Success for English Language Learners

Exploring Transformations

Steps for Success

Step I In order to create interest in the lesson, use these ideas.

- Have students discuss the definitions of the vocabulary words *transformation, translation, reflection, stretch,* and *compression*. Have them compare the English phrases and definitions to those in their native language.
- Students may be challenged to consider transformations as functions of functions. A transformation takes an input (in this case a function or graph) and produces an output. This exercise may reinforce their understanding of functions.

Step II Teach the lesson.

- Note that, in this context, *important points* are ones where the graph of a function forms a "corner." In other contexts, important points may be different ones, e.g., where the graph crosses the *x*-axis.
- To further illustrate the nature of compression, note that if a graph undergoes a horizontal com*press*ion, it is *pressed* toward the *y*-axis.

Step III Ask English Language Learners to complete the worksheet for this lesson.

- Point out that Example 1B in the student textbook is supported by Problem 1 on the worksheet. Tell students that they can use the arrows in their own graphs until they become fully comfortable translating points without them.
- Think and Discuss reinforces the ideas of order in transformations, as well as the changes the coordinates of a point undergo during translation.

Making Connections

- Have students brainstorm other examples of transformations. For example, a caterpillar can transform into a butterfly. The caterpillar changes shape, just as a transformation changes the position, size, or shape of a figure.
- When a *word* is *translated* from one language to another, it is "moved" from one language to the other while retaining its meaning. When a *graph* is *translated,* it is moved while retaining its shape.

Name _____ Date _____ Class _____

LESSON 1-8

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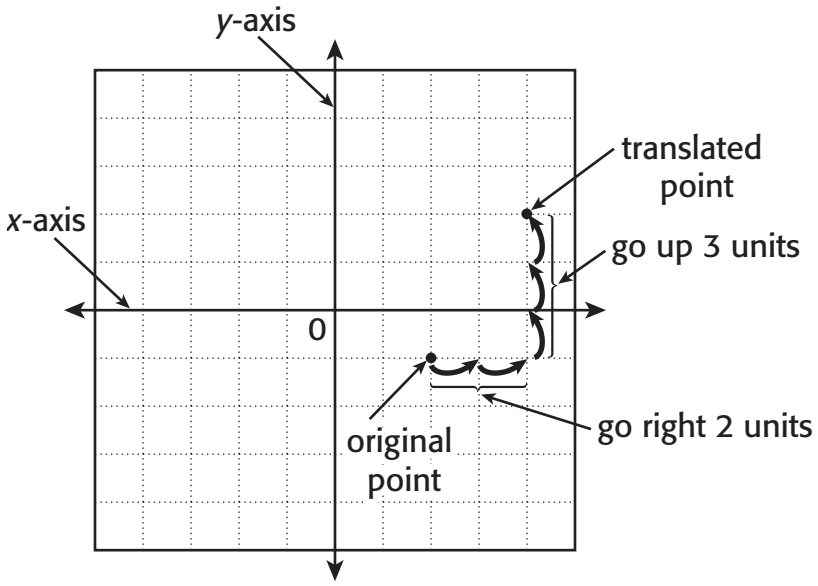
Problem 1

Translate the point $(2, -1)$ right 2 units and up 3 units.



Think and Discuss

1. What is the result if you translate the point $(2, -1)$ up 3 units and right 2 units?

_____

2. What is the result if you translate the point $(2, -1)$ right 3 units and up 2 units?

_____

3. When you translate a point left or right, which coordinate changes?

_____

4. When you translate a point up or down, which coordinate changes?

_____

Answer Key

CHAPTER 1

Lesson 1-1

1. $0.\overline{6}$, $\sqrt{2}$, 0, $-\frac{5}{2}$, and 0.5129
2. $0.\overline{6}$, $\sqrt{2}$, 0, and 0.5129
3. $0 \in \mathbb{R}$, $\mathbb{Q}$, $\mathbb{Z}$, and W

Lesson 1-2

1. -9 because $-9 + 9 = 0$.
2. 9 because $\frac{1}{9} \cdot 9 = 1$.
3. \$6.20

Lesson 1-3

1. Go through the list of squares or work "outside in."
2. They have equivalent expressions under the radical symbol.
3. Like radicals are similar to like terms and can be combined.

Lesson 1-4

1. altogether, combine groups
2. equal groups, per, fraction
3. Follow the order of operations.

Lesson 1-5

1. $(4x)(4x)(4x)(4x)(4x)$
2. Add 2 to the exponent.
3. Subtract 1 from the exponent.

Lesson 1-6

1. 2
2. Yes. Each input has only one output.
3. Because each input has only one output.

Lesson 1-7

1. x
2. The output is the dependent variable.
3. $b = 7$

Lesson 1-8

1. $(4, 2)$
2. $(5, 1)$
3. The x-coordinate.
4. The y-coordinate.

Lesson 1-9

1. It has the same shape as the data points.
2. The y-value of -3 appears to be about 4.5.
3. Not necessarily. The model is an approximation and the unknown data may not match it.

CHAPTER 2

Lesson 2-1

1. Substitute my answer into the equation and evaluate.
2. Do the same except use the inequality symbol from the equation instead of the equals sign.
3. I should get the same answer if I distribute the 5 then solve.

Lesson 2-2

1. I can check it by substitution.
2. The variable would be in the numerator.
3. Answers may vary.

Lesson 2-3

1. Answers may vary.
2. You would get the same rate of change.
3. Because the problem says it is a line.

Lesson 2-4

1. All equations that represent the line are equivalent.
2. You would get another equivalent equation.