Add Fractions with Unlike Units Using the Strategy of Creating Equivalent Fractions

Lesson by Great Minds, as featured on EngageNY,
annotation by Student Achievement Partners

GRADE LEVEL Fifth

IN THE STANDARDS 5.NF.A.1, 5.NF.A.2

WHAT WE LIKE ABOUT THIS LESSON

Mathematically:

- Provides concrete examples for the need of like denominators for addition and subtraction of fractions
- Allows students to understand adding fractions with unlike denominators without going straight to the least common denominator
- Asks students to reason about how the size of units changes as they create equivalent fractions
- Encourages students to look for and make use of structure as they analyze rectangular fraction models (MP.7)

In the classroom:

- Uses concrete and pictorial models, particularly the rectangular fraction model, to make the mathematics of the lesson explicit
- Prompts student to share their developing thinking
- Allows for whole group, partner, and individual work in one lesson
- Gives formal and informal opportunities for teachers to check for understanding

MAKING THE SHIFTS[1]

Focus	Belongs to the major work[2] of fifth grade
Coherence	Builds on key understandings of equivalent fractions (4.NF.A.1) and addition of fractions with like denominators (4.NF.B). Builds foundation toward adding and subtracting rational numbers (7.NS.A.1)
Rigor[3]	Conceptual Understanding: primary in this lesson
	Procedural Skill and Fluency: secondary in this lesson
	Application: secondary in this lesson

[1]For more information read Shifts for Mathematics.
[2]For more information, see Focus in Grade Five.
[3]Lessons may target one or more aspect(s) of rigor.

For a direct link, go to: http://www.achievethecore.org/page/892/add-fractions-with-unlike-units-using-the-strategy-of-creating-equivalent-fractions

ADDITIONAL THOUGHTS

It's important to note that this sample lesson is the first in a 5-lesson series on "Making Like Units Pictorially", which is part of a 16-lesson unit on Addition and Subtraction of Fractions. It is not intended for students to meet the full expectations of the grade-level standards addressed in these lessons through only this selected lesson. This sample lesson lays a strong foundation for the work that is to come in the unit by focusing on the use of pictorial models, particularly the rectangular fraction model, to portray addition of fractions less than 1 with unlike denominators. Subsequent lessons move away from concrete and pictorial models and focus on the abstract approach to addition and subtraction of fractions both less than 1 and between 1 and 2.

This lesson develops the understanding of adding fractions with unlike denominators by requiring students to work with rectangular fraction models. Thoughtful questioning is used throughout the lesson to promote students' reasoning on the size of denominators as they create equivalent fractions and add them. Note that there is no explicit instruction or discussion of finding the least common denominator; instead, students are developing their understanding of this concept through models. For more insight on the grade-level concepts addressed in this lesson, read page 11 of the progression document, *3–5 Number and Operations – Fractions*.

The structure of these lessons and the unit/curriculum overall have some interesting aspects to highlight. The units make explicit the coherence within the fully developed curriculum. Each topic (a set of lessons) is connected to prior learning and also points to the next topic (or module) that follows in the learning progression. Within individual lessons, there are a number of components that add to their strength including daily fluency practice, variety in questioning techniques, and frequent opportunities for students to debrief about their learning.

Topic B

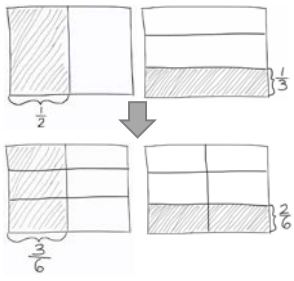
Making Like Units Pictorially

5.NF.1, 5.NF.2

Focus Standard:	5.NF.1	Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.).*
	5.NF.2	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2*
Instructional Days:	5	
Coherence -Links from:	G4–M5	Fraction Equivalence, Ordering, and Operations
-Links to:	G5–M4	Multiplication and Division of Fractions and Decimal Fractions
	G6–M3	Rational Numbers

In Module 3, students use the familiar rectangular fraction model to add and subtract fractions with unlike denominators.

Students make like units with all addends or both minuend and subtrahend. First, they draw a wide rectangle and partition it with vertical lines as they would a bar diagram (also known as tape diagram), representing the first fraction with a bracket and shading. They then partition a second congruent rectangle with horizontal lines to show the second fraction. Next, they partition both rectangles with matching lines to create like units.



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

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

$\frac{5}{6}$

This method requires that they see 3 units as equal to 1 half and 2 units as equal to one third. They practice making these models extensively until they internalize the process of making like units. Students use the same systematic drawing for addition and subtraction. In this manner, students are prepared to generalize with understanding to multiply the numerator and denominator by the same number. The topic closes with a lesson devoted to solving two-step word problems.

A Teaching Sequence Towards Mastery of Making Like Units Pictorially	
Objective 1:	**Add fractions with unlike units using the strategy of creating equivalent fractions. (Lesson 3)**
Objective 2:	**Add fractions with sums between 1 and 2. (Lesson 4)**
Objective 3:	**Subtract fractions with unlike units using the strategy of creating equivalent fractions. (Lesson 5)**
Objective 4:	**Subtract fractions from numbers between 1 and 2. (Lesson 6)**
Objective 5:	**Solve two-step word problems. (Lesson 7)**

Lesson 3

Objective: Add fractions with unlike units using the strategy of creating equivalent fractions.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(5 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**

Fluency Practice (12 minutes)

- Equivalent Fractions Sprint **5.NF.1** (10 minutes)
- Adding Like Fractions **5.NF.1** (1 minute)
- Fractions as Division **5.NF.3** (1 minute)

Sprint (10 minutes)

Materials: (S) Equivalent Fractions Sprint

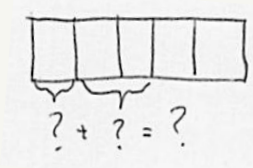
Adding Like Fractions (1 minute)

T: Let's add fractions mentally. Say answers as whole numbers when possible.
T: One third plus one third equals?
S: Two thirds.
T: One fourth plus one fourth equals?
S: Two fourths.
T: 1/5 + 2/5 =
S: 3/5.
T: 3/7 + 4/7 =
S: 1.
T: 1/4 + 1/3 + 3/4 + 2/3 =
S: 2.

Continue and adjust to meet student needs. Use a variety of fraction combinations.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Rather than name the fraction, draw it and ask students to write the corresponding equation on personal boards. Use brackets to indicate the addends.



Fractions as Division (1 minute)

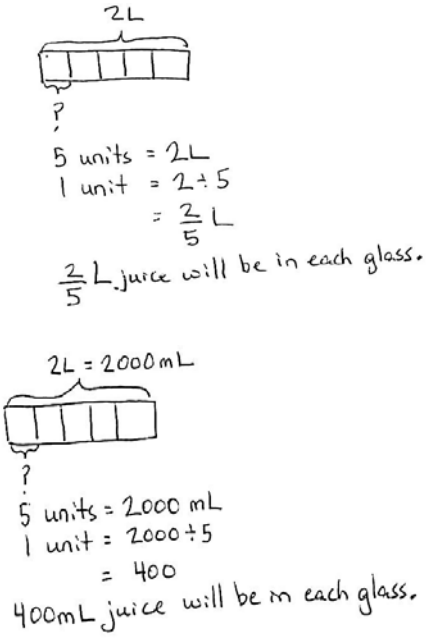
Materials: (S) Personal white boards

T: When I show a fraction, you write it as a division statement.
T: (Write 3/4.)
S: (Write 3 ÷ 4 = 3/4.)
T: (Write 5/2.)
S: (Write 5 ÷ 2 = 5/2.)

Continue with fractions that are less than and greater than one. Possible sequence: 1/3, 7/4, 5/8, 9/5, 3/10, 13/6.

Application Problem (5 minutes)

Alex squeezed 2 liters of juice for breakfast. If he pours the juice equally into 5 glasses, how many liters of juice will be in each glass? (Bonus: How many milliliters are in each glass?)



T: Let's read the problem together.
S: (Students read chorally.)
T: What is our whole?
S: 2 liters.
T: How many parts are we breaking 2 liters into?
S: 5.
T: Say your division sentence.
S: 2 liters divided by 5 equals 2/5 liter.
T: Is that less or more than one whole liter? How do you know? Tell your partner.
S: Less than a whole because 5 ÷ 5 is 1. 2 is less than 5 so you are definitely going to get less than 1. → I agree because if you share 2 things with 5 people, each one is going to get a part. There isn't enough for each person to get one whole. → Less than a whole because the numerator is less than the denominator.
T: Was anyone able to do the bonus question? How many milliliters are in 2 liters?
S: 2,000.
T: What is 2,000 divided by 5?
S: 400.
T: Say a sentence for how many milliliters are in each glass.
S: 400 mL of juice will be in each glass.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Students performing above grade level enjoy the challenge of a bonus problem. If time permits have one of the students draw the bonus problem model on the board and share his/her solution with the class.

Concept Development (33 minutes)

Materials: (S) Personal white boards, enough 4 1/2" x 4 1/2" paper for each student to have at least 2 (depending on how you decide to do the folding prior to drawing the rectangular array model)
(T) White board

T: Let's think back on what we learned about adding in third grade. What is 1 adult plus 3 adults?
T: (Write) 1 adult + 3 adults.
S: 4 adults.
T: 1 fifth plus 3 fifths?
S: 4 fifths.
T: We can add 1 fifth plus 3 fifths because the units are the same.

1 fifth + 3 fifths = 4 fifths

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

T: What is 1 child plus 3 adults? (Write 1 child + 3 adults.)
S: We can't add children and adults.
T: Why is that? Talk to your partner about that.
S: (Students share.)
T: I heard Michael tell his partner that children and adults are not the same unit. We would need to have like units before we added. What do children and adults have in common?
S: They are people.
T: Let's add people, not children and adults. Say the addition sentence with people.
S: 1 person + 3 people = 4 people.
T: 1 child + 3 adults = 1 person + 3 people = 4 people
T: We could also add 1 one plus 4 ones, which equals?
S: 4 ones.

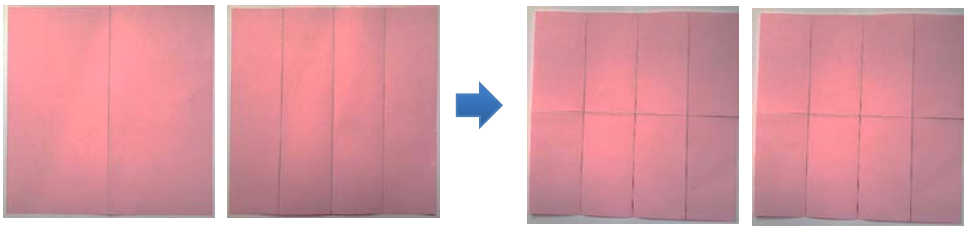
Problem 1

T: Can I add 1 half plus 1 fourth? Discuss with your partner.

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

T: (Circulate and listen for clear reasoning.)
T: Pedro, could you share your thoughts?
S: I cannot add 1 half plus 1 fourth until the units are the same. We need to find like units.

T: Let's first do that by folding paper. (Lead students through the process of folding illustrated below.)



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

T: Now let's do a similar process by drawing.

T: (Draw a rectangle model for students.) When I make 1 whole into smaller units of 1/2 each, how many units will I have?

S: 2 units.

T: (Partition the rectangle vertically into 2 units.) One half tells me to select how many of the 2 units?

S: One.

T: Let's label our unit with 1/2 and shade in one part. Now let's draw another rectangle. How many parts do I need to make it show fourths?

S: Four.

T: (Partition the rectangle horizontally into 4 units.) One-fourth tells me to show how many units?

S: One.

T: Let's label our unit with 1/4 and shade in one part. Now let's make them show the same size units. (Draw horizontal lines on the 1/2 model and 1 vertical line on the 1/4 model.) How many units does each model have now?

S: Eight.

T: How many shaded units are in 1/2?

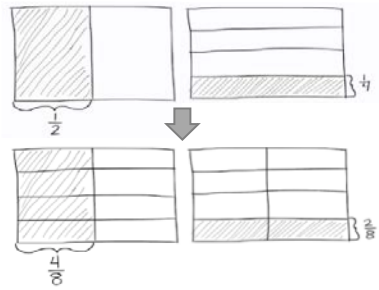
S: Four.

T: That's right, we have 4 shaded units out of 8 total units. (Change the label from 1/2 to 4/8.) How many units are on the 1/4 model?

S: Two.

T: Yes, 2 shaded parts out of 8 total parts. (Change the label from 1/4 to 2/8.) Are our models now showing like units?

S: Yes!



NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Folding paper is a concrete strategy that helps build conceptual understanding. This helps ease the hardest part of using a rectangular fraction model: recognizing the original fractions once the horizontal lines are drawn. Help students see ¼ = 2/8 and 1/2 = 4/8 by pointing and showing:

1/4 = 1/8 + 1/8.

1/2 = 1/8 + 1/8 + 1/8 + 1/8.

T: Say the addition sentence now using eighths as our common denominator.

S: 4 eighths + 2 eighths = 6 eighths.

T: We can make larger units within 6/8. Tell your partner how you might do that.

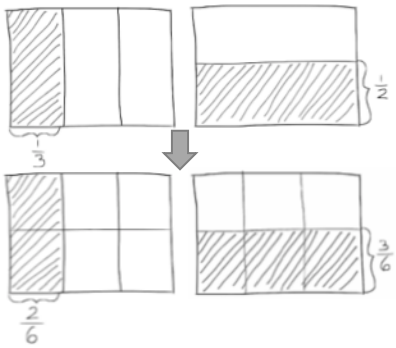
S: Two can be divided into 6 and 8. 6 ÷ 2 = 3 and 8 ÷ 2 = 4. 3/4. → We can make larger units of 2 each. 3 twos out of 4 twos. That's 3 out of 4 or 3 fourths. → 6/8 is partitioned into 6 out of 8 smaller units. It can be made into 3 out of 4 larger, equal pieces by grouping in 2's.

$$\frac{1}{2}+\frac{1}{4}=\frac{4}{8}+\frac{2}{8}=\frac{6}{8}=\frac{3}{4}$$

1 half + 1 fourth = 4 eighths + 2 eighths = 6 eighths = 3 fourths

Problem 2

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



In Problem 2 you can have students fold a paper again to transition into drawing, or start directly with drawing. This is a simple problem involving two unit fractions, like Problem 1. The primary purpose is to reinforce understanding of what is happening to the units within a very simple context. Problem 3 moves on to address a unit fraction plus a non-unit fraction.

T: Do our units get bigger or smaller when we create like units? Talk to your partner.

S: There are more units. → The units get smaller because it is the same amount of space but more parts. → The units are definitely getting smaller. There are more, yes. But, they are smaller. → We have to cut them up to make them the same size. → 1 unit will become 2 units. → Or we can also think of it as 1 unit will become 6 units. That's what is happening to the half.

T: Let's draw a diagram to help solve the problem and see if you are right.

T: Did the half become 3 smaller units and each third become 2 smaller units?

S: Yes!

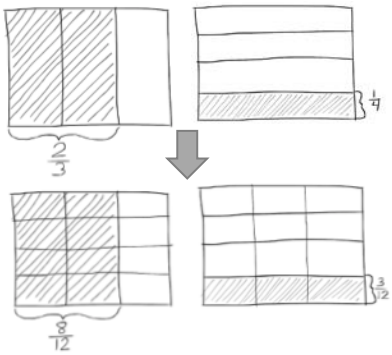
T: Tell me the addition sentence.

S: 2 sixths + 3 sixths = 5 sixths.

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

Problem 3

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



T: When we partition a rectangle into thirds, how many units will we have in all? (Draw and partition as you would a bar diagram.)

S: 3.

T: (Partition thirds vertically.) How many of those units are we selecting?

S: 2.

T: (Bracket and shade 2 thirds.) To show 1 fourth, how many units will we draw?

S: 4.

T: (Make a new rectangle of the same size and partition fourths horizontally.)

T: How many total units does this new rectangle have?

S: 4.

T: (Bracket and shade the new rectangle.)

T: Let's make these units the same size. (Partition the rectangles so the units are equal.)

T: What is the fractional value of 1 unit?

S: 1 twelfth.

T: How many twelfths are equal to 2 thirds?

S: 8 twelfths.

T: (Mark 8/12 on the 2/3 diagram.) How many twelfths are equal to 1/4?

S: 3 twelfths.

T: (Mark 3/12 on the 1/4 diagram.) Say the addition sentence now using twelfths as our like unit or denominator.

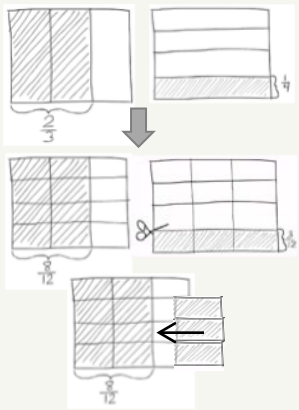
S: 8 twelfths plus 3 twelfths equals 11 twelfths.

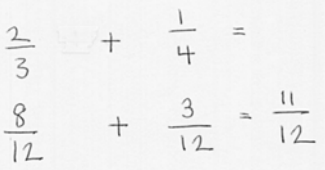
$$\frac{2}{3}+\frac{1}{4}=\frac{8}{12}+\frac{3}{12}=\frac{11}{12}$$

T: Read with me. (2 thirds + 1 fourth = 8 twelfths + 3 twelfths = 11 twelfths.)

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

For students who are confused about adding the parts together, have them cut out the parts of the second model and place them inside the first. For example, with the drawings below, have them cut out the three one-twelfths and add them to the model with 8/12, like working with a puzzle. Have them speak the sentence, "8 twelfths plus 3 twelfths equals 11 twelfths." Repeat until the student can visualize this process without the extra step.

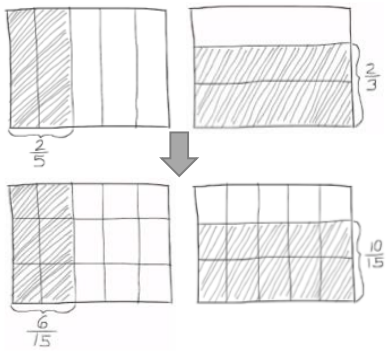




T: With your partner, review the process we used to solve 2/3 +1/4 step by step. Partner A goes first, then partner B. Use your drawing to help you.

Problem 4

$$\frac{2}{5}+\frac{2}{3}$$

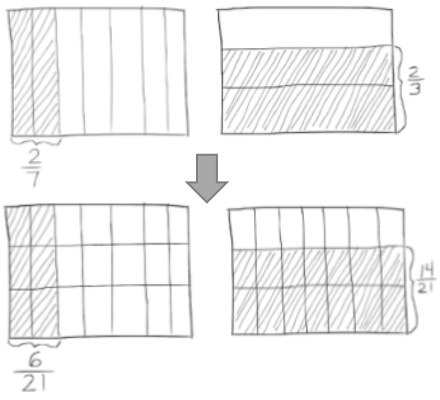


This problem adds the complexity of finding the sum of two non-unit fractions, both with the numerator of 2. Working with fractions with common numerators invites healthy reflection on the size of fifths as compared to thirds. Students can reason that while there are the same number of units (2), thirds are larger than fifths because the whole is broken into 3 parts instead of 5 parts. Therefore, there are more in each part. In addition, it can be reasoned that 2 thirds is larger than 2 fifths because when fifteenths are used for both, the number of units in 2 thirds (10) is more than the number used in 2 fifths (6). This problem also presents an opportunity to remind students about the importance of attending to precision (MP.6). When comparing fractions, care is taken to talk about the same whole amount as demonstrated by the rectangle. Such attention to precision also leads students to understand that 2 thirds of a cup is not larger than 2/5 gallon.

Problem 5

$$\frac{2}{7}+\frac{2}{3}=$$

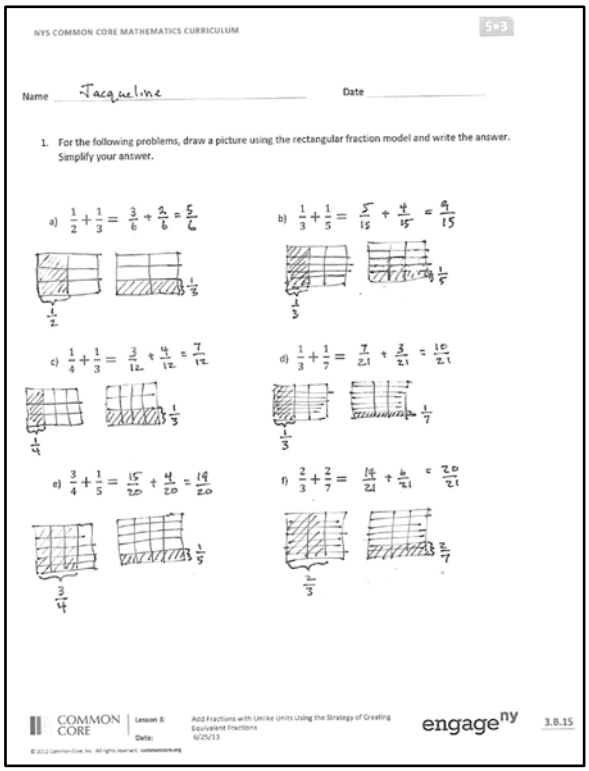
$$\frac{2}{7}+\frac{2}{3}=\frac{6}{21}+\frac{14}{21}=\frac{20}{21}$$



2 sevenths + 2 thirds = 6 twenty-oneths + 14 twenty-oneths = 20 twenty-oneths

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.


NYS COMMON CORE MATHEMATICS CURRICULUM 5•3

Name Jacqueline Date

1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer.

a) $\frac{1}{2}+\frac{1}{3}=\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$

b) $\frac{1}{3}+\frac{1}{5}=\frac{5}{15}+\frac{4}{15}=\frac{9}{15}$

c) $\frac{1}{4}+\frac{1}{3}=\frac{3}{12}+\frac{4}{12}=\frac{7}{12}$

d) $\frac{1}{3}+\frac{1}{7}=\frac{7}{21}+\frac{3}{21}=\frac{10}{21}$

e) $\frac{3}{4}+\frac{1}{5}=\frac{15}{20}+\frac{4}{20}=\frac{19}{20}$

f) $\frac{2}{3}+\frac{2}{7}=\frac{14}{21}+\frac{6}{21}=\frac{20}{21}$

COMMON CORE Lesson 3: Add Fractions with Unlike Units Using the Strategy of Creating Equivalent Fractions Date: 6/25/13 engage^ny 3.B.15

Student Debrief (10 minutes)

Lesson Objective: Add fractions with unlike units using the strategy of creating equivalent fractions.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

T: Go over the answers to your problems for 1 minute with a partner. Don't change your work.

S: (Students work together.)

T: Now let's correct together. I will say the addition problem, you say the answer. Problem a) 1 half plus 1 third is?

S: 5 sixths.

Continue. Then give students about 2 minutes to correct their errors as shown below.

T: Analyze the following problems. How are they related?

(a) and (b)

(a) and (c)

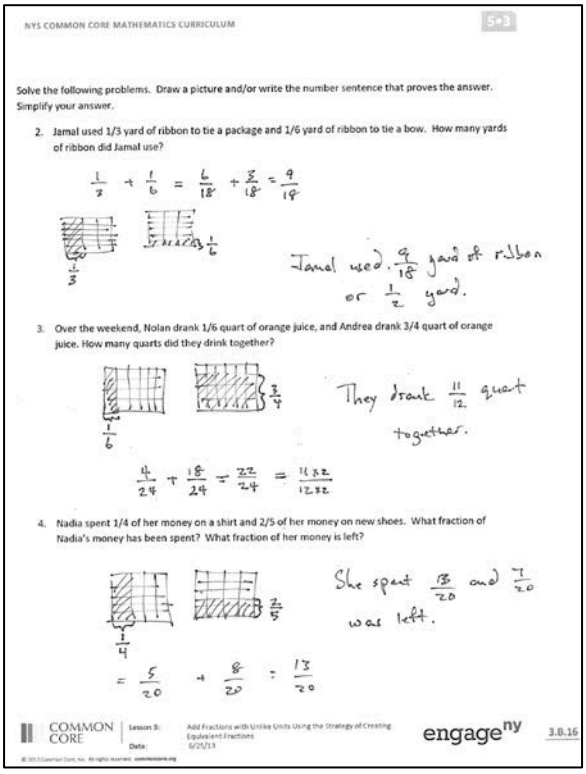
(b) and (d)

(d) and (f)

MP.7

S: (Allow for student conversation.)

T: Steven noticed something about Problems (a) and (b). Please share.


NYS COMMON CORE MATHEMATICS CURRICULUM 5•3

Solve the following problems. Draw a picture and/or write the number sentence that proves the answer. Simplify your answer.

2. Jamal used 1/3 yard of ribbon to tie a package and 1/6 yard of ribbon to tie a bow. How many yards of ribbon did Jamal use?

$\frac{1}{3}+\frac{1}{6}=\frac{6}{18}+\frac{3}{18}=\frac{9}{18}$

Jamal used $\frac{9}{18}$ yard of ribbon or $\frac{1}{2}$ yard.

3. Over the weekend, Nolan drank 1/6 quart of orange juice, and Andrea drank 3/4 quart of orange juice. How many quarts did they drink together?

They drank $\frac{11}{12}$ quart together.

$\frac{4}{24}+\frac{18}{24}=\frac{22}{24}=\frac{1132}{1232}$

4. Nadia spent 1/4 of her money on a shirt and 2/5 of her money on new shoes. What fraction of Nadia's money has been spent? What fraction of her money is left?

She spent $\frac{13}{20}$ and $\frac{7}{20}$ was left.

$=\frac{5}{20}+\frac{8}{20}=\frac{13}{20}$

COMMON CORE Lesson 3: Add Fractions with Unlike Units Using the Strategy of Creating Equivalent Fractions Date: 6/25/13 engage^ny 3.B.16

S: The answer to (b) is smaller than a) since you are adding only 1/5 to 1/2. Both answers are less than 1 but (a) is much closer to 1. Problem (b) is really close to 1/2 because 8/16 would be 1/2.

T: Kara, can you share what you noticed about letters d) and f)?

S: I noticed that both problems used thirds and sevenths. But the numerators in (d) were 1 and the numerators in (f) were 2. Since the numerators doubled, the answer doubled from 10 twenty-oneths to 20 twenty-oneths.

MP.7

T: I am glad to hear you are able to point out relationships between different problems.

T: Share with your partner about what you learned how to do today.

S: (Students share.)

T: (Help students name the objective: We learned how to add fractions that have unlike units using a rectangular fraction model to create like units.)

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

A

Correct _____

Find the missing numerator or denominator.

1	$\frac{1}{2} = \frac{}{4}$		23	$\frac{1}{3} = \frac{}{12}$	
2	$\frac{1}{5} = \frac{2}{}$		24	$\frac{2}{3} = \frac{}{12}$	
3	$\frac{2}{5} = \frac{}{10}$		25	$\frac{8}{12} = \frac{}{3}$	
4	$\frac{3}{5} = \frac{}{10}$		26	$\frac{12}{16} = \frac{3}{}$	
5	$\frac{4}{5} = \frac{}{10}$		27.	$\frac{3}{5} = \frac{}{25}$	
6	$\frac{1}{3} = \frac{2}{}$		28	$\frac{4}{5} = \frac{28}{}$	
7	$\frac{2}{3} = \frac{}{6}$		29	$\frac{18}{24} = \frac{3}{}$	
8	$\frac{1}{3} = \frac{3}{}$		30	$\frac{24}{30} = \frac{}{5}$	
9	$\frac{2}{3} = \frac{}{9}$		31	$\frac{5}{6} = \frac{35}{}$	
10	$\frac{1}{4} = \frac{}{8}$		32	$\frac{56}{63} = \frac{}{9}$	
11	$\frac{3}{4} = \frac{}{8}$		33	$\frac{64}{72} = \frac{8}{}$	
12	$\frac{1}{4} = \frac{3}{}$		34	$\frac{5}{8} = \frac{}{64}$	
13	$\frac{3}{4} = \frac{9}{}$		35	$\frac{5}{6} = \frac{45}{}$	
14	$\frac{2}{4} = \frac{}{2}$		36	$\frac{45}{81} = \frac{}{9}$	
15	$\frac{2}{6} = \frac{1}{}$		37	$\frac{6}{7} = \frac{48}{}$	
16	$\frac{2}{10} = \frac{1}{}$		38	$\frac{36}{81} = \frac{}{9}$	
17	$\frac{4}{10} = \frac{}{5}$		39	$\frac{8}{56} = \frac{1}{}$	
18	$\frac{8}{10} = \frac{}{5}$		40	$\frac{35}{63} = \frac{5}{}$	
19	$\frac{3}{9} = \frac{}{3}$		41	$\frac{1}{6} = \frac{12}{}$	
20	$\frac{6}{9} = \frac{}{3}$		42	$\frac{3}{7} = \frac{36}{}$	
21	$\frac{3}{12} = \frac{1}{}$		43	$\frac{48}{60} = \frac{4}{}$	
22	$\frac{9}{12} = \frac{}{4}$		44	$\frac{72}{84} = \frac{}{7}$	

B Improvement _____ # Correct _____

Find the missing numerator or denominator.

1	$\frac{1}{5} = \frac{2}{\_\_}$		23	$\frac{1}{3} = \frac{4}{\_\_}$	
2	$\frac{2}{5} = \frac{\_\_}{10}$		24	$\frac{2}{3} = \frac{8}{\_\_}$	
3	$\frac{3}{5} = \frac{\_\_}{10}$		25	$\frac{8}{12} = \frac{2}{\_\_}$	
4	$\frac{4}{5} = \frac{\_\_}{10}$		26	$\frac{12}{16} = \frac{\_\_}{4}$	
5	$\frac{1}{2} = \frac{2}{\_\_}$		27	$\frac{3}{5} = \frac{15}{\_\_}$	
6	$\frac{1}{3} = \frac{\_\_}{6}$		28	$\frac{4}{5} = \frac{\_\_}{35}$	
7	$\frac{2}{3} = \frac{4}{\_\_}$		29	$\frac{18}{24} = \frac{\_\_}{4}$	
8	$\frac{1}{3} = \frac{\_\_}{9}$		30	$\frac{24}{30} = \frac{4}{\_\_}$	
9	$\frac{2}{3} = \frac{6}{\_\_}$		31	$\frac{5}{6} = \frac{\_\_}{42}$	
10	$\frac{1}{4} = \frac{2}{\_\_}$		32	$\frac{56}{63} = \frac{8}{\_\_}$	
11	$\frac{3}{4} = \frac{6}{\_\_}$		33	$\frac{64}{72} = \frac{\_\_}{9}$	
12	$\frac{1}{4} = \frac{\_\_}{12}$		34	$\frac{5}{8} = \frac{40}{\_\_}$	
13	$\frac{3}{4} = \frac{\_\_}{12}$		35	$\frac{5}{6} = \frac{\_\_}{54}$	
14	$\frac{2}{4} = \frac{1}{\_\_}$		36	$\frac{45}{81} = \frac{5}{\_\_}$	
15	$\frac{2}{6} = \frac{\_\_}{3}$		37	$\frac{6}{7} = \frac{\_\_}{56}$	
16	$\frac{2}{10} = \frac{\_\_}{5}$		38	$\frac{36}{81} = \frac{4}{\_\_}$	
17	$\frac{4}{10} = \frac{2}{\_\_}$		39	$\frac{8}{56} = \frac{\_\_}{7}$	
18	$\frac{8}{10} = \frac{4}{\_\_}$		40	$\frac{35}{63} = \frac{\_\_}{9}$	
19	$\frac{3}{9} = \frac{1}{\_\_}$		41	$\frac{1}{6} = \frac{\_\_}{72}$	
20	$\frac{6}{9} = \frac{2}{\_\_}$		42	$\frac{3}{7} = \frac{\_\_}{84}$	
21	$\frac{1}{4} = \frac{\_\_}{12}$		43	$\frac{48}{60} = \frac{\_\_}{5}$	
22	$\frac{9}{12} = \frac{3}{\_\_}$		44	$\frac{72}{84} = \frac{6}{\_\_}$	

Name _____ Date _____

1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer.

a) $\frac{1}{2}+\frac{1}{3}=$

b) $\frac{1}{3}+\frac{1}{5}=$

c) $\frac{1}{4}+\frac{1}{3}=$

d) $\frac{1}{3}+\frac{1}{7}=$

e) $\frac{3}{4}+\frac{1}{5}=$

f) $\frac{2}{3}+\frac{2}{7}=$

Solve the following problems. Draw a picture and/or write the number sentence that proves the answer. Simplify your answer.

2. Jamal used 1/3 yard of ribbon to tie a package and 1/6 yard of ribbon to tie a bow. How many yards of ribbon did Jamal use?

3. Over the weekend, Nolan drank 1/6 quart of orange juice, and Andrea drank 3/4 quart of orange juice. How many quarts did they drink together?

4. Nadia spent 1/4 of her money on a shirt and 2/5 of her money on new shoes. What fraction of Nadia's money has been spent? What fraction of her money is left?

Name _____ Date _____

Solve by drawing the rectangular fraction model.

1. $\frac{1}{2} + \frac{1}{5} =$

2. In one hour, Ed used 2/5 of the time to complete his homework and 1/4 of the time to check his email. How much time did he spend completing homework and checking email? Write your answer as a fraction. (Bonus: write the answer in minutes.)

Name _____ Date _____

1. For the following problems, draw a picture using the rectangular fraction model and write the answer. Simplify your answer.

a) $\frac{1}{4}+\frac{1}{3}=$

b) $\frac{1}{4}+\frac{1}{5}=$

c) $\frac{1}{4}+\frac{1}{6}=$

d) $\frac{1}{5}+\frac{1}{9}=$

e) $\frac{1}{4}+\frac{2}{5}=$

f) $\frac{3}{5}+\frac{3}{7}=$

Solve the following problems. Draw a picture and/or write the number sentence that proves the answer.

2. Rajesh jogged 3/4 mile, and then walked 1/6 mile to cool down. How far did he travel?

3. Cynthia completed 2/3 of the items on her to-do list in the morning, and finished 1/8 of the items during her lunch break. How much of her to-do list is finished by the end of her lunch break? (Bonus: How much of her to-do list does she still have to do after lunch?)

4. Sam read 2/5 of her book over the weekend, and 1/6 of it on Monday. What fraction of the book has she read? What fraction of the book is left?