THE SCHOOL DISTRICT OF PHILADELPHIA

# 6th Grade Learning Guide Math

THE SCHOOL DISTRICT OF PHILADELPHIA

**Grade:** 6 **Subject:** Math (worksheets/images from enVision Mathematics, Common Core, 2020, Grade 6)

**Topic:** Understanding and Use Ratio and Rate

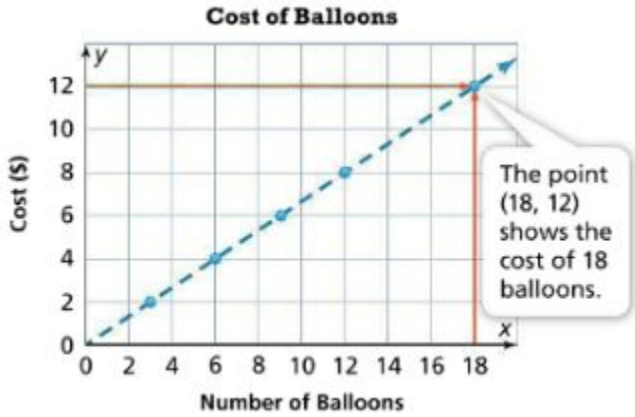
**What Your Student is Learning:**

- Use ratios to describe the relationship between two quantities and use bar diagrams/double number lines to model those ratio relationships.
- Use multiplication and division to find equivalent ratios, solve problems by finding equivalent ratios, then represent equivalent ratios in tables and on graphs.
- Compare ratios to solve problems (using ratio tables and graphs).
- Use rates to describe ratios in which the terms have different units. Use these rates and unit rates to solve problems.
- Use ratio reasoning to compare rates and solve problems.
- Use unit rates to solve problems involving speed, unit price, and an equation.

**Background and Context for Parents:** In 6th grade, students are formally seeing Ratios and Rates for the first time. It is important that students are able to interpret/create different representations of ratios and rates (double number lines, tables, graphs, numerically, etc.) so they conceptually understand the relationship between the two values and how changing one affects the value of the other. Students in 6th grade are <u>not</u> setting up proportions (to cross multiply and divide). Have students represent the ratio/rate in one of the ways shown below to help them find the missing information. They will learn the way we learned it in future grades.

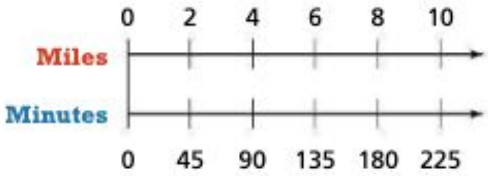
- **Ratios and Graphs** In Lesson 5-4, students make tables of equivalent ratios and graph the pairs of values on the coordinate plane. Equivalent ratios form a straight line when graphed on the coordinate plane. Other points on this line represent other equivalent ratios.

| Number of Balloons (x) | 3 | 6 | 9 | 12 |
|---|---|---|---|---|
| Cost in Dollars (y) | 2 | 4 | 6 | 8 |




- **The Concept of a Ratio** In Lesson 5-1, students learn to write ratios to represent the relationship between two quantities. They also use bar diagrams and double number line diagrams to model ratio relationships and solve problems.


The ratio of oranges to apples is 2:3, 2 to 3, or $\frac{2}{3}$.




The ratio of miles to minutes is 2:45, 2 to 45, or $\frac{2}{45}$.

In Lessons 5-2 and 5-3, students make tables of equivalent ratios to solve problems and compare ratios.

# Rates

- **The Concept of Rates and Unit Rates** In Lesson 5-5, students learn that a rate is a special type of ratio that compares quantities with different units of measure, and that a unit rate is a rate in which the comparison is to 1 unit. They use ratio tables, equivalent ratios, and double number line diagrams to help them solve problems involving rates. They learn to find a unit rate given a rate.

Find the unit rate in miles per day.

$\frac{320 \text{ miles}}{5 \text{ days}}$ or $\frac{320}{5}$ ..... Write the rate as a fraction.

$\frac{320 \div 5}{5 \div 5} = \frac{64}{1}$ ..... Divide both terms by 5 to find the unit rate.

The unit rate is $\frac{64}{1}$, or 64 miles per day.

In Lesson 5-6, students compare rates by changing each to a unit rate. In Lesson 5-7, they solve rate problems involving unit price and constant speed.

Grocery Giant is having a sale on Swiss cheese. How much would it cost to buy 5 slices of cheese at the same rate?

| Slices | Price |
|---|---|
| 1 | \$0.30 |
| 5 | \$1.50 |
| 24 | \$7.20 |

× 5 ÷ 24 × 5 ÷ 24

At this rate, it would cost \$1.50 for 5 slices of cheese.

# Conceptual Understanding

- **Attend to Two Quantities Simultaneously** Learning to pay attention to two quantities at the same time is a critical step in learning how to reason with ratios. Ratios represent a relationship, not just two numbers written together.
- **Equivalent Ratios** For students to be successful in reasoning proportionally, they must understand that the ratio of two quantities remains constant even as the corresponding values of the quantities change. By repeating or iterating the basic ratio, students can create equivalent ratios. Students understand that the relationship between the quantities is preserved when both quantities are multiplied or divided by the same nonzero number.

Multiply both terms of the original ratio by the same number to find an equivalent ratio.

× 2 × 3 × 4

| | | | | |
|---|---|---|---|---|
| **Number of Basketball Players** | 16 | 32 | 48 | 64 |
| **Number of Soccer Players** | 48 | 96 | 144 | 192 |

Multiply 16 × 4 for the 64 basketball players.

$\frac{16 \times 4}{48 \times 4} = \frac{64}{192}$

Multiply 48 × 4 to find the number of soccer players.

**Ways to support your student:**

- Talk with your student about ratios/rates as much as possible since they are all around us.
- Read the problem outloud to them.
- Before giving your student the answer to their question or specific help, ask them “What have you tried so far?”, “What do you know?”, “What might be a next step?”, or “Is there a representation you can draw to help you?”
- After your student has solved it, and before you tell them it’s correct or not, have them explain to you how they got their solution and if they think their answer makes sense. For this topic, making sense of the situation is especially important.

**Online Resources for Students:**

Kahn Academy (only do ratios and rates):
**https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-ratios-prop-topic**
Ratios- https://www.mathplayground.com/ASB_RatioBlaster.html

## Learning Support for Mathematics

For students that are approaching grade level and have learning gaps/ differences in mathematics, provide numerous opportunities for explorations at the concrete (manipulatives) and representational (visual) levels before progressing to the abstract (numbers) level. Students that need learning supports should be provided with:

- Intensive Direct Instruction and daily guided practice
- scaffolded supports
- the use of visuals as models and aids
- numerous opportunities to think out loud
- support to help them understand the why
- use of manipulatives and tools to support understanding
- Bar Modeling Representations to decode word problems
- the use of mnemonics to enhance retention of skills
- daily practice with basic facts
- the presentation of content in varied contexts and varied levels
- opportunities to use diagrams and draw math concepts
- graph paper to support understanding
- numerous opportunities to draw pictures of word problems
- the use of smaller numbers to address number operations
- opportunities for success to build a growth mindset
- computer time to allow for needed practice
- opportunities to engage in metacognition (the building and reinforcing of thinking and reasoning) skills

**See examples for each bulleted item on the following pages**

- **Intensive Direct Instruction and daily guided practice**

(Intensive Direct Instruction means to explain the skill / concept to the student with several examples repeatedly to help them understand)
https://youtu.be/F_HzrRBOU7I **/ https://youtu.be/OJJkkUPC_yM**

- **Scaffolded Supports**

(Scaffolded supports means to introduce the skill one step at a time – allowing the student to understa one section part, before moving on to
the next part) ex. 5+ 1=6, 9+1=10, 24+1=25- it is the same as "what
number comes after 5, after 9, after 24
**https://youtu.be/5hWDbSx_kdo**

- **Visuals as models and aides**

(Pictures of objects that can be used to help students understand the math)
https://studentsatthecenterhub.org/resource/helping-struggling-students-build-a-growth-mindset/

- **Thinking out loud**

(Allows students to talk and think about the skills they are learning, which allows them to better remember the skill)
**https://youtu.be/f-4N7OxSMok**

- **Understanding the why**

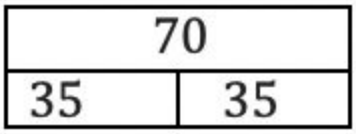
(When students understand why a strategy works, they will apply it to other skills) ex. 5x = 5, 45x1= 45, 320x1=320

- **Manipulatives and Tools**

(Manipulatives can be counters, beans, blocks, etc. – Tools can be rulers, calculators, scales, etc.) **https://youtu.be/uWBZF-Lyq58**

- **Bar Modeling Representations**

(Bar Modeling Representations consist of visuals that help students under the skill they are learning. Ex.




https://youtu.be/TbayTZvS_bc

- **Mnemonics**

(Mnemonics consist of strategies to help students remember skills – ex.



**https://youtu.be/dXvvGc9TldY**

- **Basic Facts**

(Basic facts include addition, subtraction, division, multiplication facts –
ex. 8+2=10, 2+8=10, 10-2=8, 10-8=2 / 2x5=10, 5x2=10, 10/2=5, 10/5=2
**https://youtu.be/TbayTZvS_bc**

- **Content with varied contexts and varied levels**

Means to show student how to solve a problem different ways to allow them to use the skill that way they understand best
**https://youtu.be/FVg9n0l0Gf0**

- **Diagrams**

(Diagrams provide students with visuals / pictures that help them solve the problem and they help them read the problem with less words)
**https://youtu.be/TbayTZvS_bc**

- **Graph paper**

(Graph paper helps students to solve the problem by making it visual / easier to see the answer)
**https://youtu.be/mX43cn3IASI**

- **Drawing Pictures**

(Drawing pictures allow students to show they can solve the problem without using words that they may not know or be able to write)
**https://youtu.be/TbayTZvS_bc**

- **Smaller Numbers**

(The use of smaller numbers can helps students understand the process of a skill, so that when they move on to bigger numbers, they will see that the process is still the same, they acquire understanding of the skill) ex. 5x = 5, 45x1= 45, 320x1=320

- **Growth Mindset**

(A growth mindset is a process that helps to improve intelligence (thinking), ability (skill) and performance (actions). This means that by helping students to develop a growth mindset, we can help them to learn to think and be problem solvers. This is a process that occurs over time by helping them improve by building success over time.
**https://studentsatthecenterhub.org/resource/helping-struggling-students-build-a-growth-mindset/**

- **Computer Time**

(Computer time allows students to use websites, games, activities that will help them learn math skills and concepts)
**mathgametime.com, pbs.com, bestkidsolutions.com, firstinmath.com, helpingkidsrise.org**

- **Metacognition**

(Metacognition means to help students think about what they are thinking, the steps they are using, the words and numbers that they are using- It helps students to better focus on the skills they are using- it is a process that occurs over time) / **https://youtu.be/HKFOhd5sMEc/**
**http://www.spencerauthor.com/metacognition/**

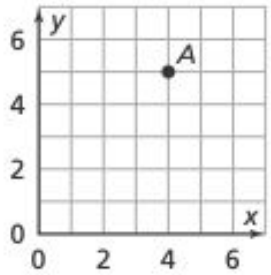
Name _____

Topic **5**
Readiness Assessment

**1.** Round the value 16.758 to the nearest hundredth.

Ⓐ 16.75
Ⓑ 16.76
Ⓒ 16.8
Ⓓ 17.0

**2.** Which coordinate pair correctly identifies the location of point *A*?




Ⓐ (5, 4)
Ⓑ (4, 6)
Ⓒ (4, 5)
Ⓓ (4, 4)

**3.** Jordan paid $682 for 124 cupcakes that each cost the same amount. Find the price of one cupcake.

Ⓐ $5.05
Ⓑ $5.50
Ⓒ $6.05
Ⓓ $6.50

**4.** Solve the equation for $x$: $126 = 3x$.

Ⓐ $x = 378$
Ⓑ $x = 129$
Ⓒ $x = 123$
Ⓓ $x = 42$

**5.** Cenisa ran 1 kilometer. How many meters did she run?

Ⓐ 10,000 meters
Ⓑ 1,000 meters
Ⓒ 100 meters
Ⓓ 10 meters

**6.** Which equation represents the pattern shown in the table below?

| ***x*** | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| ***y*** | 4 | 5 | 6 | 7 |

Ⓐ $y = x + 2$
Ⓑ $y = x + 1$
Ⓒ $y = 3x$
Ⓓ $y = x - 1$

**7.** Mateo finds a special on apples for $0.80 per pound. Which price is a better deal?

Ⓐ $0.78 per pound

Ⓑ $0.85 per pound

Ⓒ $0.90 per pound

Ⓓ $1.25 per pound

---

**8.** Which value is the solution of the equation $8r = 536$?

Ⓐ 63

Ⓑ 64

Ⓒ 67

Ⓓ 72

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**9.** Kaitlyn buys 3 T-shirts for $14.95 each. What is the total cost?

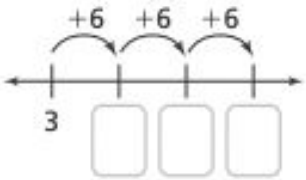
Ⓐ $ 42.95

Ⓑ $ 43.85

Ⓒ $ 44.85

Ⓓ $ 45.00

**10.** Determine the next three points on the number line.




Ⓐ 9, 15, 21

Ⓑ 6, 12, 18

Ⓒ 9, 14, 20

Ⓓ 10, 16, 22

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**11.** Which measure is equivalent to 4 feet 5 inches?

Ⓐ 53 inches

Ⓑ 50 inches

Ⓒ 45 inches

Ⓓ 4.5 inches

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**12.** Akikta bought 25 trees for $15.40 each. Chloe bought 35 trees for $14.30 each. What was the difference between the total amounts that the girls paid for the trees?

Ⓐ $1.10

Ⓑ $50.00

Ⓒ $115.50

Ⓓ $150.05

GET READY! TOPIC 5

# Review What You Know!

## Vocabulary

**Choose the best term from the box to complete each definition.**

common factor
common multiple
equivalent fractions
fraction

1. Fractions that name the same amount are called _____.
2. The number 3 is a _____ of 9 and 12.
3. A number that can be used to describe a part of a set or a part of a whole is a(n) _____.

## Equivalent Fractions

**Write two fractions equivalent to the given fraction.**

4. $\frac{3}{4}$
5. $\frac{7}{8}$
6. $\frac{12}{5}$
7. $\frac{1}{2}$
8. $\frac{8}{9}$
9. $\frac{2}{3}$

## Equations

**Write an equation that represents the pattern in each table.**

10.

| $x$ | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| $y$ | 16 | 24 | 32 | 40 | 48 |

11.

| $x$ | 2 | 4 | 6 | 8 | 10 |
|---|---|---|---|---|---|
| $y$ | 5 | 7 | 9 | 11 | 13 |

## Units of Measure

**Choose the best unit of measure by writing *inch, foot, yard, ounce, pound, ton, cup, quart,* or *gallon*.**

12. serving of trail mix
13. height of a person
14. weight of a newborn kitten
15. gasoline

## Measurement Conversions

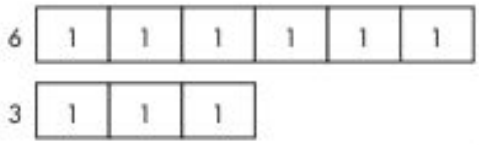
16. Michael is 4 feet tall. Explain how Michael could find his height in inches. Then explain how he could find his height in yards.

Name _____

Reteach to Build Understanding
**5-1**

A **ratio** is a comparison of two numbers or the number of items in two groups. Each quantity in a ratio is called a **term**. Ratios can be written with the word "to" separating the terms ($a$ to $b$), with a colon separating the terms ($a:b$), or in fraction form $\left(\frac{a}{b}\right)$.

The ratio 6 : 3 can be modeled using a **bar diagram** with a row of 6 equal boxes and a row of 3 equal boxes as shown on the right.




**1.** The chorus at an elementary school is made up of fifth and sixth graders. This year, the chorus has 12 fifth-grade girls, 9 fifth-grade boys, 14 sixth-grade girls, and 10 sixth-grade boys.

**a.** The ratio of girls to boys is _____ to _____.

**b.** The ratio of fifth graders to sixth graders is _____ : _____.

**c.** The ratio of girls to the total number of students in the chorus is $\frac{\square}{\square}$.

**2.** The school cafeteria orders 4 cartons of regular milk for every 3 cartons of chocolate milk.

**a.** Complete the bar diagram to show the ratio.


**b.** The school ordered 120 cartons of regular milk. Divide 120 cartons of regular milk by _____ because there are _____ boxes in the top row.

**c.** Write the value of each box in both rows of the bar diagram.


**d.** How many cartons of chocolate milk did the school order?

_____

## On the Back!

**3.** A photocopier can copy 4 pages every 2 seconds. How long will it take to copy 120 pages? Draw a diagram to solve the problem.

Name _____

Build Mathematical Literacy
**5-1**

**Read the problem below. Answer the SQRQCQ questions to help understand the problem.**

Sam is packing gift boxes with fruit. For each apple, he packs 3 plums and 5 oranges. If he puts 3 apples in a box, how many plums and oranges will Sam put in the box? Draw a diagram to solve the problem.

**Survey**

1. What is the problem about?

**Question**

2. What question will be answered by solving the problem?

**Reread**

3. Underline the sentence that describes the ratio.

**Question**

4. Why might a bar diagram be better to use than a double number line diagram to solve the problem?

**Construct**

5. How many boxes will be drawn for apples? plums? oranges? Explain.

**Question**

6. How will the number written in each box of the bar diagram signal that the solution is correct?

Name _____

Additional Vocabulary Support
**5-1**

**Use the vocabulary terms from the list to complete the sentences. Each term may be used more than once.**

| | | | |
|---|---|---|---|
| terms | bar diagram | a part | ratio |
| quantities | double number line diagram | the whole | relationship |

**1.** A _____ shows a _____ between two quantities.

**2.** The two _____ compared in a ratio are called _____.

**3.** At a pet show, there are 5 dogs and 3 cats. The ratio 5 : 3 compares _____ to _____.

**4.** At a vegetable stand, there are 10 tomatoes and 7 cucumbers. The ratio 7 : 17 compares _____ to _____.

**5.** The ratio of cups to plates is $\frac{2}{4}$. The _____ below illustrates this ratio.


**6.** The ratio of plates to cups is 4 : 2. The _____ below illustrates this ratio.

Name _____

Reteach to Build Understanding
**5-2**

Two numbers are **equivalent** if they have the same value. Ratios are equivalent when they show the same relationship.

The table shows equivalent ratios. Each term of the ratio can be multiplied or divided by the same number to find equivalent ratios.

×2 ×3 ×4

| | | | | |
|---|---|---|---|---|
| **Number of Petals** | 5 | 10 | 15 | 20 |
| **Number of Flowers** | 1 | 2 | 3 | 4 |

Bruno correctly answered 4 questions out of every 5 questions on a test.

1. Write the ratio of questions that Bruno answered correctly to the number of questions on the test. _____ : _____

2. Make a table with equivalent ratios to find the number of questions that Bruno answered correctly if there were 45 questions on the test.

×7 ×8 _____

| | | | | |
|---|---|---|---|---|
| **Number of Questions Correct** | 4 | | | |
| **Total Number of Questions** | 5 | | | |

There were _____ questions on the test. So, find the equivalent ratio with 45 as the second term.

3. If there were 45 questions on the test, then Bruno answered _____ questions correctly.

## On the Back!

4. Write three ratios that are equivalent to $\frac{6}{9}$.

Name _____

Build Mathematical Literacy
**5-2**

**Read the problem below. Answer the questions to help understand the problem.**

Three sisters are saving for a special vacation. The ratio of Ada's savings to Ellie's savings is 7 : 3, and the ratio of Ellie's savings to Jasmine's savings is 3 : 4. Together all three girls have saved $56. How much has each girl saved? Complete the table. Explain how the table can be used to solve the problem.

| | | | | |
|---|---|---|---|---|
| **Ada's savings** | $7 | | $21 | |
| **Ellie's savings** | | $6 | | |
| **Jasmine's savings** | $4 | | | $16 |

1. What are the sisters saving for? Is that important information to the problem? Explain.

2. What is another way, in words, to write "The ratio of Ada's savings to Ellie's savings is 7 : 3?"

3. Highlight both ratios given. What is the same about them? How will this information be added to the table?

4. Can it be said that Ada has saved $7, Ellie has saved $3, and Jasmine has saved $4? Use a fact from the problem to justify your answer.

5. Complete the table. Describe the change in savings amounts from left to right in the table.

Name _____

Additional Vocabulary Support
**5-2**

**Each table describes three ratios. Complete the tables, using a different format to write each ratio. Tell whether each ratio represents a part to a part, the whole to a part, or a part to the whole.**

**1.** There are 10 quarters and 5 dimes in a coin bank.

| Ratio in Words | Ratio in Numbers | Type of Ratio |
|---|---|---|
| | 5 to 15 | part to whole |
| Quarters to dimes | 10:5 | |
| Total coins to quarters | | whole to part |

**2.** On an ice hockey team, there are 3 forwards, 2 defensemen, and 1 goalie.

| Ratio in Words | Ratio in Numbers | Type of Ratio |
|---|---|---|
| Forwards to players | | |
| | 6:1 | |
| Defensemen to forwards | | |

**3.** A lemonade recipe calls for 1 cup each of sugar and lemon juice and 8 cups of water.

| Ratio in Words | Ratio in Numbers | Type of Ratio |
|---|---|---|
| Lemonade to lemon juice | | |
| Water to lemon juice | | |
| Lemon juice to sugar | | |

Name _____

Reteach to Build Understanding
**5-3**

**Ratio tables** can be used to compare different ratios. The comparisons can be used to solve problems.

**1.** Printer A prints 15 pages in 3 minutes. Complete the table with equivalent ratios.

| Printer A | | | | | |
|---|---|---|---|---|---|
| **Pages** | 15 | 30 | 45 | 60 | |
| **Time (min)** | 3 | 6 | | | |

Printer B prints 24 pages in 5 minutes. Complete the table with equivalent ratios.

| Printer B | | | | | |
|---|---|---|---|---|---|
| **Pages** | 24 | 48 | 72 | 96 | |
| **Time (min)** | 5 | 10 | | | |

**2.** If printer A and printer B were each used to print continuously for 15 minutes, how many pages would each printer print?

Printer A would print _____ pages in 15 minutes.

Printer B would print _____ pages in 15 minutes.

**3.** Which printer can print more pages in 15 minutes? _____

**4.** How long would it take each printer to print 120 pages?

Printer A would take _____ minutes to print 120 pages.

Printer B would take _____ minutes to print 120 pages.

**5.** Which printer is faster? _____

## On the Back!

**6.** Laine and Maddie are practicing free throws. Laine makes 5 baskets for every 9 shots. Maddie makes 4 baskets for every 6 shots. If each girl attempts 36 shots, which girl makes more baskets? Complete ratio tables to solve.

Name _____

Build Mathematical Literacy
**5-3**

**Read the problem below. Then circle True or False for each statement. When possible, highlight the text that supports any true statements and write the problem number above it.**

In the first week, 2 out of 3 campers were boys. In the second week, 3 out of 5 campers were boys. There were 15 total campers each week. In which week were there more boy campers? Explain.

1. The ratio of boy campers to total campers was 2 : 3 in the first week. **True** **False**

2. The ratio of girl campers to boy campers was 5 : 3 in the second week. **True** **False**

3. There was the same ratio of girl campers to boy campers each week of camp. **True** **False**

4. For every five campers in the second week, three of them were boys. **True** **False**

5. The total number of campers in both weeks was the same. **True** **False**

6. The solution to the problem will tell whether there were more boy campers in the first week or the second week. **True** **False**

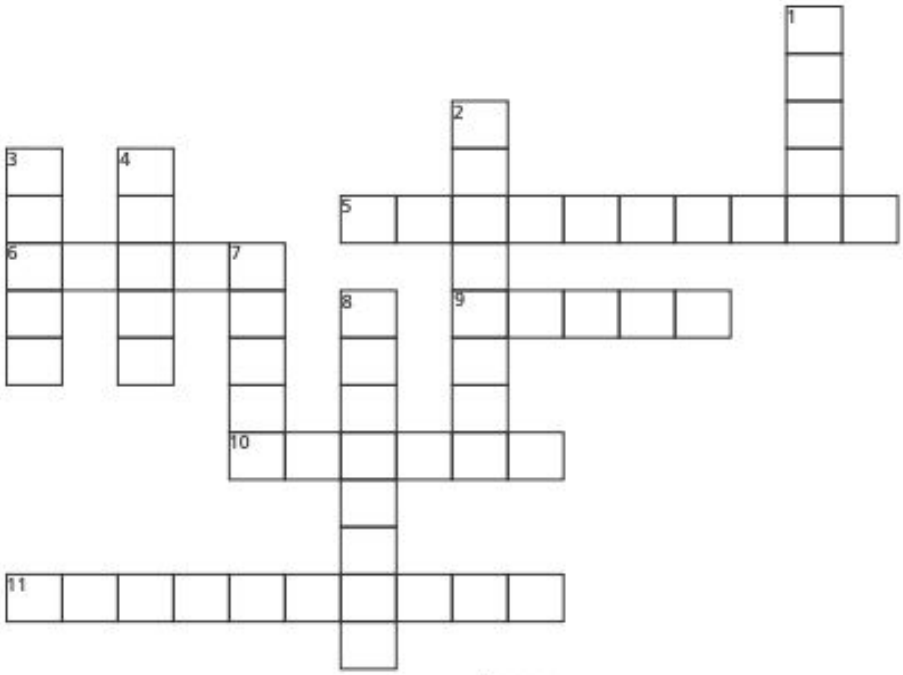
7. Ratio tables cannot be used to explain the problem solution. **True** **False**

Name _____

Additional Vocabulary Support
**5-3**

**Use the list of vocabulary terms to complete the crossword puzzle.**

| | | | | | |
|---|---|---|---|---|---|
| equivalent | fraction | quantities | solve | terms | whole |
| extend | multiply | ratio | table | three | |



**Down**

1. A ratio that compares pets to dogs is the _____ to a part.
2. One way a ratio can be expressed is a(n) _____ .
3. A(n) _____ is a relationship in which for every *x* units of one quantity there are *y* units of another quantity.
4. There are _____ ways to express a ratio.
7. You compare ratios to _____ problems.
8. To find equivalent ratios, _____ both terms of the original ratio by the same nonzero number.

**Across**

5. A ratio is a mathematical way to compare _____.
6. The quantities *x* and *y* in a ratio are called _____.
9. A ratio _____ helps organize the terms of a ratio.
10. _____ ratio tables to identify common terms.
11. The ratios 1 : 2 and 5 : 10 are _____.

Name _____

Reteach to Build Understanding
**5-4**

**Equivalent ratios** show the same relationship. You can multiply each term of a ratio by the same number to find an equivalent ratio.

To find equivalent ratios using a table, use repeated addition or repeated subtraction. The ratios from the table can then be graphed as points on a coordinate plane.

The bank offers Ryo an exchange rate of 5 U.S. dollars for every 4 British pounds.

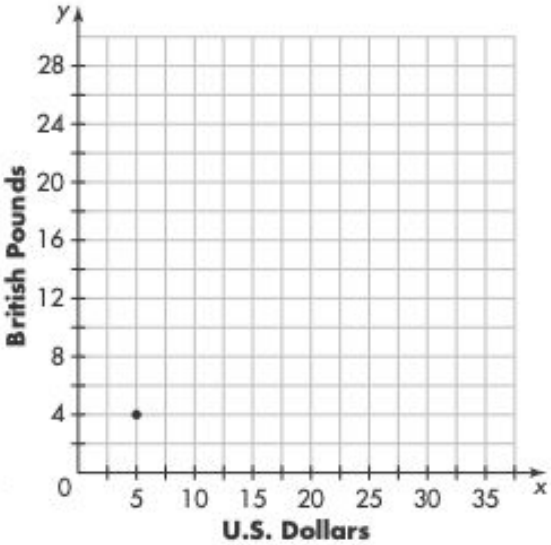
**1.** Complete the table by writing equivalent ratios.

| **U.S. Dollars (*x*)** | **5** | 10 | 15 | 20 | 25 | 30 |
|---|---|---|---|---|---|---|
| **British Pounds (*y*)** | **4** | 8 | | | | |

Based on the table, for 30 U.S. dollars Ryo gets _____ British pounds.

**2.** On the coordinate plane, the ratio of 5 U.S. dollars to 4 British pounds is represented by the point (5, 4).

Plot the remaining pairs of values from the table on the coordinate plane. Draw a dashed line from (0, 0) to the edge of the graph to connect the points.




**3.** How many British pounds can Ryo get for 35 U.S. dollars? Use the line to answer.

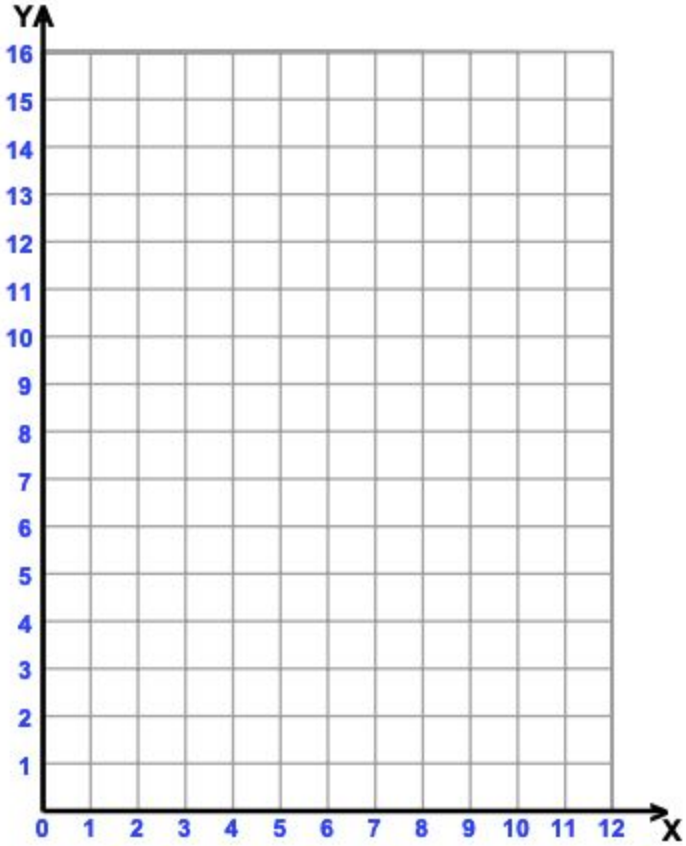
Find _____ on the *x*-axis, and move _____ until you reach your line to find the *y*-value, _____.

Ryo can get _____ British pounds for _____ U.S. dollars.

## On the Back!

**4.** Laura uses 3 balls of yarn to make 5 scarves. If Laura has 15 balls of yarn, how many scarves can she make? Make a table to find equivalent ratios. Then plot the pairs of values on a coordinate plane.

Graph for #4 on Re-teaching



Name _____

Build Mathematical Literacy
**5-4**

**Review Example 2 from the lesson. Answer the questions to help understand how to read an example.**

## EXAMPLE 2 Graph Ratios Using Repeated Addition

ACTIVITY ASSESS

**Jack is making juice. He has 25 celery sticks. If Jack uses all 25 celery sticks, how many apples will he need to make the juice?**


Use repeated addition to complete the ratio table.

For each row in the table, add 5 to the number of celery sticks and add 2 to the number of apples.

| Celery Sticks | Apples |
|---|---|
| 5 | 2 |
| 10 | 4 |
| 15 | 6 |
| 20 | 8 |
| 25 | 10 |

+5 +5 +5 +5 +2 +2 +2 +2

Plot the pairs of values on a coordinate plane.


The point (25, 10) shows that 10 apples are needed for 25 celery sticks.

Jack needs 10 apples to make the juice.

1. Circle each item in the example (text, ratio table, and graph) that represents the basic ratio of celery sticks to apples.

2. What are two ways to solve the problem that are shown in the example?

3. Why do the ratio table and graph stop at 25 celery sticks?

4. Highlight every part of the example that represents the solution to the problem.

5. Is the solution to the problem different when using a different method of solving? Explain.

Name _____

Additional Vocabulary Support
**5-4**

**Use the words, expressions, and equations from the list to complete the graphic organizer about the study of ratios.**

| | | | |
|---|---|---|---|
| division | ratio | equivalent | *x* units |
| $4.00*b* | graph | *y* units | 7 : 11 |
| $2 + 4 = 5 + 1$ | 3 cats to 5 dogs | $\frac{x}{y}$ | relationship |

**Definition**

A _____ is a relationship in which for every _____ of one quantity there are _____ of another quantity.

**Facts**

- Ratios are considered to be _____ if they express the same _____.
- A ratio compares two like or unlike quantities by _____.
- Ratios can be shown visually using a _____ or a ratio table.

**Ratios**

**Examples**

**Nonexamples**

Name _____

Reteach to Build Understanding
**5-5**

A **rate** is a special type of ratio that compares quantities with unlike units of measure.

Amy ran 18 miles in 3 days, which is a rate that can be written as $\frac{18 \text{ miles}}{3 \text{ days}}$.

A **unit rate** is a rate with a denominator of 1 unit.

Four rates are listed below. The unit rates are circled.

$\frac{\$13.20}{6 \text{ pounds}}$ $\frac{7 \text{ quarts}}{1 \text{ car}}$ $\frac{350 \text{ miles}}{7 \text{ hours}}$ $\frac{\$13}{1 \text{ tree}}$

**1.** A baseball team plays 8 games in 2 weeks.

| Games | Weeks |
|---|---|
| 8 | 2 |
| 16 | |
| | |
| | |

**a.** Complete the ratio table to find rates that are equivalent to $\frac{8 \text{ games}}{2 \text{ weeks}}$.

**b.** If the baseball team continues to play games at the same rate, how many weeks will it take for the baseball team to play 32 games? _____

**2.** Elena earns $100 in 4 hours. Write this statement as a rate. $\frac{\$\square}{\square \text{ hours}}$ or $\frac{\square}{\square}$

**3.** How much does Elena earn per hour?

To find the unit rate, start with the rate you wrote in Exercise 2. Divide each term by the denominator so that the denominator is 1.

$$\frac{100}{4} = \frac{\square \div \square}{\square \div 4} = \frac{\square}{\square}$$

Elena earns _____ per _____.

**4.** At this rate, how much money would Elena earn in 16 hours?

To find an equivalent rate, start with the unit rate, which is the amount Elena made in 1 hour. Multiply each term by 16.

$$\frac{\square \times 16}{1 \times \square} = \frac{\square}{\square}$$

In 16 hours, Elena would earn _____.

## On the Back!

**5.** Find the unit rate. $\frac{42 \text{ pages}}{3 \text{ days}}$

Build Mathematical Literacy
**5-5**

Name _____

**Read the problem. Answer the questions to help understand the problem. Tell whether the information used to answer the question was directly stated in the text (DS), implied in the text (I), or based only on previous knowledge (PK).**

A machine takes 1 minute to fill 6 cartons of eggs. At that rate, how long will it take to fill 420 cartons?

1. How long does it take to fill 6 cartons?

2. Highlight the statement in the problem that describes the relationship between the cartons that are filled and the time it takes to fill them. Write the statement as a rate.

3. To solve the problem, would you use a unit rate for 1 carton or a unit rate for 1 minute? Use words from the problem to explain.

4. Does the machine fill each carton in the same amount of time? Explain.

5. What might be a follow-up question for this problem in which the solver would need to find the unit rate for the other unit?

Name _____

Additional Vocabulary Support
**5-5**

**Use the vocabulary terms from the list to complete the sentences.**

| | | | |
|---|---|---|---|
| unit rate | ratio | rate | numerator |
| denominator | equivalent ratios | unit | graph |

1. A _____ is a special type of ratio that compares quantities with unlike units of measure.

2. In a fraction, the value that represents the number of parts as compared to the whole is the _____.

3. A quantity, such as foot or gallon, chosen as a standard in which other quantities may be expressed is a _____.

4. A _____ is a comparison of two like or unlike quantities by division.

5. In the fraction $\frac{2}{3}$, the number 3 represents the _____ of the fraction or the number of parts that the whole is divided into.

6. _____ name the same comparison.

7. In mathematics, a _____ is the ratio of two measurements in which the second quantity in the comparison is 1 unit.

8. A _____ is a mathematical tool that is used to visually represent the relationship between quantities.

Name _____

Reteach to Build Understanding
**5-6**

A unit rate is a rate in which the comparison is to 1 unit.

Daniel painted 22 wooden planks in 11 minutes.
Divide to find Daniel's unit rate.

$$\frac{22 \text{ planks} \div 11}{11 \text{ min} \div 11} = \frac{2 \text{ planks}}{1 \text{ min}}$$

Daniel's unit rate is 2 planks per minute.

A **unit price** is a unit rate that gives the price of 1 item.

Tickets are sold in sheets of 24 for $6.

To find the unit price, or the cost of 1 ticket, divide the price by the number of tickets.

$6 ÷ 24 tickets = $0.25 per ticket

**1.** Earl and Mia danced in a charity fundraiser. Earl raised $275 when he danced for 5 hours. Mia raised $376 when she danced for 8 hours. Write each rate as a fraction.

Earl: $\frac{\$\square}{\square \text{ hours}}$ Mia: $\frac{\$\square}{\square \text{ hours}}$

**2.** How much money did each dancer raise in 1 hour? Find each unit rate.

Earl raised _____ in one hour.

Mia raised _____ in one hour.

Earl: $\frac{275 \div \square}{\square \div 5} = \frac{\square}{\square}$ Mia: $\frac{\square \div \square}{\square \div 8} = \frac{\square}{\square}$

**3.** Which dancer raised more more money per hour?

Complete the statement below and use < or > to compare Earl's and Mia's earnings per hour.

Earl Mia

$\square$ ○ $\square$; _____ raised more money per hour.

## On the Back!

**4.** Compare the unit prices to find which is the better deal.

6 songs for $8 or 10 songs for $12

Name _____

Build Mathematical Literacy
**5-6**

**Read the problem. Answer the questions to help understand the problem.**

Car A travels 115 miles on 5 gallons of gas. Car B travels 126 miles on 6 gallons of gas. How can you find which car gets better gas mileage?

1. Which skill is the main focus of the problem?

   Ⓐ ordering  Ⓑ comparing  Ⓒ dividing  Ⓓ subtracting

2. Can the question be answered by simply comparing the number of miles car A travels to the number of miles car B travels? Explain.

3. What does "gas mileage" mean?

4. How can the gas mileage of each car be calculated?

5. What type of ratio is gas mileage? Explain.

6. Is it necessary to calculate the gas mileage of each car to answer the question? Explain.

Name _____

Additional Vocabulary Support
**5-6**

**Draw a line from each vocabulary term on the left to either an example of the term or its definition on the right.**

**1.** Equivalent ratios

a ratio that compares quantities with unlike units of measure

**2.** Unit

$\frac{5 \text{ miles}}{1 \text{ week}}$ and $\frac{10 \text{ miles}}{2 \text{ weeks}}$

**3.** Unit price

a relationship in which for every *x* units of one quantity there are *y* units of another quantity

**4.** Rate

a rate that gives the price of one item

**5.** Ratio

the quantities *x* and *y* in a ratio

**6.** Ratio table

foot, dollar, gallon

**7.** Terms

| Field Trip | |
|---|---|
| **Number of Students** | **Number of Chaperones** |
| 20 | 4 |
| 40 | 8 |
| 60 | 12 |
| 80 | 16 |

Name _____

Reteach to Build Understanding
**5-7**

If an object travels at a **constant speed**, then its speed stays the same over time.

A train travels at a constant speed of 68 miles per hour. The table shows how far the train travels after 1 hour, 2 hours, and 3 hours.

| Time (h) | Distance (mi) |
|---|---|
| 1 | $68 \times 1 = 68$ |
| 2 | $68 \times 2 = 136$ |
| 3 | $68 \times 3 = 204$ |

A unit price is a unit rate that gives the price of 1 item.

Write the price of the cereal as a rate. $\frac{\$2.88}{32 \text{ oz}}$

Divide to find the unit price: \$0.09 per ounce.

**1.** A cruise ship travels at a constant speed. In 3 hours, the ship travels 72 nautical miles. If the ship continues to travel at the same rate, how far would it travel in 11 hours?

**a.** How far does the ship travel in 1 hour? Find the ship's unit rate of speed.

The ship travels _____ nautical miles in 1 _____.

**b.** At this rate, how far would the ship travel in 11 hours? Find an equivalent rate.

In 11 hours, the ship would travel _____ nautical miles.

**2.** Noah spent \$66 for 20 gallons of gasoline. Lydia spent \$81.25 for 25 gallons of gasoline. Which person got the better buy?

**a.** How much did each person spend for 1 gallon of gasoline?

Noah: _____ Lydia: _____

**b.** _____ spent less money per gallon than _____ did, so she got the better buy.

## On the Back!

**3.** A thunderstorm travels at a constant speed. In 15 minutes, the storm travels 12 miles. If the storm continues to travel at the same rate, how far would it travel in 90 minutes?

Build Mathematical Literacy
**5-7**

Name _____

**Read the problem below. Answer the questions to help understand the problem.**

On a family vacation, Amy's dad drove the car at a constant speed and traveled 585 miles in 13 hours. At this rate, how long would it have taken the family to travel 810 miles? What was the car's rate of speed?

1. Highlight the words that describe the given rate.

2. Write the rate in a fractional form, including the units.

3. Underline the questions in the problem. What two answers will be found by solving this problem?

4. Which answer should be found first? Explain.

5. Describe how to find the unit rate. What does the answer represent?

Name _____

Additional Vocabulary Support
**5-7**

**Write a definition and an example for each vocabulary term.**

| | Word or Phrase | Definition | Example |
|---|---|---|---|
| **1.** | constant speed | | |
| **2.** | unit price | | |
| **3.** | rate | | |
| **4.** | unit | | |
| **5.** | equivalent ratios | | |
| **6.** | unit rate | | |

# Answer Keys

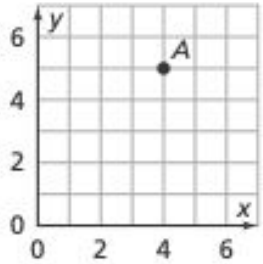
Name _____

Topic **5**
Readiness Assessment

**1.** Round the value 16.758 to the nearest hundredth.

Ⓐ 16.75
Ⓑ 16.76
Ⓒ 16.8
Ⓓ 17.0

**2.** Which coordinate pair correctly identifies the location of point *A*?




Ⓐ (5, 4)
Ⓑ (4, 6)
Ⓒ (4, 5)
Ⓓ (4, 4)

**3.** Jordan paid $682 for 124 cupcakes that each cost the same amount. Find the price of one cupcake.

Ⓐ $5.05
Ⓑ $5.50
Ⓒ $6.05
Ⓓ $6.50

**4.** Solve the equation for $x$: $126 = 3x$.

Ⓐ $x = 378$
Ⓑ $x = 129$
Ⓒ $x = 123$
Ⓓ $x = 42$

**5.** Cenisa ran 1 kilometer. How many meters did she run?

Ⓐ 10,000 meters
Ⓑ 1,000 meters
Ⓒ 100 meters
Ⓓ 10 meters

**6.** Which equation represents the pattern shown in the table below?

| ***x*** | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| ***y*** | 4 | 5 | 6 | 7 |

Ⓐ $y = x + 2$
Ⓑ $y = x + 1$
Ⓒ $y = 3x$
Ⓓ $y = x - 1$

**7.** Mateo finds a special on apples for $0.80 per pound. Which price is a better deal?

Ⓐ $0.78 per pound

Ⓑ $0.85 per pound

Ⓒ $0.90 per pound

Ⓓ $1.25 per pound

---

**8.** Which value is the solution of the equation $8r = 536$?

Ⓐ 63

Ⓑ 64

Ⓒ 67

Ⓓ 72

---

**9.** Kaitlyn buys 3 T-shirts for $14.95 each. What is the total cost?

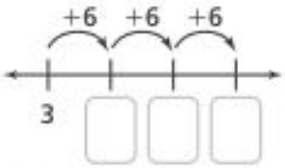
Ⓐ $ 42.95

Ⓑ $ 43.85

Ⓒ $ 44.85

Ⓓ $ 45.00

**10.** Determine the next three points on the number line.




Ⓐ 9, 15, 21

Ⓑ 6, 12, 18

Ⓒ 9, 14, 20

Ⓓ 10, 16, 22

---

**11.** Which measure is equivalent to 4 feet 5 inches?

Ⓐ 53 inches

Ⓑ 50 inches

Ⓒ 45 inches

Ⓓ 4.5 inches

---

**12.** Akikta bought 25 trees for $15.40 each. Chloe bought 35 trees for $14.30 each. What was the difference between the total amounts that the girls paid for the trees?

Ⓐ $1.10

Ⓑ $50.00

Ⓒ $115.50

Ⓓ $150.05

GET READY! TOPIC 5

# Review What You Know!

## Vocabulary

**Choose the best term from the box to complete each definition.**

common factor
common multiple
equivalent fractions
fraction

1. Fractions that name the same amount are called equivalent fractions.
2. The number 3 is a common factor of 9 and 12.
3. A number that can be used to describe a part of a set or a part of a whole is a(n) fraction.

## Equivalent Fractions

**Write two fractions equivalent to the given fraction.** Sample answers shown.

4. $\frac{3}{4}$ $\frac{6}{8}$, $\frac{9}{12}$
5. $\frac{7}{8}$ $\frac{14}{16}$, $\frac{21}{24}$
6. $\frac{12}{5}$ $\frac{24}{10}$, $\frac{120}{50}$
7. $\frac{1}{2}$ $\frac{2}{4}$, $\frac{3}{6}$
8. $\frac{8}{9}$ $\frac{16}{18}$, $\frac{24}{27}$
9. $\frac{2}{3}$ $\frac{6}{9}$, $\frac{8}{12}$

## Equations

**Write an equation that represents the pattern in each table.** Sample answers shown.

10.

| $x$ | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| $y$ | 16 | 24 | 32 | 40 | 48 |

$y = 8x$

11.

| $x$ | 2 | 4 | 6 | 8 | 10 |
|---|---|---|---|---|---|
| $y$ | 5 | 7 | 9 | 11 | 13 |

$y = x + 3$

## Units of Measure

**Choose the best unit of measure by writing *inch, foot, yard, ounce, pound, ton, cup, quart,* or *gallon*.**

12. serving of trail mix cup
13. height of a person foot or inch
14. weight of a newborn kitten ounce
15. gasoline gallon

## Measurement Conversions

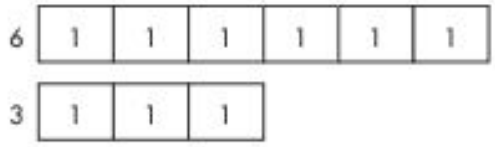
16. Michael is 4 feet tall. Explain how Michael could find his height in inches. Then explain how he could find his height in yards.
Sample answer: Because there are 12 inches in 1 foot, multiply 4 by 12 to find Michael's height in inches. Because there are 3 feet in 1 yard, divide 4 by 3 to find Michael's height in yards.

Name _____

Reteach to Build Understanding
**5-1**

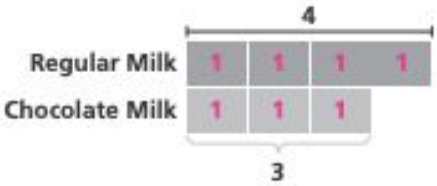
A **ratio** is a comparison of two numbers or the number of items in two groups. Each quantity in a ratio is called a **term**. Ratios can be written with the word "to" separating the terms ($a$ to $b$), with a colon separating the terms ($a:b$), or in fraction form $\left(\frac{a}{b}\right)$.

The ratio 6:3 can be modeled using a **bar diagram** with a row of 6 equal boxes and a row of 3 equal boxes as shown on the right.

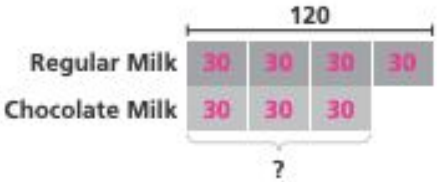



1. The chorus at an elementary school is made up of fifth and sixth graders. This year, the chorus has 12 fifth-grade girls, 9 fifth-grade boys, 14 sixth-grade girls, and 10 sixth-grade boys.
   a. The ratio of girls to boys is 26 to 19.
   b. The ratio of fifth graders to sixth graders is 21 : 24.
   c. The ratio of girls to the total number of students in the chorus is $\frac{26}{45}$.

2. The school cafeteria orders 4 cartons of regular milk for every 3 cartons of chocolate milk.
   a. Complete the bar diagram to show the ratio.




   b. The school ordered 120 cartons of regular milk. Divide 120 cartons of regular milk by 4 because there are 4 boxes in the top row.
   c. Write the value of each box in both rows of the bar diagram.




   d. How many cartons of chocolate milk did the school order?
   **90 cartons of chocolate milk**

**On the Back!**

3. A photocopier can copy 4 pages every 2 seconds. How long will it take to copy 120 pages? Draw a diagram to solve the problem.
**60 seconds; Check students' diagrams.**

Name _____

Build Mathematical Literacy
**5-1**

**Read the problem below. Answer the SQRQCQ questions to help understand the problem.**

Sam is packing gift boxes with fruit. For each apple, he packs 3 plums and 5 oranges. If he puts 3 apples in a box, how many plums and oranges will Sam put in the box? Draw a diagram to solve the problem.

**Survey**

1. What is the problem about?

   **Sample answer: Packing a certain number of each type of fruit in a gift box**

**Question**

2. What question will be answered by solving the problem?

   **How many plums and oranges will Sam put in the box?**

**Reread**

3. Underline the sentence that describes the ratio.

   **Check students' work.**

**Question**

4. Why might a bar diagram be better to use than a double number line diagram to solve the problem?

   **Sample answer: A bar diagram is better because the problem is about packing fruit into boxes and a bar diagram uses boxes to show the number of items. Also, the pictures of the fruit in the problem are arranged in ratio order like the bar diagram boxes will be.**

**Construct**

5. How many boxes will be drawn for apples? plums? oranges? Explain.

   **1; 3; 5; Sample answer: The ratio of fruit to be packed in a gift box is given as "for each apple, he packs 3 plums and 5 oranges."**

**Question**

6. How will the number written in each box of the bar diagram signal that the solution is correct?

   **Sample answer: When the solution is correct, the same number will be written in each box in the bar diagram.**

Name _____

Additional Vocabulary Support
**5-1**

**Use the vocabulary terms from the list to complete the sentences. Each term may be used more than once.**

| | | | |
|---|---|---|---|
| terms | bar diagram | a part | ratio |
| quantities | double number line diagram | the whole | relationship |

1. A ratio shows a relationship between two quantities.

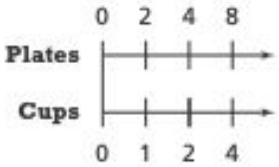
2. The two quantities compared in a ratio are called terms.

3. At a pet show, there are 5 dogs and 3 cats. The ratio 5 : 3 compares a part to a part.

4. At a vegetable stand, there are 10 tomatoes and 7 cucumbers. The ratio 7 : 17 compares a part to the whole.

5. The ratio of cups to plates is $\frac{2}{4}$. The bar diagram below illustrates this ratio.


6. The ratio of plates to cups is 4 : 2. The double number line diagram below illustrates this ratio.



Name _____

Reteach to Build Understanding
**5-2**

Two numbers are **equivalent** if they have the same value. Ratios are equivalent when they show the same relationship.

The table shows equivalent ratios. Each term of the ratio can be multiplied or divided by the same number to find equivalent ratios.

×4 ×3 ×2

| | | | | |
|---|---|---|---|---|
| **Number of Petals** | 5 | 10 | 15 | 20 |
| **Number of Flowers** | 1 | 2 | 3 | 4 |

Bruno correctly answered 4 questions out of every 5 questions on a test.

1. Write the ratio of questions that Bruno answered correctly to the number of questions on the test. 4 : 5

2. Make a table with equivalent ratios to find the number of questions that Bruno answered correctly if there were 45 questions on the test.

×9 ×8 ×7

| | | | | |
|---|---|---|---|---|
| **Number of Questions Correct** | 4 | 28 | 32 | 36 |
| **Total Number of Questions** | 5 | 35 | 40 | 45 |

There were 45 questions on the test. So, find the equivalent ratio with 45 as the second term.

3. If there were 45 questions on the test, then Bruno answered 36 questions correctly.

**On the Back!**

4. Write three ratios that are equivalent to $\frac{6}{9}$.

**Sample answer:** $\frac{2}{3}$, $\frac{12}{18}$, $\frac{18}{27}$

Name _____

Build Mathematical Literacy
**5-2**

**Read the problem below. Answer the questions to help understand the problem.**

Three sisters are saving for a special vacation. The ratio of Ada's savings to Ellie's savings is 7 : 3, and the ratio of Ellie's savings to Jasmine's savings is 3 : 4. Together all three girls have saved $56. How much has each girl saved? Complete the table. Explain how the table can be used to solve the problem.

| | | | | |
|---|---|---|---|---|
| **Ada's savings** | $7 | **$14** | $21 | **$28** |
| **Ellie's savings** | **$3** | $6 | **$9** | **$12** |
| **Jasmine's savings** | $4 | **$8** | **$12** | $16 |

1. What are the sisters saving for? Is that important information to the problem? Explain.
   **A special vacation; No; Sample answer: The reason they are saving money does not give any clues to how much they have saved.**
2. What is another way, in words, to write "The ratio of Ada's savings to Ellie's savings is 7 : 3?"
   **Sample answer: For every seven dollars Ada has saved, Ellie has saved three dollars.**
3. Highlight both ratios given. What is the same about them? How will this information be added to the table?
   **Check students' work. Sample answer: Both ratios refer to Ellie's savings (3); $3 should be written in the first column for Ellie's savings.**
4. Can it be said that Ada has saved $7, Ellie has saved $3, and Jasmine has saved $4? Use a fact from the problem to justify your answer.
   **No; Sample answer: The problem states that "together, all three girls have saved $56," and $7 + $3 + $4 is only $14.**
5. Complete the table. Describe the change in savings amounts from left to right in the table.
   **Sample answer: Each sister's savings will increase by a different constant amount.**

Name _____

Additional Vocabulary Support
**5-2**

**Each table describes three ratios. Complete the tables, using a different format to write each ratio. Tell whether each ratio represents a part to a part, the whole to a part, or a part to the whole.**

**1.** There are 10 quarters and 5 dimes in a coin bank.

| Ratio in Words | Ratio in Numbers | Type of Ratio |
|---|---|---|
| **Dimes to total coins** | 5 to 15 | part to whole |
| Quarters to dimes | 10:5 | **part to part** |
| Total coins to quarters | $\frac{15}{10}$ | whole to part |

**2.** On an ice hockey team, there are 3 forwards, 2 defensemen, and 1 goalie.

| Ratio in Words | Ratio in Numbers | Type of Ratio |
|---|---|---|
| Forwards to players | **3 to 6** | **part to whole** |
| **Players to goalies** | 6:1 | **whole to part** |
| Defensemen to forwards | $\frac{2}{3}$ | **part to part** |

**3.** A lemonade recipe calls for 1 cup each of sugar and lemon juice and 8 cups of water.

| Ratio in Words | Ratio in Numbers | Type of Ratio |
|---|---|---|
| Lemonade to lemon juice | **10 to 1** | **whole to part** |
| Water to lemon juice | **8:1** | **part to part** |
| Lemon juice to sugar | $\frac{1}{1}$ | **part to part** |

Name _____

Reteach to Build Understanding
**5-3**

**Ratio tables** can be used to compare different ratios. The comparisons can be used to solve problems.

**1.** Printer A prints 15 pages in 3 minutes. Complete the table with equivalent ratios.

| Printer A | | | | | |
|---|---|---|---|---|---|
| **Pages** | 15 | 30 | 45 | 60 | 75 |
| **Time (min)** | 3 | 6 | 9 | 12 | 15 |

Printer B prints 24 pages in 5 minutes. Complete the table with equivalent ratios.

| Printer B | | | | | |
|---|---|---|---|---|---|
| **Pages** | 24 | 48 | 72 | 96 | 120 |
| **Time (min)** | 5 | 10 | 15 | 20 | 25 |

**2.** If printer A and printer B were each used to print continuously for 15 minutes, how many pages would each printer print?

Printer A would print 75 pages in 15 minutes.

Printer B would print 72 pages in 15 minutes.

**3.** Which printer can print more pages in 15 minutes? Printer A

**4.** How long would it take each printer to print 120 pages?

Printer A would take 24 minutes to print 120 pages.

Printer B would take 25 minutes to print 120 pages.

**5.** Which printer is faster? Printer A

**On the Back!** Maddie; Check students' tables.

**6.** Laine and Maddie are practicing free throws. Laine makes 5 baskets for every 9 shots. Maddie makes 4 baskets for every 6 shots. If each girl attempts 36 shots, which girl makes more baskets? Complete ratio tables to solve.

Name _____

Build Mathematical Literacy
**5-3**

**Read the problem below. Then circle True or False for each statement. When possible, highlight the text that supports any true statements and write the problem number above it.**

**Check students' work.**

In the first week, 2 out of 3 campers were boys. In the second week, 3 out of 5 campers were boys. There were 15 total campers each week. In which week were there more boy campers? Explain.

1. The ratio of boy campers to total campers was 2 : 3 in the first week. **True** **False**

2. The ratio of girl campers to boy campers was 5 : 3 in the second week. **True** **False**

3. There was the same ratio of girl campers to boy campers each week of camp. **True** **False**

4. For every five campers in the second week, three of them were boys. **True** **False**

5. The total number of campers in both weeks was the same. **True** **False**

6. The solution to the problem will tell whether there were more boy campers in the first week or the second week. **True** **False**

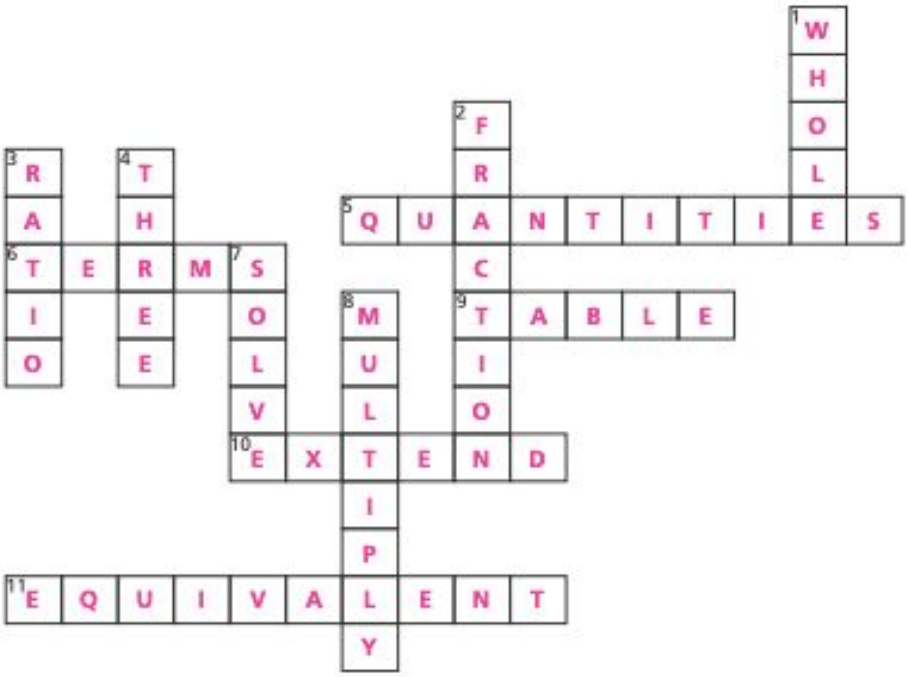
7. Ratio tables cannot be used to explain the problem solution. **True** **False**

Name _____

Additional Vocabulary Support
**5-3**

**Use the list of vocabulary terms to complete the crossword puzzle.**

| | | | | | |
|---|---|---|---|---|---|
| equivalent | fraction | quantities | solve | terms | whole |
| extend | multiply | ratio | table | three | |




**Down**

1. A ratio that compares pets to dogs is the _____ to a part.
2. One way a ratio can be expressed is a(n) _____ .
3. A(n) _____ is a relationship in which for every *x* units of one quantity there are *y* units of another quantity.
4. There are _____ ways to express a ratio.
7. You compare ratios to _____ problems.
8. To find equivalent ratios, _____ both terms of the original ratio by the same nonzero number.

**Across**

5. A ratio is a mathematical way to compare _____.
6. The quantities *x* and *y* in a ratio are called _____.
9. A ratio _____ helps organize the terms of a ratio.
10. _____ ratio tables to identify common terms.
11. The ratios 1 : 2 and 5 : 10 are _____.

Name _____

Reteach to Build Understanding
**5-4**

**Equivalent ratios** show the same relationship. You can multiply each term of a ratio by the same number to find an equivalent ratio.

To find equivalent ratios using a table, use repeated addition or repeated subtraction. The ratios from the table can then be graphed as points on a coordinate plane.

The bank offers Ryo an exchange rate of 5 U.S. dollars for every 4 British pounds.

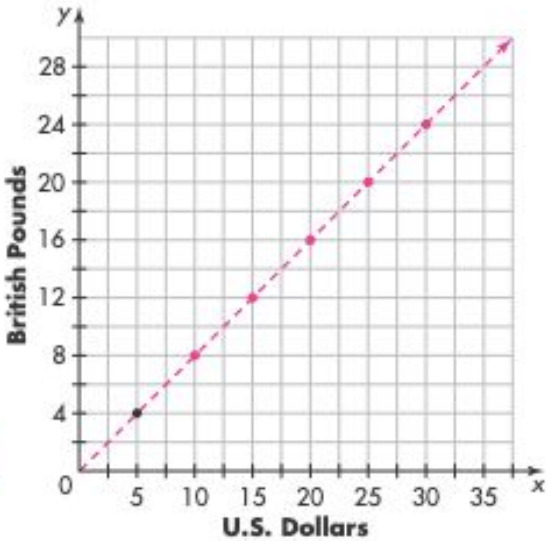
**1.** Complete the table by writing equivalent ratios.

| **U.S. Dollars ($x$)** | **5** | 10 | 15 | 20 | 25 | 30 |
|---|---|---|---|---|---|---|
| **British Pounds ($y$)** | **4** | 8 | **12** | **16** | **20** | **24** |

Based on the table, for 30 U.S. dollars Ryo gets **24** British pounds.

**2.** On the coordinate plane, the ratio of 5 U.S. dollars to 4 British pounds is represented by the point (5, 4).

Plot the remaining pairs of values from the table on the coordinate plane. Draw a dashed line from (0, 0) to the edge of the graph to connect the points.




**3.** How many British pounds can Ryo get for 35 U.S. dollars? Use the line to answer.

Find **35** on the $x$-axis, and move **up** until you reach your line to find the $y$-value, **28**.

Ryo can get **28** British pounds for **35** U.S. dollars.

**On the Back!** **25 scarves; Check students' tables and graphs.**

**4.** Laura uses 3 balls of yarn to make 5 scarves. If Laura has 15 balls of yarn, how many scarves can she make? Make a table to find equivalent ratios. Then plot the pairs of values on a coordinate plane.

Name _____

Build Mathematical Literacy
**5-4**

**Review Example 2 from the lesson. Answer the questions to help understand how to read an example.**

## EXAMPLE 2 Graph Ratios Using Repeated Addition

**Jack is making juice. He has 25 celery sticks. If Jack uses all 25 celery sticks, how many apples will he need to make the juice?**

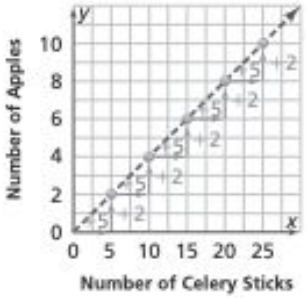

Use repeated addition to complete the ratio table.

For each row in the table, add 5 to the number of celery sticks and add 2 to the number of apples.

| Celery Sticks | Apples |
|---|---|
| 5 | 2 |
| 10 | 4 |
| 15 | 6 |
| 20 | 8 |
| 25 | 10 |

+5 +5 +5 +5 +2 +2 +2 +2

Plot the pairs of values on a coordinate plane.




The point (25, 10) shows that 10 apples are needed for 25 celery sticks.

Jack needs 10 apples to make the juice.

1. Circle each item in the example (text, ratio table, and graph) that represents the basic ratio of celery sticks to apples.
   **Check students' work.**
2. What are two ways to solve the problem that are shown in the example?
   **Sample answer: Using repeated addition in a ratio table and using repeated addition on a graph**
3. Why do the ratio table and graph stop at 25 celery sticks?
   **Sample answer: The problem states that Jack has only 25 celery sticks.**
4. Highlight every part of the example that represents the solution to the problem.
   **Check students' work.**
5. Is the solution to the problem different when using a different method of solving? Explain.
   **No; Sample answer: The answer will be the same no matter which method is used because the basic ratio stays the same.**

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Additional Vocabulary Support
**5-4**

**Use the words, expressions, and equations from the list to complete the graphic organizer about the study of ratios.**

| | | | |
|---|---|---|---|
| division | ratio | equivalent | *x* units |
| $4.00*b* | graph | *y* units | 7:11 |
| $2 + 4 = 5 + 1$ | 3 cats to 5 dogs | $\frac{x}{y}$ | relationship |

**Definition**

A **ratio** is a relationship in which for every ***x* units** of one quantity there are ***y* units** of another quantity.

**Facts**

- Ratios are considered to be **equivalent** if they express the same **relationship**.
- A ratio compares two like or unlike quantities by **division**.
- Ratios can be shown visually using a **graph** or a ratio table.

**Ratios**

**Examples**

**3 cats to 5 dogs**
**7:11**
$\frac{x}{y}$

**Nonexamples**

**$2 + 4 = 5 + 1$**
**$4.00*b***

Name _____

Retoach to Build Understanding
**5-5**

A **rate** is a special type of ratio that compares quantities with unlike units of measure.

Amy ran 18 miles in 3 days, which is a rate that can be written as $\frac{18 \text{ miles}}{3 \text{ days}}$.

A **unit rate** is a rate with a denominator of 1 unit.

Four rates are listed below. The unit rates are circled.

$\frac{\$13.20}{6 \text{ pounds}}$ $\frac{7 \text{ quarts}}{1 \text{ car}}$ $\frac{350 \text{ miles}}{7 \text{ hours}}$ $\frac{\$13}{1 \text{ tree}}$

**1.** A baseball team plays 8 games in 2 weeks.

**a.** Complete the ratio table to find rates that are equivalent to $\frac{8 \text{ games}}{2 \text{ weeks}}$.

| Games | Weeks |
|---|---|
| 8 | 2 |
| 16 | 4 |
| 24 | 6 |
| 32 | 8 |

**b.** If the baseball team continues to play games at the same rate, how many weeks will it take for the baseball team to play 32 games? **8 weeks**

**2.** Elena earns $100 in 4 hours. Write this statement as a rate. $\frac{\$100}{4 \text{ hours}}$ or $\frac{100}{4}$

**3.** How much does Elena earn per hour?

To find the unit rate, start with the rate you wrote in Exercise 2. Divide each term by the denominator so that the denominator is 1.

$$\frac{100}{4} = \frac{100 \div 4}{4 \div 4} = \frac{25}{1}$$

Elena earns **$25** per **hour**.

**4.** At this rate, how much money would Elena earn in 16 hours?

To find an equivalent rate, start with the unit rate, which is the amount Elena made in 1 hour. Multiply each term by 16.

$$\frac{25 \times 16}{1 \times 16} = \frac{400}{16}$$

In 16 hours, Elena would earn **$400**.

## On the Back!

**5.** Find the unit rate. $\frac{42 \text{ pages}}{3 \text{ days}}$

$$\frac{42 \text{ pages} \div 3}{3 \text{ days} \div 3} = \frac{14 \text{ pages}}{1 \text{ day}}$$

Name _____

Build Mathematical Literacy
**5-5**

**Read the problem. Answer the questions to help understand the problem. Tell whether the information used to answer the question was directly stated in the text (DS), implied in the text (I), or based only on previous knowledge (PK).**

A machine takes 1 minute to fill 6 cartons of eggs. At that rate, how long will it take to fill 420 cartons?

1. How long does it take to fill 6 cartons?
   **1 minute; (DS)**

2. Highlight the statement in the problem that describes the relationship between the cartons that are filled and the time it takes to fill them. Write the statement as a rate.
   **Check students' work; $\frac{6 \text{ cartons}}{1 \text{ minute}}$; (DS)**

3. To solve the problem, would you use a unit rate for 1 carton or a unit rate for 1 minute? Use words from the problem to explain.
   **Unit rate for 1 carton; Sample answer: Because the question asks how long it will take to fill 420 cartons, you need to find out how long it will take to fill one carton and then multiply that time by 420.; (I)**

4. Does the machine fill each carton in the same amount of time? Explain.
   **Sample answer: Yes, because the text calls the number of cartons filled in a certain amount of time a "rate."; (I)**

5. What might be a follow-up question for this problem in which the solver would need to find the unit rate for the other unit?
   **Sample answer: How many cartons can the machine fill in 45 minutes?; (PK)**

Name _____

Additional Vocabulary Support
**5-5**

**Use the vocabulary terms from the list to complete the sentences.**

| | | | |
|---|---|---|---|
| unit rate | ratio | rate | numerator |
| denominator | equivalent ratios | unit | graph |

1. A ___rate___ is a special type of ratio that compares quantities with unlike units of measure.

2. In a fraction, the value that represents the number of parts as compared to the whole is the ___numerator___.

3. A quantity, such as foot or gallon, chosen as a standard in which other quantities may be expressed is a ___unit___.

4. A ___ratio___ is a comparison of two like or unlike quantities by division.

5. In the fraction $\frac{2}{3}$, the number 3 represents the ___denominator___ of the fraction or the number of parts that the whole is divided into.

6. ___Equivalent ratios___ name the same comparison.

7. In mathematics, a ___unit rate___ is the ratio of two measurements in which the second quantity in the comparison is 1 unit.

8. A ___graph___ is a mathematical tool that is used to visually represent the relationship between quantities.

Name _____

Reteach to Build Understanding
**5-6**

A unit rate is a rate in which the comparison is to 1 unit.

Daniel painted 22 wooden planks in 11 minutes.
Divide to find Daniel's unit rate.

$$\frac{22 \text{ planks} \div 11}{11 \text{ min} \div 11} = \frac{2 \text{ planks}}{1 \text{ min}}$$

Daniel's unit rate is 2 planks per minute.

A **unit price** is a unit rate that gives the price of 1 item.

Tickets are sold in sheets of 24 for $6.

To find the unit price, or the cost of 1 ticket, divide the price by the number of tickets.

$6 ÷ 24 tickets = $0.25 per ticket

**1.** Earl and Mia danced in a charity fundraiser. Earl raised $275 when he danced for 5 hours. Mia raised $376 when she danced for 8 hours. Write each rate as a fraction.

Earl: $\frac{\$275}{5 \text{ hours}}$ Mia: $\frac{\$376}{8 \text{ hours}}$

**2.** How much money did each dancer raise in 1 hour? Find each unit rate.

Earl raised **$55** in one hour.

Mia raised **$47** in one hour.

Earl: $\frac{275 \div 5}{5 \div 5} = \frac{55}{1}$

Mia: $\frac{376 \div 8}{8 \div 8} = \frac{47}{1}$

**3.** Which dancer raised more money per hour?

Complete the statement below and use < or > to compare Earl's and Mia's earnings per hour.

Earl **$55** > Mia **$47**; **Earl** raised more money per hour.

## On the Back!

**4.** Compare the unit prices to find which is the better deal.

6 songs for $8 or 10 songs for $12

$\frac{\$8}{6 \text{ songs}}$ = **$1.33 per song,** $\frac{\$12}{10 \text{ songs}}$ = **$1.20 per song; 10 songs for $12**

Name _____

Build Mathematical Literacy
**5-6**

**Read the problem. Answer the questions to help understand the problem.**

Car A travels 115 miles on 5 gallons of gas. Car B travels 126 miles on 6 gallons of gas. How can you find which car gets better gas mileage?

1. Which skill is the main focus of the problem?

   Ⓐ ordering  Ⓑ comparing  Ⓒ dividing  Ⓓ subtracting

2. Can the question be answered by simply comparing the number of miles car A travels to the number of miles car B travels? Explain.

   **No; Sample answer: To determine which car gets the better gas mileage, you also need to consider the amount of gas that was used.**

3. What does "gas mileage" mean?

   **The number of miles a car can travel on 1 gallon of gas**

4. How can the gas mileage of each car be calculated?

   **Divide the number of miles each car traveled by the number of gallons it took to travel that distance.**

5. What type of ratio is gas mileage? Explain.

   **A unit rate; Sample answer: Because gas mileage compares a quantity (number of miles) to 1 unit of another quantity (gallons of gas), it is a unit rate.**

6. Is it necessary to calculate the gas mileage of each car to answer the question? Explain.

   **No; Sample answer: The question does not ask which car gets better gas mileage; it only asks how you can find which car gets better gas mileage.**

Name _____

Additional Vocabulary Support
**5-6**

**Draw a line from each vocabulary term on the left to either an example of the term or its definition on the right.**

1. Equivalent ratios
2. Unit
3. Unit price
4. Rate
5. Ratio
6. Ratio table
7. Terms

a ratio that compares quantities with unlike units of measure

$\frac{5 \text{ miles}}{1 \text{ week}}$ and $\frac{10 \text{ miles}}{2 \text{ weeks}}$

a relationship in which for every *x* units of one quantity there are *y* units of another quantity

a rate that gives the price of one item

the quantities *x* and *y* in a ratio

foot, dollar, gallon

| Field Trip | |
|---|---|
| **Number of Students** | **Number of Chaperones** |
| 20 | 4 |
| 40 | 8 |
| 60 | 12 |
| 80 | 16 |

Name _____

Reteach to Build Understanding
**5-7**

If an object travels at a **constant speed**, then its speed stays the same over time.

A train travels at a constant speed of 68 miles per hour. The table shows how far the train travels after 1 hour, 2 hours, and 3 hours.

| Time (h) | Distance (mi) |
|---|---|
| 1 | $68 \times 1 = 68$ |
| 2 | $68 \times 2 = 136$ |
| 3 | $68 \times 3 = 204$ |

A unit price is a unit rate that gives the price of 1 item.

Write the price of the cereal as a rate. $\frac{\$2.88}{32 \text{ oz}}$

Divide to find the unit price: \$0.09 per ounce.

**1.** A cruise ship travels at a constant speed. In 3 hours, the ship travels 72 nautical miles. If the ship continues to travel at the same rate, how far would it travel in 11 hours?

**a.** How far does the ship travel in 1 hour? Find the ship's unit rate of speed.

The ship travels **24** nautical miles in 1 **hour**.

**b.** At this rate, how far would the ship travel in 11 hours? Find an equivalent rate.

In 11 hours, the ship would travel **264** nautical miles.

**2.** Noah spent \$66 for 20 gallons of gasoline. Lydia spent \$81.25 for 25 gallons of gasoline. Which person got the better buy?

**a.** How much did each person spend for 1 gallon of gasoline?

Noah: **\$3.30** Lydia: **\$3.25**

**b.** **Lydia** spent less money per gallon than **Noah** did, so she got the better buy.

## On the Back!

**3.** A thunderstorm travels at a constant speed. In 15 minutes, the storm travels 12 miles. If the storm continues to travel at the same rate, how far would it travel in 90 minutes?

**72 miles**

Name _____

Build Mathematical Literacy
**5-7**

**Read the problem below. Answer the questions to help understand the problem.**

On a family vacation, Amy's dad drove the car at a constant speed and traveled 585 miles in 13 hours. At this rate, how long would it have taken the family to travel 810 miles? What was the car's rate of speed?

1. Highlight the words that describe the given rate.
   **Check students' work.**

2. Write the rate in a fractional form, including the units.
   $\frac{585 \text{ miles}}{13 \text{ hours}}$

3. Underline the questions in the problem. What two answers will be found by solving this problem?
   **Check students' work; How long it would take the family to travel 810 miles and the car's rate of speed**

4. Which answer should be found first? Explain.
   **The car's unit rate of speed; Sample answer: The unit rate must be found first because that value is needed to calculate the time it will take to travel 810 miles.**

5. Describe how to find the unit rate. What does the answer represent?
   **Sample answer: Divide 583 miles by 13 hours; The number of miles the car travels in 1 hour, or miles per hour**

Name _____

Additional Vocabulary Support
**5-7**

**Write a definition and an example for each vocabulary term.**

| | Word or Phrase | Definition | Example |
|---|---|---|---|
| 1. | constant speed | Constant speed means that the speed of an object stays the same over time. | Sample answer: Drives 60 miles every hour for the entire length of a trip |
| 2. | unit price | A unit price is a unit rate that gives the price of one item. | Sample answer: $\frac{\$2}{1 \text{ bottle of water}}$ |
| 3. | rate | A rate is a ratio that compares quantities with unlike units of measure. | Sample answer: $\frac{5 \text{ kilometers}}{2 \text{ hours}}$ |
| 4. | unit | A unit is a quantity used as a standard of measurement. | Sample answer: mile |
| 5. | equivalent ratios | Equivalent ratios are ratios that express the same relationship. | Sample answer: 3 : 5 and 9 : 15 |
| 6. | unit rate | A unit rate compares a quantity to 1 unit of another quantity. | Sample answer: Runs 3 yards per second |