



MISSISSIPPI

EXEMPLAR

Units & Lessons

MATHEMATICS

Foundations of Algebra

Grant funded by:



Lesson 4: Slope Situations

Focus Standard(s): FOA.15, FOA.16, FOA.17

Standards for Mathematical Practice: SMP.2, SMP.3, SMP.4, SMP.6

Estimated Time: 55 minutes

Resources and Materials:

- Handout 4.1: Graphing Stories
- Handout 4.2: Slope is Life Notes
- Graphing Stories Video - <http://graphingstories.com/>

Lesson Target(s):

- Student will describe linear functions based on their initial values and slopes
- Student will sketch functions based on real-world change.
- Student will make the connection between mathematical slope and the graphs of their linear functions

Guiding Question(s):

- Does change in one thing always affect another?
- How can graphs be used to represent changes in the real world?


Vocabulary

Academic Vocabulary:

- Rate of change
- Slope
- Steepness
- y-intercept

Instructional Strategies for Academic Vocabulary:

- Model how to use the words in discussion
- Discuss the meaning of word in a mathematical context
- Create pictures/symbols to represent words
- 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 recognize slope and slope changes in real-world contexts. Students will understand that slope is an exact rate of change. Students will find the slope from ordered pairs.</p> <p>Anticipatory Set/Introduction to the Lesson: Zero Slope Allow students time to share the graph they created to represent a line with a slope of zero.</p> <ul style="list-style-type: none"> ✓ Actively monitor conversations and make observations of the graphs created. Ask students to justify to one another why the line would be horizontal and not vertical using the steepness as a focus in the discussion. Play the “skeptic” to determine which students can truly explain what a slope of zero means in a mathematical and real-world context (SMP.3). <p>Activity 1: Using Graphs to Represent Situations Display the following scenario: <i>“A student gets into his car, leaving from a point 5 miles from his home and quickly speeds away towards his home.”</i></p> <p>Provide Quiet-Think-Time to allow students to construct an idea of ways they might represent this situation. Instruct students to work in teams to produce a representation they will share with the class (SMP.2 and SMP.4).</p> <ul style="list-style-type: none"> ✓ Allow students approximately 5 minutes to work on this in groups of 2-4. At the end of the time, have students share their representations. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>For students who are EL, have disabilities, or perform well below grade level:</p> <ul style="list-style-type: none"> • Students can represent the graph on the coordinate plane, with a sketch, or a video clip they created. </div>	

Activity 2: Graphing Stories Activity

Ask students to consider if, in real life, the rate or direction, ever change during a real-world situation. Explain to students that they are going to sketch graphs of changing real-world situations.

Distribute **Handout 4.1: Graphing Stories**. Explain to the students they will watch a video. Before they watch the video, have students label the y-axis as shown. Next, show a [Graphing Stories Video](#) of your choice and create a graph for the scenario. The video will play at half speed to allow time to correct errors and check values (SMP.6). **Handout 4.1: Graphing Stories** contains four graphs, so you may repeat this process as many times as time permits. Finally, the video will reveal the solution with the graph superimposed on the video as it happens so students can compare their graph to the solution.

- ✓ Check graphs for each scenario shown to verify student understanding of rates as they apply to the real-world (SMP.4).

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

- Pause video before rates change to allow time to graph each segment of change.

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

- Students could create their own video situations and graphs and show them in future classes.

Activity 3: Slope is Life Guided Notes

Distribute **Handout 4.2: Slope is Life Notes** and go through them with the students, eliciting what students think to fill in the blanks.

- ✓ Provide examples for students to practice finding slope on the back of their notes.

Reflection and Closing:

- ✓ Facilitate a whole group discussion of how mathematical slopes and real-world slopes are related and when, if ever, they differ. For example, real-world situations are often limited to Quadrant 1 and are less likely to be truly straight lines.

Homework

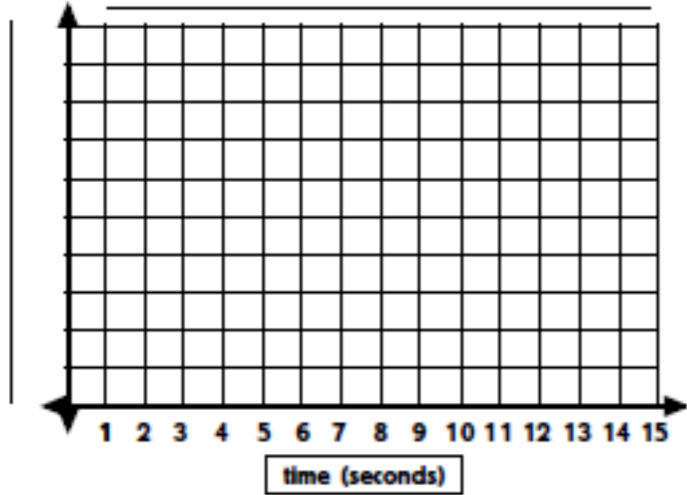
Have students write their name using only lines. Instruct students to label each line segment of each letter as positive, negative, zero, or undefined slopes.

Handout 4.1: Graphing Stories

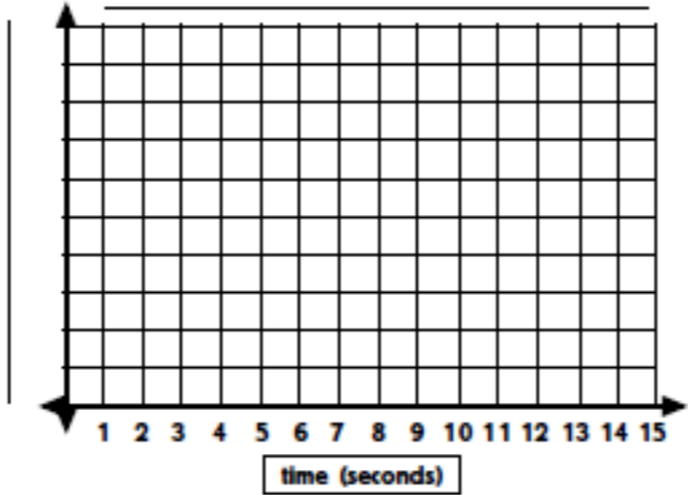
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Date: _____

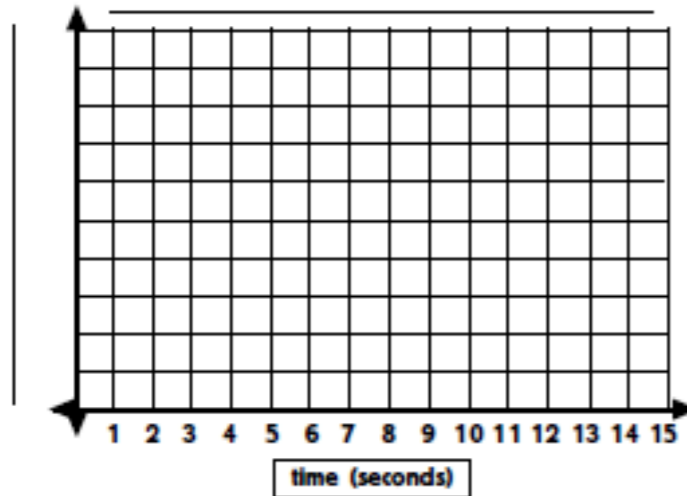
1.



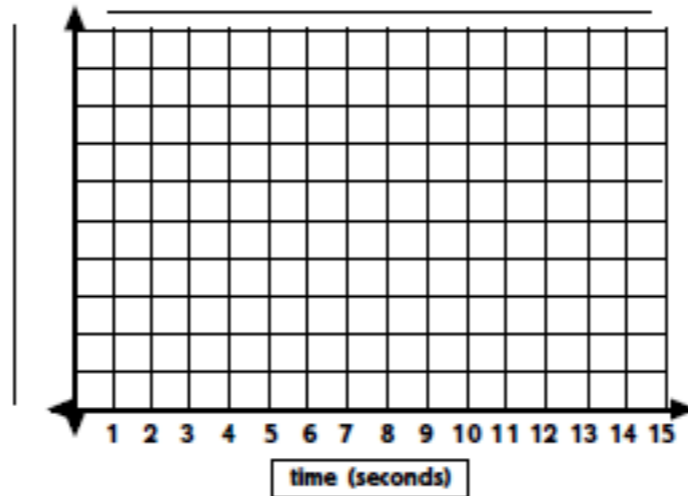
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3.



4.



Handout 4.2: Slope is Life Notes

Name: _____ Date: _____

I. Slope is a mathematical way of showing _____ and can usually be written as a _____.

II. Slope reflects life because life has a lot of _____. Slope can also be thought of as _____.

Ex:

III. Slope is about _____ and _____

A. Slopes are positive or negative. Slope is _____ when y increases as x increases or y decreases when x decreases. These lines go up to the _____ on the coordinate plane. Lines with negative slopes go up to the _____.

B. Slopes have exact rates of _____. It is written as a fraction with _____ over _____. The slope tells exactly how many points y changes compared to how many points _____ changes.

IV. Slope can be found by:

A. Looking at the graph and comparing any _____ ordered pairs to find their change.

B. Taking two ordered pairs from a table or graph to find their change with the slope formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

1. Pay close attention to your _____!

2. Be consistent. The y-value you start with must be above the x-value that you start with.

C. Is found in situations by taking the information and informally finding the change OR by making it into 2 ordered pairs and using the slope formula.

KEY

I. Slope is a mathematical way of showing change and can usually be written as a fractional ratio.

II. Slope reflects life because life has a lot of change. Slope can also be thought of as unit rate

Ex: miles per hour, growth per month, elevation after hours of descent

III. Slope is about direction and exact rate of change.

A. Slopes are positive or negative. Slope is positive when y increases as x increases or y decreases when x decreases. These lines go up to the right on the coordinate plane. Lines with negative slopes go up to the left.

B. Slopes have exact rates of change. It is written as a fraction with change in y over change in x. The slope tells exactly how many points y changes compared to how many points the x changes.

IV. Slope can be found by:

A. Looking at the graph and comparing any 2 ordered pairs to find their change.

B. Taking two ordered pairs from a table or graph to find their change with the slope formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

1. Pay close attention to your SIGNS!

2. Be consistent. The y-value you start with must be above the x-value that you start with.

C. Is found in situations by taking the information and informally finding the change OR by making it into 2 ordered pairs and using the slope formula.

For training or questions regarding this unit,
please contact:

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