Many adults would solve the three problems from the video using mathematical procedures similar to those displayed below.

Problem 1: Skylar is going to make a large container of lemonade for a party. The container holds 64 cups. Three scoops of mix are needed to make 8 cups of lemonade. How many scoops of mix does he need for the large container?

Set up a proportion using the information from the problem. One way to do this is shown below.

$$\frac{3 \text{ scoops}}{8 \text{ cups}} = \frac{x \text{ scoops}}{64 \text{ cups}}$$

Cross multiply to solve for x.

$$\frac{3 \text{ scoops}}{8 \text{ cups}} \times \frac{x \text{ scoops}}{64 \text{ cups}}$$

$$3 \cdot 64 = 8 \cdot x$$
$$192 = 8 \cdot x$$
$$24 = x$$

Problem 2a: One bag of popcorn is two and one-half servings. How many servings are there in 18 bags?

Set up a proportion using the information from the problem. One way to do this is shown below.

$$\frac{1 \text{ bag}}{2\ 1/2 \text{ servings}} = \frac{18 \text{ bags}}{x \text{ servings}}$$

Cross multiply to solve for x.

$$\frac{1 \text{ bag}}{2\ 1/2 \text{ servings}} \times \frac{18 \text{ bags}}{x \text{ servings}}$$

$$x = 2\ 1/2 \cdot 18$$
$$x = 45$$

Problem 2b: They are expecting 50 people at the party. How many bags of popcorn will they need?

Set up a proportion using the information from the problem. One way to do this is shown below.

$$\frac{1 \text{ bag}}{2\ 1/2 \text{ servings}} = \frac{x \text{ bags}}{50 \text{ servings}}$$

Cross multiply to solve for x.

$$\frac{1 \text{ bag}}{2\ 1/2 \text{ servings}} \times \frac{x \text{ bags}}{50 \text{ servings}}$$

$$50 = 2\ 1/2 \bullet x$$
$$20 = x$$

Take a closer look at Problem 1 and think about why *cross multiplication* or the *cross products* method works. *Cross products* is a short cut to writing each ratio as an equivalent ratio with a common denominator as shown below. In this case, the common denominator is not the least common denominator, but the product of the two denominators.

$$\frac{3}{8} = \frac{x}{64}$$

$$\frac{3\ (64)}{8\ (64)} = \frac{x\ (8)}{64\ (8)}$$

$$\frac{3\ (64)}{512} = \frac{x\ (8)}{512}$$

Notice that the resulting ratios have the same denominators. If the ratios are equal and the denominators are the same, the numerators must be equal. The numerators are the *cross products*. When using *cross products* do not write the common denominators. Only write the resulting numerators and solve for x.

To solve a problem using *cross multiplication* or the *cross products* method, you must determine how to set up the proportion and then carry out the procedure correctly. Students often have difficulty with this type of problem because they are not sure how to set up the proportion and they do not understand why *cross multiplication* works. Similarly, they often have difficulty recognizing if their answer makes sense. Ratio tables help students use the relationships between numbers in a proportion to solve problems. Once students develop an understanding of the relationships between the numbers in a proportion, *cross multiplication* becomes an efficient way to solve those problems.