Istation MATH

Unit 48
Operations – Subtracting Fractions with Unlike Denominators

Resource at a Glance

Unit 48
Primary Skills Addressed:
- **Subtracting fractions with unlike denominators**

Supporting Skills:
- **Understanding the meaning of equivalent fractions using a model, such as a fraction strip model and/or number line model**

Istation

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Teacher-Directed Lesson

Lesson Objective

The students will subtract fractions with unlike denominators.

Prerequisite Skills and Knowledge

- Knowing all sums and differences of two one-digit numbers (basic addition and subtraction facts)
- Understanding that two fractions need to represent parts of the same whole before they can be added or subtracted
- Writing both fractions in terms of a new common denominator before adding or subtracting

Materials and Resources

- Teacher Resource 1: Warm-Up Problem 1
    - o Optional: Laminate this sheet and use a dry-erase marker to shade.
- Teacher Resource 2: Warm-Up Problem 2
    - o Optional: Laminate this sheet and use a dry-erase marker to shade.
- Adding Fractions with Unlike Denominators: Student Page (one copy per student)
- Adding Fractions with Unlike Denominators: Teacher Page
- pencils
- colored pencils (light colors) (one per student)
- dry-erase markers (if Teacher Resource Pages are laminated)
- Teacher Note: If printing is not available, whiteboards and markers may be substituted for teacher and student materials.

Additional Accommodations

- If working one-on-one with a student, participate in the student discussion times.
- This lesson can be repeated multiple times using different values to address individual student needs. Make sure that Fraction B is greater than Fraction A.

Vocabulary

denominator – the bottom number of a fraction. This number tells you how many total parts it takes to make a whole.

difference – the answer or amount that results from subtracting two or more numbers

numerator – the top number of a fraction. This is a specified number of equal parts.

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Note: Words in bold are said aloud by the teacher.

Introduction

Today, we are going to create some equivalent fractions. Show Teacher Resource 1: Warm-Up Problem 1. **Here we have two fractions, Fraction A** (point to the fraction model on the left) **and Fraction B** (point to the fraction model on the right)**. Notice that both of these models are divided in the same way. They both have five equal parts. Fraction A represents two-fifths** (point to Fraction A)**. The goal of this activity is to create an equivalent fraction with a different number of parts on this Fraction Model that has not yet been shaded.** Point to Fraction B. **I'm going to use these dots right here to draw a horizontal line on this Fraction Model.** Using a pencil and the dots on Fraction B, draw a horizontal line from left to right. **How many parts do you see on this fraction model now?** *(Ten.)* **Yes. Ten parts. How many parts do you think need to be shaded to make this Fraction Model equivalent to Fraction A?** *(Four of ten parts.)* **That is correct. Watch me shade four of these ten parts now.** Shade the top left and the bottom left parts on Fraction B so the student can see the equivalence. **Can someone tell me why these two fractions are equivalent?** *(Both grids show the same amount; the number of equal parts is different, but the amount of shaded space is the same on both figures; the same amount is shaded on both figures.)* **Those are great observations. You are correct. Two-fifths** (point to Fraction A) **is equivalent to four-tenths** (point to Fraction B) **because both fractions show the same amount. Watch as I write the fraction, four-tenths, under Fraction Model B.** Write $\frac{4}{10}$ in the space provided under Fraction Model B.

Refer to Teacher Resource 2: Warm-Up Problem 2. **Now let's find an equivalent fraction to five-sixths.** Point to Fraction Model A. **Keep in mind that the goal is to create an equivalent fraction with a different number of parts on this Fraction Model that has not yet been shaded.** Point to Fraction Model B. **Notice that both of these models are divided in the same way. They both have six equal parts. Fraction A represents five-sixths.** Point to Fraction A. **In order to create a fraction with a different number of parts, I'm going to use these dots right here to draw a horizontal line on Fraction B. Watch me.** Using a pencil and the dots on Fraction B, draw a horizontal line from left to right. **How many parts do you see on this fraction model now?** *(Twelve.)* **Yes. Twelve parts. So, how many parts do you think need to be shaded to make Fraction B equivalent to Fraction A?** *(Ten of twelve parts.)* **That is correct. Who would like to help me shade two of these six parts now?** Get a volunteer from the group to use a light-colored pencil or dry-erase marker (if Teacher Resource 2 has been laminated) to shade ten of twelve parts on Fraction B. Instruct the student to shade the grid so that the only unshaded parts are the top and bottom parts all the way to the right. **Can you tell me why these two fractions are equivalent?** *(Both grids show the same amount; the number of equal parts is different, but the amount of shaded space is the same on both figures; the same amount is shaded on both figures.)* **Very good! Now we are going to take what we've just learned and add to that.**

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Model

Right now, we are going to subtract some fractions that have unlike denominators. Distribute copies of the student sheet Subtracting Fractions with Unlike Denominators. **Let's look at the first problem on your student sheet. What fractions do you see represented here?** Point to fractions A and B in Problem 1. *(Four-fifths and seven-tenths.)* **Very good. This fraction** (point to Fraction A) **represents four-fifths. I'm going to write four-fifths above the fraction that represents that.** Model writing *4* in the numerator/top space and *5* in the denominator/bottom space above Fraction A. **Now I want to see you write the fraction four-fifths.** Wait for students to fill in the first fraction boxes ABOVE the model of four-fifths.

Now let's look at Fraction Model B. I'm going to write seven-tenths above the model that represents it. Model writing a *7* in the numerator/top space and *10* in the denominator/bottom space above Fraction B. **Now I want to see you write the fraction seven-tenths.** Wait for students to write $\frac{7}{10}$ in the fraction boxes ABOVE the model of seven-tenths. **When we figure out the difference, we will write the correct fraction below Fraction C.**

When we subtract fractions, sometimes it helps us to make sure that both of the fractions that we are subtracting are in the same terms. Does anyone remember what that means? *(Both fraction models need to be divided into the same number of parts.)* **Yes. This means that both fractions need to be divided into the same number of parts. In order to do that, we need to create an equivalent fraction for one of the fractions that we are working with.**

Look with me again at this equation: four-fifths (point to Fraction A) **minus seven-tenths.** Point to Fraction B. **When I look at this fraction model that is divided into five equal parts** (point to Fraction A)**, it looks a lot like this fraction here that is divided into ten equal parts** (point to Fraction B) **without this horizontal line.** Run finger across horizontal line on Fraction B. **Does everyone see that?** Take a moment to ensure that students are looking at Problem 1 and that they are following your explanation. If students seem to be lost, say: **If I divided this fraction** (point to Fraction A) **into ten equal parts, it would have the same number of total parts as Fraction Model B.** Using a pencil and the dots on Fraction A, draw a horizontal line from left to right. **Now it's time for you to divide the fraction four-fifths so it looks like the fraction seven-tenths. Use the dots on both sides of the fraction model to help you draw the straightest line possible.** Wait for students to use the dots to draw their horizontal line. **What do you notice now?** *(Both fractions are in the same terms; both fractions show ten equal parts; both fractions can be subtracted now; it's easier to subtract them because they are in the same terms; it's easier to subtract both fractions because they are both in terms of tenths.)* **Great observations. Just so we can stay focused on the fractions that we are dealing with now, let's write the new fractions that we see below the models. This fraction** (point to Fraction A) **used to represent four-fifths. But we created an equivalent fraction and now it represents eight-tenths.**

Watch as I write eight-tenths below it. Model writing *8* in the numerator/top space and *10* in the

Model (cont.)

denominator/bottom space below Fraction A. **Now I want to see you fill in the fraction eight-tenths.** Wait for students to fill in the first fraction boxes BELOW Fraction A. **This fraction** (point to Fraction B) **still represents seven-tenths. Watch as I write seven-tenths below it.** Model writing *7* in the numerator/top space and *10* in the denominator/bottom space below Fraction B. **Now I want to see you fill in the fraction seven-tenths.** Wait for students to write $\frac{7}{10}$ in the numerator and denominator spaces BELOW Fraction B.

Now let's move to Fraction C. What could we do to this fraction figure to make it look like the other two models? *(We could divide it into the same number of parts as Fraction A and Fraction B; we could make sure that it has the same number of parts as the other addends.)* **That is correct. Since both fractions are part of the same whole and are in terms of tenths, our difference also needs to be in terms of tenths.** Point to Fraction C. **Watch as I draw a horizontal line to divide these five equal parts into ten equal parts.** Use the dots on both sides of Fraction C to draw a horizontal line. **Now it's time for you to divide this fraction model the same way that I have. Use the dots on both sides of the fraction to help you draw the straightest line possible.** Wait for students to use the dots to draw their horizontal line.

Since we are subtracting, that means that we are going to need to take something away from something else in order to determine the difference. These two models represent the two fractions we will be working with. They also represent the same-sized whole. Fraction A (point to Fraction A) **represents eight-tenths – the total amount that we have to work with now. Fraction B** (point to Fraction B) **represents the amount you will be subtracting from Fraction A. Look at Fraction B and tell me what fraction needs to be subtracted from Fraction A to figure out the answer.** *(Seven-tenths.)* **Very good. Seven-tenths is the number of parts that need to be subtracted.**

I'm going to place an *x* on seven parts that we are going to take away on Fraction Model A. Watch. Using a pencil, draw a dark *x* on seven of the eight shaded parts in Fraction Model A. **Now, let me see you place an *x* on seven parts that need to be taken away on Fraction Model A like I just did.**

Remember that Fraction Model B represents the number that needed to be subtracted from Fraction Model A. Now that we have figured out how many parts to subtract from our total, I'm going to draw a line through Fraction Model B to remind us that we don't need to refer to that one anymore. Draw a line through Fraction Model B. **Let me see you draw a line through Fraction Model B on your student sheet now.**

It's time to shade the difference on Fraction Model C. What is eight-tenths minus seven-tenths? *(One-tenth.)* **Yes. Eight-tenths minus seven-tenths is one-tenth. Watch me shade one-tenth on Fraction Model C.** Using a light colored pencil, shade one of ten parts on Fraction C.

Model (cont.)

Now it's your turn. Shade one-tenth on Fraction C and write the fraction below it. Fill in $\frac{1}{10}$ on the teacher copy below Fraction C while the students are filling theirs in.

Remember that our original problem was four-fifths (point to the fraction above Fraction A) **minus seven-tenths** (point to the fraction above Fraction B)**. This fraction eight-tenths** (point to Fraction A and the written fraction below it at the same time) **is the equivalent fraction for four-tenths.**

Four-fifths (point to the fraction above Fraction A) **minus seven-tenths** (point to fraction above Fraction B) **equals one-tenth. Let's write one-tenth below Fraction Model C.**

Guided and Independent Practice

Guided Practice

Now you are going to work a problem with your partner(s).

Remember that both fractions need to be in the same terms before you subtract them. Also remember that you need to use the dots on the fraction figures to draw the straightest lines possible when creating your equivalent fractions.

Problem 2 says two-sixths (point to Fraction A) **minus two-twelfths** (point to Fraction B)**. Write the fraction that you see above Fractions A and B. Since Fraction Model C is not complete yet, I do not want you to write anything above or below that one yet.** Watch as students identify each fraction and write the fraction above each pictorial representation.

Now, work with your partner(s) to put both fractions in the same terms, but do not write the new fractions that you create below the models yet. Remember to use the dots on Fraction A to help you determine the number of parts. Observe student discussion and praise quality thinking. Make sure that students have written fractions above the pictorial models but not the fractions below the models yet. **Talk to your partners about the fractions that you have created and then write the new fractions below your models.** Give students time to fill in $\frac{4}{12}$ below Fraction A and $\frac{2}{12}$ below Fraction B on Problem 2. **Who can tell me which fraction they chose to change?** Solicit answers from each partner group. *(We created an equivalent fraction for two-sixths in terms of twelfths because the fraction model that is divided into six parts looks a lot like the fraction model that is divided into twelve equal parts without the horizontal line.)* **Excellent. What equivalent fraction did you create for two-sixths in terms of twelfths?** *(Four-twelfths.)* **Yes. Make sure that you each have four-twelfths and two-twelfths written below each fraction model in Problem 2.**

Guided and Independent Practice (cont.)

Work with your partner(s) to make sure that the difference is in the same terms as the other two fractions you worked with. Listen to partner groups and praise quality thinking. **Who can tell me what you did?** *(We divided Fraction C into twelve equal parts by drawing a horizontal line from the dot on the left to the dot on the right.)* **That's right. Now you can draw a horizontal line to divide Fraction C into twelve equal parts. This way all three of the fractions will be expressed in the same terms.**

Now it's time for you and your partner(s) to subtract the number of parts that you see on Fraction B from the number of parts that you see on Fraction A. Place an *x* on each of the parts that you want to take away on Fraction A. Once you've subtracted all the parts, you can draw a line through Fraction B. Watch students use their pencils to draw an *x* on two of the four shaded parts of Fraction A. Make sure that they remember to draw a line through Fraction B. **Now it's time for you and your partners to count the number of shaded parts and determine the difference. Remember to shade the difference on Fraction C.**

What is the difference of these two fractions? *(Two-twelfths.)* **That's correct. The difference is two-twelfths.**

Remember that our original problem was two-sixths (point to the fraction above Fraction A) **minus two-twelfths** (point to the fraction above Fraction B)**. This fraction four-twelfths** (point to Fraction A and the written fraction below it at the same time) **is the equivalent fraction for two-sixths.**

Two-sixths (point to the fraction above Fraction A) **minus two-twelfths** (point to fraction above Fraction B) **equals two-twelfths. Let's write two-twelfths below Fraction Model C.**

Great work, everyone!

Independent Practice

You are going to work on a problem on your own. Look at Problem 3 on your student sheet. Think about how we worked the other two problems together and use what you have learned to complete this problem independently.

When students correctly solve the problem, even with teacher guidance, place a sticker at the top of their student sheet or use an established reward system.

Evaluation/Feedback

Review the Independent Practice problem with students. Invite different students to explain the process of adding fractions with unlike denominators. Make sure that they highlight important steps like making sure that all fractions are in the same terms. Make sure to have them think aloud

Evaluation/Feedback (cont.)

when explaining their solution to you so that you will be able to figure out where the breakdown in their understanding occurs.

Answer Key:

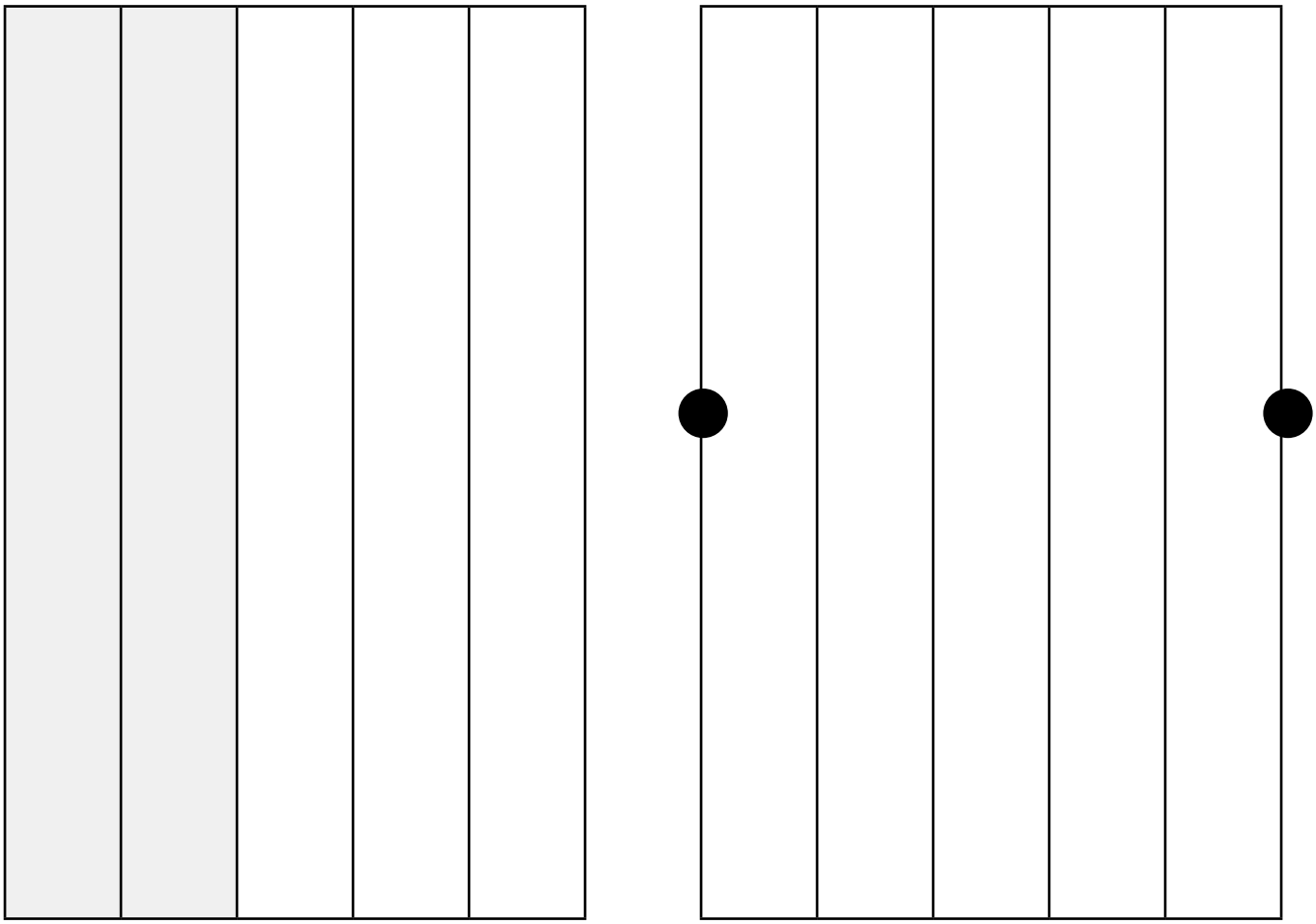
$\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$

Closure

You have worked so hard to subtract fractions with unlike denominators today! Subtracting fractions is a very useful skill, and you'll find that being able to visualize equivalent fractions will help you to subtract fractions mentally, too!

Teacher Resource 1

Warm-Up Problem 1

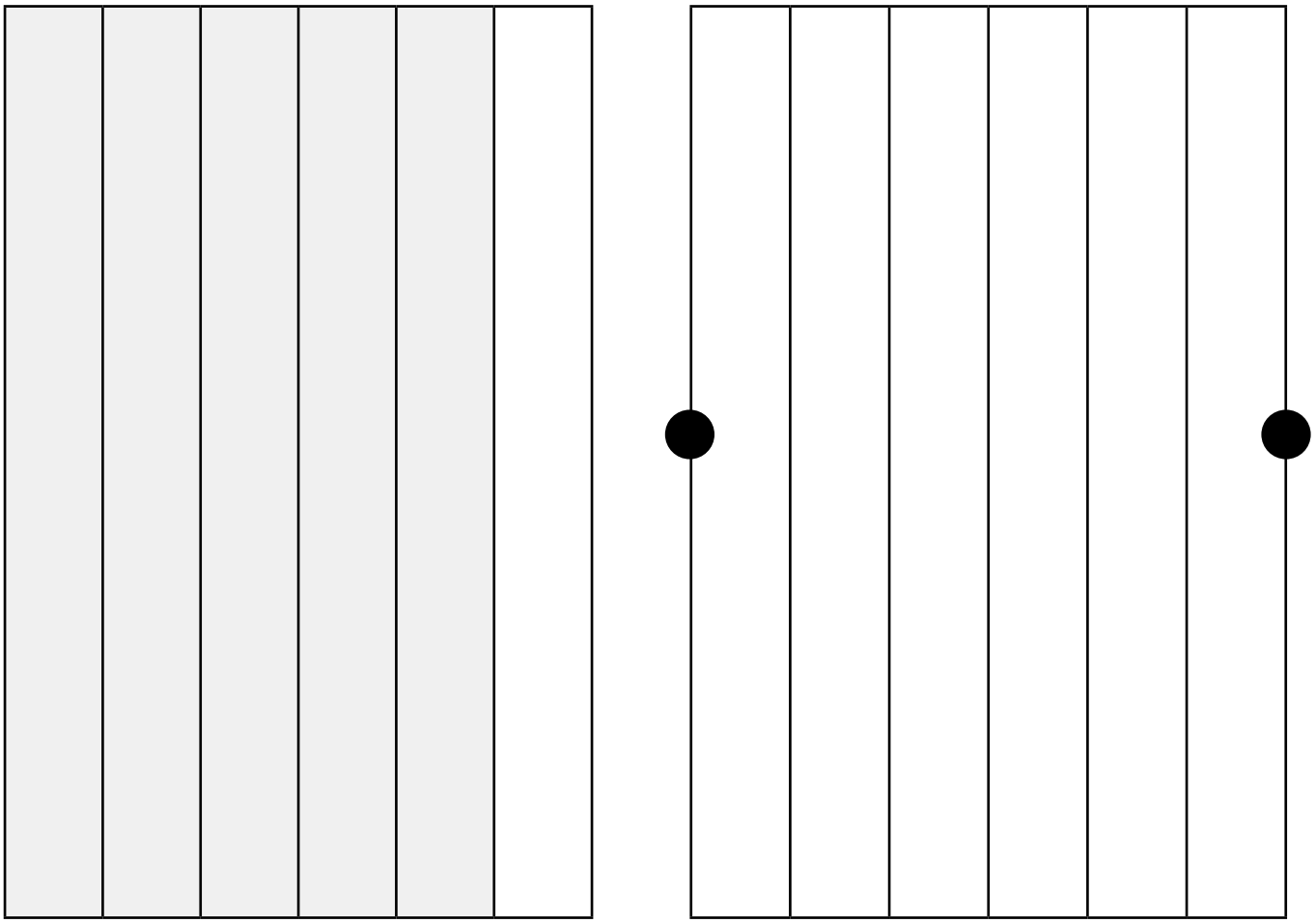


A $\frac{\square}{\square}$

B $\frac{\square}{\square}$

Teacher Resource 2

Warm-Up Problem 2



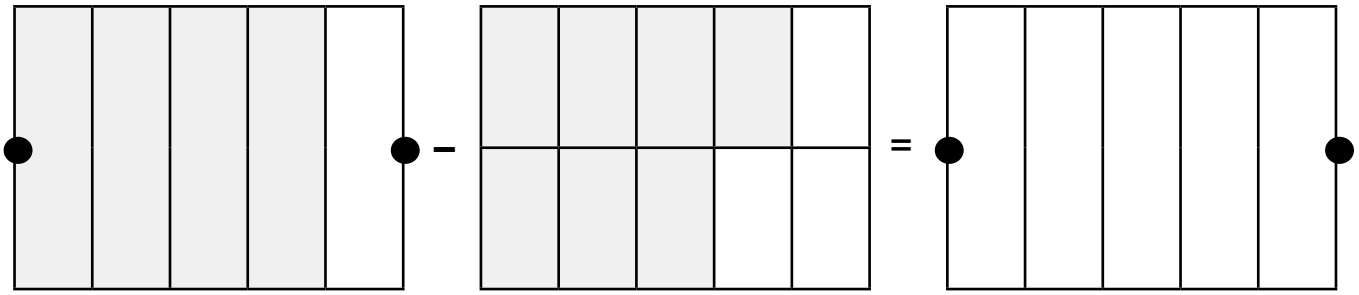
A $\frac{\square}{\square}$

B $\frac{\square}{\square}$

Subtracting Fractions with Unlike Denominators

Problem 1

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

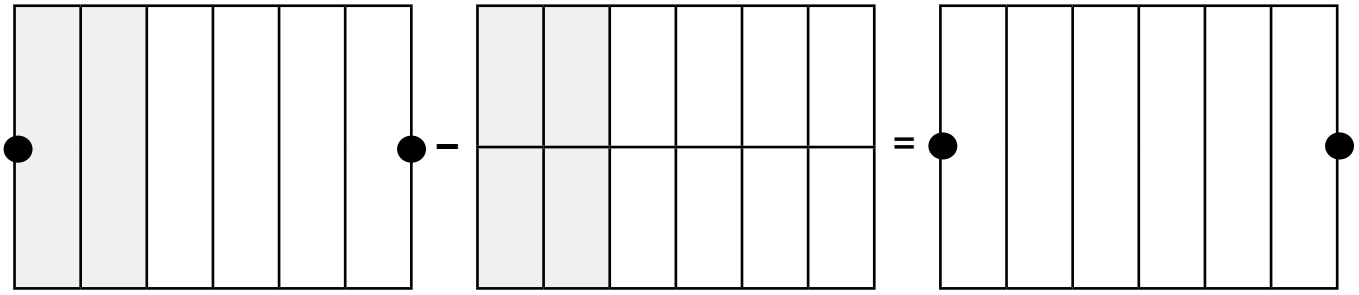


$\frac{\square}{\square} - \frac{\square}{\square} = \frac{\square}{\square}$

A B C

Problem 2

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



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

A B C

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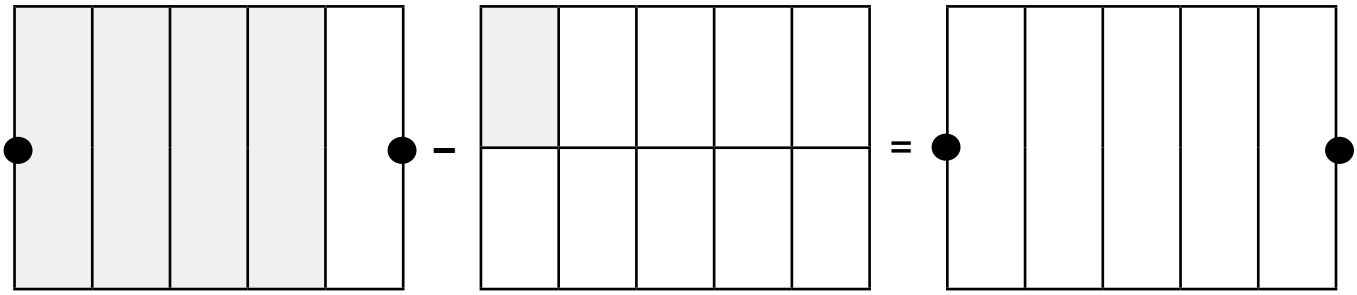
Problem 3

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



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

A B C