

## Proportional Relationships

**Short description:** Learn how ratios, tables, and graphs can help identify proportional relationships in this Math Shorts video.

**Long description:** In this video, learn how ratios, tables, and graphs can help identify proportional relationships. In the accompanying classroom activity, students use a classic mathematical task to improve their understanding of ratios and proportions. After watching the video and having a brief class discussion and review of ratios, students work in pairs to determine which of two punch mixtures tastes more like juice. This set of problems extends students' understanding of ratios while requiring them to use both multiplicative and additive reasoning in their responses.

### Activity Text

#### Learning Outcomes

Students will be able to

- identify examples of proportional relationships
- identify proportional situations
- determine whether two quantities are proportional

**Common Core State Standards:** 7.RP.A.3

**Vocabulary:** Ratio, multiplicative, proportional reasoning

**Materials:** Graph paper, juice (grape or other), ginger ale (or water), Making Punch worksheet

### Procedure

#### 1. Watching the Video (5 minutes, whole class)

Show students the video. In discussing the video afterward, emphasize that Carl needs to keep the *ratio* of juice to ginger ale consistent if he wants the punch to taste the same as he makes more and more. This is a *multiplicative* process; he has to double, triple, or quadruple the quantities of both the juice and the ginger ale for the punch to taste the same.

Contrast this with what would happen if he started with a recipe of 2 cups of juice and 1 cup of ginger ale and added 1 more cup of each. Would the punch taste more or less "juicy"? What if he added 5 cups of juice and 5 cups of ginger ale? If Carl took this additive approach, the punch would taste very different from the original recipe.

#### 2. Activity (20 minutes, pairs)

Have students pair up. Distribute the worksheet and have students solve the problems. By presenting them with problems that require them to think both

multiplicatively and additively, students will develop their *proportional reasoning* skills. If needed, allow students to watch the video again as they solve the problems on the worksheet.

Some of the mixtures provided on the worksheet will be proportional; however, many will not be. The students' task is to use proportional reasoning techniques like doubling, halving, and relating to benchmark fractions to figure out how the different mixtures relate. Graphing the mixtures, as shown in the video, can also help them determine which mixture tastes more like juice.

### **3. Conclusion (10 minutes, whole group)**

Review the problems on the worksheet as a class. Ask students to explain how they solved some of the problems in section 2. Examine their logic for examples of ratios and proportional reasoning.

At the end of class, pick one recipe pair from the worksheet and make each version of the punch of juice and ginger ale. Have students taste test to see if they can tell which recipe is "punchier" or "juicier." Does the mathematics confirm the results of taste test?