MSP

Grade 6 Module 1

Lesson Refreshers
&
Homework Starters

Lesson Summary

A ratio is an ordered pair of numbers, which are not both zero.

A ratio is denoted $A: B$ to indicate the order of the numbers—the number A is first, and the number B is second.

The order of the numbers is important to the meaning of the ratio. Switching the numbers changes the relationship. The description of the ratio relationship tells us the correct order for the numbers in the ratio.

Problem Set

Underline the categories and circle the word "to."

1. At the sixth-grade school dance, there are 132 boys, 89 girls, and 14 adults.
   a. Write the ratio of the number of boys to the number of girls.
   b. Write the same ratio using another form ($A: B$ vs. A to B). If you used a colon, use the word "to."
   c. Write the ratio of the number of boys to the number of adults.
   d. Write the same ratio using another form. See b above

2. In the cafeteria, Start 100 milk cartons were put out for breakfast. At the end of breakfast, 27 Left remained. Focus on "remained."
   a. What is the ratio of the number of milk cartons taken to the total number of milk cartons? How many were taken?
   b. What is the ratio of the number of milk cartons remaining to the number of milk cartons taken?

3. Choose a situation that could be described by the following ratios, and write a sentence to describe the ratio in the context of the situation you chose.
   For example:
   3: 2. When making pink paint, the art teacher uses the ratio 3: 2. For every 3 cups of white paint she uses in the mixture, she needs to use 2 cups of red paint.
   a. 1 to 2
   b. 29 to 30
   c. 52: 12

a

b

c

Lesson Summary

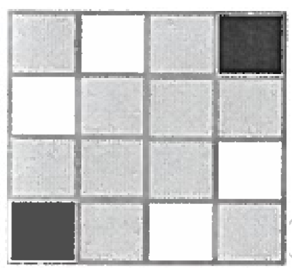
- Ratios can be written in two ways: A to B or $A:B$.
- We describe ratio relationships with words, such as *to*, *for each*, *for every*.
- The ratio $A:B$ is not the same as the ratio $B:A$ (unless A is equal to B).

Problem Set

1. Using the floor tiles design shown below, create 4 different ratios related to the image. Describe the ratio relationship, and write the ratio in the form $A:B$ or the form A to B.

Ratio 1: ___ : ___

Ratio 2: ___ : ___



Pick 2 categories (colors)

___ : ___

How many / How many

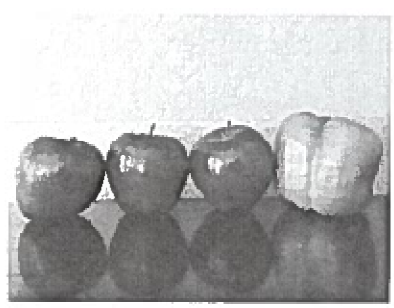
Ratio 3: ___ : ___

Ratio 4: ___ : ___

2. Billy wanted to write a ratio of the number of apples to the number of peppers in his refrigerator. He wrote 1: 3. Did Billy write the ratio correctly? Explain your answer.

Apples are first in your ratio.

Did he give you the correct number for apples (Look @ the first number)? ______



What does his first number describe (which category)? apples or peppers?

How should the ratio be written to represent Apples : Peppers?

Lesson Summary

Two ratios $A: B$ and $C: D$ are *equivalent ratios* if there is a nonzero number c such that $C = cA$ and $D = cB$. For example, two ratios are equivalent if they both have values that are equal.

Ratios are equivalent if there is a nonzero number that can be multiplied by both quantities in one ratio to equal the corresponding quantities in the second ratio.

Problem Set

1. Write two ratios that are equivalent to 1: 1. 2:2 , 50:50

2. Write two ratios that are equivalent to 3: 11. 6:22 , 9:33

3. 9 4

   a. The ratio of the width of the rectangle to the height of the rectangle is 9 to 4.

9

1	2	3	4	5	6	7	8	9
2								
3								
4								

4 Down

9 across (width)
× 4 Down (height)

9

4 x 8 = 32 mm (high)

   b. If each square in the grid has a side length of 8 mm, what is the width and height of the rectangle?

8 x 9 = 72 mm (wide)

4. For a project in their health class, Jasmine and Brenda recorded the amount of milk they drank every day. Jasmine drank 2 pints of milk each day, and Brenda drank 3 pints of milk each day.

   a. Write a ratio of the number of pints of milk Jasmine drank to the number of pints of milk Brenda drank each day.

   b. Represent this scenario with tape diagrams.

   c. If one pint of milk is equivalent to 2 cups of milk, how many cups of milk did Jasmine and Brenda each drink? How do you know?

   d. Write a ratio of the number of cups of milk Jasmine drank to the number of cups of milk Brenda drank.

   e. Are the two ratios you determined equivalent? Explain why or why not.

Jayce Jackson

Lesson Summary

Recall the description:

Two ratios A: B and C: D are *equivalent ratios* if there is a positive number, c, such that $C = cA$ and $D = cB$. For example, two ratios are equivalent if they both have values that are equal.

Ratios are equivalent if there is a positive number that can be multiplied by both quantities in one ratio to equal the corresponding quantities in the second ratio.

This description can be used to determine whether two ratios are equivalent.

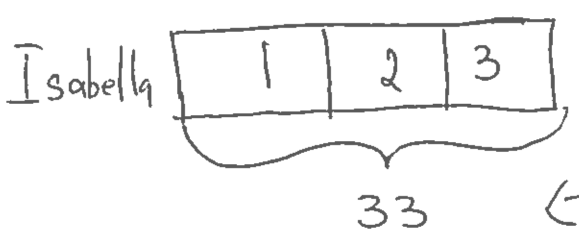
Problem Set

1. Use diagrams or the description of equivalent ratios to show that the ratios 2: 3, 4: 6, and 8: 12 are equivalent.

2. Prove that 3: 8 is equivalent to 12: 32.
   a. Use diagrams to support your answer.
   b. Use the description of equivalent ratios to support your answer.

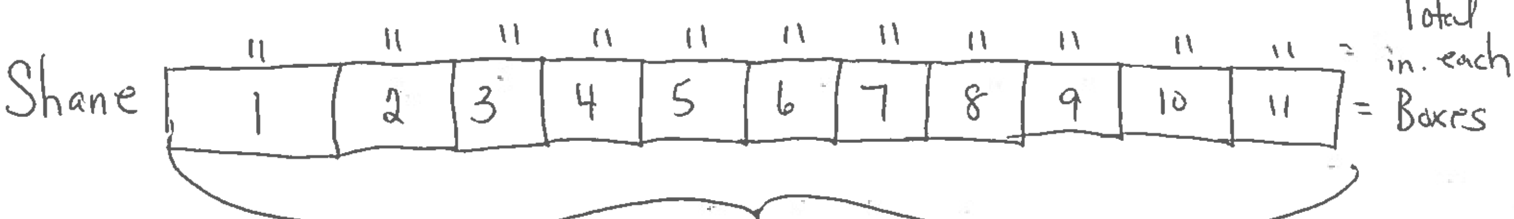
3. The ratio of Isabella's money to Shane's money is 3: 11. If Isabella has $33, how much money do Shane and Isabella have together? Use diagrams to illustrate your answer.

Isabella has $33.00
and Shane has $121.00
$154.00 = Together



33 ÷ 3 = 11

Each unit represents $11.00



11 x 11 = 121.00

* Skip Count
Add 11 + 11 + 11 + 11 + 11 + 11 + 11 + 11 + 11 + 11 + 11 = 121.00

Jaye Jackson

Problem Set

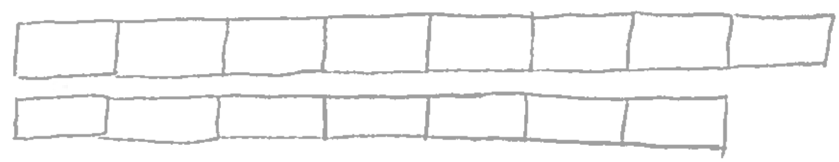
1. Last summer, at *Camp Okey-Fun-Okey*, the ratio of the number of boy campers to the number of girl campers was 8: 7. If there were a total of 195 campers, how many boy campers were there? How many girl campers?

2. The student-to-faculty ratio at a small college is 17: 3. The total number of students and faculty is 740. How many faculty members are there at the college? How many students?

3. The Speedy Fast Ski Resort has started to keep track of the number of skiers and snowboarders who bought season passes. The ratio of the number of skiers who bought season passes to the number of snowboarders who bought season passes is 1: 2. If 1,250 more snowboarders bought season passes than skiers, how many snowboarders and how many skiers bought season passes?

4. The ratio of the number of adults to the number of students at the prom has to be 1: 10. Last year there were 477 more students than adults at the prom. If the school is expecting the same attendance this year, how many adults have to attend the prom?

1. Boy
Girl



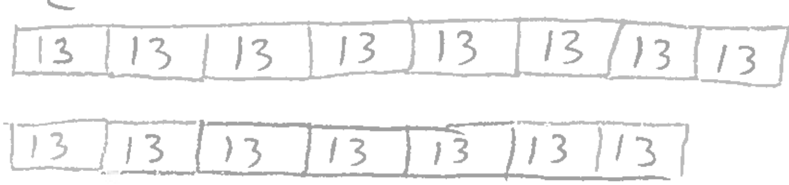
Total of 15 equal parts

15 represents my whole

The 15 boxes are represented by 195 campers.
So we can divide the 195 campers into 15 equal parts.

$\frac{195}{15} = 13$

So, we can plug 13 into every box



= 104 boys

= 91 girls

we can take our number of boxes and multiply by 13.
$13 \times 8 = 104$ boys
$13 \times 7 = 91$ girls

$\boxed{\text{There are 104 boy campers and 91 girl campers}}$ OR

Lesson Summary

When solving problems in which a ratio between two quantities changes, it is helpful to draw a *before* tape diagram and an *after* tape diagram.

Problem Set

1. Shelley compared the number of oak trees to the number of maple trees as part of a study about hardwood trees in a woodlot. She counted 9 maple trees to every 5 oak trees. Later in the year there was a bug problem and many trees died. New trees were planted to make sure there was the same number of trees as before the bug problem. The new ratio of the number of maple trees to the number of oak trees is 3: 11. After planting new trees, there were 132 oak trees. How many more maple trees were in the woodlot before the bug problem than after the bug problem? Explain.

2. The school band is comprised of middle school students and high school students, but it always has the same maximum capacity. Last year the ratio of the number of middle school students to the number of high school students was 1: 8. However, this year the ratio of the number of middle school students to the number of high school students changed to 2: 7. If there are 18 middle school students in the band this year, how many fewer high school students are in the band this year compared to last year? Explain.

2. Last Year

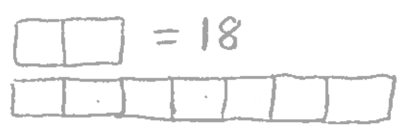
Middle

High

This Year

Middle = 18

High



Since there are 18 middle school students in band and there are 2 boxes, we can do $\frac{18}{2} = 9$, so 9 should go in each box. So 7 high school boxes × 9 = 63 high school students this year.

Last year if we fill in 9 for each box, there were 8 high school boxes. 9 × 8 = 72 high school students last year.

How many fewer this year means 72 − 63 = 9.

There were 9 fewer high school students this year.

Lesson Summary

For a ratio $A: B$, we are often interested in the associated ratio $B: A$. Further, if A and B can both be measured in the same unit, we are often interested in the associated ratios $A: (A + B)$ and $B: (A + B)$.

For example, if Tom caught 3 fish and Kyle caught 5 fish, we can say:

The ratio of the number of fish Tom caught to the number of fish Kyle caught is $3: 5$.

The ratio of the number of fish Kyle caught to the number of fish Tom caught is $5: 3$.

The ratio of the number of fish Tom caught to the total number of fish the two boys caught is $3: 8$.

The ratio of the number of fish Kyle caught to the total number of fish the two boys caught is $5: 8$.

For the ratio $A: B$, where $B \neq 0$, the value of the ratio is the quotient $\frac{A}{B}$.

For example: For the ratio $6: 8$, the value of the ratio is $\frac{6}{8}$ or $\frac{3}{4}$.

Problem Set

1. Maritza is baking cookies to bring to school and share with her friends on her birthday. The recipe requires 3 eggs for every 2 cups of sugar. To have enough cookies for all of her friends, Maritza determined she would need 12 eggs. If her mom bought 6 cups of sugar, does Maritza have enough sugar to make the cookies? Why or why not?

2. Hamza bought 8 gallons of brown paint to paint his kitchen and dining room. Unfortunately, when Hamza started painting, he thought the paint was too dark for his house, so he wanted to make it lighter. The store manager would not let Hamza return the paint but did inform him that if he used $\frac{1}{4}$ of a gallon of white paint mixed with 2 gallons of brown paint, he would get the shade of brown he desired. If Hamza decided to take this approach, how many gallons of white paint would Hamza have to buy to lighten the 8 gallons of brown paint?

#2

b	b	b	b	b	b	b	b
1/4 w		1/4 w		1/4 w		1/4 w	

8 gallons of brown paint

1/4 w, per 2 gallons of brown

$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4} = 1$ gallon of white

*Answer: Hamza would need 1 gallon of white paint to make the shade of brown he desires.

S. Hill

Lesson Summary

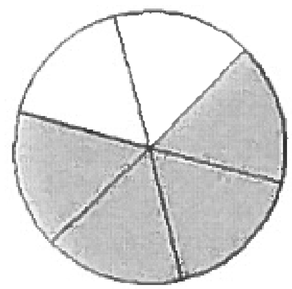
The *value of the ratio* $A: B$ is the quotient $\frac{A}{B}$ as long as B is not zero.

If two ratios are equivalent, then their values are the same (when they have values).

Problem Set

* 1. The ratio of the number of shaded sections to the number of unshaded sections is 4 to 2. What is the value of the ratio of the number of shaded pieces to the number of unshaded pieces? Shaded - 4 ; unshaded - 2

$\frac{4}{2} = \frac{2}{1}$ or 2



2. Use the value of the ratio to determine which ratios are equivalent to $7: 15$.
   a. $21: 45$
   b. $14: 45$
   c. $3: 5$
   d. $63: 135$

3. Sean was at batting practice. He swung 25 times but only hit the ball 15 times.
   a. Describe and write more than one ratio related to this situation.
   b. For each ratio you created, use the value of the ratio to express one quantity as a fraction of the other quantity.
   c. Make up a word problem that a student can solve using one of the ratios and its value.

4. Your middle school has 900 students. $\frac{1}{3}$ of students bring their lunch instead of buying lunch at school. What is the value of the ratio of the number of students who do bring their lunch to the number of students who do not?

S. Hill

Lesson Summary

A ratio table is a table of pairs of numbers that form equivalent ratios.

Problem Set

Assume each of the following represents a table of equivalent ratios. Fill in the missing values. Then choose one of the tables and create a real-world context for the ratios shown in the table.

Rule - +4 +11

1.

4	11
8	22
12	33
16	44
20	55
24	66

increase of 4

increase of 11

2.

	14
15	21
25	35
30	

3.

	34
	51
12	
15	85
18	102

S. Hill

Problem Set

Lemon Juice (cups)	Water (cups)
1	3
2	6
3	9
4	12
12	36

→ $12 \times 3 = 36$

1.
   a. Create a ratio table for making lemonade with a lemon juice-to-water ratio of $1:3$. Show how much lemon juice would be needed if you use 36 cups of water to make lemonade. 12 cups of lemon juice would be needed if 36 cups of water is used.

   b. How is the value of the ratio used to create the table?

The value of the ratio is $\frac{1}{3}$, if we know the amount of lemon juice, we multiply that amount by 3 to get the amount of water.

2. Ryan made a table to show how much blue and red paint he mixed to get the shade of purple he will use to paint the room. He wants to use the table to make larger and smaller batches of purple paint.

Blue	Red
12	3
20	5
28	7
36	9

   a. What ratio was used to create this table? Support your answer.

   b. How are the values in each row related to each other?

   c. How are the values in each column related to each other?

S. Hill

Lesson Summary

Ratio tables can be used to compare two ratios.

Look for equal amounts in a row or column to compare the second amount associated with it.

3	6	12	30
7	14	28	70

10	25	30	45
16	40	48	72

The values of the tables can also be extended in order to get comparable amounts. Another method would be to compare the values of the ratios by writing the values of the ratios as fractions and then using knowledge of fractions to compare the ratios.

When ratios are given in words, creating a table of equivalent ratios helps in comparing the ratios.

$12:35$ compared to $8:20$

Quantity 1	12	24	36	48
Quantity 2	35	70	105	140

Quantity 1	8	56
Quantity 2	20	140

Problem Set

1. Sarah and Eva were swimming.

   a. Use the ratio tables below to determine who the faster swimmer is.

   Sarah

   3:75
   1:25 → 25 meters in 1 min

Time (min)	3	5	12	17
Distance (meters)	75	125	300	425

   Eva

   2:52
   1:26 → 26 meters in 1 min

Time (min)	2	7	10	20
Distance (meters)	52	182	260	520

   * Eva is the faster swimmer because she swam 26 meters in 1 min.

   b. Explain the method that you used to determine your answer.

   I had to find equivalent ratios to determine how many meters each girl swam in 1 min.

2. A 120 lb. person would weigh about 20 lb. on the earth's moon. A 150 lb. person would weigh 28 lb. on Io, a moon of Jupiter. Use ratio tables to determine which moon would make a person weigh the most.

S. Hill

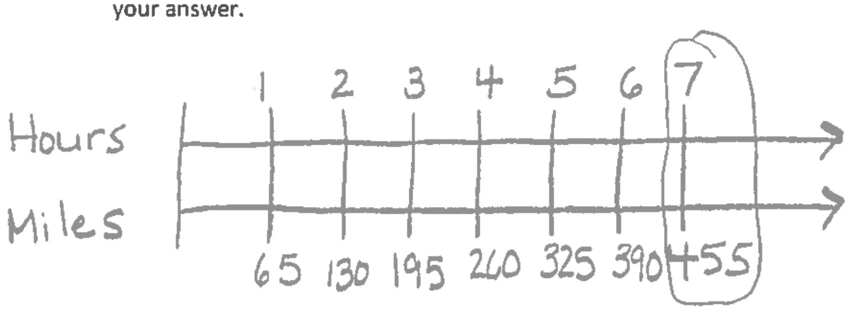
Lesson Summary

A *double number line* is a representation of a ratio relationship using a pair of parallel number lines. One number line is drawn above the other so that the zeros of each number line are aligned directly with each other. Each ratio in a ratio relationship is represented on the double number line by always plotting the first entry of the ratio on one of the number lines and plotting the second entry on the other number line so that the second entry is aligned with the first entry.

Problem Set

1. While shopping, Kyla found a dress that she would like to purchase, but it costs $52.25 more than she has. Kyla charges $5.50 an hour for babysitting. She wants to figure out how many hours she must babysit to earn $52.25 to buy the dress. Use a double number line to support your answer.

2. Frank has been driving at a constant speed for 3 hours, during which time he traveled 195 miles. Frank would like to know how long it will take him to complete the remaining 455 miles, assuming he maintains the same constant speed. Help Frank determine how long the remainder of the trip will take. Include a table or diagram to support your answer.



7 hours to travel 455 miles

S.Hill

Lesson Summary

The value of a ratio can be determined using a ratio table. This value can be used to write an equation that also represents the ratio.

Example:

1	4
2	8
3	12
4	16

The multiplication table can be a valuable resource to use in seeing ratios. Different rows can be used to find equivalent ratios.

Problem Set

(1 : 3)

A cookie recipe calls for 1 cup of white sugar and 3 cups of brown sugar.

Make a table showing the comparison of the amount of white sugar to the amount of brown sugar.

White Sugar (W)	Brown Sugar (B)
1	3
2	6
3	9
4	12
5	15

1. Write the value of the ratio of the amount of white sugar to the amount of brown sugar.

   $\frac{1}{3}$ - the value of the ratio of the amount of white sugar to brown sugar

2. Write an equation that shows the relationship of the amount of white sugar to the amount of brown sugar.

3. Explain how the value of the ratio can be seen in the table.

4. Explain how the value of the ratio can be seen in the equation.

S. Hill

Lesson Summary

A ratio table, equation, or double number line diagram can be used to create ordered pairs. These ordered pairs can then be graphed on a coordinate plane as a representation of the ratio.

Example:

Equation: $y = 3x$

x	y
0	0
1	3
2	6
3	9

→

Ordered Pairs

(x, y)

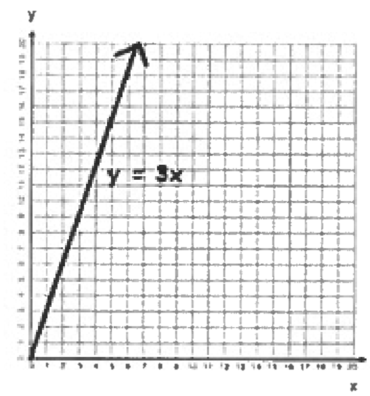
$(0, 0)$

$(1, 3)$

$(2, 6)$

$(3, 9)$

→

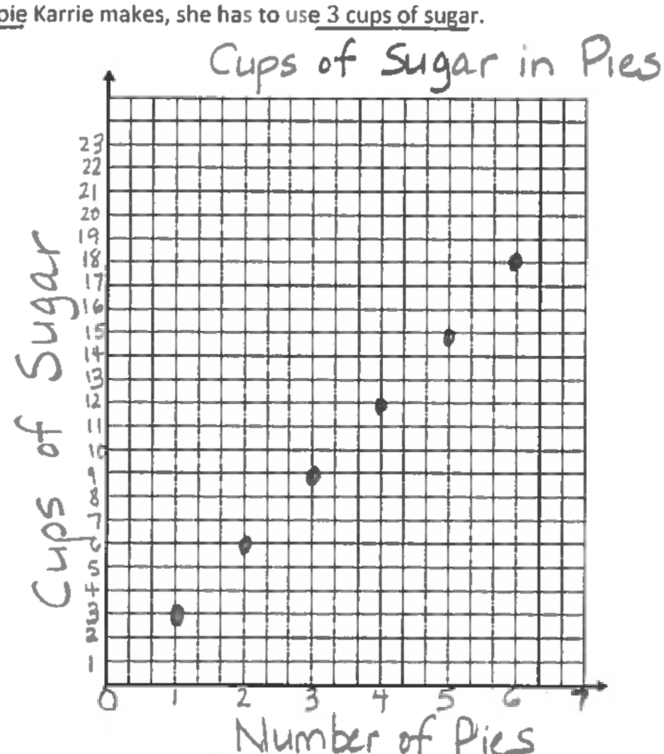


Problem Set

1. Complete the table of values to find the following:
   Find the number of cups of sugar needed if for each pie Karrie makes, she has to use 3 cups of sugar.

Pies	Cups of Sugar
1	3
2	6
3	9
4	12
5	15
6	18

Use a graph to represent the relationship.



S. Hill

Lesson Summary

There are several ways to represent the same collection of equivalent ratios. These include ratio tables, tape diagrams, double number line diagrams, equations, and graphs on coordinate planes.

Problem Set

1. The producer of the news station posted an article about the high school's football championship ceremony on a new website. The website had 500 views after four hours. Create a table to show how many views the website would have had after the first, second, and third hours after posting, if the website receives views at the same rate. How many views would the website receive after 5 hours?
2. Write an equation that represents the relationship from Problem 1. Do you see any connections between the equations you wrote and the ratio of the number of views to the number of hours?
3. Use the table in Problem 1 to make a list of ordered pairs that you could plot on a coordinate plane.
4. Graph the ordered pairs on a coordinate plane. Label your axes and create a title for the graph.
5. Use multiple tools to predict how many views the website would have after 12 hours.

#1

Hours	Views
1	125
2	250
3	375
4	500
5	625

S.Hill

Lesson Summary

A *rate* is a quantity that describes a ratio relationship between two types of quantities.

For example, 15 miles/hour is a rate that describes a ratio relationship between hours and miles: If an object is traveling at a constant 15 miles/hour, then after 1 hour it has gone 15 miles, after 2 hours it has gone 30 miles, after 3 hours it has gone 45 miles, and so on.

When a rate is written as a measurement, the *unit rate* is the measure (i.e., the numerical part of the measurement). For example, when the rate of speed of an object is written as the measurement 15 miles/hour, the number 15 is the unit rate. The *unit of measurement* is miles/hour, which is read as "miles per hour."

Problem Set

The Scott family is trying to save as much money as possible. One way to cut back on the money they spend is by finding deals while grocery shopping; however, the Scott family needs help determining which stores have the better deals.

1. At Grocery Mart, strawberries cost $2.99 for 2 lb., and at Baldwin Hills Market strawberries are $3.99 for 3 lb.
   a. What is the unit price of strawberries at each grocery store? If necessary, round to the nearest penny.
   b. If the Scott family wanted to save money, where should they go to buy strawberries? Why?

2. Potatoes are on sale at both Grocery Mart and Baldwin Hills Market. At Grocery Mart, a 5 lb. bag of potatoes cost $2.85, and at Baldwin Hills Market a 7 lb. bag of potatoes costs $4.20. Which store offers the best deal on potatoes? How do you know? How much better is the deal?

Grocery Mart offers the best deal at .57 per pound, after dividing $2.85 by 5, they are .03 cheaper than Baldwin's.

1a.) Grocery Mart $2.99 ÷ 2 = 1.50 per pound
Baldwin Hills $3.99 ÷ 3 = 1.33 per pound

b.) Baldwin Hills is cheaper per pound

2.) Grocery Mart $2.85 ÷ 5 = .57 per pound
Baldwin Hills $4.20 ÷ 7 = .60 per pound

Deanna [illegible]

Lesson Summary

A rate of $\frac{2}{3}$ gal/min corresponds to the unit rate of $\frac{2}{3}$ and also corresponds to the ratio 2: 3.

All ratios associated with a given rate are equivalent because they have the same value.

Problem Set

1. Once a commercial plane reaches the desired altitude, the pilot often travels at a cruising speed. On average, the cruising speed is 570 miles/hour. If a plane travels at this cruising speed for 7 hours, how far does the plane travel while cruising at this speed? $570 \times 7 = 3{,}990$ miles

2. Denver, Colorado often experiences snowstorms resulting in multiple inches of accumulated snow. During the last snow storm, the snow accumulated at $\frac{4}{5}$ inch/hour. If the snow continues at this rate for 10 hours, how much snow will accumulate?

$$\frac{4}{5} \times 10 = \frac{40}{5} = 8 \text{ inches}$$

$$\underbrace{\frac{4}{5}+\frac{4}{5}+\frac{4}{5}+\frac{4}{5}+\frac{4}{5}+\frac{4}{5}+\frac{4}{5}+\frac{4}{5}+\frac{4}{5}+\frac{4}{5}}_{10 \text{ hours}}$$

Lesson Summary

We can convert measurement units using rates. The information can be used to further interpret the problem. Here is an example:

$$\left(5\frac{\text{gal}}{\text{min}}\right)\cdot(10\text{ min})=\frac{5\text{ gal}}{1\cancel{\text{ min}}}\cdot 10\cancel{\text{ min}}=50\text{ gal}$$

Problem Set

1. Enguun earns $17 per hour tutoring student-athletes at Brooklyn University.
   a. If Enguun tutored for 12 hours this month, how much money did she earn this month? $204.00
   b. If Enguun tutored for 19.5 hours last month, how much money did she earn last month? $331.50

2. The Piney Creek Swim Club is preparing for the opening day of the summer season. The pool holds 22,410 gallons of water, and water is being pumped in at 540 gallons per hour. The swim club has its first practice in 42 hours. Will the pool be full in time? Explain your answer.

1a.) $\$17\frac{\text{Per}}{\text{hour}}\cdot 12\text{ hours}=\$204.00$

b.) $\$17\frac{\text{Per}}{\text{hour}}\cdot 19.5\text{ hours}=\$331.50$

Lupini

> **Lesson Summary**
>
> When comparing rates and ratios, it is best to find the unit rate.
>
> Comparing unit rates can happen across tables, graphs, and equations.

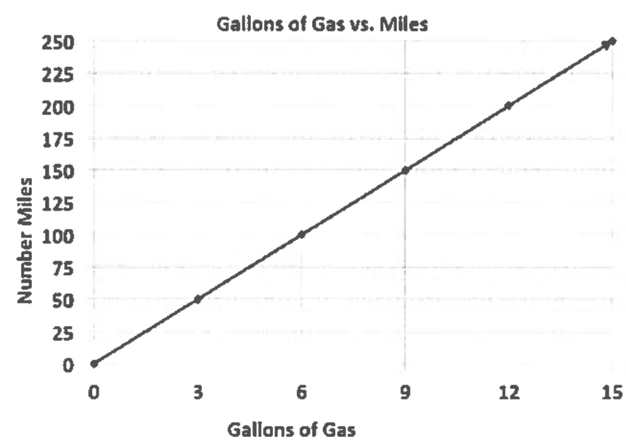
Problem Set

Victor was having a hard time deciding which new vehicle he should buy. He decided to make the final decision based on the gas efficiency of each car. A car that is more gas efficient gets more miles per gallon of gas. When he asked the manager at each car dealership for the gas mileage data, he received two different representations, which are shown below.

Vehicle 1: Legend

Gallons of Gas	4	8	12
Number of Miles	72	144	216

Vehicle 2: Supreme



1. If Victor based his decision only on gas efficiency, which car should he buy? Provide support for your answer.

   $72 \div 4 = 18$ miles per gallon ; $50 \div 3 = 16.\overline{66}$ per gallon

2. After comparing the Legend and the Supreme, Victor saw an advertisement for a third vehicle, the Lunar. The manager said that the Lunar can travel about 289 miles on a tank of gas. If the gas tank can hold 17 gallons of gas, is the Lunar Victor's best option? Why or why not?

   Lunar gets 17 miles per gallon. The Legend is still the best option.

   The Legend has better gas efficiency than the Supreme.

Lesson Summary

Unit Rate can be located in tables, graphs, and equations.

- Table–the unit rate is the value of the first quantity when the second quantity is 1.
- Graphs–the unit rate is the value of r at the point $(1, r)$.
- Equation–the unit rate is the constant number in the equation. For example, the unit rate in $r = 3b$ is 3.

Problem Set

The table below shows the amount of money Gabe earns working at a coffee shop.

Number of Hours Worked	3	6	9	12
Money Earned (in dollars)	40.50	81.00	121.50	162.00

1. How much does Gabe earn per hour?

   40.50 ÷ 3 = $13.50 per hour

2. Jordan is another employee at the same coffee shop. He has worked there longer than Gabe and earns $3 more per hour than Gabe. Complete the table below to show how much Jordan earns.

Number of Hours Worked	4	8	12	16
Money Earned (in dollars)				

3. Serena is the manager of the coffee shop. The amount of money she earns is represented by the equation $m = 21h$, where h is the number of hours Serena works, and m is the amount of money she earns. How much more money does Serena make an hour than Gabe? Explain your thinking.

4. Last month, Jordan received a promotion and became a manager. He now earns the same amount as Serena. How much more money does he earn per hour now that he is a manager than he did before his promotion? Explain your thinking.

Exit Ticket Sample Solutions

Jill and Erika made 4 gallons of lemonade for their lemonade stand. How many quarts did they make? If they charge $2.00 per quart, how much money will they make if they sell it all?

The conversion rate is 4 quarts per gallon.

$\frac{4 \text{ quarts}}{1 \cancel{\text{gallon}}} \cdot 4 \cancel{\text{gallons}} = \frac{4 \cdot 4}{1} \text{ quarts} = 16 \text{ quarts}$

$16 \cancel{\text{quarts}} \times \frac{2 \text{ dollars}}{1 \cancel{\text{quart}}} = 32 \text{ dollars in sales}$

Problem Set Sample Solutions

1. 7 ft. = 84 in. $7 \times 12 = 84$
2. 100 yd. = 300 ft. $100 \times 3 = 300$
3. 25 m = 2,500 cm $25 \times 100 = 2,500$
4. 5 km = 5,000 m $5 \times 1,000 = 5,000$
5. 96 oz. = 6 lb. $96 \div 16 = 6$
6. 2 mi. = 10,560 ft. $5,280 \times 2 = 10,560$
7. 2 mi. = 3,520 yd. $2 \times 1,760 = 3,520$
8. 32 fl.oz. = 4 c. $32 \div 8 = 4$
9. 1,500 mL = 1.5 L $1,500 \div 1,000 = 1.5$
10. 6 g = 6,000 mg $6 \times 1,000 = 6,000$
11. Beau buys a 3-pound bag of trail mix for a hike. He wants to make one-ounce bags for his friends with whom he is hiking. How many one-ounce bags can he make?

    48 bags

12. The maximum weight for a truck on the New York State Thruway is 40 tons. How many pounds is this?

    80,000 lb.

13. Claudia's skis are 150 centimeters long. How many meters is this?

    1.5 m

Exit Ticket Sample Solutions

Franny took a road trip to her grandmother's house. She drove at a constant speed of 60 miles per hour for 2 hours. She took a break and then finished the rest of her trip driving at a constant speed of 50 miles per hour for 2 hours. What was the total distance of Franny's trip?

$d = 60\frac{miles}{\cancel{hour}} \cdot 2\ \cancel{hours} = 120\ miles$

$d = 50\frac{miles}{\cancel{hour}} \cdot 2\ \cancel{hours} = 100\ miles$

$120\ miles + 100\ miles = 220\ miles$

Problem Set Sample Solutions

1. **If Adam's plane traveled at a constant speed of 375 miles per hour for six hours, how far did the plane travel?**

   $d = r \cdot t$

   $d = \frac{375}{1}\frac{miles}{\cancel{hour}} \times 6\ \cancel{hours} = 2250\ miles$ 375 × 6 = 2250

2. **A Salt March Harvest Mouse ran a 360 centimeter straight course race in 9 seconds. How fast did it run?**

   $r = \frac{d}{t}$

   $r = \frac{360}{9}\frac{centimeters}{seconds} = 40\frac{\text{cm}}{\text{sec}}$ 360 ÷ 9 = 40

3. **Another Salt Marsh Harvest Mouse took 7 seconds to run a 350 centimeter race. How fast did it run?**

   $r = \frac{d}{t}$

   $r = \frac{350}{7}\frac{centimeters}{seconds} = 50\frac{\text{cm}}{\text{sec}}$ 350 ÷ 7 = 50

4. **A slow boat to China travels at a constant speed of 17.25 miles per hour for 200 hours. How far was the voyage?**

   $d = r \cdot t$

   $d = \frac{17.25}{1}\frac{miles}{\cancel{hour}} \times 200\ \cancel{hours} = 3450\ miles$ 17.25 × 200 = 3,450

5. **The Sopwith Camel was a British, First World War, single-seat, biplane fighter introduced on the Western Front in 1917. Traveling at its top speed of 110 mph in one direction for $2\frac{1}{2}$ hours, how far did the plane travel?**

   $d = r \cdot t$

   $d = \frac{110}{1}\frac{miles}{\cancel{hour}} \times 2.5\ \cancel{hours} = 275\ miles$ 110 × 2.5 = 275

Exit Ticket Sample Solutions

A sixth-grade math teacher can grade 25 homework assignments in 20 minutes.

Is he working at a faster rate or slower rate than grading 36 homework assignments in 30 minutes?

$\frac{25}{20}\frac{assignments}{minutes} = \frac{1.25}{1}\frac{assignments}{minute}$ $\frac{36}{30}\frac{assignments}{minutes} = \frac{1.2}{1}\frac{assignments}{minute}$

It is faster to grade 25 assignments in 20 minutes.

Problem Set Sample Solutions

1. **Who walks at a faster rate: someone who walks 60 feet in 10 seconds or someone who walks 42 feet in 6 seconds?**

   $\frac{60}{10}\frac{feet}{seconds} = 6\frac{feet}{second}$ $60 \div 10 = 6$

   $\frac{42}{6}\frac{feet}{seconds} = 7\frac{feet}{second} \rightarrow$ *Faster* $42 \div 6 = 7$

2. **Who walks at a faster rate: someone who walks 60 feet in 10 seconds or someone who takes 5 seconds to walk 25 feet? Review the lesson summary before answering!**

   $\frac{60}{10}\frac{feet}{seconds} = 6\frac{feet}{second} \rightarrow$ *Faster* $60 \div 10 = 6$

   $\frac{25}{5}\frac{feet}{seconds} = 5\frac{feet}{second}$ $25 \div 5 = 5$

3. **Which parachute has a slower decent: a red parachute that falls 10 feet in 4 seconds or a blue parachute that falls 12 feet in 6 seconds?**

   Red: $\frac{10}{4}\frac{feet}{seconds} = 2.5\frac{feet}{second}$ $10 \div 4 = 2.5$

   Blue: $\frac{12}{6}\frac{feet}{seconds} = 2\frac{feet}{second} \rightarrow$ *Slower* $12 \div 6 = 2$

4. **During the winter of 2012–2013, Buffalo, New York received 22 inches of snow in 12 hours. Oswego, New York received 31 inches of snow over a 15-hour period. Which city had a heavier snowfall rate? Round your answers to the nearest hundredth.**

   $\frac{22}{12}\frac{inches}{hours} = 1.83\frac{inches}{hour}$ $22 \div 12 = 1.83$

   $\frac{31}{15}\frac{inches}{hours} = 2.07\frac{inches}{hour} \rightarrow$ *Heavier* $31 \div 15 = 2.07$

Lesson Summary

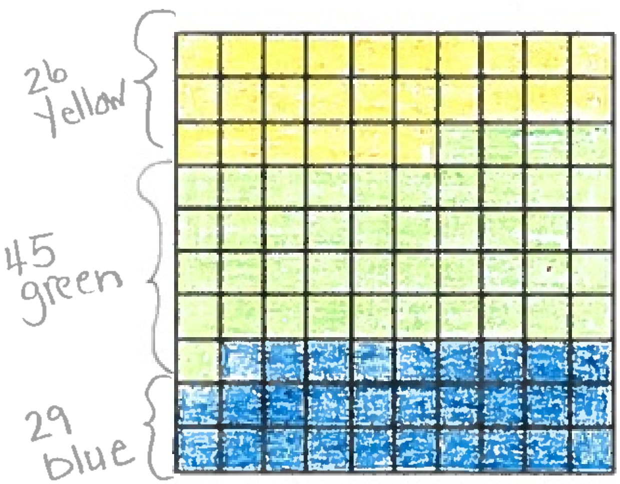
One percent is the number $\frac{1}{100}$ and is written as 1%.

Percentages can be used as rates. For example, 30% of a quantity means $\frac{30}{100}$ times the quantity.

We can create models of percents. One example would be to shade a 10×10 grid. Each square in a 10×10 grid represents 1% or 0.01.

Problem Set

1. Marissa just bought 100 acres of land. She wants to grow apple, peach, and cherry trees on her land. Color the model to show how the acres could be distributed for each type of tree. Using your model, complete the table.



Tree	Percentage	Fraction	Decimal
Apple	26%	$\frac{26}{100}$	0.26
Peach	45%	$\frac{45}{100}$	0.45
Cherry	29%	$\frac{29}{100}$	0.29
	=100	=100	=100

2. After renovations on Kim's bedroom, only 30 percent of one wall is left without any décor. Shade the grid below to represent the space that is left to decorate.

   a. What does each block represent?

   b. What percent of this wall has been decorated?

$\frac{1}{100}$

30% or $\frac{30}{100}$

0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

30

100

Lesson Summary

Fractions, decimals, and percentages are all related.

To change a fraction to a percentage, you can scale up or scale down so that 100 is in the denominator.

Example:

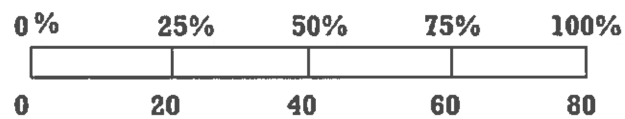
$$\frac{9}{20} = \frac{9 \times 5}{20 \times 5} = \frac{45}{100} = 45\%$$

There may be times when it is more beneficial to convert a fraction to a percent by first writing the fraction in decimal form.

Example:

$$\frac{5}{8} = 0.625 = 62.5 \text{ hundredths} = 62.5\%$$

Models, like tape diagrams and number lines, can also be used to model the relationships.

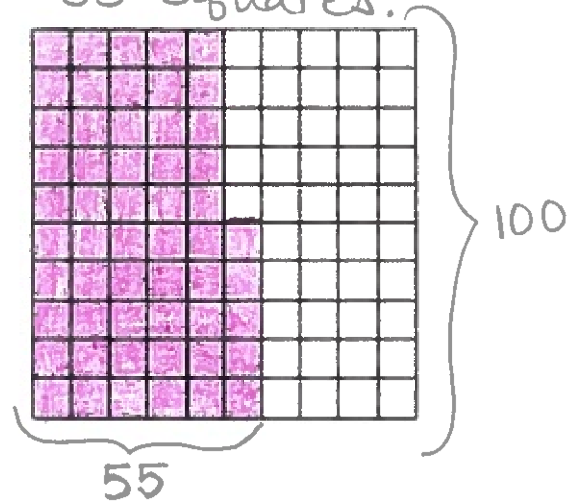


The diagram shows that $\frac{20}{80} = 25\%$.

Problem Set

Shade 11 out of every 20 or 11 x 5 = 55 squares.

1. Use the 10×10 grid to express the fraction $\frac{11}{20}$ as a percent.



2. Use a tape diagram to relate the fraction $\frac{11}{20}$ to a percent.

3. How are the diagrams related?

4. What decimal is also related to the fraction?

5. Which diagram is the most helpful for converting the fraction to a decimal? _______________ Explain why.

Lesson Summary

Models and diagrams can be used to solve percent problems. Tape diagrams, 10×10 grids, double number line diagrams, and others can be used in a similar way to using them with ratios to find the percent, the part, or the whole.

Problem Set

1. What is 15% of 60? Create a model to prove your answer.

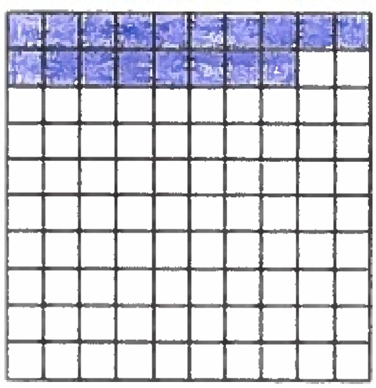
$\frac{15}{100}\ \frac{N}{60} = N = 9$

2. If 40% of a number is 56, what was the original number?

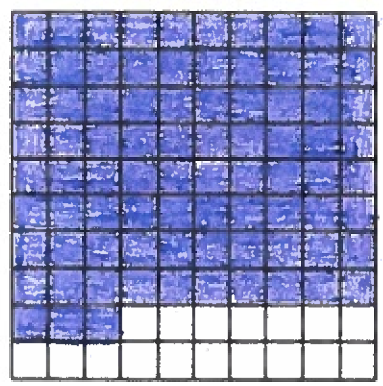
$\frac{40}{100} = \frac{56}{N} = N = 140$

3. In a 10×10 grid that represents 800, one square represents 8.

Use the grids below to represent 17% and 83% of 800.



17%



83%

17% of 800 is 136.

$\frac{17}{100} = \frac{N}{800} = N = 136$

83% of 800 is 664.

$\frac{83}{100} = \frac{N}{800} = N = 664$

Lesson Summary

Percent problems include the part, whole, and percent. When one of these values is missing, we can use tables, diagrams, and models to solve for the missing number.

Problem Set

1. Mr. Yoshi has 75 papers. He graded 60 papers, and he had a student teacher grade the rest. What percent of the papers did each person grade? $60 \div 75 = 80\%$ Mr. Yoshi
$100\% - 80\% = 20\%$ Student teacher

2. Mrs. Bennett has graded 20% of her 150 students' papers. How many papers does she still need to finish grading?

$\frac{20}{100} = \frac{N}{150} = N = 30$ papers graded

$150 - 30 = 120$ papers still need grading

Lesson Summary

Percent problems include the part, whole, and percent. When one of these values is missing, we can use tables, diagrams, and models to solve for the missing number.

Problem Set

1. The Sparkling House Cleaning Company has cleaned 28 houses this week. If this number represents 40% of the total number of houses the company is contracted to clean, how many total houses will the company clean by the end of the week? $\frac{40}{100} = \frac{28}{N} = 40N = 2800$
   $N = 70$ total houses

2. Joshua delivered 30 hives to the local fruit farm. If the farmer has paid to use 5% of the total number of Joshua's hives, how many hives does Joshua have in all?

   $\frac{5}{100} = \frac{30}{N} = 5N = 3000$
   $N = 600$ hives

Lesson Summary

Percent problems have three parts: whole, part, percent.

Percent problems can be solved using models such as ratio tables, tape diagrams, double number line diagrams, and 10×10 grids.

Problem Set

1. Henry has 15 lawns mowed out of a total of 60 lawns. What percent of the lawns does Henry still have to mow?

15 mowed ÷ 60 total = 25   100 − 25 = 75% still to mow.

2. Marissa got an 85% on her math quiz. She had 34 questions correct. How many questions were on the quiz?

$\frac{85}{100} = \frac{34}{N} = 85N = 3400$ $N = 40$ questions on test

3. Lucas read 30% of his book containing 480 pages. What page is he going to read next?

$\frac{30}{100} = \frac{N}{480} = \frac{100N}{100} = \frac{14,400}{100} = 144$ is 30% so he will pick up on p.145.