



MISSISSIPPI

EXEMPLAR

Units & Lessons

MATHEMATICS

Foundations of Algebra

Grant funded by:



Lesson 8: Summarizing Situations

Focus Standard(s): FOA.15, FOA.16, FOA.18

Standards for Mathematical Practice: SMP.2, SMP.3, SMP.4, SMP.7

Estimated Time: 55 minutes

Resources and Materials:

- Sticky Notes
- Handout 8.1: Index Card Carousel
- Handout 8.2: Jeopardy

Lesson Target(s):

- Students will find the initial value from a table, graph or situation.
- Students will find the slope from a table, graph, or situation.

Guiding Question(s):

- How do tables, graphs, and situations give you the same information in different ways?
- Is it easier to work with one representation over another?

Vocabulary

Academic Vocabulary:

- Initial value
- Linear function
- Ordered pairs
- Rate of change
- Slope
- y-intercept

Instructional Strategies for Academic Vocabulary:

- Model how to use the words in discussion
- Discuss the meaning of word in a mathematical context
- Write/discuss using the words

Symbol	Type of Text and Interpretation of Symbol
	Instructional support and/or extension suggestions for students who are EL, have disabilities, or perform well below the grade level and/or for students who perform well above grade level
✓	Assessment (Pre-assessment, Formative, Self, or Summative)
Instructional Plan	
<p>Understanding Lesson Purpose and Student Outcomes: Students will find slope of a linear function using the slope formula or rise over run method and the initial value of a linear function by identifying the y-intercept.</p> <p>Anticipatory Set/Introduction to the Lesson: Index Card Carousel</p> <p>Note: Prior to the lesson, cut out the cards on Handout 8.1: Index Card Carousel.</p> <p>Group students in teams to begin the Carousel. The activity will review material covered throughout the unit, such as:</p> <ul style="list-style-type: none"> • finding slope (from values, from a graph, from a situation); • finding initial value (from values, from a graph, from a situation); • writing a linear equation with slope and y-intercept. <p>Distribute a card to each team. Allow the team time to work together and agree on their answer. Have teams write their response on a sticky note and stick it to the back of the card. Instruct all teams to pass their card clockwise to the next group. Continue this process until each team has responded to every card (SMP.2, SMP.4).</p> <ul style="list-style-type: none"> ✓ Collect all cards and do a quick check for understanding using the responses. Facilitate a whole group discussion on the responses on the cards needing reinforcement (SMP.3). <p>Activity 1: Self Reflection</p> <p>List the topics of review on the board and ask students to first write them down and then, score themselves from 1 (I don't feel at all confident with this) to 5 (I feel very confident with this) for each topic.</p>	

The topics include:

- finding slope
 - from values,
 - from a graph,
 - from a situation;
- finding initial value
 - from values,
 - from a graph,
 - from a situation;
- writing a linear equation with slope and y-intercept.

Read the list and allow time for students to ask clarifying questions for the areas they do not feel confident. Provide additional examples for areas of weakness.

For students who are EL, have disabilities, or perform well below grade level:

- Provide examples of each topic for students to properly assess themselves.
- Ask specific questions about each topic. Use formative assessments in the unit to guide discussion.

Activity 2: Jeopardy

Note: The Jeopardy game can be modified based on the amount of time available.

Distribute the first page of **Handout 8.2: Jeopardy**. Read the game directions to the class. Give clarification where necessary.

Jeopardy Directions:

1. Sort the class into equal teams. Number them so they know who is #1, #2, etc. on each team. You may want to rearrange the teams so that, for example, all the #2s are about equal in ability. If you can't make teams with the same numbers of students, make sure the students on the unequal team keep track of whose turn it is (you will probably have to help them with this as the game progresses).

2. Project the Jeopardy Board with the projector. The purpose of the board is for you to cross off questions as they are asked, to keep score, and to have room to write graphs or questions if the students need to see them written down.
3. Start by explaining the rules:
 - a. They will compete against the other people in the same position on the team (all the #2s, etc.).
 - b. They do not get points if you have not called on them.
 - c. When it is their turn and they have an answer, they should say “Buzz” and wait for you to call on them.
 - d. Whoever gets a question correct, the next person on their team gets to pick the next category and amount.
 - e. If everyone whose turn it was misses the question, other people can be called on to answer. Everyone should do every question.
 - f. They should start with easy ones (lower point value). There are no hidden “Double Jeopardy” questions, but the game will have a “Final Jeopardy” question.
 - g. Poor sportsmanship (against other teams or your own teammates) is the only way to lose points.
4. The game begins by the first person trying to guess a number you have chosen between 1 and 20. Whoever is closest will choose the first category and amount. For the first question, all the #1s compete.
5. Continue until the last question is marked out.
6. At that point, total all the points and ask each team to decide:
 - a. Which teammate will play Final Jeopardy.
 - b. How much the team will wager.
7. Collect their wagers before Final Jeopardy.

8. Write (or read) the Final Jeopardy Question. No talking. When the player from each team has his/her answer, they should hand it to you (with the Team # on it). When all players have handed in answers, start with the team with the least points and, based on whether they were correct, change their score. Continue until all are done and you have a final winner.

9. If the game is taking too long, skip right to Final Jeopardy. If the Final Jeopardy question seems too hard, use one you think at least 2 of your players could do.

For students who are EL, have disabilities, or perform well below grade level:

- Allow students to use Anchor Charts, Guided Notes, or example problems to help them work through the Jeopardy problems.

Activity 3: Modeling

- ✓ Model the following situation using a graph, an equation, a table of values, or an illustration:

“The online book club charges a sign-up fee of \$25 and then each book costs \$4.”

- ✓ Pair-Share the model with a partner. Each student models the situation with a graph, equation, table, or illustration.

Extensions for students with high interest or working above grade level:

- Encourage students to model the situation as many ways possible, including multiple forms of the linear equation.

Have students critique their partner’s models to check for different methods to correctly model the situation (SMP3, SMP4, SMP7).

Reflection and Closing:

Have students write notes to Jeopardy teammates describing what they learned from them during class discussions today.

Reflect on the level of accuracy of the student responses to the following questions:

- How do slope and y-intercept describe linear functions?
- How do you know which method you should use when finding slope or y-intercept?

Homework

Simile Me: Have students complete the following sentence: Working with linear functions is like _____ because _____.

Write an equation of a line through
the given points:

$(8, -1)$ and $(9, 0)$

Write an equation of a line through
the given points:

$(2, 7)$ and $(-3, 1)$

Write an equation to represent
the following situation:

Samantha drinks 2oz. of water out of a 32oz.
bottle every 4 minutes.

Write an equation to represent
the following situation:

Amos is draining his pool. The pool initially had
13,500 gallons of water in it, and it is draining at a
rate of 1400 gallons every 2 hours.

Write an equation to represent
the following situation:

Ariana is taking a taxi from the airport to her
hotel. The taxi has a service charge of \$5.00 and
then charges \$1.80 per mile.

Write an equation to represent
the following situation:

Ladarius is moving into his first apartment. The
complex is asking for a \$200 safety deposit and
rent is \$985 per month.

<i>Y-Intercept</i>	<i>Coordinate Plane</i>	<i>Slope</i>	<i>Mixed Review</i>
<p>100</p> <p>What is the y-intercept in $y = \frac{3}{4}x + 5$?</p>	<p>100</p> <p>How many quadrants make up the Coordinate Plane?</p>	<p>100</p> <p>What happens to line when the slope gets bigger?</p>	<p>100</p> <p>Give an example of a real-world problem that would only use the first quadrant.</p>
<p>200</p> <p>If a person saves \$40 a week for 3 weeks and starts with \$50, what is the initial value?</p>	<p>200</p> <p>Write an equation for a linear function going through the origin with a slope of -2.</p>	<p>200</p> <p>If a line goes up to the left, what do you know about the slope?</p>	<p>200</p> <p>What do you call the slope of a completely vertical line?</p>
<p>300</p> <p>What is the y-intercept of the line passing through (6,7) and (0,9)?</p>	<p>300</p> <p>Write an equation for a horizontal line with a y-intercept of 3.</p>	<p>300</p> <p>Describe the graph of $y = \frac{2}{3}x - 5$</p>	<p>300</p> <p>What is the slope of the line passing through (5, 7) & (-1,0)?</p>
<p>400</p> <p>What is the equation of a line with an initial value of 0 and a slope of 3?</p>	<p>400</p> <p>What is the equation of the line with a y-intercept of 8 and a slope of $\frac{1}{2}$?</p>	<p>400</p> <p>Put these lines in order from least steep to most steep: $y = \frac{1}{3}x + 4$, $y = 5x - 7$, $y = -2x$, $y = 8$</p>	<p>400</p> <p>Which two sets of ordered pairs are found on the graph of $2x - 3y = 18$? (0,18) (3,4) (9,0) (12, 2)</p>
<p>500</p> <p>What is the y-intercept of the line passing through (3, 7) and (4, 9)?</p>	<p>500</p> <p>What type of change would a linear function have if it had an initial value of (0,4) and went through (3, -2)?</p>	<p>500</p> <p>What would the equation of the line be that passes through (4, 7) and (2, 8)?</p>	<p>500</p> <p>If a line passes through (5, 8) and (6, 8), what is the slope?</p>

Y-Intercept	Coordinate Plane	Slope	Mixed Review
<p>100</p> <p>What is the y-intercept in $y = \frac{3}{4}x + 5$</p> <p>5</p>	<p>100</p> <p>How many quadrants make up the Coordinate Plane?</p> <p>4</p>	<p>100</p> <p>What happens to line when the slope gets bigger?</p> <p>it gets steeper</p>	<p>100</p> <p>Give an example of a real-world problem that would only use the first quadrant.</p>
<p>200</p> <p>If a person saves \$40 a week for 3 weeks and starts with \$50, what is the initial value?</p> <p>50</p>	<p>200</p> <p>Write an equation for a linear function going through the origin with a slope of -2.</p> <p>$y = -2x$</p>	<p>200</p> <p>If a line goes up to the left, what do you know about the slope?</p> <p>it is negative</p>	<p>200</p> <p>What do you call the slope of a completely vertical line?</p> <p>no slope or undefined</p>
<p>300</p> <p>What is the y-intercept of the line passing through (6,7) and (0,9)?</p> <p>9</p>	<p>300</p> <p>Write an equation for a horizontal line with a y-intercept of 3.</p> <p>$y = 3$</p>	<p>300</p> <p>Describe the graph of $y = \frac{2}{3}x - 5$</p> <p>it starts at -5 and goes up to the right at a rate of over 3 and up 2</p>	<p>300</p> <p>What is the slope of the line passing through (5, 7) & (-1,0)?</p> <p>$\frac{7}{6}$</p>
<p>400</p> <p>What is the equation of a line with an initial value of 0 and a slope of 3?</p> <p>$y = 3x$</p>	<p>400</p> <p>What is the equation of the line with a y-intercept of 8 and a slope of $\frac{1}{2}$?</p> <p>$y = \frac{1}{2}x + 8$</p>	<p>400</p> <p>Put these lines in order from least steep to most steep: $y = \frac{1}{3}x + 4$, $y = 5x - 7$, $y = -2x$, $y = 8$</p> <p>$y = 8$, $y = \frac{1}{3}x + 4$, $y = -2x$, $y = 5x - 7$</p>	<p>400</p> <p>Which two sets of ordered pairs are found on the graph of $2x - 3y = 18$?</p> <p>(0,18) (3,4) (9,0) (12, 2)</p>
<p>500</p> <p>What is the y-intercept of the line passing through (3, 7) and (4, 9)?</p> <p>1</p>	<p>500</p> <p>What type of change would a linear function have if it went had an initial value of (0,4) and went through (3, -2)?</p> <p>negative</p>	<p>500</p> <p>What would the equation of the line be that passes through (4, 7) and (2, 8)?</p> <p>$y = -\frac{1}{2}x + 9$</p>	<p>500</p> <p>If a line passes through (5, 8) and (6, 8), what is the slope?</p> <p>0</p>

Final Jeopardy:

A new candle is 12" tall. If the candle is 10" tall after 3 hours, what is the equation of the line that names this linear function?

KEY

Final Jeopardy:

A new candle is 12" tall. If the candle is 10" tall after 3 hours, what is the equation of the line that names this linear function?

$y = -\frac{2}{3}x + 12$ or $y - 12 = \frac{2}{3}(x - 0)$ or $2x + 3y = 36$

For training or questions regarding this unit,
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