MISSISSIPPI
EXEMPLAR
Units & Lessons
MATHEMATICS

Foundations of Algebra

Grant funded by:

Lesson 10: Slope Art

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

Additional Standard(s): FOA.17, FOA.20

Standards for Mathematical Practice: SMP.2, SMP.3, SMP.4, SMP.5, SMP.7, SMP.8

Estimated Time: 120 minutes

Resources and Materials:
- Document Camera
- Graph Paper
- Markers or Colored Pencils
- Handout 10.1: Slope Art Performance Task
- Handout 10.2: Performance Task Rubric
- https://www.desmos.com/

Lesson Target(s):
- Students will find rate of change and initial value for a linear function.
- Students will compare two functions at a given point.

Guiding Question(s):
- How can you interpret a situation to find information needed to write a linear function?
- How can you compare two functions at a given point?

Vocabulary

Academic Vocabulary:	Instructional Strategies for Academic Vocabulary:
• Initial value • Linear function • Ordered pairs • Rate of change • Slope • y-intercept	☐ 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
[rectangle]	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

Understanding Lesson Purpose and Student Outcomes: Students will identify slope and y-intercept and complete a Performance Task requiring the application of these skills to compare linear functions at a given point.

Anticipatory Set/Introduction to the Lesson: Elevator Talk
Note: An Elevator Task asks students to summarize a concept or topic into a 30-60 second talk. Basically, if someone got on an elevator with you and asked what slope is for example, you have until the elevator gets to your floor to explain it (SMP.3).

Have students pair up using Proximity Partners. Have the student on the left be partner A. Their topic will be **slope**. Have the student on the right be partner B. Their topic will be **y-intercept**.

Set a timer for 30 seconds. Allow partner A to begin by sharing their pitch to their partner. Partner B should listen and ask questions as needed. Reverse roles and repeat with Partner B sharing their pitch.

Ask students to share with the class something their partner said that clarified slope or y-intercept for them.

Review unit concepts, including finding the initial value and rate of change from a real-world situation and from a graph.

Activity 1: Performance Task
   ✓ Have students create and color a picture using graph paper and line segments (SMP.5).
The picture must include the following:
   • 5 line segments with a positive slope
   • 5 line segments with a negative slope
   • 3 lines with a zero slope
   • 3 lines with an undefined slope.

Instruct students to label each line in the drawing with a number from #1-#16.
Note: Picture may include other lines that are not straight; however, the 30 segments must be labeled and easy to find.

On **Handout 10.1: Slope Art Performance Task**, students will record all work, which will include the following:
   • 2 points found on the line segment,
   • the slope and y-intercept of the two points (SMP.8),
   • the equation of the line segment in slope-intercept form (SMP.2 and SMP.7), and
   • reflection questions to compare linear functions and write a real-world situation (SMP.4).

Distribute **Handout 10.2: Performance Task Rubric** and discuss expectations with the class before they begin working.
Have students complete the Performance Task by adding details to their picture and coloring.

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

- Students may work in Desmos to test lines before graphing them.
- Have students complete the Performance Task with a partner.

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

- Students can write a story to accompany their picture.

Reflection and Closing:

✓ **Exit Ticket:** On paper, small groups sketch and write what they learned throughout the unit. Then team representatives line up and, one at a time, slide their work under the document camera while quickly summarizing what was learned. All teams must share the summary created.

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

- How do linear functions reflect change and predict change?
- How can you determine slope and initial value of a function?

Homework

No Homework.

Handout 10.1: Slope Art Performance Task

Name: _____   Date: _____

Line #	Point #1	Point #2	Slope of Line	Slope (m)	y-intercept (b)	Equation of Line y = mx + b
			Positive			
			Positive			
			Positive			
			Positive			
			Positive			
			Negative			
			Negative			
			Negative			
			Negative			

Line #	Point #1	Point #2	Slope of Line	Slope (m)	y-intercept (b)	Equation of Line y = mx + b
			Negative			
			Zero			
			Zero			
			Zero			
			Undefined			
			Undefined			
			Undefined			

Comparing Lines:

a. Compare two lines with positive slopes. Which would have a greater y-value when x is 4? How do you know?

b. Find two lines that have the same slope. What does this look like in the graph? Why?

Real-World Connection:

a. Select a line from your graph. Write a real-world situation for the line.

Handout 10.2: Rubric for Performance Task

	4	3	2	1
Student has included 16 line segments following the criteria: • **5 positive slope** • **5 negative slope** • **3 zero slope** • **3 undefined slope**	All 16 line segments include the following criteria: • 5 positive slope • 5 negative slope • 3 zero slope • 3 undefined slope	The 12-14 line segments include the following criteria: • 5 positive slope • 5 negative slope • 3 zero slope • 3 undefined slope	The 8-11 line segments include the following criteria: • 5 positive slope • 5 negative slope • 3 zero slope • 3 undefined slope	The 7 or fewer line segments include the following criteria: • 5 positive slope • 5 negative slope • 3 zero slope • 3 undefined slope
Student correctly found the slope and y-intercept of the line segments.	Correctly calculated the slope and y-intercept for all 16 lines and included work.	Correctly calculated the slope and y-intercept for 12-14 segments and included work.	Correctly calculated the slope and y-intercept for 8-11 segments and included work.	Correctly calculated the slope and y-intercept for 7 or fewer segments and included work. OR Did not include work for any problems.
Student wrote linear equations in slope-intercept form.	Correctly wrote a linear equation in slope-intercept form for all 16 segments.	Correctly wrote a linear equation in slope-intercept form for 12-14 segments.	Correctly wrote a linear equation in slope-intercept form for 8-11 segments.	Correctly wrote a linear equation in slope-intercept form for 7 or fewer segments.
Comparing Functions	Responds correctly to both questions and justifies reasoning.	Responds correctly to both questions, but does not justify reasoning.	Responds correctly to one question and justifies reasoning.	Does not respond correctly to either question. OR Responds correctly to one without justifying reasoning.
Real-World Connections	Writes a practical real-world situation with the correct rate of change and initial value.	Writes a real-world situation with the correct rate of change and initial value, but it is not practical.	Writes a real-world situation with only one correct value.	Writes a real-world situation that does not include the correct rate of change and initial value OR Does not attempt to write a situation.

For training or questions regarding this unit,
please contact:

exemplarunit@mdek12.org