

Unit 2

Lesson 2

More Transformations

Created with Doceri



Now let's return to the function whose equation is $y = F(x)$.

Complete the chart with the key points.

x	$F(x)$
-1	1
1	-1
2	-1
4	-2



Created with Doceri



Let's suppose that $y = 4F(x)$

x	$F(x)$	y
-1	1.4	4
1	-1.4	-4
2	-1.4	-4
4	-2.4	-8

$$(x, y) \rightarrow (x, 4y)$$

Describe the transformation:
Dilation: Stretch by 4
Did the transformation affect the domain or the range of the function?
Range

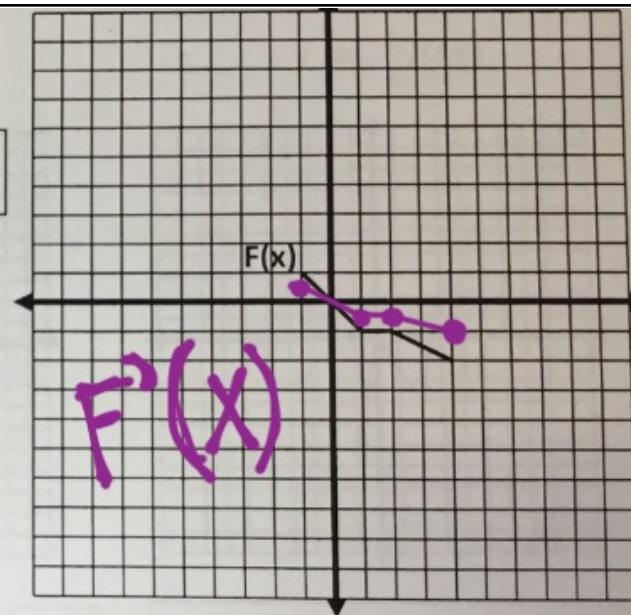
Created with Doceri



➤ Graph: $y = \frac{1}{2}F(x)$

x	$F(x)$	y
-1	$1 \cdot \frac{1}{2}$.5
1	$-1 \cdot \frac{1}{2}$	-.5
2	$-1 \cdot \frac{1}{2}$	-.5
4	$-2 \cdot \frac{1}{2}$	-1

$$(x, y) \rightarrow (x, \frac{1}{2}y)$$



Describe the transformation:

Dilation: Compress by $\frac{1}{2}$

Did the transformation affect the domain or the range of the function?

Range

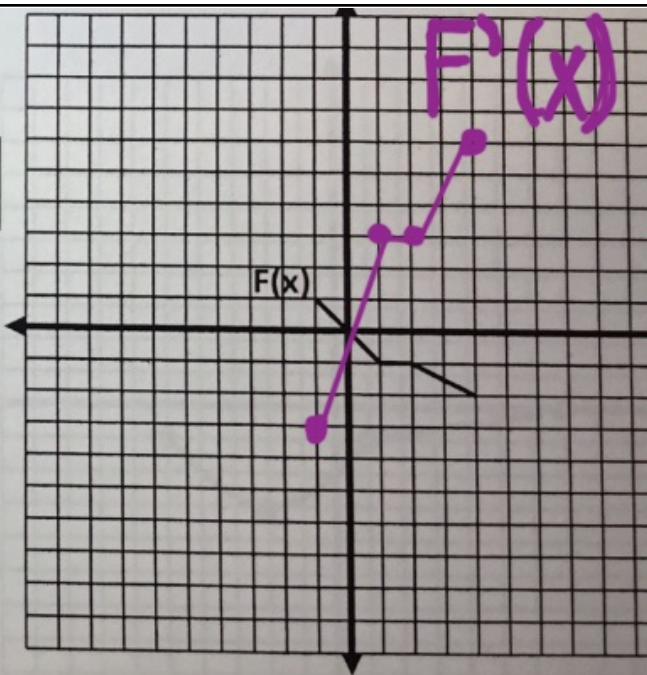
Created with Doceri



➤ Graph: $y = -3F(x)$

x	$F(x)$	y
-1	1	-3
1	-1	3
2	-1	3
4	-2	6

$(x, y) \rightarrow (x, -3y)$



Describe the transformations:

R: x-axis
D: 5 by 3

Did the transformation affect the domain or the range of the function?

Range

➤ Checkpoint: Let's revisit $H(x)$.

Created with Doceri



the function?

➤ **Checkpoint: Let's revisit $H(x)$.**

1. Describe the effect on Harry's graph for each of the following.

Example: $y = -5H(x)$ Each point is reflected across the x-axis and stretched by a factor of 5

a. $y = 3H(x)$ Dilation: Stretch by 3

b. $y = -2H(x)$ Rx-axis, Dilation: Stretch by 2

c. $y = \frac{1}{2}H(x)$ Dilation: Compress by $\frac{1}{2}$

Created with Doceri



<p>a. $y = 3H(x)$ 5 by 3</p>	<p>b. $y = -2H(x)$ Kx-axis 5 by 2</p>	<p>c. $y = \frac{1}{2}H(x)$ C by 2</p>
<p>$(x, y) \rightarrow (x, 3y)$</p>	<p>$(x, y) \rightarrow (x, -2y)$</p>	<p>$(x, y) \rightarrow (x, \frac{1}{2}y)$</p>
<p>Dom: $[-1, 3]$</p>	<p>Dom: $[-1, 3]$</p>	<p>Dom: $[-1, 3]$</p>
<p>Range: $[-15, 9]$</p>	<p>Range: $[-6, 10]$</p>	<p>Range: $[-2.5, 1.5]$</p>

$$y = F(3x)$$

$$y = 3F(x)$$

Created with Doceri



➤ The graph of $D(x)$ is shown.

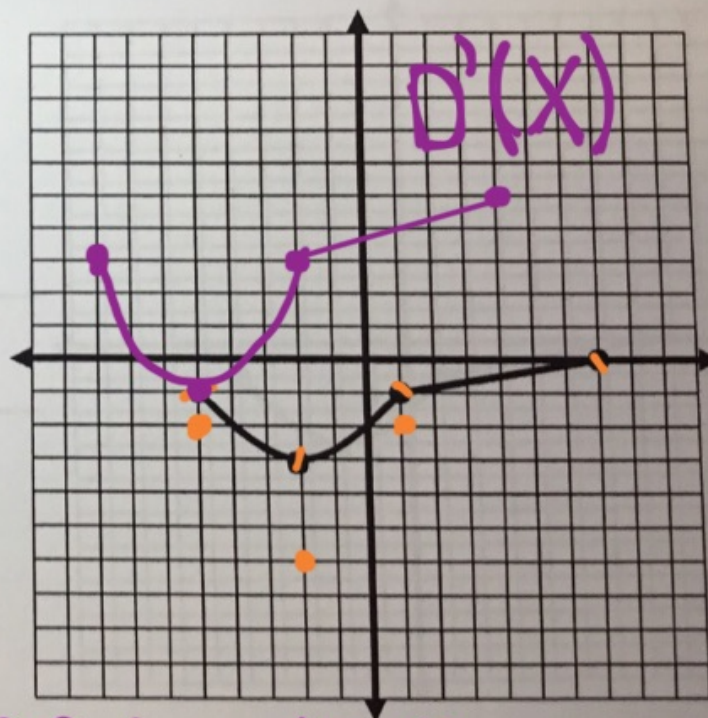
List the key points of $y = D(x)$.

$(-5, -1)(-2, -3)(1, -1)(7, 0)$

Since $D(x)$ is our original function, we will refer to it as the **parent function**.

Note: In transformational graphing where there are multiple steps, it is ~~important~~ to perform the **translations** last.

imperative/necessary



$2D(x+3)+5$
 D: 5 by 2
 left 3
 up 5

Created with Doceri



➤ **Example:** Let's explore the steps to graph $y = 2D(x + 3) + 5$, without using tables.

Step 1. The transformations represented in this new function are listed below in the order they will be performed. (See note above.)

- Vertical stretch by 2 (Multiply y - coordinate by 2)
- Translate left 3
- Translate up 5

$$(x, y) \rightarrow (x-3, 2y+5)$$

Created with Doceri



Step 2. Follow the process used in Step 1 above to perform all the transformations on the other 3 points.

Step 3. After completing Step 2, you will have all four key points for the graph. Be sure you use a curve in the appropriate place.

- ✓ What are the **domain** and **range** of $y = D(x)$?

$$D: [-5, 7]$$
$$R: [-3, 0]$$

- ✓ What are the **domain** and **range** of $y = D(x)$ after the transformations?

$$D: [-8, 4]$$
$$R: [-1, 5]$$

Created with Doceri



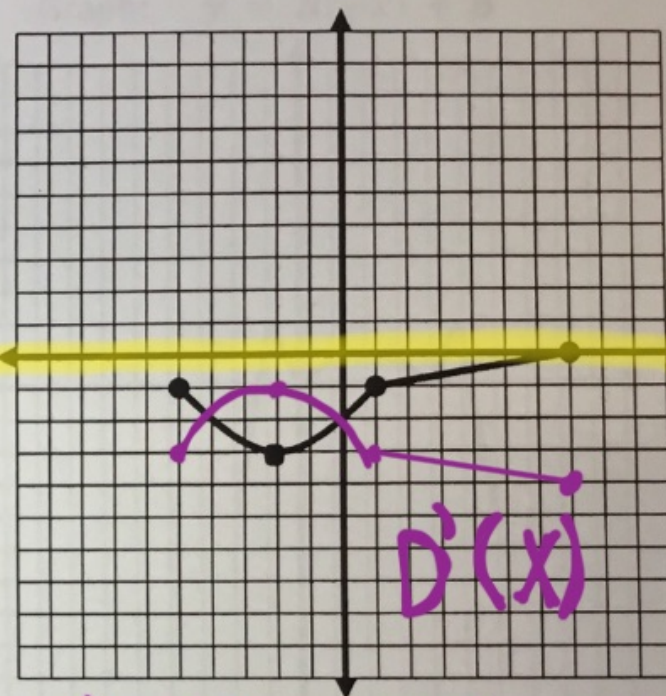
➤ Graph: $y = -D(x) - 4$ *R_x-axis, 04*

- List the transformations needed to sketch the graph.
(Remember, to be careful with order.)

- R_x-axis*
- Down 4*

- Plot the new points and sketch the graph.

3. $(x, y) \rightarrow (x, -y - 4)$



~~*(-5, -1)*~~ ~~*(-2, -3)*~~

Created with Doceri

➤ Graph: $y = 3D(-x)$

1. List the transformations needed to sketch the graph.
(Remember, to be careful with order.)

- R_y-axis
- Dilate: Stretch by 3

2. Plot the new points and sketch the graph.

3.

$$(x, y) \rightarrow (-x, 3y)$$



D(3)

(-5, -1) (-2, -3)
(5, 3) (2, 9)

Created with Doceri



➤ Checkpoint:
Graph: $y = 3C(x) + 5$

*5 by 3
up 5*

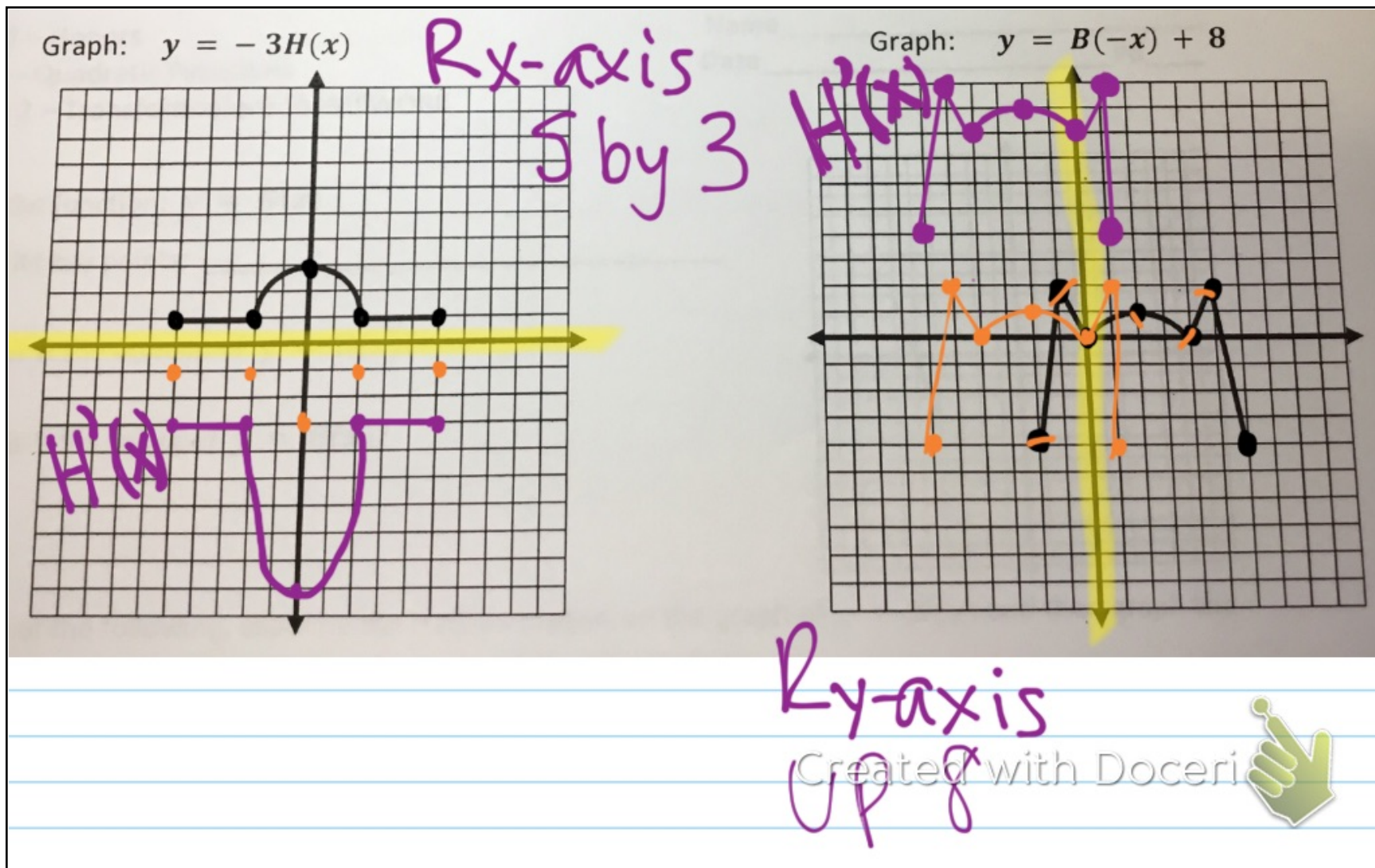
C(x)

Graph: $y = -G(x - 3) - 6$

G(x)

Rx-axis

R 3, 0 6



➤ Finally, let's examine a reflection in the line $y = x$.

1. Graph this line $y = x$ on the grid.
2. Complete the charts below with the characteristic points:

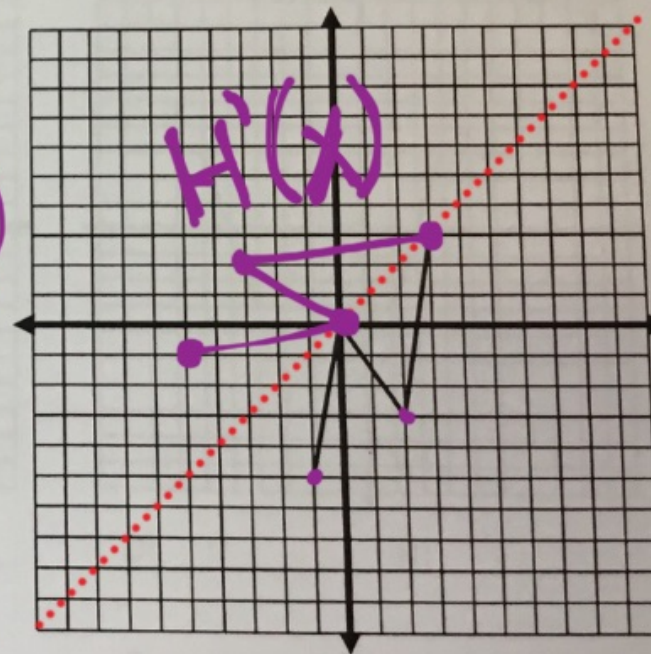
$y = H(x)$

x	y
-1	-5
0	0
2	-3
3	3


Reflection

x	y
-5	-1
0	0
-3	2
3	3

(y, x)



3. Describe what happens when we reflect in the line $y = x$.

$(x, y) \rightarrow (y, x)$
 Created with Doceri 

4. What is the domain of $H(x)$? $[-1, 3]$

What is the range of $H(x)$? $[-5, 3]$

5. What is the domain of the reflection? $[-5, 3]$

What is the range of the reflection?

$[-1, 3]$

6. A reflection in the line $y = x$, shows a graph's **inverse**. Look at the graph of the inverse. Is the inverse a function? Explain how you know.

Fails V.L.T.

Created with Doceri



Page 13-14

Homework

Created with Doceri



A large rectangular area with a black border, containing horizontal blue lines for writing. The lines are evenly spaced and extend across the width of the box. In the bottom right corner of this area, there is a watermark that reads "Created with Doceri" in a light gray font, followed by a green hand icon with the index finger pointing upwards.