

Math: Grade 6, Lesson 12, Ratios and Rates

**Lesson Focus:** Compare Ratios

**Practice Focus:** Students will focus on practicing what they have learned about equivalent ratio relationships as they use tables to compare ratios and solve problems.

**Objective:** Students will use ratio tables to compare ratios and rates with a focus to solve real world and mathematical problems.

**Key Vocabulary:** compare, equivalent ratio, and equivalent rate

**TN Standards:** 6.RP.A.3

**Teacher Materials:**

- White board and markers
- Printed set of problems and independent practice
- Student Practice Packet

**Student Materials:**

- Paper and a pencil, and a surface to write on
- Calculator, optional

Teacher Do	Student Do
<p><u>Opening</u> (1 min)</p> <p><b>Hello! Welcome to Tennessee's At Home Learning Series for math! Today's lesson is for all our 6<sup>th</sup> graders out there, though all children are welcome to tune in. This lesson is the twelfth in our series.</b></p> <p><b>My name is ____ and I'm a ____ grade teacher in Tennessee schools! I'm so excited to be your teacher for this lesson! Welcome to my virtual classroom!</b></p> <p><b>If you didn't see our previous lesson, you can find it on the TN Department of Education's website at <a href="http://www.tn.gov/education">www.tn.gov/education</a>. You can still tune in to today's lesson if you haven't see any of our others. But, it might be more fun if you first go back and watch our other lessons since we'll be talking about things we learned previously.</b></p> <p><b>Today we will be learning about generating equivalent ratios and rates in mathematics! Before we get started, to participate fully in our lesson today, you will need:</b></p> <ul style="list-style-type: none"> <li>• Paper and a pencil, and a surface to write on</li> <li>• Calculator, optional</li> </ul> <p><b>Ok, let's begin!</b></p>	<p>Students get materials ready for the lesson.</p>
<p><u>Intro</u> (3 min)</p> <p><b>Let's get started with a problem to get your brain engaged.</b> [Write the problem and table on the board as you talk through it.]</p>	<p>Students participate in the introduction discussion by completing the question. Pauses are given for student response. This</p>

Dimensions of Rectangular Base				
	Model A	Model B	Model C	Model D
Width (cm)	5	10	15	20
Length (cm)	8	16	24	32

The given table lists the dimensions of four models' rectangular bases. Look at the table of values. Describe a pattern shown in the table. [pause]

What pattern did you notice about the width? [pause] You're right, the width is multiples of 5 ( $5 \times 1$ ,  $5 \times 2$ ,  $5 \times 3$ ,  $5 \times 4$ ).

What pattern did you notice about the length? [pause] It is multiples of 8 ( $8 \times 1$ ,  $8 \times 2$ ,  $8 \times 3$ ,  $8 \times 4$ ,  $8 \times 5$ ). In previous lessons, we used multiplication and division to generate ratios. Today we're going to create ratio tables to use them to compare ratios and solve problems.

Teacher Model (12 min)

Objective 1: Comparing ratios

[Write the problem on the board as you read it or display it.]

**Dustin had 3 hits for every 8 at bats. Adrian had 4 hits for every 10 at bats. Who has the better hits to bats ratio? Do we have any baseball fans out there? [pause] Me too. We want to have the best at base ratio, so let's learn how to calculate it.**

As we work through this problem, I want you to think about how you can compare ratios to solve a problem. The original ratios are difficult to compare because none of the terms are the same. A ratio table helps us organize the terms so that we can generate equivalent ratios. Draw this table on your paper with me.

Dustin		Adrian	
Hits	At Bats	Hits	At Bats
3	8	4	10

Now let's extend and complete the ratio tables until the number of at bats is the same in each table. How do you

introduction will allow students to think about looking for multiplicative patterns. This knowledge will help students generate equivalent ratios and rates.

Objective #1:

Students will be creating a ratio table to help provide structure to the math problem. This will help them be able to generate equivalent ratio tables. Students will listen to the teacher do a think aloud working a contextual problem modeling the thought process for a problem from the start of the problem through finding the solution.

Students draw the table on their paper.

generate the numbers in each column to find equivalent ratios? [pause] When do you think they will equal the same at bats? [pause] Let's complete it and see if you are right. [Talk through the multiplication as you complete the table. You can draw the x 2, x 3, x 4, x5 to make connections for students about what is occurring.]

Dustin		Adrian	
Hits	At Bats	Hits	At Bats
3	8	4	10
6	16	8	20
9	24	12	30
12	32	16	40
15	40		

Let's interpret the chart. Dustin gets 15 hits for every 40 at bats. Adrian gets 16 hits for every 40 bats. So who has the better at bats ratio? [pause] You're right! Adrian gets more hits in 40 at bats, he has the better hits to bats ratio.

If we had stopped at 12 hits, would you have come to the same conclusion? [pause] Yes, Dustin reaches 12 hits at 32 at bats and Adrian reaches 12 hits at 30 at bats. So Adrian still has a better at bat ratio.

Objective 2: Compare ratios to solve problems  
[Write or display the problem as you read with the students. You can draw a rectangle for each tank with each ratio in the rectangle.]

Due to compatibility and size restriction, only certain types of fish can live together in a tank. If there are 15 mollies in each tank with the right ratios shown under the tanks, which tank has more fish?



Let's make a table to show the ratios of guppies to mollies in Tank 1 and Tank 2.

Students respond.

Students respond.

Objective #2:  
Students will compare ratios using a ratio table to solve problems. They will recognize that sometimes we need to find the total amount after we complete the ratio table in order to compare the amounts.

Students will make the table, multiply to complete the table, and add to find the total amount in

<p style="text-align: center;">Tank 1</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>Guppies</th><th>Mollies</th></tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> <p style="text-align: center;">Tank 2</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>Angelfish</th><th>Mollies</th></tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	Guppies	Mollies													Angelfish	Mollies													<p>order to compare the amount of fish.</p>
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<p><b>Let's multiple by 2, x 3, x 4, and x 5.</b> [Fill in the chart as you multiply. The highlighted values show where there are 15 mollies in each tank.]</p> <p>Tank 1</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>Guppies</th><th>Mollies</th></tr> </thead> <tbody> <tr><td>4</td><td>5</td></tr> <tr><td>8</td><td>10</td></tr> <tr><td>12</td><td>15</td></tr> <tr><td>16</td><td>20</td></tr> <tr><td>20</td><td>25</td></tr> </tbody> </table> <p>Tank 2</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>Angelfish</th><th>Mollies</th></tr> </thead> <tbody> <tr><td>2</td><td>3</td></tr> <tr><td>4</td><td>6</td></tr> <tr><td>6</td><td>9</td></tr> <tr><td>8</td><td>12</td></tr> <tr><td>10</td><td>15</td></tr> </tbody> </table> <p><b>Let's look at the original question. We want to know which tank has more fish. So, what do we need to do next?</b> [pause] <b>Right, we need to find the total number of fish in each tank when it has 15 mollies. Find the total and tell me which one has more fish.</b> [Pause for students to add.] <b>Which tank has more fish?</b> [Pause and add beside your chart the totals as you read the answers.] <b>Tank 1 has 12 guppies + 15 mollies = 27 fish and tank 2 has 10 angelfish + 15 mollies = 25 fish. Since 27 is greater than 25 you're right, tank 1 has more fish.</b></p> <p>Tying the learning together:  <b>We learned that we can use ratio tables to compare ratios and solve a ratio problem by finding equivalent ratios that have corresponding terms that are the same. We've done a couple of problems together, and you're doing great! Let's transition to you trying some problems and then we'll discuss them together.</b></p>	Guppies	Mollies	4	5	8	10	12	15	16	20	20	25	Angelfish	Mollies	2	3	4	6	6	9	8	12	10	15	<p>Students respond.</p> <p>Tying the learning together:          Student will listen to the teacher connect how the ratio table allow them to generate equivalent ratios.</p>				
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<p><u>Guided Practice</u> (8 min)</p> <p><b>Let's look at another problem.</b>          [Write or display the problem as you read it.]</p> <p><b>1. Scott is making a snack mix using almonds and raisins. For every two 2 cups of almonds in the snack mix, there are 3 cups of raisins. Ariel is making a snack mix that has 3 cups of almonds for every 5 cups of sunflower seeds. If Scott and Ariel each use 6 cups of almonds to make a batch of snack mix, who would make a larger batch?</b></p>	<p>Students will work through problems to compare ratios. The teacher will work alongside the students in the gradual release process.</p>																												

How can we use a ratio tables to represent Scott's and Ariel's snack mixes? Draw a table on your paper. [Pause and draw the table below.] Below is one way you could write your table.

Scott's Snack Mix in Cups					
Almonds					
Raisins					

Ariel's Snack Mix in Cups					
Almonds					
Sunflower Seeds					

Take a minute to complete the table. Then use the table to find who make a larger batch if they each use 6 cups of almonds. [pause for students to solve the problem.]

Let's work this problem, and you compare it to your work.

[As you fill in the table, discuss x 2, x3, x4, x5.]

Scott's Snack Mix in Cups					
Almonds	2	4	6	8	10
Raisins	3	6	9	12	15

Ariel's Snack Mix in Cups					
Almonds	3	6	9	12	15
Sunflower Seeds	5	10	15	20	25

Can we answer the question? [pause] No, we need to find the total cups in each recipe. Scott has 6 cups of almonds + 9 cups of raisins for a total of 15 cups. Ariel has 6 cups of almonds + 10 cups of sunflower seed for a total of 16 cups. So who has the larger recipe? [pause] Right, Ariel does. She will have 16 cups of mix.

Let's look at another problem together.

[Write or show the problem as you read it.]

If there are 6 goldfish in each tank with the ratios shown below, which tank has more fish?

Tank 1  
1 Gouramis: 2 Goldfish

Tank 2  
2 Tetras: 3 Goldfish

Students draw the table.

Complete the ratio table.

**Take a minute to make your ratio tables.** [Pause, then write the tables on the board.]

**Tank 1**

Gouramis	Goldfish

**Tank 2**

Tetras	Goldfish

**Now, generate the ratios in the table.** [Pause for the students to complete the table. The highlighted values show the row for 6 goldfish. You may star or circle your table as you go over the problem below.]

**Tank 1**

Gouramis	Goldfish
1	2
2	4
3	6
4	8
5	10

**Tank 2**

Tetras	Goldfish
2	3
4	6
6	9
8	12
10	15

**Now, which tank has more fish when there are 6 goldfish?**  
 [pause] **What do you need to do to answer this question?**  
 [pause] **Right, you'll need to find the total amount of fish in each tank. Do that now, and then we'll discuss.** [pause]  
**Which tank has more fish?** [pause] **You're right! Tank 2 has more fish because 10 is greater than 9.**

Additional Problems (if needed):

**1. To make plaster, Kevin mixes 3 cups of water with 4 pounds of plaster powder. Jenny makes plaster using a ratio of 4 cups of water to 5 pounds of plaster powder. If they each use 12 cups of water to make plaster. Who will make more plaster?**

**2. If there are 3 gouramis in each tank with the ratios below, which tank has more fish?**

**Tank 1**

**5 Swordtails: 2 Gouramis**

**Tank 2**

**2 Angelfish: 3 Gouramis**

Independent Practice (1 min)

**Great work! Today, we reviewed ways to generate equivalent ratios and use them to compare ratios. I hope**

## PBS Lesson Series

<p><b>you're seeing some connections to problems you can solve around your house! You sure did a great job! After the video, you will have some problems to practice on your own. I will show you the independent practice problems now, or you can find them in the student practice for this lesson posted on our website, <a href="http://www.tn.gov/education">www.tn.gov/education</a>. [Teacher shows student practice page under document camera or camera zooms in on student practice page.]</b></p> <p><b>Good luck and thanks for hanging with me today!</b></p>	
<p><u>Closing</u> (1 min)</p> <p><b>Students, I enjoyed reviewing comparing ratios with you! Thank you for inviting me into your home. I look forward to seeing you in our next lesson in Tennessee's At Home Learning Series! Bye!</b></p>	

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