|  |
| --- |
| Stage 1 – Desired Results |
| **Established Goal(s):**Math 10C – Relations and Functions **(RF6)****General Outcome**: Develop algebraic and graphical reasoning through the study of relations.**Specific Outcome**: Relate linear relations expressed in the following forms to their graphs:slope-intercept form ()**,** general form ()**,** slope-point form (). |
| **Big Idea(s):** * Algebraic reasoning is a process of describing and analyzing generalized mathematical relationships and change using words and symbols.
* Comparing mathematical relationships, for example, algebraically, numerically, verbally, or pictorially/concretely, helps us see that there are classes of relationships with common characteristics and helps us describe each member of the class.
* The same algebraic expression or equation can be related to different real-world situations, and different algebraic expressions or equations can describe the same real-world situation.
* Many equivalent representations can describe the same situation or generalization. Each representation may give a different insight into certain characteristics of the situation or generalization.
 |
| **Enduring Understanding(s):***Students will understand that...** Graphs and equations of linear relations have characteristics that can be analyzed and interpreted in context.
 | **Essential Question(s):*** Why is it useful to be able to write the equations of lines in different forms?
 |
| *Students will know ...** Terminology
	+ Slope-Intercept Form
	+ General Form
	+ Slope-Point Form
 | *Students will be able to...*RF6* I can change equations from slope-intercept form to general form.
* I can change equations from general form to slope-intercept form.
* I can graph a linear relation without technology.
* I can graph a linear relation using technology.
* I can identify equivalent linear relations that have been written in different forms.
* I can match a linear relation to its graph.
 |
| Stage 2 – Assessment Evidence |
| **Performance Task(s):*** Task 1:
 | **Other Evidence:*** Formative Assessments
* Check Ups
* Strand Exam
 |
| Stage 3 – Learning Plan |
| **Learning Activities:** * A summary sheet is provided in Appendix 1 for students to use throughout this lesson. After completing each activity, have students return to this record sheet to record their generalizations.

**Activity 1: Graphing Linear Relations Using the Calculator & Slope-Intercept Form*** Use the sample question from Appendix 2 (Part A) to demonstrate how the graphing calculator can be used to determine some of the characteristics of a relation.
	+ Generate a table of values.
	+ View the graph.
	+ Calculate the x-intercept (zero) using the calculate zeroes the function.
	+ Calculate the y-intercept (value) using the calculate values function.
	+ Use two of the points from the table of values to determine the slope.
* Be sure that students understand that they could also determine these characteristics from their hand-drawn graphs.
* Have students complete Part B as well as Part C of Appendix 2.
* Students should notice that the slope and *y*-intercept of each relation are visible in the equation.
* Introduce **slope-intercept**form of an equation to students and have them record their generalizations in the appropriate section of Appendix 1 and/or their notebooks.

**Formative Assessment Option:*** + Bonnie Uses: Pages 154, 155 from *Algebra with Pizzazz*

**Activity 2: Slope-Point Form*** Have students work through Part A of Appendix 3 to familiarize themselves with Slope-Point form of an equation.
* Discuss the solutions to these questions as a class.
* Ask students to complete parts B and C of Appendix 3 to practice the following:
	+ Graph an equation given and equation in slope-point form.
	+ Determine the equation of a line in slope-point form given the graph.
	+ Rewrite slope-point form equations in other forms.
* Go over Parts B and C as a class.
* Have students record their generalizations regarding slope-point form in the appropriate section of Appendix 1 and/or their notebooks.

**Activity 3: General Form*** Introduce general form of an equation to students by asking students to describe the way that general form looks different from the other two equation forms. A sample is shown in Part A of Appendix 4. Students may list characteristics such as:
	+ The variables are both on the same side of the equation.
	+ There are no fractions.
* Ask students to graph the relation and describe the method they used.
* After students have completed their graph, have them share the method they chose with the class. Ask students to record at least three different methods for graphing equations written in general form. Some may include:
	+ Create a table of values.
	+ Calculate the x- and y- intercepts.
	+ Rewrite the equation in slope-intercept form.
	+ Rewrite the equation in slope-point form.
* Ask students to pull out their Appendix 1 summary sheets and answer the following question (from the third section).
* Why is it useful to write an equation in general form?
* Students may have a hard time answering this question. Explain that both slope-intercept and slope-point form are specific to linear relations. In the future, students will be asked to work with many relations that are not linear. General form is different from the other two forms of an equation because all equations (even those that are not linear) can be written in general form. In the future, being familiar with and able to compare equations written in general form will be a useful skill.
* Ask students to record their preferred method of graphing a linear relation that is written in general form in the appropriate place in appendix 1 and/or their notebook.
* Ask students to complete Part B of Appendix 4 to practice graphing equations written in general form.

**Formative Assessment Options:*** Pull this from Mary Jo’s

**Problem Solving Activities*** Use the provided performance task as a problem solving activity.
 |
| **Reflections:** (Things to change within this lesson plan before using it again.) |

**Performance Task(s)**

Task 1 –

Appendix 1 Math 10C – RF6

**Part A: Summary - Forms of Equations**

**Slope-Intercept Form:**

 Why is it useful to write an equation in slope-intercept form?

How can this help you to sketch the graph?

**Slope-Point Form:**

 Why is it useful to write an equation in slope-point form?

How can this help you to sketch the graph?

**General Form:**

Why is it useful to write an equation in general form?

How do you sketch the graph of a linear relation written in general form?

Appendix 2 Math 10C – RF6

**Part A: Sample Problem**

Use your calculator to graph each of the linear relations in Part A and B. For each;

* + create a table of values
	+ sketch the graph
	+ state the *x*- and *y*- intercepts
	+ determine the slope
	+ state the domain and range
* ***x-*intercept:**

|  |  |
| --- | --- |
| ***x*** | ***y*** |
|  |  |
|  |  |
|  |  |
|  |  |

* ***y-*intercept:**
* **slope:**
* **domain:**
* **range:**

**Part B: Graphing Linear Relations Using the Graphing Calculator**

|  |  |
| --- | --- |
| ***x*** | ***y*** |
|  |  |
|  |  |
|  |  |
|  |  |

1. 
* *x-*intercept:
* *y-*intercept:
* slope:
* domain:
* range:



|  |  |
| --- | --- |
| ***x*** | ***y*** |
|  |  |
|  |  |
|  |  |
|  |  |

* *x-*intercept:
* *y-*intercept:
* slope:
* domain:
* range:

|  |  |
| --- | --- |
| ***x*** | ***y*** |
|  |  |
|  |  |
|  |  |
|  |  |



* *x-*intercept:
* *y-*intercept:
* slope:
* domain:
* range:

|  |  |
| --- | --- |
| ***x*** | ***y*** |
|  |  |
|  |  |
|  |  |
|  |  |

1. 
* *x-*intercept:
* *y-*intercept:
* slope:
* domain:
* range:



|  |  |
| --- | --- |
| ***x*** | ***y*** |
|  |  |
|  |  |
|  |  |
|  |  |

* *x-*intercept:
* *y-*intercept:
* slope:
* domain:
* range:



|  |  |
| --- | --- |
| ***x*** | ***y*** |
|  |  |
|  |  |
|  |  |
|  |  |

* *x-*intercept:
* *y-*intercept:
* slope:
* domain:
* range:

**Part C: Taking a Closer Look**

1. Do you notice any similarities between the equations and the characteristics of each graph?
2. Use what you have noticed to complete the following:
	1. Quickly sketch the graph of .



* 1. Determine the equation of a line with a slope of 5 and a *y­-*intercept of -8.
	2. Determine the equation of the line shown.



* 1. Quickly sketch the graph of .
	2. Determine the equation of a line with a slope of 0 and a *y­-*intercept of 2.
	3. Determine the equation of the line shown.

Appendix 3 Math 10C – RF6

**Part A: Working with Slope-Point Form**

The following equation is written in slope-point form:

|  |  |
| --- | --- |
| ***x*** | ***y*** |
| -4 |  |
| -2 |  |
| 0 |  |
| 2 |  |

1. Generate a table of values for the linear relation.
2. Do you notice any similarities between the table of values and the equation?
3. Sketch the graph.
4. Determine the slope.
5. Do you notice any similarities between the equation and the slope?
6. Why is called slope-point form?
7. Rewrite the equation in slope-intercept form.
8. Rewrite the equation in general form.

**Part B: Using Slope-Point Form to Graph**

For each linear relation; sketch the graph, then rewrite the equation in slope-intercept and general form.

Slope-Intercept Form:

General Form:

Slope-Intercept Form:

General Form:

Slope-Intercept Form:

General Form:

**Part C: Writing an Equation in Slope-Point Form from a Graph**

For each linear relation, write the equation in slope-point form, then rewrite the equation in slope-intercept and general form.



1. Slope-Point Form:

Slope-Intercept Form:

General Form:

1. Slope-Point Form:

Slope-Intercept Form:

General Form:

1. Slope-Point Form:

Slope-Intercept Form:

General Form:

Appendix 4 Math 10C – RF6

**Part A: Working with General Form**

The following equation is written in general form:

My Method for Graphing:

My Classmates Methods for Graphing:

Rewrite the equation in slope-intercept form. Rewrite the equation in general form.

**Part B: Graphing Equations in General Form**

Sketch the graph of each of the following linear relations.

1. 
2. 
3. 
4. 