Folder Check Algebra Unit #3

Name: ___________ Score: ___ out of 70

Worksheet Policy
-0 All Questions Done
-1 More than Half Done
-2 Only Groupwork Q’s
-3 Less than Half Done
-4 Blank/Absent

Notes Policy
-0 All boxes filled
-1 One Empty Box
-2 Two Empty Boxes
-3 Less than Half Done
-4 Blank/Absent

Name on all pages. ________

Pages 1-2 Worksheet Lesson 1 ______

Pages 3-4 Notes Lesson 1 ______

Pages 5-6 Worksheet Lesson 2 ______

Pages 7-8 Notes Lesson 2 ______

Pages 9-10 Worksheet Lesson 3 ______

Pages 11-12 Notes Lesson 3 ______

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Pages 19-20 Notes Lesson 5 ______

Pages 21-22 Worksheet Lesson 6 ______

Pages 23-24 Notes Lesson 6 ______

Pages 25-26 Study Guide ______

Pages 27-28 Study Guide ______

This page on top.
Four Quadrant Graphing Puzzle

Connect each sequence of points with a line.

13. (-3,0), (-4,-1), (-6,-2), (-6,-3), (-5,-4), (-4,-4), (-3,-4), (1,-2) End of Sequence
14. (-1,1), (5,3), (6,5), (7,5), (7,3), (9,2), (8,1), (6,2), (3,-1) End of Sequence
15. (-5,-3), (-6,0), (-5,0), (-5,-6), (-4,-6), (-5,-3) End of Sequence
16. (-9,3), (-7,4), (7,-3), (5,-4), (-9,3) End of Sequence
17. (-6,-2), (-4,-3), (-2,-2), (-1,-1) End of Sequence
18. (5,3), (4,4), (5,4) End of Sequence
19. (-4,-1), (-2,-2) End of Sequence

Did you make an airplane? ___
Function Notation Worksheet Alternate

For #1-8: Evaluate the following expressions given the functions below. Then, write the point.

\[ g(x) = -3x \quad f(x) = x - 7 \quad h(x) = \frac{16}{x} \quad j(x) = x + 4 \]

1. \( g(10) = \) [ ]
2. \( (10, \quad -30) \)
3. \( f(3) = \)
4. \( (-1, \quad -1) \)
5. \( h(-2) = \)
6. \( (-1, \quad -1) \)
7. \( j(7) = \)
8. \( (-1, \quad -1) \)

For #9-12: Translate the following functions into coordinate points.

9. \( f(-1) = 3 \) \( (-1, \quad 3) \)
10. \( g(4) = -1 \)
11. \( h(2) = 8 \) \( (-1, \quad -1) \)
12. \( k(2) = 9 \)
1. Evaluate the following expressions given the functions below:

\[ g(x) = x - 2 \quad f(x) = 2x \quad h(x) = x + 2 \quad j(x) = \frac{x}{2} \]

a. \( g(10) = \) 

b. \( f(3) = \) 

c. \( h(-2) = \) 

d. \( j(8) = \) 

#2. A. \( f(-1) = \) 

B. \( h(-3) = \) 

c. \( j(-4) = \) 

D. \( \text{Find} \quad g(10) + f(3) = 8 + 6 = 14 \)

#3. A. \( \text{Find} \quad h(-2) + j(-4) = \) 

B. \( \text{Find} \quad h(-3) + j(8) = \) 

#4. Translate the following statements into coordinate points:

a. \( f(-1) = 1 \quad (-1, 1) \) 

b. \( h(2) = 8 \) 

c. \( g(1) = -2 \)
For #5 use the graph to find:

a. \( f(2) = -2 \)

b. \( f(0) = \) 

c. \( f(-4) = \) 

d. \( f(-5) = \) 

e. \( f(5) = \) 

f. Does the graph represent a function? Explain why or why not.

Yes, the values do not repeat.

7. Swine flu is attacking Porkopolis. The function \( S(x) = 2x \) determines how many people have swine flu after 1 day, 2 days, 3 days, ..., 8 days. Graph the points.

a. \( S(1) = \) \( \left(1, \frac{1}{2}\right) \)

b. \( S(2) = \) 

c. \( S(3) = \) 

d. \( S(4) = \) 

e. \( S(5) = \) 

f. \( S(6) = \)

g. \( S(7) = \)
h. \( S(8) = \)
Misconception (4 of 4)
1. Given $f(x) = 2x + 3$. Fill in the table.

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

2. Given $g(x) = \frac{1}{2}x - 2$. Fill in the table.

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

3. Evaluate the following expressions given the functions below:

$$
\begin{align*}
g(x) &= -3x + 1 \\
f(x) &= x + 7 \\
h(x) &= \frac{12}{x} \\
j(x) &= 2x + 9
\end{align*}
$$

a. $g(10) = -3(10) + 1 = -29 + 1 = -28$

b. $f(3) = (3) + 7 = 10$

c. $h(-2) = \frac{12}{-2} = -6$

d. $j(4) = 2(4) + 9 = 8 + 9 = 17$

4. Translate the following statements into coordinate points.

a. $f(3) = 10$

$$(3, 10)$$

b. $g(10) = -29$

$$(10, -29)$$

c. $h(-2) = -6$

d. $j(4) = 17$

5. Given this graph of the function $f(x)$:

Find:

a. $f(-4) = 2$

b. $f(0) = -9$

c. $f(2) = -9$

d. $f(5) = -9$
**Lesson #3**

**Unit 3.3**

**INTRODUCTION TO FUNCTIONS**

**COMMON CORE ALGEBRA I HOMEWORK**

**FLUENCY**

6. Decide whether each of the following relations is a function. Explain your answer.

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Outputs (y)</th>
<th>Function?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>No, because the value repeats. The x=2 has two outputs.</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

7. In each of the following examples, use an input-output chart to decide if the following relation is a function.

7(a) Consider the following relation:

\[ y = |x+2| \]

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Calculation</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>(-3) + 2</td>
<td>y = -1</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7(b) Consider the following table:

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Calculation</th>
<th>Output (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>-3(-2) - 1</td>
<td>y = 7</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7(c) Function? Yes/No

8. (a) Consider the following graph

\[ y = \sqrt{x+2} \]

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Calculation</th>
<th>Output(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>(-2)^2</td>
<td>y = 4</td>
</tr>
<tr>
<td>1</td>
<td>(1)^2</td>
<td>y = 1</td>
</tr>
<tr>
<td>2</td>
<td>(2)^2</td>
<td>y = 4</td>
</tr>
</tbody>
</table>

8(b) Consider the following graph

\[ y = \frac{x^2}{3} + 2 \]

<table>
<thead>
<tr>
<th>Input (x)</th>
<th>Calculation</th>
<th>Output(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6</td>
<td>(-6)^2 / 3</td>
<td>y = 0</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Name: ____________________________  Unit # 3  Lesson # 3

Activator

New Vocabulary (1 of 4)

New Vocabulary (2 of 4)

New Vocabulary (3 of 4)
Misconception (4 of 4)
GRAPHS OF FUNCTIONS
COMMON CORE ALGEBRA I

Unit 3 Lesson 4

Graphs are one of the most powerful ways of visualizing a function's rule because you can quickly read outputs given inputs. You can also easily see features such as **maximum and minimum** output values. Let's review some of those skills in Exercise #1.

**Exercise #1:** Given the function \( y = f(x) \) defined by the graph below, answer the following questions.

(a) Find the value of each of the following:

\[ f(4) = \quad f(-1) = \]

(b) For what values of \( x \) does \( f(0) = \)

(c) State the **minimum** \( (\quad, \quad) \) of the function.

So, if we can read a graph to produce outputs \( (y\text{-values}) \) if we are given inputs \( (x\text{-values}) \), then we should be able to reverse the process and produce a graph of the function from its **algebraically expressed rule**.

**Exercise #2:** Consider the function given by the rule \( g(x) = 2x + 3 \).

(a) Fill out the table below for the inputs provided.

\[
\begin{array}{|c|c|c|}
\hline
x & 2x + 3 & (x, y) \\
\hline
-2 & 2(-2) + 3 & -1 \\
-1 & & \\
0 & & \\
1 & & \\
2 & & \\
3 & & \\
\hline
\end{array}
\]

(b) Draw a graph of the function on the axes provided.
Lesson #4

Never forget that all we need to do to translate between an equation and a graph is to plot input/output pairs according to whatever rule we are given. Let's look at a simple linear function next.

Exercise #3: Consider the simplest linear function \( f(x) = x + 1 \). Fill out the function table below for the inputs given and graph the function on the axes provided.

\[
\begin{array}{|c|c|c|c|}
\hline
x & x + 1 & y & \text{point} \\
\hline
-3 & -3 + 1 & -2 & (-3, -2) \\
-2 & \phantom{-} & \phantom{-} & \phantom{-} \\
-1 & \phantom{-} & \phantom{-} & \phantom{-} \\
0 & \phantom{-} & \phantom{-} & \phantom{-} \\
1 & \phantom{-} & \phantom{-} & \phantom{-} \\
2 & \phantom{-} & \phantom{-} & \phantom{-} \\
3 & \phantom{-} & \phantom{-} & \phantom{-} \\
\hline
\end{array}
\]

Sometimes the function's rule gets all sorts of funny and can include being piecewise defined. These functions have different rules for different values of \( x \). These separate rules combine to make a larger (and more complicated rule). Let's try to get a feel for one of these.

Exercise #4: Consider the function given by the formula \( f(x) = \begin{cases} 2x + 6 & x < 0 \\ 2x + 6 & x \geq 0 \end{cases} \). Your teacher will help you understand the notation of this function.

(a) Evaluate each of the following:

\[ f(4) = \quad f(-3) = \]

(b) Fill out the table below for the inputs given. Keep in mind which formula you are using.

\[
\begin{array}{|c|c|c|}
\hline
x & 2x + 6 & (x, y) \\
\hline
-5 & 2(-5) + 6 & (-5, -4) \\
-4 & \phantom{-} & \phantom{-} \\
-3 & \phantom{-} & \phantom{-} \\
-2 & \phantom{-} & \phantom{-} \\
-1 & \phantom{-} & \phantom{-} \\
0 & \phantom{-} & \phantom{-} \\
1 & \phantom{-} & \phantom{-} \\
\hline
\end{array}
\]

(c) Graph \( y = f(x) \) on the axes below.
<table>
<thead>
<tr>
<th>Activator</th>
<th>New Vocabulary (1 of 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New Vocabulary (2 of 4)</th>
<th>New Vocabulary (3 of 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
THE DOMAIN AND RANGE OF A FUNCTION
COMMON CORE ALGEBRA I

Ultimately, all functions do is convert inputs into outputs. So, each function has two sets associated with it. Those things that serve as inputs and those things that serve as outputs. These sets are given names.

THE DOMAIN AND RANGE OF A FUNCTION
1. The **domain of a function** is the set of all inputs for which the function rule can give an output.
2. The **range of a function** is the set of all outputs for which there is an input that results in them.

**Exercise #1:** Consider the function \( y = f(x) \) shown on the graph below.

(a) Evaluate each of the following:

\[
 f(-3) = \quad f(1) = \quad f(3) =
\]

(b) Can the function rule, given by the graph, give you a value when \( x = 5 \)? If so, what is it? If not, why not?

\[
 (5, \frac{1}{2}) \text{ is not on the line}
\]

(c) Is \( x = 5 \) in the domain of the function?

\[
 \text{Yes or No, the graph stops at } x = --
\]

(d) Give two other values of \( x \) that are in the domain of the function. Write the points

\[
 \text{Left most } \leq x \leq \text{ Right most }
\]

\[
 (\text{---,} -3) \text{ and } (\text{---, 5})
\]

(f) Write the range of this function. Write the points

\[
 \text{Lowest most } \leq y \leq \text{ Upper most }
\]

\[
 (0, \text{---}) \text{ and } (3, \text{---})
\]
1. \( y = x - 2 \)
   a. Create a table to show the range if the domain is -4, 0, 4.
   
   \[
   \begin{array}{c|c}
   x & y \\ 
   -4 & \_ \\ 
   0 & \_ \\ 
   4 & \_ \\ 
   \end{array}
   \]

   b. Graph the relation

   ![Graph of \( y = x - 2 \)]

   c. Is the relation a function?

3. \( \{(3, 4), (-2, 5), (6, 3), (3, -2)\} \)
   
   a. Create a table to represent the relation.

<table>
<thead>
<tr>
<th>Time (s)</th>
<th>Height (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

   b. Graph the relation.

   ![Graph of \( \{(3, 4), (-2, 5), (6, 3), (3, -2)\} \)]

   c. Is this relation a function?

4. 
   a. Is this relation a function?

   b. Why? Every \( x \) has a unique \( y \).

   c. Create a table of the data gathered from the graph above.

   ![Graph of data points]
1. Consider the function given by \( f(x) = 9 + x \). Find its average rate of change between the following points. Carefully show the work that leads to your final answer.

   (a) \( x = 0 \) to \( x = 3 \)
   \[
   \begin{array}{c|c}
   x & f(x) \\
   \hline
   0 & 9 \\
   3 & 12 \\
   \end{array}
   \]
   \( \frac{+3}{+3} = 1 \)

   (b) \( x = -1 \) to \( x = 5 \)
   \[
   \begin{array}{c|c}
   x & f(x) \\
   \hline
   -1 & -5 \\
   5 & 14 \\
   \end{array}
   \]

   (c) \( x = -2 \) to \( x = 2 \)
   \[
   \begin{array}{c|c}
   x & f(x) \\
   \hline
   -2 & -1 \\
   2 & 11 \\
   \end{array}
   \]

2. The function \( f(x) \) is given in the table below. Find its average rate of change between the following points. Show the calculations that lead to your answer.

   (a) \( x = -3 \) to \( x = 1 \)
   \[
   \begin{array}{c|c}
   x & f(x) \\
   \hline
   -3 & 7 \\
   1 & 3 \\
   \end{array}
   \]
   \[
   \frac{+4}{-4} = -1
   \]

   (b) \( x = 0 \) to \( x = 4 \).
   \[
   \begin{array}{c|c}
   x & f(x) \\
   \hline
   0 & -2 \\
   4 & -8 \\
   \end{array}
   \]

3. The function \( f(x) \) is given in the graph below. Find its average rate of change between the following points. Show the calculations that lead to your answer.

   (a) \( x = -6 \) to \( x = 4 \)
   \[
   \left( \frac{-6}{4}, - \right) \quad \text{and} \quad \left( \frac{4}{2}, - \right)
   \]
APPLICATIONS

4. The following table shows the number of points the Arlington girls team scored in their last basketball game where \( t \) is the time passed in minutes and \( f(t) \) the total number of points scored after \( t \) minutes.

(a) What was the average rate they were shooting in the game? Be sure to include proper units in your answer.

\[
\begin{array}{c|c}
 t & f(t) \\
 0 & 0 \\
 8 & 30 \\
 16 & 48 \\
 24 & 55 \\
 32 & 64 \\
\end{array}
\]

(c) Given your answers above scores, what can you say?

The girls scored ___ points per 1 minute.

REASONING

5. Consider the function given by \( f(x) = 6x + 5 \).

(a) Find its average rate of change from \( x = 1 \) to \( x = 5 \).

\[
\begin{array}{c|c}
 x & f(x) \\
 1 & \_ \\
 5 & \_ \\
\end{array}
\]

(c) The average rate of change for this function is always 6 (as you should have found in the first two parts of the problem). What type of function has a constant average rate of change? What do we call this average rate of change in this case? Search the Internet if needed.

This is called ____.
UNIT #3 Study Guide
COMMON CORE ALGEBRA I

PART I QUESTIONS: Answer all questions in this part. Show all of your work.

1. If \( g(x) = 5x + 2 \) and \( g(c) = 5c + 2 \), then which of the following is the value of \( g(-6) \) and \( f(-5) \)?
   \begin{align*}
   g(c) &= 5c + 2 \\
   f(x) &= x - 4 \\
   f(c) &= (c) - 4
   \end{align*}

2. If a function is defined by the formula \( f(x) = \frac{1}{4}x - 2 \) and its domain is given by the set \([-8, -4, 0, 4] \), which of the following sets gives the function's range?

   \[ \begin{array}{r}
   -8 \\
   -4 \\
   0 \\
   4
   \end{array} \]

   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>(y)</th>
<th>(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>119</td>
<td>2</td>
</tr>
<tr>
<td>150</td>
<td>4</td>
</tr>
<tr>
<td>271</td>
<td>6</td>
</tr>
<tr>
<td>332</td>
<td>8</td>
</tr>
<tr>
<td>468</td>
<td>10</td>
</tr>
</tbody>
</table>

   Divide miles by hours to get miles per hour.

4. For the function \( h(x) \) shown graphed below, over which of the following intervals is \( h(x) = 0 \)?

   \[ h(x) = |x - 1| - 2 \]

   \[ \begin{array}{r}
   -1 < x < 1 \\
   (0, 0)
   \end{array} \]
5. For the function defined by \( f(x) = \begin{cases} 3x - 1 & x < 5 \\ 3x - 1 & x \geq 5 \end{cases} \) which of the following represents the value of \( f(6) \)? 
\[
6 < 5 \quad \text{NO} \\
6 \geq 5 \quad \text{yes}
\]
and \( f(-3) \)

6. For function \( g(x) \) graphed below, over which of the following intervals is \( g(x) \) increasing?

\((-\infty, -1)\) and \((-1, \infty)\)

7. Given the graph of the function \( f(x) \) shown below, which of the following intervals represents its domain?

\([-1, 3]\)

8. A function is initially defined by the set of coordinate pairs \( \{(-2, 4), (-5, 4), (7, -3)\} \). Which coordinate pair below, if added to this set, prevents the set from representing a function?

\((-2, -4)\) add this to create a non-function

 Explain why? \(-2\) is repeated

 Define a non-function: it has repeating \( x \) or \( y \) values.

9. If the function \( h(x) \) is defined by \( h(x) = 3x \), then which of the following values of \( x \) solves the equation \( h(-2) \)?

\[ h(\_\_\_) = 3(\_\_) \]

Substitution problem

\[-26\]
PART II QUESTIONS: Answer all questions in this part. Show all of your work.

10. The function $f(x)$ is shown on the graph. What point does $f(-1)$ represent? Put this point on the graph.

$(-1, -\_)$

11. What point(s) does the value of $f(x) = -1$ represent? Graph the point(s).

$(-\_, -1)$ and $(-\_, -1)$

12-13. Do the following graphs represent functions? Explain how you arrived at your choice.

Draw a non-function

Draw a function

Explain: $x$ value repeats

Explain: $x$ value doesn't repeat

PART III QUESTIONS: Answer all questions in this part. Show all of your work.

14. Two functions, $f(x)$ and $g(x)$, are given below. Determine which of these functions has the greater average rate of change over the interval $1 \leq x \leq 5$

The average rate of change shows ...

Divide the two numbers

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f(x)$</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>$g(x)$</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>34</td>
<td>68</td>
</tr>
</tbody>
</table>

$\frac{5}{34}$

$-27$
15. Graph the piecewise function shown below on the axes provided. Which point below is on the graph?

$$f(x) = \begin{cases} 
-3x - 8 & -4 \leq x \leq -2 \\
2x - 3 & 0 \leq x \leq 3
\end{cases}$$

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

16. What is the value of $f(-3)$ for this piecewise function? Circle this point on your graph.

Which point is on the $x = -3$ line?

(____, ____)

**PART IV QUESTION:** Answer the question in this part. Show all of your work.

17. For the function $f(x)$ shown graphed below answer the following questions.

State the domain and range.

$\underline{\text{Domain:}}$ $\underline{\text{Range:}}$

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 $f(x) = -1$

$x = \{____, ____ , ____\}$

19. Give the intervals over which $f(x)$ is decreasing, and circle the decreasing sections on the graph.

Left (Top of the hill) 
Right (Bottom of the hill)