



Ratio Rumble Teacher Guide

Ratio Rumble is available to play at mathsnacks.org and on iPad via the Apple Store.

Ratio Rumble is a game similar to *Bejeweled* in which students pick a character and play a different opponent at each level. There are 14 levels to the game. Students move from simple two part ratios {1 : 2} to harder, more complex 3 part ratios {1 : 2 : 4} and decimal ratios {1.5 : 3}. Players are provided with a ratio recipe and they are expected to create that ratio or an equivalent ratio by selecting from colored potions on the game board. This game can be used to introduce ratios and *does not* require pre-teaching.

Time Required: Two gaming sessions: 40 minutes each. Bonus activity: 30 minutes

Learning Objectives:

By playing *Ratio Rumble* and engaging in the recommended bonus activities, students will be able to:

- Identify and build equivalent ratios.
- Use multiplication and division to derive equivalent ratios.
- Organize equivalent ratios into a table.

Vocabulary: Ratio, equivalent ratio, multiple

Vocabulary in Spanish: Razón, razón equivalente, múltiplo, múltiple

Materials and Technology required:

- Access to computers and the Internet

Common Core State Standards Covered

Standard	Standard Description
4.OA.4	Gain familiarity with factors and multiples
6.RP	Understand ratio concepts and use ratio reasoning to solve problems.
6.RP.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
6.RP.2	Understand the concept of a unit rate a/b associated with the ratio $a:b$ with b not equal to 0, and use rate language in the context of a ratio relationship.
6.RP.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g. by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
7.RP	Ratios and Proportional Relationships
7.RP.1	Compute unit rates associated with ratios and fractions, including ratios of lengths, areas and other quantities measured in like or different units.
7.RP.2	Recognize and represent proportional relationships between quantities.

Preliminary Preparation

1. Please play the game so that you understand the game mechanics and how the math concepts are taught during gameplay. The games are a fun way for students to learn, and teachers also enjoy them.
2. Secure the proper number of computers for each student to play the game.
3. Make sure **Ratio Rumble** is open on all computers before taking the class to the computer lab. This will maximize game playing time in the lab.

Game Session 1 (40 minutes)

Note: There is no need to *teach* ratios before going to the computer lab. We suggest having the students experience the game first. It is also important to encourage students to talk and discuss while they are playing the game. Keep the sound at a manageable level, but do not have students mute the sound.

1. Allow students to play the game for 15–20 minutes.
2. Have students pause the game, and lead a discussion with the students about the gameplay. **(Limit discussion to 10 minutes.)**
 - What do you like about this game?
 - What are some things that make this game challenging?
 - Can anyone give classmates hints about how to defeat their opponent?
 - What math do you see in this game so far?
 - What is the fastest way to clear a level? (Ask this to see if any of the students figured out that if the ratio is 1:2, they can also clear the level with 2:4 or 3:6.)
3. After the discussion, allow students to continue to play the game for an additional 20 minutes.
4. Once students have finished playing for 40 minutes, ask the students the following questions:
 - What do you think a ratio is?
 - What is an equivalent ratio?
 - If I give you the ratio 1:2, can you give me examples of equivalent ratios?
 - Why are equivalent ratios important in the game?

Encourage students to play *Ratio Rumble* at home.



Ratio Rumble can be played at [MathSnacks.org](https://www.mathsnacks.org) or on iOS mobile device: <https://itunes.apple.com/us/app/ratio-rumble/id592807496?mt=8>



On the level select screen, type the "shift" and the "c" key on the keyboard to open up levels. This is helpful for students at home, they can pick up where they left off in class.

Bonus Activity and Discussion Questions (30 minutes)

Hands-On Ratios

For some students, it is important to their learning to experience creating ratios with concrete items. The activity outlined below offers them the opportunity to create ratios using manipulatives.

Supplies:

Three different sets of chips, stones or other manipulatives. There should be at least 20 of each different manipulative.

Directions:

1. Divide students into groups of 2–4 students.
2. Pass out a stack of chips, stones or other manipulatives of at least three colors or shapes. There should be at least 20 of each color/shape so that students can build equivalent ratios.
3. Give the students the ratio 2 red: 3 blue. Have students create this ratio using the manipulatives.
4. Have students build **equivalent** ratios using the manipulatives. Make a list of these on the board using a table format. (Note: red and blue are arbitrary labels; use labels that match the manipulatives you give students.)

Red	Blue
2	3
4	6 x2 (multiple of 2)
6	9 x3 (multiple of 3)
7	12 x4 (multiple of 4)
10	15 x5 (multiple of 5)

5. Ask the following questions:
 - a. What operation are you using to create equivalent ratios?
Answer (multiplication or division). A misconception students have at first is that you create ratios by adding or subtracting the same number from both sides. It is important that students realize that equivalent ratios are derived using multiplication and division.
 - b. How is this the same as *Ratio Rumble*?
 - c. Why is it important to label the equivalent ratios?
Answer: One blue and two red isn't the same as one red and two blue. Make sure students understand labeling is important.
4. If students need another whole class example, give the students the ratio 3:5 and repeat the same procedure as above.
5. Now assign each group three different ratios and have them build equivalent ratios with their manipulatives. Have students create a table of equivalent ratios for each ratio you give them. Use differentiated instruction when assigning ratios to groups and make adjustments as needed. Below is a list of ratios of varying difficulty.

Bonus Activity and Discussion Questions (continued)

Use the following list of ratios for this activity. *Make sure to specify* the **color** or **shape** that goes with each number to stress the importance of labeling. Have students build an equivalence table like the table in step 4 for some of the ratios below.

Easy	Decimals	Three-Number Ratios
1:3	.5 : 1	1:1:2
2:4	.5 : 2	1:2:3
2:5	1.5 : 3	2:3:5
3:4	.5 : 1.5	1:2:4

Note: For the decimal ratios, encourage students to first build an equivalent whole number ratio. Once they know the equivalent whole number ratio, it is easier to create other equivalent ratios. For example, see the ratios below:

Red	Blue	
.5	1	original ratio
1	2	x2 multiple of 2
1.5	3	x3 multiple of 3
2	4	x4 multiple of 4

Gaming Session 2 (40 minutes)

Allow students to play *Ratio Rumble* again. Allow students to use the CHEAT (shift + C on the level select screen) for the game during this second session so that they do not have to start from the beginning. Tell students to start at the level where they finished the last time they played.

1. Ask students to think about the bonus activity as they play the game again and encourage the use of equivalent ratios as they play the game.
2. Allow students to play for 15–20 minutes and then ask them to pause the game.
3. Ask the following questions:
 - How do the later levels in *Ratio Rumble* get more challenging?
 - What are some strategies you have used to get through more challenging levels?
 - How are the later levels related to the bonus activity?
4. Have students continue to play for as long as time allows.

The Bow (Tie it all together to bring out the main ideas)

What is an equivalent ratio?

1. What operations do you use to build equivalent ratios?
2. What is a good way to organize a list of equivalent ratios?
3. Why is labeling ratios important?
4. What did you learn about ratios that you did not know before playing *Ratio Rumble*?

Encourage students to keep playing *Ratio Rumble* at home.

Encourage them to try to get through all levels of the game.