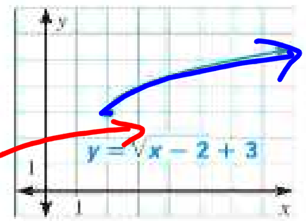
Warm Up

*Need Graph Paper

VOCABULARY CHECK

Copy and complete the statement using the graph at the right.



1. The **domain** of the function is __?__. $(2, \infty)$
2. The **range** of the function is __?__. $(3, \infty)$
3. The **inverse** of the function is __?__.

$Y = (x-3)^2 + 2$

SKILLS CHECK

Graph the function. State the domain and range. *(Review p. 446 for 7.1–7.3.)*

4. $y = -2\sqrt{x} - 1$
5. $y = \sqrt{x+3}$ $(-3, \infty)$ $(0, \infty)$
6. $y = \sqrt[3]{x-2} + 5$ $(-\infty, \infty)$ $(-\infty, \infty)$

Find the inverse of the function. *(Review p. 438 for 7.4.)*

7. $y = 3x + 5$
8. $y = -2x^3 + 1$
9. $y = \frac{1}{2}x^2, x \geq 0$

$x = -2y^3 + 1$
$-1 \qquad -1$

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

$\sqrt[3]{\frac{x-3}{-2}} = \sqrt[3]{y^3}$

$Y = \sqrt[3]{\frac{x-3}{-2}}$

A

11 $-5\sqrt[3]{16}+2\sqrt[3]{128}$

$-5\sqrt[3]{8\cdot 2}$ $\sqrt[3]{64\cdot 2}$

$-5\cdot 2\sqrt[3]{2}+2\cdot 4\sqrt[3]{2}$

$-10\sqrt[3]{2}+8\sqrt[3]{2}$

$-2\sqrt[3]{2}$

B

11

$-5\sqrt[3]{250}+2\sqrt[3]{16}$

$-5\sqrt[3]{125\cdot 2}$ $2\sqrt[3]{8\cdot 2}$

$-5\cdot 5\sqrt[3]{2}+2\cdot 2\sqrt[3]{2}$

$-25\sqrt[3]{2}+4\sqrt[3]{2}$

$-21\sqrt[3]{2}$

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

*What is an exponential function?

$y = 2 \cdot 3^x$

$y = -2 \cdot 3^x$

$y=ab^x$ where $a \neq 0$ and the base b is a positive number other than 1.

*If $a>0$ and $b>1$, the function $y=ab^x$ is an <u>exponential growth function</u>, and b is called the <u>growth factor</u>.

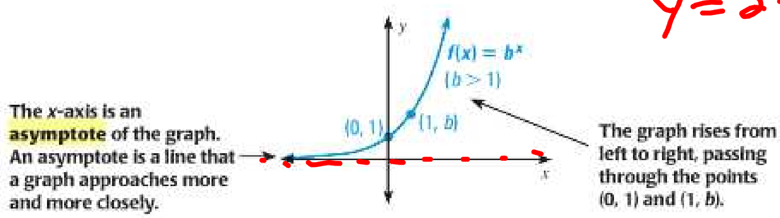
7.1 & 7.2 Graphing Exponential Growth & Decay Functions

KEY CONCEPT *For Your Notebook*

Parent Function for Exponential Growth Functions

The function $f(x) = b^x$, where $b > 1$, is the parent function for the family of exponential growth functions with base b. The general shape of the graph of $f(x) = b^x$ is shown below.

$y = 2 \cdot 3^x + 4$



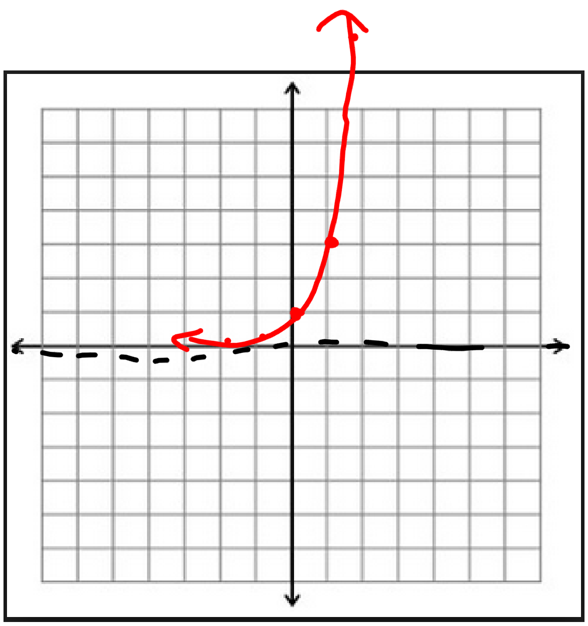
The domain of $f(x) = b^x$ is all real numbers. The range is $y > 0$.

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

Graph $y=3^x$

D: $(-\infty, \infty)$

R: $(0, \infty)$



Steps to graphing:

1) Make a table of values.

2) Plot the points from the table.

3) Draw the curve.

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

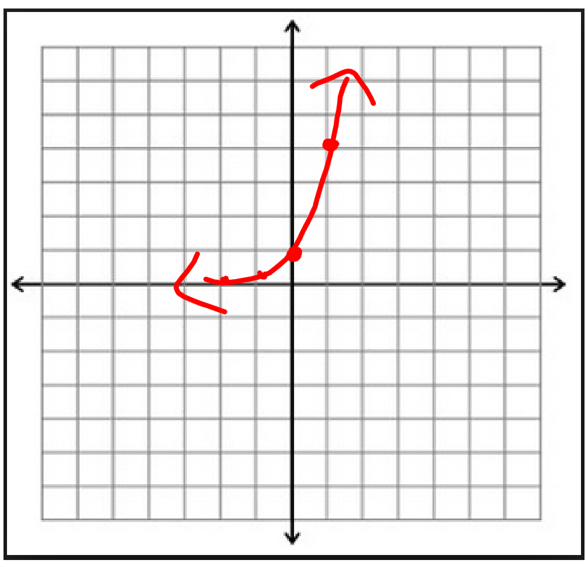
7.1 & 7.2 Graphing Exponential Growth & Decay Functions

TOYO

Graph $y=4^x$

D: $(-\infty, \infty)$

R: $(0, \infty)$



Steps to graphing:

1) Make a table of values.

2) Plot the points from the table.

3) Draw the curve.

x	y
-2	$4^{-2} = \frac{1}{16}$
-1	$4^{-1} = \frac{1}{4}$
0	$4^0 = 1$
1	$4^1 = 4$
2	$4^2 = 16$

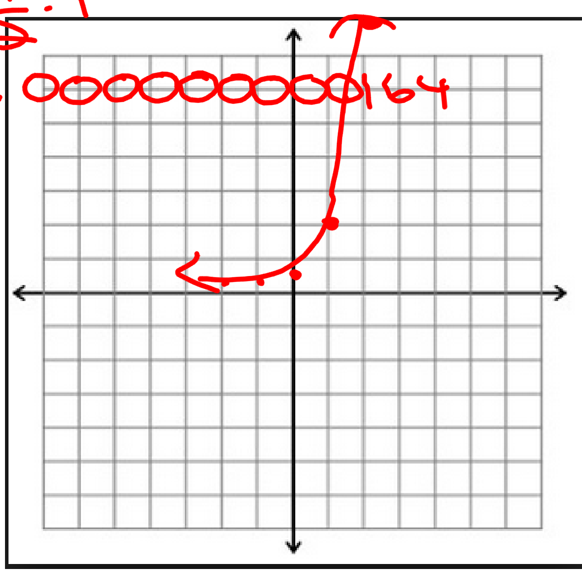
7.1 & 7.2 Graphing Exponential Growth & Decay Functions

TOYO

Graph $y=\frac{1}{2}\cdot 4^x$ D: $(-\infty, \infty)$ R: $(0, \infty)$

$\frac{1}{2}\cdot 4^{-16}$

.000000000000164



Steps to graphing:

1) Make a table of values.

2) Plot the points from the table.

3) Draw the curve.

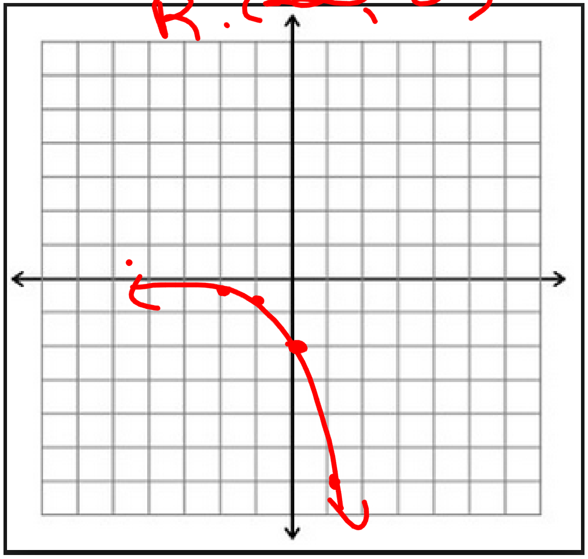
x	y
-2	$\frac{1}{2}\cdot 4^{-2} = \frac{1}{2}\cdot\frac{1}{16} = \frac{1}{32}$
-1	$\frac{1}{2}\cdot 4^{-1} = \frac{1}{2}\cdot\frac{1}{4} = \frac{1}{8}$
0	$\frac{1}{2}\cdot 4^{0} = \frac{1}{2}\cdot 1 = \frac{1}{2}$
1	$\frac{1}{2}\cdot 4^{1} = \frac{1}{2}\cdot 4 = 2$
2	$\frac{1}{2}\cdot 4^{2} = \frac{1}{2}\cdot 16 = 8$

*Spring Break Fun?

$y = -2 \cdot 3^x$

D: $(-\infty, \infty)$

R: $(-\infty, 0)$



x	y
-2	$-2 \cdot 3^{-2} = -2 \cdot \frac{1}{9} = -\frac{2}{9}$
-1	$-2 \cdot 3^{-1} = -2 \cdot \frac{1}{3} = -\frac{2}{3}$
0	$-2 \cdot 3^{0} = -2 \cdot 1 = -2$
1	$-2 \cdot 3^{1} = -2 \cdot 3 = -6$
2	$-2 \cdot 3^{2} = -2 \cdot 9 = -18$

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

What is the y-intercept of the graph $y=ab^x$?

(0,a)

Ex: Find the y-intercept of $y= \frac{1}{4} \cdot 2^x$.

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

Translations:

Left/Right

$$y=ab^{x-h}+k$$

up/down

1) Graph $y=ab^x$

2) Translate the graph horizontally by h units and vertically by k units.

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

Graph: $y=\boxed{3}^{x+1}+2$ Range

State the domain and range.

$y = 3^x$

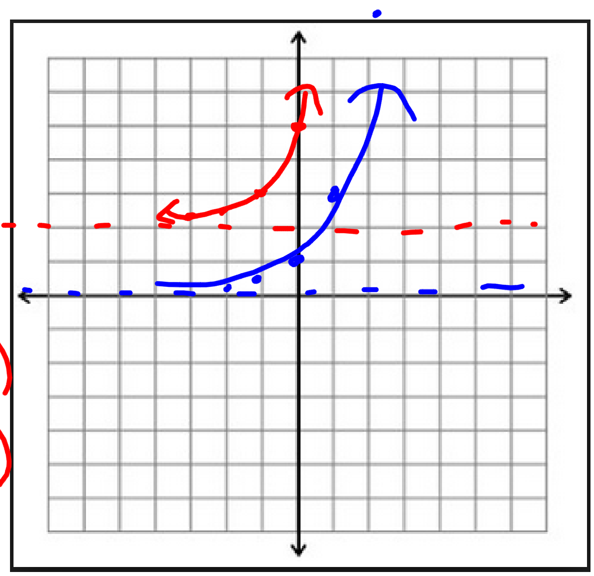
x	y
-2	$\frac{1}{9}$
-1	$\frac{1}{3}$
0	1
1	3
2	9

left one

up 2

D: $(-\infty, \infty)$

R: $(2, \infty)$



1) Graph $y=ab^x$

2) Translate the graph horizontally by h units and vertically by k units.

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

TOYO

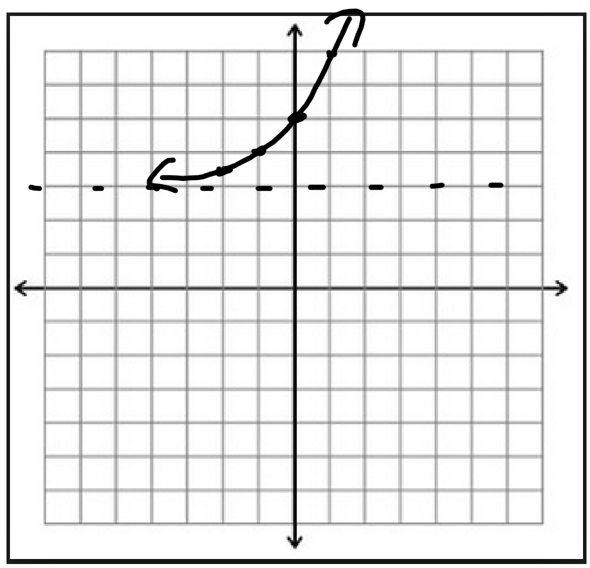
Graph: $y= 2^{x+1}+3$

State the domain and range.

X	Y
-2	3.5
-1	4
0	5
1	7
2	

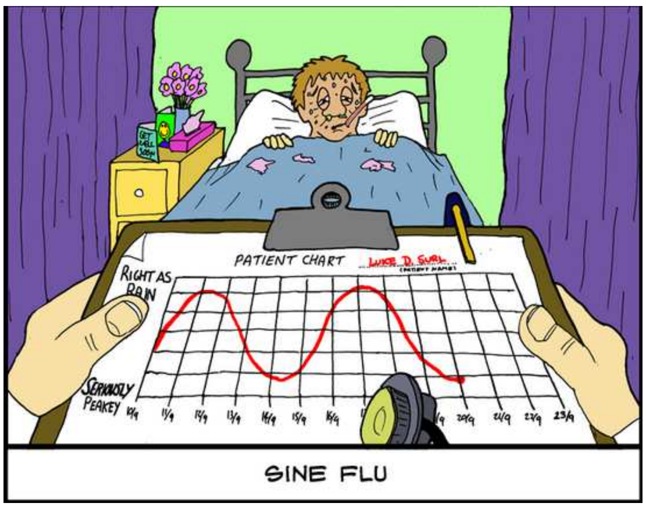
D: $(-\infty, \infty)$

R: $(3, \infty)$

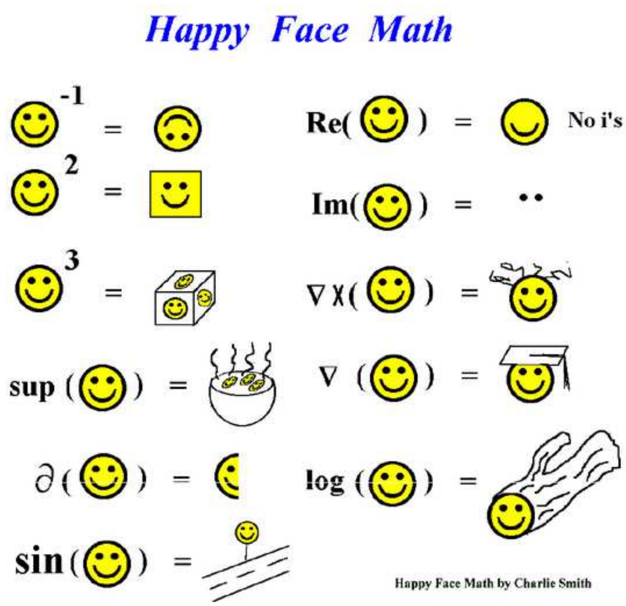


1) Graph $y=ab^x$

2) Translate the graph horizontally by h units and vertically by k units.


PATIENT CHART
RIGHT AS RAIN
SERIOUSLY PEAKEY
SINE FLU


I'm not being obtuse but you're acute girl.


Happy Face Math
-1
=
Re( )
=
No i's
2
=
Im( )
=
3
=
∇ X ( )
=
sup ( )
=
∇ ( )
=
∂ ( )
=
log ( )
=
sin ( )
=
Happy Face Math by Charlie Smith

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

What is the y-intercept of the graph $y=ab^x$?

(0,a)

Ex: Find the y-intercept of $y=-(5/2)^x$.

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

Exponential decay functions-

$y=ab^x$ where $a>0$ and $0<b<1$.

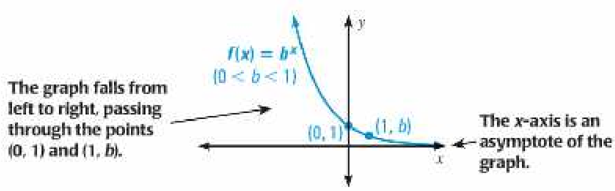
The base b of an exponential decay function is called the decay factor.

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

KEY CONCEPT *For Your Notebook*

Parent Function for Exponential Decay Functions

The function $f(x) = b^x$, where $0 < b < 1$, is the parent function for the family of exponential decay functions with base b. The general shape of the graph of $f(x) = b^x$ is shown below.



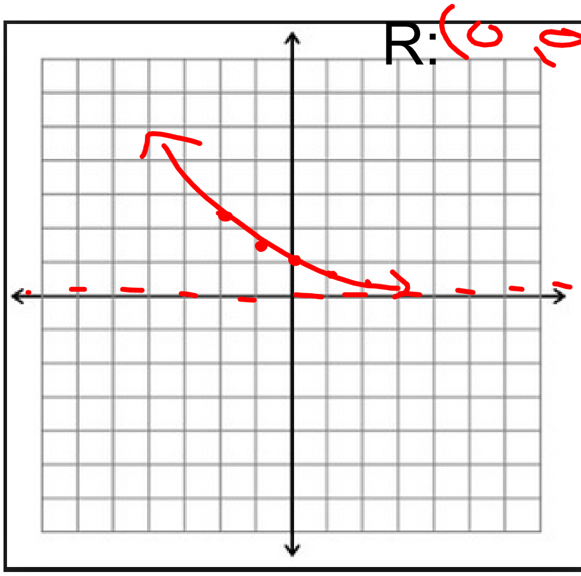
The domain of $f(x) = b^x$ is all real numbers. The range is $y > 0$.

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

Graph $y=(2/3)^x$

D: $(-\infty, \infty)$

R: $(0, \infty)$



Steps to graphing:

1) Make a table of values.

2) Plot the points from the table.

3) Draw the curve.

x	y
-2	$\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$ $2\frac{1}{4}$
-1	$\left(\frac{2}{3}\right)^{-1} = \frac{3}{2}$
0	$\left(\frac{2}{3}\right)^0 = 1$
1	$\left(\frac{2}{3}\right)^1 = \frac{2}{3}$
2	$\left(\frac{2}{3}\right)^2 = \frac{4}{9}$

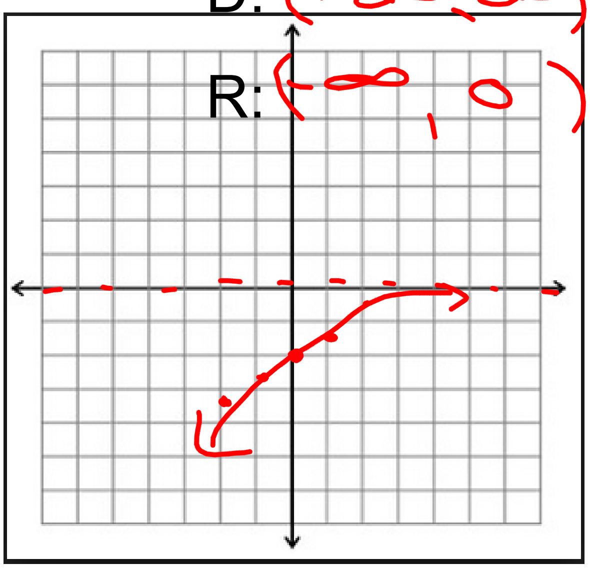
7.1 & 7.2 Graphing Exponential Growth & Decay Functions

TOYO

Graph $y=-2(3/4)^x$

D: $(-\infty, \infty)$

R: $(-\infty, 0)$



Steps to graphing:

1) Make a table of values.

2) Plot the points from the table.

3) Draw the curve.

x	y
-2	$-\frac{32}{9} = -3\frac{5}{9}$
-1	$-2 \cdot \frac{4}{3} = -\frac{8}{3} = -2\frac{2}{3}$
0	$-2 \cdot 1 = -2$
1	$-2 \cdot \frac{3}{4} = -\frac{6}{4} = -\frac{3}{2} = -1.5$
2	$-2 \cdot \frac{9}{16} = -\frac{18}{16}$

7.1 & 7.2 Graphing Exponential Growth & Decay Functions

✓ **GUIDED PRACTICE** for Examples 3 and 4

Graph the function. State the domain and range.

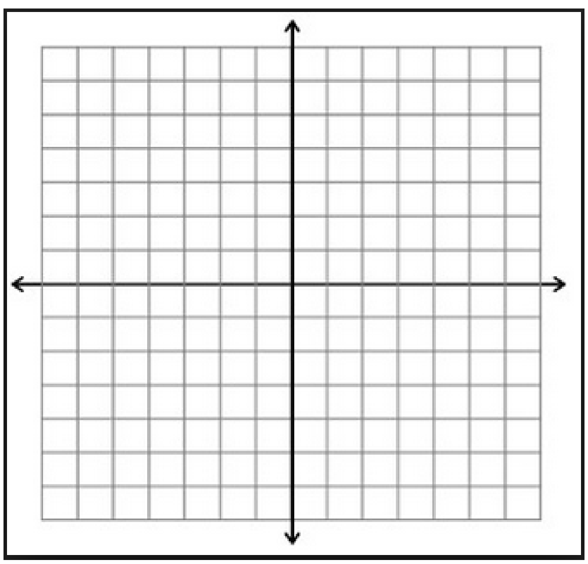
4. $y = \left(\frac{1}{4}\right)^{x-1} + 1$

5. $y = 5\left(\frac{2}{3}\right)^{x+1} - 2$

6. $g(x) = -3\left(\frac{3}{4}\right)^{x-5} + 4$

TOYO

5&6



How can you tell the difference between growth and decay?

$y = ab^{x+h} + k$

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

D

$$y = 3 \cdot \left(\frac{1}{2}\right)^{x+1} - 2$$

D

$$y = 4\, 2^{x-1} - 3$$

G

$$y = \left(\frac{1}{2}\right)^x$$

D

$$y = \frac{1}{3} \cdot 4^x$$

G

*Go over test

Homework:

Page 482 #6-21 multiples of 3

Page 489 #3-6, 9-24 multiples of 3, 25