TEACHER'S GUIDE

MATH SERIES 2

RATIOS

23 Minutes

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FOR USE IN. Mathematics

LEVEL: Grades 7-9

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EDUCATIONAL OBJECTIVES:
To help the students understand:

- **ratios and equivalent ratios**
- **expressing ratios in fractions or whole numbers**
- **calculating and comparing ratios of quantities**
- **calculating and comparing rates of production**
- **ratios in scaled drawings**
- **using scaled drawings to calculate actual lengths**
- **calculating in metric units, equivalence in imperial units**

BACKGROUND INFORMATION:
A ratio, which is the comparison of two numbers, is the quotient obtained when the first number is divided by the second, nonzero number. A ratio may be considered as an ordered pair of numbers, and finding the ratio of two numbers is a binary operation. Since a ratio is the quotient of two numbers divided in a definite order, care must be taken to write each ratio in its intended order! To find the ratio of two numbers, both must first be expressed in the same unit of measure.

BEFORE SHOWING THE VIDEO:
It is useful to draw the students' attention to the fact that the video will address a very important concept that they often encounter in their daily lives. Describe situations in which it would be useful to know the ratios of events. What is the ratio of the number of gallons of gas in an automobile tank to the capacity of the tank? As we shall see, the gas indicator expresses that relationship as a ratio, say one-half full or one-quarter full. The same unit of measure used is a gallon. However a rate, such as a rate of speed, which is distance divided by time, is a comparison of two quantities which have different units of measure, say miles divided by hours.

CONTENT OF THE VIDEO:
A young male runner, after an ankle sprain, is given an **increasing ratio** of alternately running to walking by his coach over a five-week period as his ankle strengthens. The concept of **equivalent ratios** is explained. The importance of having the **first and second numbers in the correct order** is made vividly clear.
Exercises in finding equivalent ratios are presented and after the video is paused for the students to calculate the answers, the correct answers are shown.
The ratio is then calculated into units of time. If the runner has a ratio of 2: 1 for running and walking, in one hour, the three units each have the same time value of 20 minutes each, and there is 40 minutes of running for 20 minutes of walking in one hour. Each increasing ratio of running to walking in one hour is calculated into a common unit of time, and then to the ratio of time spent running and walking in one

hour...
There is a review of the above.
In the kitchen, the runner, now hungry, **converts the fractional quantities** in a recipe for pancake batter **into equivalent ratios of whole numbers.** The calculations continue for flour, milk, pancakes with more flour or less flour. Additional calculations are needed to **find equivalent ratios to** make a large quantity of batter.
To answer the question of **who makes pancakes at a faster rate,** the runner or his younger brother, calculations are made as to who produces more pancakes per minute, that is at a faster rate. Again, **one must be careful of the order of the numbers in the division**; one way becomes pancakes per minute, while reversing the numbers becomes minutes per pancake.
Exercises in calculating rates are given, the video may be paused, and then the answers are shown..
There is a **review** of the above.
Our runner receives an Email from a friend in Paris who walked from the Arch of Triumph to the Notre Dame Cathedral. To find the actual distance, he measures the distance with a ruler on a **map with a scale (ratio) of 1:25,000 using centimeters**. First, the **equivalent lengths between the metric and Imperial systems** of measurement are carefully explained. After the **calculations in centimeters using a calculator, the** result in kilometers is converted into miles.
Two equivalent ratios read as an equation are a **proportion.**
For determining the longer distance his friend took to travel from the Louvre to the Palace at Versailles, **he uses a map with a scale (ratio) of 1:300,000.** Again he measures the distance with a ruler in centimeters on the map, and uses a calculator to apply the scale (ratio) to the map measurement to find the actual distance traveled. The metric result is converted into miles. There is a review of the above.

AFTER SHOWING THE VIDEO:

The students may be given the following problems:

1. Express the following ratios in their simplest forms:
   (a)30:35 (b) $\frac{3}{8}:\frac{5}{8}$ (c) l0ft:6in

2. If 10 paper clips weigh 15 grams, what is the weight in grams of 150 paper clips? Express the two equivalent ratios in their simplest forms State the two ratios as a proportion.

3. What is the ratio of five nickels to four quarters?

4. The ratio of two numbers is 1:6 and the sum of the two numbers is *56.* What are the two numbers?

5. The scale on a map is 1: 50,000. if a distance measured on the map is 8 inches what is the acI~al distance in miles?

6. The scale on a map is 1:75,000. If the distance measured on the map is 14 centimeters, what is the actual distance in kilometers? Convert the kilometers to miles.

7. If a bakery is baking pies at the rate of 2 per minute, how many are they baking per hour? Express the two equivalent ratios as a proportion.

8. A sales tax of $63 cents is collected on a sale of $9.00. What is the sales tax a as a percentage of any sale? Express the answer as a ratio in whole numbers

9. If rain is falling at the rate of 1.5 inches per hour, how many inches of rain will fall in x minutes?

Math Series 1, consists of 10 videos:
ALGEBRA: A Piece of Cake Part 1
ALGEBRA: A Piece of Cake Part 2
SLOPES: That's a Bit Steep!
PERCENTAGES: That Make Sense
LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part I
LINEAR EQUATIONS and Their Graphs: Let's Get **it Straight Part 2**
INTEGER OPERATIONS: into the Negative Zone Part I Adding and Subtracting
INTEGER OPERATIONS: Into the Negative Zone Part 2 Multiplying and Dividing
FACTORING IS FANTASTiC Part 1: Common Factors
FACTORING IS FANTASTIC Part 2: Quadratic Trinomials

Math Series *2,* **consists of** 12 videos:
PROBABILITY, Parts 1 & 2
RATIOS
TRIGONOMETRY, Parts 1 & 2
STATISTICS Parts **I & 2**
PROBLEM SOLVING Parts I & 2
GEOMETRIC SOLIDS Parts 1,2, &3

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