KHANACADEMY

CollegeBoard SAT®

Official SAT Practice

Lesson Plans

for Teachers by Teachers

LESSON 6 (1 OF 5 FOR PROBLEM SOLVING AND DATA ANALYSIS)

Ratio, Proportion, Units, and Percentage—Part 1

Ratio, Proportion, Units, and Percentage—Part 2

Subscore: Problem Solving and Data Analysis

Focus: Using ratios and proportions to solve problems

Objective:

Students will

- use ratios and proportions to solve problems.

Before the Lesson:

- ☐ Review Chapter 17 of the *SAT® Study Guide for Students*.
- ☐ Preview the Teacher Notes for this lesson.
- ☐ Make sure you have a way to share the example problems with students.
- ☐ Make sure students have access to Official SAT Practice during class.
- ☐ Preview Part 2 of Ratio, Proportion, Units, and Percentage.

Warm Up | 5 minutes

- Have students complete this example problem independently and then turn to a partner to discuss their work.

  On Thursday, 240 adults and children attended a show. The ratio of adults to children was 5 to 1. How many children attended the show?

  A. 40

  B. 48

  C. 192

  D. 200

Teacher Notes

- See page 210 in Chapter 17 of the *SAT Study Guide for Students* for the solution and explanation.
  - Alternatively, students might set up an equation to solve this problem: Number of children = $1x$; Number of adults = $5x$; Total number of adults and children = 240.

Class Activity—The Length of a Shadow | 25 minutes

- Classic Ratio Example: The length of a shadow.
  - Present students with the shadow scenario below.
    - Have them find various lengths of shadows given different heights of objects.
    - Have them find heights of objects when given the length of a shadow.

  Example: At a given location and time of day, it might be true that a fence post that is 4 feet high casts a shadow that is 6 feet long.

  - What is the ratio of the height of the object to the length of the shadow?
    - Answer: 4 to 6 or $\frac{2}{3}$.
    - This ratio remains the same for any object at the same location and time.
  - How long of a shadow would a 6-foot man cast?
  - How tall would an object with a 12-foot shadow be?

  Have students work in groups and create a scenario of their own that is **directly proportional** like the example above. Have students identify the **constant of proportionality** as they create their scenarios and questions.

Teacher Notes about Ratio and Proportion

- Ratio and proportion is one of the major ideas in mathematics. Introduced before high school, ratio and proportion is a theme throughout mathematics, in applications, in careers, in college mathematics courses, and beyond.
- A ratio represents the proportional relationship between quantities, not the actual quantities themselves.
- Fractions are an especially effective way to represent and work with ratios.
- Ratios on the SAT may be expressed in the form of 3 to 1, $3{:}1$, $\frac{3}{1}$, or simply 3.
- See page 211 in Chapter 17 of the *SAT Study Guide for Students* for further explanation and discussion regarding what makes a situation directly proportional and how the constant of proportionality is defined.
  - In the Classic Shadow Example, the length of an object's shadow is directly proportional to the height of the object, with a constant of proportionality $\frac{3}{2}$. So if you let L be the length of the shadow and H be the height of the object, then $L = \frac{3}{2}H$.

Class Work | 10 minutes

- Have students complete the Basic and Harder Examples for "Ratios, rates, and proportions" in Official SAT Practice on Khan Academy®.
- Remind students to pause the video as soon as they can see the problem. Once students have worked through the problem, have them watch the video to check their work.
- As students watch the videos to check their work, ask them if they completed the problems using the same strategy as shown in the video. Are there more than one way to solve these types of problems?

Wrap-Up: For your term book or word wall | 5 minutes

- Ratio
- Proportion
- Directly proportional
- Constant of proportionality

Homework | 20 minutes

Complete practice problems in Official SAT Practice on Khan Academy in these skill areas:

- Ratios, rates, and proportions.
- Encourage students to move on to the higher skill level once they complete the problems in their current skill level and can "level up."