

# learning focus:

- ✓ find and interpret slope and rate of change
- ✓ write equations for proportional and non-proportional situations
- ✓ create multiple representations of a linear relationship

# LINEAR RELATIONSHIPS UNIT

8<sup>th</sup> GRADE

10 DAY CCSS-ALIGNED UNIT

Unit: Linear Relationships  
Student Handout 6

Name \_\_\_\_\_  
Date \_\_\_\_\_ Pd \_\_\_\_\_

### PROPORTIONAL AND NON-PROPORTIONAL RELATIONSHIPS

Linear relationships can be proportional or non-proportional. A proportional relationship means that there is a constant rate of change between the variables. A non-proportional relationship means that the rate of change is not constant. Complete the table below to review the differences between these two types of relationships.

NON-PROPORTIONAL	
Ratio of $y$ to $x$	is not constant
Equation	cannot be written as $y = mx$ where $m$ is the slope and $b$ does not equal 0
Graph	is not a straight line through the origin
Example	Ex: _____

LINEAR RELATIONSHIPS UNIT		
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LINEAR RELATIONSHIPS UNIT	
PACING GUIDE	
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DAY 2	The Slope Formula
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DAY 4	Slope-Intercept Form: Part II
DAY 5	Slope and Rate of Change
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A MANEUVERING THE MIDDLE ® RESOURCE

# LINEAR RELATIONSHIPS



a 9 day CCSS-aligned unit

CCSS: 8.EE.5, 8.EE.6, 8.F.4

ready-to-go, scaffolded  
student materials

## LINEAR RELATIONSHIPS UNIT

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# LINEAR RELATIONSHIPS



a 9 day CCSS-aligned unit  
CCSS: 8.EE.5, 8.EE.6, 8.F.4

## student friendly + real-world application

multiple representations

Unit: Linear Relationships  
Student Handout 3

Name \_\_\_\_\_  
Date \_\_\_\_\_ Pd \_\_\_\_\_

### SLOPE-INTERCEPT FORM: PART I

Xander has biked 2 miles so far this week and plans to bike an average of 6 miles each day over the next several days. Xander wrote the equation and created the graph to represent  $x$ , the number of days and  $y$ , the total number of miles traveled on his bike.

$y = 6x + 2$

5. Find the slope of the graph. Where does Xander's equation touch the y-axis?

6. What value does the graph touch on the x-axis? See this value in Xander's equation?

Xander's equation is written in slope-intercept form.

- Slope-intercept form is one way to write the equation of a line.
- The y-intercept of a line is where the line crosses the y-axis.

In 1-3, use the given information to write the equation of the line.

1. slope = -9, y-intercept = 2      2. m = 4, y-intercept = -3

4. Complete the table below by recording the equation's graph.

	$y = x - 5$
SLOPE (m)	
Y-INT (b)	
GRAPH	

For each graph below, record the slope, y-intercept, and equation in slope-intercept form.

5. m: \_\_\_\_\_ b: \_\_\_\_\_ equation: \_\_\_\_\_

6. m: \_\_\_\_\_ b: \_\_\_\_\_ equation: \_\_\_\_\_

7. m: \_\_\_\_\_ b: \_\_\_\_\_ equation: \_\_\_\_\_

8. m: \_\_\_\_\_ b: \_\_\_\_\_ equation: \_\_\_\_\_

9. m: \_\_\_\_\_ b: \_\_\_\_\_ equation: \_\_\_\_\_

11. Matt is going to create a graph of the line  $y = -3x - 2$ . Circle the name of any student who correctly completed the task.

JAVIER      KARI

$y = -3x - 2$        $y = 2x - 3$

Summarize today's lesson:

Unit: Linear Relationships  
Homework 3

Name \_\_\_\_\_  
Date \_\_\_\_\_ Pd \_\_\_\_\_

### SLOPE-INTERCEPT FORM: PART I

Apply your knowledge of slope-intercept form to answer the questions below.

1. Harper is going to create a graph of the equation  $y = -0.5x + 12$ . Which of the following will be true about the graph?

2. Khari graphed the line below. Which equation could represent Khari's graph?

a. The graph will contain the origin.  
b. The graph will increase from left to right.  
c. The graph will cross the x-axis at (12, 0).  
d. The graph will have a slope of -0.5.

a.  $y = -2x - 3$   
b.  $y = 3x + 4$   
c.  $y = -4x + 3$   
d.  $y = -2x - 5$

For each graph below, record the slope, y-intercept, and equation in slope-intercept form.

3. m: \_\_\_\_\_ b: \_\_\_\_\_ equation: \_\_\_\_\_

4. m: \_\_\_\_\_ b: \_\_\_\_\_ equation: \_\_\_\_\_

5. m: \_\_\_\_\_ b: \_\_\_\_\_ equation: \_\_\_\_\_

6. Li wrote the equation below to represent the graph shown. Explain her errors and correct the equation.

$y = \frac{1}{2}x - 3$

7. For a and b, write an equation in slope-intercept form that meets the given criteria.

a. A negative slope and passes through the origin

b. Slopes upward from left to right and has a y-intercept below the x-axis.

8. Mr. Brown asked his students to write an equation that represents a line with a positive slope and a negative y-intercept. Circle the name of any student who correctly completed the task.

EZRA      AALIYAH      JACOBY      PENNY

$y = -5x + 2.5$        $y = 4x - 7$        $y = -3x - 11$        $y = \frac{4}{5}x - 20$

error analysis

# LINEAR RELATIONSHIPS



a 9 day CCSS-aligned unit  
 CCSS: 8.EE.5, 8.EE.6, 8.F.4

streamline your planning process with unit overviews

- ✓ key vocabulary
- ✓ vertical alignment

sample pacing calendar

## LINEAR RELATIONSHIPS OVERVIEW

**STANDARDS**

**8.EE.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

**8.EE.6** Use similar triangles to explain why the slope  $m$  is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation  $y = mx$  for a line through the origin and the equation  $y = mx + b$  for a line intercepting the vertical axis at  $b$ .

**8.F.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two  $(x, y)$  values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

**BIG IDEAS**

- Slope of linear relationship; linear graph is the same b
- The rate of change and ini representations (graphs, t
- Linear relationships can b characteristics.

**ESSENTIAL QUESTI**

- How can the slope of a line l
- What makes a situation prop
- How can rate of change be f

## LINEAR RELATIONSHIPS UNIT PACING GUIDE

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Slope and Rate of Change	The Slope Formula	Slope-Intercept Form: Part I	Slope-Intercept Form: Part II	Slope and Slope-Intercept Form Quiz
Student Handout 1 Homework 1	Student Handout 2 Homework 2			
DAY 6	DAY 7			
Graphing Linear Equations	Multiple Representations			
Student Handout 5 Homework 5	Student Handout 6 Homework 6			
NOTES				

## LINEAR RELATIONSHIPS UNIT OVERVIEW

TOPIC	TEACHING TIPS
Slope and Rate of Change	<ul style="list-style-type: none"> <li>Have students draw the side view of a steep ramp and the side view of a ramp that isn't very steep. Allow students to discuss what makes one ramp steeper than the other and emphasize the differences in the vertical change over the horizontal change.</li> </ul>
Proportional and Non-Proportional Relationships	<ul style="list-style-type: none"> <li>An easy question students can ask to see if a situation is proportional is, "As one quantity doubles, does the other quantity double?". If the answer is yes, the relationship is proportional.</li> </ul>
Slope-Intercept Form	<ul style="list-style-type: none"> <li>Search "Linear Equations" on <a href="http://www.Flocabulary.com">www.Flocabulary.com</a> for a related video.</li> <li>To help students remember "b" is the y-intercept, use alliteration to say that "b" represents "begin".</li> </ul>
Equations and Graphs	<ul style="list-style-type: none"> <li>Search "Graphing Lines" on <a href="http://www.brainpop.com">www.brainpop.com</a> for an interactive tool where students can manipulate the slope and the y-intercept of an equation to see how it will affect the graph of the equation.</li> </ul>

teaching ideas

# LINEAR RELATIONSHIPS



a 9 day CCSS-aligned unit  
CCSS: 8.EE.5, 8.EE.6, 8.F.4

## unit study guide + assessments



quizzes



editable unit test

Unit: Linear Relationships  
Quiz 1

Name \_\_\_\_\_  
Date \_\_\_\_\_ Pd \_\_\_\_\_

### QUIZ: SLOPE AND SLOPE-INTERCEPT FORM

Answers

1. Kayla thinks that the slope of a vertical line is undefined, while Joshua argues that the slope of a vertical line is zero. Who is correct?

2. Find the rate of change shown in the table.

x	y
1	-3
2	-9
3	-15
4	-21

4. Which of the following triangles could question #3?

A. B.

5. A line has a slope of zero. Which of the following points could this line pass through?

A. (12, 9) and (12, 6)  
B. (3, -6) and (7, -6)  
C. (1, 4) and (2, 5)  
D. (-9, 7) and (9, -7)

Unit: Linear Relationships  
Review

Name \_\_\_\_\_  
Date \_\_\_\_\_ Pd \_\_\_\_\_

### LINEAR RELATIONSHIPS STUDY GUIDE

Solve each of the problems below. Be sure to ask questions if you need more help with a topic.

#### I CAN DETERMINE RATE OF CHANGE.

1. Find the rate of change from the table.

x	y
-3	
-2	
-1	
0	
3	

2. Find the slope of the graph.

3. The graph represents the cost per a pottery painting studio. Find the rate of change.

5. Find the slope of the graph.

7. Find the rate of change from the

EIGHTH GRADE CURRICULUM

# LINEAR RELATIONSHIPS

UNIT FOUR: ANSWER KEY

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answer keys included

