HMH | into Math®

Teacher Tabletop Flipchart Sampler

Grades 6–8

AVAILABLE FOR EVERY LESSON

HMH | into Math®

Into Math® supports students as they develop their conceptual understanding and grow into procedurally fluent mathematicians.

What's Inside

What is the Flipchart?

Ready-Made Mini-Lessons for Differentiation

The Teacher Tabletop Flipchart

- Pulled teacher-led, small-group instruction
- Small-group lessons correlated to skills within the program
- Perfect for both mixed- and like-ability grouping for differentiation
- Encourages math discourse and perseverance in problem solving

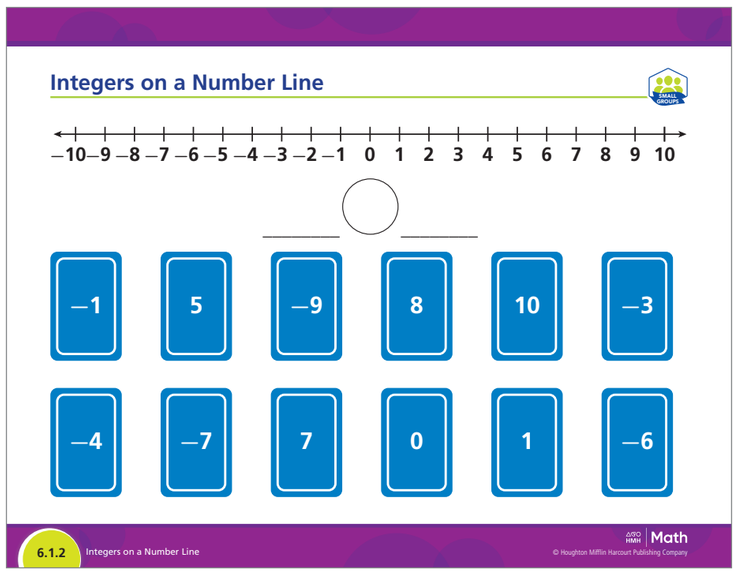
Using the Flipchart with Students

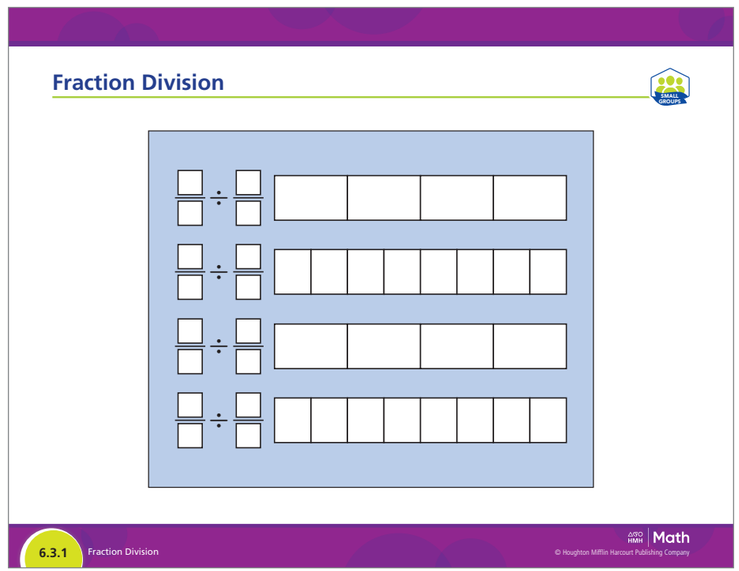
Teachers can easily lead pulled, small-group instruction with the TEACHER side, which includes:

- A complete mini-lesson connected to daily class lessons
- Guiding questions to help facilitate math discourse and problem solving
- English Language Proficiency level supports for multilingual learners

Students engage during this pulled, small-group learning opportunity with:

- Models and hints available to support problem solving
- PDF downloads for each student to write on, if desired
- Bilingual MathBoards and manipulatives to support problem solving





Lesson 1.2

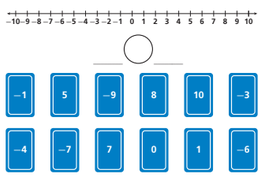
Integers on a Number Line

Materials: number line −10 to 10 (Teacher Resource Masters)

Have students compare integers using a number line.

Give the following sequence of instruction.

- Have students pick two cards from the set of number cards. Then have students draw a number line and graph the numbers on the line.
- Ask students to compare the two numbers they have graphed. **Ask:** Which number is larger? Which number is smaller? How do you know? The number to the right of the other number is larger; the number to the left of the other number is smaller.
- Have students write the relationship between the two numbers as two sentences. For example: −7 is less than 5. 5 is greater than −7.
- Have students repeat the activity with two more cards, and continue until all of the cards are chosen. If some students compare some of the pairs of numbers using a vertical number line, ask them to share how they know which number is larger and which number is smaller.



Proficiency Level

Beginning
Graph the numbers −7 and 5 on a number line. Say, "5 is greater than −7. On the number line, 5 is further to the right." Write the following sentences: "5 is _____ −7. On the number line, 5 is farther to the _____." Have students complete the sentence.

Intermediate
Graph the numbers −7 and 5 on a number line. Have students complete the following sentences. "____ is greater than ____. The number to the ____ of the other number is greater." Have students write the inequality. Repeat the activity with two more cards.

Advanced
Have students choose two integers and describe the process for determining which number is greater.

Lesson 3.1

Fraction Division

Materials: fraction strips (Teacher Resource Masters)

Have students demonstrate division of fractions using models.

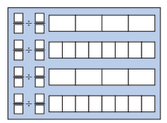
If students use fraction strips, have fourths and eighths available.

Fill in the following expressions for the activity.

$\frac{2}{4} \div \frac{1}{4}$ $\frac{3}{8} \div \frac{1}{8}$ $\frac{3}{4} \div \frac{2}{4}$ $\frac{5}{8} \div \frac{3}{8}$

- Have students think about how they could divide $\frac{2}{4}$ by $\frac{1}{4}$. **Ask:** You know how to divide 4 by 2. You can think of how many groups of 2 are in 4. How can you use fraction strips to divide $\frac{2}{4}$ by $\frac{1}{4}$? Possible answer: I can use fraction strips for fourths to see that there are 2 groups of $\frac{1}{4}$ in $\frac{2}{4}$.
- Now have students think about how they could divide $\frac{3}{8}$ by $\frac{1}{8}$. **Ask:** You saw how to find how many fourths are in $\frac{2}{4}$. What is $\frac{3}{8}$ divided by $\frac{1}{8}$? How many eighths can fit in $\frac{3}{8}$? Three eighths can fit in $\frac{3}{8}$. The answer is 3.
- Have students use fraction strips to solve division problems where the answer is not a whole number. **Ask:** When you divide $\frac{3}{4}$ by $\frac{2}{4}$, how many whole groups of $\frac{2}{4}$ are there in $\frac{3}{4}$? How many fourths are left over? What fraction of $\frac{2}{4}$ is the left over amount? What is $\frac{3}{4} \div \frac{2}{4}$? $1; 1; \frac{1}{2}; 1\frac{1}{2}$
- Have students use fraction strips to solve an additional division problem. **Ask:** What is the answer to the problem $\frac{5}{8} \div \frac{3}{8}$? $1\frac{2}{3}$

If time allows, repeat the activity with other fraction division problems.

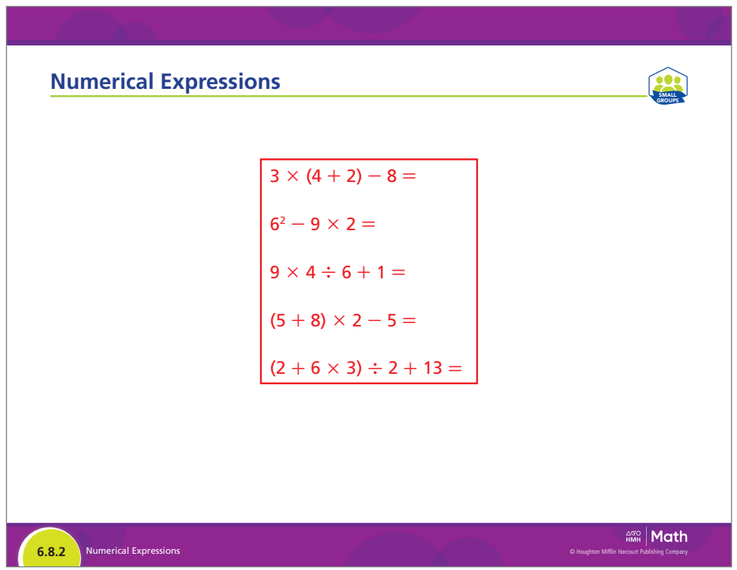


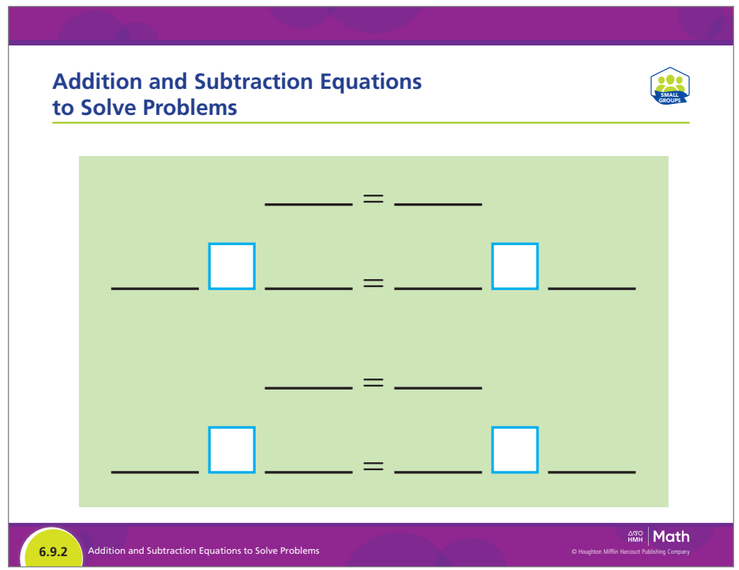
Proficiency Level

Beginning
Write the expression $\frac{2}{4} \div \frac{1}{2}$. Say "two-fourths divided by one-fourth" and have students repeat this phrase. Repeat with $\frac{3}{8} \div \frac{1}{8}$ and $\frac{3}{4} \div \frac{2}{4}$. Write $\frac{5}{8} \div \frac{3}{8}$ and have students say the corresponding word phrase on their own.

Intermediate
Have students work in groups. Give each group two sets of four cards. One set should show these expressions: $\frac{2}{4} \div \frac{1}{4}$, $\frac{3}{8} \div \frac{1}{8}$, $\frac{3}{4} \div \frac{2}{4}$, $\frac{5}{8} \div \frac{3}{8}$. The other set should show the corresponding word phrases: *two-fourths divided by one-fourth, three-eighths divided by one-eighth, three-fourths divided by two-fourths, five-eighths divided by three-eighths*. Have students match each expression with its word phrase. For each expression, have students take turns saying: "There are _____ groups of _____ in _____. For instance, "There are three groups of fourths in $\frac{3}{4}$."

Advanced
Say "five-eighths divided by three-eighths" and have students write the corresponding expression: $\frac{5}{8} \div \frac{3}{8}$. Have students say the number of groups of a fraction type that are in each fraction. Repeat the activity using other division expressions.





Lesson 8.2

Numerical Expressions

Have students use order of operations to determine the value of each numerical expression.

Give the following sequence of instruction.

- Direct students' attention to the first numerical expression. **Ask:** How do you determine the value of each expression? I have to do the operations in the correct order.
- **Ask:** Why is it important to use order of operations? The answer will only be correct if the order of operations is followed.
- Review using order of operations to solve problems. **Ask:** What is special about operations inside a parentheses? Always do the operations inside parentheses before the operations outside the parentheses.
- For each expression, have students circle the operation that should be done first. Then have them write the expression that is the next step. For the first expression, students should circle (4 + 2) and write 3 × 6 − 8. Continue the process, having a student circle the next operation. In this case, they would circle 3 × 6, and write 18 − 8 = 10.
- **Ask:** What is the value of each expression? 10, 18, 7, 21, 23

Evaluate more expressions as needed.

$3 \times (4 + 2) - 8 =$

$6^2 - 9 \times 2 =$

$9 \times 4 \div 6 + 1 =$

$(5 + 8) \times 2 - 5 =$

$(2 + 6 \times 3) \div 2 + 13 =$

Proficiency Level

Beginning
Write the following list: Parentheses; Exponents; Multiplication and Division; Addition and Subtraction. As students evaluate each expression, have them point to and say the step that they are on.

Intermediate
Have students work in small groups. As they evaluate each expression, have them use full sentences to describe their actions step by step.

Advanced
Have students explain how to use the order of operations to evaluate an expression.

Lesson 9.2

Addition and Subtraction Equations to Solve Problems

Have students identify the first step in solving an addition or subtraction equation.

- Write the following equation in the first line.
  $m + 5 = 13$
- **Ask:** Is the correct first step to add or subtract a value from each side of the equation? subtract Direct students to circle the subtraction sign. **Ask:** What value should be subtracted from both sides? 5 Why? By subtracting 5 from both sides, the variable m is isolated on the left side.
- Repeat with $k - 7 = 12$, $45 = 13 + j$, and $\frac{1}{2} = b - \frac{1}{4}$. For each equation, start by having the students explain what it is different about the equation from ones they have seen previously. Then, direct students to circle the operation and write the value that represents the first step in solving the equation.
- Have students repeat the activity with a partner. One student will write an equation. The partner will determine the first step to solving the equation.

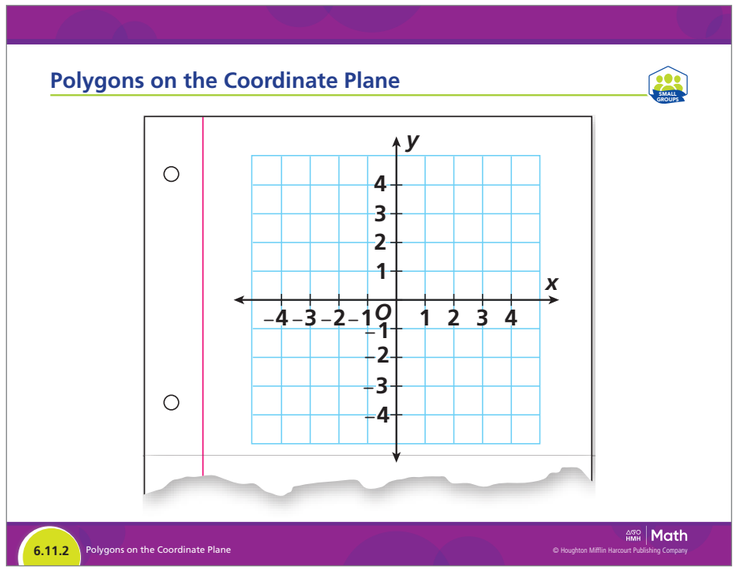
If time allows, repeat the activity using more equations with one unknown amount.

Proficiency Level

Beginning
Have students identify the first step in solving the equation $m + 5 = 13$. Give them the following sentence as a model: I am _____ 5 from both sides. OR I am _____ 5 to both sides. The variable is by itself on the _____ side.

Intermediate
As students work through the activity, have them use a full sentence to explain why each choice is correct.

Advanced
Have students explain how to isolate a variable on one side of an addition or subtraction equation.



Lesson 11.2

Polygons on the Coordinate Plane

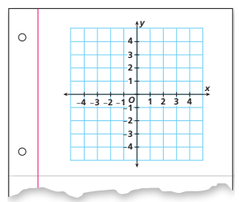
Materials: coordinate planes (Teacher Resource Masters), ruler

Have students classify figures on a plane by drawing new figures and using measuring tools.

Draw a rectangle on the coordinate plane with vertices (−3, 1), (−4, 1), (−3, 4), and (−4, 4), and a triangle with vertices (4, −1), (4, −4), and (5, −4).

- **Ask:** How could you use the coordinates of the vertices of these figures to identify the types of polygons shown? Possible answer: I can compare the *x*-coordinates and *y*-coordinates of vertices within each figure to check if the angles are right angles. What are the polygons? The figures are a rectangle and a right triangle.
- Have students plot the points *A*(2, 4), *B*(1, −1), and *C*(−2, 3), and connect them to make a polygon. **Ask:** What type of polygon did you draw? Triangle What other names could you use to classify this polygon? Acute triangle and scalene triangle
- **Ask:** What is a scalene triangle? A triangle with sides of 3 different lengths What is an acute triangle? A triangle with all angle measures less than 90°
- Have students plot the points *D*(2, −4), *E*(1, −3) , *F*(−4, −3), and *G*(−3, −4), and connect the points in order. **Ask:** What type of polygon did you draw? Quadrilateral What other names could you use to classify this polygon? Parallelogram
- **Ask:** Do all quadrilaterals have four vertices? Yes
- **Ask:** What is a parallelogram? A quadrilateral with two pairs of parallel sides

Repeat the activity if time allows by having students draw and measure different figures on the plane.

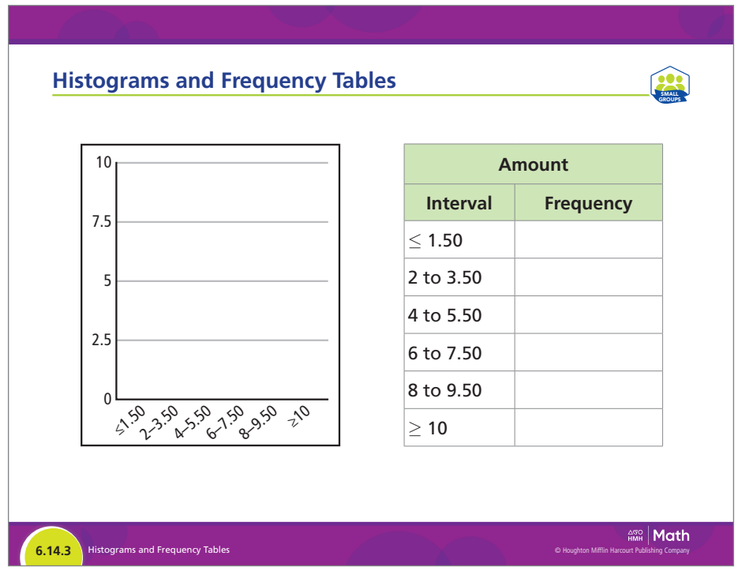


Proficiency Level

Beginning
Draw a right triangle, an acute triangle, a rectangle, and a parallelogram that is not a rectangle. Say, "Point to the right triangle," and have a student point to the right triangle and say the name of the shape. Repeat the activity with all three shapes.

Intermediate
Draw a right triangle, an acute triangle, a rectangle, and a parallelogram that is not a rectangle. Have students use a full sentence to identify each of the shapes.

Advanced
Have students describe three types of triangles and three types of quadrilaterals.



Lesson 14.3

Histograms and Frequency Tables

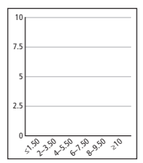
Have students analyze the data presented in a histogram and a frequency table.

Use the table to complete the histogram and the frequency table.

Amount Spent
0, 0, 0, 0.50, 1, 1.50, 1.50, 2, 2, 2, 2, 2.50, 3, 3, 3.50, 3.50, 3.50, 4, 4.50, 5, 5, 6.50, 6.50, 7, 8, 8.50, 8.50, 8.50, 9, 10

- Introduce the problem. Tell students an Internet music service recorded the purchases of its 30 best customers for one day. The frequency table and histogram each show the data. **Ask:** What do the histogram and frequency table show? Possible answer: Both show the number of purchases over an interval of amounts.
- **Ask:** How are the histogram and frequency table useful? Histograms and frequency tables are useful for providing trends and general categories for very large data sets.
- **Ask:** What trend or pattern do you observe in the data, judging from the histogram? Possible answer: The interval of $2 to $3.50 was the most common, while a smaller group of customers spent around $8 or $9.
- **Ask:** How would changing the interval affect the histogram? Shortening the interval would produce more bars with lower heights. Increasing the interval would produce fewer bars with taller heights.

If time allows, repeat the activity with different data.



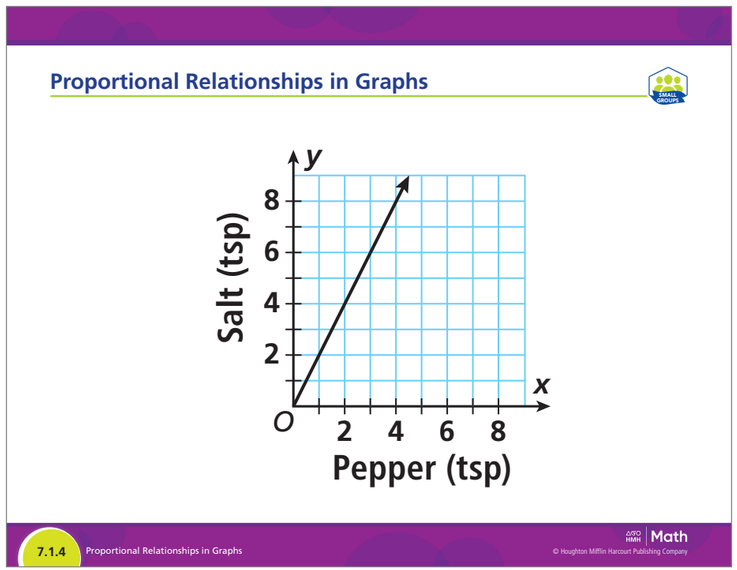
Amount	
Interval	Frequency
≤ 1.50	
2 to 3.50	
4 to 5.50	
6 to 7.50	
8 to 9.50	
≥ 10	

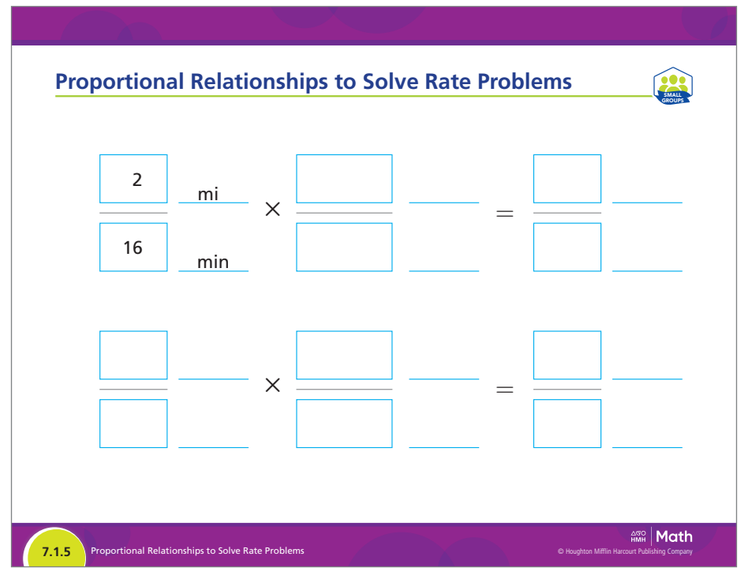
Proficiency Level

Beginning
Have students complete the following sentence: The _____ and the _____ show purchases over intervals.

Intermediate
Have students use full sentences to explain what the histogram and frequency table represent.

Advanced
Ask students to discuss the advantages and disadvantages of using histograms and frequency tables.





Lesson 1.4

Proportional Relationships in Graphs

Materials: recipe conversion graph (Teacher Resource Masters)

Have students calculate constants of proportionality by reading information from a graph.

Give the following sequence of instruction.

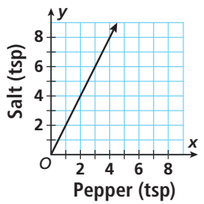
Introduce the problem. Tell students that the graph shows a relationship between the amount of salt and pepper in a recipe.

- **Ask:** Does the graph show a proportional relationship? Why or why not? yes; because it is a straight line that passes through the origin
- Have the students graph the point corresponding to 1 teaspoon of pepper.

  Ask: What are the coordinates of the point? (1, 2)
- **Ask:** How can you use this ordered pair to calculate the constant of proportionality? Divide the *y*-coordinate by the *x*-coordinate. $k = \frac{y}{x} = 2$
- Have the students label two more points on the graph with their coordinates.

  Ask: What is the ratio of the *y*-coordinate to the *x*-coordinate of each point? 2

  Ask: Does your answer support the value you already found for the constant of proportionality? yes



Proficiency Level

Beginning
Have students answer the second question in the activity by completing the sentence: The *x*-coordinate of the point is ____ and the *y*-coordinate is _____. Have them complete the sentence for each of the points they graph.

Intermediate
As students progress through the activity, have them use a full sentence to identify the coordinates of each point they graph. Each sentence should begin, "The *x*-coordinate of the point is _____."

Advanced
As students progress through the activity, have them use a full sentence to identify the coordinates of each point they graph.

Lesson 1.5

Proportional Relationships to Solve Rate Problems

Have students analyze conversion factors to solve rate problems.

Review the measurement chart with students. Briefly discuss other measurements they may know, such as the number of seconds in a minute and minutes in an hour.

- A cross-country runner runs 2 miles in 16 minutes. **Ask:** What conversion factor can you use to find the rate in feet per minute? $\frac{5{,}280 \text{ feet}}{1 \text{ mile}}$ **Ask:** What is the rate in feet per minute? 660 feet per minute
- A tank is leaking water at a rate of 8 ounces every 5 seconds. **Ask:** What is the rate in ounces per minute? 96 ounces per minute **Ask:** What is the rate in gallons per hour? 45 gallons per hour **Ask:** At that rate, how many gallons of water would leak from the tank in 3 hours? 135 gallons

Invite students to suggest other unit conversion problems and calculate the solutions.

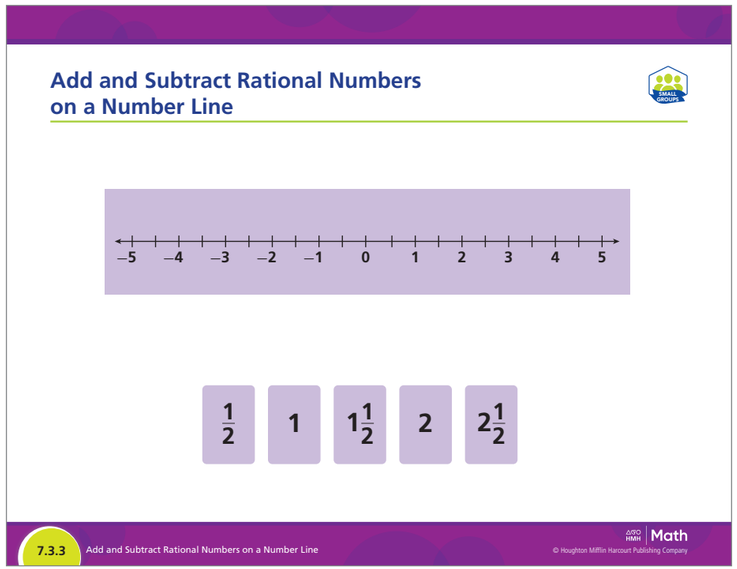
Customary Measurements		
Length	**Weight**	**Capacity**
1 foot = 12 inches	1 pound (lb) = 16 ounces (oz)	1 cup = 8 fluid ounces
1 yard = 36 inches		1 pint = 2 cups
1 yard = 3 feet	1 ton = 2,000 pounds	1 quart = 2 pints
1 mile = 5,280 feet		1 quart = 4 cups
1 mile = 1,760 yards		1 gallon = 4 quarts

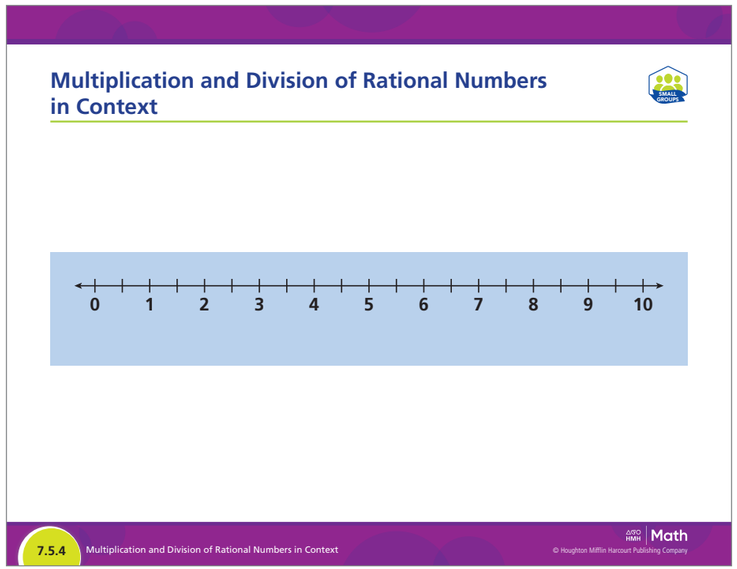
Proficiency Level

Beginning
Be sure that students understand that converting a measurement means to multiply it by a conversion factor, which is a ratio of one type of unit to another type. Write or read aloud several conversion factors as written in the table. Have students write them as ratios in fraction form, including units.

Intermediate
Be sure that students understand that converting a measurement means to multiply it by a conversion factor, which is a ratio of one type of unit to another type. Write several conversion factors and have students read them aloud and explain what they mean.

Advanced
Be sure that students understand that converting a measurement means to multiply it by a conversion factor, which is a ratio of one type of unit to another type. Have students write two different conversion factors related to the equation 1 foot = 12 inches, and have the students then explain what the conversion factors mean.





Lesson 3.3

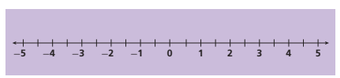
Add and Subtract Rational Numbers on a Number Line

Materials: coin, index cards with the numbers $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$

Have students use the cards and the coin to practice adding and subtracting rational numbers on the number line.

Give the following sequence of instruction.

- Have a student toss the coin (heads = positive, tails = negative) and choose a card without looking. Tell students that this determines the first addend in a sum.
- Have another student repeat the process to determine the second addend in the sum.
- Ask students to locate the first addend on the number line. **Ask:** How do you know which direction to move on the number line when you add? How is this related to the sign of the second addend? Possible answer: If the second addend is positive, move to the right. If the second addend is negative, move to the left.
- Repeat the process multiple times, having students use subtraction for some of the problems they generate if they are proficient with addition.



$\frac{1}{2}$ 1 $1\frac{1}{2}$ 2 $2\frac{1}{2}$

Proficiency Level

Beginning
Show students the number line, and write the expressions $2\frac{1}{2} + 1\frac{1}{2}$ and $2\frac{1}{2} + (-1\frac{1}{2})$. Ask, "How do you know which direction to move on the number line when you add?" Have students complete the sentences: "If the second addend is positive, move to the _____. If the second addend is negative, move to the _____."

Intermediate
As students progress through the activity, have them use a full sentence to tell how they know which direction to move on the number line. Each sentence should begin, "If the second addend is _____."

Advanced
Have students describe the process for adding and subtracting rational numbers using a number line.

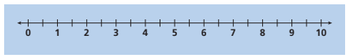
Lesson 5.4

Multiplication and Division of Rational Numbers in Context

Materials: integer cards 3 to 10

Have students determine the quantity of an amount that is decreasing using a number line.

Explain to students that a bucket has a leak, and the amount of water in the bucket changes by −0.5 gallon each minute. Tell students they will be choosing a number card to determine the amount of water in the bucket at the start and they will be using a number line to help them determine the amount of water in the bucket after 5 minutes.



Give the following sequence of instruction.

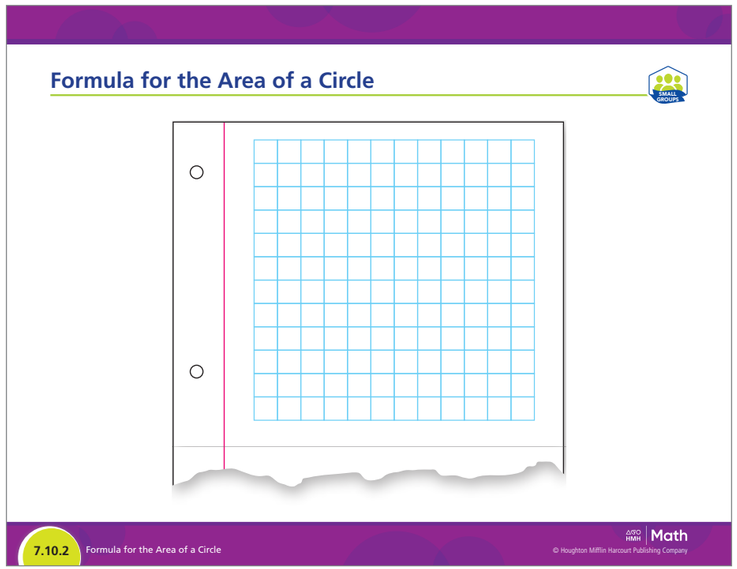
- Have a student choose a number card at random to determine the number of gallons of water in the bucket at the start.
- **Ask:** How can you use the number line to find the amount of water in the bucket after 5 minutes? Possible answer: Start at the initial amount and move 0.5 unit to the left 5 times.
- **Ask:** How can you write a product to find the total change in the amount of water? Possible answer: $5 \times (-0.5) = -2.5$.
- Now have students write a sum to calculate the amount of water in the bucket after 5 minutes. Ask them to compare the result to the amount they found using the number line.
- Repeat the process, as time permits, by having students choose a new starting amount.

Proficiency Level

Beginning
Show students the number card 7. Say, "There are 7 gallons of water in the bucket. It changes by −0.5 gallon each minute." Write and have students complete the sentences: Start at _____. Move _____ unit to the left for each minute.

Intermediate
Show students the number card 7. Say, "There are 7 gallons of water in the bucket." Ask students, "How can I use the number line to find the amount of water in the bucket after each minute?" The student should start his or her answer with: "Start at _____ and move _____."

Advanced
As students progress through the activity, have them describe their movements on the number line.



Lesson 10.2

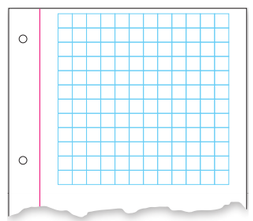
Formula for the Area of a Circle

Materials: centimeter grid paper (Teacher Resource Masters), compass

Have students work in pairs. Choose a radius for a circle and draw it with a compass on grid paper, putting the center of the circle at the intersection of two gridlines.

Give the following sequence of instruction.

- **Ask:** What is the radius of your circle in grid squares? What is the square of the radius? Answers will vary.
- **Ask:** How could you estimate the area of your circle? Possible answer: I could count the squares inside the circle, and then estimate the area of the partial squares.
- Have students use the grid squares to estimate the area of their circle.
- Have students find the ratio of the estimated area of their circle to its radius, and have them share their results. **Ask:** Are the ratios all approximately equal? Possible answer: No, we all got different ratios.
- Have students find the ratio of the estimated area of their circle to the square of its radius, and share their results. **Ask:** Are the ratios all approximately equal? What do you think this number is? Possible answer: Yes, all the ratios are a little more than 3. The ratio is an approximation of π.

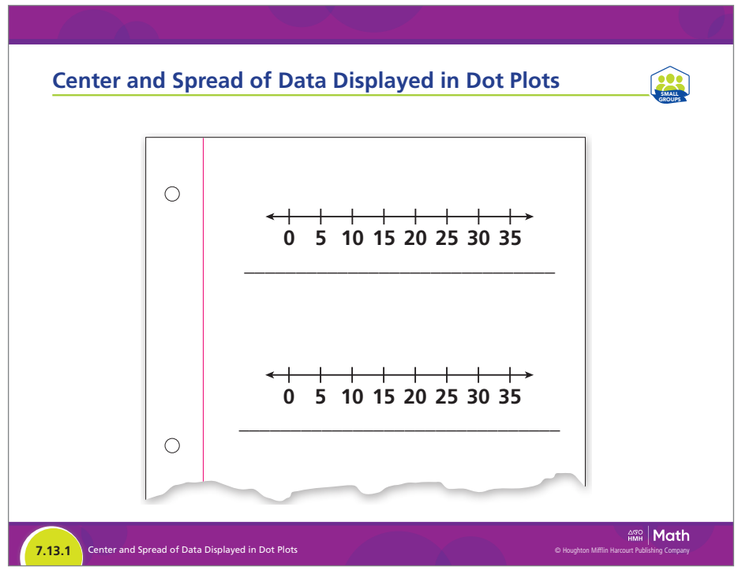


Proficiency Level

Beginning
Ask students, "How could you estimate the area of your circle?" Have students answer by completing the following sentences: I could count the _____ inside the circle. Then I could estimate the _____ of the partial squares.

Intermediate
As students estimate the area of their circles, have them use a full sentence to identify the number of squares inside the circle. Then have them use a full sentence to estimate the area of the partial squares.

Advanced
Have students describe the process for estimating the area of a circle on graph paper.



Lesson 13.1

Center and Spread of Data Displayed in Dot Plots

Have students compare data displayed in dot plots.

Ms. Schwab and Ms. Petersen are comparing homework assignments. Each takes a random selection of recent assignments and counts the number of problems assigned. The results are displayed in the dot plots.

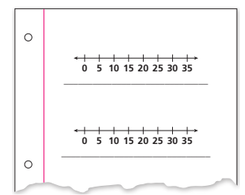
Plot these points on the dot plots.

Ms. Schwab: 5, 5, 10, 10, 10, 10, 15, 15,15, 15, 15, 20, 20, 25, 30

Ms. Petersen: 10, 10, 10, 15, 15, 15, 15, 20, 20, 20, 20, 20, 20, 25, 25, 25

- **Ask:** How can you find the minimum value on a dot plot? It is the value beneath a column of dots farthest to the left. What is the minimum number of assignments that Ms. Schwab has assigned? 5 What is Ms. Petersen's minimum? 10
- **Ask:** How can you find the maximum value on a dot plot? It is the value beneath a column of dots farthest to the right. What is the maximum number of assignments that Ms. Schwab has assigned? 30 What is Ms. Petersen's maximum? 25 Which set of values has the greater spread? Ms. Schwab's set
- Invite students to suggest a method for finding the median on a dot plot. Have students state the median for each set. Ms. Schwab: 15, Ms. Petersen: 20
- Lead students in a discussion about the measures and what they tell about the data sets. Encourage a variety of ideas and accept all reasonable responses.

Repeat the activity with different sets of data displayed on the dot plots.

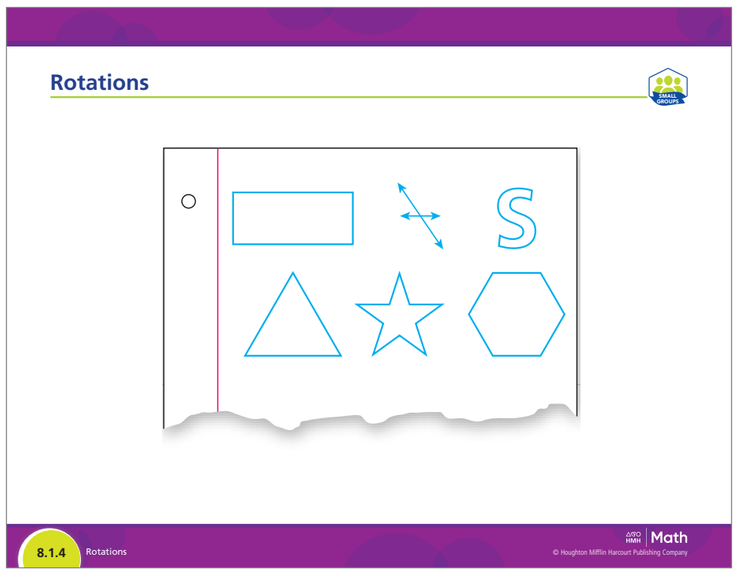


Proficiency Level

Beginning
Have students complete the following sentences: The median is the _____ value in a data set. The median for Ms. Schwab's assignments is _____. The median for Ms. Petersen's assignments is _____.

Intermediate
Have students work in pairs, with one partner explaining to the other how to find the median. Have the partners switch roles for the second dot plot.

Advanced
Have students describe the process for finding the median on a dot plot.



Lesson 1.4

Rotations

Have students describe how a set of figures would be changed by being rotated.

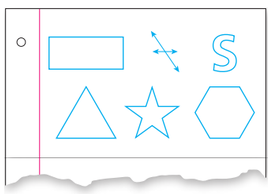
Give the following sequence of instruction.

Have students observe the 6 shapes shown in the flipchart. Then give the following sequence of instruction.

- Have students look at the rectangle. **Ask:** If we rotated the rectangle 180°, do you think it would look the same as before? Explain. Possible answer: Yes. Each vertex and side match their opposites in the figure.
- Have students watch as you gradually rotate the flipchart 180°, so that it is upside down. Discuss how the rectangle looks identical before and after the rotation, although its apparent position has changed. Identify the center of the page as the center of the rotation.
- Return the flipchart to its upright position. Tell students to circle the shapes that they think will appear the same when they are rotated 180°. Possible answer: crossed lines, S, hexagon

  Rotate the flipchart 180° to determine whether or not each shape appears the same.
- Discuss shapes that do not appear the same after a 180° rotation. **Ask:** How can the triangle and star be rotated to appear the same? Rotate the triangle 120° either clockwise or counterclockwise. Rotate the star 360° ÷ 5, or 72°, and multiples of 72°.

As time allows, repeat the activity using different figures.

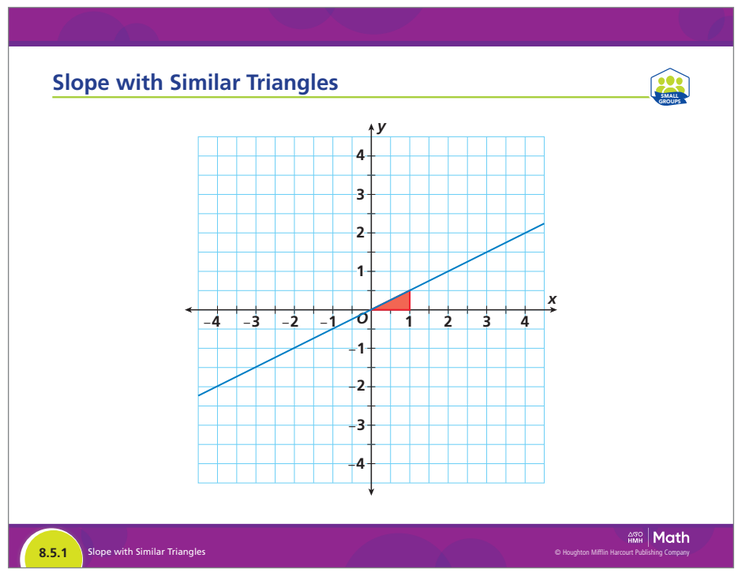


Proficiency Level

Beginning
Show students the shapes on the flipchart. Have students say the name of each shape that does not appear the same after a 180° rotation.

Intermediate
Show students the shapes on the flipchart. Have students use a full sentence to answer the question: "Which shapes do not appear the same after a 180° rotation?"

Advanced
Have students explain how the triangle and star can be rotated to appear the same.



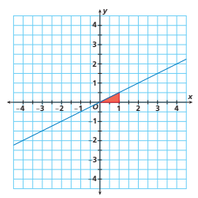
Lesson 5.1

Slope with Similar Triangles

Ask students whether the graph represents a proportional relationship. Have them explain their reasoning.

Give the following sequence of instruction.

- Tell students that for a right triangle formed by a line and the *x*-axis as shown, the height is referred to as the *rise* and the base is referred to as the *run*. **Ask:** What does the red triangle tell you about the line? The triangle's height shows the line's rise, and the triangle's length shows the line's corresponding run.
- Tell students that the ratio of the rise to the run is called the *slope*. **Ask:** What is the ratio of rise to run for this line? What does this ratio tell you about the line? What does it tell you about the proportional relationship? The ratio of rise to run is $\frac{1}{2}$. The ratio tells you the slope of the line and the unit rate for the proportional relationship.
- Have students draw other right triangles whose hypotenuses lie along the line and find the ratio of rise to run for each triangle. **Ask:** What do you notice about the rise-to-run ratios? What does this mean about the slope between any two points on the line? Elicit that the rise-to-run ratio is always $\frac{1}{2}$, and therefore the slope of the line is always $\frac{1}{2}$ regardless of the two points on the line used to calculate it.

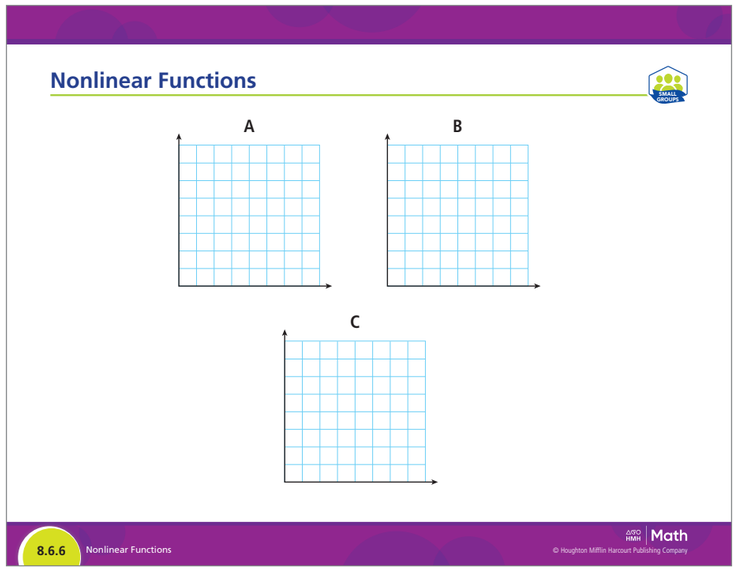


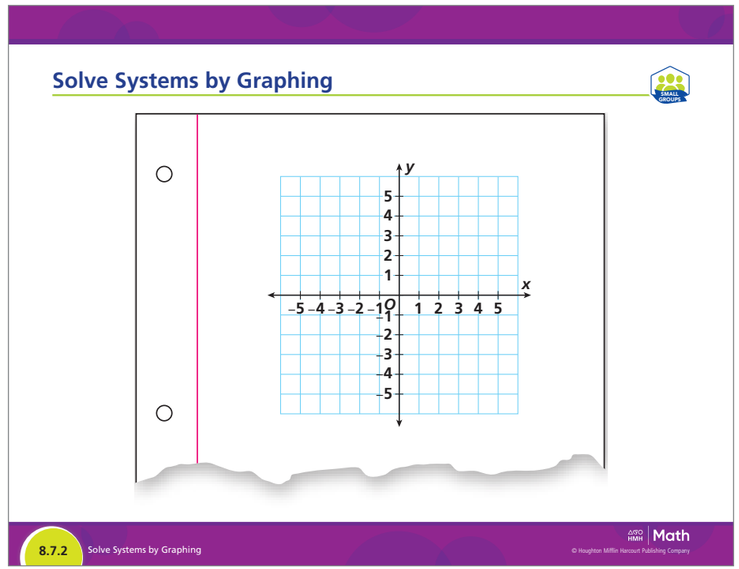
Proficiency Level

Beginning
Point to the vertical side of the red triangle and say "rise." Then point to the horizontal side of the red triangle and say "run." On the students' grid, draw a larger triangle illustrating the slope of the line and ask them to identify the side representing the rise and the side representing the run.

Intermediate
Draw several triangles on the students' grid. For each triangle, have students complete this sentence with the appropriate numbers: The rise is ____ and the run is ____.

Advanced
Have students use the terms *rise* and *run* to describe how to find the slope of a line.





Lesson 6.6

Nonlinear Functions

Students will match verbal descriptions to images of the graphs.

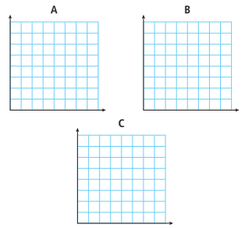
Give the following sequence of instruction:

Draw the following graphs on the coordinate grids.

- Graph A has a slope of -2 for x-values of 0 to 3, then changes to a slope of 0.
- Graph B has a slope of 0 for x-values of 0 to 5, then changes to a slope of 1.
- Graph C has a slope of $\frac{1}{6}$ for x-values of 0 to 6, then changes to a slope of 0.

Give the students the following descriptions of situations and have them choose the graph that represents the situation.

- The value of a collectible figurine is constant for several years, then increases. B
- Sales of a cell phone model decreases significantly for several months, then remains constant. A
- The attendance at an art festival increases slightly for several years, then remains constant. C
- **Ask:** Which word is associated with a negative slope? decrease
  Which word is associated with a slope of 0? constant
  Which word is associated with a positive slope? increase



Proficiency Level

Beginning
For each situation, have students circle the key phrase that tells them which graph matches the situation. Read the phrase aloud. Then have them draw a line from that situation to the graph.

Intermediate
Have students work in small groups to complete this activity. Have them write at the top of a piece of paper, "Negative Slope," "No Slope," and "Positive Slope." Then, for each situation, have them find the key phrase that tells them which graph matches the situation and write the key phrase under the correct heading.

Advanced
Have students describe the process for matching a verbal description to a graph of a function.

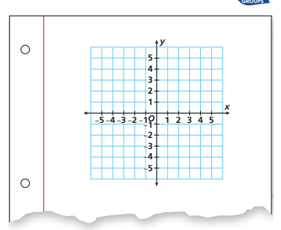
Lesson 7.2

Solve Systems by Graphing

Materials: coordinate plane (Teacher Resource Masters)

Have students solve a system of equations by graphing them and finding the intersection.

- Write the following system of equations for the students.
  $\begin{cases} y = x + 3 \\ y = -2x \end{cases}$
- Graph the two equations in the system. **Ask:** How can you graph the equations? The equations are in slope-intercept form, so for each equation, plot the y-intercept and then use the slope to find another point on the line.
- **Ask:** What do you notice about the two lines you graphed? Possible answer: The lines have different slopes, the lines intersect.
- **Ask:** What is special about the point $(-1, 2)$? The point lies on both lines and is the point where the lines intersect.
- Tell students that the point $(-1, 2)$ is called a solution of the system. Explain that the solution can also be written as $x = -1$, $y = 2$.
- **Ask:** How can you check that this ordered pair is a solution of the system? Substitute $x = -1$ and $y = 2$ into both equations and check that a true statement is the result in both cases.

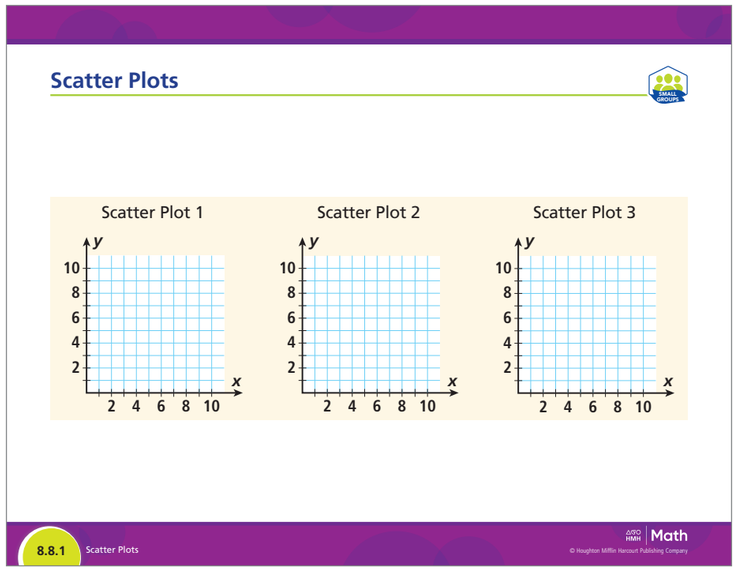


Proficiency Level

Beginning
Ask students, "How many points do the two lines have in common?" Have students answer using one word. Then ask, "At what point do the lines intersect?" Have students answer using an ordered pair. Finally, have students complete the sentence: The solution to the system of equations can be written as $x =$ _____, $y =$ _____.

Intermediate
Have students use a full sentence to answer each of these questions: "How many points do the two lines have in common? At what point do the lines intersect?"

Advanced
Have students explain how to find the solution to a system of equations by looking at graphs of the equations.



Lesson 8.1

Scatter Plots

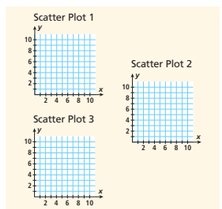
Materials: grid of Quadrant I (Teacher Resource Masters)

Students will examine scatter plots for signs of positive association, negative association, and no association.

Tell students that the scatter plots shown do not have axis labels, so the data may represent a variety of real-world situations.

Draw scatter plots with the following points:
Scatter Plot 1: (2, 2), (4, 5), (6, 6), (8, 9), (8, 10), (9, 7), (10, 8), (10, 10)
Scatter Plot 2: (2, 10), (4, 5), (5, 10), (6, 6), (8, 2), (8, 3), (9, 1), (10, 0), (10, 1)
Scatter Plot 3: (2, 2), (2, 10), (4, 5), (5, 10), (6, 1), (6, 6), (8, 3), (8, 6), (9, 1)

- **Ask:** Look at Scatter Plot 1. Can you draw a straight line that comes close to most of the points? Yes. A reasonable line would connect the points (2, 2) and (10, 10). **Ask:** Describe this line. What does it tell you about the data? The line has a positive slope and is reasonably close to all points. It shows a positive, strong association. As *x* increases, so does *y*.
- **Ask:** Now look at Scatter Plot 2. Can you draw a straight line that comes close to most of the points? Yes, although not as close as in Scatter Plot 1. A reasonable line connects the points (2, 10) and (10, 0). **Ask:** Describe this line. What does it tell you about the data? The line has a negative slope, and it comes close to many of the points. This shows that the data has a negative, moderate association. As *x* increases, *y* decreases.
- **Ask:** Now look at Scatter Plot 3. Can you draw a straight line that comes close to most of the points? No. There is no trend or pattern in the data, and a line that comes reasonably close to most of the points cannot be drawn.
- **Ask:** One of the graphs describes the relationship between the prices of used cars and their ages. Which graph do you think it is? Explain. Scatter Plot 2; It makes sense that the greater the age of a car, the lower its price is.

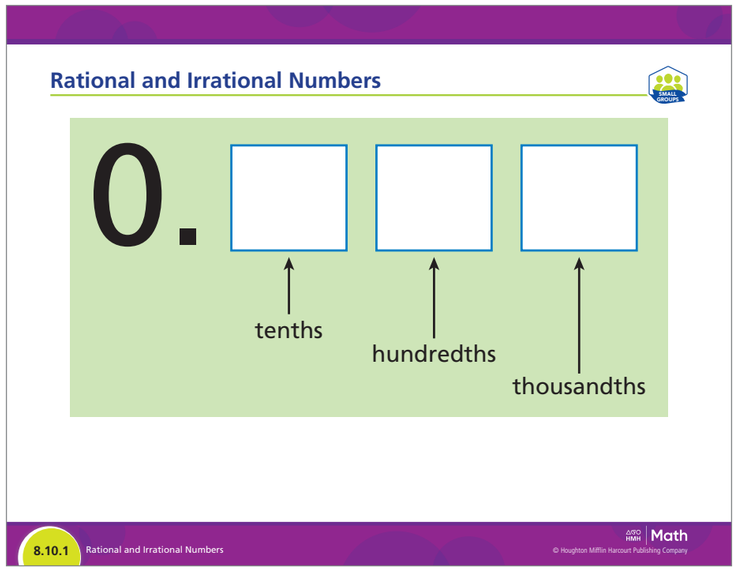


Proficiency Level

Beginning
Direct students' attention to Scatter Plot 1. Say and have students repeat, "I can draw a line with a positive slope that is reasonably close to all points. It shows a positive association. As *x* increases, *y* increases." Then have students complete these sentences for Scatter Plot 2: I can draw a line with a _____ slope that is reasonably close to _____ points. It shows a _____ association. As *x* _____, *y* _____.

Intermediate
Have students complete the following sentences for Scatter Plots 1 and 2: I can draw a line with a _____ slope that is reasonably close to _____ points. It shows a _____ association. As *x* _____, *y* _____.

Advanced
Have students describe the association for Scatter Plots 1 and 2.



Lesson 10.1

Rational and Irrational Numbers

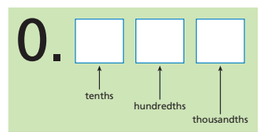
Materials: number cubes, decimal chart (Teacher Resource Masters)

Have students write fractions as decimals.

Give students a number cube. Explain that they will use the number cube to create decimals that they will write as fractions.

Give the following sequence of instruction.

- Roll the number cube one time. Write the number you rolled in the tenths place on the diagram. **Ask:** What decimal did you form? Is this a repeating or terminating decimal? How do you know? Terminating; It ends after one digit.
- Have students write the decimal as a fraction. **Ask:** What is the place value of the last digit in the terminating decimal you wrote? tenths **Ask:** How does this help you write a fraction? You use 10 as the denominator and use the digit to the right of the decimal point as the numerator.
- Have students determine whether the fraction is in lowest terms. **Ask:** How can you tell whether the fraction is in lowest terms? If it is not in lowest terms, what do you do? Check whether the numerator and denominator have common factors other than 1. If so, divide the numerator and denominator by the greatest common factor.
- Have students repeat this process, but this time have them roll the number cube two times and write the first number that was rolled in the tenths place and the next in the hundredths place.
- Repeat the process again, but this time have students roll the number cube three times and create a decimal to the thousandths place.



Proficiency Level

Beginning
Write 0.72 and say, "The 7 is in the tenths place. The 2 is in the hundredths place." Have students repeat the sentences. Then write 0.19 and 0.64. For each number, have students complete the following sentences: The _____ is in the tenths place. The _____ is in the hundredths place.

Intermediate
Write 0.72, 0.19, and 0.64. For each number, have students use a full sentence to identify the digit in the tenths place and the digit in the hundredths place.

Advanced
Have students use full sentences to identify the place of each digit in 0.72, 0.19, and 0.64.

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