Unit 6 Family Support Materials

More Decimal and Fraction Operations

In this unit, students solve multi-step problems involving measurement conversions, line plots, and fraction operations, including addition and subtraction of fractions with unlike denominators. They also explain patterns when multiplying and dividing by powers of 10. Students interpret multiplication as scaling, by comparing products with factors.

Section A: Measurement Conversions and Powers of 10

In this section, students extend their understanding of place value and apply it to perform conversions between different, mostly metric, units.

Students begin by observing that the value of the digit in each place is 10 times the value of the same digit in the place to its right and $\frac{1}{10}$ the value of the same digit in the place to its left. They see that this applies not only to whole-number places but also to decimal places. Students then learn to use exponential notation for powers of 10 and use this notation to represent very large numbers, such as 1 million or 1 billion.

Students convert smaller units to larger units (for example, centimeters to kilometers), and describe the patterns they notice when multiplying and dividing by powers of 10. Students work with the metric system (for example, meters, liters, kilograms, and so on) and the customary system (for example, feet, quarts, pounds, and so on) and develop an understanding of the relative sizes of units of length, volume, and weight. Students use the four operations with whole numbers, decimals, and fractions to solve multi-step word problems involving measurement conversions.

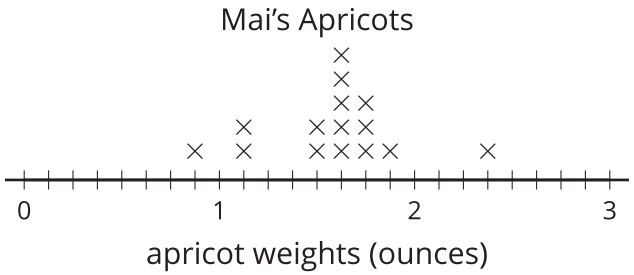
Section B: Add and Subtract Fractions with Unlike Denominators

In this section, students add and subtract fractions and mixed numbers with unlike denominators, and apply this learning to problem solving. Students first encounter problems in which one denominator is a factor of the other (for example, fourths and eighths), so that they will need to change only one denominator. Then students solve problems where the denominators are not related (for example, thirds and fourths). Students conclude that multiplying the denominators or finding a common multiple are

helpful ways to create common denominators.

Students also extend their understanding of line plots. They create line plots, using measurement data in fractional units (halves, fourths, and eighths), and interpret the data on line plots to solve problems such as this, involving the four fraction operations:

Do all of Mai's apricots together weigh more or less than a pound?



Section C: The Size of a Product

In this section, students build on their understanding of multiplication to include the concept of scaling. Students interpret multiplication expressions as a quantity that is resized or scaled by a factor.

Students compare multiplication expressions, without performing the multiplication. In the example shown, students reason that $\frac{7}{6} \times 4$ is greater than the other two expressions because in each expression, 4 is being multiplied by a fraction, and $\frac{7}{6}$ is the greatest of the three fractions.

Which expression represents the greatest product?

$\frac{5}{8} \times 4$ $\frac{7}{6} \times 4$ $\frac{1}{2} \times 4$

Students locate multiplication expressions on a number line, and analyze expressions to determine if the product is greater than, less than, or equal to one of its factors. Students make sense of their learning by recognizing that if a given number is multiplied by:

- a fraction greater than 1, then the product will be greater than the given number.
- a fraction less than 1, then the product will be less than the given number.
- a fraction equal to 1, then the product will be equal to the given number.

Try it at home!

Near the end of the unit, ask your fifth grader to solve the following problems:

- How many kilometers is equal to 200 centimeters?
- $\frac{2}{3} + \frac{2}{9}$
- $\frac{2}{3} + \frac{5}{8}$
- Will $\frac{4}{3} \times 5$ be greater than, less than, or equal to 5? How do you know?

Questions that may be helpful as they work:

- What strategy are you going to use to help you solve the problem?
- Could you have solved the problem in a different way?
- Which problem was easier to solve? Why?

Solution:

- 200 centimeters is equal to 0.002 kilometer.
- $\frac{8}{9}$
- $\frac{31}{24}$ or $1\frac{7}{24}$
- $\frac{4}{3} \times 5$ will be greater than 5. I know this because $\frac{4}{3}$ is greater than one whole. When I multiply 5 by any factor greater than 1, the product will be greater than 5.

Answers may vary. Sample response:

- I know that 3 is a factor of 9, so I found a fraction equivalent to $\frac{2}{3}$ and with a denominator of 9.
- I could have also solved by multiplying the denominators and finding equivalent fractions using the common denominator.
- It was easier to solve $\frac{2}{3} + \frac{2}{9}$ because I only had to change one fraction to get a common denominator. It was also easier to solve because the answer is less than 1 whole, which means I did not need to convert my answer to a mixed number like I had to when I added $\frac{2}{3} + \frac{5}{8}$.