

Lesson Plan Title

Rates and Ratios

Discipline and Topic

This is a 6th grade mathematics course over an 80 minute block. The students will be solving real-world problems involving ratios and rates.

Target Population

The lesson is for 20 6th grade students in a general eighth grade mathematics classroom. This classroom period is 80 minutes long.

- **General Characteristics:** The class consists of 20 students, with 9 boys and 11 girls. The class has two minority students, who are Asian.
- **Entry Competencies:** The students have to be able to convert a rate into a ratio and create equivalent ratios, as a prerequisite. The students will use this prior knowledge to solve real-world problems.
- **Learning Styles:** 15 students are visual learners, 4 student is kinesthetic, and 1 is a logical/mathematical learner. There are two students that have a 504 plan and get a separate location for testing and extended time.

Curriculum Alignment and Standards

This lesson follows the local standards and the NYS Common Core Learning Standards. The middle school CCLS are called the story of ratios, so ratios are a major emphasis.

NYS Learning Standards: 6.RP.3.b

Understand ratio concepts and use ratio reasoning to solve problems.

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.
 - b. Solve unit rate problems including those involving unit pricing and constant speed. For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?

Mathematical Practices:

4. Model with mathematics.
5. Use appropriate tools strategically.

ISTE NETS Standards

Teacher:

Facilitate and inspire student learning and creativity

- Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

Design and develop digital age learning experiences and assessments

- Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the Standards•S.

Students:

Creativity and innovation

- Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

Goals

The students will use rates and ratios to solve real-world problems.

Objectives (State)

- Given a rate, the student will find the unit rate, with 90% done correctly.
- Given a ratio, the student will list equivalent ratios, with 95% done correctly.
- Given a worksheet, the 6th grade student will convert the given rate into a ratio and solve a real-world problem, with 85% done correctly.

Underlying Educational Theory

This lesson utilizes Constructivist learning and Cooperative learning. The students will be working in pairs and collaborating on the real-world problems. As an extension project, students will use a hands-on approach and create a PowerPoint to show what they have learned.

Materials Description and Timing

The students have a block schedule and have class for 80 minutes. The students will be using the NYS CCLS modules, watching two videos using the laptops from the laptop cart, and creating a PowerPoint using what they learned.

Warm-up (7 Minutes)

- This is used to settle the students down when they come in and get them focused. It also allows the students to refresh on the prerequisite information needed for the lesson.

Introduction to lesson (3 Minutes)

- Tell the students the sequence for the class. (see below).

Videos (10 minutes)

https://www.khanacademy.org/math/arithmetic/rates-and-ratios/ratios_and_proportions/v/simplifying-rates-and-ratios

https://www.khanacademy.org/math/arithmetic/rates-and-ratios/rates_tutorial/v/finding-unit-rates

Lesson (30)

- Guided Practice (10 minutes)
- Pair work (20 minutes)

Exit ticket (10 minutes)

Start of PowerPoint assignment (20 minutes)

Supplemental Materials/Links

NYS CCLS modules (6th grade-Module 1, lesson 17) can be accessed from www.engageny.org.
Two videos from Khanacademy with links above.

Laptop Cart

Lesson

Warm-up:

- The student will work on the warm-up for 5 minutes. This refreshes the idea of unit rate and equivalent ratios. The class will spend 2 minutes going over it by displaying work from the students using the ELMO, a document camera.

Introduction:

- After the warm-up, tell the students they will watch two videos related to rates and ratios and then (after guided practice) work in pairs on the NYS CCLS 6th grade module 1, lesson 17 class work problems. When completed, they will work on the exit ticket. Lastly, they will begin to work on a PowerPoint which will demonstrate what they have learned in this unit with ratios and rates.

Modeling using videos:

- The class will be shown two videos that introduce solving rate and ratio problems using the laptop cart. Students will be able to pause or re-watch the videos, so that they can learn at their own pace. This will set up a foundation for today's lesson. They will spend a maximum of 10 minutes on the videos. There will be several minutes allotted for setup of the laptops.

Guided Practice:

- The teacher will guide the students through the example problems. The teacher should only be a facilitator during this time. This should be a student-centered environment.

Group Work:

- The students will work in pairs on the remaining classwork problems. The pairs were chosen earlier to match up strong students with weaker students, so that the stronger student can help the weaker student. The teacher will circulate around the room and help any student in need and to assess how the lesson is going, thus far. When the students have complete the work, use the ELMO to display volunteer work samples to show the rest of the class. Make corrections, if needed, but ask the students for feedback instead of telling them if it is right or wrong.

Exit Ticket:

- The students will take five minutes and work on the exit ticket. They will be allowed a maximum of 10 minutes, but five should be good for the majority of students. This exit ticket will assess the students understanding of the lesson, as well.

PowerPoint assignment:

- The students will be asked to create a PowerPoint presentation on one of the major themes from this unit. They have a choice of rates, unit rates, ratios, or equivalent ratios. This will be graded as a pass/fail. This is because they will get an actual grade from their technology teacher on the creation of the PowerPoint (see below). They need a minimum of two slides, with a minimum of two pictures, and to cover one of the key topics stated above. Before completion, the students need to check with the teacher to ensure they have met the minimum requirements. Extra credit will be given to the ones who surpass the minimum requirements and create an engaging presentation. This project will be a cross-curriculum assignment. They will have time later in the week in technology class to continue working on and finish the assignment.

Closure:

- The students will put away the laptops back into the correct spots on the laptop cart. The teacher will assign the problem set for homework. Remind the students that the end-of-module assessment will be given a week from Friday.

Assessment of Students

The students will be assessed by circulating the room during pair work, by the exit ticket, the homework problem set, the PowerPoint assignment (pass/fail), and an end-of-module exam. These exams will be graded using the CCLS rubric provided in the teacher's module

Evaluation of Students and Lesson

The lesson will be considered successful if there are no failures on the exit ticket or PowerPoint presentation and 80% of the students get an 80% or better on the exam at the end of the module. There is an expectation that no students will fail the end-of-module exam. Any students who are assessed prior to being in need will be required to stay activity period for remediation.

Low Tech Modification

If the videos are not accessible, the teacher will explain the process and model several problems, instead. Then the teacher will guide several questions. If the students do not have access to presentational software, i.e. PowerPoint, then they will make posters to hang up around the room. Materials will have to be used from the Art room.