LESSON 17: Add Fractions - Unlike Denominators

[OBJECTIVE]

The student will add fractions with unlike denominators.

[PREREQUISITE SKILLS] equivalent fractions, adding fractions with like denominators

[MATERIALS]

Student pages **S160 – S169**
Transparencies **T483, T485, T487, T489, T491, T493, and T495**
Fraction Kits 1–3
Overhead fraction strips
Colored pencils
Foldable from Lesson 16

[ESSENTIAL QUESTIONS]

1. How does it help our understanding of adding fractions to build with concrete materials?
2. How does it help our understanding of adding fractions to build with pictorial models?
3. How can we add fractions with unlike denominators?

[WORDS FOR WORD WALL]

addend, sum, denominator, numerator, equivalent, legal trade, simplest form

[GROUPING]

Cooperative Pairs (CP), Whole Group (WG), Individual (I)
*For Cooperative Pairs (CP) activities, assign the roles of Partner A and Partner B to students. This allows each student to be responsible for designated tasks within the lesson.

[LEVELS OF TEACHER SUPPORT]

Modeling (M), Guided Practice (GP), Independent Practice (IP)

[MULTIPLE REPRESENTATIONS]

SOLVE, Graphic Organizer, Verbal Description, Pictorial Representation, Concrete Representation

[WARM-UP] (5 minutes – IP, I, WG) S160 (Answers on T482.)

- Have students turn to S160 in their books to begin the Warm-Up. Students will add fractions with like denominators. Monitor students to see if any of them need help during the Warm-Up. Give students 3 minutes to complete the problems and then spend 2 minutes reviewing the answers as a class. **{Verbal Description}**

LESSON 17: Add Fractions - Unlike Denominators

[HOMEWORK] (5 minutes)
Take time to go over the homework from the previous night.

[LESSON] (60 minutes – M, GP, IP, WG, I, CP)

SOLVE Problem	(3 minutes – GP, WG) T483, S161 (Answers on T484.)

Have students turn to S161 in their books, and place T485 on the overhead. The first problem is a SOLVE problem. You are only going to complete the S step with students at this point. Tell students that during the lesson they will learn how to add fractions with unlike denominators. They will use this knowledge to complete this SOLVE problem at the end of the lesson. **{SOLVE, Graphic Organizer}**

Add Fractions – Concrete – Unlike Denominators
(9 minutes – M, CP, GP, IP, WG) T483, T485, S161, S162 (Answers on T484, T486.)

5 minutes – M, CP, GP, WG: Have students turn to S161 in their books, and place T483 on the overhead. Use the overhead fraction strips and the following modeling activity to help students investigate adding fractions with unlike denominators using their fraction kits. Assign the roles of Partner A and Partner B.
**{Verbal Description, Concrete Representation, Graphic Organizer}**

MODELING

Add Fractions – Concrete - Unlike Denominators

Step 1: Direct students' attention to Problem 1. Explain to students that they will use their fraction kits to find the sum of $\frac{3}{8}$ and $\frac{1}{4}$.
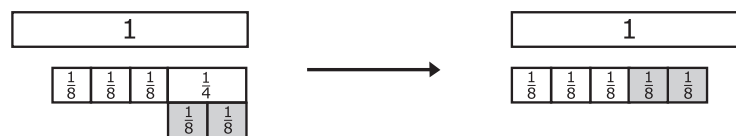
Step 2: Have students place the fraction strips for $\frac{3}{8}$ and $\frac{1}{4}$ underneath the whole unit as shown below as you model on the overhead.

1

| $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | | $\frac{1}{4}$ |
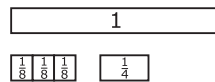
- Partner A, identify the color of the first **addend.** (red) Record.
- Partner B, identify the color of the second addend. (yellow) Record.
- Partner A, determine if the **denominators** are the same. (No.)
- Partner B, explain how you know. (The fraction strips are different colors.)

Step 3: Tell students that before the fractions can be added they must all be in one color.

Explain to students that they must **legally trade** $\frac{3}{8}$ and $\frac{1}{4}$ for fraction strips of one color. Model for students how to trade $\frac{1}{4}$ for $\frac{2}{8}$ and then push together the eighths to create $\frac{5}{8}$ as shown below. Ask students if the **sum** is now all in one color. (Yes.) Record the sum of $\frac{5}{8}$.

| 1 | → | 1 |

| $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{4}$ |
| $\frac{1}{8}$ | $\frac{1}{8}$ |

| $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ |

Step 4: Partner A, explain what happened to the denominators when the fractions were added. (The denominators were not alike, so one had to be changed to make a fraction that was **equivalent** with a common denominator.)

Partner B, explain what happened to the **numerators** when the fractions were added. (The numerator of one fraction changed when the denominator was changed. Once the two fractions had a common denominator, the numerators were added together to find the sum.)

Step 5: Ask students if they can legally trade the sum of $\frac{5}{8}$ for fewer fraction strips in another color. (No.) Tell students that this indicates that the sum is in simplest form.

Step 6: Direct students' attention to Problem 2. Explain to students that they will use their fraction kits to find the sum of $\frac{1}{3}$ and $\frac{1}{2}$.

Step 7: Have students place the fractions $\frac{1}{3}$ and $\frac{1}{2}$ underneath the whole unit as shown below.

1

| $\frac{1}{3}$ | | $\frac{1}{2}$ |
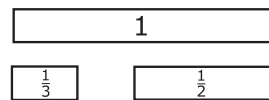
- Partner A, determine the color of the first addend $\frac{1}{3}$. (green)
- Partner B, determine the color of the second addend $\frac{1}{2}$. (brown)
- Partner A, determine if the denominators are the same. (No.) Record.

Step 8: Model for students how to trade $\frac{1}{3}$ for $\frac{2}{6}$ and $\frac{1}{2}$ for $\frac{3}{6}$, and then push together the sixths to create $\frac{5}{6}$ as shown below.

- Partner B, determine if the sum is now all in one color. (Yes.) Record.

1	1

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

$\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$ $\frac{1}{6}$

Step 9:
- Partner A, explain what happened to the denominators when the fractions were added. (The denominators were not alike, and they both had to be changed to make fractions that have a common denominator.)

- Ask students what happened to the numerators when the fractions were added. (The numerators both changed when the denominators were changed. Once the two fractions had a common denominator, the numerators were added together to find the sum.)

Step 10: Ask students if they can legally trade the **sum** of $\frac{5}{6}$ for fewer fraction strips in another color. (No.) Tell students this indicates that the sum is in **simplest form**. Record the sum.

LESSON 17: Add Fractions - Unlike Denominators

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3 minutes – IP, CP: Have students work in partners to complete Problems 3 and 4 on S162. Tell students to make sure they use their fraction strips to legally trade for strips of one color and to put the solutions in simplest form. **{Verbal Description, Concrete Representation, Graphic Organizer}**

1 minute – WG: Have students come back together as a class and share their results. They should be able to justify sums using their fraction strips. **{Verbal Description, Concrete Representation, Graphic Organizer}**

Add Unlike Fractions – Move to Pictorial – Rename One Addend
(8 minutes – M, GP, WG, IP, CP) T487, S163 (Answers on T488.)

5 minutes – M, GP, CP, WG: Have students turn to S163 in their books, and place T487 on the overhead. Pass out colored pencils to each student. Use the overhead fraction strips and the following modeling activity to help students investigate adding fractions with unlike denominators at the pictorial level by renaming one addend. **{Verbal Description, Concrete Representation, Graphic Organizer, Pictorial Representation}**

MODELING

Add Unlike Fractions - Move to Pictorial - Rename One Addend

Step 1: Have students build $\frac{1}{3} + \frac{4}{9}$ using green and purple fraction strips. Direct students' attention to Problem 1 and explain that now students will model adding $\frac{1}{3}$ and $\frac{4}{9}$ pictorially. Tell students that they are going to learn how to find the sum of fractions that have different denominators by finding a common denominator.

Step 2: Point out the three strips in the Picture Column next to Problem 1. Tell students that the first two strips will represent the addends, and the third strip will represent the sum. Tell students to shade $\frac{1}{3}$ on the first strip with green to represent the first addend. Tell students to shade $\frac{4}{9}$ on the second strip with purple to represent the second addend. The shading is shown below.

Step 3: • Partner A, determine if we can legally trade a third for ninths. (Yes.)

• Partner B, determine how many ninths make a third. (3) Model for students how to draw a line to separate the thirds into ninths on the first strip as shown below.

• Partner A, identify how many ninths are in $\frac{1}{3}$. (3)

• Partner B, identify the equivalent fraction for $\frac{1}{3}$ in ninths. ($\frac{3}{9}$) Explain to students that drawing the lines gives them a common denominator of 9. Record on T487 and have students do the same in their books.

Step 4: Remind students that the third strip will represent the sum. Model for students how to divide the third strip into ninths. Explain that both fractions have the same, or common, denominator and students can now add the two fractions.

Model for students how to add $\frac{3}{9}$ ($\frac{1}{3}$) and $\frac{4}{9}$ from the first two strips and record the sum on the third strip in purple as shown below. Have students rewrite the number sentence as $\frac{3}{9} + \frac{4}{9} = \frac{7}{9}$ on S163 as you do the same on T487.

Ask students if $\frac{7}{9}$ can be legally traded for fewer strips of another color. (No.) Tell students that the sum is in simplest form. Have students look again at the equivalent fraction for $\frac{1}{3}$, which was $\frac{3}{9}$. Explain that, mathematically, the 3 was multiplied by 3 to get 9. Ask, "What happened to the numerator?" (It was also multiplied by 3.)

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2 minutes – IP, CP:	Have students work in partners to complete Problems 2–4 on S163. Tell students to use their fraction strips to check if they can legally trade the solutions for fewer strips in another color. Tell students that they may have to shade a fourth fraction strip to show simplest form. **{Verbal Description, Concrete Representation, Pictorial Representation, Graphic Organizer}**
1 minute – WG:	Have students come back together as a class and share their results. They should be able to justify their sums using the pictorial models. **{Verbal Description, Pictorial Representation, Graphic Organizer}**

Add Unlike Fractions – Move to Pictorial – Rename Both Addends
(8 minutes – M, GP, CP, IP, WG) T489, S164 (Answers on T490.)

4 minutes – M, GP, WG, CP:	Have students turn to S164 in their books, and place T489 on the overhead. Use the overhead fraction strips and the following modeling activity to help students investigate adding fractions with unlike denominators at the pictorial level by renaming both addends. **{Verbal Description, Pictorial Representation, Graphic Organizer}**

MODELING

Add Unlike Fractions – Move to Pictorial – Rename Both Addends

Step 1: Direct students' attention to Problem 1 and explain that now students will model adding $\frac{1}{5}$ and $\frac{1}{2}$ pictorially. Remind students that in these problems a common denominator will have to be determined for both fractions. Explain that students will be finding equivalent fractions.

Step 2: Point out the strips in the Picture Column. Tell students that the first two strips will represent the addends and the third strip will represent the sum.

Step 3: • Partner A, determine if the fractions can be added with these denominators. (No, they must have a common, or the same, denominator.) Model for students how to list the multiples of the denominators, 5 and 2.

$$5: \mathbf{5, \textcircled{10}, 15}$$
$$2: \mathbf{2, 4, 6, 8, \textcircled{10}, 12}$$

Have students circle the common multiples.

- Partner B, determine the least common multiple. (10) Tell students that this becomes the new denominator.

- Partner A, determine the addends with the common denominator. $\left(\frac{2}{10} \text{ and } \frac{5}{10}\right)$ Look at the equivalent fractions again. $\frac{1}{5}$ changed to $\frac{2}{10}$. The denominator of 5 was multiplied by 2 to equal the 10. What happened to the numerator? (It was also multiplied by 2.)

Step 4: Have students rewrite the problem using the common denominators. $\left(\frac{2}{10} \text{ and } \frac{5}{10}\right)$ Have students divide the first strip into tenths and shade $\frac{2}{10}$ in tan. Have students divide the second strip into tenths and shade $\frac{5}{10}$ in tan. Finally, have students divide the third strip into tenths, and then shade $\frac{7}{10}$ in tan to show the sum.

Step 5: Ask students, "What is $\frac{2}{10} + \frac{5}{10}$?" $\left(\frac{7}{10}\right)$ Ask students if they can legally trade the sum of $\frac{7}{10}$ for fewer fraction strips in another color. (No.) Explain that the fraction $\frac{7}{10}$ is in simplest form. Record.

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3 minutes – IP, CP: Have students work in partners to complete S164. Tell students that they may use their fraction strips to check if their solutions are in simplest form. **{Verbal Description, Pictorial Representation, Graphic Organizer}**

1 minute – WG: Have students come back together as a class and share their results. They should be able to justify their sums using the pictorial models. **{Verbal Description, Pictorial Representation, Graphic Organizer}**

Add Fractions – Move to Abstract	**(8 minutes – M, CP, IP, GP, WG) T491, S165**
	(Answers on T492.)

5 minutes – M, GP, CP, WG: Have students turn to S165 in their books, and place T491 on the overhead. Use the following modeling activity to help students investigate adding fractions with unlike denominators at the abstract level. **{Verbal Description, Pictorial Representation, Graphic Organizer}**

MODELING

Add Fractions – Move to Abstract

Step 1: Direct students' attention to Problem 1. Have students draw a pictorial model of the problem as you model. Shade $\frac{1}{2}$ in brown and $\frac{2}{6}$ in orange.

Step 2: Model for students how to find a common denominator by finding the least common multiple of 2 and 6:

$$\textbf{2: } 2, 4, \textbf{⑥}$$
$$\textbf{6: } \textbf{⑥} \ 12$$

- Partner A, identify the common denominator. (6)
- Partner B, which fraction will need to have the denominator changed? $\left(\frac{1}{2}\right)$ Have students draw a picture in the second column next to Problem 1 to show the legal trade as you model.

Explain that $\frac{1}{2}$ changed to $\frac{3}{6}$ and that the 2 was multiplied by 3 to get the denominator of 6. Ask, "What happened to the numerator?" (It was also multiplied by 3.)

Step 3: Have students draw the problem and solution in the second column as shown below.

Step 4: Ask students if they can legally trade to get fewer strips in another color. (No.) Tell students that the fraction is in simplest form. Have students write the problem and solution numerically in the third column to represent what is in the second column.

Step 5: Direct students' attention to Problem 2. Have students draw a pictorial model of the problem as you model. Shade $\frac{2}{4}$ in yellow and $\frac{2}{6}$ in orange.

Step 6: Model for students how to find a common denominator by finding the least common multiple of 4 and 6:

$$\textbf{4}: 4, 8, \textcircled{12}\ 16$$
$$\textbf{6}: 6, \textcircled{12}\ 18$$

- Partner A, identify the common denominator. (12)
- Partner B, identfy which fraction or fractions will need to have the denominator changed. $\left(\frac{2}{4} \text{ and } \frac{2}{6}\right)$ Have students draw pictures in the second column to show the legal trades as you model.

Explain that $\frac{2}{4}$ changed to $\frac{6}{12}$ and that the denominator was multiplied by 3 to get the common denominator of 12. Ask, "What happened to the numerator?" (It was also multiplied by 3.) Explain that $\frac{2}{6}$ changed to $\frac{4}{12}$ and that the denominator was multiplied by 2 to get the common denominator of 12. Ask, "What happened to the numerator?" (It was also multiplied by 2.)

Step 7: Have students draw the problem and solution in the second column.

Step 8: Have students write the problem and solution numerically in the third column to represent what is in the second column.

2 minutes – IP, CP:	Have students work in partners to complete Problems 3–4 on S165. **{Verbal Description, Pictorial Representation, Graphic Organizer}**
1 minutes – WG:	Have students come back together as a class and share their results. They should be able to justify sums using the pictorial models. **{Verbal Description, Pictorial Representation, Graphic Organizer}**

Add Fractions – Without Models	**(12 minutes – M, GP, IP, CP, WG) T493, S166 (Answers on T494.)**
6 minutes – M, GP, CP, WG:	Have students turn to S166 in their books, and place T493 on the overhead. Use the following activity to help students add unlike fractions without models. **{Verbal Description, Graphic Organizer}**

─────────────── **MODELING** ───────────────

Add Fractions – Without Models

Step 1: Direct students' attention to Problem 1.

- Partner A, identify the problem. (What is $\frac{1}{6} + \frac{2}{3}$?)
- Partner B, determine if the fractions have a common denominator. (No.)
- Find a common denominator by finding the least common multiple of both denominators. (Model how to list the multiples and find the least common multiple. Multiples of 3: 3, 6, 9, 12; Multiples of 6: 6, 12, 18.)
- Partner A, determine the least common multiple of 3 and 6. (6)
- Change $\frac{2}{3}$ to a fraction with a denominator of 6. This will be a fraction that is equivalent to $\frac{2}{3}$. What would you multiply 3 by to get a product of 6? (2) Multiply the numerator by the same factor. What is the equivalent fraction? $\left(\frac{4}{6}\right)$
- Partner B, identify the new problem. $\left(\frac{1}{6} + \frac{4}{6}\right)$
- Add the numerators, and the denominators will remain the same.
- Partner A, identify the sum. $\left(\frac{5}{6}\right)$
- Partner B, determine if we need to simplify this fraction. (No.)

Step 2: Look at the Problem 2. What does it ask us? (What is $\frac{2}{5} + \frac{1}{2}$?)

- Partner A, determine if the fractions have a common denominator. (No.)

- Find a common denominator by finding the least common multiple of both denominators. (Model how to list the multiples and find the least common multiple. Multiples of 5: 5, 10, 15, 20; Multiples of 2: 2, 4, 6, 8, 10, 12)

- Partner B, what is the least common multiple of 5 and 2? (10)

- Change both fractions to equivalent fractions with a denominator of 10. Think about what you would multiply the denominator of each fraction by to get an equivalent fraction. What will happen to the numerators? (They will be multiplied by the same factor.)

- Partner A, what is the new problem? ($\frac{4}{10} + \frac{5}{10}$)

- Partner B, add the numerators, and the denominators will remain the same. What is the sum? ($\frac{9}{10}$)

- Do we need to simplify this fraction? (No.)

4 minutes – IP, CP: Have students work in partners to complete Problems 3–6 on S166. **{Verbal Description, Graphic Organizer}**

2 minutes – WG: Have students come back together as a class and share their results. They should be able to justify sums using pictorial models. **{Verbal Description, Graphic Organizer}**

Fraction Foldable   **(5 minutes – M, GP, WG)**

Have students take out the Fraction Foldable they created in Lesson 16. Use the following activity to help students continue to add to the fraction foldable. **{Verbal Description, Graphic Organizer}**

MODELING

Fraction Foldable

Step 1: Have students take out their fraction foldables.

Step 2: Create a transparency to model for students what should be included on the page for Addition - Unlike Denominators.

Step 3: On page 2 of the Fraction Foldable, model for students how to label the section: Addition - Unlike Denominators. Discuss with students what they have to do to add fractions with unlike denominators and then list the steps. Use your foldable to reference what you want written in the foldable.

SOLVE Problem   **(5 minutes – GP, WG) T495, S167 (Answers on T496.)**

Remind students that the SOLVE problem is the same one from the beginning of the lesson. Complete the SOLVE problem with your students. Ask them for possible connections from the SOLVE problem to the lesson.(Students will work with addition of fractions with unlike denominators.) **{SOLVE, Verbal Description, Graphic Organizer}**

If time permits... **(10 minutes – IP, I) S168 (Answers on T497.)**

Have students complete Problems 1–10 on S168.

[Closure] (2 minutes)

To wrap up the lesson, go back to the essential questions and discuss them with students.

- How does it help our understanding of adding fractions to build with concrete materials? *(Using concrete materials helps us see and touch the fractions we are adding.)*
- How does it help our understanding of adding fractions to build with pictorial models? *(Using pictorial models helps us see the relationship between the fractions we are adding.)*
- How can we add fractions with unlike denominators? *(Represent both fractions, legally trade for one color, push together and simplify; fewest pieces of one color.)*

[Homework] Assign S169 for homework. (Answers on T498.)

[Quiz Answers] T499–T500

1. **D** 2. **C** 3. **D** 4. **C** 5. **D** 6. **B** 7. **A** 8. **B** 9. **D** 10. **C**

The quiz can be used at any time as extra homework or to see how students progress on understanding adding fractions with unlike denominators.

Here is the key to **S160.**

──────────────────── **Warm–Up** ────────────────────

Directions: Find the sum for the following problems. Simplify all answers.

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

2. $\frac{3}{8} + \frac{3}{8} = \frac{6}{8} = \frac{3}{4}$

3. $\frac{1}{6} + \frac{2}{6} = \frac{3}{6} = \frac{1}{2}$

4. $\frac{4}{10} + \frac{2}{10} = \frac{6}{10} = \frac{3}{5}$

TRANSPARENCY MASTER for S161

Directions: Complete the following SOLVE problem with your teacher. You will only complete the S step.

Dino and Mark are doing a project for art class. It is due on Tuesday. Dino begins by drawing a $\frac{1}{2}$-inch line, and Mark draws a $\frac{1}{3}$-inch line. What is the total length of the lines?

S Underline the question.
This problem is asking me to find _____

_____.

Directions: Complete this page with your teacher and partner.

1.

Problem: $\frac{3}{8} + \frac{1}{4} =$

↓

What color are the fraction strips?

↓

Think about this:

Denominators? _____
Legally trade for fraction strips of all
_____ _____. Then, _____
the numerators.

↓

Legally trade for fewer fraction pieces, if possible.

2.

Problem: $\frac{1}{3} + \frac{1}{2} =$

↓

What color are the fraction strips?

↓

Think about this:

Denominators? _____
Legally trade for fraction strips of all
_____ _____. Then, _____
the numerators.

↓

Legally trade for fewer fraction pieces, if possible.

Here is the key to **S161**.

Directions: Complete the following SOLVE problem with your teacher. You will only complete the S step.

Dino and Mark are doing a project for art class. It is due on Tuesday. Dino begins by drawing a $\frac{1}{2}$-inch line, and Mark draws a $\frac{1}{3}$-inch line. <u>What is the total length of the lines?</u>

S Underline the question.

   This problem is asking me to find **the sum of the lengths of the lines**.

Directions: Complete this page with your teacher and partner.

1.

Problem: $\frac{3}{8} + \frac{1}{4} = \frac{5}{8}$

↓

What color are the fraction strips?

red, yellow

↓

Think about this:

Denominators? **not the same**
Legally trade for fraction strips of all **one color.** Then, **add** the numerators.

↓

Legally trade for fewer fraction pieces, if possible.

2.

Problem: $\frac{1}{3} + \frac{1}{2} = \frac{5}{6}$

↓

What color are the fraction strips?

green, brown
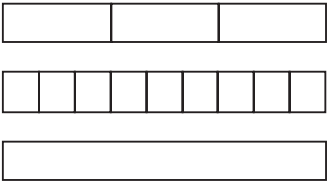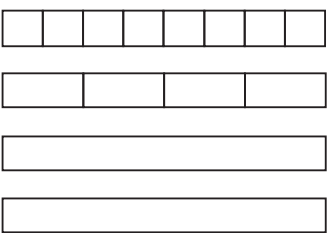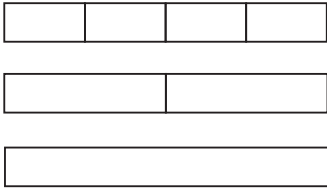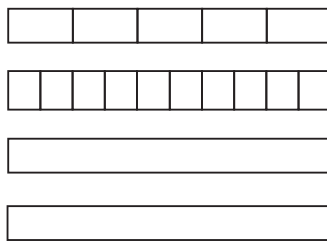
↓

Think about this:

Denominators? **not the same**
Legally trade for fraction strips of all **one color.** Then, **add** the numerators.

↓

Legally trade for fewer fraction pieces, if possible.

TRANSPARENCY MASTER for S162

Directions: Complete this page with your partner.

3.

Problem: $\frac{1}{2} + \frac{1}{6} =$

↓

What color are the fraction strips?

↓

Think about this:

Denominators? _____

Legally trade for fraction strips of all
_____ _____. Then, _____
the numerators.

↓

Legally trade for fewer fraction
pieces, if possible.

4.

Problem: $\frac{1}{4} + \frac{1}{3} =$

↓

What color are the fraction strips?

↓

Think about this:

Denominators? _____

Legally trade for fraction strips of all
_____ _____. Then, _____
the numerators.

↓

Legally trade for fewer fraction
pieces, if possible.

Here is the key to **S162.**

Directions: Complete this page with your partner.

3.

| Problem: $\frac{1}{2} + \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$ |

↓

| What color are the fraction strips? **brown, orange** |

↓

| Think about this:
Denominators? **not the same**
Legally trade for fraction strips of all **one color.** Then, **add** the numerators. |

↓

| Legally trade for fewer fraction pieces, if possible.
4 orange = 2 green or $\frac{2}{3}$ |

4.

| Problem: $\frac{1}{4} + \frac{1}{3} = \frac{7}{12}$ |

↓

| What color are the fraction strips? **yellow, green** |

↓

| Think about this:
Denominators? **not the same**
Legally trade for fraction strips of all **one color.** Then, **add** the numerators. |

↓

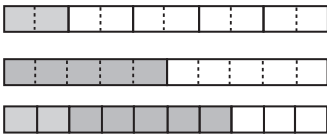| Legally trade for fewer fraction pieces, if possible. |

TRANSPARENCY MASTER for S163

Directions: Complete this page with your teacher and partner.

Problem	Picture	Rewrite Fraction with Common Denominator	Add Fractions	Simplest Form
1. $\frac{1}{3} + \frac{4}{9}$			$\frac{1}{3} + \frac{4}{9} =$ __ + __ = __	
2. $\frac{4}{8} + \frac{1}{4}$			$\frac{4}{8} + \frac{1}{4} =$ __ + __ = __	
3. $\frac{1}{4} + \frac{1}{2}$			$\frac{1}{4} + \frac{1}{2} =$ __ + __ = __	
4. $\frac{1}{5} + \frac{3}{10}$			$\frac{1}{5} + \frac{3}{10} =$ __ + __ = __	

Mathematics Success – Level E

Here is the key to **S163**.

Directions: Complete this page with your teacher and partner.

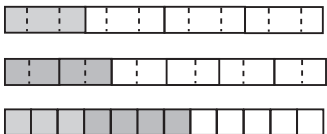| Problem	Picture	Rewrite Fraction with Common Denominator	Add Fractions	Simplest Form
1. $\frac{1}{3} + \frac{4}{9}$		$\frac{1}{3} = \frac{3}{9}$	$\frac{1}{3} + \frac{4}{9} =$ $\frac{3}{9} + \frac{4}{9} = \frac{7}{9}$	$\frac{7}{9}$
2. $\frac{4}{8} + \frac{1}{4}$		$\frac{1}{4} = \frac{2}{8}$	$\frac{4}{8} + \frac{1}{4} =$ $\frac{4}{8} + \frac{2}{8} = \frac{6}{8}$	$\frac{6}{8} = \frac{3}{4}$
3. $\frac{1}{4} + \frac{1}{2}$		$\frac{1}{2} = \frac{2}{4}$	$\frac{1}{4} + \frac{1}{2} =$ $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$	$\frac{3}{4}$
4. $\frac{1}{5} + \frac{3}{10}$		$\frac{1}{5} = \frac{2}{10}$	$\frac{1}{5} + \frac{3}{10} =$ $\frac{2}{10} + \frac{3}{10} = \frac{5}{10}$	$\frac{5}{10} = \frac{1}{2}$

TRANSPARENCY MASTER for S164

Directions: Complete this page with your teacher and partner.

Problem	Picture	Rewrite Fraction with Common Denominator	Add Fractions	Simplest Form
1. $\frac{1}{5} + \frac{1}{2}$		5: 2:	$\frac{1}{5} + \frac{1}{2} =$ ___ + ___ = ___	
2. $\frac{1}{4} + \frac{2}{6}$		4: 6:	$\frac{1}{4} + \frac{2}{6} =$ ___ + ___ = ___	
3. $\frac{3}{6} + \frac{1}{3}$		6: 3:	$\frac{3}{6} + \frac{1}{3} =$ ___ + ___ = ___	
4. $\frac{2}{3} + \frac{1}{4}$		3: 4:	$\frac{2}{3} + \frac{1}{4} =$ ___ + ___ = ___	

Mathematics Success – Level E

Here is the key to **S164**.

Directions: Complete this page with your teacher and partner.

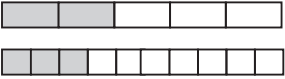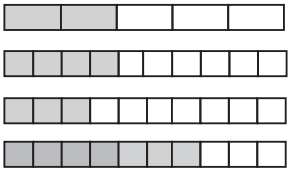| Problem	Picture	Rewrite Fraction with Common Denominator	Add Fractions	Simplest Form
1. $\frac{1}{5} + \frac{1}{2}$		5: **5, (10) 15** 2: **2, 4, 6, 8, (10)** $\frac{1}{5} = \frac{2}{10}$ $\frac{1}{2} = \frac{5}{10}$	$\frac{1}{5} + \frac{1}{2} =$ $\frac{2}{10} + \frac{5}{10} = \frac{7}{10}$	$\frac{7}{10}$
2. $\frac{1}{4} + \frac{2}{6}$		4: **4, 8, (12) 16** 6 : **6, (12), 18** $\frac{1}{4} = \frac{3}{12}$ $\frac{2}{6} = \frac{4}{12}$	$\frac{1}{4} + \frac{2}{6} =$ $\frac{3}{12} + \frac{4}{12} = \frac{7}{12}$	$\frac{7}{12}$
3. $\frac{3}{6} + \frac{1}{3}$		6: **(6,) 12, 18** 3: **3, (6,) 9** $\frac{1}{3} = \frac{2}{6}$	$\frac{3}{6} + \frac{1}{3} =$ $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$	$\frac{5}{6}$
4. $\frac{2}{3} + \frac{1}{4}$		3: **3, 6, 9, (12)** 4: **4, 8, (12) 16** $\frac{2}{3} = \frac{8}{12}$ $\frac{1}{4} = \frac{3}{12}$	$\frac{2}{3} + \frac{1}{4} =$ $\frac{8}{12} + \frac{3}{12} = \frac{11}{12}$	$\frac{11}{12}$
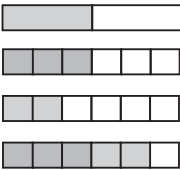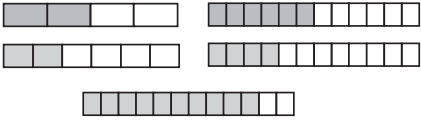
TRANSPARENCY MASTER for S165

Directions: Complete this page with your teacher and partner.

Draw your problem.	Legally trade so they are all one color. Push together once they are all in one color.	Rewrite problem with common denominator and show in simplest form.
1. $\frac{1}{2} + \frac{2}{6}$		
2. $\frac{2}{4} + \frac{2}{6}$		
3. $\frac{2}{5} + \frac{3}{10}$		
4. $\frac{2}{9} + \frac{2}{3}$		

Here is the key to **S165**.

Directions: Complete this page with your teacher and partner.

Draw your problem.	Legally trade so they are all one color. Push together once they are all in one color.	Rewrite problem with common denominator and show in simplest form.
1. $\frac{1}{2} + \frac{2}{6}$		$\frac{1}{2} + \frac{2}{6} =$ $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$
2. $\frac{2}{4} + \frac{2}{6}$		$\frac{2}{4} + \frac{2}{6} =$ $\frac{6}{12} + \frac{4}{12} = \frac{10}{12} = \frac{5}{6}$
3. $\frac{2}{5} + \frac{3}{10}$		$\frac{2}{5} + \frac{3}{10} =$ $\frac{4}{10} + \frac{3}{10} = \frac{7}{10}$
4. $\frac{2}{9} + \frac{2}{3}$		$\frac{2}{9} + \frac{2}{3} =$ $\frac{2}{9} + \frac{6}{9} = \frac{8}{9}$

TRANSPARENCY MASTER for S166

Directions: Complete this page with your teacher and partner.

1. $\dfrac{1}{6}$ $+\ \dfrac{2}{3}$ Are denominators common? Least Common Multiple: Equivalent Fractions: Rewrite number sentence	**4.** $\dfrac{1}{4}$ $+\ \dfrac{3}{8}$ Are denominators common? Least Common Multiple: Equivalent Fractions: Rewrite number sentence:
2. $\dfrac{2}{5}$ $+\ \dfrac{1}{2}$ Are denominators common? Least Common Multiple: Equivalent Fractions: Rewrite number sentence:	**5.** $\dfrac{3}{5}$ $+\ \dfrac{1}{10}$ Are denominators common? Least Common Multiple: Equivalent Fractions: Rewrite number sentence:
3. $\dfrac{2}{3}$ $+\ \dfrac{1}{9}$ Are denominators common? Least Common Multiple: Equivalent Fractions: Rewrite number sentence:	**6.** $\dfrac{3}{8}$ $+\ \dfrac{1}{2}$ Are denominators common? Least Common Multiple: Equivalent Fractions: Rewrite number sentence:

Here is the key to **S166**.

Directions: Complete this page with your teacher and partner.

1. $\frac{1}{6}$ $+ \frac{2}{3}$ Are denominators common? **No**. Least Common Multiple: **6** Equivalent Fractions: $\frac{2}{3} = \frac{4}{6}$ Rewrite number sentence: $\frac{1}{6} + \frac{4}{6} = \frac{5}{6}$	**4.** $\frac{1}{4}$ $+ \frac{3}{8}$ Are denominators common? **No**. Least Common Multiple: **8** Equivalent Fractions: $\frac{1}{4} = \frac{2}{8}$ Rewrite number sentence: $\frac{2}{8} + \frac{3}{8} = \frac{5}{8}$
2. $\frac{2}{5}$ $+ \frac{1}{2}$ Are denominators common? **No**. Least Common Multiple: **10** Equivalent Fractions: $\frac{2}{5} = \frac{4}{10}$, $\frac{1}{2} = \frac{5}{10}$ Rewrite number sentence: $\frac{4}{10} + \frac{5}{10} = \frac{9}{10}$	**5.** $\frac{3}{5}$ $+ \frac{1}{10}$ Are denominators common? **No**. Least Common Multiple: **10** Equivalent Fractions: $\frac{3}{5} = \frac{6}{10}$ Rewrite number sentence: $\frac{6}{10} + \frac{1}{10} = \frac{7}{10}$
3. $\frac{2}{3}$ $+ \frac{1}{9}$ Are denominators common? **No**. Least Common Multiple: **9** Equivalent Fractions: $\frac{2}{3} = \frac{6}{9}$ Rewrite number sentence: $\frac{6}{9} + \frac{1}{9} = \frac{7}{9}$	**6.** $\frac{3}{8}$ $+ \frac{1}{2}$ Are denominators common? **No**. Least Common Multiple: **8** Equivalent Fractions: $\frac{1}{2} = \frac{4}{8}$ Rewrite number sentence: $\frac{3}{8} + \frac{4}{8} = \frac{7}{8}$

TRANSPARENCY MASTER for S167

Directions: Complete the follwing SOLVE problem with your teacher.

Dino and Mark are doing a project for art class. It is due on Tuesday. Dino begins by drawing a $\frac{1}{2}$-inch line, and Mark draws a $\frac{1}{3}$-inch line. What is the total length of the lines?

S Underline the question.

   This problem is asking me to find _____

   _____.

O Identify the facts.

   Eliminate the unnecessary facts.

   List the necessary facts.

L Choose an operation or operations.

   Write in words what your plan of action will be.

V Estimate your answer.

   Carry out your plan.

E Does your answer make sense? (Compare your answer to the question.)

   Is your answer reasonable? (Compare your answer to the estimate.)

   Is your answer accurate? (Check your work.)

   Write your answer in a complete sentence.

Here is the key to **S167**.

Directions: Complete the following SOLVE problem with your teacher.

~~Dino and Mark are doing a project for art class.~~ | ~~It is due on Tuesday.~~ | Dino begins by drawing a $\frac{1}{2}$-inch line, | and Mark draws a $\frac{1}{3}$-inch line. | <u>What is the total length of the lines?</u>

S Underline the question.
   This problem is asking me to find **the sum of the lengths of the lines.**

O Identify the facts.
   Eliminate the unnecessary facts.
   List the necessary facts. **Dino - $\frac{1}{2}$-inch line, Mark - $\frac{1}{3}$-inch line**

L Choose an operation or operations. **Addition**
   Write in words what your plan of action will be. **Add the length of the line Mark draws to the length of the line Dino draws. Find the common multiple to determine the common denominator, and then change each fraction to an equivalent fraction using the common denominator. Then add, and simplify if needed.**

V Estimate your answer. **About 1 inch**

   Carry out your plan. $\frac{1}{2} + \frac{1}{3} =$ **Common Multiple: 6**

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

   $\frac{1}{3} = \frac{2}{6}$ $\frac{3}{6} + \frac{2}{6} = \frac{5}{6}$ **of an inch**

E Does your answer make sense? (Compare your answer to the question.) **Yes**, **because we are looking for the sum of the lengths of the lines.**

   Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because it is close to our estimate of about 1 inch.**

   Is your answer accurate? (Check your work.) **Yes.**

   Write your answer in a complete sentence. **The sum of the lengths of the lines drawn by Dino and Mark is $\frac{5}{6}$ of an inch.**

Here is the key to **S168**.

Directions: Complete the following addition problems with unlike denominators. Draw pictures if needed. All answers should be simplified.

1. $\frac{4}{10} + \frac{3}{5} = \frac{10}{10} = 1$

2. $\frac{6}{12} + \frac{1}{4} = \frac{9}{12} = \frac{3}{4}$

3. $\frac{2}{6} + \frac{1}{3} = \frac{4}{6} = \frac{2}{3}$

4. $\frac{2}{9} + \frac{1}{3} = \frac{5}{9}$

5. $\frac{4}{10} + \frac{1}{2} = \frac{9}{10}$

6. $\frac{5}{6} + \frac{1}{12} = \frac{11}{12}$

7. $\frac{2}{5} + \frac{4}{10} = \frac{8}{10} = \frac{4}{5}$

8. $\frac{3}{4} + \frac{1}{8} = \frac{7}{8}$

9. $\frac{3}{8} + \frac{2}{4} = \frac{7}{8}$

10. $\frac{3}{6} + \frac{1}{2} = \frac{6}{6} = 1$

LESSON 17: Add Fractions - Unlike Denominators

Here is the key to **S169**.

Homework

Name _____   **Date** _____

Directions: Solve the following fraction addition problems. Draw pictures if needed. Simplify.

1. $\frac{2}{5} + \frac{2}{10} = \frac{6}{10} = \frac{3}{5}$

2. $\frac{5}{9} + \frac{1}{3} = \frac{8}{9}$

3. $\frac{4}{8} + \frac{2}{4} = \frac{8}{8} = 1$

4. $\frac{2}{4} + \frac{1}{3} = \frac{10}{12} = \frac{5}{6}$

5. $\frac{1}{2} + \frac{3}{10} = \frac{8}{10} = \frac{4}{5}$

6. $\frac{3}{8} + \frac{2}{4} = \frac{7}{8}$

7. $\frac{3}{4} + \frac{2}{8} = \frac{8}{8} = 1$

8. $\frac{4}{12} + \frac{1}{3} = \frac{8}{12} = \frac{2}{3}$

9. $\frac{3}{12} + \frac{1}{3} = \frac{7}{12}$

10. $\frac{3}{5} + \frac{2}{10} = \frac{8}{10} = \frac{4}{5}$

LESSON 17: Add Fractions - Unlike Denominators

Name _____   Date _____

Quiz

Directions: Find the sum. All answers should be in simplest form.

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

   A. $\frac{5}{12}$

   B. $\frac{1}{2}$

   C. $\frac{3}{4}$

   D. 1

2. $\frac{2}{6} + \frac{1}{3} =$

   A. $\frac{1}{4}$

   B. $\frac{1}{3}$

   C. $\frac{2}{3}$

   D. 1

3. $\frac{3}{5} + \frac{3}{10} =$

   A. $\frac{2}{5}$

   B. $\frac{1}{2}$

   C. $\frac{4}{5}$

   D. $\frac{9}{10}$

4. $\frac{1}{2} + \frac{1}{12} =$

   A. $\frac{4}{12}$

   B. $\frac{5}{12}$

   C. $\frac{7}{12}$

   D. $\frac{11}{12}$

5. $\frac{6}{9} + \frac{1}{3} =$

   A. $\frac{2}{9}$

   B. $\frac{1}{3}$

   C. $\frac{2}{3}$

   D. 1

6. $\frac{1}{12} + \frac{1}{6} =$

   A. $\frac{1}{6}$

   B. $\frac{1}{4}$

   C. $\frac{1}{2}$

   D. $\frac{2}{3}$

7. $\frac{1}{3} + \frac{3}{6} =$

   A. $\frac{5}{6}$

   B. $\frac{8}{9}$

   C. 1

   D. $1\frac{1}{2}$

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

   A. $\frac{1}{3}$

   B. $\frac{3}{4}$

   C. $\frac{5}{6}$

   D. 1

9. $\frac{1}{10} + \frac{4}{5} =$

   A. $\frac{1}{5}$

   B. $\frac{1}{3}$

   C. $\frac{1}{2}$

   D. $\frac{9}{10}$

10. $\frac{2}{3} + \frac{2}{9} =$

   A. $\frac{1}{3}$

   B. $\frac{2}{3}$

   C. $\frac{8}{9}$

   D. 1