**Unit 5 - Functions**

Lesson 1: Writing a Function Rule.
Objective: Today we will write the rule for a given function.
Standard: 8.F.1, 8.F.3

**Vocabulary**

* **\_\_\_\_\_\_\_ values** – X-values of an ordered pair
* **\_\_\_\_\_\_\_\_\_ Values** – Y-values of an ordered pair
* **Relation** – A set of ordered pairs
* **Function –** A relation in which there are no repeating x-values
* **Function Rule** -

**Making Function Tables**

To find the output values of a function, substitute the input values for the variable in the function rule.

|  |  |  |  |
| --- | --- | --- | --- |
| Input | Function Rule | Output | Ordered Pair |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Finding Function Rules**

This year, the only function rules you will write will be linear functions. To write a function rule, then, is to write a linear equation!

|  |  |
| --- | --- |
| Input  | Output  |
|  |  |
|  |  |
|  |  |

What is the slope? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the y-intercept? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write the equation for the line (function rule) \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lesson 2: Determining if a relation is a function.
Objective: Today we will determine if a relation is a function.
Standard: 8.F.1, 8.F.3

**Vocabulary**

* The **\_\_\_\_\_\_\_\_\_\_\_** is the set of x-values.
* The **\_\_\_\_\_\_\_** is the set of y-values.

Given the relation:

What is the domain:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
What is the range:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Complete the following table and graph the function:

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

Is this relation a function?
How do you know?

Which relation represents a function?

Which relation diagram represents a function?



**Using the Vertical Line Test**

Which of the following graphs are functions?

How do you know?

|  |  |  |  |
| --- | --- | --- | --- |
| **A.** | **B.** | **C.** | **D.** |

Lesson 3: Linear Vs. Nonlinear
Objective: Today we will identify if functions are linear or nonlinear.
Standard: 8.F.3

|  |
| --- |
| **Linear Functions*** Have graphs that are \_\_\_\_\_\_\_\_\_ lines.
* The rate of change between any two points is \_\_\_\_\_\_\_\_\_\_.
* Variable terms can only have an exponent of \_\_\_\_.

**Nonlinear Functions*** Have graphs that are **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** lines.
* The rate of change between any two points is **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.
* Variable terms will have exponents that are numbers other than \_\_\_\_\_.
 |

Tell whether the following are linear or nonlinear and justify your answer.

1.

|  |  |
| --- | --- |
|  |  |
| 0 | 5 |
| 2 | 3 |
| 4 | 0 |
| 6 | -4 |

1.

|  |  |
| --- | --- |
|  |  |
| -5 | 15 |
| -2 | 9 |
| 2 | 1 |
| 3 | -1 |

1. d) e)

Lesson 4: Evaluating Functions
Objective: Today we will evaluate functions using function notation.
Standard: 8.F.1

Function Notation

This is read as: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This means that the equation represents a function and it uses the variable *x*.

* To evaluate a function for a given value, substitute the number for the variable.

Try It:

If find

If find

Lesson 5: Proportional Linear Functions
Objective: Today we will identify proportional and non-proportional relationships.
Standard: 8.EE.5

Vocabulary

* **Proportional Linear Functions** – can be written in the form
\*\* The y-intercept (b) is always 0 – which means the line will pass through the \_\_\_\_\_\_\_\_!
 Example:
* **Non-Proportional Linear Functions** – Can be written in the form
* **Constant of Proportionality** is or the \_\_\_\_\_\_\_\_ of the line. It represents the \_\_\_\_\_\_\_\_\_\_\_.

Which equations represent a proportional relationship?



Compare the two graphs:



What is the slope for graph A? \_\_\_\_\_ What is the slope for graph B? \_\_\_\_\_
What is the equation of the line? \_\_\_\_\_\_\_\_\_\_ What is the equation of the line? \_\_\_\_\_\_
Which graph represents a proportional relationship? Justify your answer.

Lesson 6: Interpreting Graphs
Objective: Today we will interpret the rate of change and y-intercept for a graph.
Standard: 8.F.5

The \_\_\_\_\_\_\_ represents the rate of change of the function.

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ represents the starting value of the function.

A locksmith charges a flat fee for each house call plus an hourly rate, as shown by the graph below.

 What does the x-axis represent (in words)?
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 What does the y-axis represent (in words)?
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 What is the rate of change? \_\_\_\_\_\_\_\_\_\_

 What does the rate of change represent (in
 words)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 What is the y-intercept? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

 What does the y-intercept represent (in words)?
 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What equation can we use to find how much a job will cost? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Find how much an 8 hour job will cost. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lesson 7: Qualitative Graphs
Objective: Today we will interpret the meaning of qualitative graphs.
Standard: 8.F.5

**Qualitative Graphs**

When interpreting qualitative graphs you are telling a story of what is happening for the given situation.

Use the graph at the right to answer the
following questions:

1. Which sections of the graph are:

Increasing:

Decreasing:

Constant:

1. What was the total change in income from the beginning of March until the end of April?
2. What was the total change in income from the beginning of March until the end of May?
3. Explain what could be happening during each section of the graph.

Lesson 8: Comparing Functions
Objective: Today we will compare rates of change and their graphs.
Standard: 8.F.2, 8.F.4

**Comparing Functions**

**Comparing Rate of Change**

Which of the graphs is the steepest?

The greater rate of change has the higher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the slope of the line.

1. Which equation has a greater rate of change?



1. Which of the following has a greater rate of change?



**Comparing Two Linear Equations**



Lesson 9: Representing Functions
Objective: Today we will represent functions in different ways.
Standard: 8.F.4

Every function can be written in four ways:

|  |
| --- |
| 1. \_\_\_\_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_\_\_\_
3. \_\_\_\_\_\_\_\_\_\_
4. \_\_\_\_\_\_\_\_\_\_
 |

Create a function rule to represent the situation.

1. Emma is writing a term paper. She writes 3 pages per day. If represents the total pages and represents days, create a function rule for this scenario.
2. A large pool contains 20,000 gallons of water. 5 gallons evaporate each day. is the gallons of water and is the days. Write an equation.

Creating a Situation