

# 5.4

## Using Models to Subtract Fractions

**Focus** Use Pattern Blocks, fraction strips, and number lines to subtract fractions.

### Explore



You will need congruent squares, grid paper, and coloured pencils.

Use these rules to create a rectangular design.

The design must be symmetrical.

- One-half of the squares must be red.
- One-third of the squares must be blue.
- The remaining squares must be green.

What fraction of the squares are green? How do you know?

How many squares did you use?

Explain why you used that number of squares.

Describe your design.

Record your design on grid paper.



### Reflect & Share

Compare your design with that of another pair of classmates.

If the designs are different, explain why your classmates' design obeys the rules.

How could you subtract fractions to find the fraction of the squares that are green?

### Connect

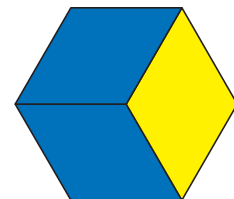
We can use models to subtract fractions.

To subtract  $\frac{2}{3} - \frac{1}{2}$ , we can use Pattern Blocks.

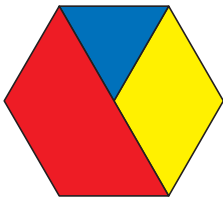
The yellow hexagon represents 1. The blue rhombus represents  $\frac{1}{3}$ .

The red trapezoid represents  $\frac{1}{2}$ .

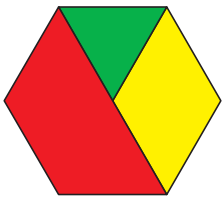
Place 2 blue rhombuses over the hexagon.



To subtract  $\frac{1}{2}$ , place a red trapezoid over the 2 blue rhombuses.



Find a Pattern Block equal to the difference.  
The green triangle represents the difference.



The green triangle is  $\frac{1}{6}$  of the hexagon.  
So,  $\frac{2}{3} - \frac{1}{2} = \frac{1}{6}$

We can also use fraction strips and number lines to subtract.  
To subtract fractions with unlike denominators, we use equivalent fractions.

### Example

Subtract:  $\frac{5}{8} - \frac{1}{4}$

### A Solution

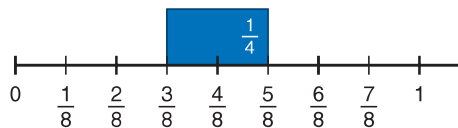
$$\frac{5}{8} - \frac{1}{4}$$

Think addition.

What do we add to  $\frac{1}{4}$  to get  $\frac{5}{8}$ ?

Use a number line that shows equivalent fractions for eighths and fourths. That is, use the eighths number line.

Place the  $\frac{1}{4}$ -strip on the eighths number line with its right end at  $\frac{5}{8}$ .



The left end of the strip is at  $\frac{3}{8}$ .

$$\text{So, } \frac{5}{8} - \frac{1}{4} = \frac{3}{8}$$

Equivalent fractions:

$$\frac{1}{4} = \frac{2}{8}$$

## Practice

Use models.

1. Find equivalent fractions with like denominators for each pair of fractions.

a)  $\frac{1}{2}$  and  $\frac{5}{8}$

b)  $\frac{1}{4}$  and  $\frac{1}{3}$

c)  $\frac{2}{3}$  and  $\frac{1}{6}$

d)  $\frac{3}{5}$  and  $\frac{1}{2}$

2. Is each difference less than  $\frac{1}{2}$  or greater than  $\frac{1}{2}$ ?

How can you tell?

a)  $\frac{5}{6} - \frac{1}{2}$

b)  $\frac{7}{8} - \frac{1}{8}$

c)  $\frac{4}{6} - \frac{1}{3}$

d)  $1 - \frac{5}{6}$

3. Subtract. Sketch pictures to show each difference.

a)  $\frac{3}{4} - \frac{2}{4}$

b)  $\frac{4}{5} - \frac{1}{5}$

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

d)  $\frac{5}{8} - \frac{3}{8}$

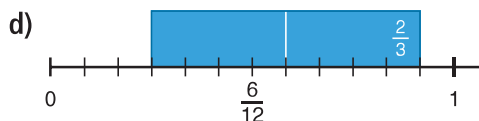
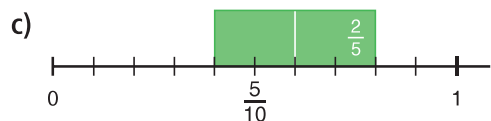
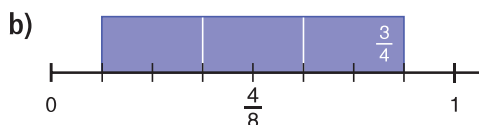
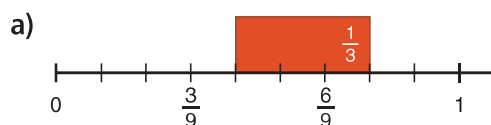
4. a) Write a rule you could use to subtract fractions with like denominators without using number lines or fraction strips.

- b) Write 3 subtraction questions with like denominators.

Use your rule to subtract the fractions.

Use fraction strips and number lines to check your answers.

5. Write a subtraction equation for each picture.



6. Subtract. Sketch pictures to show each difference.

a)  $\frac{3}{8} - \frac{1}{4}$

b)  $\frac{7}{10} - \frac{1}{2}$

c)  $\frac{7}{8} - \frac{1}{2}$

d)  $\frac{5}{6} - \frac{1}{4}$

7. Sergio has the lead role in the school play.

He still has to memorize  $\frac{1}{2}$  of his lines.

Suppose Sergio memorizes  $\frac{1}{3}$  of his lines today.

What fraction of his lines will he have left to memorize?

Show your work.

8. Freida has  $\frac{3}{4}$  of a bottle of ginger ale.  
She needs  $\frac{1}{2}$  of a bottle of ginger ale for her fruit punch.  
How much will be left in the bottle after Freida makes the punch?

9. A cookie recipe calls for  $\frac{3}{4}$  cup of chocolate chips.  
Spencer has  $\frac{2}{3}$  cup. Does he have enough?  
If your answer is yes, explain why it is enough.  
If your answer is no, how much more does Spencer need?

10. Copy and replace each  $\square$  with a digit, to make each equation true.  
Try to do this more than one way.

a)  $\frac{2}{3} - \frac{\square}{\square} = \frac{1}{3}$       b)  $\frac{\square}{\square} - \frac{1}{5} = \frac{3}{5}$       c)  $\frac{\square}{3} - \frac{2}{\square} = \frac{1}{6}$

11. **Assessment Focus** Kelly had  $\frac{3}{4}$  of a tank of gas at the beginning of the week.

At the end of the week, Kelly had  $\frac{1}{8}$  of a tank left.

a) Did Kelly use more or less than  $\frac{1}{2}$  of a tank? Explain.

b) How much more or less than  $\frac{1}{2}$  of a tank did Kelly use?  
Show your work.

12. a) Which of these differences is greater than  $\frac{1}{2}$ ?

Why do you think so?

i)  $\frac{5}{6} - \frac{2}{3}$

ii)  $\frac{5}{6} - \frac{1}{2}$

iii)  $\frac{5}{6} - \frac{1}{6}$

b) Explain how you found your answers to part a.

Which other way can you find the fractions with a difference greater than  $\frac{1}{2}$ ? Explain another strategy.

### Reflect

When you subtract fractions with unlike denominators, how do you subtract?  
Give 2 different examples.  
Use diagrams to show your thinking.