Matching Representations

Strand: Patterns, Functions, and Algebra

Topic: Making connections between representations

Primary SOL: 8.16 The student will

e) make connections between and among representations of a linear function using verbal descriptions, tables, equations, and graphs.

Related SOL: 7.10, 8.16 a-d

Materials

- Representation of Relationships activity sheet (attached)
- Envelopes
- Dry-erase boards and markers

Vocabulary

functions, graphs, rules, relationships, tables (8.16)

Student/Teacher Actions: What should students be doing? What should teachers be doing?

Note: Before the lesson, copy the Representation of Relationships sheet on card stock (one copy for each group of three students). Cut the cards apart and shuffle each set of cards before putting the set into an envelope. Each envelope should contain a complete set of shuffled cards.

1. Divide the class into groups of three. Give each group a set of Representation of Relationships cards. Direct each group to match the four different representations of each relationship.
2. Have each group come up and present one set of cards to the class, discussing the different representations and how all of them mean the same thing (i.e., the same relationship).
3. Next, give each student a dry-erase board and a marker. Instruct each group of three students to decide which member will represent a relationship as an equation, which will represent it as a graph, and which will represent it as a table. Display an equation written in words (e.g., "*y* is two more than a number." "*y* is equal to the product of three and a number."). Have each student work individually to come up with his/her assigned representation. When students are finished, have them hold up their boards for verification.
4. Repeat the process in step 3 twice, but with different equations. Each time, have students switch the representations for which they are responsible. Make sure each student has the chance to represent relationships in all three forms. *Note: Be sure to include tables where y-intercept is not included when making connections between and among representations.*

Assessment

- **Questions**
  - Why is it important to know how to represent the same relationship in different ways?
  - How can you draw a graph to represent the equation "*y* is equal to four less than a number?"
- **Journal/Writing Prompts**
  - "Tweet it out"; using 280 characters or less, describe as though you were teaching someone how to transition from one representation to the next.
  - Why might it be a good skill to be able to represent data or information in different representations? Think about how people learn things, how a company runs, how government communicates with different groups of people.
  - Explain to a friend how you can make the connection between the graph, table, and its function.

Extensions and Connections (for all students)

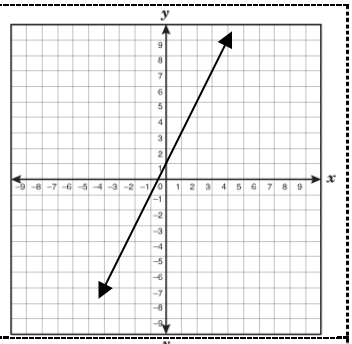
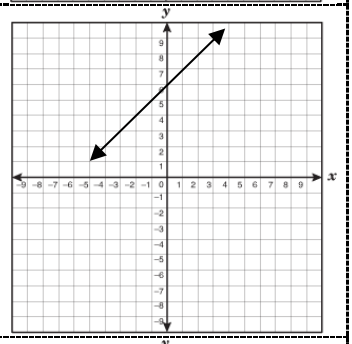
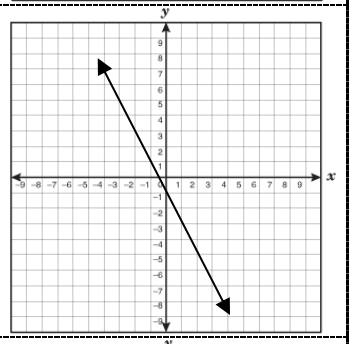
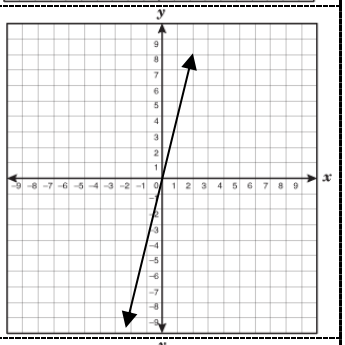
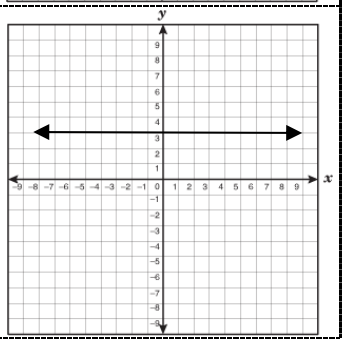
- Give students various graphs, and have them come up with a table, equation, and words to represent the relationship shown in each graph.
- Discuss the relationship between the constant and the graph.
- Use interactive software and internet resources to model graphing tables and equations (e.g., mathisfun.com, khanacademy.com).
- Be sure that students recognize that $y = 2x - 5$ is the same as $y = -5 + 2x$; and that $2x - 5 = y$ is the same as $-5 + 2x = y$.

Strategies for Differentiation

- Copy the Representation of Relationships cards on different colors of card stock so that each set has a unique color.
- Begin with integer values for slope and progress to fractional values.
- Precede the lesson with a vocabulary check on translating equations and graphing in the coordinate plane.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

Representations of Relationships

$y = 2x + 1$	***y* equals twice a number, increased by one.**		
$y = x + 6$	**Si*x* more than a number is equal to *y*.**		
$y = -2x - 1$	**The product of negative two and a number, minus one, is another number.**		
$y = 4x$	**Four times a number is *y*.**		
$y = 3$	***y* is three.**		

x	*y*
−3	−5
0	1
3	7

x	*y*
−2	4
−1	5
2	8

x	*y*
−2	3
−1	1
0	−1

x	*y*
−2	−8
0	0
1	4

x	*y*
2	3
3	3
4	3