Lesson 3- Solving Problems with 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, $c$, in the definition of equivalent ratios and the value of the unit in the tape diagram used to solve ratio problems.
* Students use tape diagrams to solve problems when given a ratio between two quantities and a change to those quantities that changes the ratio.

Lesson 3- Solving Problems with Equivalent Ratios- Notes

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 192 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 5 passenger cars registered, there were 7 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 ratios and describe the meaning of each.
	2. Make a tape-diagram that represents the quantities in the ratios that you wrote.
	3. How many equal-sized parts does the tape diagram consist of?
	4. What total quantity does the tape diagram represent?
	5. What value does each individual part of the tape diagram represent?
	6. How many of each type of vehicle were registered in August?

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 14 non-commercial vehicles, there were 5 commercial vehicles. If there were 108 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?

Exercises

1. The ratio of the number of people who own a smartphone to the number of people who own a flip phone is 4:3. If 500 more people own a smartphone than a flip phone, how many people own each type of phone?
2. Sammy and David were selling water bottles to raise money for new football uniforms. Sammy sold 5 water bottles for every 3 water bottles David sold. Together they sold 160 water bottles. How many did each boy sell?
3. 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 2:3. At the end of the day, Ms. Johnson and Ms. Siple folded a total of 300 report cards. How many did each person fold?
4. At a country concert, the ratio of the number of boys to the number of girls is 2:7. If there are 250 more girls than boys, how many boys are at the concert?
5. The Business Direct Hotel caters to people who travel for different types of business trips. On Saturday night there is not a lot of business travel, so the ratio of the number of occupied rooms to the number of unoccupied rooms is 2:5. However, on Sunday night the ratio of the number of occupied rooms to the number of unoccupied rooms is 6:1 due to the number of business people attending a large conference in the area. If the Business Direct Hotel has 432 occupied rooms on Sunday night, how many unoccupied rooms does it have on Saturday night?
6. Peter is trying to work out by completing sit-ups and push-ups in order to gain muscle mass. Originally, Peter was completing five sit-ups for every three push-ups, but then he injured his shoulder. After the injury, Peter completed the same amount of exercises as he did before his injury, but completed seven sit-ups for every one push-up. During a training session after his injury, Peter completed eight push-ups. How many push-ups was Peter completing before his injury?
7. Tom and Rob are brothers who like to make bets about the outcomes of different contests between them. Before the last bet, the ratio of the amount of Tom’s money to the amount of Rob’s money was 4:7. Rob lost the latest competition, and now the ratio of the amount of Tom’s money to the amount of Rob’s money is 8:3. If Rob had $280 before the last competition, how much does Rob have now that he lost the bet?
8. A sporting goods store ordered new bikes and scooters. For every 3 bikes ordered, 4 scooters were ordered. However, bikes were way more popular than scooters, so the store changed its next order. The new ratio of the number of bikes ordered to the number of scooters ordered was 5:2. If the same amount of sporting equipment was ordered in both orders and 64 scooters were ordered originally, how many bikes were ordered as part of the new order?
9. At the beginning of 6th grade, the ratio of the number of advanced math students to the number of regular math students was 3:8. However, after taking placement tests, students were moved around changing the ratio of the number of advanced math students to the number of regular math students to 4:7. How many students started in regular math and advanced math if there were 92 students in advanced math after the placement tests?
10. During first semester, the ratio of the number of students in art class to the number of students in gym class was 2:7. However, the art classes were really small, and the gym classes were large, so the principal changed students’ classes for second semester. In second semester, the ratio of the number of students in art class to the number of students in gym class was 5:4. If 75 students were in art class second semester, how many were in art class and gym class first semester?
11. Jeanette wants to save money, but she has not been good at it in the past. The ratio of the amount of money in Jeanette’s savings account to the amount of money in her checking account was 1:6. Because Jeanette is trying to get better at saving money, she moves some money out of her checking account and into her savings account. Now, the ratio of the amount of money in her savings account to the amount of money in her checking account is 4:3. If Jeanette had $936 in her checking account before moving money, how much money does Jeanette have in each account after moving money?

Lesson 3- Solving Problems with Equivalent Ratios Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Classwork/ Partner Practice \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 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 1250 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?

5. 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 were 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.

6. 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.

Lesson 3- Solving Problems with Equivalent Ratios Name:

Exit Ticket/HW

1. When Carla looked out at the school parking lot, she noticed that for every 2 minivans, there were 5 other types of vehicles. If there are 161 vehicles in the parking lot, how many of them are not minivans?

2. Students surveyed boys and girls separately to determine which sport was enjoyed the most. After completing the boy survey, it was determined that for every 3 boys who enjoyed soccer, 5 boys enjoyed basketball. The girl survey had a ratio of the number of girls who enjoyed soccer to the number of girls who enjoyed basketball of 7:1. If the same number of boys and girls were surveyed and 90 boys enjoy soccer, how many girls enjoy each sport?

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