Unit 3, Lesson 12

# Solving Problems Involving Fractions

Let's add, subtract, multiply, and divide fractions.

## 12.1 Operations with Fractions

Without calculating, order the expressions according to their values from least to greatest. Be prepared to explain your reasoning.

$\frac{3}{4} + \frac{2}{3}$ $\frac{3}{4} - \frac{2}{3}$ $\frac{3}{4} \cdot \frac{2}{3}$ $\frac{3}{4} \div \frac{2}{3}$

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## 12.2 Situations with $\frac{3}{4}$ and $\frac{1}{2}$

Here are four situations that involve $\frac{3}{4}$ and $\frac{1}{2}$.

- Before calculating, estimate if each answer is greater than 1 or less than 1.
- Write a multiplication equation or division equation for the situation.
- Answer the question. Show your reasoning. Draw a tape diagram, if needed.

1. There was $\frac{3}{4}$ liter of water in Andre's water bottle. Andre drank $\frac{1}{2}$ of the water. How many liters of water did he drink?

2. The distance from Han's house to his school is $\frac{3}{4}$ kilometer. Han walked $\frac{1}{2}$ kilometer. What fraction of the distance from his house to the school did Han walk?


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3. Priya's goal was to collect $\frac{1}{2}$ kilogram of cans to recycle. She collected $\frac{3}{4}$ kilogram of cans. How many times her goal was the amount of cans she collected?

4. Mai's class volunteered to clean a park with an area of $\frac{1}{2}$ square mile. Before they took a lunch break, the class had cleaned $\frac{3}{4}$ of the park. How many square miles had they cleaned before lunch?

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# 12.3 Pairs of Problems

Here are two sets of problems.

A1. Lin's bottle holds $3\frac{1}{4}$ cups of water. She drank 1 cup of water. What fraction of the water in the bottle did she drink?

A2. Lin's bottle holds $3\frac{1}{4}$ cups of water. After she drank some, there were $1\frac{1}{2}$ cups of water in the bottle. How many cups did she drink?

B1. Plant A is $\frac{16}{3}$ feet tall. This is $\frac{4}{5}$ as tall as Plant B. How tall is Plant B?

B2. Plant A is $\frac{16}{3}$ feet tall. Plant C is $\frac{4}{5}$ as tall as Plant A. How tall is Plant C?

C1. $\frac{8}{9}$ kilogram of berries is put into a container that already has $\frac{7}{3}$ kilograms of berries. How many kilograms are in the container?

C2. A container with $\frac{8}{9}$ kilogram of berries is $\frac{2}{3}$ full. How many kilograms can the container hold?

D1. The area of a rectangle is $14\frac{1}{2}$ sq cm and one side is $4\frac{1}{2}$ cm. How long is the other side?

D2. The side lengths of a rectangle are $4\frac{1}{2}$ cm and $2\frac{2}{5}$ cm. What is the area of the rectangle?

E1. A stack of magazines is $4\frac{2}{5}$ inches high. The stack needs to fit into a box that is $2\frac{1}{8}$ inches high. How many inches too high is the stack?

E2. A stack of magazines is $4\frac{2}{5}$ inches high. Each magazine is $\frac{2}{5}$-inch thick. How many magazines are in the stack?


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1. Take turns with your partner to write equations to represent the situations.
   - For each equation that you write, explain to your partner how you know it describes the situation correctly.
   - For each equation that your partner writes, listen carefully to their explanation. If you disagree, discuss your thinking and work to reach an agreement.

2. Your teacher will assign 2 or 3 questions for you to answer. For each question:
   - Estimate the answer before calculating it.
   - Find the answer, and show your reasoning.

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## 12.4 Making Ornaments

Mai, Kiran, and Clare are making dough ornaments together. To make one batch of the dough, they need $\frac{3}{4}$ cup of flour and $\frac{1}{3}$ cup of salt. They each brought the ingredients they had at home.

- Mai brought 2 cups of flour and $\frac{1}{4}$ cup of salt.
- Kiran brought 1 cup of flour and $\frac{1}{2}$ cup of salt.
- Clare brought $1\frac{1}{4}$ cups of flour and $\frac{3}{4}$ cup of salt.

If the students have plenty of the other ingredients in the recipe, how many whole batches of ornaments can they make? Explain your reasoning.

### Lesson 12 Summary

We can add, subtract, multiply, and divide both whole numbers and fractions. Here is a summary of how we add, subtract, multiply, and divide fractions.

- To add or subtract fractions, we often look for a common denominator so the pieces involved are the same size. This makes it easy to add or subtract the pieces.

$$\frac{3}{2} - \frac{4}{5} = \frac{15}{10} - \frac{8}{10}$$

- To multiply fractions, we often multiply the numerators and the denominators.

$$\frac{3}{8} \cdot \frac{5}{9} = \frac{3 \cdot 5}{8 \cdot 9}$$

- To divide a number by a fraction $\frac{a}{b}$, we can multiply the number by $\frac{b}{a}$, which is the reciprocal of $\frac{a}{b}$.

$$\frac{4}{7} \div \frac{5}{3} = \frac{4}{7} \cdot \frac{3}{5}$$


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