Today’s Objective

Students will be able to graph lots of points in function notation.

Lesson 3.1
Where is (3, 5)?
+3 right and +5 up

What does the 3 mean? Right
What does the 5 mean? Up

Is x the number line? Yes
Graph and connect the points in the following sequence.

(-2,1) (2left, 1up)
(2,-3) (2right, 3down)
(2, 2) (2right, 2up)
(-2,-3) (2left, 3down)
(4, 0) (4right, 0up)
(-2,1) (2left, 1up)
Write the points in function notation.

\[
\begin{align*}
\text{G}(3) &= 3 \\ 
\text{f}(0) &= 5 \\ 
\text{H}(6) &= 1
\end{align*}
\]

\((0, 5)\) 
\((3, 3)\) 
\((6, 1)\)
Today’s New Vocab (3 of 4)

Write the function as a point. Graph the point.

F(7) = -5 \hspace{1cm} (7, -5)

What point is this? F

B(-4) = 6 \hspace{1cm} (-4, 6)

What point is this? B
Today’s New Vocab (4 of 4)

What is $G(3)$ and $F(4)$?

$G(x) = -2x$  $F(x) = x - 7$

$G(3) = -2(3)$  $F(4) = (4) - 7$

$G(3) = -6$  $F(4) = -3$

$(3, -6)$ The point is... $(4, -3)$
Graph the points and write the functions.

\[(x, y) \quad y = -x\]

\[(-4, 4) \quad F(-4) = 4\]

\[(-2, 2) \quad G(-2) = 2\]

\[(0, 0) \quad H(0) = 0\]

\[(2, -2) \quad J(2) = -2\]
Tuesday July 14, 2020 Exit Ticket
Graph the table and write the functions.

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-6</td>
</tr>
<tr>
<td>-2</td>
<td>-4</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

F(-3) = -6
G(-2) = -4
H(1)  = 2
J(2)  = 4
Today’s Objective

Students will be able to determine if problems are functions.

Lesson 3.2
Make a table for this function

<table>
<thead>
<tr>
<th>X(input)</th>
<th>f(x) (output)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>-6</td>
</tr>
<tr>
<td>4</td>
<td>-5</td>
</tr>
<tr>
<td>5</td>
<td>-2</td>
</tr>
</tbody>
</table>

Right and Left

Up and Down
Today’s New Vocab (1 of 4)

Is this a point or line at $G(3)$?

$G(x) = -2x$  
$G(3) = -6$

$G(3) = -2(3)$  
$G(3) = -6$

$G(3) = -6$  
$G(3) = -6$ is a point.

$G(x) = -2x$ is a line.  
$(3, -6)$
Today’s New Vocab (2 of 4)

\( f(x) = 3x \) is a line on a graph.

<table>
<thead>
<tr>
<th>( x ) (Input)</th>
<th>( f(x) = 3x )</th>
<th>( f(x) ) (output)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(-1) )</td>
<td>( f(-1) = 3(-1) )</td>
<td>( f(-1) = -3 )</td>
</tr>
<tr>
<td>( f(0) )</td>
<td>( f(0) = 3(0) )</td>
<td>( f(0) = 0 )</td>
</tr>
<tr>
<td>( f(1) )</td>
<td>( f(1) = 3(1) )</td>
<td>( f(1) = 3 )</td>
</tr>
<tr>
<td>( f(2) )</td>
<td>( f(2) = 3(2) )</td>
<td>( f(2) = 6 )</td>
</tr>
</tbody>
</table>

If every point is \( f \), then the line is called \( f \).
Can the calculator make a table for you?

\[ f(x) = 3x \]

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>-3</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
Evaluate the expression for $g(3)$ and $g(-3)$.

\[ g(x) = x - 2 \]

\[
\begin{align*}
g(3) &= (3) - 2 \\
g(3) &= 3 - 2 \\
g(3) &= 3 - 2 = 1
\end{align*}
\]

\[
\begin{align*}
g(-3) &= (-3) - 2 \\
g(-3) &= -3 - 2 = -5
\end{align*}
\]

What is $g(3) + g(-3)$? $1 - 5 = -4$
Evaluate when $g(3)$ and $f(3)$.

$f(x) = 2x$  \quad  g(x) = x + 2$

$f(3) = 2(3)$  \quad  g(3) = (3) + 2$

$f(3) = \underline{6}$  \quad  $g(3) = \underline{5}$

What is $f(3) + g(3)$?  $6 + 5$ is 11

What is $f(3) - g(3)$?  $6 - 5$ is 1

What is $f(3)(g(3))$?  $6(5)$ is 30
Wednesday July 15, 2020 Exit Ticket

Make a table from the graph.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$f(x)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

What is $f(0)$? 3
What is $f(4)$? 1
Today’s Objective

Students will be able to make a table on the calculator.

Lesson 3.3
Enter the function.
Make a table.

\[ g(x) = x - 7 \]

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-7</td>
</tr>
<tr>
<td>1</td>
<td>-6</td>
</tr>
<tr>
<td>2</td>
<td>-5</td>
</tr>
<tr>
<td>3</td>
<td>-4</td>
</tr>
<tr>
<td>4</td>
<td>-3</td>
</tr>
<tr>
<td>5</td>
<td>-2</td>
</tr>
</tbody>
</table>
Evaluate the function for \( g(2) \) and \( g(4) \)

\[
g(x) = x - 7
\]

\[
g(2) = (2) - 7
\]

\[
g(2) = 2 - 7
\]

\[
g(2) = -5
\]

\[
g(4) = (4) - 7
\]

\[
g(4) = 4 - 7
\]

\[
g(4) = -3
\]

What number was next to 4 on the table? -3
Make a graph from the following table.

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-7</td>
</tr>
<tr>
<td>1</td>
<td>-6</td>
</tr>
<tr>
<td>2</td>
<td>-5</td>
</tr>
<tr>
<td>3</td>
<td>-4</td>
</tr>
<tr>
<td>4</td>
<td>-3</td>
</tr>
</tbody>
</table>

\[ g(x) = x - 7 \]
What is a function?

A function is an equation which gives a unique output for all inputs.

For example,

You work at a shirt factory and press the red button, it should make a red shirt.
Today’s New Vocab (4 of 4)

This graph is $f(x) = x^2$

What is $f(-2)$? 4
Write the point. (-2,4)

What is $f(-1)$? 1
Write the point. (-1,1)

What is $f(0)$? 0
Write the point. (0,0)
Which mapping diagram is a function? Left

Why? The x-value is repeated and not unique.

The 2 is repeated.
Translate the function into points, a table, and a graph.

\[ f(x) = x+2 \]

<table>
<thead>
<tr>
<th>X</th>
<th>F(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-1</td>
</tr>
<tr>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>-1</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Points:
- \((-3, -1)\)
- \((-2, 0)\)
- \((-1, 1)\)
- \((0, 2)\)
Today’s Objective
Students will be able to determine the maximum and minimum of a function.

Lesson 3.4
What is the maximum (or top) of the parabola (or curved line) $f(x)$? State the point. $(2, 1)$

What is $f(4)$? $-3$
Today’s New Vocab (1 of 4)

Find the value of the parabola (function).

What is \( f(0) \)? __7__

What is \( f(3) \)? __1__

What is \( f(6) \)? __7__

What is the minimum (bottom) of the function? (3,1)
**Today's New Vocab (2 of 4)**

Make a table for the function.

<table>
<thead>
<tr>
<th>X (Input)</th>
<th>f(x) = x^2 − 4</th>
<th>Y (output)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>(−2)^2−4</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>(0)^2−4</td>
<td>-4</td>
</tr>
<tr>
<td>2</td>
<td>(2)^2−4</td>
<td>0</td>
</tr>
</tbody>
</table>
Today’s New Vocab (3 of 4)

Is $f(x) = x^2 - 4$ a function? **YES**

Why? The input $x$ does have a unique output $f(x)$. Every $x$-value has exactly one answer when you substitute.

What is $f(-3)$?

$f(-3) = (-3)^2 - 4$

$f(-3) = +9 - 4$

$f(-3) = 5$
Today’s New Vocab (4 of 4)

Make a graph.

\[ f(x) = x^2 - 4 \]

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>5</td>
</tr>
<tr>
<td>-2</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>-4</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>
Make a table for the piece-wise function

\[ f(x) = \begin{cases} 
3x & \text{if } -3 \leq x < 1 \\
3x & \text{if } 1 \leq x \leq 8 
\end{cases} \]

At what point does the line split into pieces? **(1,3)**

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>-3</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>
For what value of $x$ does $f(x) = 2$?
- Two answers: $(4,2)$, $(-2,2)$

For what value of $x$ does $f(x) = 0$?
- Two answers: $(-1,0)$, $(3,0)$
Today’s Objective

Students will be able to Review for Unit Test #3.
3. The distance, $d$, that a car has traveled, as a function of time, $t$, is given in the table below. What is the average rate of change of the distance over the interval $4 \leq t \leq 10$?

<table>
<thead>
<tr>
<th>$t$ (hours)</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>$d$ (miles)</td>
<td>0</td>
<td>119</td>
<td>150</td>
<td>271</td>
<td>332</td>
<td>468</td>
</tr>
</tbody>
</table>

$d(t) = 6t + 150$ for $0 \leq t \leq 10$.

$\text{Avg. Rate of Change} = \frac{468 - 150}{10 - 4} = \frac{318}{6} = 53 \text{ mph}$.
1. If \( g(x) = 5x + 2 \) and \( f(x) = x^2 - 4 \), then which of the following is the value of \( g(-6) \) and \( f(-5) \)?

\[
\begin{align*}
  g(-6) &= 5(-6) + 2 \\
  f(-5) &= (-5)^2 - 4
\end{align*}
\]

\[
\begin{align*}
  g(-6) &= -28 \\
  f(-5) &= 21
\end{align*}
\]
12-13. Do the following graphs represent functions? Explain how you arrived at your choice.

#12

- Draw a non-function
- \((-2, 3), (-2, -1)\)
- Explain: Repeating x values
- Answer is not unique

#13

- Draw a function
- Explain: VLT has only one point.
- X values do not repeat.
8. A function is initially defined by the set of coordinate pairs \( \{(-2, 6), (-5, 4), (7, -3)\} \). Which coordinate pair below, if added to this set, prevents the set from representing a function?

\[
\begin{align*}
(-2, \text{any#}) \text{ or } (-5, \text{any#}) \\
(7, \text{any#})
\end{align*}
\]

Explain why? I made the x values repeat.
So, it is not a function.

Define a non-function; it has repeating x.
Today’s New Vocab (4 of 4)

18. What values of $x$ solve the equation $f(x) = -1$?

Circle points on your graph that justify your solution.

There are 3 $x$-values on $f(x) = -1$.

A set $x = \{-2, \frac{2}{3}, \frac{4}{3}\}$

$(-2, -1)$  $(\_\_, -1)$  $(4, -1)$