Building Concepts: Comparing Ratios

TEACHER NOTES

Lesson Overview

This TI-Nspire™ lesson allows students to reason about ratio tables, which helps their understanding of what a ratio describes in a context and what quantities in equivalent ratios have in common.

When comparing ratios students should be aware that the rows (or columns) of a ratio table are multiples of each other.

Learning Goals

1. Develop strategies for comparing ratios;
2. use ratio tables to solve problems;
3. understand how addition and multiplication relate to the values in a ratio table;
4. recognize that strategies such as finding differences are not generally useful for comparing ratios.

Prerequisite Knowledge

Comparing Ratios is the fifth lesson in a series of lessons that explore the concepts of ratios and proportional reasoning. This lesson builds on the concepts of the previous lessons. Prior to working on this lesson students should have completed *Building a Table of Ratios* and *Ratio Tables.* Students should understand:

- the concepts of ratios and equivalent ratios;
- how to complete multiplication tables.

Vocabulary

- **common multiples:** a common multiple of two numbers is a number that is a multiple of each number.

Lesson Pacing

This lesson should take 50–90 minutes to complete with students, though you may choose to extend, as needed.

Lesson Materials

- Compatible TI Technologies:

  TI-Nspire CX Handhelds, TI-Nspire Apps for iPad®, TI-Nspire Software
- Comparing Ratios_Student.pdf
- Comparing Ratios_Student.doc
- Comparing Ratios.tns
- Comparing Ratios_Teacher Notes
- To download the TI-Nspire activity (TNS file) and Student Activity sheet, go to http://education.ti.com/go/buildingconcepts.

Class Instruction Key

The following question types are included throughout the lesson to assist you in guiding students in their exploration of the concept:

Class Discussion: Use these questions to help students communicate their understanding of the lesson. Encourage students to refer to the TNS activity as they explain their reasoning. Have students listen to your instructions. Look for student answers to reflect an understanding of the concept. Listen for opportunities to address understanding or misconceptions in student answers.

Student Activity: Have students break into small groups and work together to find answers to the student activity questions. Observe students as they work and guide them in addressing the learning goals of each lesson. Have students record their answers on their student activity sheet. Once students have finished, have groups discuss and/or present their findings. The student activity sheet can also be completed as a larger group activity, depending on the technology available in the classroom.

Additional Discussion: These questions are provided for additional student practice, and to faciliate a deeper understanding and exploration of the content. Encourage students to explain what they are doing and to share their reasoning.

Mathematical Background

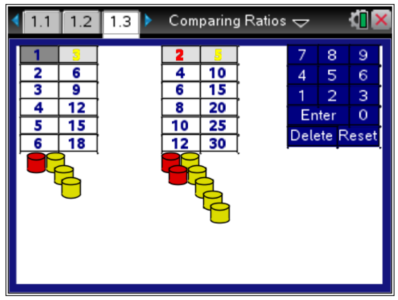
The TI-Nspire™ lesson *Comparing Ratios* allows students to reason about ratio tables, which helps their understanding of what a ratio describes in a context and what quantities in equivalent ratios have in common. For example, in determining which orange juice is more "orangey," students should note that all equivalent ratios will have the same ratio of water to orange juice and so will taste the same. They can then compare another ratio of water to orange juice by generating equivalent ratios and looking for the same amount of water, the same amount of orange juice, or the same total. To compare how "orangey" each mixture is, they can compare any entry within a ratio table for one mixture with any entry from the ratio table for the other mixture. Students should be aware that the rows (or columns) of a ratio table are multiples of each other. If students do not think multiplicatively, a common error is to make additive comparisons. For example, students may think incorrectly that the ratios for water to orange juice, 1:3 and 3:5, are equivalent because the difference between the number of cups of water and orange juice in both mixtures is the same, or because one could be made from the other by adding 2 cups of water and 2 cups of orange juice. This misconception is directly addressed in the suggested discussion questions for the lesson.

Part 1, Page 1.3

Focus: What are some strategies for comparing ratios?

Page 1.3 displays ratio tables for two different ratios. The tables compare two different mixtures of red and yellow paint. Selecting a row in either table displays the number of cans of paint for that row. New ratios can be entered in the top row. Select a cell in the top row, and set the ratio by typing in a value using keypad on the screen or on the handheld. **Enter** generates tables of equivalent ratios. **Delete** removes the values in a table. The **Reset** returns to the original screen.

As students explore the activity, they should compare two ratios by looking at tables of equivalent ratios for each given ratio. They will also compare the ratios by identifying common values for the same quantity in the two labels.



TI-Nspire Technology Tips

Use the cells in top row to set the ratio.

Enter button or enter generates tables of equivalent ratios

Use Delete or del to clear the content of the cell.

Use the tab key to toggle between cells in the tables.

Use **Reset** button or ctrl del will reset the document.

Class Discussion

Have students…	Look for/Listen for…
Compare two ratios by looking at tables of equivalent ratios for each given ratio.	
John uses 1 can of red paint for every 3 cans of yellow paint. Abbie uses 2 cans of red paint for every 5 cans of yellow.	
• ***What are the ratios for the two mixtures of paint?***	Answer: One mixture is 1 red can to 3 yellow cans or 1:3, and the other is 2 red cans to 5 yellow cans or 2:5.
• ***John made the table on the left side of the page represent the number of cans of red and yellow paint according his ratio. Which of his mixtures would be the reddest?***	Answer: All of the ratios in the table at the left are equivalent to 1:3, and so all of the mixtures in the table will be the same shade of red. The total amount of paint changes for each row of the table but not the ratio of red to yellow.
• ***Select the fifth row in the table at the left. Describe what has changed***	Answer: 5 cans of red paint and 15 cans of yellow paint are displayed.

Class Discussion (continued)

- ***Without changing anything on John's table, think of a way to select a row in Abbie's table (on the right) to compare the amount of red to yellow in the two mixtures. Check your thinking using the TNS activity.***

  Answer: If you get the same number of yellow cans in both mixtures, you can compare the amount of red and see which mixture is redder. Selecting the cell with 15 in the table on the right gives you 15 cans of yellow paint and 6 cans of red paint. This is 1 more can of red paint than the other mixture for the same amount of yellow paint, so paint mixed in the ratio 2 red to 5 yellow is redder.

- ***Based on your work above, which of the two ratios will produce paint that is the redder? Explain your reasoning.***

  Possible answer: Abbie will have the redder paint mixture because when they both have 15 cans of yellow paint in their mixtures. She has 6 cans of red paint while John only has 5.

Student Activity Questions—Activity 1

1. **Select the Reset button to return to the original display. Think of another strategy to compare the two mixtures to see which is redder. Check your strategy using the TNS activity and explain how it supports your reasoning.**

   Possible answer: Students might suggest getting the same number of cans of red paint in both mixtures and seeing which mixture has the fewer number of cans of yellow paints. For example, 6:18 and 6:15. In the example, 6:15 would be the redder mixture.

> **Teacher Tip:** The following question addresses the misconception that you can compare ratios by finding differences. One strategy to help students understand why this does not work is to have students share several different methods for comparing ratios and note that the difference strategy does not produce the same result because adding a number to each value in a ratio does not maintain the balance or proportion of the original ratio.

2. **Reset and change one ratio to 4 cans of red paint to 3 cans of yellow paint and the other to 6 cans of red paint to 4 cans of yellow paint. Select Enter to generate the two tables after you have entered the ratios.**

   a. **Explain at least two ways to decide which mixture is redder.**

   Possible answer: One way is to highlight the rows in both tables with 12 cans of red paint. The ratio shows that for the same number of cans of red paint, the 6 to 4 mixture has only 8 cans of yellow paint while the 4 to 3 mixture has 9 cans of yellow paint. So the 6:4 is redder. Another way is to look for the same number of yellow cans in both mixtures and see which has more red paint – for example, for 12 cans of yellow, the 4:3 mixture has 16 cans of red paint, but the 6:4 has 18 cans of red paint so it is redder.

Student Activity Questions—Activity 1 (continued)

b. **Betina said, "For 4 to 3, there are 3 red to 3 yellow and 1 red left over. But for 6 to 4, there are 4 red to 4 yellow with 2 red cans left over. This means that the ratio 6:4 is redder because there are more red cans." Do you agree with Betina? Explain your reasoning.**

Answer. The 6:4 mixture is redder, but her reasoning is not correct. Think about 3 to 2 and 6 to 4. In the first ratio there is 1 red can left over, and in the second, there are 2. So by Betina's reasoning, the second mixture should be redder. However, the two ratios are equivalent, so the two mixtures are the same. She is confusing adding with the multiplicative idea of equivalent ratios.

c. **Carmela suggested looking at the rows that both had 24; 24:18 in the 4:3 table and 36:24 in the 6:4 table. What would you say to Carmela?**

Possible answer: You are comparing 24 red cans of paint for one ratio to 24 cans of yellow paint in the other. You cannot really tell any difference unless you are comparing the same things, like both reds or both yellows.

d. **Why is it important when comparing two mixtures to have either the same number of cans of red paint in both mixtures or the same number of cans of yellow paint in both mixtures?**

Answers will vary. Possible answer: The only way to compare is to work from something in common, which could either be the amount of red paint, yellow paint, or it could be the total number of cans.

3. a. **How would you use the cans of yellow paint to find the redder of two mixtures if one mixture was 7 cans of red paint to 2 cans of yellow paint and another was 8 cans of red paint to 3 cans of yellow paint?**

Answers will vary. Possible answer: One suggestion might be to create the same number of yellow cans and see how the number of red cans compare. You can do this by making them both 6, multiplying the values in the ratio 7:2 by 3 to get 21:6 and the values in 8:3 by 2 getting 16:6. Comparing 21:6 to 16:6, the ratio 21:6 (or 7:2) has more red for the same number of yellow, so it is redder.

b. **Check your answer using the TNS activity.**

Answers will vary. Students should discuss how their answers compare to the TNS file.

c. **How would you use the cans of red paint to find the redder mixture of the two described in part a?**

Possible answer: One suggestion might be to find equivalent ratios for both of the mixtures that have the same number of cans of red paint and see how the numbers compare in relation to the cans of yellow paint. You can make them both have 56 cans of red paint; for 7:2, the equivalent ratio would be 56:14, and for 8:3, the equivalent ratio would be 56:21. The ratio 7:2 has the least amount of yellow for the same amount of red, so it is the redder.

Class Discussion

One mixture of orange juice contains 5 cans of water to 4 cans of orange concentrate. Another contains 7 cans of water to 6 cans of orange concentrate.

Have students…	**Look for/Listen for…**
• ***Describe how you can use the cans of water to compare which mixture is more orange. Check your answer using the TNS file***.	Answer: Find equivalent ratios for 5:4 and 7:6 with the same number of cans of water. If both have 35 cans of water, the ratios will be 35:28 and 35:30. The mixture that has the greater amount of orange concentrate will be more orange, so 35:30, which is 7:6 will be more orange
• ***Describe how you can use the cans of orange concentrate to see which mixture is the more "orangey"? Check your answer using the TNS activity.***	Answer: Find equivalent ratios for 5:4 and 7:6 with the same number of cans of orange concentrate. If both have 12 cans of orange concentrate, the ratios will be 15:12 and 14:12. The mixture that has the least amount of water will be more orange so 14:12, which is 7:6 will be more orange.
• ***Veronica says that she can tell what to do by thinking about common multiples of the numbers in the ratios. What do you think she means?***	Possible answer: Equivalent ratios are made from multiples of the values in a base ratio. If you are looking for something common in tables of equivalent ratios, you need to consider multiples of the base ratios and that means looking for common multiples.

Review the concept of *common multiples.* A number that is a multiple of two or more numbers is a common multiple for those numbers. Have students circle the common multiples in a ratio table.

Additional Discussion

Have students…	**Look for/Listen for…**
Use the TNS activity to help explain reasoning.	
• ***John uses 1 can of red paint for every 3 cans of yellow paint. Abbie uses 2 cans of red paint for every 5 cans of yellow. If Abbie and John each had 12 cans of red paint, how many cans of yellow paint would each have? Explain how you found your answers.***	Answer: You can see from the table that Abbie would have 30 cans of yellow paint. To keep the ratio 1:3, if John had 12 cans of red, he would need 3 times as much yellow, so John would have 36 cans of yellow paint.

Additional Discussion (continued)

- ***Suppose Abbie has only 1 can of yellow paint. How much red paint must she use to get a paint mixture in her ratio?***

Answer: Abbie would have $\frac{2}{5}$ cans of red paint to keep the ratio 2:5. You could find the answer by dividing each value in the ratio by 5 to get the unit ratio $\frac{2}{5}$:1

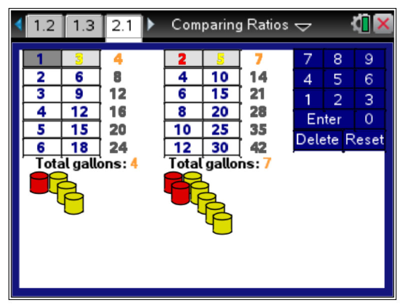
- ***Suppose Abbie has only 1 can of mixed paint. How much red paint and how much yellow paint are in the pail?***

Answer: Abbie would have $\frac{2}{7}$ cans red paint to $\frac{5}{7}$ cans of yellow paint because if she had 2 cans of red and 5 cans of yellow, she would have 7 cans all together. So if she has only 1 can, it has to be divided into 7 parts of which 2 are red and 5 are yellow, or $\frac{2}{7}$ and $\frac{5}{7}$.

Part 2, Page 2.1

Focus: Using total amount as a basis for comparing ratios.

The tables on page 2.1 function in the same way as those on page 1.3. Each table, however, has an additional column that lists the total number of cans of red paint and cans of yellow paint.



Class Discussion

Have students…

Look for/Listen for…

Compare two ratios by looking at tables of equivalent ratios for each given ratio.

- ***How does the total number of cans of paint help you figure out which mixture will be redder?***

Answer: When the two mixtures both total 28 cans of paint, the 1:3 mixture has only 7 cans of red paint while the 2:5 mixture has 8 cans of red paint. Thus, the fractional amount of red for the 2:5 mixture $\left(\frac{8}{28}\right)$ is greater than the fractional amount of red for the 1:3 mixture $\left(\frac{7}{28}\right)$.

Class Discussion (continued)

• ***Set the ratio 1:3 in the table on the left, and change the ratio in the table on the right to 3:5. Which of the two mixtures is redder? Explain your reasoning.***	Answer: When both rows total 8 cans of paint, the 1 to 3 mixture has 2 red and 6 yellow, and the 3 to 5 mixture has 3 red to 5 yellow. The fractional amount of red in the first mixture, $\frac{2}{8}$, is less than the fractional amount of red in the second, $\frac{3}{8}$. The mixture with 3 red and 5 yellow is redder.
• ***Identify the rows where the total amount of paint is the same. Make a conjecture about the next rows that will have the same totals.***	Possible answer: A total of 8 from the rows 2:6 and 3:5; a total of 16 from the rows 4:12 and 6:10; a total of 24 from 6:18 and 9:15. Given the pattern, 8, 16, 24, 32 would be the next common total. The ratios would be 8:24 and 12:20. The common totals are multiples of 8, the sum of the 3 cans of red and 5 cans of yellow paint.
• ***Test your conjecture about comparing rows that have the same total by changing the ratios for the mixtures to 2:3 and 3:4.***	

Student Activity Questions—Activity 2

The following question addresses the misconception that you can compare ratios by finding differences.

1. **Consider two mixtures:**

   Mixture 1: 1 can of red paint to 4 cans of yellow paint

   Mixture 2: 4 red cans of red paint to 7 cans of yellow paint

   Tori says these will both be the same shade of red because to get Mixture 2, you add 3 cans of red paint to the 1 can of red in Mixture 1; and add 3 cans of yellow paint to the 4 cans of yellow paint in Mixture 1 (1:4 ratio) to get Mixture 2 (4:7 ratio). What would you say to Tori?

   Possible answer: You cannot compare ratios by finding differences. One way to think is to use unit rates or the number of cans of yellow paint for every one can of red paint. In Mixture 1, the ratio is 1:4 and the unit rate is $\frac{4}{1}$, or 4 cans of yellow to 1 can of red. In Mixture 2, the ratio is 4:7, the unit rate is $\frac{7}{4}$; there are $\frac{7}{4}$ cans of yellow to every 1 red can, which is the same as $1\frac{3}{4}$ yellow to 1 red. Since 7/4 is less than 4/1, a mixture of 7 yellow cans to 4 red cans of paint is redder than a mixture of 4 yellow cans to 1 red can.

2. Describe three different strategies for comparing ratios.

Answer: If the ratios are *a*:*b* and *c*:*d*, you can compare the ratios if you can generate equivalent ratios so the first quantities are the same or so the second quantities are the same. You can find equivalent ratios that have common totals and compare proportions of the totals.

Class Discussion

Have students…	Look for/Listen for…
Answer the following and explain your reasoning in each case.	
• ***Tess traveled 2 meters in 5 seconds; Ana traveled 5 meters in 9 seconds. Which girl was faster?***	Answer: Ana was faster because if they had both traveled 10 meters, it would have taken Tess 25 seconds and Ana only 18 seconds.
• ***Which faucet leaks the most water: a faucet that drips 6 ounces every 10 minutes or one that drips 8 ounces every 12 minutes?***	Answer: If they both dripped 24 ounces, it would take the first one 40 minutes and the second one 36 minutes, so the second one leaks the most. Or in 15 minutes, the first would drip 9 ounces and the second one would drip 10 ounces.

Additional Discussion

Have students…	Look for/Listen for…
Explain your reasoning in each case.	
Which of the following can be solved using the strategy of finding a common total?	
• ***Which is more cranberry tasting: 3 cups of water to 1 cup of concentrate or 7 cups of water to 3 cups of concentrate?*** • ***Which is the better deal: 5 cans for $3 or 7 cans for $4?*** • ***Which will use more nails for 20 feet of board; 3 nails per 1 foot or 6 nails for every 3 feet?***	Answer: Only the first one can be done using the common total strategy because you can add the cups of water and concentrate to get a total of number of cups of liquid. You cannot add the dollars to the cans for 8 or 11 of anything, so cannot get totals to compare. The same is true of the nails in the boards; you cannot add nails and feet.

Additional Discussion (continued)

Answer each of the previous questions.

Describe your strategy.

Possible answer: In 3 cups water to 1 cup concentrate. 1 cup out of the total of 4 cups is concentrate; in 7 cups water to 3 cups concentrate, 3 cups out of the total of 10 cups is concentrate. That gives $\frac{1}{4} = \frac{5}{20}$ and $\frac{3}{10} = \frac{6}{20}$, so the 7 cups water to 3 cups concentrate will more cranberry tasting.

Possible answer: 5 cans for $3 is the same as 20 cans for $12 and 7 cans for $4 is the same as 21 cans for $12. The better deal is 7 cans for $4.

Possible answer: 3 nails for 1 ft is the same as 9 nails for 3 ft, which is more nails than 6 nails for 3 ft.

Sample Assessment Items

After completing the lesson, students should be able to answer the following types of questions. If students understand the concepts involved in the lesson, they should be able to answer the following questions without using the TNS activity.

1.

Class	Boys	Girls
Class 1	12	9
Class 2	14	10
Class 3	16	12
Class 4	18	15

Adapted from PISA, 2012

The table above shows the number of boys and girls in four classes.

a. Which of the classes have the same ratio of boys to girls

Answer: Class 1, 12:9; Class 2, 14:10; Class 3, 16:12; Class 4, 18:15. Class 1 and Class 3 have the same ratio because they are both equivalent to 4:3.

b. Does Class 2 or Class 4 have a greater ratio of boys to girls?

Answer: Class 2 at 14:10 is equivalent to 7:5, and Class 4 at 4 18:15 is equivalent to 6:5. Class 2 has a greater ratio of boys to girls.

c. Which of the four classes has the greatest ratio of boys to girls?

Answer: Class 2 has the greatest ratio of boys to girls. Classes 1 and 3 both have a ratio of 4 boys to 3 girls. Comparing that to Class 2 (7 boys to 5 girls) by getting equivalent ratios with the same number of girls, would mean 20 boys to 15 girls for Classes 1 and 3 and 21 boys to 15 girls for Class 2. (Note that Class 4 had a smaller ratio than Class 2 from part b).

2. Which is the more strawberry flavored: 3 cups of strawberries to $1\frac{1}{2}$ cups of yogurt or 5 cups of strawberries to 2 cups of yogurt?

Answer: Answer: 5 cups of strawberries to 2 cups of yogurt is the more strawberry flavored. 3: $1\frac{1}{2}$ is equivalent to 2:1 or 4:2. And 5:2 is a greater ratio of strawberries to yogurt than 4 strawberries to 2 cups of yogurt.

3. Which company has the smallest ratio of defective bolts to non-defective bolts? Company A, which produces 2 defective bolts for every 300 non-defective bolts, or Company B, which produces 3 defective bolts for every 420 non-defective bolts?

Answer: Company A is 2:300, equivalent to 1:150 and Company B is 3:420, equivalent to 1:140. Company A has the smallest ratio of defective to non-defective because they produce 1 defective for every 150 good ones, while Company B produces 1 defective for every 140 good ones.

Student Activity Solutions

In these activities you will work together to use ratio tables to solve problems. After completing each activity, discuss and/or present your findings to the rest of the class.

Activity 1 [Page 1.3]

1. Select the Reset button to return to the original display. Think of another strategy to compare the two mixtures to see which is redder. Check your strategy using the TNS activity and explain how it supports your reasoning.

   Possible answer: Students might suggest getting the same number of cans of red paint in both mixtures and seeing which mixture has the fewer number of cans of yellow paints. For example, 6:18 and 6:15. In the example, 6:15 would be the redder mixture.

2. Reset and change one ratio to 4 cans of red paint to 3 cans of yellow paint and the other to 6 cans of red paint to 4 cans of yellow paint. Select Enter to generate the two tables after you have entered the ratios.

   a. Explain at least two ways to decide which mixture is redder.

   Possible answer: One way is to highlight the rows in both tables with 12 cans of red paint. The ratio shows that for the same number of cans of red paint, the 6 to 4 mixture has only 8 cans of yellow paint while the 4 to 3 mixture has 9 cans of yellow paint. So the 6:4 is redder. Another way is to look for the same number of yellow cans in both mixtures and see which has more red paint – for example, for 12 cans of yellow, the 4:3 mixture has 16 cans of red paint, but the 6:4 has 18 cans of red paint so it is redder.

   b. Betina said, “For 4 to 3, there are 3 red to 3 yellow and 1 red left over. But for 6 to 4, there are 4 red to 4 yellow with 2 red cans left over. This means that the ratio 6:4 is redder because there are more red cans.” Do you agree with Betina? Explain your reasoning.

   Answer. The 6:4 mixture is redder, but her reasoning is not correct. Think about 3 to 2 and 6 to 4. In the first ratio there is 1 red can left over, and in the second, there are 2. So by Betina’s reasoning, the second mixture should be redder. However, the two ratios are equivalent, so the two mixtures are the same. She is confusing adding with the multiplicative idea of equivalent ratios.

   c. Carmela suggested looking at the rows that both had 24; 24:18 in the 4:3 table and 36:24 in the 6:4 table. What would you say to Carmela?

   Possible answer: You are comparing 24 red cans of paint for one ratio to 24 cans of yellow paint in the other. You cannot really tell any difference unless you are comparing the same things, like both reds or both yellows.

   d. Why is it important when comparing two mixtures to have either the same number of cans of red paint in both mixtures or the same number of cans of yellow paint in both mixtures?

   Answers will vary. Possible answer: The only way to compare is to work from something in common, which could either be the amount of red paint, yellow paint, or it could be the total number of cans.

3. a. How would you use the cans of yellow paint to find the redder of two mixtures if one mixture was 7 cans of red paint to 2 cans of yellow paint and another was 8 cans of red paint to 3 cans of yellow paint?

Answers will vary. Possible answer: One suggestion might be to create the same number of yellow cans and see how the number of red cans compare. You can do this by making them both 6, multiplying the values in the ratio 7:2 by 3 to get 21:6 and the values in 8:3 by 2 getting 16:6. Comparing 21:6 to 16:6, the ratio 21:6 (or 7:2) has more red for the same number of yellow, so it is redder.

b. Check your answer using the TNS activity.

Answers will vary. Students should discuss how their answers compare to the TNS file.

c. How would you use the cans of red paint to find the redder mixture of the two described in part a?

Possible answer: One suggestion might be to find equivalent ratios for both of the mixtures that have the same number of cans of red paint and see how the numbers compare in relation to the cans of yellow paint. You can make them both have 56 cans of red paint; for 7:2, the equivalent ratio would be 56:14, and for 8:3, the equivalent ratio would be 56:21. The ratio 7:2 has the least amount of yellow for the same amount of red, so it is the redder.

Activity 2 [Page 2.1]

1. Consider two mixtures:

Mixture 1: 1 can of red paint to 4 cans of yellow paint

Mixture 2: 4 red cans of red paint to 7 cans of yellow paint

Tori says these will both be the same shade of red because to get Mixture 2, you add 3 cans of red paint to the 1 can of red in Mixture 1; and add 3 cans of yellow paint to the 4 cans of yellow paint in Mixture 1 (1:4 ratio) to get Mixture 2 (4:7 ratio). What would you say to Tori?

Possible answer: You cannot compare ratios by finding differences. One way to think is to use unit rates or the number of cans of yellow paint for every one can of red paint. In Mixture 1, there are 1 cans of red to 4 cans of yellow; the ratio is 1:4 and the unit rate $\frac{1}{4}$. In Mixture 2, the ratio is 4:7, the unit rate is $\frac{7}{4}$; there are $\frac{7}{4}$ yellow cans to every 1 red can, which is the same as $1\frac{3}{4}$ yellow to 1 red.. Comparing $1\frac{3}{4}$ cans of yellow to 1 can of red and 4 cans of yellow to 1 can of red, a mixture of 7 yellow cans to 4 red cans of paint is redder than a mixture of 4 yellow cans to 1 red can.

2. Describe three different strategies for comparing ratios.

Answer: If the ratios are a:b and c:d, you can compare the ratios if you can generate equivalent ratios so the first quantities are the same or so the second quantities are the same. You can find equivalent ratios that have common totals and compare proportions of the totals.