



MISSISSIPPI

# EXEMPLAR

Units & Lessons

MATHEMATICS

Foundations of Algebra

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## Lesson 3: What's Changing This Line?

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

**Additional Standard(s):** FOA.17, FOA.19

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

**Estimated Time:** 55 minutes

**Resources and Materials:**

- Anchor Chart Paper
- Copy Paper
- Dry Erase Markers
- Glue
- Mini-White Boards
- Handout 3.1: Changing the Constant
- Handout 3.2: Changing the Coefficient
- Handout 3.3: What Changes Card Sort

**Lesson Target(s):**

- Students will graph linear functions in slope-intercept form.
- Students will compare linear functions.

**Guiding Question(s):**

- How does a change in the coefficient of  $x$  affect the graph of a linear function?
- How does a change in the constant affect the graph of a linear functions?

## Vocabulary

**Academic Vocabulary:**

- 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

**Understanding Lesson Purpose and Student Outcomes:** Students will compare linear functions to make connections between an equation and a graph.

**Anticipatory Set/Introduction to the Lesson: Homework Pair-Share**

- ✓ Have students Pair-Share the two equations they created for homework. Ask students to identify common characteristics their equations have and discuss what the lines would look like if all four were graphed on one coordinate plane.

Circulate and actively monitor discussions listening for students who correctly discuss and identify the slope and y-intercept (SMP.3, SMP.8).

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

- Provide students with graph paper and rulers to test theories of what the graph would look like.
- Encourage students who have not yet made connections to use a table to organize ordered pairs.

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

- Ask students to create a situation their rules may apply to.
- Have students explain in words the relationship between the slope and y-intercept to the graph.

**Activity 1: Changing the Constant**

**Note:** Prior to activity, cut out cards from **Handout 3.1: Changing the Constant**.

Pass out mini-white boards and dry erase markers.

- ✓ Instruct students to graph the equations  $y = x$ .

Once students have graphed the parent linear function  $y = x$ , pass out a card from **Handout 3.1: Changing the Constant**. Instruct students to graph the new equation on the same graph.

- ✓ Have students show their graphs.
- ✓ Facilitate a whole group discussion about what changed in the equation and the graph. Ask students to explain why this is important to understand. Instruct students to Turn and Talk to explain how this will help them graph (SMP.3 and SMP.8).

**Activity 2: Changing the Coefficient**

**Note:** Prior to activity, cut out cards from **Handout 3.2: Changing the Coefficient**.

Instruct students to erase their boards.

- ✓ Have students graph the equations  $y = x$ .

Once students have graphed the parent linear function  $y = x$ , pass out a card from **Handout 3.2: Changing the Coefficient**. Instruct students to graph the new equation on the same graph.

- ✓ Have students show their graphs.
- ✓ Facilitate a whole group discussion about what changed in the equation and the graph. Ask students to explain why this is important to understand. Instruct students to Turn and Talk with a different partner to explain how this will help them graph (SMP.3, SMP.7, SMP.8).

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

- Make cards with rational slopes for students who have successfully master graphing using slope - intercept form in previous math courses.

**Activity 3: Slope-Intercept Anchor Chart**

Create an anchor chart to display the findings of the day. Model the use of academic vocabulary: slope, y-intercept, steepness, constant, coefficient, rate of change when creating the anchor chart.

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

- Students can create a foldable to match the anchor chart for use throughout the remainder of the unit.

**Activity 4: What Changes Card Sort**

**Note:** Prior to activity, cut out cards from **Handout 3.3: What Changes Card Sort** so each team receives one set of cards.

Pass out a card set from **Handout 3.3 What Changes Card Sort**, glue, and a sheet of copy paper to each team. Have teams work together to sort cards in two groups: steepness change and initial value change (SMP.7).

- ✓ Once cards are sorted, have teams write a summary at the bottom of their paper to explain the role of the constant and the coefficient in a linear equation.

**Reflection and Closing:**

- ✓ **Exit Ticket:** Have students write a rule for a line with a negative slope and a y-intercept that is greater than 2 (SMP.2).

**Homework**

Ask students to draw a representation of a slope of zero and provide proof of how they arrived at their conclusion.

Handout 3.1: Changing the Constant

$y=x+1$	$y=x+4$	$y=x+1$	$y=x+4$
$y=x-1$	$y=x-4$	$y=x-1$	$y=x-4$
$y=x+2$	$y=x+5$	$y=x+2$	$y=x+5$
$y=x-2$	$y=x-5$	$y=x-2$	$y=x-5$
$y=x+3$	$y=x+6$	$y=x+3$	$y=x+6$
$y=x-3$	$y=x-6$	$y=x-3$	$y=x-6$

Handout 3.2: Changing the Coefficient

$y = -1x$	$y = 4x$	$y = -1x$	$y = 4x$
$y = -1x$	$y = -4x$	$y = -1x$	$y = -4x$
$y = 2x$	$y = 5x$	$y = 2x$	$y = 5x$
$y = -2x$	$y = -5x$	$y = -2x$	$y = -5x$
$y = 3x$	$y = 6x$	$y = 3x$	$y = 6x$
$y = -3x$	$y = -6x$	$y = -3x$	$y = -6x$

Handout 3.3: What Changes Card Sort

$y = -1x$	$y = 4x$	$y = x + 1$	$y = x + 4$
$y = -x$	$y = -4x$	$y = x - 1$	$y = x - 4$
$y = 2x$	$y = 5x$	$y = x + 2$	$y = x + 5$
$y = -2x$	$y = -5x$	$y = x - 2$	$y = x - 5$
$y = 3x$	$y = 6x$	$y = x + 3$	$y = x + 6$
$y = -3x$	$y = -6x$	$y = x - 3$	$y = x - 6$



For training or questions regarding this unit,  
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