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Lesson 5: Solving Problems by Finding Equivalent Ratios

Student Outcomes

* Students use tape diagrams to find an equivalent ratio when given the part-to-part ratio and the total of those two quantities. Students use tape diagrams to find an equivalent ratio when given the part-to-part ratio and the difference between those two quantities.
* Students make the connection between the constant, , in the definition of equivalent ratios and the value of the unit in the tape diagram used to solve ratio problems.

Classwork

**Example 1 (10 minutes)**

Provide students time to think about each question, and then elicit a class discussion for each question. Provide students opportunities to participate and ask questions.

Example 1

A County Superintendent of Highways is interested in the numbers of different types of vehicles that regularly travel within his county. In the month of August, a total of registrations were purchased for passenger cars and pickup trucks at the local Department of Motor Vehicles (DMV). The DMV reported that in the month of August, for every passenger cars registered, there were pickup trucks registered. How many of each type of vehicle were registered in the county in the month of August?

* 1. Using the information in the problem, write four different ratios and describe the meaning of each.

The ratio of cars to trucks isand is a part-to-part ratio. The ratio of trucks to cars is and that is a part-to-part ratio. The ratio of cars to total vehicles is to and that is a part-to-whole ratio. The ratio of trucks to total vehicles is to and that is a part-to-whole ratio.

* 1. Make a tape diagram that represents the quantities in the part-to-part ratios that you wrote.

***Passenger Cars***

***Pickup Trucks***

* 1. How many equal-sized parts does the tape diagram consist of?
	2. What total quantity does the tape diagram represent?

vehicles

* 1. What value does each individual part of the tape diagram represent?

Divide the total quantity into equal-sized parts:

* 1. How many of each type of vehicle were registered in August?

passenger cars

pickup trucks

**Example 2 (10 minutes)**

Find the values of the partial quantities in Example 2.

Example 2

The Superintendent of Highways is further interested in the numbers of commercial vehicles that frequently use the county’s highways. He obtains information from the Department of Motor Vehicles for the month of September and finds that for every non-commercial vehicles, there were commercial vehicles. If there were more non-commercial vehicles than commercial vehicles, how many of each type of vehicle frequently use the county’s highways during the month of September?

***Non-Commercial Vehicles***

MP.5

***Commercial Vehicles***

 These sections represent the “more than commercial vehicles,” which is .

To determine how many cars each section represents, divide by to get . Therefore, each section of the tape diagram represents vehicles.

Since every section of the tape diagram represents vehicles, demonstrate how to calculate the number of each type of vehicle.

*168 non-commercial vehicles and 60 commercial vehicles*.

Exercises (16 minutes)

In pairs or small groups, students complete the following problems. After students are given time to work, have groups explain their answers.

Exercises

1. The ratio of the number of people who own a smartphone to the number of people who own a flip phone is . If more people own a smartphone than a flip phone, how many people own each type of phone?

 people own a smartphone, and people own a flip phone.

1. Sammy and David were selling water bottles to raise money for new football uniforms. Sammy sold water bottles for every water bottles David sold. Together they sold water bottles. How many did each boy sell?

Sammy sold water bottles, and David sold water bottles.

1. Ms. Johnson and Ms. Siple were folding report cards to send home to parents. The ratio of the number of report cards Ms. Johnson folded to the number of report cards Ms. Siple folded is . At the end of the day, Ms. Johnson and Ms. Siple folded a total of report cards. How many did each person fold?

Ms. Johnson folded report cards, and Ms. Siple folded report cards.

1. At a country concert, the ratio of the number of boys to the number of girls is . If there are more girls than boys, how many boys are at the concert?

There are boys at the country concert.

Closing (4 minutes)

* Explain how tape diagrams can be helpful in solving ratio word problems.

Exit Ticket (5 minutes)

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Exit Ticket

When Carla looked out at the school parking lot, she noticed that for every minivans, there were other types of vehicles. If there are vehicles in the parking lot, how many of them are not minivans?

Exit Ticket Sample Solution

When Carla looked out at the school parking lot, she noticed that for every minivans, there were other types of vehicles. If there are vehicles in the parking lot, how many of them are not minivans?

 out of vehicles are not minivans. . So, . of the vehicles are not minivans.

Problem Set Sample Solutions

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

boys and girls are at Camp Okey-Fun-Okey.

1. The student-to-faculty ratio at a small college is . The total of students and faculty is . How many faculty members are there at the college? How many students?

 faculty members and students are at the college.

1. 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 . If more snowboarders bought season passes than skiers, how many snowboarders and how many skiers bought season passes?

skiers bought season passes, and snowboarders bought season passes.

1. The ratio of the number of adults to the number of students at the prom has to be . Last year there were 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?

 adults have to be at the prom to keep the ratio.