lesson sixteen - student resource sheet

Lesson Objective: Represent relations as ordered pairs, tables, mappings, or graphs. Describe domains and ranges of relations.

Vocabulary Box

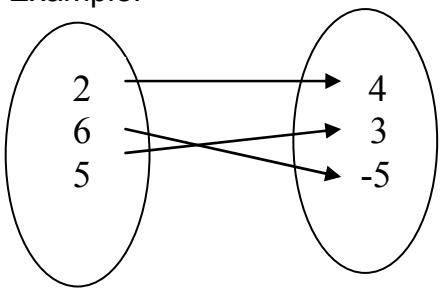
relation – A set of ordered pairs. Example: {(4, 7), (3, –2), (-7.5, 0)}

ordered pair – A set of two numbers in which the order has an agreed-upon meaning, such as the Cartesian coordinates (x, y), where the first coordinate represents the horizontal position, and the second coordinate represents the vertical position. Example: (4,7)

domain – All possible inputs for a relation or function; the set of first numbers in ordered pairs of a function or relation. Example: For {(4, 7), (3, –2), (-7.5, 0)} the domain is 4, 3, and -7.5.

range – All possible outputs for a relation or function; the set of second numbers in ordered pairs of a function or relation. Example: For {(4, 7), (3, –2), (-7.5, 0)} the range is 7, -2, and 0.

mapping – Illustrates how each element of the domain is paired with each element of the range. Example:



Independent Practice

Please complete the following practice problems on your own. Your teacher will review the answers.

Directions: Use the data below to answer the questions.

Capital Cities of the First 13 United States

Dover, Delaware
Harrisburg, Pennsylvania
Trenton, New Jersey
Atlanta, Georgia
Hartford, Connecticut
Boston, Massachusetts
Annapolis, Maryland
Columbia, South Carolina
Concord, New Hampshire
Richmond, Virginia
Albany, New York
Raleigh, North Carolina
Providence, Rhode Island

1. Make an input-output table for the data. Use the number of letters in the name of the capital city for the input and the number of letters in the name of the state for the output.

2. Write ordered pairs for the data.

3. Draw a mapping for the data.

4. On graph paper below, create a graph for the data.

5. State the domain of the relation.

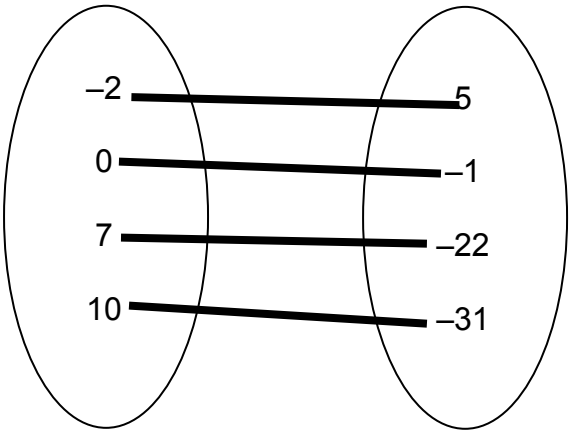
6. State the range of the relation.

Directions: Find an additional capital city and state that would add an additional unique ordered pair to the relation but would **not** change the domain and the range of the relation.

Problem Solving

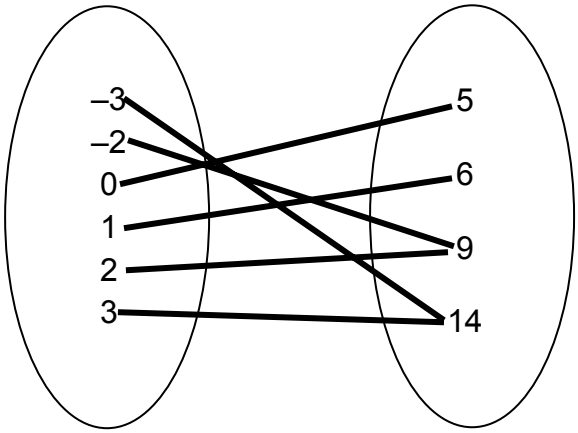
Equation Mapping

1. All of the pairs of numbers in the mapping below satisfy the equation $y = -3x - 1$. For example, if the input is 7 and the output is –22, we can show that $-22 = -3(7) - 1$. Show that all of the pairs of numbers in the mapping below satisfy the equation $y = -3x - 1$.



2. Draw a mapping for some pairs of values that satisfy the equation $y = |x + 2|$. Choose values so that there are six unique input values but only four unique output values.

3. Find an equation that will be satisfied by all the pairs of values in the mapping below.

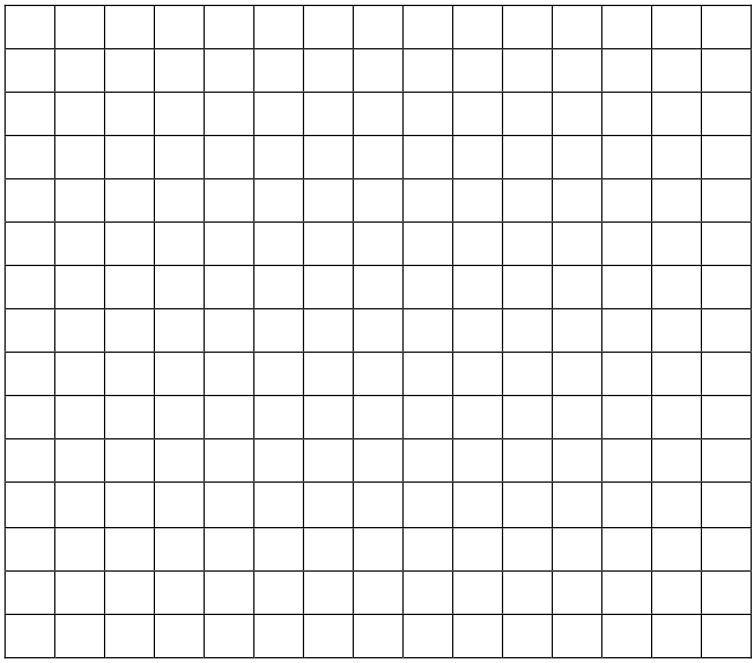


Directions: Answer each question based on the input-output table below.

Input	Output
2	4
–7	–3
–7	0
5	5
0	–3

1. Draw a mapping of the relation.

2. Create a graph of the relation.



3. State the domain and range of the relation.

lesson seventeen - student resource sheet

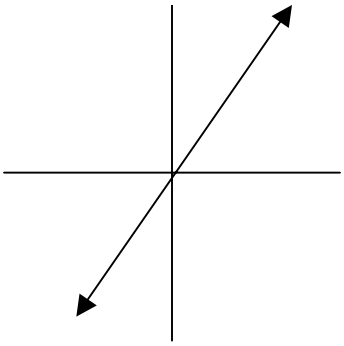
Lesson Objective: Define a function. Determine whether a given relation is a function.

Vocabulary Box

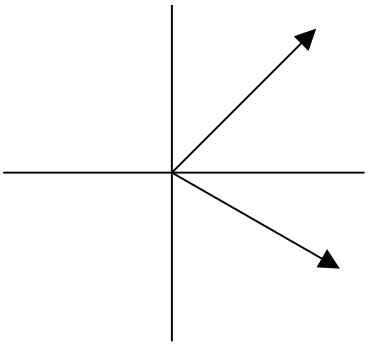
function – A relation in which each input has exactly one output. Examples: The relation (1, 2), (2, 4), and (3, 4), is a function.

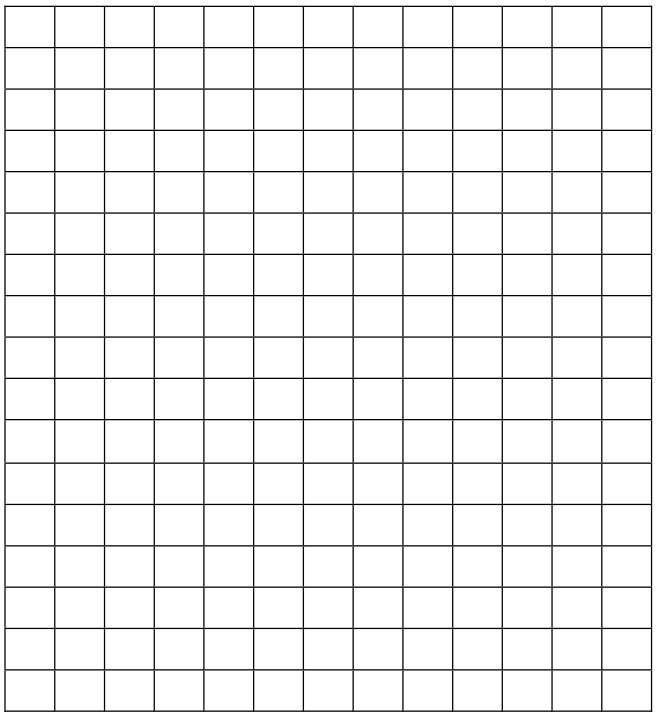
vertical line test – A test to determine whether a relation is a function. If a vertical line can be passed through more than one point on a graph, then the graph is not a function; otherwise it is a function. Examples:

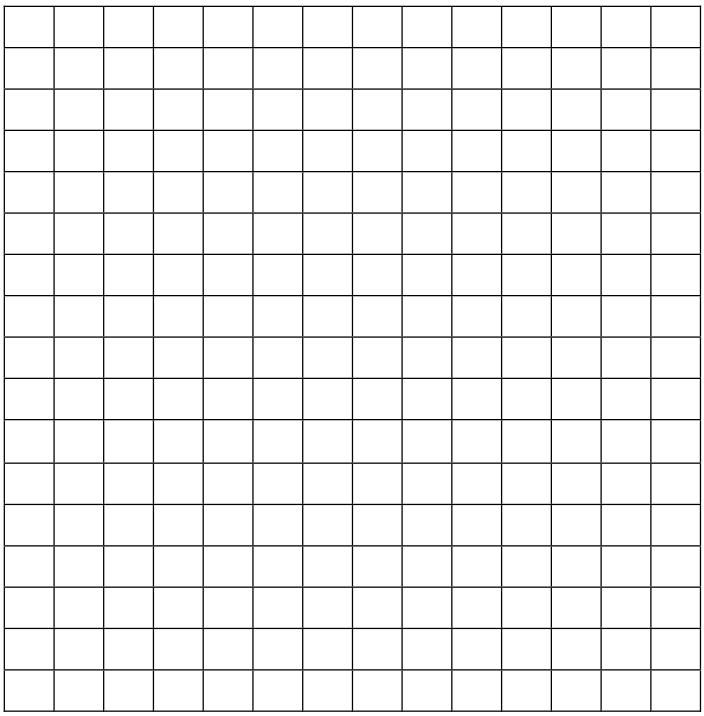
Function

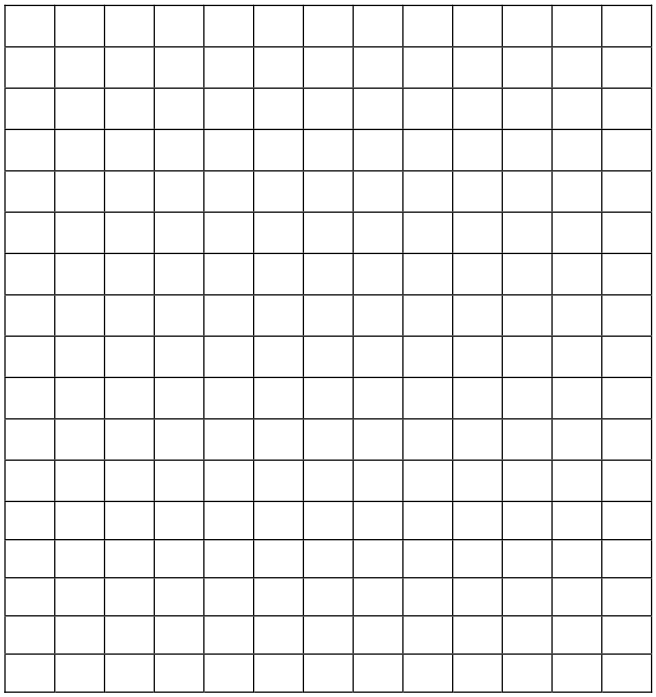


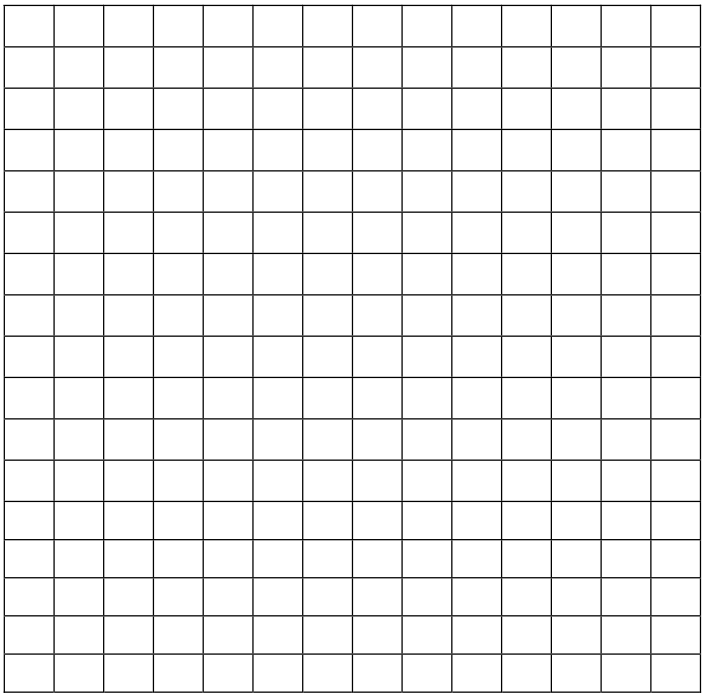
Not a Function











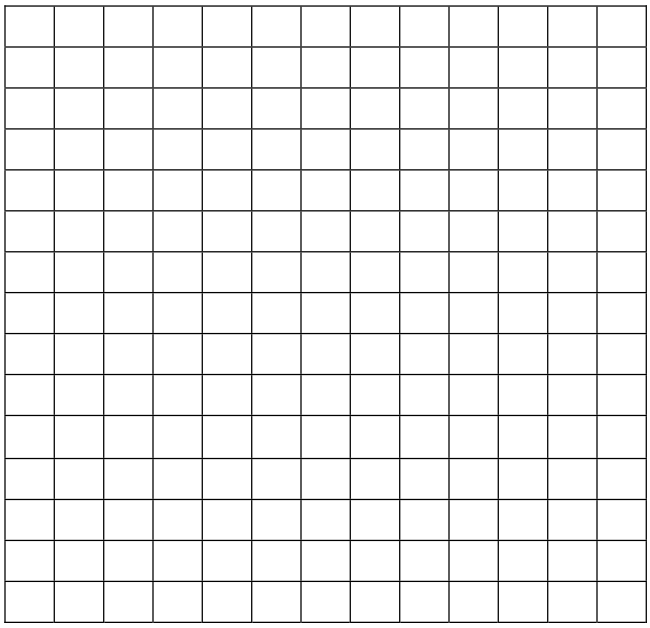
Guided Practice

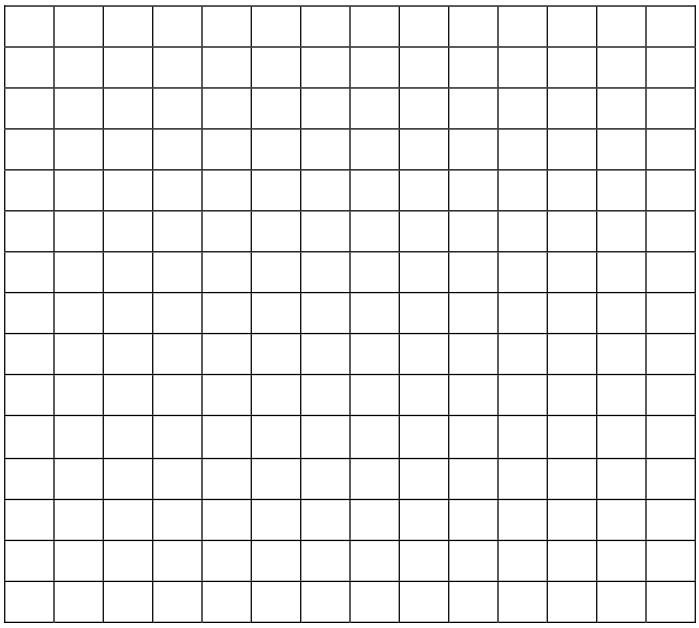
You will complete the following practice problems with your partner. Then your teacher will review the answers.

Directions: For each relation, draw a mapping and draw a graph. Tell whether the relation is a function and explain your answer.

1. {(0, 5), (1, 6), (1, 4), (2, 3), (3, 1)}

2. {(–2, 3), (–1, 1), (0, –1), (1, 1), (2, 3)}.





Summary/Closure

A. Vocabulary Words

Directions: Change the incorrect words so that the sentence makes a correct definition.

1. A relation is a function in which each output has more than one input.

2. A horizontal line test is a test to determine whether a function is a relation; if a horizontal line can be passed through less than three points on a graph, then the graph is a function, and otherwise it is a function.

B. Summarize What We Learned Today

Directions: Write four ordered pairs that form a relation that is a function. Then write four ordered pairs that form a relation that is not a function. Then map and graph each relation, and tell how the map and graph can be used to tell if a relation is a function. You will use this explanation as a personal reminder.

lesson eighteen - student resource sheet

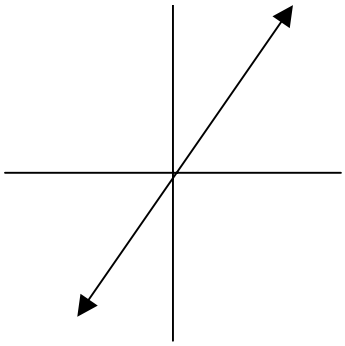
Lesson Objective: Define a function. Determine whether a given relation is a function.

Vocabulary Box

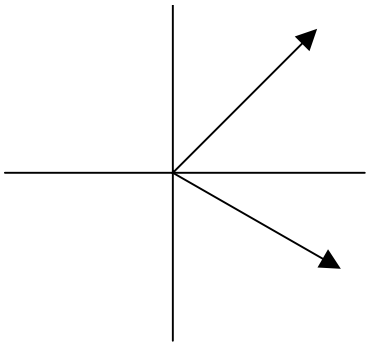
function – A relation in which each input has exactly one output. Examples: The relation (1, 2), (2, 4), and (3, 4), is a function.

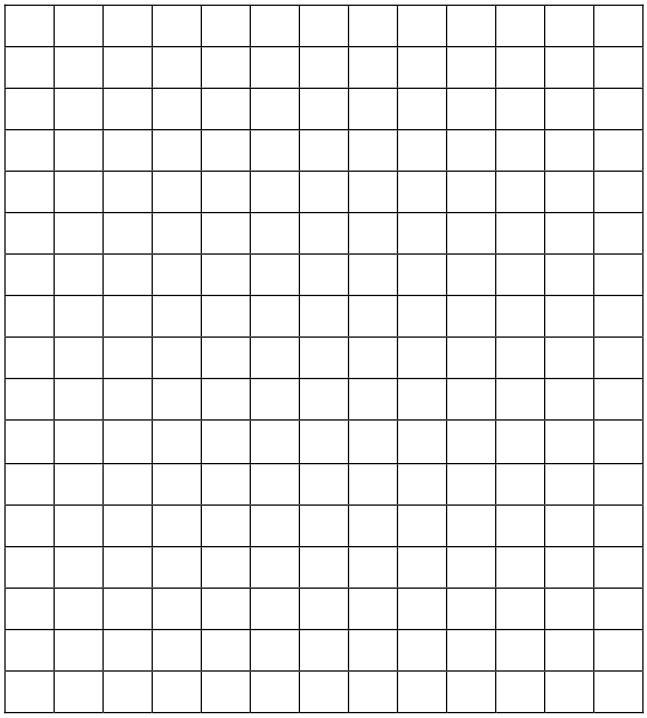
vertical line test – A test to determine whether a relation is a function. If a vertical line can be passed through more than one point on a graph, then the graph is not a function; otherwise it is a function. Examples:

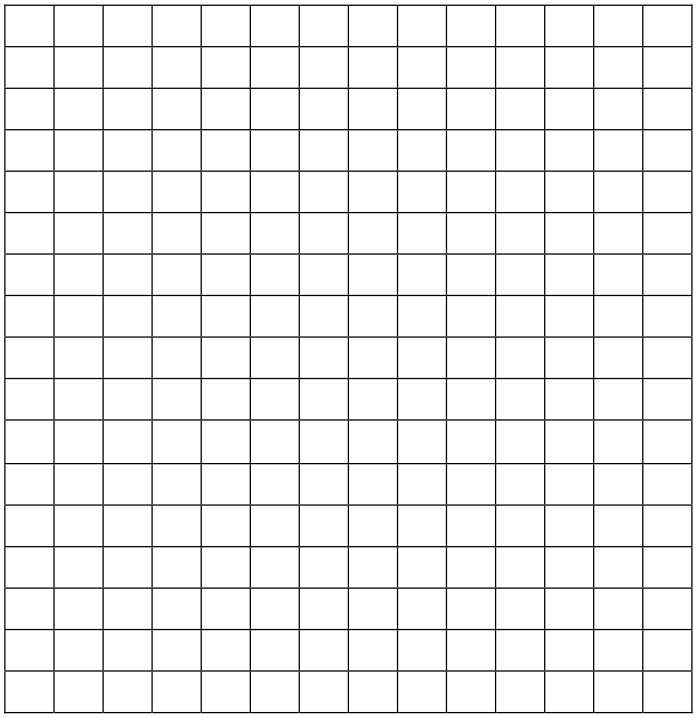
Function



Not a Function







Independent Practice

Please complete the following practice problems on your own. Your teacher will review the answers.

Directions: For each relation, draw a mapping and draw a graph. Tell whether the relation is a function and explain your answer.

1. {(4, –5), (–1, –1), (6, 2), (0, –7)}

2. {(–3, –1), (–1, 0), (1, 0), (3, –1)}

3. {(5, 2), (3, 4), (2, 6), (5, 8)}

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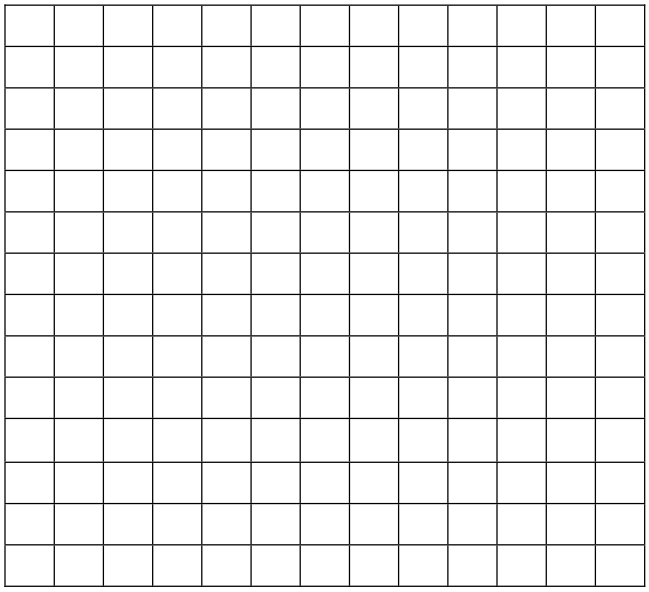

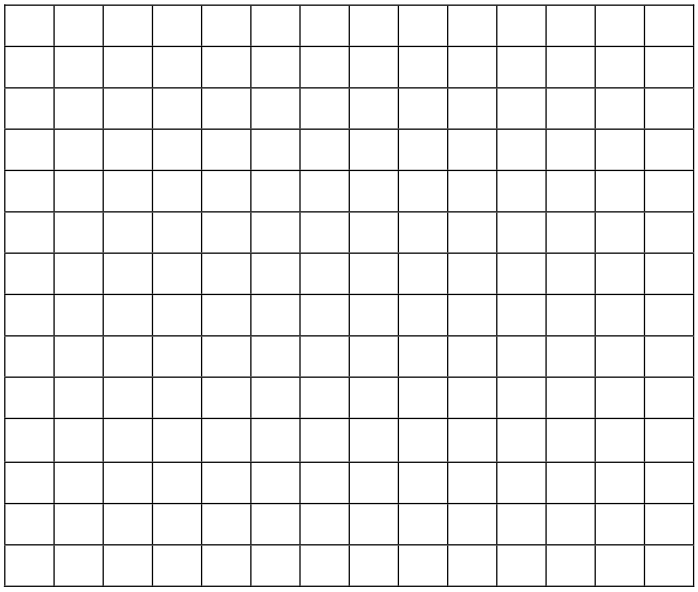

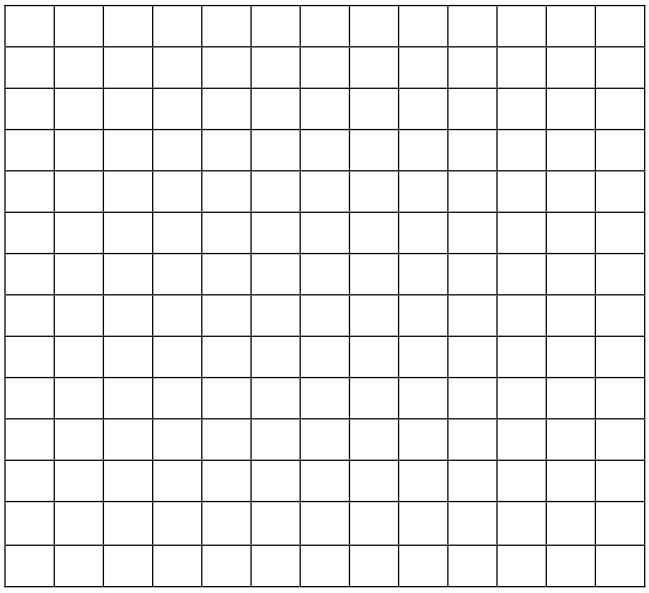

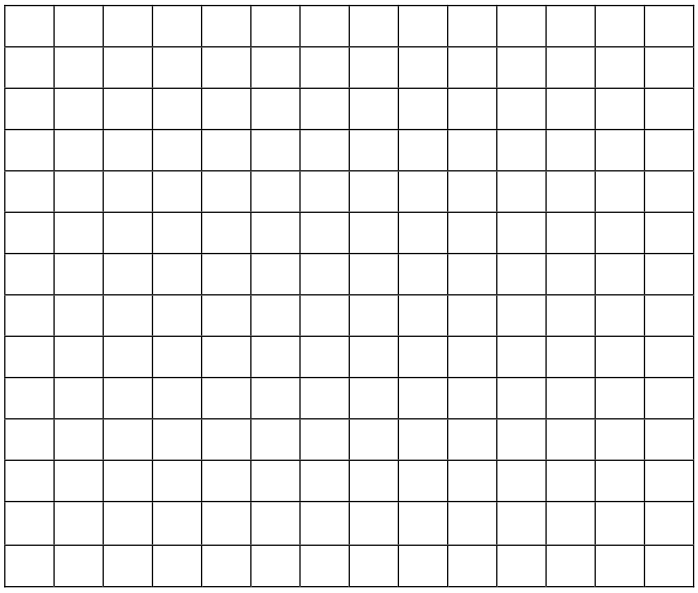

BONUS?

Directions: Answer the following questions.

1. If the following letters were graphed as they appear below, which ones would make graphs of functions?

   A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

2. Which letters would make graphs of functions if their graphs were rotated 90° clockwise?

3. If the following symbols were graphed as they appear below, which ones would make graphs of functions?

   ~ ! @ # $ % ^ & * ( ) _ + = | \ < > ? /

Problem Solving

Relation Recreation and Function Fun

There are many relations in our everyday lives. Some of them are functions, and some of them are not. Using the definition of a function, classify the following relations as "function" or as "not a function". Then explain your reasoning, using specific examples. (Hint: try to determine if there would be an input that would have more than one output.)

1. Input: time of the day on a certain day in a certain place
   Output: outside temperature

2. Input: outside temperature on a certain day in a certain place
   Output: time of the day

3. Input: number of minutes exercising
   Output: number of calories burned

4. Input: number of minutes walking in the mall
   Output: distance from the mall entrance

5. Input: number of touchdowns for one team, in a game of football
   Output: score for that team in that football game

6. Input: number of days passed in the school year
   Output: number of days left in the school year

7. Choose and explain a real-life situation that is a function. Identify the input and output. Tell why you know that this relation is a function.

Directions: For each relation, draw a mapping and draw a graph. Tell whether the relation is a function and explain your answers.

1.

Input	Output
4	2
–4	–6
–9	0
3	9
0	2

2. {(2, 4), (4, 8), (6, 16), (8, 32)}

3. {(-2, 4), (2, 4), (0, 0), (-4, 16), (4, 16)}

lesson eighteen - student resource sheet