

**Core Focus**

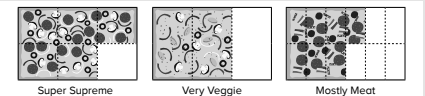
- Common fractions: Subtracting
- Common fractions: Solving word problems involving mixed numbers
- Number: Working with exponential notation and representing numbers with exponents
- Number: One billion and beyond, and exploring place-value patterns

**Common fractions**

- Students build on what they already know about equivalent fractions and strategies for adding fractions to work with subtracting fractions and mixed numbers.
- Area models (e.g. rectangles) and length models (e.g. number lines) help students make sense of subtracting fractions.
- When fractions have different denominators, visual models help students identify which fraction needs to be rewritten so the denominators will be the same.

**7.2 Common fractions: Subtracting (related denominators)**

**Step In** These pizzas were left over after a party.



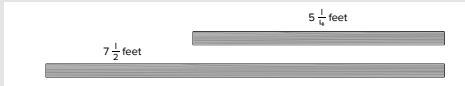
Which pizza had the most left over? How do you know?  
What do you notice about each pair of fractions shown below?  
How do they match the pictures of the pizzas?

In this lesson, students use area models to subtract fractions with related denominators.

- As with addition, the denominators need to be made the same before students can subtract. E.g. students could rewrite  $2\frac{3}{4} - 1\frac{1}{12}$  as  $2\frac{9}{12} - 1\frac{1}{12}$ .
- Students choose whether to subtract the whole numbers and the fractions separately, or to change the mixed numbers to improper fractions before subtracting.

**7.4 Common fractions: Subtracting mixed numbers (related denominators)**

**Step In** Mika bought these two strips of wood to make a picture frame.




How could you calculate the difference in length?  
Look at these students' methods.

Megan subtracted using improper fractions.

$$\frac{15}{2} - \frac{21}{4} = \square$$

Andrea subtracted the whole numbers and then subtracted the fractions.

$$7 - 5 = \square \quad \frac{1}{2} - \frac{1}{4} = \square$$

 The denominators are related, so they only have to change one of them.

In this lesson, students describe strategies for subtracting mixed numbers.

**Ideas for Home**

- Continue to work with your child on their basic multiplication facts. They use those multiplication skills when converting mixed numbers to improper fractions, and when rewriting fractions to have a common denominator. Have your child solve  $4\frac{2}{5} - 1\frac{8}{10}$  using one of the strategies shown in the examples below. Ask them to describe each step as they work.

**Subtract whole numbers and fractions**

$$\begin{aligned} 2\frac{3}{4} - 1\frac{1}{12} \\ 2\frac{9}{12} - 1\frac{1}{12} \\ (2 - 1) + \left(\frac{9}{12} - \frac{1}{12}\right) \\ = 1\frac{8}{12} \end{aligned}$$

**Subtract proper fractions**

$$\begin{aligned} 2\frac{3}{4} - 1\frac{1}{12} \\ 2\frac{9}{12} - 1\frac{1}{12} \\ \frac{33}{12} - \frac{13}{12} \\ = \frac{20}{12} \end{aligned}$$


- Students encounter a new challenge in subtracting mixed numbers that they did not experience with addition. Sometimes, students cannot subtract the whole numbers and fractions separately because the fraction in the first mixed number is less than the second fraction.
- One strategy is to rewrite the first mixed number so its fraction part is greater (by taking 1 from the whole number and using it in fraction form).
- Another strategy is to convert both mixed numbers to improper fractions.

**Ideas for Home**

- Find nine-digit numbers and have your child read them aloud.
- Think of a five-digit number and ask your child to write the number using exponents. E.g.  $3,245 = (3 \times 10^3) + (2 \times 10^2) + (4 \times 10^1) + (5 \times 10^0)$

**7.6 Common fractions: Subtracting mixed numbers with unrelated denominators (decomposing whole numbers)**

**Step In** How could you calculate the difference between the amounts in these two pots?



Why is it necessary to rewrite the fractions?

$$3 \frac{1}{3} - 1 \frac{1}{2} = 3 \frac{2}{6} - 1 \frac{3}{6} = \square$$

Try to subtract the fractions first. What do you notice?

Jack and Naomi share their strategies.

**Jack wrote the mixed numbers as improper fractions to make it easier to subtract.**

$$3 \frac{1}{3} - 1 \frac{1}{2}$$

$$3 \frac{2}{6} - 1 \frac{3}{6}$$

$$\frac{\square}{6} - \frac{\square}{6} = \square$$

What steps do you think he used? Write the missing values in his equation.

**Naomi worked with the mixed numbers.**

$$3 \frac{1}{3} - 1 \frac{1}{2}$$

$$3 \frac{2}{6} - 1 \frac{3}{6}$$

$$2 \frac{8}{6} - 1 \frac{3}{6} = \square$$

What steps do you think she used? Why did she write  $2 \frac{8}{6}$  to help subtract? Write the missing value in her equation.

*I'll have to write  $3 \frac{2}{6}$  in a different way to solve the problem.  $3 \frac{2}{6} = 1 + 1 + \frac{2}{6}$ , or  $2 \frac{8}{6}$*

In this lesson, students solve subtraction problems involving mixed numbers.

**Glossary**

► **Exponential notation** is used to represent multi-digit numbers. It involves repeatedly multiplying a base number. E.g.  $10^3$  is equivalent to  $10 \times 10 \times 10$ . The 10 is the **base** and the 3 is the **exponent**.


**Number**

- Students develop a picture of the quantity of one million using everyday situations and classroom materials. In this module, the emphasis is on place value, with students expanding numbers that have been recorded using **exponential notation**.

**7.10 Number: Working with exponents**

**Step In** Scientists estimate that there are up to one billion bacteria cells in a single teaspoon of soil.

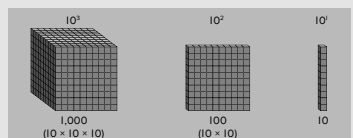
What numeral would you write to match this number?



*We use **billion** to mean 1,000,000,000. In some other countries, billion means 1,000,000,000,000, and they call our billion a **thousand million** or a **milliard**. This can be confusing, so **exponents** are a common way of describing multi-digit numbers.*

Exponents are often used to represent multi-digit numbers. They involve repeatedly multiplying a base number.  $10^3$  is equivalent to  $10 \times 10 \times 10$ . The 10 is the base and the 3 is the exponent.

Look at the picture below.



$10^3$  (1,000)  $(10 \times 10 \times 10)$      $10^2$  (100)  $(10 \times 10)$      $10^1$  (10)

In this lesson, students work with exponential notation.