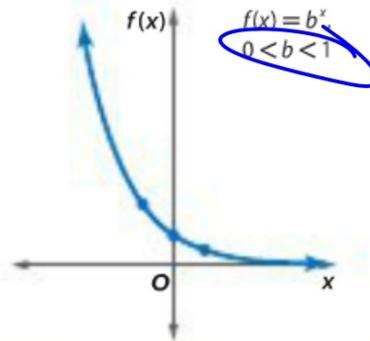
### Exponential Decay Functions

**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

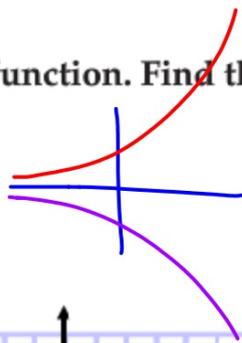


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**Examples 1-2** Graph each function. Find the  $y$ -intercept and state the domain and range.

1.  $y = 2^x$

0	$-1.5^0$	-1
1	$-1.5^1$	-5
2	$-1.5^2$	-25
-1	$-1.5^{-1}$	$-\frac{1}{5}$

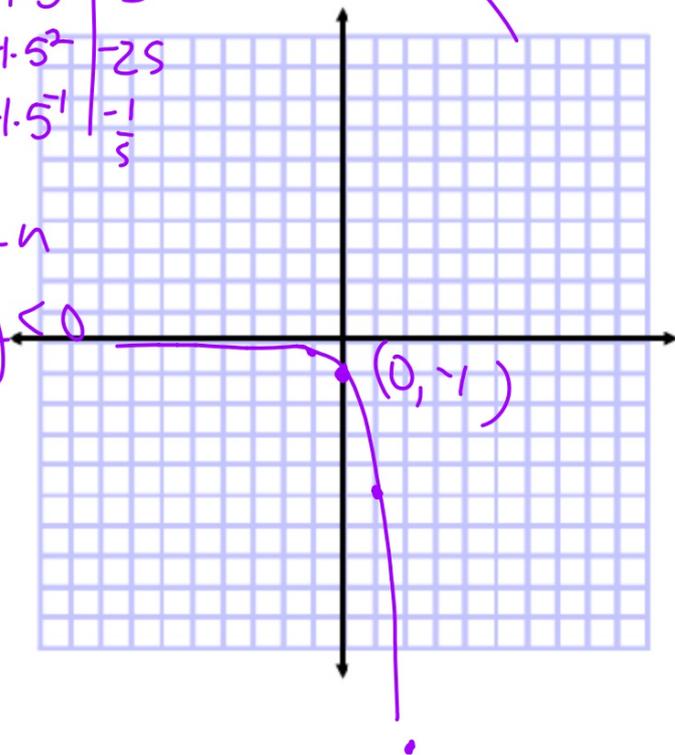


2.  $y = -5^x$   
 $= -1.5^x$

3.  $y = -\left(\frac{1}{5}\right)^x$   
 $-1 \cdot \left(\frac{1}{5}\right)^x$

1. What shape is it?
2. Find ordered pairs (table)
3. Follow order of operations in equation

D: all  
R:  $y \leq 0$



G e m A

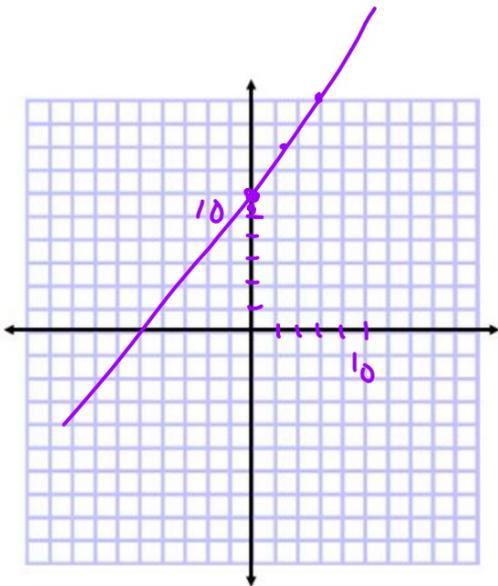
Is it a multiplication rule?

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

<b>x</b>	.0	3	6	9	12	15
<b>y</b>	12	16	20	24	28	32

+4 +4 +4 +4

no  
adding rule



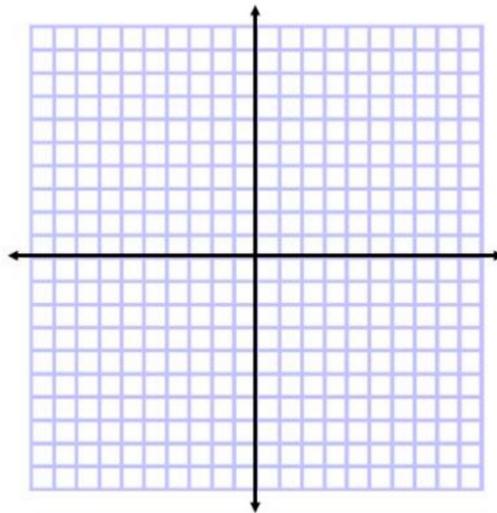
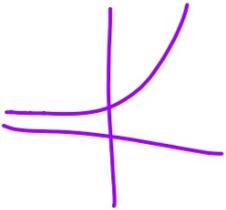
Is it a multiplication rule?

9.

<b>x</b>	2	4	6	8	10	12
<b>y</b>	1	4	16	64	256	1024

$\times 4$   $\times 4$   $\times 4$   $\times 4$   $\times 4$

yes  
mult rule

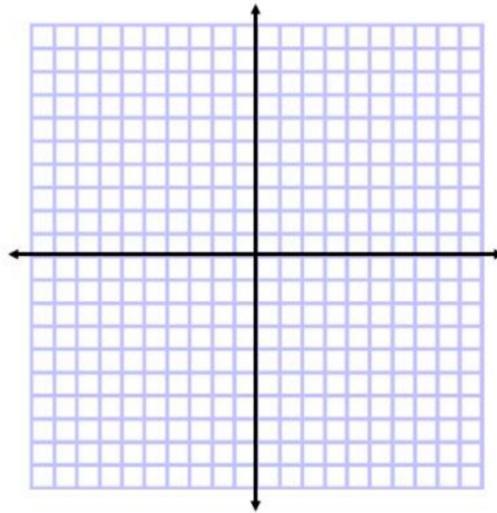


Is it a multiplication rule?

8.

<b>x</b>	1	2	3	4	5	6
<b>y</b>	-4	-2	0	2	4	6

$+2 +2 +2 +2 \rightsquigarrow$



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1	2
2	4
3	8
4	16
5	32
6	64