CITYTUTOR DC

Fifth Grade Math Lesson Materials

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Identification of the material that is claimed to be infringing and that is to be removed or access to which is to be disabled, and information reasonably sufficient to permit us to locate the allegedly infringing material, e.g., the specific web page address on the Platform;

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G5 Unit 3:

Add and Subtract Fractions

G5 U3 Lesson 1

Make equivalent fractions with the number line, the area model, and numbers

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G5 U3 Lesson 1 - Students will make equivalent fractions with the number line, the area model, and numbers

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Today is our first lesson of a new unit all about fractions. You've likely worked with fractions in math class since around third grade, but fractions show up all the time in the world around us. Can you think of a time in your everyday life where you might see fractions? Possible Student Answers, Key Points:

- I see fractions in the kitchen when I use measuring cups.
- When I share a pizza with my family, those equal parts represent fractions.
- In sports they have "half time" and sometimes games are split into quarters.

Fractions are everywhere. Today, we're going to focus on making equivalent fractions using a number line, an area model, and numbers.

Let's Talk (Slide 3): Before we work on a few problems, take a second and look at these models. What do you notice? What do you wonder? Possible Student Answers, Key Points:

- I notice the models are paired up. I notice some are rectangular and some are circles. I notice the colored-in parts are the same amount, but different pieces.
- I wonder what these are supposed to represent. I wonder why one in each pair has smaller pieces and one in each pair has bigger pieces.

Interesting ideas. Thanks for sharing! Each pair of models here represent equivalent fractions. Equivalent fractions are fractions that have the same value, but use different numerators and denominators. For example, let's look at the yellow models. The top model shows 3 shaded pieces out of 4 pieces in the whole. We'd write that in fraction form as 3 over 4. *(write ¾)* The model underneath is the same whole, just cut into smaller pieces. I see 6 pieces shaded out of 8 pieces in the whole. We'd write that as 6 over 8 in fraction form. *(write = 6/8 after ¾)* These fractions are equivalent. We can visually see that in the model, because the yellow shaded region is the same amount in both models.

$\frac{3}{4} = \frac{6}{8}$

The circular fraction models also represent equivalent fractions. The first fraction modeled is ½, and the second fraction is 2/4. *(write ½ = 2/4)* Look at the red fraction models. How do those represent equivalent fractions? Possible Student Answers, Key Points:

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

- The first shows 2 shaded pieces out of 6. The second shows 1 shaded piece out of 3. So these show that 2/6 is equivalent to ⅓
- The red shaded region on both is the same, so even though the pieces are different sizes, the red shading represents an equivalent amount.

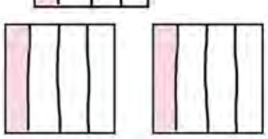
$\frac{2}{6} = \frac{1}{3}$

Excellent. Today, we'll use number lines, area models, and numbers to help us make equivalent fractions. Let's give it a try!

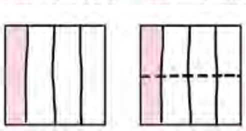
Let's Think (Slide 4): This question is asking us to use a number line, area model, and numbers to find a fraction equivalent to ¼. We'll start by using an area model. How can I show the fraction ¼ on an area model? Possible Student Answers, Key Points:

- Draw a square for the whole and cut it into four pieces.
- Shade 1 of the 4 pieces, since we want to think about ¼.

(draw as you narrate) I'll draw the whole as a square. Then I'll partition the whole into 4 equal pieces. I'm going to use vertical lines to partition. I now see four equal pieces, so I will shade one of them to represent ¼.

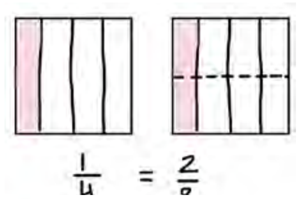


Since our goal is to make an equivalent fraction, let's draw another area model exactly like the one we just drew. We'll use this other area model to represent our equivalent fraction. *(draw another identical area model)*



We can use a horizontal line to partition our other area model into different-sized pieces. Watch! *(draw a horizontal dotted-line to partition the second area model into eighths)* What do you notice about the fraction we see now? Possible Student Answers, Key Points:

- The shaded part didn't change at all. We just cut across it.
- There are 8 total pieces now instead of 4. There are 2 shaded pieces now instead of 1.

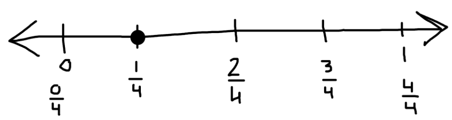


Our first area model showed 1 shaded piece out of 4, or ¼. *(write ¼ underneath the first area model)* The second area model shows 2 shaded pieces out of 8, or 2/8. *(write = 2/8 underneath the second area model)* The shaded amount didn't change at all. We see that ¼ and 2/8 are equivalent fractions.

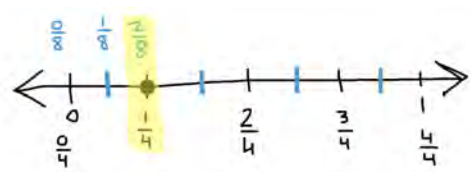
$$\frac{1}{4} = \frac{1 \times 2}{4 \times 2} = \frac{2}{8}$$

If we want to show all this thinking with numbers, we can think of it like this. We started by drawing ¼, and then we drew another area model representing ¼. *(write ¼ = ¼)* We partitioned the second area model so we had twice as many shaded pieces and total pieces. It's like we doubled the shaded and total pieces with our horizontal line, without changing the whole. We can show that using multiplication. *(write x2 in numerator and denominator)* We ended up with 2 shaded pieces and 8 total pieces in our equivalent fraction model. *(write = 2/8)* So, with an area model or with numbers, we can see that ¼ is equivalent to 2/8.

Let's think about how we can show this same work using a number line. What two whole numbers is the fraction ¼ between? (¼ is more than 0 and less than 1) I'll draw a number line and label 0 and 1 at each end.



(sketch number line as you narrate) Since we're talking about fourths, I'll partition my number line into 4 units by making 3 tick marks. Let's label each tick mark in terms of fourths. 0 is 0/4, then ¼, 2/4, ¾, and 1 is 4/4.



In our area model, we drew a horizontal line that cut each piece into two equal parts. We can show that on the number line by partitioning each unit into two parts. *(draw a tick mark between each unit using a different color)* See? I cut each fourth into two pieces, so now we have 8 units or eighths. If I count my eighths *(label 0/8, ⅛and 2/8 above the number line as you verbally count)*, I can see that ¼ is equivalent to 2/8.

What was different about the three ways we just thought about these equivalent fractions? Possible Student Answers, Key Points:

- They look different. The area models and the number line are very visual, but the numbers are more abstract.

What was the same about the three ways we just thought about these equivalent fractions? Possible Student Answers, Key Points:

- They each show fourths partitioned into eighths in some way. The area model showed it with a horizontal line. The number line showed it with the tick marks between each unit. The numbers showed it using multiplication.

We just used three different strategies to find that 2/8 is equivalent to ¼. Let's try one more example.

Let's Think (Slide 5): This problem wants us to use the same strategies to find a fraction equivalent to 3/2. What's different about this fraction? Possible Student Answers, Key Points:

- It's an improper fraction or a fraction greater than 1.
- This fraction's numerator is bigger than its denominator. This fraction is more than 1 whole.

I wonder if we can use the same work to help us. Let's give it a try. We'll start with an area model. I know 2/2 is equal to 1 whole, so I'll need to draw more than 1 square to make my area model. *(draw 2 squares partitioned into halves, then shade 3 of the halves)* There, each whole is partitioned into halves, and I've shaded 3 of them. This is 3/2. I'll draw another identical model that we can use to show the equivalent fraction. *(draw it)*

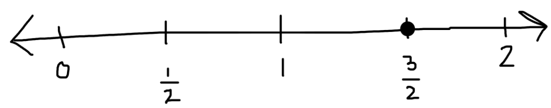
What can I do in the second area model to show an equivalent fraction? (Partition it horizontally) I can cut, or partition, the model horizontally. Last time, we made one cut. That could work this time too, but let's try making 2 cuts. We know there are many different equivalent fractions we can make from one fraction, so let's try out something different this time just for fun. *(use 2 dotted horizontal lines to partition the second area model)* Notice, the shaded region stayed the same. Our first area model shows 3 halves, or 3/2. *(write 3/2*

=) Our second area model now shows 9 sixths, because each whole has 6 pieces and we see 9 shaded pieces. *(write 9/6)* We just used area models to show that 3/2 is equivalent to 9/6.

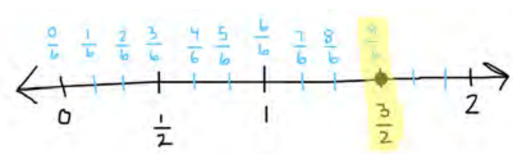
$$\frac{3}{2} = \frac{3 \times 3}{2 \times 3} = \frac{9}{6}$$

If we were to show this with numbers, we'd do it similar to how we thought of it in our last example. *(write equation as you narrate)* The fraction we started with was 3/2. In our last example, we cut each piece into 2, so we multiplied our numerator and denominator by 2. In this case, we cut each piece into 3 to try something different. What do you think I'll need to multiply the numerator and denominator by, then? (3, since we cut each part into 3 pieces) Right, we can multiply the numerator and denominator by 3. 3 x 3 = 9 shaded pieces. 2 x 3 = 6 pieces in each whole. We just used numbers to show that 3/2 is equivalent to 9/6.

Last but not least, let's think about a number line. What two whole numbers is 3/2 between? (1 and 2) I'll sketch a number line from 0 to 2, and I'll make tick marks to represent halves. *(sketch number line, then count as you label)* The first tick mark is 0, or 0/2. Then ½. Then 1, or 2/2. Then 1 ½, or 3/2. Then 2, or 4/2.



We partitioned the area model using two horizontal lines in this case. How can we show that on a number line? (Cut each unit into three pieces, or put two tick marks between each unit) Let's use two tick marks between each unit. *(partition each unit with two tick marks using a different color)* The original tick marks show halves, and the new tick marks in blue show sixths. If I label each sixth, I can see what 3/2 is equivalent to in terms of sixths. *(count from 0/6 to 9/6, labeling the number line as you go)* We drew 3/2 on the number line, partitioned to show sixths, and then we were able to see that 3/2 is equivalent to 9/6.



In our first problem, we found a fraction equivalent to ¼. In our second problem, we had to find a fraction equivalent to 3/2, which is greater than 1 whole. What was the same or different about how we went about making equivalent fractions? Possible Student Answers, Key Points:

- We used the same strategies for the fraction <1 and the fraction >1. Nothing was really different.
- For the fraction >1, we had to build our area model and number line to be a little bigger, but nothing about our steps or our thinking changed.

Let's Try it (Slides 6 - 7): Now let's work on making equivalent fractions together. We'll use number lines, area models, and mathematical expressions with numbers to show our thinking. We will want to carefully use horizontal and vertical partitions as we work to make equal-sized pieces with precision. We've also seen that there are *many* different equivalent fractions we can make from a given fraction, so we're not necessarily just looking for *one* correct answer. Let's go for it.

WARM WELCOME

Today we will make equivalent fractions with the number line, the area model, and numbers.

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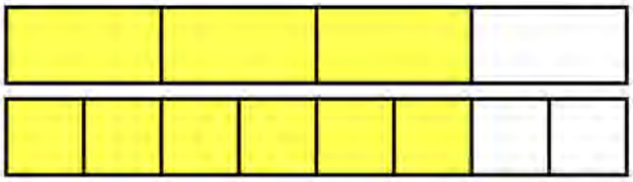
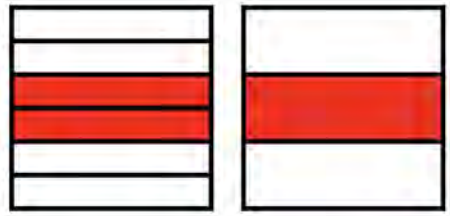
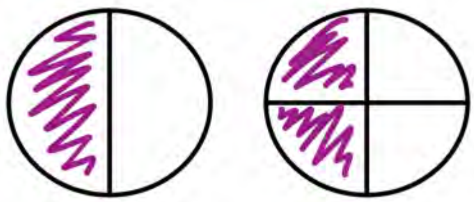
Let's Talk:

What do you notice? What do you wonder?







Let's Think:

Use a number line, area model, and numbers to find a fraction equivalent to ¼.

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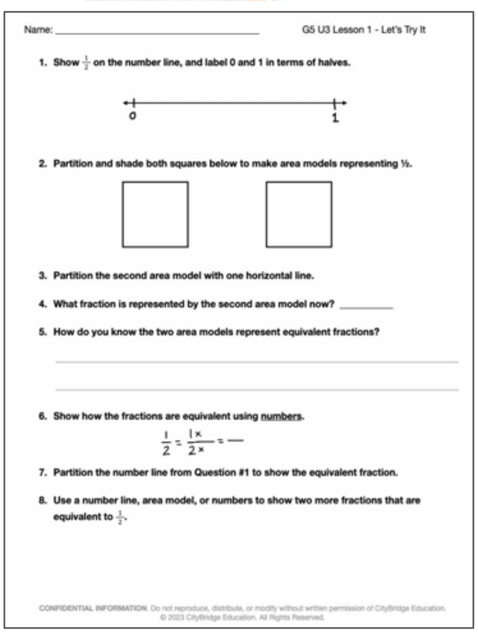
Let's Think:

Use a number line, area model, and numbers to find a fraction equivalent to 3/2.

Let's Try It:

Let's explore making equivalent fractions with number lines, area models, and numbers together.


Name: ______________________ G5 U3 Lesson 1 - Let's Try It

1. Show $\frac{1}{2}$ on the number line, and label 0 and 1 in terms of halves.

2. Partition and shade both squares below to make area models representing ½.
3. Partition the second area model with one horizontal line.
4. What fraction is represented by the second area model now? ________
5. How do you know the two area models represent equivalent fractions?
6. Show how the fractions are equivalent using numbers.

$$\frac{1}{2} = \frac{1\times}{2\times} = \frac{}{}$$

7. Partition the number line from Question #1 to show the equivalent fraction.
8. Use a number line, area model, or numbers to show two more fractions that are equivalent to $\frac{1}{2}$.

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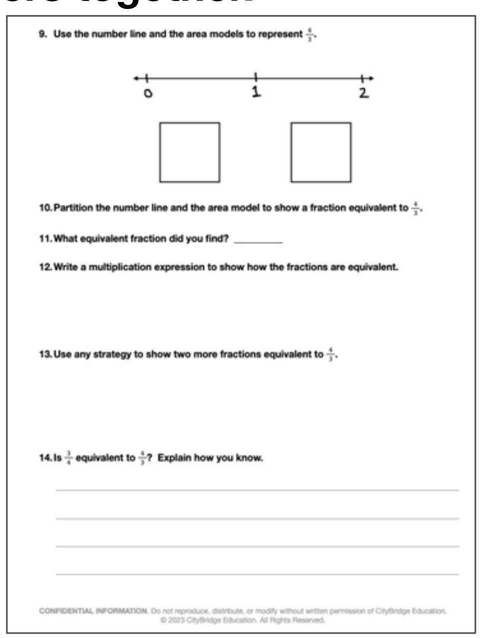
9. Use the number line and the area models to represent $\frac{4}{3}$.

10. Partition the number line and the area model to show a fraction equivalent to $\frac{4}{3}$.
11. What equivalent fraction did you find? ________
12. Write a multiplication expression to show how the fractions are equivalent.
13. Use any strategy to show two more fractions equivalent to $\frac{4}{3}$.
14. Is $\frac{3}{4}$ equivalent to $\frac{4}{3}$? Explain how you know.

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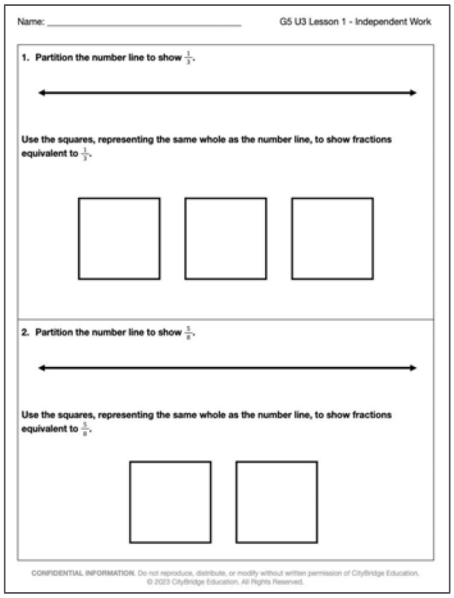
On your Own:

Now it's time to explore making equivalent fractions with number lines, area models, and numbers on your own.



Name: ______________________ G5 U3 Lesson 1 - Independent Work

1. Partition the number line to show $\frac{1}{3}$.

Use the squares, representing the same whole as the number line, to show fractions equivalent to $\frac{1}{3}$.

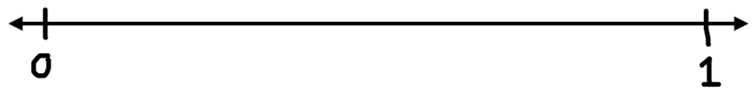
2. Partition the number line to show $\frac{5}{8}$.

Use the squares, representing the same whole as the number line, to show fractions equivalent to $\frac{5}{8}$.

3. Use a number line to show $\frac{7}{6}$. Then model a fraction that is equivalent to $\frac{7}{6}$.

3. Irene said the fractions $\frac{5}{4}$ and $\frac{4}{5}$ are equivalent because they use the same numbers. Explain why Irene is incorrect using words and models.

1. Show $\frac{1}{2}$ on the number line, and label 0 and 1 in terms of halves.



2. Partition and shade both squares below to make area models representing ½.

3. Partition the second area model with one horizontal line.

4. What fraction is represented by the second area model now? ____________

5. How do you know the two area models represent equivalent fractions?

____

____

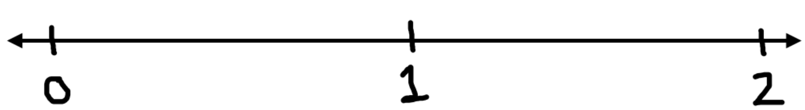
6. Show how the fractions are equivalent using <u>numbers</u>.

$$\frac{1}{2} = \frac{1\times}{2\times} = \frac{\quad}{\quad}$$

7. Partition the number line from Question #1 to show the equivalent fraction.

8. Use a number line, area model, or numbers to show two more fractions that are equivalent to $\frac{1}{2}$.

9. Use the number line and the area models to represent $\frac{4}{3}$.



10. Partition the number line and the area model to show a fraction equivalent to $\frac{4}{3}$.

11. What equivalent fraction did you find? ___________

12. Write a multiplication expression to show how the fractions are equivalent.

13. Use any strategy to show two more fractions equivalent to $\frac{4}{3}$.

14. Is $\frac{3}{4}$ equivalent to $\frac{4}{3}$? Explain how you know.

1. Partition the number line to show $\frac{1}{3}$.

Use the squares, representing the same whole as the number line, to show fractions equivalent to $\frac{1}{3}$.

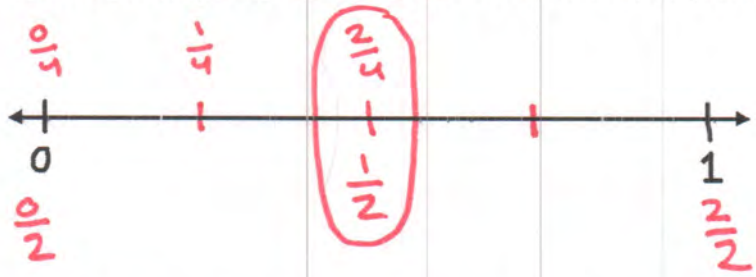
2. Partition the number line to show $\frac{5}{8}$.

Use the squares, representing the same whole as the number line, to show fractions equivalent to $\frac{5}{8}$.

3. Use a number line to show $\frac{7}{6}$. Then model a fraction that is equivalent to $\frac{7}{6}$.

3. Irene said the fractions $\frac{5}{4}$ and $\frac{4}{5}$ are equivalent because they use the same numbers. Explain why Irene is incorrect using words and models.

1. **Show $\frac{1}{2}$ on the number line, and label 0 and 1 in terms of halves.**



2. **Partition and shade both squares below to make area models representing ½.**

3. **Partition the second area model with one horizontal line.**

4. **What fraction is represented by the second area model now?** 2/4

5. **How do you know the two area models represent equivalent fractions?**

They both have the same area. They take up the same amount of the whole.

6. **Show how the fractions are equivalent using <u>numbers</u>.**

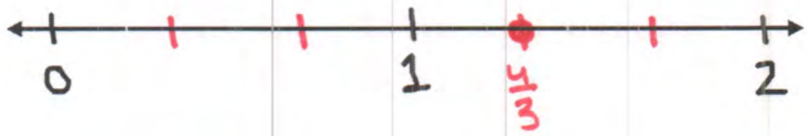
$$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$$

7. **Partition the number line from Question #1 to show the equivalent fraction.**

8. **Use a number line, area model, or numbers to show two more fractions that are equivalent to $\frac{1}{2}$.**

$\frac{1}{2} \times \frac{3}{3} = \frac{3}{6}$ $\frac{1}{2} \times \frac{10}{10} = \frac{10}{20}$

9. Use the number line and the area models to represent $\frac{4}{3}$.



10. Partition the number line and the area model to show a fraction equivalent to $\frac{4}{3}$.

11. What equivalent fraction did you find? 8/6

12. Write a multiplication expression to show how the fractions are equivalent.

$$\frac{4}{3} = \frac{4 \times 2}{3 \times 2} = \frac{8}{6}$$

13. Use any strategy to show two more fractions equivalent to $\frac{4}{3}$.

$\frac{4}{3} \times \frac{5}{5} = \frac{20}{15}$ $\frac{4}{3} \times \frac{3}{3} = \frac{12}{15}$

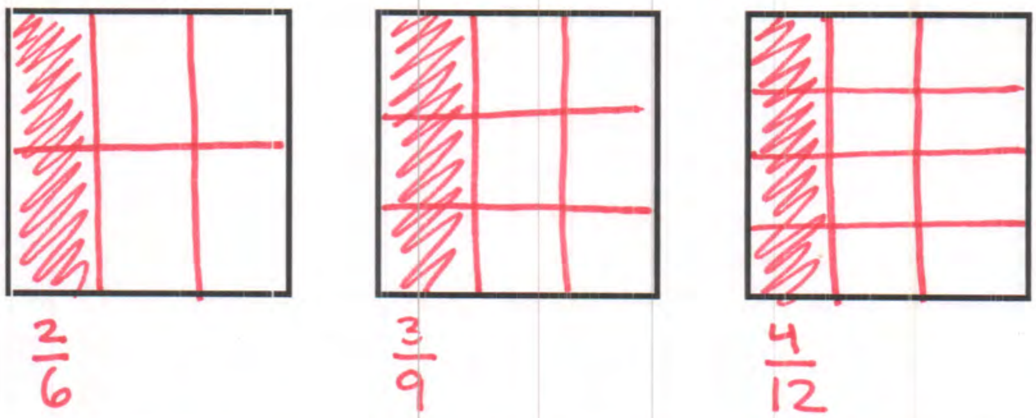
14. Is $\frac{3}{4}$ equivalent to $\frac{4}{3}$? Explain how you know.

No. 3/4 is 3 pieces out of 4. It's less than a whole. 4/3 is 4 pieces that are thirds. It's greater than a whole.

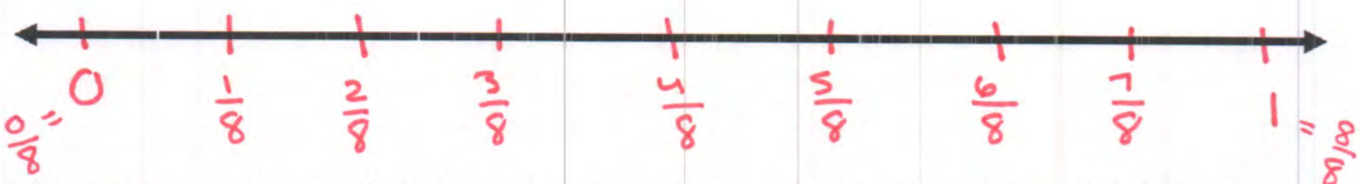
Name: KEY

1. **Partition the number line to show $\frac{1}{3}$.**

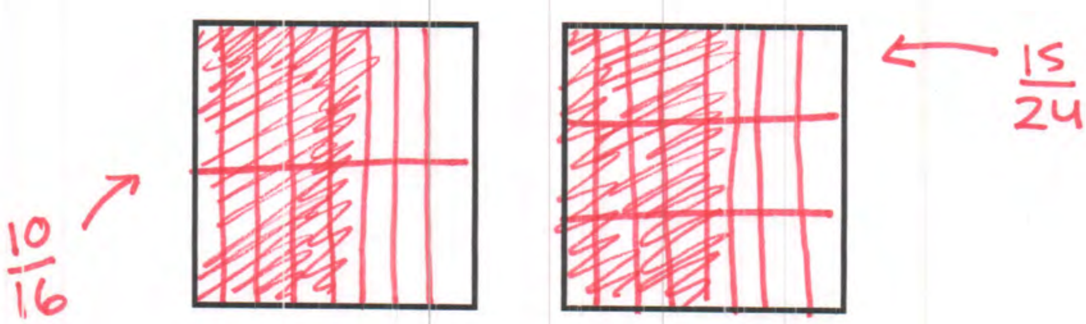
Use the squares, representing the same whole as the number line, to show fractions equivalent to $\frac{1}{3}$.



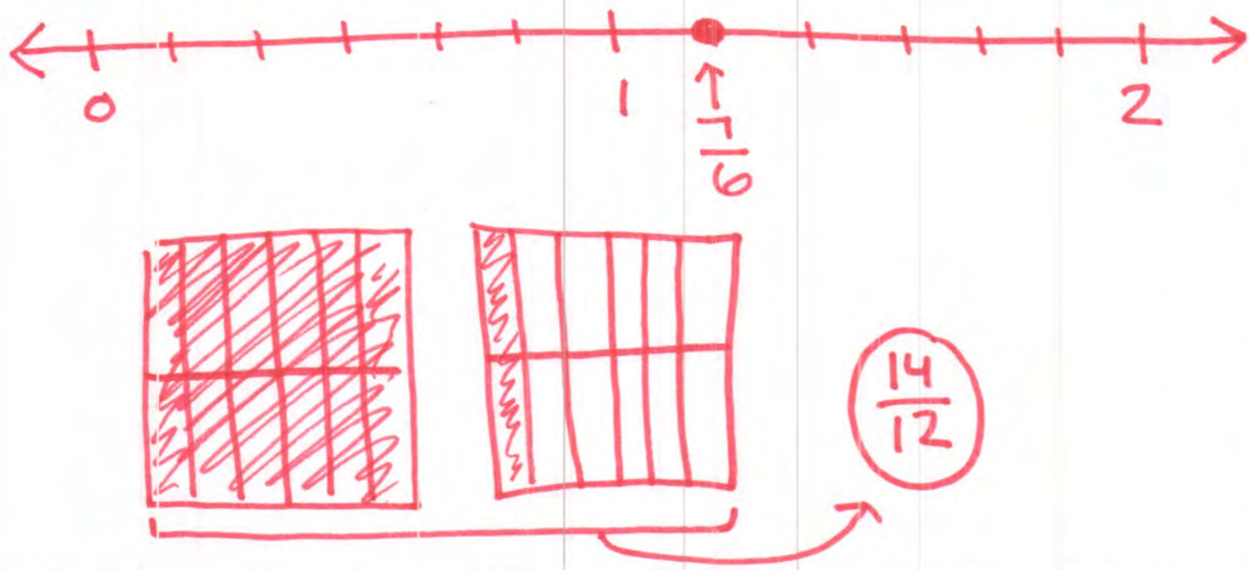
2. **Partition the number line to show $\frac{5}{8}$.**



Use the squares, representing the same whole as the number line, to show fractions equivalent to $\frac{5}{8}$.



3. **Use a number line to show $\frac{7}{6}$. Then model a fraction that is equivalent to $\frac{7}{6}$.**



3. **Irene said the fractions $\frac{5}{4}$ and $\frac{4}{5}$ are equivalent because they use the same numbers. Explain why Irene is incorrect using words and models.**

They are not equivalent. 4/5 is less than 1, and $\frac{5}{4}$ is greater than 1. Irene can't just switch the numerator and denominator.

G5 U3 Lesson 2

Make equivalent fractions with sums of fractions with like denominators

CITYTUTOR DC

G5 U3 Lesson 2 - Students will make equivalent fractions with sums of fractions with like denominators

Warm Welcome (Slide 1): Tutor choice

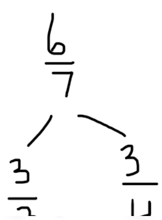
Frame the Learning/Connect to Prior Learning (Slide 2): Today, we're going to continue the work we've been doing with fractions. Our focus today is going to be on adding fractions to find sums with like denominators. We'll think about ways we can use addition to help us compose and decompose fractions with like units.

Let's Talk (Slide 3): There are many ways to decompose a numbers. For example, I can decompose 5 into 2 and 3, or 4 and 1. *(draw number bonds for each example you name)* We could even decompose 5 into more parts like 1, 1, and 3. There are so many ways to decompose 5.

What if, instead of 5, we thought about the fraction 6/7. Take a second and think about different ways you could decompose 6/7 into parts. Feel free to write your ideas down to keep track of them. Possible Student Answers, Key Points:

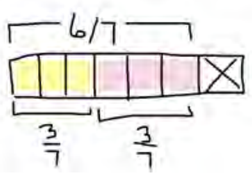
- I can do 3/7 and 3/7, 4/7 and 2/7, 5/7 and 1/7, 0/7 and 6/7.
- I can decompose into more pieces like 1/7, 1/7, 1/7, 1/7, 1/7, and 1/7.

(write a number bond to keep track of any correct possibilities the student shares) There are many ways we can decompose the fraction 6/7. Thinking of a fraction as the sum of other fractions with like units will help us a lot in our work today.



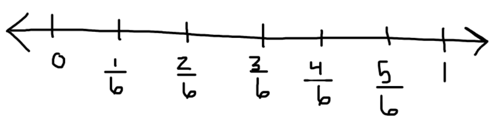
I once had a student show me this decomposition. *(write a number bond showing 6/7 decomposed into 3/3 and 3/4)* They said if they added the numerators and the denominators together it could make 6/7. I saw where they might think that, but why is this example NOT an accurate decomposition? Possible Student Answers, Key Points:

- The pieces are sevenths, so if I decompose 6 of them into 3 parts and 3 parts, they'll still be sevenths.
- We don't actually add the denominators when thinking about fractions. The denominator just tells us the size of the pieces.

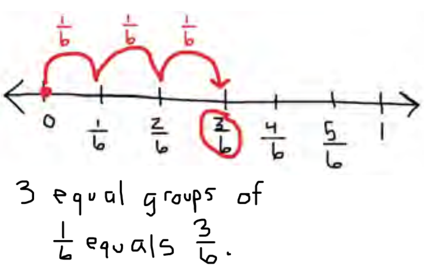


Great thinking. We want to be careful not to add denominators, because the denominator is just telling us the size of the pieces. If we picture 6/7 being decomposed *(draw a rectangular tape diagram showing 6/7)*, and if we're decomposing it into 3 parts and 3 parts, the parts are still 7ths. *(shade and label 3/7 and 3/7 and point out the denominators)* The parts aren't changing size, so the denominator remains the same.

Let's Think (Slide 4): This problem wants us to use a number line, words, and multiplication to find the total of the expression. Let's start with the number line. What unit should I partition the number line into? (sixths)



Okay, let's show a number line from 0 to 1. We'll partition it into six equal units. *(sketch and label number line)*



Since our number line is partitioned into sixths, If we want to show 1/6 + 1/6 + 1/6 we can start at 0 and move up one unit three times. *(draw hops along the number line as you simultaneously say 1/6 plus 1/6 plus 1/6)* So, what's the total? Where did we end up? (3/6)
Correct! 1/6 + 1/6 + 1/6 = 3/6, and we see that clearly on the number line.

If we were using words to describe this, we could say that 3 equal groups of 1/6 is equivalent to 3/6. *(write this sentence underneath the number line)*

We know that when we want a fast way to describe equal groups, we can use multiplication. What multiplication equation do you think could represent the words we just wrote and why? Possible Student Answers, Key Points:

- 3 x 1/6 = 3/6
- We have 3 equal groups, so we can multiply 1/6 by 3 to get the total.

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

(write multiplication equation) We can use multiplication to show equal groups, so 3 x ⅙ = 3/6 is another way to show that 3 groups of ⅙ make a total of 3/6.

We just used a number line, words, and multiplication to find the total. How are the three ways we thought about ⅙ + ⅙ + ⅙ the same or different? Possible Student Answers, Key Points:

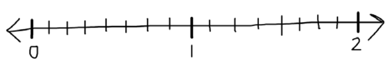
- The number line, words, and multiplication all look like different representations. One shows hops on a line, one is just words, and one uses symbols and numbers.
- They're the same, because they all show that 3 equal groups of ⅙ make a total of 3/6.

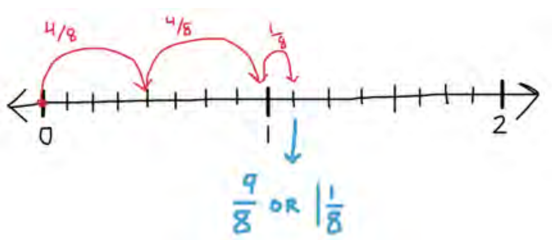
Let's try one more example that's just a bit different.

Let's Think (Slide 5): What do you notice is the same or different about this problem? Possible Student Answers, Key Points:

- Our last problem was just unit fractions. This problem has unit and non-unit fractions. This problem also involves eighths, not sixths.
- This problem still involves three fractions and wants us to find the total using a number line, words, and multiplication.

Let's see if we can use similar thinking to find this total. We'll start by making a number line. *(draw number line from 0 to 2 labeling just the whole numbers)* What should I partition the number line into for this problem? (eighths) I'll cut each whole into 8 pieces, using 7 tick marks between each whole. *(partition each whole into 8 units)*





We want to show 4 eighths plus 4 eighths plus 1 eighth. I'll show that using one hop of four units, then another hop of four units, then another hop of just 1 unit. *(model and label on the number line, saying 4/8 plus 4/8 plus 1/8 as you make each hop)*

We ended up ⅛ past the 1 whole mark. We can write that total as 9/8 or as 1 ⅛ in mixed number form.

If you were to describe the addition we just modeled on the number line to a friend, how would you describe it? Possible Student Answers, Key Points:

- We made two bigger hops of 4/8, and then we hopped 1 more unit.
- Our first two jumps were the same, 4/8 each, and then our last jump was smaller, because we only needed to go 1 more eighth.

2 groups of $\frac{4}{8}$ and $\frac{1}{8}$ more is $\frac{9}{8}$

Thinking about what we see on the number line can help us describe the composition in words. We can say that *(write as you say it)* 2 groups of 4/8 and ⅛ more is 9/8.

Would the multiplication expression 3 x 4/8 represent this total? Why or why not? Possible Student Answers, Key Points:

- No, we don't have 3 groups of 4/8. We don't have three equal groups in this problem.
- 3 groups of 4/8 is 12/8, but our total is 9/8.

$\left(2 \times \frac{4}{8}\right) + \frac{1}{8}$

Since we don't have exclusively equal groups like we did in our previous problem, we need to write our multiplication expression a little different. We can show two groups of 4/8 using multiplication, but then we'll need to add the ⅛ to that amount. We can write that like *(write as you say it)* (2 x 4/8) + 1/8 = 9/8.

We just found the total of this expression using a number line, words, and multiplication. This problem was similar to our last one, but we noted some differences. What did we have to consider differently in this problem? Possible Student Answers, Key Points:

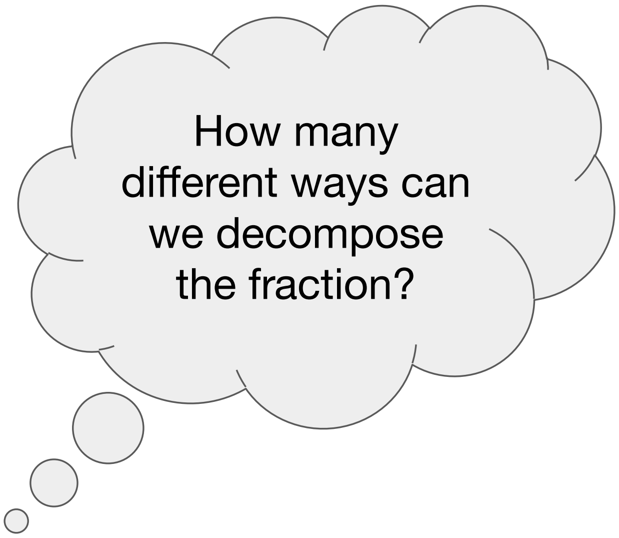
- Since we didn't have all equal groups, the jumps on the number line had to be different sizes. For our word form and the multiplication, we had to show the equal groups *plus* the extra eighth.
- This problem's total was greater than 1 whole, so we had to make our number line a little longer. We can also write our total as a fraction or a mixed number.

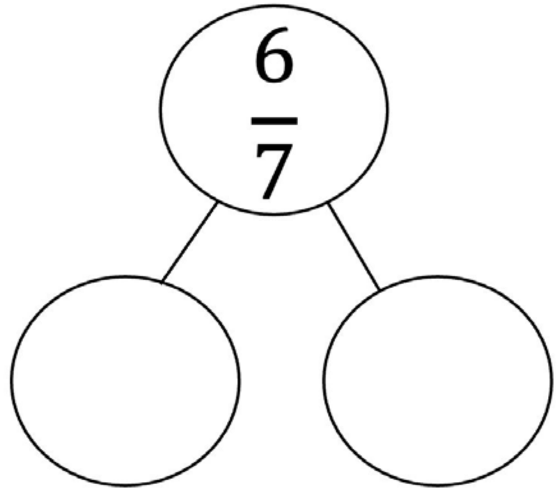
Let's Try it (Slides 6 - 7): Now let's work on making equivalent fractions with sums of fractions with like denominators together. We'll show our thinking with number lines, words, and multiplication like we've been doing. When we compose or decompose fractions, remember that the unit, or the denominator, remains the same; the size of the pieces remains consistent in the problems we've seen today, so it makes sense that the denominator remains consistent. Let's work on some problems together.

WARM WELCOME

Today we will make equivalent fractions with sums of fractions with like denominators.

Let's Talk:





Let's Think:

Use a number line, words, and multiplication to find the total of the expression.

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

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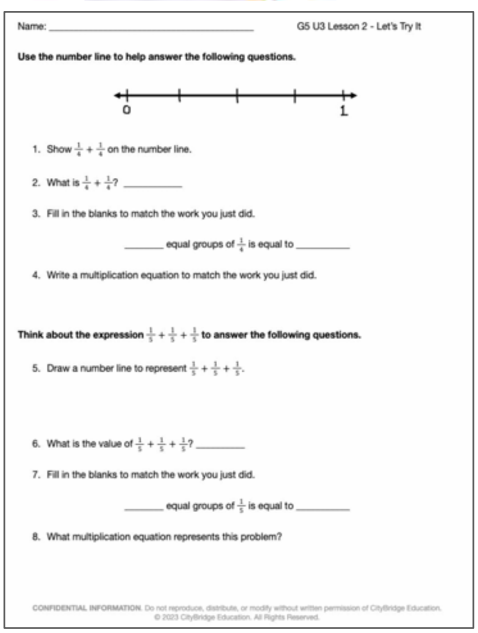
Let's Think:

Use a number line, words, and multiplication to find the total of the expression.

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

Let's Try It:

Let's explore making equivalent fractions with sums of fractions with like denominators together.



Name: ______________________ G5 U3 Lesson 2 - Let's Try It

Use the number line to help answer the following questions.

0 1

1. Show $\frac{1}{4}+\frac{1}{4}$ on the number line.
2. What is $\frac{1}{4}+\frac{1}{4}$? ________
3. Fill in the blanks to match the work you just did.

   ______ equal groups of $\frac{1}{4}$ is equal to ________

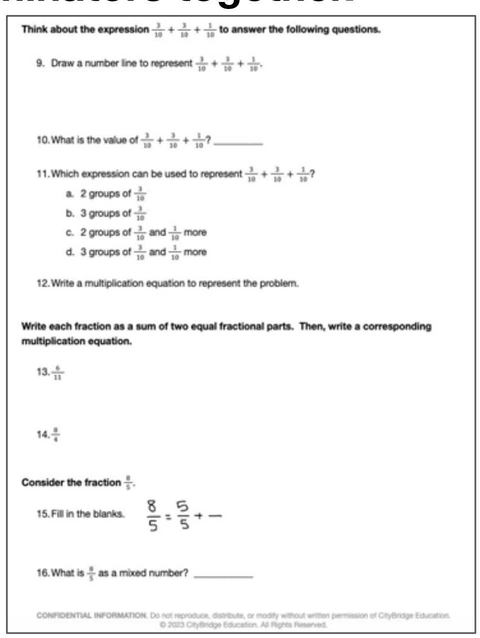
4. Write a multiplication equation to match the work you just did.

Think about the expression $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$ to answer the following questions.

5. Draw a number line to represent $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$.
6. What is the value of $\frac{1}{5}+\frac{1}{5}+\frac{1}{5}$? ________
7. Fill in the blanks to match the work you just did.

   ______ equal groups of $\frac{1}{5}$ is equal to ________

8. What multiplication equation represents this problem?



Think about the expression $\frac{3}{10}+\frac{3}{10}+\frac{1}{10}$ to answer the following questions.

9. Draw a number line to represent $\frac{3}{10}+\frac{3}{10}+\frac{1}{10}$.
10. What is the value of $\frac{3}{10}+\frac{3}{10}+\frac{1}{10}$? ________
11. Which expression can be used to represent $\frac{3}{10}+\frac{3}{10}+\frac{1}{10}$?
    a. 2 groups of $\frac{3}{10}$
    b. 3 groups of $\frac{3}{10}$
    c. 2 groups of $\frac{3}{10}$ and $\frac{1}{10}$ more
    d. 3 groups of $\frac{3}{10}$ and $\frac{1}{10}$ more
12. Write a multiplication equation to represent the problem.

Write each fraction as a sum of two equal fractional parts. Then, write a corresponding multiplication equation.

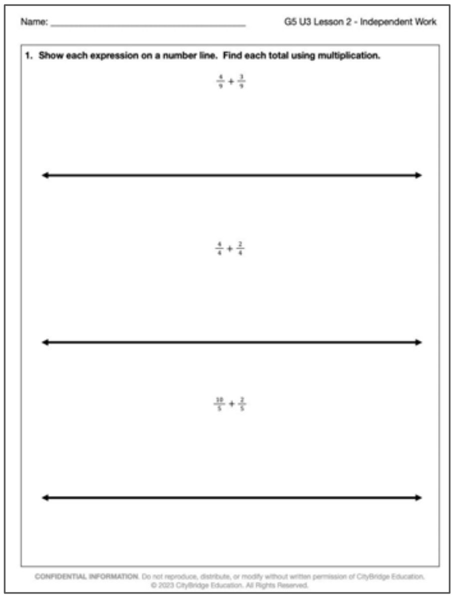
13. $\frac{6}{11}$
14. $\frac{8}{4}$

Consider the fraction $\frac{8}{5}$.

15. Fill in the blanks. $\frac{8}{5}=\frac{5}{5}+\frac{\ }{\ }$
16. What is $\frac{8}{5}$ as a mixed number? ________

On your Own:

Now it's time to explore making equivalent fractions with sums of fractions with like denominators on your own.



Name: ______________________ G5 U3 Lesson 2 - Independent Work

1. Show each expression on a number line. Find each total using multiplication.

$\frac{4}{9} + \frac{3}{9}$

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

$\frac{10}{5} + \frac{2}{5}$

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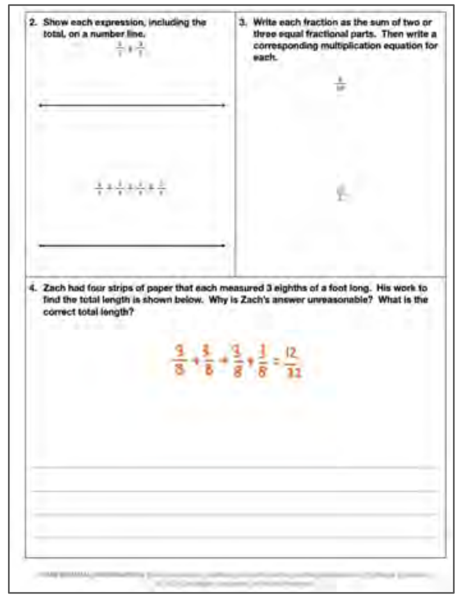


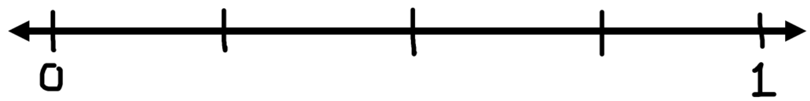
2. Show each expression, including the total, on a number line.

3. Write each fraction as the sum of two or three equal fractional parts. Then write a corresponding multiplication equation for each.

4. Zach had four strips of paper that each measured 3 eighths of a foot long. His work to find the total length is shown below. Why is Zach's answer unreasonable? What is the correct total length?

$\frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} = \frac{12}{32}$

Use the number line to help answer the following questions.



1. Show $\frac{1}{4} + \frac{1}{4}$ on the number line.

2. What is $\frac{1}{4} + \frac{1}{4}$? ____________

3. Fill in the blanks to match the work you just did.

________ equal groups of $\frac{1}{4}$ is equal to ___________

4. Write a multiplication equation to match the work you just did.

Think about the expression $\frac{1}{5} + \frac{1}{5} + \frac{1}{5}$ to answer the following questions.

5. Draw a number line to represent $\frac{1}{5} + \frac{1}{5} + \frac{1}{5}$.

6. What is the value of $\frac{1}{5} + \frac{1}{5} + \frac{1}{5}$? __________

7. Fill in the blanks to match the work you just did.

________ equal groups of $\frac{1}{5}$ is equal to ___________

8. What multiplication equation represents this problem?

Think about the expression $\frac{3}{10} + \frac{3}{10} + \frac{1}{10}$ to answer the following questions.

9. Draw a number line to represent $\frac{3}{10} + \frac{3}{10} + \frac{1}{10}$.

10. What is the value of $\frac{3}{10} + \frac{3}{10} + \frac{1}{10}$? ___________

11. Which expression can be used to represent $\frac{3}{10} + \frac{3}{10} + \frac{1}{10}$?

   a. 2 groups of $\frac{3}{10}$
   b. 3 groups of $\frac{3}{10}$
   c. 2 groups of $\frac{3}{10}$ and $\frac{1}{10}$ more
   d. 3 groups of $\frac{3}{10}$ and $\frac{1}{10}$ more

12. Write a multiplication equation to represent the problem.

Write each fraction as a sum of two equal fractional parts. Then, write a corresponding multiplication equation.

13. $\frac{6}{11}$

14. $\frac{8}{4}$

Consider the fraction $\frac{8}{5}$.

15. Fill in the blanks. $\frac{8}{5} = \frac{5}{5} + \frac{\quad}{\quad}$

16. What is $\frac{8}{5}$ as a mixed number? _____________

1. Show each expression on a number line. Find each total using multiplication.

$$\frac{4}{9}+\frac{3}{9}$$

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

$$\frac{10}{5}+\frac{2}{5}$$

2. Show each expression, including the total, on a number line.

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

3. Write each fraction as the sum of two or three equal fractional parts. Then write a corresponding multiplication equation for each.

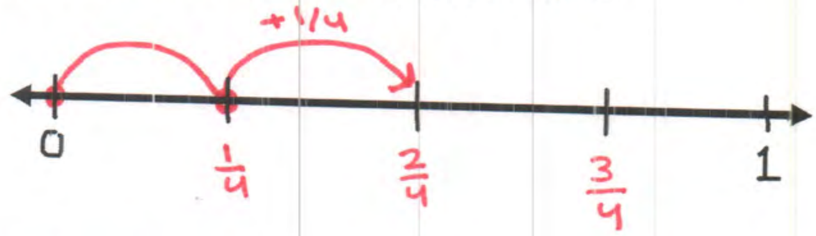
	$\frac{8}{10}$
$\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}$	$\frac{15}{6}$

4. Zach had four strips of paper that each measured 3 eighths of a foot long. His work to find the total length is shown below. Why is Zach's answer unreasonable? What is the correct total length?

$$\frac{3}{8}+\frac{3}{8}+\frac{3}{8}+\frac{3}{8}=\frac{12}{32}$$

Name: KEY

Use the number line to help answer the following questions.



1. Show $\frac{1}{4} + \frac{1}{4}$ on the number line.

2. What is $\frac{1}{4} + \frac{1}{4}$? 2/4

3. Fill in the blanks to match the work you just did.

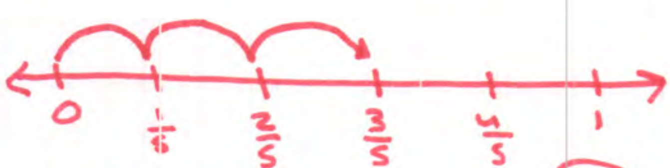
   2 equal groups of $\frac{1}{4}$ is equal to 2/4

4. Write a multiplication equation to match the work you just did.

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

Think about the expression $\frac{1}{5} + \frac{1}{5} + \frac{1}{5}$ to answer the following questions.

5. Draw a number line to represent $\frac{1}{5} + \frac{1}{5} + \frac{1}{5}$.



6. What is the value of $\frac{1}{5} + \frac{1}{5} + \frac{1}{5}$? 3/5

7. Fill in the blanks to match the work you just did.

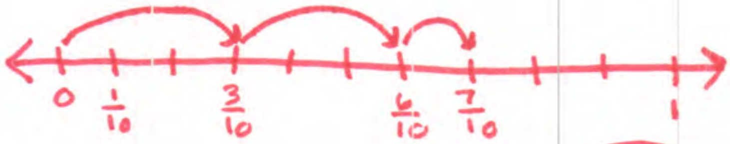
   3 equal groups of $\frac{1}{5}$ is equal to 3/5

8. What multiplication equation represents this problem?

   $3 \times \frac{1}{5} = \frac{3}{5}$

Think about the expression $\frac{3}{10} + \frac{3}{10} + \frac{1}{10}$ to answer the following questions.

9. Draw a number line to represent $\frac{3}{10} + \frac{3}{10} + \frac{1}{10}$.



10. What is the value of $\frac{3}{10} + \frac{3}{10} + \frac{1}{10}$? 7/10

11. Which expression can be used to represent $\underbrace{\frac{3}{10} + \frac{3}{10}}_{\text{2 groups of } \frac{3}{10}} + \frac{1}{10}$?

    a. 2 groups of $\frac{3}{10}$
    b. 3 groups of $\frac{3}{10}$
    c. 2 groups of $\frac{3}{10}$ and $\frac{1}{10}$ more
    d. 3 groups of $\frac{3}{10}$ and $\frac{1}{10}$ more

12. Write a multiplication equation to represent the problem.

$$\left(2 \times \frac{3}{10}\right) + \frac{1}{10} = \frac{7}{10}$$

Write each fraction as a sum of two equal fractional parts. Then, write a corresponding multiplication equation.

13. $\frac{6}{11}$ $\quad \frac{3}{11} + \frac{3}{11} = \frac{6}{11} \qquad 2 \times \frac{3}{11} = \frac{6}{11}$

14. $\frac{8}{4}$ $\quad \frac{4}{4} + \frac{4}{4} = \frac{8}{4} \qquad 2 \times \frac{4}{4} = \frac{8}{4}$

Consider the fraction $\frac{8}{5}$.

15. Fill in the blanks. $\frac{8}{5} = \frac{5}{5} + \frac{3}{5}$

16. What is $\frac{8}{5}$ as a mixed number? $1\frac{3}{5}$

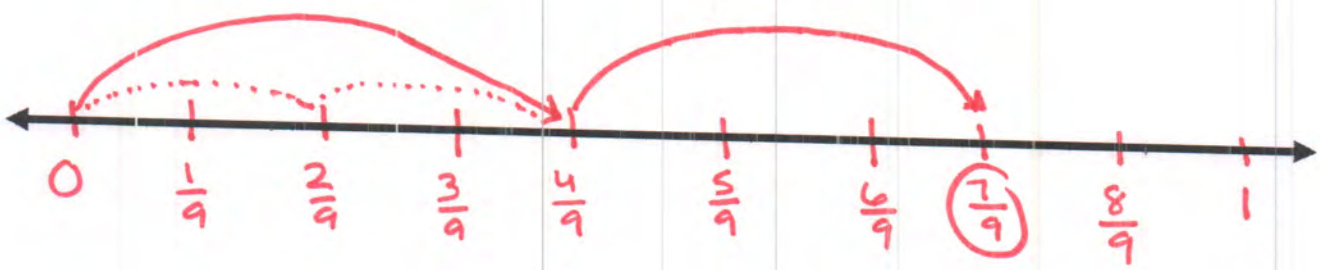
Name: KEY

1. Show each expression on a number line. Find each total using multiplication.

$\frac{4}{9} + \frac{3}{9}$

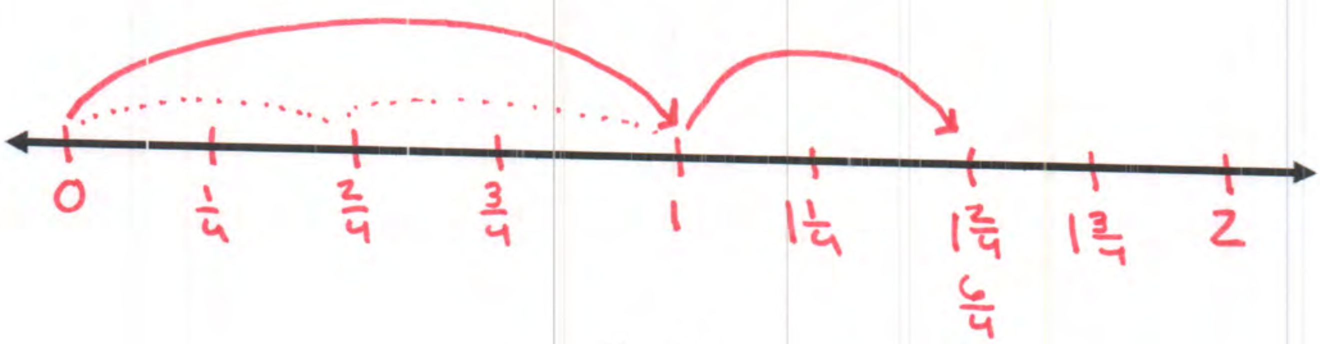
$\frac{2}{9}$ $\frac{2}{9}$

$\left(2 \times \frac{2}{9}\right) + \frac{3}{9} = \frac{7}{9}$



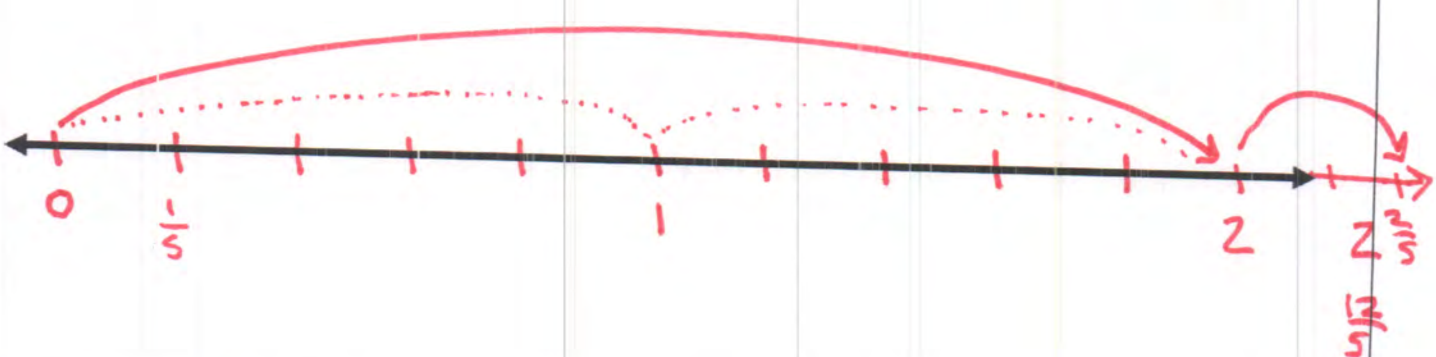
$\frac{4}{4} + \frac{2}{4}$

$3 \times \frac{2}{4} = \frac{6}{4}$



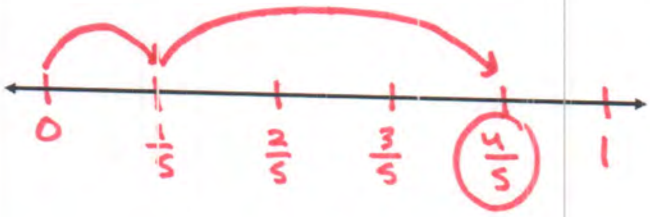
$\frac{10}{5} + \frac{2}{5}$

$\left(2 \times \frac{5}{5}\right) + \frac{2}{5} = \frac{12}{5}$

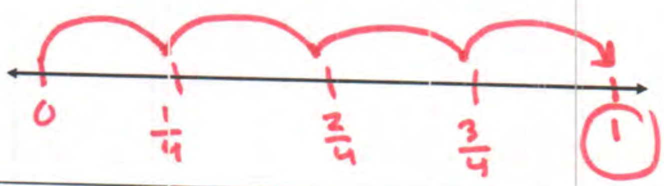


2. **Show each expression, including the total, on a number line.**

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



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



3. **Write each fraction as the sum of two or three equal fractional parts. Then write a corresponding multiplication equation for each.**

$\frac{8}{10}$

$\frac{4}{10} + \frac{4}{10}$

$2 \times \frac{4}{10} = \frac{8}{10}$

$\frac{15}{6}$

$\frac{5}{6} + \frac{5}{6} + \frac{5}{6}$

$3 \times \frac{5}{6} = \frac{15}{6}$

4. **Zach had four strips of paper that each measured 3 eighths of a foot long. His work to find the total length is shown below. Why is Zach's answer unreasonable? What is the correct total length?**

$\frac{3}{8} \times 4 = \frac{12}{8}$

$\frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} = \frac{12}{32}$

Four groups of 3/8 would be more than a whole, but Zach's answer is less than a whole. Zach added his denominators, but ~~8~~ 4 groups of 3 eighths would be 12 eighths.

G5 U3 Lesson 3

Add fractions with unlike units using the strategy of creating equivalent fractions

G5 U3 Lesson 3 - Students will add fractions with unlike units using the strategy of creating equivalent fractions

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): In our past few lessons, we've been thinking about equivalent fractions. Today, we will use what we've been thinking about to help us add fractions with unlike units.

Let's Talk (Slide 3): Before we solve some problems, take a look at these equations. What do you notice about them? Possible Student Answers, Key Points:

- I notice they're all addition equations. They all have 4 and 2 in them. They all would have an answer of 6. I notice some are objects like apples, and some are math units like tenths.
- They all have like units. Apples and apples, cows and cows, etc.

There is a lot you can notice about these four equations, but I want to specifically point out the units. I know that if I add 2 apples with 4 apples, my answer will be 6 *apples*. We see the same with more math-y units. I know 2 tens plus 4 tens will be 6 *tens.* I know 2 tenths plus 4 tenths will be 6 *tenths*.

If I gave you a problem like this *(write 2 cows + 4 apples)*, what would you think?

2 cows + 4 apples = ?

Possible Student Answers, Key Points:

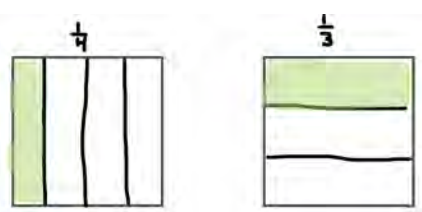
- They're not like units. I can't really add cows and apples together, because they're different things.
- 2 + 4 is 6, but the unit is confusing.

It is easier to think about addition when we have like units. Today, we'll be asked to think about sums of fractions with unlike units. We'll use what we know about equivalent fractions to help us rewrite fractions so they have like units, which will make it easier for us to add. Let me show you what I mean.

Let's Think (Slide 4): This question wants us to add ¼ and ⅓ What fractional units does this problem involve? *(fourths and thirds)* Since these fractions don't have the same unit, we can't automatically add them, because we don't know what unit the total would be. It's sort of like trying to add cows + apples, from before.

Let's use an area model to represent both fractions. Then we'll use what we know about equivalent fractions to help us find like units. How can I represent these two addends using area models? Possible Student Answers, Key Points:

- For ¼, you can split an area model into four pieces and shade one of them.
- For ⅓you can split an area model into three pieces and shade one of them.

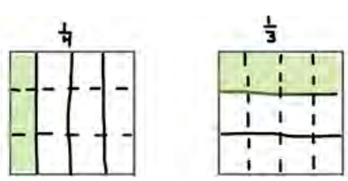


(draw the area models and label each as you narrate) I'm going to partition the first area model into four pieces vertically, and shade one of them. This shows ¼. I'm going to partition the second area model into three pieces horizontally, and shade one of them. This shows ⅓ I want to add these two fractions, but they're unlike units.

I need to think of a like unit that I can use to make equivalent fractions with both ¼ and ⅓ Maybe you know one off the top of your head, but if you're not sure of a common unit to use for each fraction, you can visualize creating equivalent fractions.

4, 8, 12, 16 ...
3, 6, 9, 12 ...

(list multiples as you name them) For instance, I know if I partition fourths once, I'll make 8 pieces. If I partition fourths twice, I'll make 12 pieces. If I partition fourths three times, I'll make 16 pieces. I can do the same thinking with thirds. If I partition thirds once, I'll make 6 pieces. If I partition thirds twice, I'll make 9 pieces. If I partition thirds three times, I'll make 12 pieces. Which fractional unit could we use to write two equivalent fractions with like units? (12ths or 12 pieces)



To write ¼ as an equivalent fraction with 12 pieces, I can partition the area model with two horizontal lines. *(draw two horizontal lines)* I didn't change the shaded region at all, I just partitioned the model to make an equivalent fraction with different-sized pieces. How can I use my area model to show ⅓ as an equivalent fraction with 12 pieces? (draw 3 lines to cut the thirds into twelfths) Great, I'll use 3 vertical lines to cut the thirds into twelfths. *(draw three vertical lines)*

What equivalent fractions did we make, and how do you know? Possible Student Answers, Key Points:

- The first area model showed ¼. We partitioned it into 12 pieces, and I see 3 are shaded. The equivalent fraction is 3/12.
- The second area model showed ⅓ We partitioned it into 12 pieces, and I see 4 are shaded. The equivalent fraction is 4/12.

$\frac{3}{12} + \frac{4}{12} = \frac{7}{12}$

Instead of ¼ + ⅓we can now think of our equation with like units. *(write new equation)* We have 3/12 + 4/12 = ?. Now that we have like units, it's much easier to think about the addition. What is 3 twelfths plus 4 twelfths? (7 twelfths) Well done. *(write answer to equation)* We just used area models to help us find like units, so that we could add fractions that originally had unlike units. Let's try one more.

Let's Think (Slide 5): *(read problem)* What do you notice is the same or different about this problem? Possible Student Answers, Key Points:

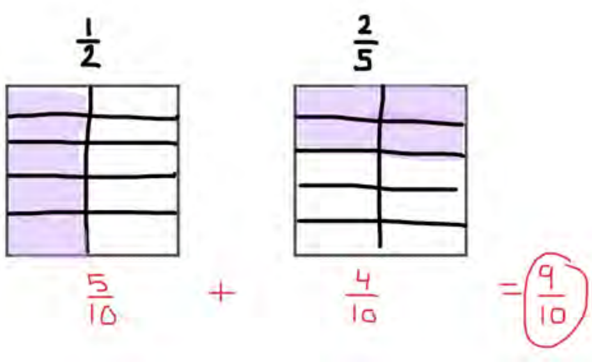
- It's still an addition problem. It still involves fractions. The fractions have unlike units again.
- It's different because these fractions have units of halves and fifths. It's different because one fraction isn't a unit fraction.

These fractions, once again, don't have like units. This means we can't just add automatically, because these fractions don't represent the same size pieces. Let's see if we can use similar thinking to find this sum. We'll start by drawing an area model to represent each. Since I know I'll have to make like units, I'll model ½ by partitioning vertically and ⅖ by partitioning horizontally. *(draw and shade ½ using a vertical cut, then draw and shade ⅖ using four horizontal cuts)*

We know, and we can see in our models, that halves and fifths are not the same size. How did we find a common unit in the last example, and how could we use that to find a common unit in this problem? Possible Student Answers, Key Points:

- We thought about each fraction and what units we could make if we partitioned each one a few times. We listed out the new parts each partition would make.
- Halves can make fourths, sixths, eighths, tenths, and so on. Fifths can make tenths, fifteenths, twentieths, and so on.

Since I know I can partition halves into ten pieces *and* fifths into ten pieces, we can make equivalent fractions using tenths as our denominator. Let's partition each area model to show tenths.



(partition each area model as you narrate) I can use four horizontal cuts to partition ½ into tenths. I can use one vertical cut to partition ⅖ into tenths. What equivalent fractions do we see now? (½ is equivalent to 5/10, and ⅖ is equivalent to 4/10)

If we rewrite our original expression using like units, *(write 5/10 + 4/10 underneath corresponding area models)* we can now add with ease. 5 tenths plus 4 tenths is equal to 9 tenths. *(write = 9/10)*

When asked to add fractions with unlike units, or unlike denominators, we can rewrite the problem using equivalent fractions with like units to make the addition easier to think about.

Let's Try it (Slides 6 - 7): Now let's work on adding fractions with unlike units by making equivalent fractions together. As we work, we'll draw area models to visualize our fractions. We can skip-count or visualize partitioning each fraction to find a common unit we can convert each fraction into, and then partition our area models to match. Let's give it a try!

WARM WELCOME

Today we will add fractions with unlike units by using the strategy of creating equivalent fractions.

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Let's Talk:

2 apples + 4 apples = ?

2 cows + 4 cows = ?

2 tens + 4 tens = ?

2 tenths + 4 tenths = ?

Let's Think:

Use an area model to find the sum.

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

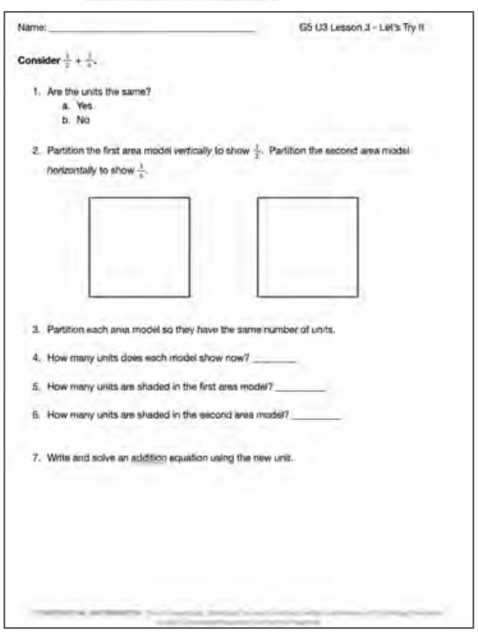
Let's Think:

Use an area model to find the sum.

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

Let's Try It:

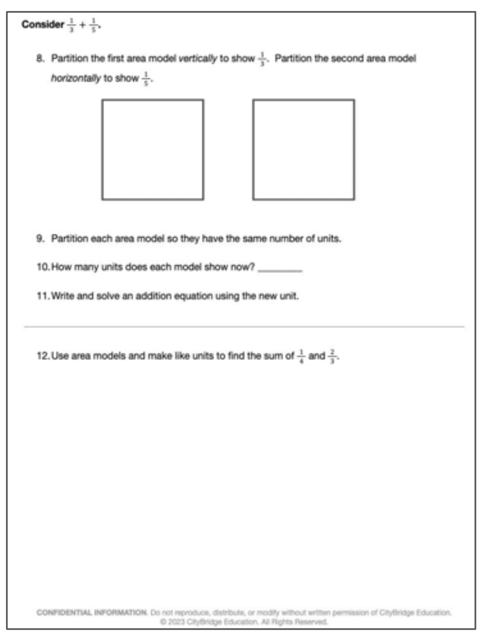
Let's explore adding fractions with unlike units together.



Name: ______________________ G5 U3 Lesson 3 - Let's Try It

Consider $\frac{1}{2} + \frac{1}{4}$.

1. Are the units the same?
   a. Yes
   b. No
2. Partition the first area model vertically to show $\frac{1}{2}$. Partition the second area model horizontally to show $\frac{1}{4}$.
3. Partition each area model so they have the same number of units.
4. How many units does each model show now? ________
5. How many units are shaded in the first area model? ________
6. How many units are shaded in the second area model? ________
7. Write and solve an addition equation using the new unit.



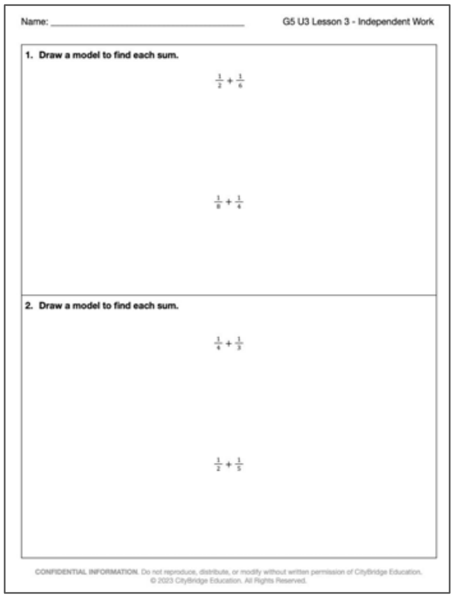
Consider $\frac{1}{3} + \frac{1}{5}$.

8. Partition the first area model *vertically* to show $\frac{1}{3}$. Partition the second area model *horizontally* to show $\frac{1}{5}$.
9. Partition each area model so they have the same number of units.
10. How many units does each model show now? ________
11. Write and solve an addition equation using the new unit.

12. Use area models and make like units to find the sum of $\frac{1}{4}$ and $\frac{2}{3}$.

On your Own:

Now it's time to explore adding fractions with unlike units on your own.



Name: ______________________ G5 U3 Lesson 3 - Independent Work

1. Draw a model to find each sum.

$\frac{1}{2} + \frac{1}{6}$

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

2. Draw a model to find each sum.

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

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

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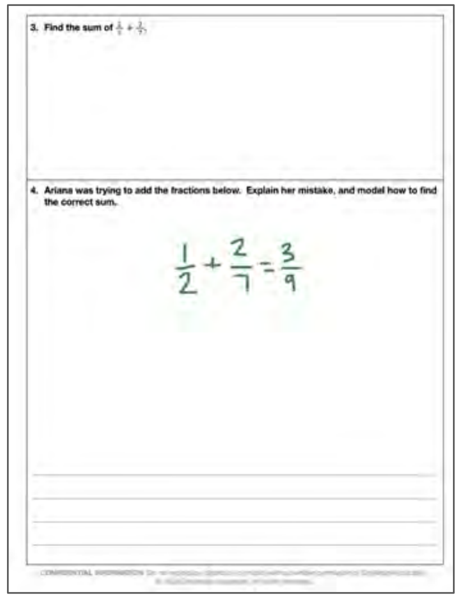


3. Find the sum of 1/[illegible] + $\frac{2}{7}$.

4. Ariana was trying to add the fractions below. Explain her mistake, and model how to find the correct sum.

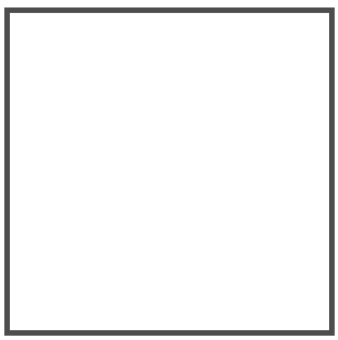
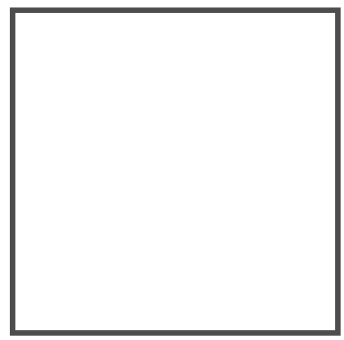
$\frac{1}{2} + \frac{2}{7} = \frac{3}{9}$

Name: ____

Consider $\frac{1}{2} + \frac{1}{6}$.

1. Are the units the same?
    a. Yes
    b. No

2. Partition the first area model *vertically* to show $\frac{1}{2}$. Partition the second area model *horizontally* to show $\frac{1}{6}$.

3. Partition each area model so they have the same number of units.

4. How many units does each model show now? __________

5. How many units are shaded in the first area model? ___________

6. How many units are shaded in the second area model? ___________

7. Write and solve an addition equation using the new unit.

Consider $\frac{1}{3} + \frac{1}{5}$.

8. Partition the first area model *vertically* to show $\frac{1}{3}$. Partition the second area model *horizontally* to show $\frac{1}{5}$.


9. Partition each area model so they have the same number of units.

10. How many units does each model show now? __________

11. Write and solve an addition equation using the new unit.

---

12. Use area models and make like units to find the sum of $\frac{1}{4}$ and $\frac{2}{3}$.

1. Draw a model to find each sum.

$$\frac{1}{2} + \frac{1}{6}$$

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

2. Draw a model to find each sum.

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

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

3. Find the sum of $\frac{2}{3} + \frac{2}{7}$.

4. Ariana was trying to add the fractions below. Explain her mistake, and model how to find the correct sum.

$$\frac{1}{2} + \frac{2}{7} = \frac{3}{9}$$

Name: KEY

Consider $\frac{1}{2} + \frac{1}{6}$.

1. Are the units the same?
    a. Yes
    b. No

2. Partition the first area model *vertically* to show $\frac{1}{2}$. Partition the second area model *horizontally* to show $\frac{1}{6}$.

3. Partition each area model so they have the same number of units.

4. How many units does each model show now? 12

5. How many units are shaded in the first area model? 6

6. How many units are shaded in the second area model? 2

7. Write and solve an addition equation using the new unit.

$$\frac{6}{12} + \frac{2}{12} = \frac{8}{12}$$

Consider $\frac{1}{3} + \frac{1}{5}$.

8. Partition the first area model *vertically* to show $\frac{1}{3}$. Partition the second area model *horizontally* to show $\frac{1}{5}$.

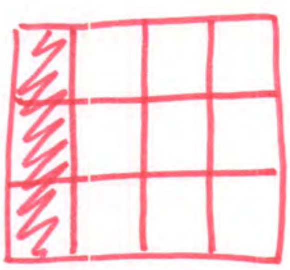
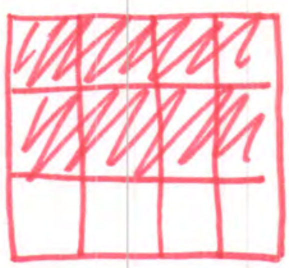

9. Partition each area model so they have the same number of units.

10. How many units does each model show now? 15

11. Write and solve an addition equation using the new unit. $\frac{5}{15} + \frac{3}{15} = \frac{8}{15}$

---

12. Use area models and make like units to find the sum of $\frac{1}{4}$ and $\frac{2}{3}$.

$$\frac{3}{12} + \frac{8}{12} = \frac{11}{12}$$

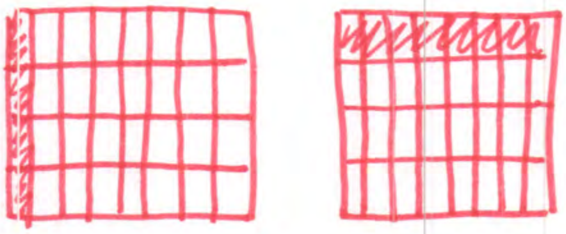
Name: KEY

1. Draw a model to find each sum.

$\frac{1}{2}+\frac{1}{6}$

$\frac{6}{12}+\frac{2}{12}=\frac{8}{12}$

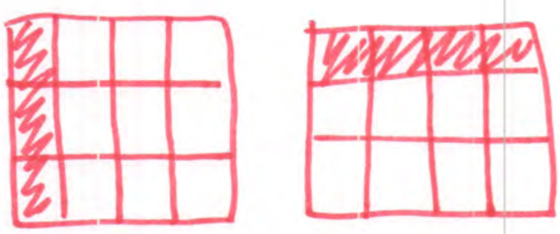
$\frac{1}{8}+\frac{1}{4}$



$\frac{4}{32}+\frac{8}{32}=\frac{12}{32}$

2. Draw a model to find each sum.

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

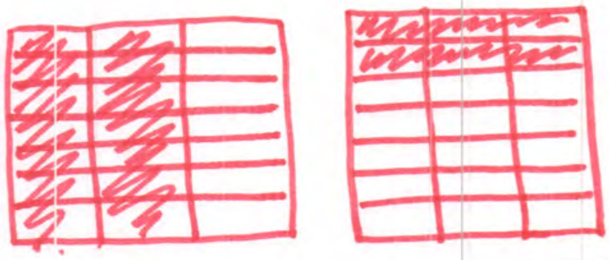


$\frac{3}{12}+\frac{4}{12}=\frac{7}{12}$

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

$\frac{5}{10}+\frac{2}{10}=\frac{7}{10}$

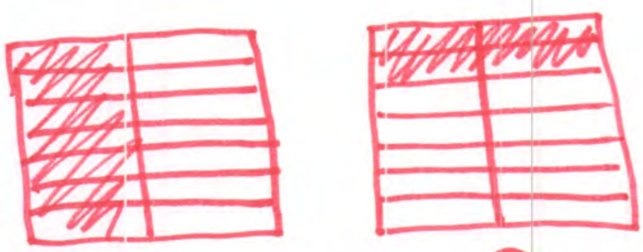
3. **Find the sum of $\frac{2}{3} + \frac{2}{7}$.**



$\frac{14}{21} + \frac{6}{21} = \frac{20}{21}$

4. **Ariana was trying to add the fractions below. Explain her mistake, and model how to find the correct sum.**

$$\frac{1}{2} + \frac{2}{7} = \frac{3}{9}$$



$\frac{7}{14} + \frac{4}{14} = \frac{11}{14}$

Ariana added straight across without thinking about finding like units. She can make halves and sevenths into fourteenths. Then $\frac{7}{14} + \frac{4}{14}$ would make a sum of 11 fourteenths ($\frac{11}{14}$).

G5 U3 Lesson 4

Add fractions with sums between 1 and 2

G5 U3 Lesson 4 - Students will add fractions with sums between 1 and 2

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Previously, we have worked to add fractions with like units. We know that when we add fractions with like units, say 1 fourth plus 2 fourths, the denominator stays the same. *(write ¼ + 2/4 = ¾)* This is because 1 fourth and 2 fourths have like units, so the unit remains consistent as we add. It's like adding 1 banana plus 2 more bananas and getting a total of 3 bananas.

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

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

In our previous lesson, we saw addition problems where our fractions did *not* have like units. For example, we saw problems like *(write equation)* ¼ + ⅔= ?. Fourths and thirds are not the same size units, so we couldn't automatically add. What did we do with our fractions to make problems like this easier? Possible Student Answers, Key Points:

- We drew each fraction using an area model, and then partitioned them so they had the same number of pieces.
- We found a common unit for each fraction, then rewrote the problem as the sum of two equivalent fractions with the same unit.

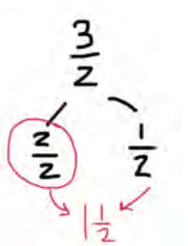
When we don't have the same unit, we can write equivalent fractions that *do* have the same unit to make adding fractions easier. We're going to keep practicing this today, but you'll notice that sometimes our totals will be greater than 1 whole. Let's dive in!

Let's Talk (Slide 3): Take a look at these three fractions. What do you notice? What do you wonder? Possible Student Answers, Key Points:

- I notice they all use threes or twos. I notice they're in order from least to greatest. I notice the middle one is equal to 1 whole.
- I wonder what these fractions represent. I wonder why they all use similar numbers.

Today, we'll be adding fractions, and many of our totals will be between 1 and 2. Which fraction here is between 1 and 2, and how do you know? Possible Student Answers, Key Points:

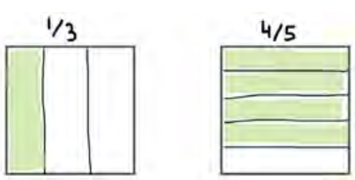
- The first fraction is less than 1, because 2 thirds is 1 third less than a whole. The second fraction is equal to a whole. The third fraction is greater than 1 whole, because 2/2 would be 1 whole.
- The third fraction is greater than 1 whole, because 3/2 is the same as 1 ½.



Well, 3/2 is between 1 and 2. *(write 3/2 with two branches of a number bond)* 2 halves would be 1 whole. (write 2/2 for one of the number bond branches) That leaves ½ as the other part. (write ½ for the other number bond branch) This means 3/2 is the same as 1 whole and ½ or the mixed number 1 ½. *(write this beneath the number bond)*

When we find the sum of fractions today, we should be prepared to see totals that are greater than 1 whole. This means our answers might be fractions greater than 1, sometimes called improper fractions, or mixed numbers.

Let's Think (Slide 4): This problem wants us to find the sum of ⅔and ⅔

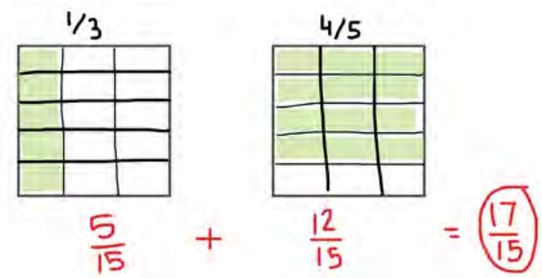


These fractions do not have the same unit. What units do we have in this problem? (thirds and fifths) Let's start by drawing an area model to represent each fraction. Since I know I'll need to find like units, let's partition thirds vertically and fifths horizontally. *(draw, shade, and label an area model for ⅔and another for ⅔)*

3, 6, 9, 12, 15

5, 10, 15

In order to add these fractions, we'll need a common denominator or a common unit. *(list multiples as you name them)* I know I can split thirds into 6 pieces, or 9 pieces, or 12 pieces, or 15 pieces depending on the number of cuts I use to partition the model. I know I can split fifths into 10 pieces, 15 pieces, or 20 pieces depending on the number of cuts I use to partition. What unit would be appropriate for these two fractions? We can partition each model into fifteenths!

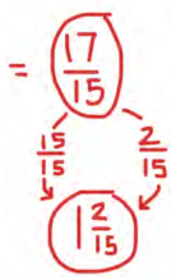


I'll make 4 horizontal cuts to partition $\frac{1}{3}$ into fifteen pieces. How can I partition $\frac{4}{5}$ to make 15 pieces? (make 2 vertical cuts)

Now the pieces are the same size. We've made equivalent fractions with units of fifteenths. $\frac{1}{3}$ is equivalent to 5/15 and $\frac{4}{5}$ is equivalent to 12/15. *(write 5/15 + 12/15 = 17/15 underneath corresponding area models)* When we add the two equivalent fractions together, we end up with 17/15. Is this sum more or less than 1 whole, and how do you know?

Possible Student Answers, Key Points:

- It is more than 1 whole because 15/15 would be 1 whole.
- It is more than 1 whole because the numerator, or number of shaded pieces, is more than the denominator.

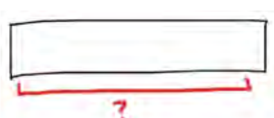


Our answer is greater than 1 whole, because 15/15 would be 1 whole. Right now, the sum is written as a fraction greater than 1. We could also write this sum as a mixed number. *(write number bond as you narrate)* I know 17/15 can be decomposed into 15/15, or 1 whole, and 2/15. So, in mixed number form, our sum is 1 2/15. Either a fraction greater than 1 or a mixed number is an acceptable answer, unless the problem we're given specifies the form they want the answer in.

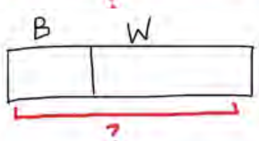
Let's Think (Slide 5): Let's try one more. *(Read story problem)* In your own words, what is this story problem about?

Possible Student Answers, Key Points:

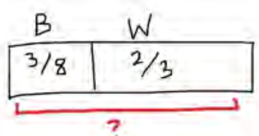
- Erik wants to find the total white sugar and brown sugar needed for his recipe.
- Part of his sugar is white and part of his sugar is brown, and we need to find the total sugar.



When I'm picturing this story, I know it's asking for the total amount of sugar. *(draw rectangle and label the entire tape diagram with a question mark)*



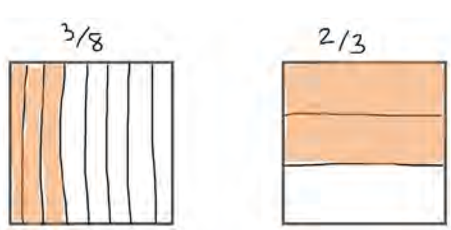
Some of the sugar is brown sugar, and some of the sugar is white sugar. So I know I'll need to combine, or add, these two types of sugar to find the total of the two parts. *(partition the tape diagram and label each type of sugar)*



If there is $\frac{3}{8}$ cup of brown sugar and $\frac{2}{3}$ cup of white sugar, I know this problem is asking me to find the sum of those two fractions. *(label tape diagram with corresponding numbers in each box)*

Now that we've made sense of the story, let's see what we can do to find the total amount of sugar. What do you think we'll need to do first to add these fractions? Possible Student Answers, Key Points:

- Eighths and thirds are not the same size pieces, so we'll want to make like units.
- We can draw an area model for each fraction and partition them so they have the same number of units.



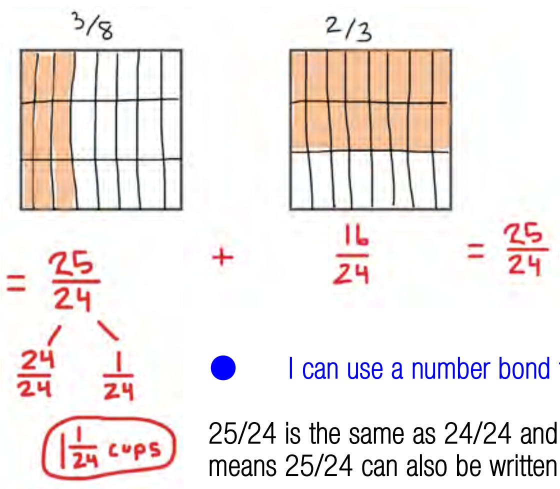
Eighths and thirds are not the same unit, so let's draw area models to help us think of equivalent fractions that are easier to add. I'll make an area model showing $\frac{3}{8}$ vertically and another area model showing $\frac{2}{3}$ horizontally. *(draw, shade, and label each area model)*

How can I determine a common denominator, or like unit, that will work for adding $\frac{3}{8}$ and $\frac{2}{3}$?

Possible Student Answers, Key Points:

- You can skip-count by 8 and by 3 to find a common multiple.
- You can list out ways you can partition thirds or eighths until you find a unit that both models could be partitioned into.

I can list out ways to partition eighths and thirds. When I'm doing that, I'm really just listing out multiples of 8 and 3. I know 8 and 3 share a multiple of 24, so I can partition each model into 24 like-sized pieces. Let's do that.



(partition models as you narrate) I'll partition 3/8 horizontally with 2 cuts to form 24 pieces. I'll partition 2/3 vertically with 7 cuts to form 24 pieces.

What equivalent fractions did we make? (9/24 and 16/24) When I add 9/24 and 16/24, we end up with 25/24. *(write equation)* We can leave the answer like that, or we can write it as a mixed number.

How can we write 25/24 as a mixed number? Possible Student Answers, Key Points:

- I know 24/24 is 1 whole, so we have 1 1/24.
- I can use a number bond to decompose 25/24 into 1 whole and 1/24.

25/24 is the same as 24/24 and 1/24. *(write number bond decomposing 25/24 into 24/24 and 1/24)* This means 25/24 can also be written as 1 1/24. Erik needs 1 1/24 cups of sugar in all.

Nice work so far adding fractions with sums between 1 and 2. How does adding with sums between 1 and 2 compare with adding from our previous lessons? Possible Student Answers, Key Points:

- It's not really different, just our answers are bigger.
- We can use the same strategies to find equivalent fractions. The only difference is our answer is more than 1 whole, so we can write them as mixed numbers.

It's not that different! Finding a common denominator, or like unit, made it possible for us to make equivalent fractions so we could add fractions with unlike units.

Let's Try it (Slides 6 - 7): Now let's work on adding fractions with sums between 1 and 2 together. Just like we saw in our previous lesson and earlier today, we'll want to make sure we have like units before adding. We can use an area model to help us rewrite any problem with unlike units as an easier problem with like units. Let's give it a try.

WARM WELCOME

Today we will add fractions with sums between 1 and 2.

Let's Talk:

What do you notice about the fractions below?

$$\frac{2}{3} \qquad \frac{3}{3} \qquad \frac{3}{2}$$

Let's Think:

Use an area model to find the sum.

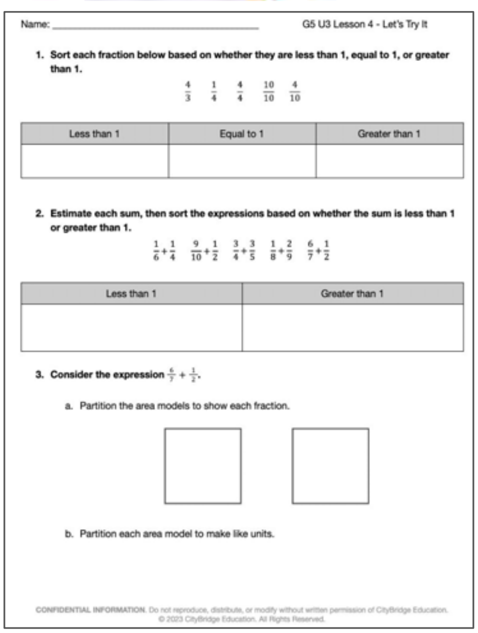
$$\frac{1}{3} + \frac{4}{5}$$

Let's Think:

Erik needs ⅜ cup of brown sugar and ⅔ cup of white sugar to make muffins. How much sugar does Erik need in all?

Let's Try It:

Let's explore adding fractions with sums between 1 and 2 together.



Name: ______________________ G5 U3 Lesson 4 - Let's Try It

1. **Sort each fraction below based on whether they are less than 1, equal to 1, or greater than 1.**

$\frac{4}{3}$ $\frac{1}{4}$ $\frac{4}{4}$ $\frac{10}{10}$ $\frac{4}{10}$

Less than 1	Equal to 1	Greater than 1

2. **Estimate each sum, then sort the expressions based on whether the sum is less than 1 or greater than 1.**

$\frac{1}{6}+\frac{1}{4}$ $\frac{9}{10}+\frac{1}{2}$ $\frac{3}{4}+\frac{3}{5}$ $\frac{1}{8}+\frac{2}{9}$ $\frac{6}{7}+\frac{1}{2}$

Less than 1	Greater than 1

3. **Consider the expression $\frac{6}{7}+\frac{1}{2}$.**

   a. Partition the area models to show each fraction.

   b. Partition each area model to make like units.

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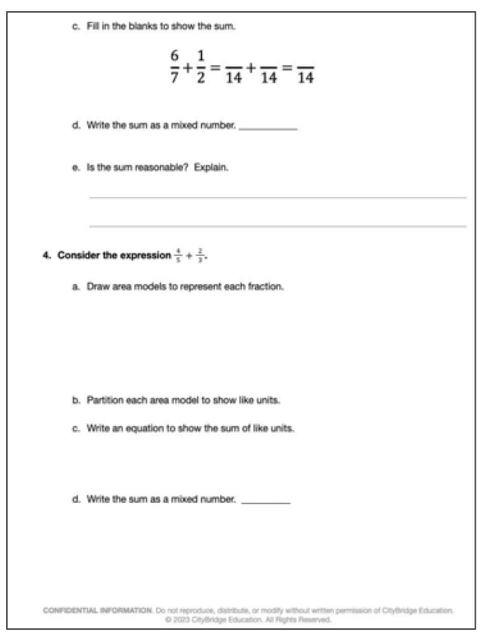

c. Fill in the blanks to show the sum.

$$\frac{6}{7}+\frac{1}{2}=\frac{\_\_}{14}+\frac{\_\_}{14}=\frac{\_\_}{14}$$

d. Write the sum as a mixed number. ________

e. Is the sum reasonable? Explain.

4. **Consider the expression $\frac{4}{5}+\frac{2}{3}$.**

   a. Draw area models to represent each fraction.

   b. Partition each area model to show like units.

   c. Write an equation to show the sum of like units.

   d. Write the sum as a mixed number. ________

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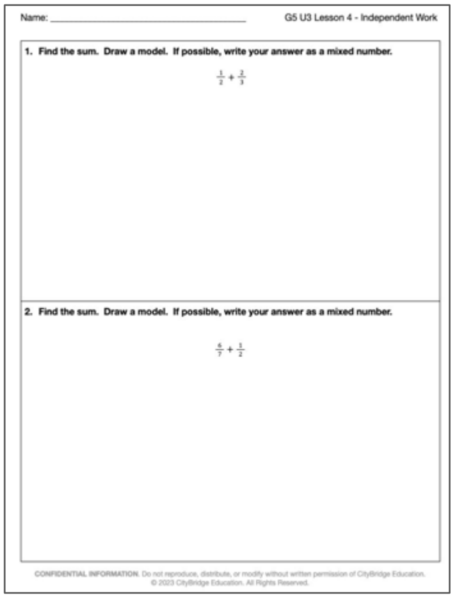
On your Own:

Now it's time to explore adding fractions with sums between 1 and 2 on your own.


Name: ______________________ G5 U3 Lesson 4 - Independent Work

1. Find the sum. Draw a model. If possible, write your answer as a mixed number.

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

2. Find the sum. Draw a model. If possible, write your answer as a mixed number.

$\frac{6}{7} + \frac{1}{2}$


3. Leland and Norman are at the candy store. Leland's bag of candy weighs $\frac{3}{5}$ lb, and Norman's bag of candy weighs $\frac{3}{4}$ lb. How much does their candy weigh in all?

Solve the problem. Include a model and a number sentence.

4. Mae needs 1 cup of flour for a recipe. She has $\frac{3}{4}$ cup and borrowed $\frac{7}{10}$ cup from a neighbor. She wrote $\frac{3}{4} + \frac{7}{10} = \frac{10}{14}$. Since $\frac{10}{14}$ is less than 1 whole, she thinks she doesn't have enough flour.

Explain why her thinking is incorrect. Include a model.

1. Sort each fraction below based on whether they are less than 1, equal to 1, or greater than 1.

$$\frac{4}{3} \quad \frac{1}{4} \quad \frac{4}{4} \quad \frac{10}{10} \quad \frac{4}{10}$$

Less than 1	Equal to 1	Greater than 1

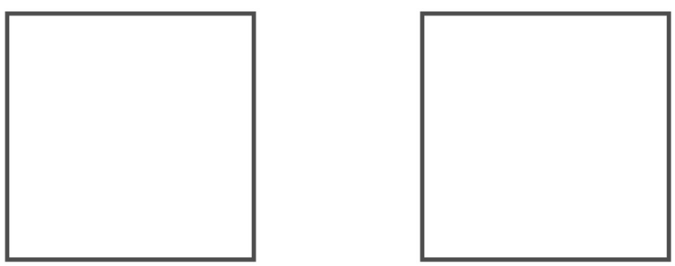
2. Estimate each sum, then sort the expressions based on whether the sum is less than 1 or greater than 1.

$$\frac{1}{6}+\frac{1}{4} \quad \frac{9}{10}+\frac{1}{2} \quad \frac{3}{4}+\frac{3}{5} \quad \frac{1}{8}+\frac{2}{9} \quad \frac{6}{7}+\frac{1}{2}$$

Less than 1	Greater than 1

3. Consider the expression $\frac{6}{7}+\frac{1}{2}$.

a. Partition the area models to show each fraction.



b. Partition each area model to make like units.

c. Fill in the blanks to show the sum.

$$\frac{6}{7}+\frac{1}{2}=\frac{\quad}{14}+\frac{\quad}{14}=\frac{\quad}{14}$$

d. Write the sum as a mixed number. ____________

e. Is the sum reasonable? Explain.

---

4. Consider the expression $\frac{4}{5} + \frac{2}{3}$.

 a. Draw area models to represent each fraction.

 b. Partition each area model to show like units.

 c. Write an equation to show the sum of like units.

 d. Write the sum as a mixed number. __________

1. Find the sum. Draw a model. If possible, write your answer as a mixed number.

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

2. Find the sum. Draw a model. If possible, write your answer as a mixed number.

$$\frac{6}{7}+\frac{1}{2}$$

3. Leland and Norman are at the candy store. Leland's bag of candy weighs $\frac{3}{5}$ lb, and Norman's bag of candy weighs $\frac{3}{4}$ lb. How much does their candy weigh in all?

Solve the problem. Include a model and a number sentence.

4. Mae needs 1 cup of flour for a recipe. She has $\frac{3}{4}$ cup and borrowed $\frac{7}{10}$ cup from a neighbor. She wrote $\frac{3}{4} + \frac{7}{10} = \frac{10}{14}$. Since $\frac{10}{14}$ is less than 1 whole, she thinks she doesn't have enough flour.

Explain why her thinking is incorrect. Include a model.

Name: KEY

1. Sort each fraction below based on whether they are less than 1, equal to 1, or greater than 1.

$$\cancel{\frac{4}{3}} \quad \cancel{\frac{1}{4}} \quad \cancel{\frac{4}{4}} \quad \cancel{\frac{10}{10}} \quad \frac{4}{10}$$

Less than 1	Equal to 1	Greater than 1
$\frac{1}{4}$ $\frac{4}{10}$	$\frac{4}{4}$ $\frac{10}{10}$	$4/3$

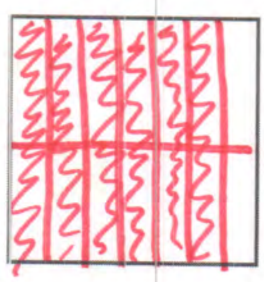
2. Estimate each sum, then sort the expressions based on whether the sum is less than 1 or greater than 1.

$$\cancel{\frac{1}{6}+\frac{1}{4}} \quad \cancel{\frac{9}{10}+\frac{1}{2}} \quad \cancel{\frac{3}{4}+\frac{3}{5}} \quad \cancel{\frac{1}{8}+\frac{2}{9}} \quad \cancel{\frac{6}{7}+\frac{1}{2}}$$

Less than 1	Greater than 1
$\frac{1}{6}+\frac{1}{4}$ $\frac{1}{8}+\frac{2}{9}$	$\frac{9}{10}+\frac{1}{2}$ $\frac{3}{4}+\frac{3}{5}$ $\frac{6}{7}+\frac{1}{2}$

3. Consider the expression $\frac{6}{7}+\frac{1}{2}$.

a. Partition the area models to show each fraction.



b. Partition each area model to make like units.

c. Fill in the blanks to show the sum.

$$\frac{6}{7}+\frac{1}{2}=\frac{12}{14}+\frac{7}{14}=\frac{19}{14}$$

$\frac{14}{14}$

$\frac{5}{14}$

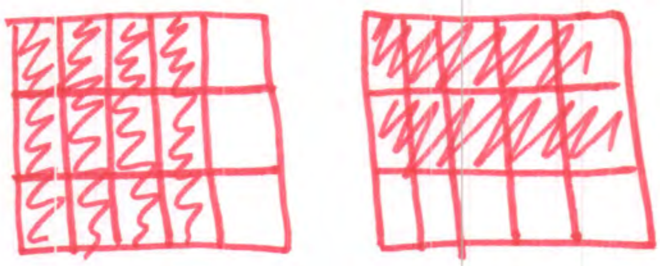
d. Write the sum as a mixed number. $1\frac{5}{14}$

e. Is the sum reasonable? Explain.

Yes. $\frac{6}{7}$ is close to 1, so our answer should be close to $1+\frac{1}{2}$, or $1\frac{1}{2}$.

4. Consider the expression $\frac{4}{5}+\frac{2}{3}$.

a. Draw area models to represent each fraction.



b. Partition each area model to show like units.

c. Write an equation to show the sum of like units.

$$\frac{12}{15}+\frac{10}{15}=\frac{22}{15}$$

d. Write the sum as a mixed number. $1\frac{7}{15}$

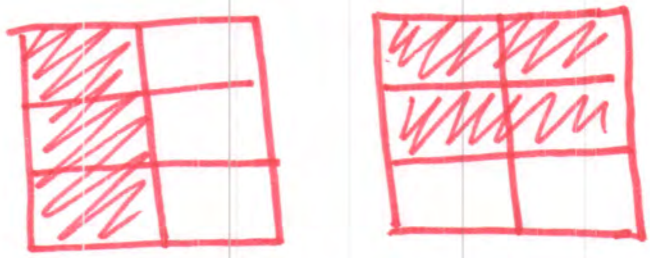
$\frac{22}{15}$

$\left(\frac{15}{15}\right) \rightarrow 1$ $\frac{7}{15}$

Name: KEY

1. Find the sum. Draw a model. If possible, write your answer as a mixed number.

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



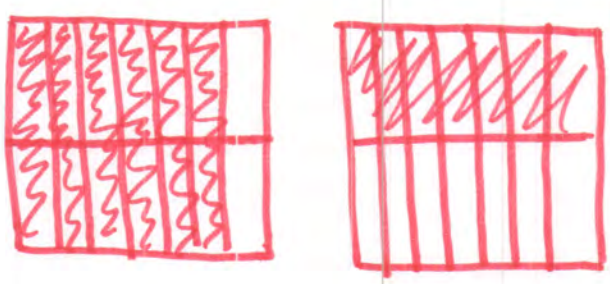
$$\frac{3}{6} + \frac{4}{6} = \frac{7}{6}$$

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

$1\frac{1}{6}$

2. Find the sum. Draw a model. If possible, write your answer as a mixed number.

$$\frac{6}{7} + \frac{1}{2}$$



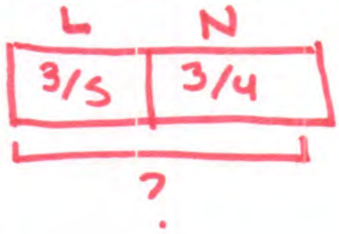
$$\frac{12}{14} + \frac{7}{14} = \frac{19}{14}$$

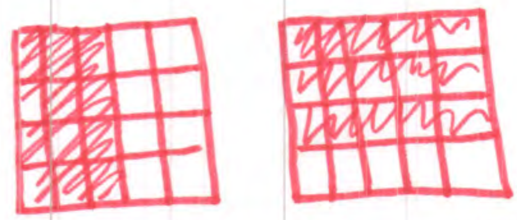
$1\frac{5}{14}$

$\frac{14}{14}$ $\frac{5}{14}$

3. **Leland and Norman are at the candy store. Leland's bag of candy weighs $\frac{3}{5}$ lb, and Norman's bag of candy weighs $\frac{3}{4}$ lb. How much does their candy weigh in all?**

Solve the problem. Include a model and a number sentence.



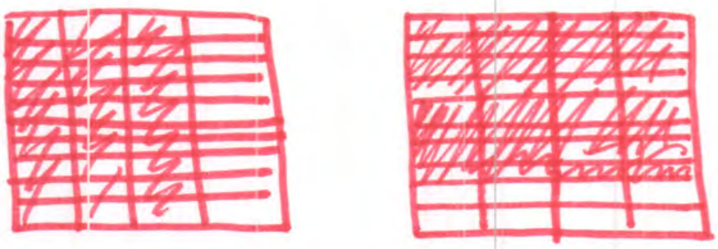


$\frac{12}{20} + \frac{15}{20} = \frac{27}{20}$

$1\frac{7}{20}$ lb.

4. **Mae needs 1 cup of flour for a recipe. She has $\frac{3}{4}$ cup and borrowed $\frac{7}{10}$ cup from a neighbor. She wrote $\frac{3}{4} + \frac{7}{10} = \frac{10}{14}$. Since $\frac{10}{14}$ is less than 1 whole, she thinks she doesn't have enough flour.**

Explain why her thinking is incorrect. Include a model.



$\frac{30}{40} + \frac{28}{40} = \frac{58}{40}$

She added the denominators and didn't think about finding like units. She actually has more than 1 cup. 3/4 is equivalent to 30/40. 7/10 is equivalent to 28/40. Combined, that's $\frac{58}{40}$ which is greater than $\frac{40}{40}$ or 1 whole.

G5 U3 Lesson 5

Subtract fractions with unlike units using the strategy of creating equivalent fractions

G5 U3 Lesson 5 - Students will subtract fractions with unlike units using the strategy of creating equivalent fractions

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): We've spent the past few lessons thinking about adding fractions. What are some things we've learned about fraction addition? Possible Student Answers, Key Points:

- We need like units or common denominators when we add.
- We can use area models or number lines to help us add.
- Sometimes when we add, we get totals that are greater than 1. We can write some totals as mixed numbers.

Today, we're going to keep exploring operations with fractions, but our focus is going to shift to subtraction. As we work today, notice how a lot of the same ideas that help us add fractions also help us when we subtract fractions.

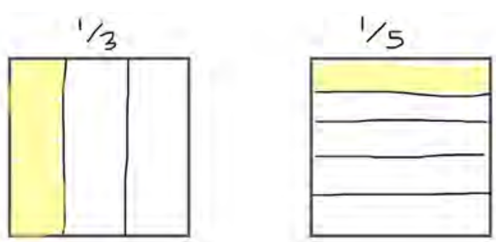
Let's Talk (Slide 3): Take a look at the equations here. What do you notice about them? Possible Student Answers, Key Points:

- I notice they all involve subtraction.
- I notice they're kind of like the equations we saw in an earlier lesson.
- I notice they all involve like units.

Each of these equations involves subtracting and each equation involves like units. 5 apples minus 2 apples would be…? (3 apples) 5 cows minus 2 cows would be…? (3 cows) 5 tens minus 2 tens would be…? (3 tens or 30) And 5 tenths minus 2 tenths would be…? (3 tenths or 0.3 or 3/10)

We've learned in previous lessons that when we add fractions, it's important to add like units. Today, we'll see that the same is true for subtraction. When we subtract fractions, it's important that we subtract like units.

Let's Think (Slide 4): Our first problem wants us to subtract $\frac{1}{3}$ $\frac{1}{5}$. Are these like units? (No, thirds and fifths are different sizes) Since we don't have like units, we'll want to rewrite $\frac{1}{3}$ $\frac{1}{5}$ using like units. Just like when we added fractions, let's begin by drawing an area model to represent each fraction.

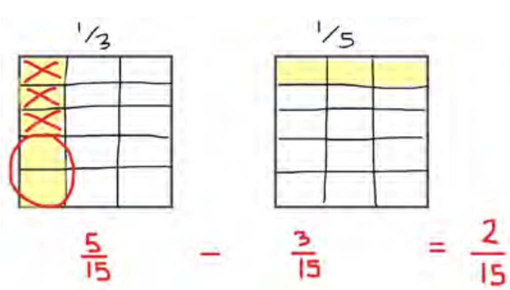


(draw two squares) Each square represents 1 whole. *(partition, shade, and label each area model as you narrate)* I'll show $\frac{1}{3}$ by partitioning the first area model using 2 vertical cuts. I'll show $\frac{1}{5}$ by partitioning the second area model using 4 horizontal cuts. As we know, thirds and fifths are not like units, and our area model makes that even more apparent.

What is a common denominator, or like unit, that we can use to help us subtract these fractions, and how do you know? Possible Student Answers, Key Points:

- I can cut thirds into 9, 12, or 15 pieces. I can cut fifths into 10, 15, or 20 pieces. Since they can both be cut into 15 pieces, we can use fifteenths.
- 15 is a common multiple of 3 and 5, so we can write equivalent fractions in terms of fifteenths.

Let's use fifteen as our unit. I'll make four horizontal cuts to partition $\frac{1}{3}$ into fifteen pieces. I'll make two vertical cuts to partition $\frac{1}{5}$ into fifteen pieces. What equivalent fractions did we make? (5/15 and 3/15) *(label the equivalent fractions under the corresponding area model)*



Our rewritten equation is 5/15 - 3/15 = ?. When we were adding, we knew to count or add up all the pieces. Now that we're subtracting, we'll want to take away pieces. Let's cross out 3/15 from our total amount. *(mark an X through three pieces on the first area model and circle the remaining 2 pieces)*

What is 5/15 minus 3/15? (2/15) *(write answer)*

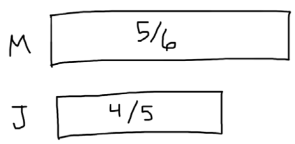
We just subtracted fractions with unlike units by creating equivalent fractions with like units. What did you notice was the same and different about subtracting fractions compared to adding fractions? Possible Student Answers, Key Points:

- It's the same in that we used area models to find like units. We needed to find a common denominator before we could perform the operation.
- It's only different in that we took away pieces at the end rather than combining them.

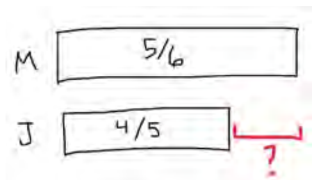
Let's try one more, just to make sure we feel confident.

Let's Think (Slide 5): This one is a story problem. *(read problem)* In your own words, could you retell what this story is about?
Possible Student Answers, Key Points:

- Two people have candy, and I want to find out how much more one person has than the other.
- We're comparing Maria's amount of candy to Joshua's amount of candy.



Before we start with any computation, let's visualize the story with a quick tape diagram. I know we're comparing Maria's amount of candy to Joshua's. I'll draw two rectangles to represent those amounts, making sure that Maria's is a bit longer since she has more candy. *(draw two rectangles as stated, label with the person's initial and the amount of candy)*



We're being asked to find how much more, so we're trying to find the difference. I'll label the difference between the two amounts with a question mark, since that is what is unknown. *(draw a bracket and a question mark to represent the unknown difference)* When we're looking for a difference, we can subtract the two values.

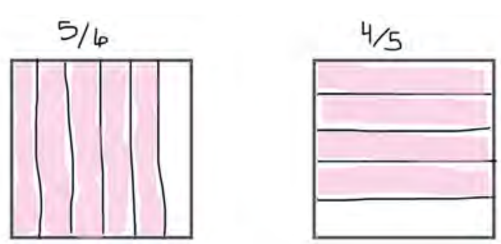
$$\frac{5}{6} - \frac{4}{5} = ?$$

(write ⅚ ⅘ = ?) Can I subtract these right now? 5 - 4 = 1 and 6 - 5 = 1, so could my answer be 1/1?
Possible Student Answers, Key Points:

- No, we have to have like units to help us subtract. We need to rewrite these as equivalent fractions with a common denominator.
- No, if we got 1/1 that wouldn't make sense. 1/1 is 1, and neither student even had 1 lb of candy to start with. That's unreasonable.

Great thinking. Like the last problem, let's find equivalent fractions by using area models. How could I set up my area models for this problem? Possible Student Answers, Key Points:

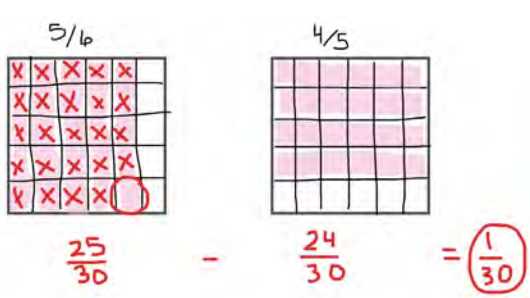
- For ⅚, draw a square partitioned into 6 columns, then shade in 5 of the pieces.
- For ⅘, draw a square partitioned into 5 rows, then shade 4 of the pieces.



(draw both area models as student describes them) ⅚ looks like 5 pieces shaded out of 6 equal pieces. ⅘ looks like 4 pieces shaded out of 5 equal pieces. We made one area model vertically and the other horizontally, since we know we'll have to partition them to make like units.

If one fraction is cut into sixths and the other is cut into fifths, I know that thirtieths can work for this problem. I can cut 6ths and 5ths into 30 equal pieces. Before we do that, I once had a student tell me that they wanted to cut each area model into 60 equal pieces, since 6 and 5 both have 60 as a multiple. This isn't wrong, but can you think of why thirtieths might be a better choice? Possible Student Answers, Key Points:

- We're already cutting into a lot of pieces. I'd rather cut into 30 pieces than 60, just to save time.
- Sixty pieces would mean they're really small. It would be hard to see and count those pieces.



Let's cut into 30 pieces. *(partition as you narrate)* I will cut across the first area model to make 5 rows of 6, making 30 pieces. I'll cut down the second area model to make 6 columns of 5, making 30 pieces. Now, we have equivalent fractions with like units. What is our new equation we can write, and what is the answer? *(write as student shares)* Possible Student Answers, Key Points:

- Our new equation is 25/30 - 24/30.
- 25 minus 24, means the numerator is 1. The answer is 1/30.

Our answer is 1/30. Maria has 1/30 pound more candy than Joshua. We can see that in the model and in the equation. *(cross 24 pieces from the first area model)* 25 thirtieths take away 24 thirtieths leaves us with 1 thirtieth.

Thanks for the help with these problems. You did a great job applying what we know about fraction equivalence and fraction addition to help us think about subtracting fractions with unlike units.

Let's Try it (Slides 6 - 7): Now let's work on subtracting fractions with unlike units together. Just like when we added fractions in previous lessons, we will want to make sure our fractions have like units before subtracting. We can use area models to help us find equivalent fractions before rewriting our subtraction problems. Let's give it a try!

WARM WELCOME

Today we will subtract fractions with unlike units using the strategy of creating equivalent fractions.

Let's Talk:

5 apples - 2 apples = ?

5 cows - 2 cows = ?

5 tens - 2 tens = ?

5 tenths - 2 tenths = ?

Let's Think:

Use an area model to find the difference.

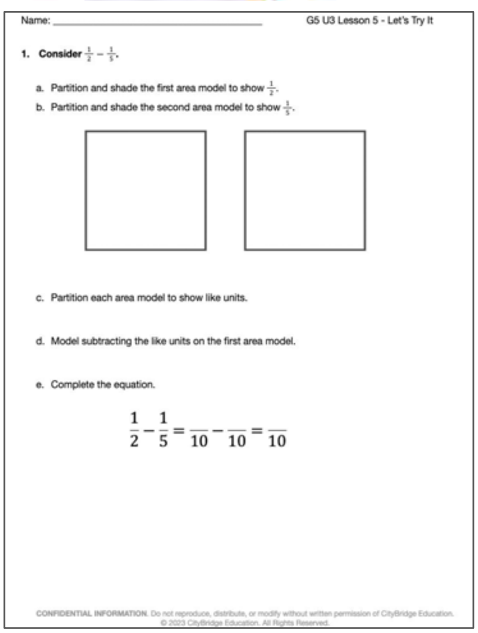
$$\frac{1}{3} - \frac{1}{5}$$

Let's Think:

Maria has $\frac{5}{6}$ pound of candy. Joshua has $\frac{4}{5}$ pound of candy. How much more candy does Maria have than Joshua?

Let's Try It:

Let's explore subtracting fractions with unlike units using the strategy of creating equivalent fractions together.


Name: ______________________ G5 U3 Lesson 5 - Let's Try It

1. **Consider $\frac{1}{2} - \frac{1}{5}$.**

   a. Partition and shade the first area model to show $\frac{1}{2}$.

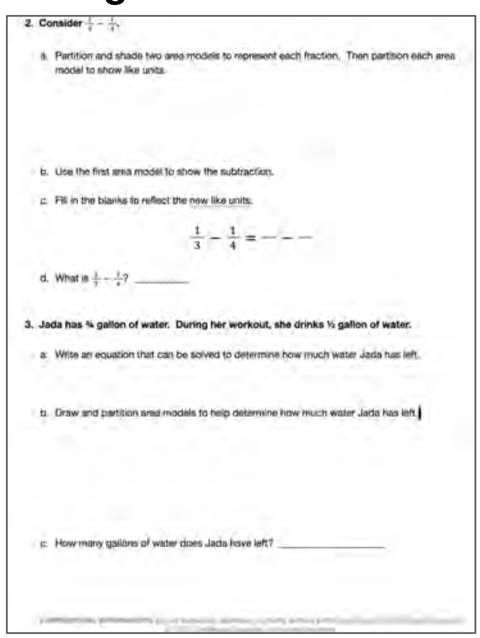
   b. Partition and shade the second area model to show $\frac{1}{5}$.

   c. Partition each area model to show like units.

   d. Model subtracting the like units on the first area model.

   e. Complete the equation.

$$\frac{1}{2} - \frac{1}{5} = \frac{\_\_}{10} - \frac{\_\_}{10} = \frac{\_\_}{10}$$


2. **Consider [illegible].**

   a. Partition and shade two area models to represent each fraction. Then partition each area model to show like units.

   b. Use the first area model to show the subtraction.

   c. Fill in the blanks to reflect the new like units.

$$\frac{1}{3} - \frac{1}{4} = \_\_ - \_\_$$

   d. What is [illegible]? ________

3. **Jada has ¾ gallon of water. During her workout, she drinks ½ gallon of water.**

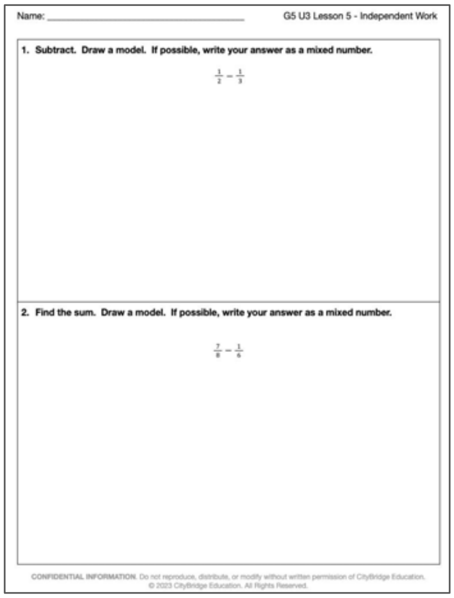
   a. Write an equation that can be solved to determine how much water Jada has left.

   b. Draw and partition area models to help determine how much water Jada has left.

   c. How many gallons of water does Jada have left? ____________

On your Own:

Now it’s time to explore subtracting fractions with unlike units using the strategy of creating equivalent fractions on your own.



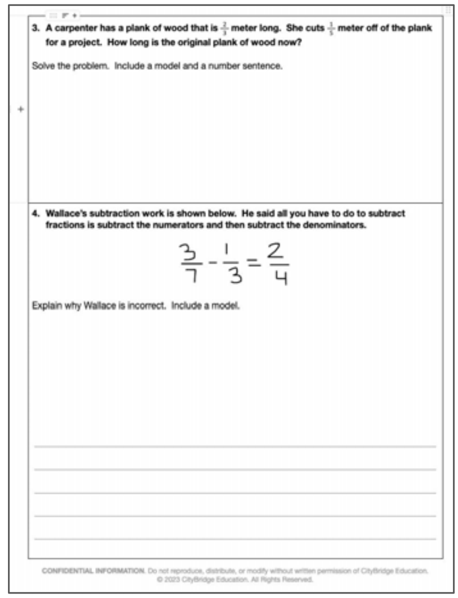
Name: ______________________ G5 U3 Lesson 5 - Independent Work

1. Subtract. Draw a model. If possible, write your answer as a mixed number.

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

2. Find the sum. Draw a model. If possible, write your answer as a mixed number.

$\frac{7}{8} - \frac{1}{6}$



3. A carpenter has a plank of wood that is $\frac{2}{3}$ meter long. She cuts $\frac{1}{5}$ meter off of the plank for a project. How long is the original plank of wood now?

Solve the problem. Include a model and a number sentence.

4. Wallace's subtraction work is shown below. He said all you have to do to subtract fractions is subtract the numerators and then subtract the denominators.

$\frac{3}{7} - \frac{1}{3} = \frac{2}{4}$

Explain why Wallace is incorrect. Include a model.

1. Consider $\frac{1}{2} - \frac{1}{5}$.

   a. Partition and shade the first area model to show $\frac{1}{2}$.

   b. Partition and shade the second area model to show $\frac{1}{5}$.

   c. Partition each area model to show like units.

   d. Model subtracting the like units on the first area model.

   e. Complete the equation.

$$\frac{1}{2} - \frac{1}{5} = \frac{\_\_}{10} - \frac{\_\_}{10} = \frac{\_\_}{10}$$

2. Consider $\frac{1}{3} - \frac{1}{4}$.

   a. Partition and shade two area models to represent each fraction. Then partition each area model to show like units.

b. Use the first area model to show the subtraction.

c. Fill in the blanks to reflect the new like units.

$$\frac{1}{3} - \frac{1}{4} = \frac{\blacksquare}{\blacksquare} - \frac{\blacksquare}{\blacksquare}$$

d. What is $\frac{1}{3} - \frac{1}{4}$? ____________

3. Jada has ¾ gallon of water. During her workout, she drinks ⅛ gallon of water.

a. Write an equation that can be solved to determine how much water Jada has left.

b. Draw and partition area models to help determine how much water Jada has left.

c. How many gallons of water does Jada have left? _______________________

1. Subtract. Draw a model. If possible, write your answer as a mixed number.

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

2. Find the difference. Draw a model. If possible, write your answer as a mixed number.

$$\frac{7}{8} - \frac{1}{6}$$

3. A carpenter has a plank of wood that is $\frac{2}{3}$ meter long. She cuts $\frac{1}{5}$ meter off of the plank for a project. How long is the original plank of wood now?

Solve the problem. Include a model and a number sentence.

4. Wallace's subtraction work is shown below. He said all you have to do to subtract fractions is subtract the numerators and then subtract the denominators.

$$\frac{3}{7} - \frac{1}{3} = \frac{2}{4}$$

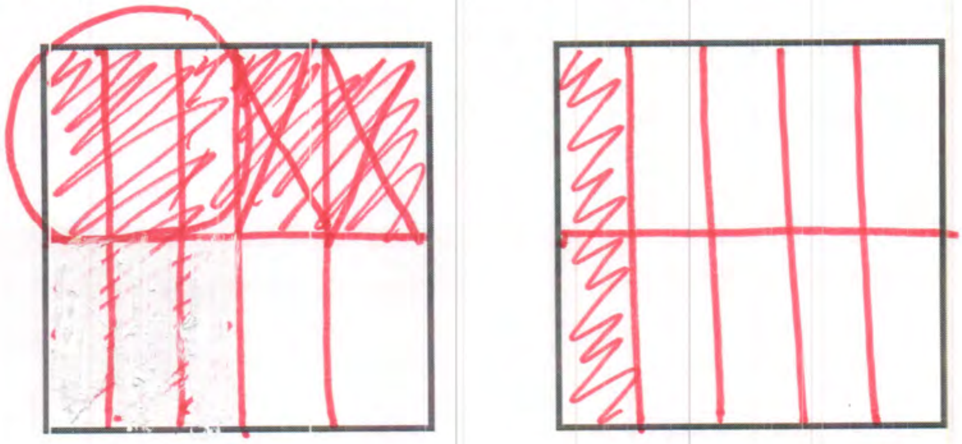
Explain why Wallace is incorrect. Include a model.

Name: KEY

1. Consider $\frac{1}{2} - \frac{1}{5}$.

a. Partition and shade the first area model to show $\frac{1}{2}$.

b. Partition and shade the second area model to show $\frac{1}{5}$.



c. Partition each area model to show like units.

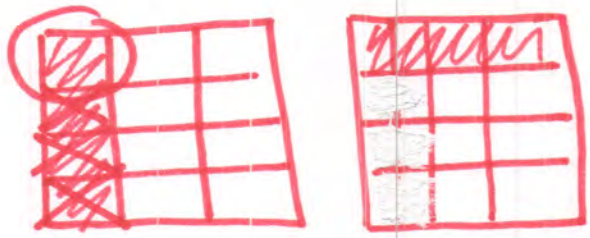
d. Model subtracting the like units on the first area model.

e. Complete the equation.

$$\frac{1}{2} - \frac{1}{5} = \frac{5}{10} - \frac{2}{10} = \frac{3}{10}$$

2. **Consider $\frac{1}{3} - \frac{1}{4}$.**

a. Partition and shade two area models to represent each fraction. Then partition each area model to show like units.



b. Use the first area model to show the subtraction.

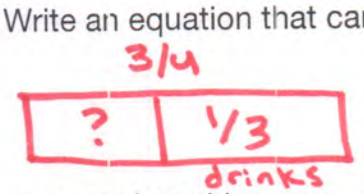
c. Fill in the blanks to reflect the new like units.

$$\frac{1}{3} - \frac{1}{4} = \frac{4}{12} - \frac{3}{12}$$

d. What is $\frac{1}{3} - \frac{1}{4}$? $\frac{1}{12}$

3. **Jada has ¾ gallon of water. During her workout, she drinks ⅓ gallon of water.**

a. Write an equation that can be solved to determine how much water Jada has left.



$\frac{3}{4} - \frac{1}{3} = ?$

b. Draw and partition area models to help determine how much water Jada has left.

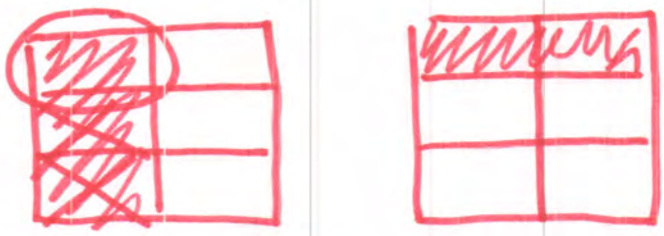
$\frac{9}{12} - \frac{4}{12} = \frac{5}{12}$

c. How many gallons of water does Jada have left? 5/12 gallon

Name: KEY

1. Subtract. Draw a model. If possible, write your answer as a mixed number.

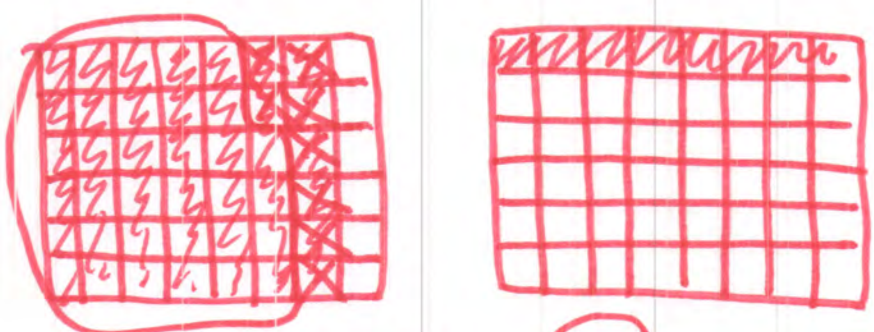
$$\frac{1}{2} - \frac{1}{3}$$



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

2. Find the ~~sum~~ difference. Draw a model. If possible, write your answer as a mixed number.

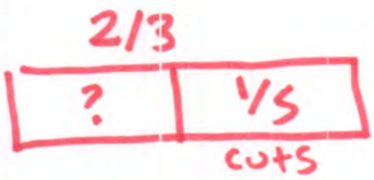
$$\frac{7}{8} - \frac{1}{6}$$

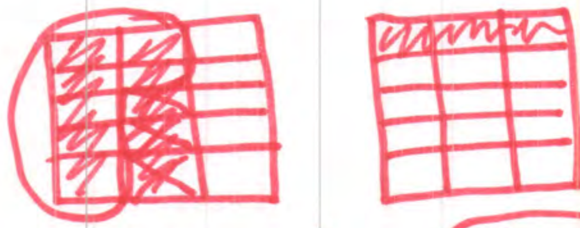


$$\frac{42}{48} - \frac{8}{48} = \frac{34}{48}$$

3. **A carpenter has a plank of wood that is $\frac{2}{3}$ meter long. She cuts $\frac{1}{5}$ meter off of the plank for a project. How long is the original plank of wood now?**

Solve the problem. Include a model and a number sentence.



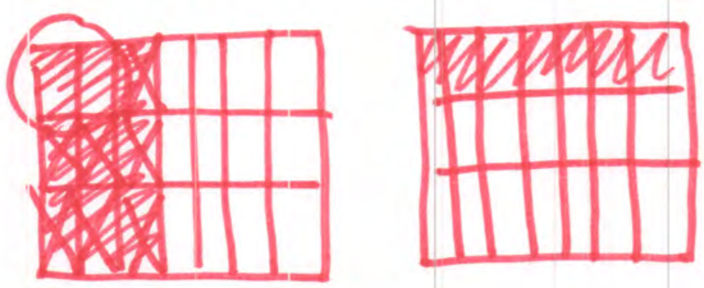


$$\frac{10}{15} - \frac{3}{15} = \frac{7}{15} \text{ m}$$

4. **Wallace's subtraction work is shown below. He said all you have to do to subtract fractions is subtract the numerators and then subtract the denominators.**

$$\frac{3}{7} - \frac{1}{3} = \frac{2}{4}$$

Explain why Wallace is incorrect. Include a model.



$$\frac{9}{21} - \frac{7}{21} = \frac{2}{21}$$

Wallace is incorrect, because you need like units to subtract. 3/7 is equivalent to 9/21. 1/3 is equivalent to 7/21. 9/21 minus 7/21 is 2/21.

G5 U3 Lesson 6

Subtract fractions from numbers between 1 and 2

G5 U3 Lesson 6 - Students will subtract fractions with numbers between 1 and 2

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): In our last lesson we subtracted fractions with unlike units by making equivalent fractions. We drew an area model to represent each fraction, partitioned to show equivalent fractions with the same units, and then subtracted. Today we'll do similar work, only we'll be subtracting from totals greater than 1 whole in some cases.

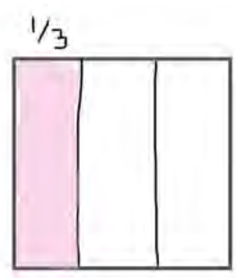
Let's Talk (Slide 3): Take a look at how this student subtracted ¼ from ½. Their work is correct, but it doesn't look identical to the work we did during our last lesson. What do you notice and what do you wonder about this student't work? Possible Student Answers, Key Points:

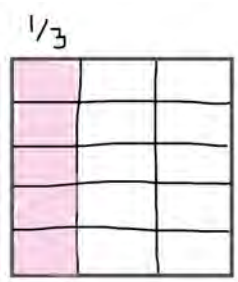
- I notice they rewrote their fractions as having like units of eighths. I notice they drew a model and partitioned it into eighths. I notice they crossed off parts of their model.
- I wonder why they only shaded ½. I wonder why they only used one area model, because we've previously drawn two area models for each problem.

You likely noticed that this student only modeled ½. They then partitioned it into eighths. Then, since they figured out that ¼ is equivalent to 2/8, they just took away the 2/8 rather than draw a whole other area model. As we work with our problems today that involve numbers greater than 1 whole, we'll try using this slightly different approach to modeling subtraction.

Our previous method works fine and could work for any problem we do today, but this method of only drawing one area model can save time and is generally more efficient.

Let's Think (Slide 4): Our first problem wants us to subtract ⅕ from ⅓ using only one area model. Do these fractions have like units? (No, one has thirds and one has fifths) We will need to find like units before subtracting.

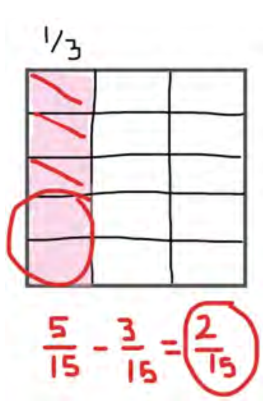




Let's start by drawing an area model to show ⅓ *(sketch, shade, and label area model as you narrate)* I'll draw a square to represent 1 whole, then partition it into three pieces and shade 1 of the pieces. What common unit can we partition thirds and fifths into? (fifteenths) I can partition thirds into fifteenths, and I can partition fifths into fifteenths. Fifteen is a multiple of 3 and 5. Let's partition ⅓ with four horizontal lines, so we can see 3 columns of 5. 15 pieces in all. *(partition the area model by making 4 horizontal cuts)*

Now, I can think of ⅓ as being equivalent to 5/15. If I want to subtract ⅕ from the total, I'll need to think of ⅕ in terms of fifteenths. What is ⅕ in terms of fifteenths, and how do you know? Possible Student Answers, Key Points:

- If I cut ⅕ into fifteenths, I would have 3/15.
- 5 total pieces x 3 = 15 total pieces. 1 shaded piece x 3 = 3 shaded pieces. ⅕ is equivalent to 3/15.

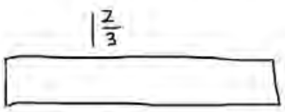


If ⅕ is equivalent to 3/15, I can think of the original problem as being 5/15 3/15. *(write 5/15 - 3/15 = underneath the area model)* 5 fifteenths take away 3 fifteenths would leave us with 2 fifteenths. *(cross out 3 pieces in the area model, circle the remaining 2 pieces, and write 2/15 as the solution to the equation)*

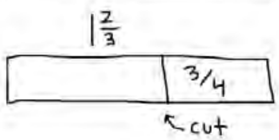
We just used one area model, instead of two, to subtract fractions with unlike units. Now let's try another example. This time we'll see a number that is between 1 and 2. You'll notice, our strategies and models will remain consistent.

Let's Think (Slide 5): Our next example is a story problem. Let's read it. *(read the problem)* Read the problem one more time to yourself, then retell it in your own words. Possible Student Answers, Key Points:

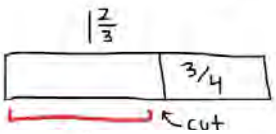
- Christian has some string. He cuts some off, and we're trying to figure out what's left over.
- A kid is doing an art project and he needs to figure out how much string he has left.



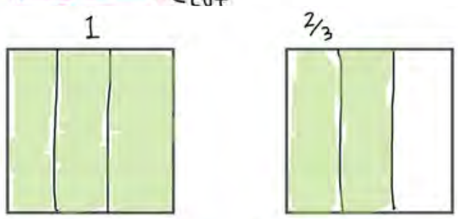
We can picture this with a tape diagram to help us make sense of the story. We know he has 1 ⅔ string to start with. I'll draw and label a rectangle to represent that entire amount of string. *(draw long rectangle and label 1 ⅔ on top)*



I know he's cutting a piece off, so I'll partition my rectangle to show what he's cutting off. *(partition a portion of the rectangle and label with ¾)*



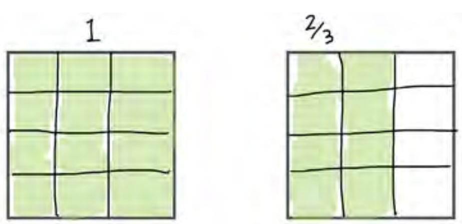
What is unknown? (the leftover piece) I'll label his leftover piece of string with a question mark, since that's what we're trying to find out. Since we know the total and one part, what can we do to find the other part? (subtract the total minus the part we know) We can use subtraction to find the missing part.



What fractional units are involved in this problem? (thirds and fourths) Thirds and fourths are not like units, so I know we'll need to do some work to find like units, or a common denominator. Let's start by drawing *one* tape diagram like we did in the last example. Our tape diagram for 1 ⅔ will need more than 1 whole. So I'll draw 1 whole fully shaded in, and then another whole to partitioned into thirds to show the fractional part of the mixed number. *(draw area model showing 1 ⅔ as described)*

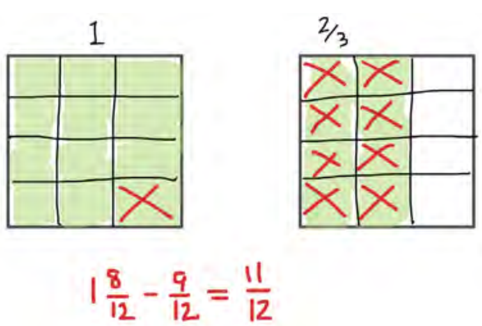
If we need to take away ¾, what like unit could we consider that could be made from thirds and fourths? Possible Student Answers, Key Points:

- 12 is a multiple of 3 and 4. We can use twelfths.
- I can partition thirds into 6, 9, or 12 pieces. I can partition fourths into 8, 12, or 16 pieces. Since 12 works with both units, let's use twelfths.



Let's partition each whole of our area model into twelve pieces by making 3 horizontal cuts. Each whole will have 4 rows of 3. *(partition each whole of the area model as described)* Now we see twelfths. We can see this as 1 8/12 or as 20/12.

I know if we're trying to subtract ¾, I will need to write an equivalent fraction in terms of twelfths. ¾ is equivalent to 9/12, because we'd be partitioning the shaded region and the entire whole into 3 times as many pieces. What's our new problem? (1 8/12 - 9/12, or 20/12 - 9/12)



Let's take away 9 twelfths from our model. *(cross out 9 pieces starting with the second area model)* When I take away 9 twelfths, we see there are 11 twelfths left over. *(write 11/12)*

Returning to the original story, Christian has 11/12 meter of string left over. Nice work!

We just subtracted with a fraction between 1 and 2, since we started with 1 ⅔ in this problem. What was the same or different about subtracting with a number between 1 and 2 compared to subtracting with all fractions less than 1 whole? Possible Student Answers, Key Points:

- There really wasn't anything different. We just had to keep track of a bigger amount, which could mean more pieces.
- Since our area model was more than 1 whole, we needed to build a bigger area model. We still found a like unit and rewrote our problem.

Subtracting with larger fractions involves the same thinking and follows the same rules as subtracting with smaller values.

Let's Try it (Slides 6 - 7): Now let's work on subtracting fractions with numbers between 1 and 2. The strategies we use to subtract from numbers greater than 1 are no different than the strategies we use to subtract from fractions less than 1. As we work on the following problems, we'll try to be efficient and use one area model to represent the total, and then take what we need to subtract from that area model rather than draw two separate area models. Are you ready?

WARM WELCOME

Today we will subtract fractions with numbers between 1 and 2.

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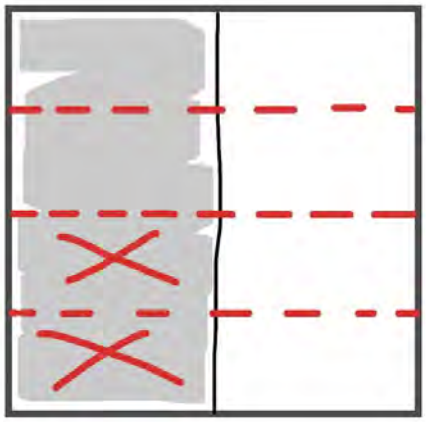
Let's Talk:

This doesn't look like how we've been subtracting…

$$\frac{1}{2} - \frac{1}{4} = ?$$

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



Let's Think:

Use one area model to find the difference.

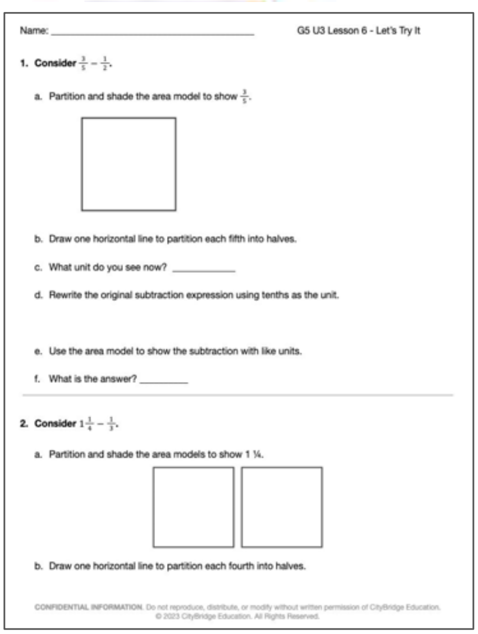
$$\frac{1}{3} - \frac{1}{5}$$

Let's Think:

Christian has a piece of yarn that is $1\frac{2}{3}$ meters long. He needs to cut off $\frac{3}{4}$ meter for an art project. How much yarn does Christian have left?

Let's Try It:

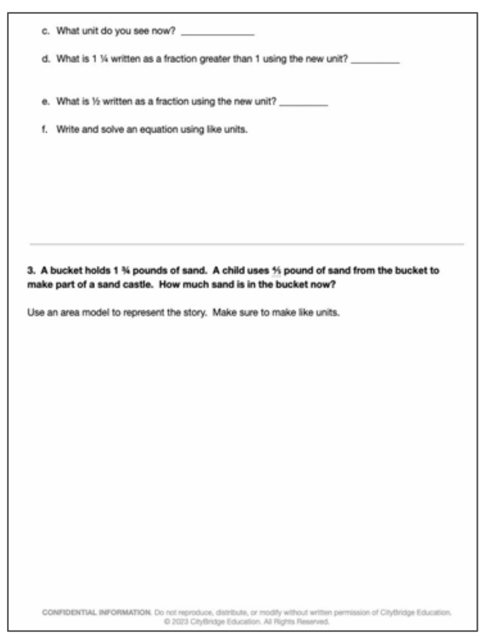
Let's explore subtracting fractions with numbers between 1 and 2 together.



Name: ______________________ G5 U3 Lesson 6 - Let's Try It

1. **Consider $\frac{3}{5} - \frac{1}{2}$.**
   a. Partition and shade the area model to show $\frac{3}{5}$.
   b. Draw one horizontal line to partition each fifth into halves.
   c. What unit do you see now? __________
   d. Rewrite the original subtraction expression using tenths as the unit.
   e. Use the area model to show the subtraction with like units.
   f. What is the answer? ________

2. **Consider $1\frac{1}{4} - \frac{1}{3}$.**
   a. Partition and shade the area models to show $1\frac{1}{4}$.
   b. Draw one horizontal line to partition each fourth into halves.



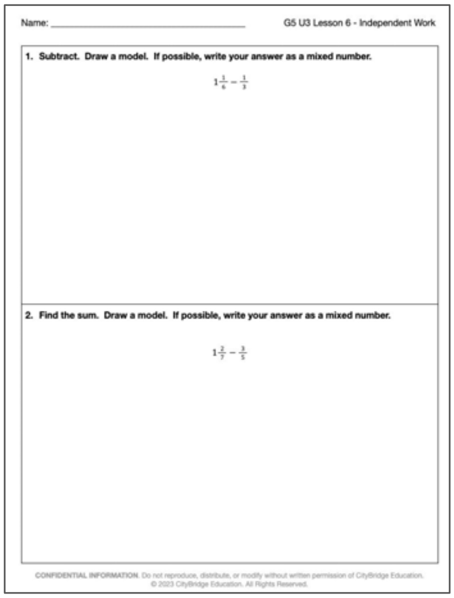
   c. What unit do you see now? __________
   d. What is $1\frac{1}{4}$ written as a fraction greater than 1 using the new unit? ________
   e. What is $\frac{1}{2}$ written as a fraction using the new unit? ________
   f. Write and solve an equation using like units.

3. **A bucket holds $1\frac{3}{4}$ pounds of sand. A child uses $\frac{4}{5}$ pound of sand from the bucket to make part of a sand castle. How much sand is in the bucket now?**

Use an area model to represent the story. Make sure to make like units.

On your Own:

Now it's time to explore subtracting fractions with numbers between 1 and 2 on your own.



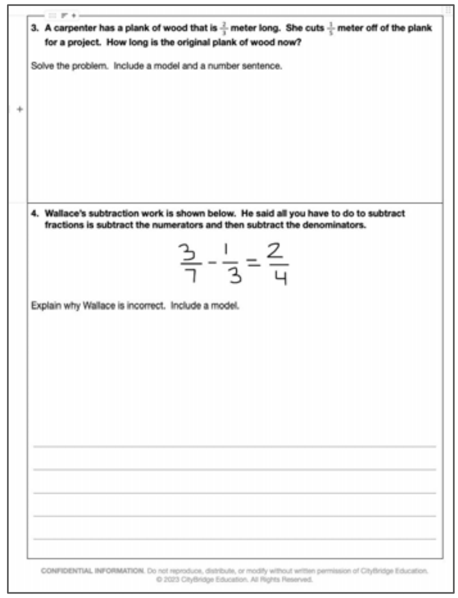
Name: ______________________ G5 U3 Lesson 6 - Independent Work

1. Subtract. Draw a model. If possible, write your answer as a mixed number.

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

2. Find the sum. Draw a model. If possible, write your answer as a mixed number.

$1\frac{2}{7} - \frac{3}{5}$



3. A carpenter has a plank of wood that is $\frac{2}{3}$ meter long. She cuts $\frac{1}{5}$ meter off of the plank for a project. How long is the original plank of wood now?

Solve the problem. Include a model and a number sentence.

4. Wallace's subtraction work is shown below. He said all you have to do to subtract fractions is subtract the numerators and then subtract the denominators.

$\frac{3}{7} - \frac{1}{3} = \frac{2}{4}$

Explain why Wallace is incorrect. Include a model.

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Name: ______________________________ G5 U3 Lesson 6 - Let's Try It

1. Consider $\frac{3}{5} - \frac{1}{2}$.

   a. Partition and shade the area model to show $\frac{3}{5}$.

   b. Draw one horizontal line to partition each fifth in half.

   c. What unit do you see now? ______________

   d. Rewrite the original subtraction expression using tenths as the unit.

   e. Use the area model to show the subtraction with like units.

   f. What is the answer? ___________

---

2. Consider $1\frac{1}{4} - \frac{1}{3}$.

   a. Partition and shade the area models to show 1 ¼.

   b. Draw two horizontal lines to partition each fourth into three pieces.

   c. What unit do you see now? ________________

   d. What is 1 ¼ written as a fraction greater than 1 using the new unit? ___________

e. What is ½ written as a fraction using the new unit? ___________

f. Write and solve an equation using like units.

---

3. A bucket holds 1 ¾ pounds of sand. A child uses ⅘ pound of sand from the bucket to make part of a sand castle. How much sand is in the bucket now?

Use an area model to represent the story. Make sure to make like units.

1. Subtract. Draw a model. If possible, write your answer as a mixed number.

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

2. Find the difference. Draw a model. If possible, write your answer as a mixed number.

$$1\frac{2}{7} - \frac{3}{5}$$

3. A turtle traveled $1\frac{1}{4}$ yard in an hour. A caterpillar traveled $\frac{5}{6}$ yard in an hour. How much farther did the turtle travel than the caterpillar?

Solve the problem. Include a model and a number sentence.

4. Look at the work shown below. Identify and correct the mistake using words and models.

$1\frac{1}{3} - \frac{5}{6}$

$1\frac{5}{6} - \frac{1}{3}$

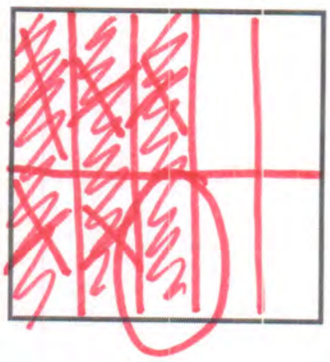
$1\frac{5}{6} - \frac{2}{6}$

$1\frac{3}{6}$

Name: KEY

1. Consider $\frac{3}{5} - \frac{1}{2}$.

a. Partition and shade the area model to show $\frac{3}{5}$.



b. Draw one horizontal line to partition each fifth into ~~halves~~ half.

c. What unit do you see now? tenths

d. Rewrite the original subtraction expression using tenths as the unit.

$$\frac{6}{10} - \frac{5}{10} = ?$$

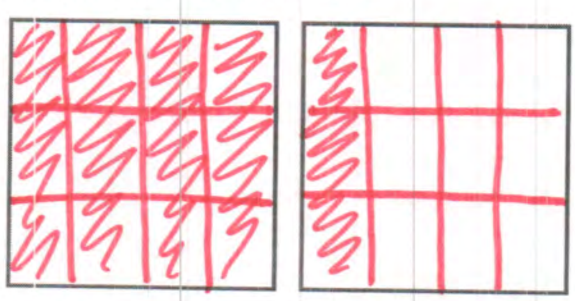
e. Use the area model to show the subtraction with like units.

f. What is the answer? $\frac{1}{10}$

---

2. Consider $1\frac{1}{4} - \frac{1}{3}$.

a. Partition and shade the area models to show 1 ¼.



b. Draw ~~one~~ two horizontal lines to partition each fourth into ~~halves.~~ three pieces.

c. What unit do you see now? twelfths

d. What is 1 ¼ written as a fraction greater than 1 using the new unit? $1\frac{3}{12} = \frac{15}{12}$

e. What is ½ written as a fraction using the new unit? 6/12

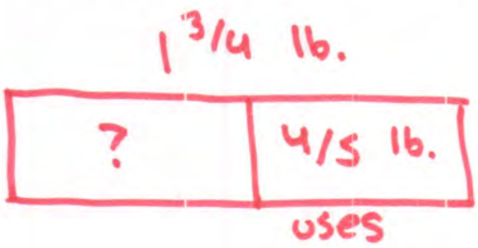
f. Write and solve an equation using like units.

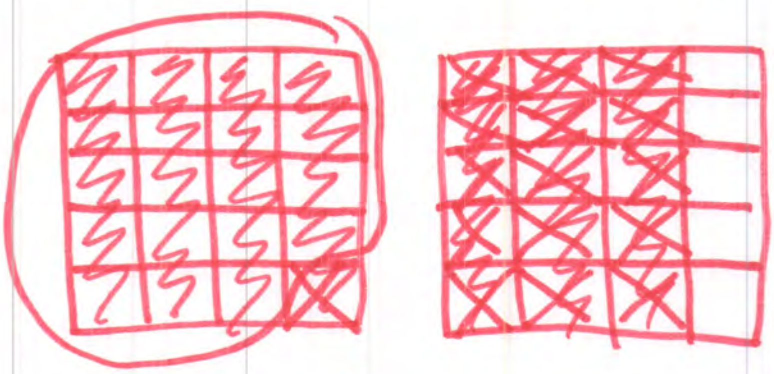
$$\frac{15}{12} - \frac{6}{12} = \frac{9}{12}$$

---

3. A bucket holds 1 ¾ pounds of sand. A child uses ⅘ pound of sand from the bucket to make part of a sand castle. How much sand is in the bucket now?

Use an area model to represent the story. Make sure to make like units.





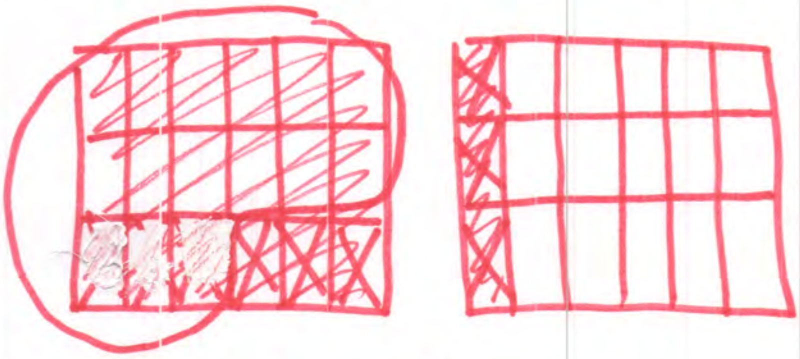
$$1\frac{15}{20} - \frac{16}{20}$$

$$\frac{35}{20} - \frac{16}{20} = \frac{19}{20} \text{ lb.}$$

Name: KEY

1. Subtract. Draw a model. If possible, write your answer as a mixed number.

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

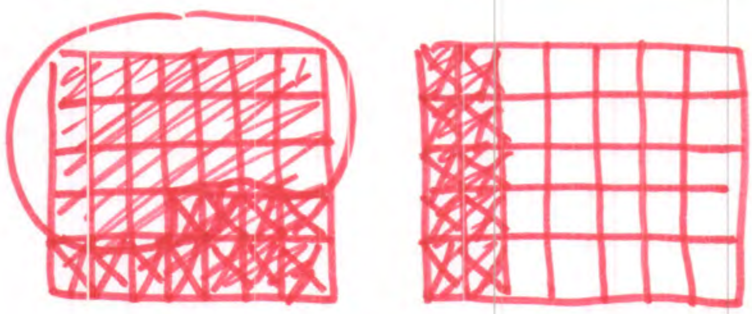


$1\frac{3}{18} - \frac{6}{18}$

$\frac{21}{18} - \frac{6}{18} = \frac{15}{18}$

2. Find the ~~sum~~ difference. Draw a model. If possible, write your answer as a mixed number.

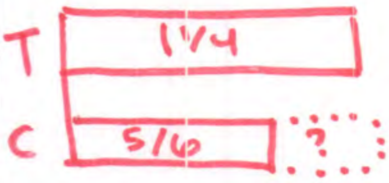
$$1\frac{2}{7} - \frac{3}{5}$$

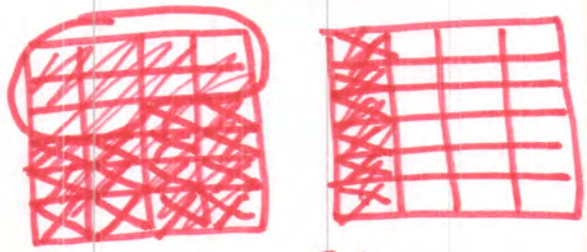


$1\frac{10}{35} - \frac{21}{35} \longrightarrow \frac{45}{35} - \frac{21}{35} = \frac{24}{35}$

3. A turtle traveled $1\frac{1}{4}$ yard in an hour. A caterpillar traveled $\frac{5}{6}$ yard in an hour. How much farther did the turtle travel than the caterpillar?

Solve the problem. Include a model and a number sentence.





$1\frac{6}{24} - \frac{20}{24}$

$\frac{30}{24} - \frac{20}{24} = \frac{10}{24}$ yd.

4. Look at the work shown below. Identify and correct the mistake using words and models.

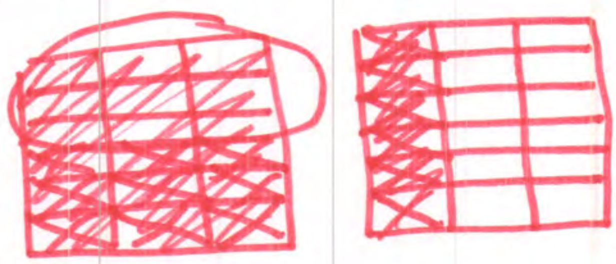
$1\frac{1}{3} - \frac{5}{6}$

You can't just switch the fractions when we subtract.

$1\frac{5}{6} - \frac{1}{3}$

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

$1\frac{3}{6}$



$1\frac{6}{18} - \frac{15}{18}$

$\frac{24}{18} - \frac{15}{18} = \frac{9}{18}$

G5 U3 Lesson 7

Add fractions to and subtract fractions from whole numbers using equivalence and the number line as strategies

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G5 U3 Lesson 7 - Students will add fractions to and subtract fractions from whole numbers using equivalence and the number line as strategies

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): We've been working a lot around adding and subtracting fractions. We've worked with fractions with like units, we've worked with fractions with unlike units, and we've even worked with some fractions greater than 1 and some mixed numbers. Today, we'll continue the work we've been doing by focusing on efficient strategies to add and subtract from whole numbers. As a reminder, a whole number is just a number that does not include a fraction or a decimal. For example, 1, 5 and 42 are all whole numbers.

Let's Talk (Slide 3): Take a look at the two equations here. Take a second to notice and wonder about the equations, then share out what you're thinking.

Possible Student Answers, Key Points:

- I notice the equations seem color-coded. I notice some whole numbers, some fractions, and some mixed numbers. I notice the top equation involves addition, and the bottom equation involves subtraction. I notice the mixed numbers are decomposed into a whole number and a fraction.
- I wonder why the numbers are color-coded. I wonder why they person decomposed the mixed numbers. I wonder if writing equations like this can help us add and subtract with fractions.

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

$$5 - 2\frac{3}{7} = 5 - 2 - \frac{3}{7}$$

This work shows adding to a whole number and subtracting from a whole number. The person broke apart their mixed numbers to help them add and subtract.

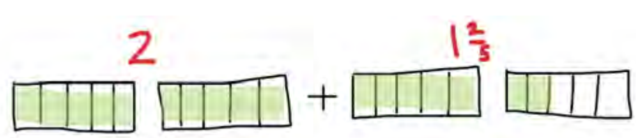
(circle the mixed number in each equation and draw an arrow to each decomposed part as you narrate) In the first equation, they were adding 2 and 1 ½. They decomposed the 1 ½ into 1 and ½. In the second equation, they were subtracting 5 minus 2 3/7. They decomposed the 2 3/7 into 2 and 3/7. We'll explore this strategy more in a moment. Why do you think this might help us add and subtract? Possible Student Answers, Key Points:

- Maybe breaking the mixed number up helps us add or subtract in easier parts.
- Breaking the mixed number up might help us so we can focus on the whole numbers first, and then handle the fractions after.

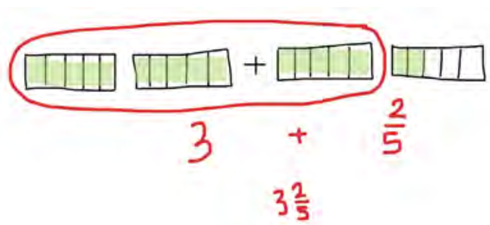
Let's keep this person's strategy in mind as we explore problems of our own.

Let's Think (Slide 4): This first problem wants us to find the sum of 2 and 1 ⅖. We'll solve this problem using a bar model, a number line, and an equation.

Let's start with a bar model. I'll start by drawing the first addend of 2 by drawing two rectangles. There isn't a fractional unit involved with this addend, but I know the other addend has fifths, so I'll partition each of the two wholes into fifths. *(draw and shade two rectangles partitioned into fifths)* Our other addend is 1 ⅖. How can I model 1 ⅖ using a bar model? (draw 1 rectangle for the whole and another showing 2 out of five pieces shaded) We can add *(write +)* another whole and 2 fifths to the model. I'll draw two rectangles partitioned into fifths. I'll shade one whole rectangle to represent the 1, and I'll shade 2 fifths of the other. *(draw as stated)* Now we see a model that shows 2 wholes plus 1 ⅖.



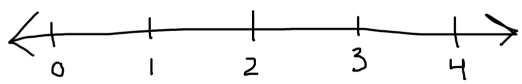
When adding these, I can first think about the whole numbers. *(Draw a circle to group the two wholes and the 1 whole)* 2 wholes plus 1 whole is 3 wholes. *(write 3 underneath the circled wholes)* Then, all I have left to add is the extra ⅖. 3 + ⅖ is 3 ⅖ *(write answer)*



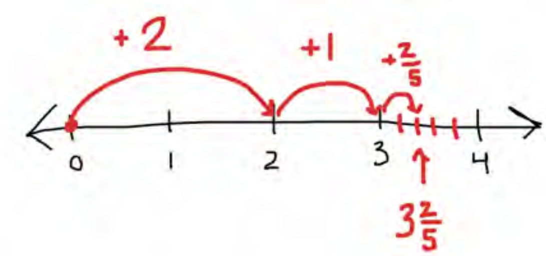
How did grouping the whole numbers in our bar model help us add? Possible Student Answers, Key Points:

- Adding whole numbers is easy. We can quickly group the whole numbers, then add the fraction part last.
- We decomposed the mixed number so we could group the whole numbers together. Adding whole numbers is quick, so we could efficiently find the entire total in two steps.

We already know the sum is 3 ⅖, but let's think of another way we can show similar thinking. We'll do the same problem on a number line.



I'll start by sketching out a number line. *(draw a number line from 0 to 4 with labeled whole numbers)*



Since we're adding 2 + 1 ⅖, I'll make one hop to 2. (model and label hopping on the number line as narrated) Hopping 1 ⅖ all at once might be hard to visualize. Instead, I'll decompose 1 ⅖ and think of it as 1 and ⅖ I'll hop 1 whole. Where am I at now, and how much more do I need to hop? (You're at 3, and you need to hop ⅖ more)All that is left is to hop ⅖. I'll partition the next whole into fifths, so I can hop two units that are fifths. We ended up ⅖ after the 3 on the number line. Our sum is 3 ⅖.

How do we see decomposing the mixed number in our number line model of the sum? Possible Student Answers, Key Points:

- Instead of jumping 1 ⅖ all at once, we hopped 1 space and then ⅖ more.
- We hopped in steps so that we could add our whole numbers first, before adding the fractional unit.

$$\underbrace{2 + 1} + \frac{2}{5} \qquad 3\frac{2}{5}$$

Let's think about what we did numerically. Instead of thinking of 2 + 1 ⅖, we decomposed the mixed number to add in pieces. *(write 2 + 1 + ⅖, and bracket the parts as you narrate combining the whole numbers)*This made it easy to add the whole numbers. Once we had a whole number of 3, we added on the fractional unit to get a sum of 3 ⅖.

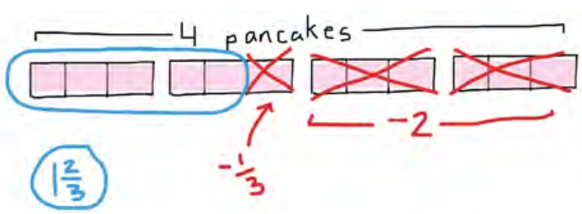
We just added a mixed number to a whole number using a visual model, a number line, and an equation. Let's try another example that is a little different.

Let's Think (Slide 5): This next example is a story problem. I'll read it, then I want you to re-read it to yourself. *(read problem aloud)* Once you've re-read the story, retell it in your own words. Possible Student Answers, Key Points:

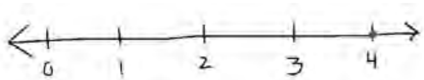
- She has 4 pancakes, and then she eats some. We want to know how many she has left.
- We know the total number of pancakes and a part that she ate. We're trying to find the other part that she did not eat.

Let's solve this problem using a bar model first. I know she has 4 pancakes. *(draw and shade four rectangles, each partitioned into thirds)*

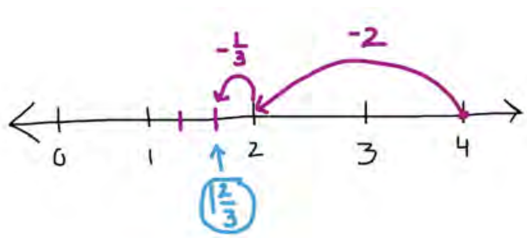
Why do you think I split each rectangle into three pieces, or thirds? (We need to take away 2 ⅓ so you were thinking ahead to the units you would need) I know I have to take away 2 ⅓ so splitting each whole into thirds will make my work easier in the long run.



Since she is eating the pancakes, and we want to know what is left over, I'm not adding in this problem. I'll need to take away 2 ⅓ pancakes. Let's take away 2 ⅓ in parts; we'll take away 2 wholes and then 1 third. *(cross off and label 2 wholes, then cross off and label ⅓)* How many pancakes do you see are left based on the model? (1 whole pancake and 2 pieces, so 1 ⅔ pancakes) Nicely done. *(write answer)*



Let's consider how the same problem might look on a number line. We know Angela has 4 pancakes to start, so I can sketch a number line to show that. *(draw a number line from 0 to 4 and place a point on 4)*



Rather than hop 2 ⅓ back all at once, because that might be tricky to visualize, we can subtract in parts. Let's subtract 2 and then subtract ⅓ *(draw and label a hop from 4 to 2)* I subtracted 2, and now I'm at 2 on the number line. I have to subtract ⅓ more, so I'll partition the whole between 1 and 2 into thirds. Then I can hop back ⅓ *(partition thirds by making 2 tick marks between 1 and 2, then label a hop back from 2 to 1 ⅔)* Where did we end up? (1 ⅔) We got the same answer as when we modeled with a bar model.

How is the work we did in the bar model the similar to and different from the work we did on the number line? Possible Student Answers, Key Points:

- One uses partitioned rectangles, whereas the other one uses a number line.
- They both show how we subtracted in parts. We first subtracted the whole number, and then subtracted the fractional piece.

$$4 - 2\tfrac{1}{3}$$

$$\underbrace{4 - 2}_{} - \tfrac{1}{3} = ?$$

$$2 - \tfrac{1}{3} = 1\tfrac{2}{3}$$

They both show 4 minus 2 ⅓ *(write that expression)*

Both models show that we decomposed the 2 ⅓ into 2 and ⅓ *(rewrite expression using a number bond to decompose 2 ⅓ into 2 and ⅓)* This made it easy for us to subtract the whole numbers first. *(draw a bracket showing 4 - 2 is equal to 2, then rewrite the remaining problem as 2 - ⅓ = 1 ⅔* Once we subtracted the whole numbers, it was simpler to subtract the remaining fractional piece.

When adding to or subtracting from whole numbers, it can be helpful to decompose a mixed number into a whole number and a fractional part.

Let's Try it (Slides 6 - 7): Now let's work on adding to and subtracting from whole numbers together. We can model our thinking with bar model or area models, number lines, and/or equations. As we saw in the examples today, it can be helpful to decompose a mixed number into a whole number and a fraction to help us efficiently add or subtract in parts. Let's try some out!

WARM WELCOME

Today we will add fractions to and subtract fractions from whole numbers using equivalence and the number line as strategies.

Let's Talk:

What do you notice?
What do you wonder?

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

$$5 - 2\frac{3}{7} = 5 - 2 - \frac{3}{7}$$

Let's Think:

Find the sum.

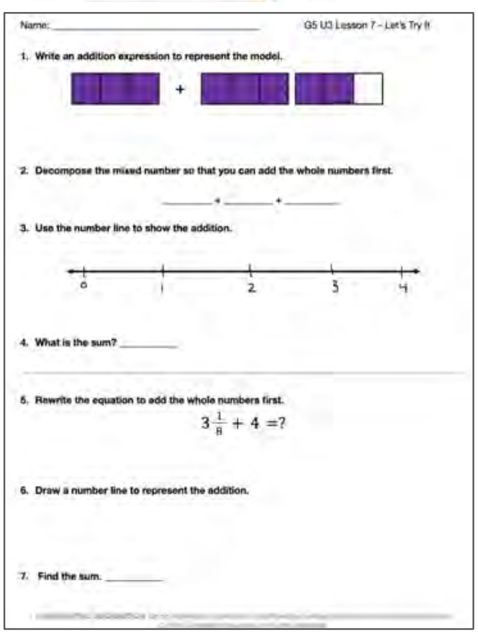
$$2 + 1\frac{2}{5}$$

Let's Think:

Angela has 4 pancakes. She eats 2 ⅓ of the pancakes. How many pancakes does Angela have now?

Let's Try It:

Let's explore adding fractions to and subtracting fractions from whole numbers using equivalence and the number line as strategies together.



Name: ____________________ G5 U3 Lesson 7 – Let's Try It

1. Write an addition expression to represent the model.

2. Decompose the mixed number so that you can add the whole numbers first.

   ______ + ______ + ______

3. Use the number line to show the addition.

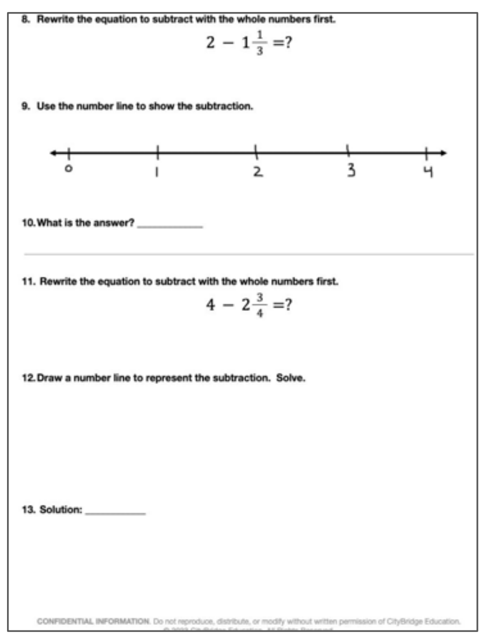
4. What is the sum? ________

5. Rewrite the equation to add the whole numbers first.

   $3\frac{1}{8} + 4 = ?$

6. Draw a number line to represent the addition.

7. Find the sum. ________



8. Rewrite the equation to subtract with the whole numbers first.

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

9. Use the number line to show the subtraction.

10. What is the answer? ________

11. Rewrite the equation to subtract with the whole numbers first.

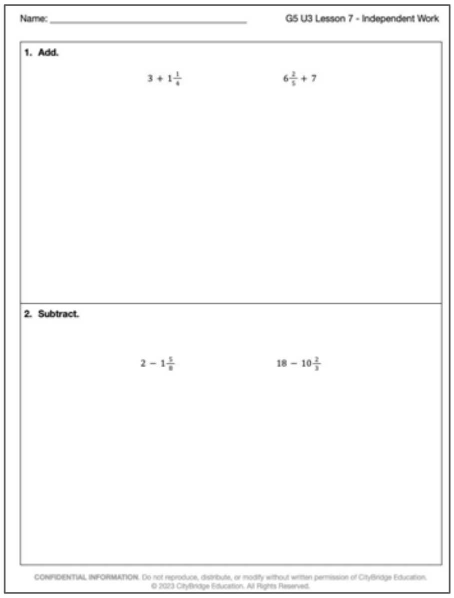
   $4 - 2\frac{3}{4} = ?$

12. Draw a number line to represent the subtraction. Solve.

13. Solution: ________

On your Own:

Now it's time to explore adding fractions to and subtracting fractions from whole numbers using equivalence and the number line as strategies on your own.



Name: ______________________ G5 U3 Lesson 7 - Independent Work

1. Add.

$3 + 1\frac{1}{4}$ $6\frac{2}{5} + 7$

2. Subtract.

$2 - 1\frac{5}{8}$ $18 - 10\frac{2}{3}$

3. Catherine has a goal to run 8 miles this weekend. On Saturday she will run $2\frac{1}{2}$ miles. How far does Catherine need to run on Sunday to meet her goal?

Solve the problem. Include a model and a number sentence.

4. Bianca says $4 - 1\frac{1}{5}$ will be less than 3. Pedro says it will be more than 3. Who do you agree with? Explain using words and pictures.

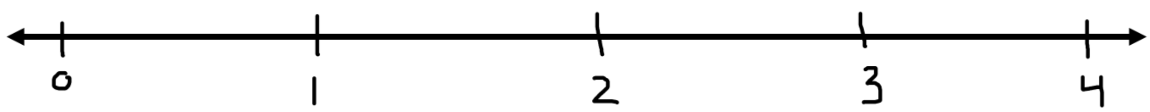
Name: ____ G5 U3 Lesson 7 - Let's Try It

1. Write an addition expression to represent the model.

2. Decompose the mixed number so that you can add the whole numbers first.

__________ + __________ + ___________

3. Use the number line to show the addition.



4. What is the sum? ____________

---

5. Rewrite the equation to add the whole numbers first.

$$3\frac{1}{8} + 4 = ?$$

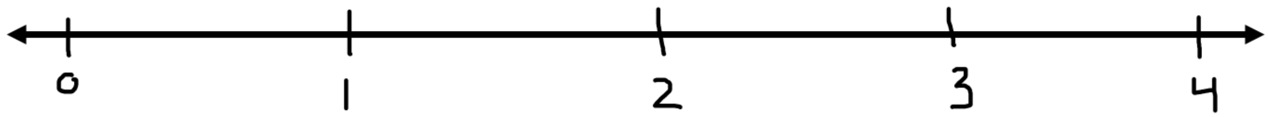
6. Draw a number line to represent the addition.

7. Find the sum. ____________

8. Rewrite the equation to subtract with the whole numbers first.

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

9. Use the number line to show the subtraction.



10. What is the answer? ______________

11. Rewrite the equation to subtract with the whole numbers first.

$$4 - 2\frac{3}{4} = ?$$

12. Draw a number line to represent the subtraction. Solve.

13. Solution: _____________

1. Add.

$3 + 1\frac{1}{4}$ $6\frac{2}{5} + 7$

2. Subtract.

$2 - 1\frac{5}{8}$ $18 - 10\frac{2}{3}$

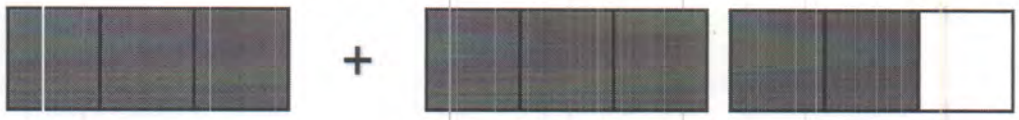
3. Catherine has a goal to run 8 miles this weekend. On Saturday she will run $2\frac{1}{2}$ miles. How far does Catherine need to run on Sunday to meet her goal?

Solve the problem. Include a model and a number sentence.

4. Bianca says $4 - 1\frac{1}{5}$ will be less than 3. Pedro says it will be more than 3. Who do you agree with? Explain using words and pictures.

Name: KEY

1. Write an addition expression to represent the model.

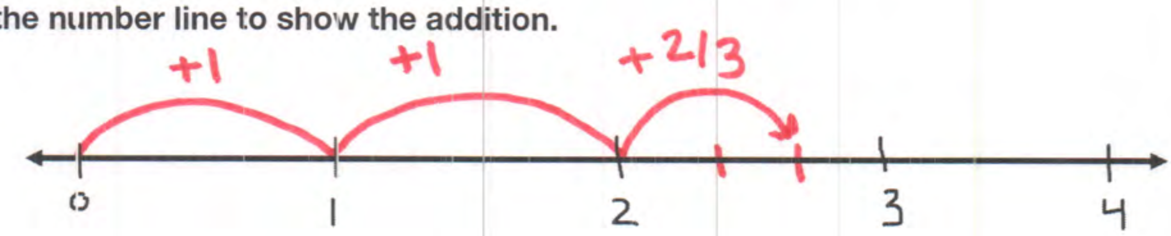


$1 + 1\frac{2}{3}$

2. Decompose the mixed number so that you can add the whole numbers first.

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

3. Use the number line to show the addition.



4. What is the sum? $2\frac{2}{3}$

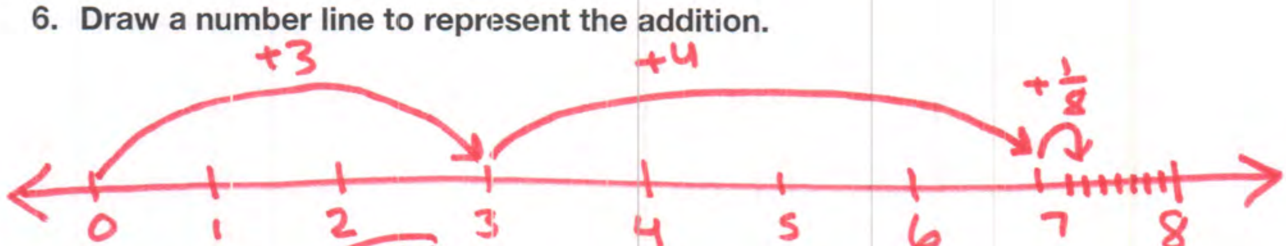
---

5. Rewrite the equation to add the whole numbers first.

$$3\frac{1}{8} + 4 = ?$$

$3 + 4 + \frac{1}{8}$

6. Draw a number line to represent the addition.



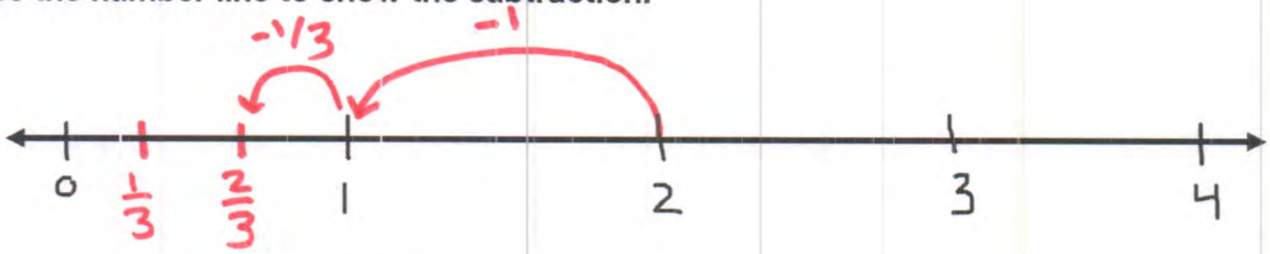
7. Find the sum. $7\frac{1}{8}$

8. **Rewrite the equation to subtract with the whole numbers first.**

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

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

9. **Use the number line to show the subtraction.**



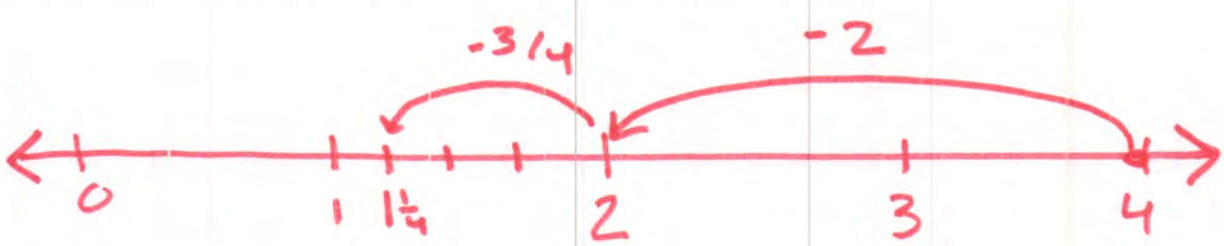
10. **What is the answer?** 2/3

11. **Rewrite the equation to subtract with the whole numbers first.**

$$4 - 2\frac{3}{4} = ?$$

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

12. **Draw a number line to represent the subtraction. Solve.**



13. **Solution:** $1\frac{1}{4}$

Name: KEY

1. Add.

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

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

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

$4\frac{1}{4}$

$6\frac{2}{5} + 7$

$6 + 7 + \frac{2}{5}$

$13 + \frac{2}{5}$

$13\frac{2}{5}$

2. Subtract.

$2 - 1\frac{5}{8}$

$2 - 1 - \frac{5}{8}$

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

$\frac{3}{8}$

$18 - 10\frac{2}{3}$

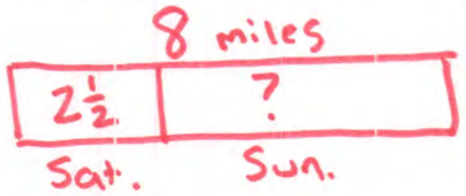
$18 - 10 - \frac{2}{3}$

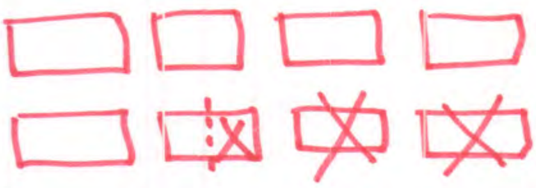
$8 - \frac{2}{3}$

$7\frac{1}{3}$

3. **Catherine has a goal to run 8 miles this weekend. On Saturday she will run $2\frac{1}{2}$ miles. How far does Catherine need to run on Sunday to meet her goal?**

Solve the problem. Include a model and a number sentence.





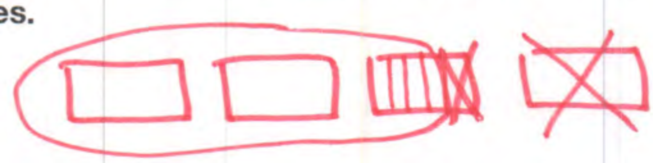
$8 - 2\frac{1}{2}$

$8 - 2 - \frac{1}{2}$

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

$5\frac{1}{2}$ miles

4. **Bianca says $4 - 1\frac{1}{5}$ will be less than 3. Pedro says it will be more than 3. Who do you agree with? Explain using words and pictures.**



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

$3 - \frac{1}{5} = 2\frac{4}{5}$

Bianca is correct. I know 4 minus 1 is 3, then I still need to subtract 1/5 more. This means my answer has to be a little less than 3.

G5 U3 Lesson 8

Add fractions making like units numerically

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G5 U3 Lesson 8 - Students will add fractions making like units numerically

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): We've spent several lessons engaging in adding and subtracting fractions and showing our thinking. There are many ways we can show our work when adding and subtracting fractions. What ways have we tried so far? Possible Student Answers, Key Points:

- We've used visual models like tape diagrams or area models to help us think about the units in our fractions.
- We've added and subtracted on a number line.

Today, we're going to focus on fraction addition, and we'll consider whether or not we always have to draw a model or a number line to help us find like units. Let's get started!

Let's Talk (Slide 3): Think about the problem ½ + ¼. We could draw an area model to think about our units and find the sum…but do we have to? Is there a way you can think of to find the sum without sketching out models? Possible Student Answers, Key Points:

- I know we can't add them right away, because they're not like units. Maybe I can picture what an area model might look like in my head and write out what I'm picturing using numbers.
- I know ½ is equivalent to 2 fourths. So I can think of 2/4 plus ¼ without needing to draw a model.

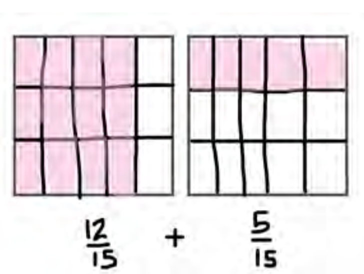
I wonder if your ideas will help us today! Let's try the first problem out with an area model and without an area model and see what we notice.

Let's Think (Slide 4): Our first question wants us to find the sum of ⅓ and ⅓ Even though our focus today is working on making like units numerically, or with numbers, let's start by drawing a model for this problem.

Let's show ⅘ vertically and ⅓ horizontally. *(cut the first area model into 5 columns and shade 4 of them, and then cut the second area model into 3 rows and shade 2 of them)*

We know we can't add fifths and thirds together, because they're unlike units What can I do in my model to show these two fractions as equivalent fractions with like units? Possible Student Answers, Key Points:

- We can partition them into 15 pieces, since 15 is a multiple of 5 and 3.
- We can cut the first model into 3 horizontal rows and the second model into 5 vertical columns. That will make each area model have 15 pieces.



(partition each area model as you narrate) I can partition each model into 15 pieces since thirds and fifths can both be made into fifteenths. I'll use 2 horizontal cuts to partition the first area model into 15 pieces. I'll use 4 vertical cuts to partition the second area model into 15 pieces. What equivalent fractions do we see now? (12/15 and 5/15)

Sometimes, when we are dealing with a lot of pieces, partitioning area models isn't efficient. Let's think about how we can arrive at these same equivalent fractions numerically, so that we don't always need to rely on a model.

$$\frac{4}{5} = \frac{4}{5}$$

Let's think about ⅘ first. *(write ⅘ = ⅘ as shown)* We started with 4 shaded columns out of 5 columns in all. To partition fifths into fifteenths, we cut our model into 3 rows. This meant that we were essentially tripling our pieces. We had 3 times as many pieces after we cut the model.

$$\frac{4}{5} = \frac{4 \times 3}{5 \times 3} = \frac{12}{15}$$

We can show that using multiplication. We had 4 shaded pieces, but we cut to have 3 times as many shaded pieces. *(write x 3 in the numerator)* We had 5 columns, or 5 total pieces, but we cut to have 3 times as many shaded pieces. *(write x 3 in the numerator)* Since we tripled the number of shaded pieces and tripled the number of total pieces in the whole, we can show that by multiplying the numerator and denominator by 3. We end up with an equivalent fraction of 12/15. We see the same work we did numerically in our area model.

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

Now let's think about ⅓ *(write ⅓= ⅓as shown)* We started with 1 shaded row out of 3 rows in all. To partition thirds into fifteenths, we cut our model into 5 columns. We have 5 times as many pieces after we cut the model.

$$\frac{1}{3} = \frac{1 \times 5}{3 \times 5} = \frac{5}{16}$$

We can show that using multiplication. We had 1 shaded piece, but we cut to have 5 times as many shaded pieces. *(write x 5 in the numerator)* We had 3 rows, or 3 total pieces, but we cut to have 5 times as many shaded pieces. *(write x 5 in the numerator)* We can show that by multiplying the numerator and denominator by 5. We end up with an equivalent fraction of 5/15. Once again, this is just a numerical way to show the work we did partitioning our area model.

Whether we found like units using the area model or numerically, we're now ready to add. What is our equation with like units and what is the sum? Possible Student Answers, Key Points:

- Our new equation is 5/15 + 12/15 = ?
- I know 5 units and 12 units is 17 units, so the sum is 17/15. We can also write that as 1 2/15.

$$\frac{5}{15} + \frac{12}{15} = \frac{17}{15} \text{ OR } 1\frac{2}{15}$$

(write 5/15 + 12/15 = 17/15) We can add 5 fifteenths plus 12 fifteenths to get 17 fifteenths. We can leave our answer as a fraction greater than 1, like 17/15, or we can write our answer as a mixed number. I know 15/15 is 1 whole, so I can think of 17/15 as 1 whole with 2 extra fifteenths. The mixed number form is 1 2/15.

From this first example, how is finding like units with area models similar to or different from finding like units numerically? Possible Student Answers, Key Points:

- Both strategies help us to find like units. In this case, both ways helped us think about fifteenths.
- The area model involves drawing and partitioning, while the numerical way involves multiplying in place of actually partitioning. The area model way is more visual, but could take longer with some problems.

Let's try one more example together, and this time we'll try not to use a model at all. We'll just try to add by finding equivalent fractions numerically.

Let's Think (Slide 5): This problem wants us to find the sum of 1 ½ and 3/7. Without using a model, let's think about our units. What like unit can help us in this problem, and how do you know? Possible Student Answers, Key Points:

- We can use 14 since it is a multiple of 2 and 7.
- I could partition halves into 14 pieces and 7 into 14 pieces, so we can use fourteenths as a unit.

If we were drawing a model, we could partition both models into 14 pieces. We could also maybe use 28 pieces or something bigger, but 14 is arguably the easiest unit to use here.

$$1\frac{1}{2} = 1\frac{1 \times}{2 \times} = 1\frac{}{14}$$

Let's think about how we can make equivalent fractions with units of fourteenths numerically. We'll start with 1 ½. We know we can use multiplication to represent how we might partition our model. If I want to convert 1 ½ into fourteenths, I can think about what I can multiply each part of my fraction by to make 14 pieces. *(write incomplete equation as shown)*

Let's look at the fractional part of the mixed number, since I don't need to worry about the whole number when I write equivalent fractions. What can I multiply ½ by to write it as an equivalent fraction? (I know 2 x 7 = 14, so we can multiply the numerator and denominator by 7)

$$1\frac{1}{2} = 1\frac{1 \times 7}{2 \times 7} = 1\frac{7}{14}$$

We can multiply the numerator and denominator each by 7. It's as though we partitioned our model into 7 rows or columns to make 14 pieces. *(fill in 7s in the blanks of the equation you previously wrote)* 1 ½ is equivalent to 1 7/14. No area model required!

$$\frac{3}{7} = \frac{3 \times}{7 \times} = \frac{}{14}$$

Let's use the same thinking to write an equivalent fraction for 3/7. We want to think of 3/7 as being cut into 14 pieces. *(write incomplete equation as shown)* How can I use multiplication to show that I am partitioning 3/7 into 14 pieces? (I know 7 x 2 = 14, so we can multiply the numerator and denominator by 2)

$$\frac{3}{7} = \frac{3 \times 2}{7 \times 2} = \frac{6}{14}$$

It's like we partitioned the sevenths into 2 columns or 2 rows. *(fill in 2s in the blanks of the equation you previously wrote)* 3/7 is equivalent to 6/14. We figured this out numerically without the use of an area model.

$$1\frac{7}{14} + \frac{6}{14} = 1\frac{13}{14}$$

Now we can add our fractions with like units. 1 7/14 + 6/14 is 1 13/14, when we add our fractional units.

We've written equivalent fractions using area models for several lessons. Today we learned how to add by writing equivalent fractions numerically, without an area model. Which strategy do you prefer at this moment in time and why? Possible Student Answers, Key Points:

- I prefer finding equivalent fractions numerically, because it's more efficient. I don't have to draw as much and count up all the pieces.
- I prefer the area model because it's more visual, and I'm more used to it for now.
- I like both, it just depends on the problem. If there are a ton of pieces, I might prefer to use multiplication instead of an area model.

Let's Try it (Slides 6 - 7): Now let's work on adding fractions making like units numerically together. Rather than rely on partitioning a model, we can use multiplication to help us rewrite equivalent fractions with like units numerically. We can always go back to drawing models, but we know that sometimes this can be an inefficient, time-consuming strategy. This is especially true if our fractions will involve many pieces. Let's use what we've been practicing and try a few more problems together.

WARM WELCOME

Today we will add fractions making like units numerically.

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Let's Talk:

Do I always have to draw a model to add fractions with unlike units?

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

Let's Think:

Find the sum by making like units numerically.

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

Let's Think:

Find the sum by making like units numerically.

$$1\frac{1}{2} + \frac{3}{7}$$

Let's Try It:

Let's explore adding fractions making like units numerically together.

Name: ______________________ G5 U3 Lesson 8 - Let's Try It

Consider the expression $\frac{1}{5} + \frac{1}{3}$.

1. Model each addend.

2. Partition each area model to show like units. What unit do you have now? ________

3. Show how you can use multiplication to rewrite $\frac{1}{5}$ with like units.

$$\frac{1}{5} = \frac{1\times \_\_}{5\times \_\_} = \frac{\_\_}{\_\_}$$

4. Show how you can use multiplication to rewrite $\frac{1}{3}$ with like units.

$$\frac{1}{3} = \frac{1\times \_\_}{3\times \_\_} = \frac{\_\_}{\_\_}$$

5. How is the multiplication you did in #3 and #4 related to the area model you drew?

6. Determine the sum.

7. List at least two other common multiples of 3 and 5 that can be used to find like units.

8. Use multiplication and one of the common multiples to add [illegible] a different way.

9. Is the sum from Question #8 equivalent to the sum from Question #6? Explain.

Consider the expression [illegible].

10. List at least two common multiples you can use to make like units.

11. Use multiplication to write the expression using equivalent fractions with like units.

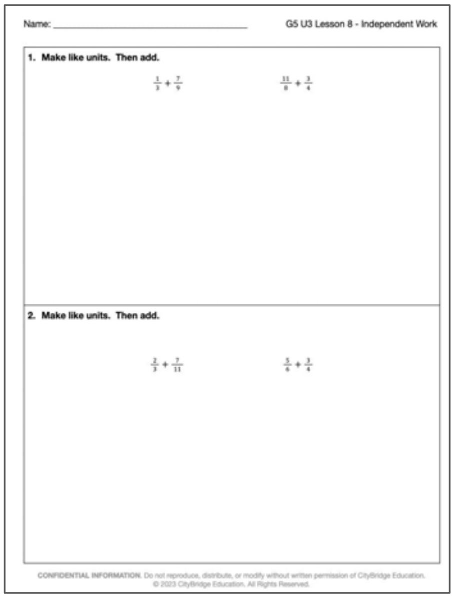
12. What is the sum as a fraction greater than 1? As a mixed number?

Consider the expression [illegible].

13. Kyle wants to use the common multiple 18 to make like units. Trevor wants to use the common multiple 54 to make like units. Who do you agree with and why?

On your Own:

Now it's time to explore adding fractions making like units numerically on your own.



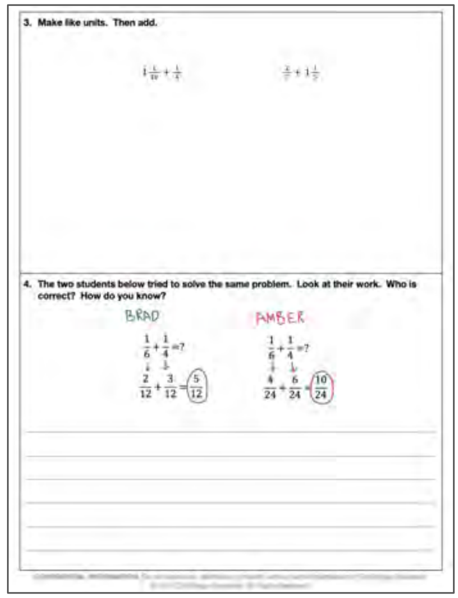
Name: ______________________ G5 U3 Lesson 8 - Independent Work

1. Make like units. Then add.

$\frac{1}{3} + \frac{7}{9}$ $\frac{11}{8} + \frac{3}{4}$

2. Make like units. Then add.

$\frac{2}{3} + \frac{7}{11}$ $\frac{5}{6} + \frac{3}{4}$



3. Make like units. Then add.

[illegible]

4. The two students below tried to solve the same problem. Look at their work. Who is correct? How do you know?

BRAD

$\frac{1}{6} + \frac{1}{4} = ?$

$\frac{2}{12} + \frac{3}{12} = \frac{5}{12}$

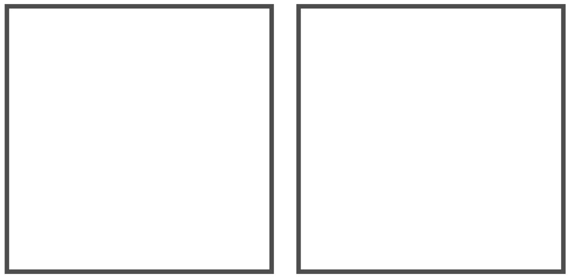
AMBER

$\frac{1}{6} + \frac{1}{4} = ?$

$\frac{4}{24} + \frac{6}{24} = \frac{10}{24}$

Consider the expression $\frac{1}{5} + \frac{1}{3}$.

1. Model each addend.



2. Partition each area model to show like units. What unit do you have now? ____________

3. Show how you can use multiplication to rewrite $\frac{1}{5}$ with like units.

$$\frac{1}{5} = \frac{1\times \_\_\_}{5\times \_\_\_} = \frac{\_\_\_}{\_\_\_}$$

4. Show how you can use multiplication to rewrite $\frac{1}{3}$ with like units.

$$\frac{1}{3} = \frac{1\times \_\_\_}{3\times \_\_\_} = \frac{\_\_\_}{\_\_\_}$$

5. How is the multiplication you did in #3 and #4 related to the area model you drew?

____

____

____

____

6. Determine the sum.

7. List at least two other common multiples of 3 and 5 that can be used to find like units.

8. Use multiplication and one of the common multiples to add $\frac{1}{5} + \frac{1}{3}$ a different way.

9. Is the sum from Question #8 equivalent to the sum from Question #6? Explain.

Consider the expression $\frac{3}{4} + \frac{1}{3}$.

10. List at least two common multiples you can use to make like units.

11. Use multiplication to write the expression using equivalent fractions with like units.

12. What is the sum as a fraction greater than 1? As a mixed number?

Consider the expression $\frac{2}{9} + \frac{1}{6}$.

13. Kyle wants to use the common multiple 18 to make like units. Trevor wants to use the common multiple 54 to make like units. Who do you agree with and why?

1. Make like units. Then add.

$\frac{1}{3} + \frac{7}{9}$ $\frac{11}{8} + \frac{3}{4}$

2. Make like units. Then add.

$\frac{2}{3} + \frac{7}{11}$ $\frac{5}{6} + \frac{3}{4}$

3. Make like units. Then add.

$1\frac{1}{10} + \frac{1}{4}$ $\frac{2}{7} + 1\frac{1}{5}$

4. The two students below tried to solve the same problem. Look at their work. Who is correct? How do you know?

BRAD

$$\frac{1}{6}+\frac{1}{4}=?$$

$$\frac{2}{12}+\frac{3}{12}=\frac{5}{12}$$

AMBER

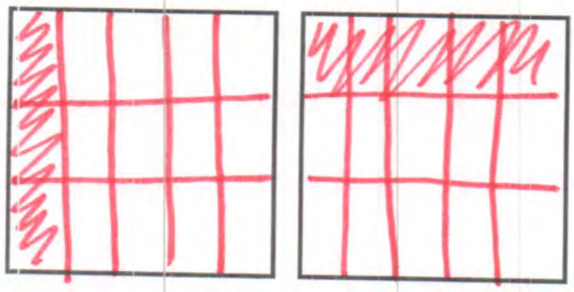
$$\frac{1}{6}+\frac{1}{4}=?$$

$$\frac{4}{24}+\frac{6}{24}=\frac{10}{24}$$

Name: KEY

Consider the expression $\frac{1}{5} + \frac{1}{3}$.

1. Model each addend.



2. Partition each area model to show like units. What unit do you have now? fifteenths

3. Show how you can use multiplication to rewrite $\frac{1}{5}$ with like units.

$$\frac{1}{5} = \frac{1 \times 3}{5 \times 3} = \frac{3}{15}$$

4. Show how you can use multiplication to rewrite $\frac{1}{3}$ with like units.

$$\frac{1}{3} = \frac{1 \times 5}{3 \times 5} = \frac{5}{15}$$

5. How is the multiplication you did in #3 and #4 related to the area model you drew?

I cut the fifths into 3 times as many pieces.
I cut the thirds into 5 times as many pieces.

6. Determine the sum. $\frac{3}{15} + \frac{5}{15} = \frac{8}{15}$

7. List at least two other common multiples of 3 and 5 that can be used to find like units.

30, 45, 60, 75, 90... (any multiples of 15)

8. Use multiplication and one of the common multiples to add $\frac{1}{5} + \frac{1}{3}$ a different way.

$\frac{1}{3} \times \frac{10}{10} = \frac{10}{30}$ $\frac{1}{5} \times \frac{6}{6} = \frac{6}{30}$ $\frac{10}{30} + \frac{6}{30} = \frac{16}{30}$

9. Is the sum from Question #8 equivalent to the sum from Question #6? Explain.

Yes, $\frac{16}{30}$ is equivalent to $\frac{8}{15}$. The products are equivalent, but the pieces are partitioned differently.

Consider the expression $\frac{3}{4} + \frac{1}{3}$.

10. List at least two common multiples you can use to make like units.

12, 24, 36, 48... (any multiple of 12)

11. Use multiplication to write the expression using equivalent fractions with like units.

$\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$ $\frac{1 \times 4}{3 \times 4} = \frac{4}{12}$

$\frac{9}{12} + \frac{4}{12} = \frac{13}{12}$ OR $1\frac{1}{12}$

12. What is the sum as a fraction greater than 1? As a mixed number?

Consider the expression $\frac{2}{9} + \frac{1}{6}$.

13. Kyle wants to use the common multiple 18 to make like units. Trevor wants to use the common multiple 54 to make like units. Who do you agree with and why?

Either student is correct. I prefer Kyle's way because I think 18 is a little easier to think about.

Name: KEY

1. Make like units. Then add.

$\frac{1}{3} + \frac{7}{9}$

$\frac{1\times3}{3\times3} = \frac{3}{9}$

$\frac{3}{9} + \frac{7}{9}$

$\frac{10}{9}$ OR $1\frac{1}{9}$

$\frac{11}{8} + \frac{3}{4}$

$\frac{3\times2}{4\times2} = \frac{6}{8}$

$\frac{11}{8} + \frac{6}{8} = \frac{17}{8}$ OR $2\frac{1}{8}$

2. Make like units. Then add.

$\frac{2}{3} + \frac{7}{11}$

$\frac{2\times11}{3\times11} = \frac{22}{33}$

$\frac{7\times3}{11\times3} = \frac{21}{33}$

$\frac{22}{33} + \frac{21}{33} = \frac{43}{33}$ OR $1\frac{10}{33}$

$\frac{5}{6} + \frac{3}{4}$

$\frac{5\times2}{6\times2} = \frac{10}{12}$

$\frac{3\times3}{4\times3} = \frac{9}{12}$

$\frac{10}{12} + \frac{9}{12} = \frac{19}{12}$ OR $1\frac{7}{12}$

3. Make like units. Then add.

$1\frac{1}{10} + \frac{1}{4}$

$1\frac{1}{10} \times \frac{2}{2} = 1\frac{2}{20}$

$\frac{1}{4} \times \frac{5}{5} = \frac{5}{20}$

$1\frac{2}{20} + \frac{5}{20}$

$1\frac{7}{20}$

$\frac{2}{7} + 1\frac{1}{5}$

$\frac{2}{7} \times \frac{5}{5} = \frac{10}{35}$

$1\frac{1}{5} \times \frac{7}{7} = 1\frac{7}{35}$

$\frac{10}{35} + 1\frac{7}{35}$

$1\frac{17}{35}$

4. The two students below tried to solve the same problem. Look at their work. Who is correct? How do you know?

BRAD

$$\frac{1}{6} + \frac{1}{4} = ?$$
$$\downarrow \quad \downarrow$$
$$\frac{2}{12} + \frac{3}{12} = \frac{5}{12}$$

AMBER

$$\frac{1}{6} + \frac{1}{4} = ?$$
$$\downarrow \quad \downarrow$$
$$\frac{4}{24} + \frac{6}{24} = \frac{10}{24}$$

They are both correct. They just used a different like unit. Brad used twelfths and Amber used 24ths. The sums are equivalent.

G5 U3 Lesson 9

Add fractions with sums greater than 2

G5 U3 Lesson 9 - Students will add fractions with sums greater than 2

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): In previous lessons, we've worked to add and subtract with fractions. Today, we'll use what we know to add fractions where our sums, or totals, are greater than 2.

Let's Talk (Slide 3): Think about the two addition expressions shown here. What is the same? What is different? Possible Student Answers, Key Points:

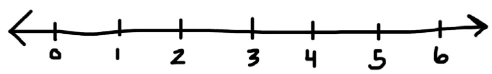
- They both involve units of sixths and units of fourths. They both have the same fractional parts. They both involve addition.
- They're different colors. The green one shows mixed numbers. The green one involves fractions and whole numbers. The green one is going to be a bigger total.

These two expressions are very similar. They both involve adding, they both involve $\frac{5}{6}$ and $\frac{1}{4}$, but the second expression shows mixed numbers. Knowing what we've done in previous lessons to add fractions with unlike units, what strategies do you think might help us find the total of two mixed numbers? Possible Student Answers, Key Points:

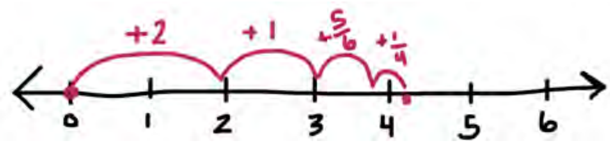
- We'll need to make like units, so maybe we can draw area models or use multiplication to write equivalent fractions with common denominators.
- We've decomposed mixed numbers before to add the whole numbers together. Maybe we can do that today.

Let's see how we can use what we know to add fractions with sums greater than 2.

Let's Think (Slide 4): For our first problem, let's actually evaluate the expression we just talked about. We'll find the sum of 2 $\frac{5}{6}$ and 1 $\frac{1}{4}$. To start, let's estimate using a number line.



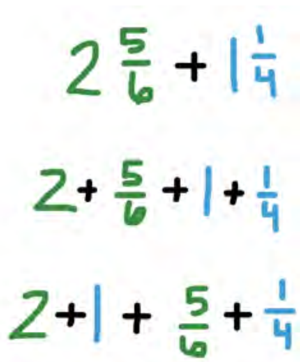
Just by looking at the whole numbers, I know I don't need to make my number line too long, so I'll make a number line from 0 to 6. I can always adjust it later if I need to. *(draw and label a number line from 0 to 6)*



Let's add the whole numbers first. *(hop and label as you narrate)* I'll make a hop of 2 and a hop of 1 to show that the sum of the whole numbers is 3. Now we can eyeball or estimate the fractional parts. $\frac{5}{6}$ is really close to a whole, so from the 3, I'll make a hop that's *almost* 1 whole. *(hop to just before the 4 and label as +$\frac{5}{6}$)* I'm now a little before the 4 on my number line, because I know $\frac{5}{6}$ is $\frac{1}{6}$ away from 1 whole jump. Our last jump is $\frac{1}{4}$. I know $\frac{1}{4}$ is going to push me a little past the 4. I know this because I'm $\frac{1}{6}$ away from the 4, and I need to jump $\frac{1}{4}$. $\frac{1}{4}$ is bigger than $\frac{1}{6}$, so I'll make my hop go just a little beyond the 4. We don't know the exact value yet, but what does estimating on the number line tell me about what the actual sum should be? Possible Student Answers, Key Points:

- The actual sum should be between 4 wholes and 5 wholes.
- We landed close to the 4, so our answer should be about 4 and a little more. It looks like it should be smaller than 4 ½.

Let's now find the actual sum, and we can check to see if what we get is reasonable based on our estimate. Just like we've done in previous lessons, and just like we did when we estimated, let's break apart or decompose each mixed number into whole numbers and fractions.



(write 2 + $\frac{5}{6}$ + 1 + $\frac{1}{4}$ as you explain, color coding as shown) We can think of 2 $\frac{5}{6}$ as 2 + $\frac{5}{6}$. We can add that to 1 $\frac{1}{4}$, and we'll think of 1 $\frac{1}{4}$ as 1 + $\frac{1}{4}$. Now our original expression is decomposed into parts. Let's quickly rearrange those parts so we can add whole numbers together and fractions together. *(write 2 + 1 + $\frac{5}{6}$ + $\frac{1}{4}$ maintaining the colors)* What do you notice about the expression I just wrote? Possible Student Answers, Key Points:

- It's the same, but just in a different order.
- You brought the whole numbers next to each other and the fractions next to each other.

Let's add like units. I know 2 + 1 is 3, that's easy. What will I need to do to add $\frac{5}{6}$ and $\frac{1}{4}$? (They need to be like units like twelfths or twenty-fourths) You can use an area model to find like units, but we also learned multiplication can work. Let's use multiplication, but know that when you work, you can choose the strategy that works best for you.

How can I use multiplication to write ⅚ as an equivalent fraction using units of twelfths? (multiply the numerator and denominator by 2)

$$\frac{5\times2}{6\times2}=\frac{10}{12}$$

Let's show that we're multiplying both parts of our fraction by 2. *(write equation as shown)* We can think of ⅚ as being equivalent to 10/12.

How can I use multiplication to write ¼ as an equivalent fraction using units of twelfths? *(multiply the numerator and denominator by 3)* Let's show that we're multiplying both parts of our fraction by 3. *(write equation as shown)* We can think of ¼ as being equivalent to 3/12.

$$\underbrace{2+1}+\frac{5}{6}+\frac{1}{4}$$
$$3+\left(\frac{10}{12}+\frac{3}{12}\right)=3\frac{13}{12}$$

(rewrite underneath the decomposed equation as you narrate) We already said that 2 + 1 is 3. We also just rewrote our fractional parts as equivalent fractions using twelfths. If we add those parts together, we can see that our sum is 3 and 13/12. We did it! We added fractions with a sum greater than 2.

Before we close out this problem, do you notice anything about our answer? Possible Student Answers, Key Points:
- I notice that we have a fraction greater than 1 as part of the mixed number. That kind of looks strange.
- I notice our estimate said our answer should be greater than 4, but our mixed number shows a 3 as the whole number.

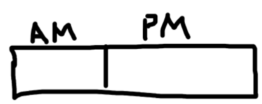
$$3\frac{13}{12}=4\frac{1}{12}$$
$$1 \qquad \frac{1}{12}$$

Let's rewrite the mixed number so that we can think of our sum just as a whole number and a fraction less than 1. I know 13/12 is 1 whole, or 12/12, plus 1 extra twelfth. *(use a number bond to show 1 whole and 1/12 underneath 13/12)* If I combine the 1 whole with the 3 wholes, our final answer can be 4 1/12. *(write answer)*

How do I know that our answer is reasonable? Possible Student Answers, Key Points:
- 4 1/12 is between 4 and 5, like our number line showed.
- Our sum is a little bit more than 4, just like we thought it would be when we estimated.

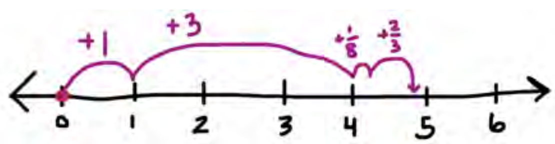
Job well done!

Let's Think (Slide 5): Let's look at a story problem. *(read the problem)* Now, re-read the problem to yourself. When you're finished, retell the story in your own words. Possible Student Answers, Key Points:
- She read a little in the morning and a lot in the evening, and we're trying to find how much she read altogether for the day.
- It's asking us to combine the hours she read at two different points during the day.



To help me think about the story and how the numbers are related, I can sketch a quick tape diagram. I know she read some in the morning and some in the evening, so I can draw a rectangle partitioned into two parts and label them morning and evening. *(draw a rectangle as described, and write AM and PM above corresponding parts)*

(continue labeling as you narrate) I can fill in the values for how much she read in the morning and afternoon, and the story named that the unknown is how much she read in all. I can represent that with a question mark. This tape diagram makes it clear that we need to add these two values to find the total amount of hours Destini read.



Let's estimate the sum using a number line. *(sketch and label number line from 0 to 6)* If I think about the whole numbers first, I can show a hop of 1 and a hop of 3, which lands us at 4. I'm not done. I need to estimate the fractional parts too. What do I know about the size of the fractions ⅛ and ⅔? Possible Student Answers, Key Points:
- ⅛ is pretty small, and ⅔ is bigger. ⅔ is bigger than half.
- I know a hop of ⅛ and a hop of ⅔ would be less than 1 whole.

I'll show a small hop to represent 1/8 since it's only an eighth of a whole. Then I'll show a slightly bigger hop to represent 1/8 I won't go an entire whole jump to 5, because 1/8 plus 1/8 is not quite a whole. I know 1/8 and 1/8 would be a whole, so 1/8 and a smaller eighth won't make it all the way to 5.

Based on our estimate, I know the sum should be between 4 and 5. It should probably be *almost* 5, but no bigger than 5.

$$1\tfrac{1}{8} + 3\tfrac{2}{3}$$

$$1 + \tfrac{1}{8} + 3 + \tfrac{2}{3}$$

Let's test it out by doing the actual computation. *(write 1 1/8 + 3 1/8 using different colors for each addend)* Just like our last example, we can decompose each mixed number into a whole number and a fraction. *(write decomposed expression underneath using similar color coding)* To make it easier on ourselves, let's rearrange the addends so our fractions are next to each other. *(rearrange as shown, maintaining color coding)* Now we can easily see that our whole number sum will be 4, and we can figure out the sum of our fractional parts.

$$\frac{1 \times 3}{8 \times 3} = \frac{3}{24}$$

$$\frac{2 \times 8}{3 \times 8} = \frac{16}{24}$$

What can I do to add these fractions with unlike units? (We can multiply to find like units. They can both be written as fractions with 24 pieces.) *(complete each equation as you narrate)* Let's multiply the numerator and denominator of 1/8 by 3. We'll get an equivalent fraction of 3/24. What can we multiply 1/8 by to make an equivalent fraction with like units? (8/8) If we multiply 2 and 3 each by 8, we can see our equivaelnt fraction is 16/24.

$$\underbrace{1 + 3}_{4} + \tfrac{1}{8} + \tfrac{2}{3}$$

$$4 + \left(\tfrac{3}{24} + \tfrac{16}{24}\right) = 4\tfrac{19}{24}\text{ hr.}$$

Now let's add our whole numbers together and our fractions together. I know 1 and 3 makes 4. I know 3/24 and 16/24 makes 19/24. I know Destini read for 4 19/24 hours in all. We didn't need to rewrite this mixed number, because it didn't have a fraction greater than 1.

Is our answer reasonable? Possible Student Answers, Key Points:

- Yes, it's between 4 and 5.
- Yes, we said our answer should be almost 5. 4 19/24 is close to being 5 wholes.

We just completed two addition problems where our sum was greater than 2. If you were to explain how to add fractions with sums greater than 2 to a friend who was new to this, what would you say to them? Possible Student Answers, Key Points:

- It's not too different from adding other fractions with smaller sums. You still need to find like units to add the fractional parts.
- To add with mixed numbers, it can help to decompose the mixed numbers. This helps you focus on the whole numbers and the fractional parts separately.

Let's Try it (Slides 6 - 7): Now let's work on adding fractions with sums greater than 2 together. In most cases, we'll want to estimate first using a number line or other strategy. Once we have an idea of what our answer should be close to, we can use decomposition to help us work with the whole numbers and the fractions separately. Let's try it out.

WARM WELCOME

Today we will add fractions with sums greater than 2.

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Let's Talk: What's the same? What's different?

$$\frac{5}{6}+\frac{1}{4}$$

$$2\frac{5}{6}+1\frac{1}{4}$$

Let's Think: Estimate, then find the sum.

$$2\frac{5}{6}+1\frac{1}{4}$$

Let's Think:

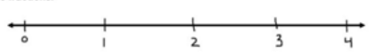
Destini reads for 1 ⅛ hours in the morning and 3 ⅔ hours in the evening. How many total hours does Destini ready?

Let's Try It:

Let's explore adding fractions with sums greater than 2 together.

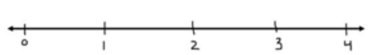
Name: ______________________ G5 U3 Lesson 9 - Let's Try It

1. **Use a number line to *estimate* the sum of 2 ½ + 1 ⅓. Add the whole numbers first, then the fractions.**



2. **Add 2 ½ + 1 ⅓.**
   a. What is the sum of the whole numbers? ________
   b. What like unit can be used to add the fractional parts? ________
   c. Add the fractional parts by using equivalent fractions with like units.
   d. What is the sum of 2 ½ + 1 ⅓? ________
   e. Explain how you know the sum is reasonable.

3. **Use a number line to *estimate* the sum of 1 ½ + 1 ⅔. Add the whole numbers first, then the fractions.**

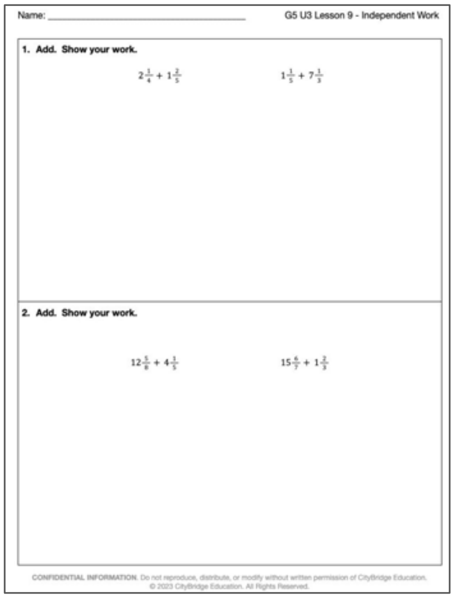


4. **Add 1 ½ + 1 ⅔ .**
   a. What is the sum of the whole numbers? ________
   b. Add the fractional parts by using equivalent fractions with like units.
   c. What is the sum of 1 ½ + 1 ⅔? ________
   d. Write the sum as a simplified mixed number.
   e. Explain how you know the sum is reasonable.

5. **Adriana is growing a sunflower. It is 6 ⅔ feet tall. How tall will Adriana's sunflower be if it grows 2 ¾ more feet?**
   a. Add the whole numbers first.
   b. Make like units to add the fractional parts.
   c. Find the sum. Rewrite as a simplified mixed number, if possible.

On your Own:

Now it’s time to explore adding fractions with sums greater than 2 on your own.



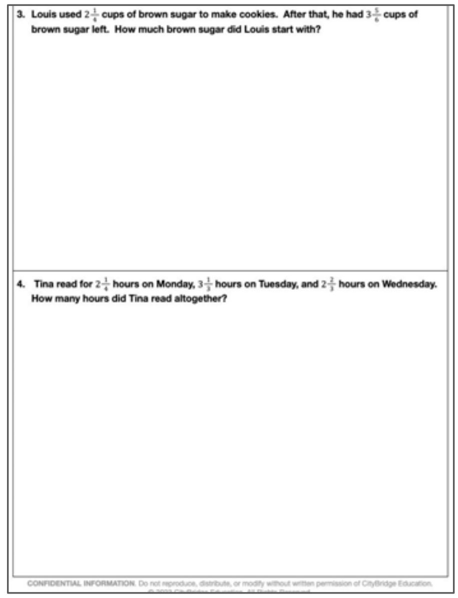
Name: ______________________ G5 U3 Lesson 9 - Independent Work

1. **Add. Show your work.**

$2\frac{1}{4} + 1\frac{2}{5}$ $1\frac{1}{5} + 7\frac{1}{3}$

2. **Add. Show your work.**

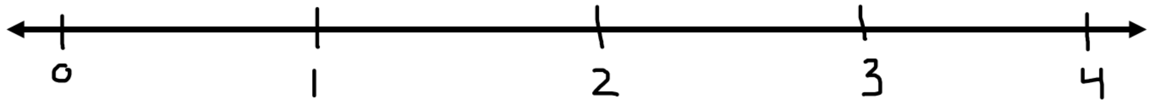
$12\frac{5}{8} + 4\frac{1}{5}$ $15\frac{6}{7} + 1\frac{2}{3}$



3. **Louis used $2\frac{1}{4}$ cups of brown sugar to make cookies. After that, he had $3\frac{5}{6}$ cups of brown sugar left. How much brown sugar did Louis start with?**

4. **Tina read for $2\frac{1}{4}$ hours on Monday, $3\frac{1}{3}$ hours on Tuesday, and $2\frac{2}{3}$ hours on Wednesday. How many hours did Tina read altogether?**

1. Use a number line to *estimate* the sum of $2\frac{1}{2} + 1\frac{1}{5}$. Add the whole numbers first, then the fractions.



2. Add $2\frac{1}{2} + 1\frac{1}{5}$.
    a. What is the sum of the whole numbers? ____________

    b. What like unit can be used to add the fractional parts? ____________

    c. Add the fractional parts by using equivalent fractions with like units.

    d. What is the sum of $2\frac{1}{2} + 1\frac{1}{5}$? ____________

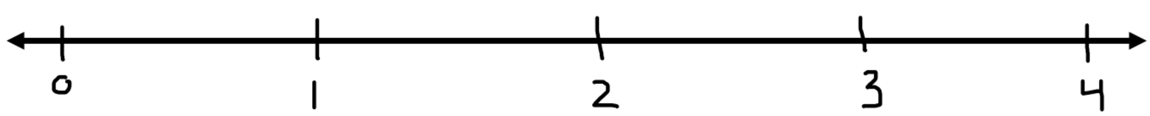
    e. Explain how you know the sum is reasonable.

    ____

    ____

---

3. Use a number line to *estimate* the sum of $1\frac{1}{2} + 1\frac{2}{3}$ Add the whole numbers first, then the fractions.



4. Add $1\frac{1}{2} + 1\frac{2}{3}$
    a. What is the sum of the whole numbers? ____________

    b. Add the fractional parts by using equivalent fractions with like units.

c. What is the sum of 1 ½ + 1 ⅔ ____________

d. Write the sum as a simplified mixed number.

e. Explain how you know the sum is reasonable.

____

____

5. Adriana is growing a sunflower. It is 6 ⅔ feet tall. How tall will Adriana's sunflower be if it grows 2 ¾ more feet?
   a. Add the whole numbers first.
   b. Make like units to add the fractional parts.
   c. Find the sum. Rewrite as a simplified mixed number, if possible.

1. Add. Show your work.

$2\frac{1}{4} + 1\frac{2}{5}$ $1\frac{1}{5} + 7\frac{1}{3}$

2. Add. Show your work.

$12\frac{5}{8} + 4\frac{1}{5}$ $15\frac{6}{7} + 1\frac{2}{3}$

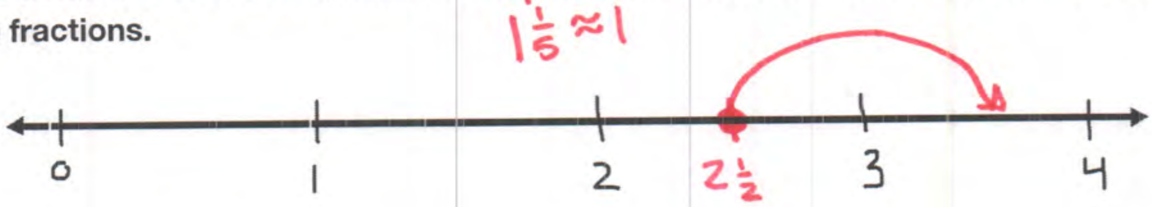
3. Louis used $2\frac{1}{4}$ cups of brown sugar to make cookies. After that, he had $3\frac{5}{6}$ cups of brown sugar left. How much brown sugar did Louis start with?

4. Tina read for $2\frac{1}{4}$ hours on Monday, $3\frac{1}{3}$ hours on Tuesday, and $2\frac{2}{3}$ hours on Wednesday. How many hours did Tina read altogether?

Name: KEY

1. Use a number line to *estimate* the sum of 2 ½ + 1 ⅕. Add the whole numbers first, then the fractions.

$1\frac{1}{5} \approx 1$



2. Add 2 ½ + 1 ⅕.

a. What is the sum of the whole numbers? $1+2=3$

b. What like unit can be used to add the fractional parts? tenths

c. Add the fractional parts by using equivalent fractions with like units.

$\frac{1\times5}{2\times5}=\frac{5}{10}$

$\frac{1\times2}{5\times2}=\frac{2}{10}$

$\frac{5}{10}+\frac{2}{10}=\frac{7}{10}$

d. What is the sum of 2 ½ + 1 ⅕? $3\frac{7}{10}$

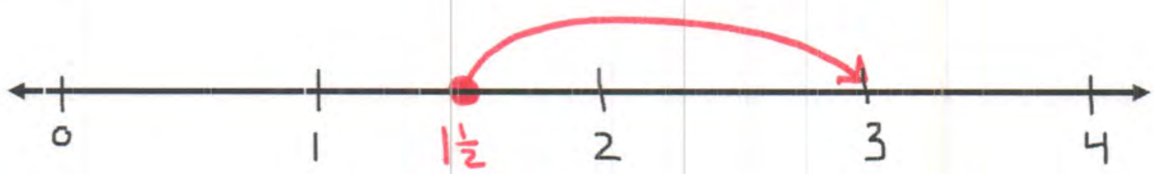
e. Explain how you know the sum is reasonable.

I estimated that the sum should be about $3\frac{1}{2}$. $3\frac{7}{10}$ is pretty close.

---

3. Use a number line to *estimate* the sum of 1 ½ + 1 ⅔. Add the whole numbers first, then the fractions.

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



4. **Add 1 ½ + 1 ⅔ .**

a. What is the sum of the whole numbers? $1+1=2$

b. Add the fractional parts by using equivalent fractions with like units.

$\frac{1\times3}{2\times3}=\frac{3}{6}$ $\quad \frac{3}{6}+\frac{4}{6}=\frac{7}{6}$

$\frac{2\times2}{3\times2}=\frac{4}{6}$

c. What is the sum of 1 ½ + 1 ⅔? $2\frac{7}{6}$

d. Write the sum as a simplified mixed number.

$2\frac{7}{6}$ $\quad 1 \quad \frac{1}{6}$ $\quad 3\frac{1}{6}$

e. Explain how you know the sum is reasonable.

I estimated the sum to be about 3, and $3\frac{1}{6}$ is close to that.

---

5. **Adriana is growing a sunflower. It is 6 ⅔ feet tall. How tall will Adriana's sunflower be if it grows 2 ¾ more feet?**

a. Add the whole numbers first.

b. Make like units to add the fractional parts.

c. Find the sum. Rewrite as a simplified mixed number, if possible.

ⓐ $6+2=8$

ⓑ $\frac{2\times4}{3\times4}=\frac{8}{12}$, $\frac{3\times3}{4\times3}=\frac{9}{12}$ $\quad \frac{17}{12}$

ⓒ $8\frac{17}{12}$ $\quad 1 \quad \frac{5}{12}$

$9\frac{5}{12}$ feet

Name: KEY

1. Add. Show your work.

$2\frac{1}{4} + 1\frac{2}{5}$

$2+1=3$

$\frac{1\times5}{4\times5}=\frac{5}{20}$

$\frac{2\times4}{5\times4}=\frac{8}{20}$

$\frac{13}{20}$

$3\frac{13}{20}$

$1\frac{1}{5} + 7\frac{1}{3}$

$1+7=8$

$\frac{1\times3}{5\times3}=\frac{3}{15}$

$\frac{1\times5}{3\times5}=\frac{5}{15}$

$\frac{8}{15}$

$8\frac{8}{15}$

2. Add. Show your work.

$12\frac{5}{8} + 4\frac{1}{5}$

$12+4=16$

$\frac{5\times5}{8\times5}=\frac{25}{40}$

$\frac{1\times8}{5\times8}=\frac{8}{40}$

$\frac{33}{40}$

$16\frac{33}{40}$

$15\frac{6}{7} + 1\frac{2}{3}$

$15+1=16$

$\frac{6\times3}{7\times3}=\frac{18}{21}$

$\frac{2\times7}{3\times7}=\frac{14}{21}$

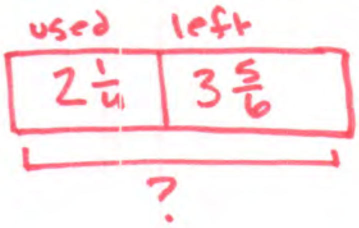
$\frac{32}{21}$

$\frac{21}{21}$ $\frac{11}{21}$

1

$17\frac{11}{21}$

3. **Louis used $2\frac{1}{4}$ cups of brown sugar to make cookies. After that, he had $3\frac{5}{6}$ cups of brown sugar left. How much brown sugar did Louis start with?**



$2+3=5$

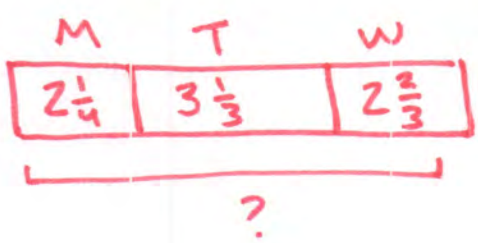
$\frac{1\times3}{4\times3}=\frac{3}{12}$

$\frac{5\times2}{6\times2}=\frac{10}{12}$

$\frac{13}{12}$ → 1 $\frac{1}{12}$

$6\frac{1}{12}$ cups

4. **Tina read for $2\frac{1}{4}$ hours on Monday, $3\frac{1}{3}$ hours on Tuesday, and $2\frac{2}{3}$ hours on Wednesday. How many hours did Tina read altogether?**



$2+3+2=7$

$\frac{1\times3}{4\times3}=\frac{3}{12}$

$\frac{1\times4}{3\times4}=\frac{4}{12}$

$\frac{2\times4}{3\times4}=\frac{8}{12}$

$\frac{15}{12}$ → 1 $\frac{3}{12}$

$8\frac{3}{12}$ hours OR $8\frac{1}{4}$ hours

G5 U3 Lesson 10

Subtract fractions making like units numerically

CITYTUTOR DC

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Recently, we've been working to add fractions with unlike units by making like units numerically, without always having to draw a model. Today, we're going to switch gears just a bit and think about how we can apply that same thinking to subtraction. We don't always need an area model to think about subtracting with unlike units; we can reason numerically when we subtract similar to how we reason numerically when we add fractions.

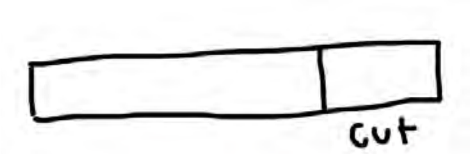
Let's Talk (Slide 3): Look at the two expressions shown here. If you had to choose the easier of the two expressions, which expression would you choose to work with and why? Possible Student Answers, Key Points:

- The first expression doesn't have like units, so I'd prefer to evaluate the second expression.
- The second expression is easier. It's just 10 units minus 3 units, which I can do in my head. I already know the answer is 7 units or 7/12.

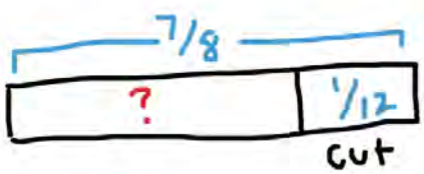
Let's see how we can use what we know to add fractions with sums greater than 2.

Let's Think (Slide 4): Today's first problem is a story problem. *(read the problem)* Now, re-read it to yourself. When you've finished, retell the story in your own words. Possible Student Answers, Key Points:

- We have a piece of yarn, and we're cutting some off to see what is left.
- We know his total amount of yarn and the part that he's cutting off. The leftover part is unknown.



I can make sure I understand the story by drawing a quick tape diagram. This helps make sure I can make sense of what is going, and it helps me see the relationship between the numbers in the story. *(draw a rectangular tape diagram as you narrate)* I can draw a rectangular bar to represent the whole piece of yarn. I know he's cutting off a piece, so I'll partition the rectangle and label the piece that is cut off.



I'll label the tape diagram with what I know from the story. *(label 7/8 with a bracket across the tape diagram, and fill in the partitioned piece as 1/12)* The unknown is what is left, so I'll label that piece with a question mark. What does this tape diagram tell us about how we can go about solving the problem? (I can subtract the 1/12 from the total of 7/8 to find the missing part)

$$\frac{7}{8} - \frac{1}{12} =$$

(write 7/8 - 1/12 =) We need to subtract 7/8 minus 1/12. We can't subtract these two fractions right away, because they have unlike units. Let's think about a common denominator that can help us subtract easily.

(list out multiples of 8 to 48 and multiples of 12 to 48, highlight or circle 24 and 48 in both lists) I listed out multiples and found that 8 and 12 have a lot of common multiples I can consider. From this list, which option do you think will be most efficient and why? Possible Student Answers, Key Points:

8, 16, 24, 32, 40, 48

12, 24, 36, 48

- I think 24, because it's easier to work with smaller numbers.
- Either will work to find a like unit, but 48 would be a lot of pieces to think about.

$$\frac{7 \times 3}{8 \times 3} = \frac{21}{24}$$

Let's use 24 as the common denominator. Our like unit will be 24ths. What can I multiply eighths by to write an equivalent fraction using 24ths? (3/3) Let's multiply the numerator of 7 and the denominator of 8 each by 3. *(write equation as shown)* 7/8 is equivalent to 21/24.

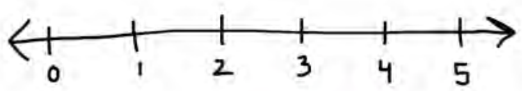
$$\frac{1 \times 2}{12 \times 2} = \frac{2}{24}$$

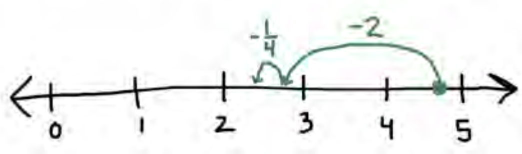
What about 1/12? What can I do to write 1/12 as twenty-fourths? (Multiply 1 x 2 to get a numerator of 2. Multiply 12 x 2 to get a denominator of 24) We can multiply 1/12 x 2/2 to find the equivalent fraction in twenty-fourths. *(write equation as shown)* We see that 1/12 is equivalent to 2/24.

$\frac{21}{24} - \frac{2}{24} = \boxed{\frac{19}{24} \text{ ft.}}$

(rewrite the original equation using the equivalent fractions with like units) What is 21/24 take away 2/24? (19/24) Frank has 19/24 foot of yarn left after cutting off the piece. We just solved a subtraction problem with fractions by finding like units numerically. No area model required!

Let's Think (Slide 5): Let's try another problem. This one involves subtracting mixed numbers with unlike units. *(read problem)*





We will start by estimating, just to make sure the final answer we get is reasonable. To help us estimate, we'll use a number line. *(draw number line partitioned from 0 to 5)*

(draw and label hops as you narrate) Our total is 4 ⅚, so I'll mark that as being pretty close to 5 wholes. We'll subtract 2 wholes first, which means we'll be at 2 ⅚ so pretty close to 3 wholes. Then, we just have to subtract ¼. Should I draw a big hop or a little hop to subtract ¼? (¼ is not that much, so a small hop back will make the most sense) We ended up between 2 and 3 wholes. When we get our final, actual answer, we can use our estimate to check our thinking.

Now we'll find the actual answer. I know I can't subtract automatically. We still need like units. How can I find like units for these two mixed numbers? Possible Student Answers, Key Points:

- We can ignore the whole numbers for a moment, and find a like unit for the fractional parts. The whole numbers will stay the same when we rewrite them as equivalent fractions with like units.
- We can think of multiples of 4 and 6 to help us find a common denominator. I know 12 is the least common multiple of 4 and 6, so we can think of each mixed number in terms of twelfths.

$\frac{5 \times 2}{6 \times 2} = \frac{10}{12}$

Great thinking. For now, let's look just at the fractional parts and rewrite them as fractions with like units of twelfths. *(write equation as shown as you narrate)* I know I can multiply ⅚ x 2/2 to rewrite it as 10/12. That means 4 ⅚ is equivalent to 4 and 10/12.

$\frac{1 \times 3}{4 \times 3} = \frac{3}{12}$

I know I can multiply ¼ by 3/3 to rewrite it as 3/12. That means 1 ¼ is equivalent to 1 3/12. Notice how in both mixed numbers, we left the whole number intact, since we only needed to make adjustments to the fractional units.

$4\frac{10}{12} - 2\frac{3}{12} = 2\frac{7}{12}$

(rewrite equation with equivalent mixed numbers as shown) What is the answer, and how do you know? Possible Student Answers, Key Points:

- I know 4 minus 2 is 2. The whole number will be 2.
- I know 10 twelfths minus 3 twelfths is 7 twelfths. The answer is 2 wholes and 7/12, or 2 7/12 written as a mixed numbers.

Nicely done! I know our answer is reasonable, because when we estimated on the number line, we figured our answer would be between 2 and 3.

It's okay to use area models to think about like units when subtracting, but as we saw today, it's not always necessary. We can use multiplication to show equivalent fractions numerically instead.

Let's Try it (Slides 6 - 7): Now let's work together on subtracting fractions making like units numerically. Even though we can use area models to partition fractions into like units, it is often more efficient to use multiplication to write equivalent fractions numerically. Once we get a common denominator with each fraction, we're able to easily subtract. Let's go for it.

WARM WELCOME

Today we will subtract fractions making like units numerically.

Let's Talk:

$$\frac{5}{6} - \frac{1}{4} \qquad \frac{10}{12} - \frac{3}{12}$$

Which expression is easier to evaluate?

Let's Think:

Frank is making friendship bracelets. A piece of yarn is 7/8 ft long. He cuts off 1/12 ft. How long is the yarn now?

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Let's Think:

Estimate, then solve.

$$4\frac{5}{6} - 2\frac{1}{4} = ?$$

Let's Try It:

Let's explore subtracting fractions making like units numerically together.

Name: ______________________ G5 U3 Lesson 10 - Let's Try It

Consider the expression $\frac{1}{4} - \frac{1}{10}$.

1. What like unit works for fourths and tenths? ______________
2. Find equivalent fractions for $\frac{1}{4}$ and $\frac{1}{10}$ using like units.
3. Rewrite the subtraction expression using like units, then find the difference.

Consider the expression $\frac{4}{5} - \frac{1}{2}$.

4. What like unit can you use? ______________
5. Find equivalent fractions for $\frac{4}{5}$ and $\frac{1}{2}$ using like units.
6. Rewrite the subtraction expression using like units, then find the difference.

Consider the expression $2\frac{2}{3} - \frac{1}{2}$.

7. Use a number line to estimate the difference.

0 1 2 3 4

8. What two whole numbers is the difference between? ________ and ________
9. Rewrite the expression using like units, then subtract.
10. Is the answer you got reasonable? How do you know?

A family is filling a sandbox. They use a bag of sand that hold 7 ¼ pounds of sand. They pour 5 ½ pounds of sand out of the bag.

11. Write an equation that can be used to find the amount of sand left in the bag.
12. Draw a number line to estimate your answer.
13. How much sand is left in the bag? Rewrite your equation with like units and solve.

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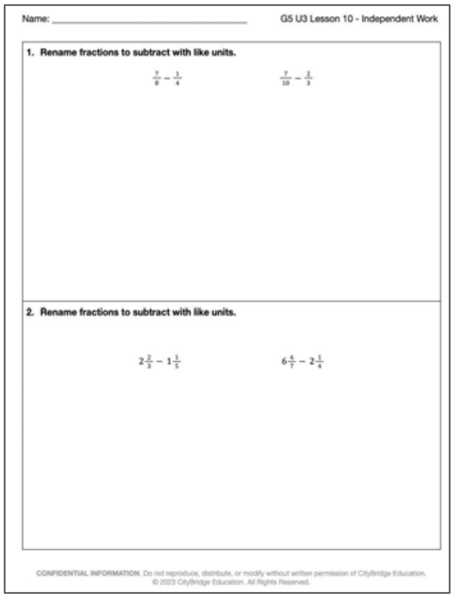
On your Own:

Now it's time to explore subtracting fractions making like units numerically on your own.


Name: ______________________ G5 U3 Lesson 10 - Independent Work

1. **Rename fractions to subtract with like units.**

$\frac{7}{8} - \frac{1}{4}$ $\frac{7}{10} - \frac{2}{3}$

2. **Rename fractions to subtract with like units.**

$2\frac{2}{3} - 1\frac{1}{5}$ $6\frac{6}{7} - 2\frac{1}{4}$

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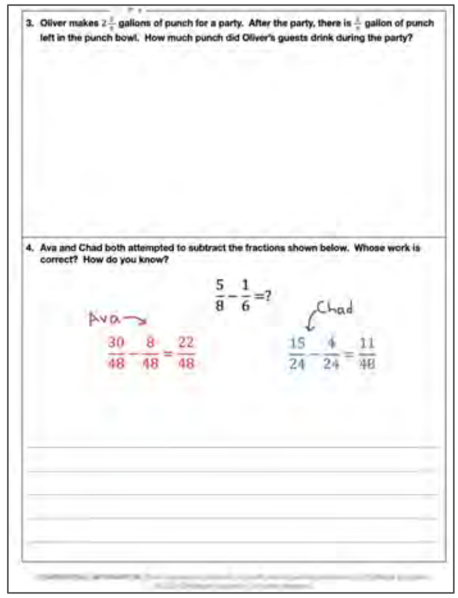

3. **Oliver makes 2 [illegible] gallons of punch for a party. After the party, there is [illegible] gallon of punch left in the punch bowl. How much punch did Oliver's guests drink during the party?**

4. **Ava and Chad both attempted to subtract the fractions shown below. Whose work is correct? How do you know?**

$\frac{5}{8} - \frac{1}{6} = ?$

Ava

$\frac{30}{48} - \frac{8}{48} = \frac{22}{48}$

Chad

$\frac{15}{24} - \frac{4}{24} = \frac{11}{48}$

Consider the expression $\frac{1}{4} - \frac{1}{10}$.

1. What like unit works for fourths and tenths? ____________________

2. Find equivalent fractions for $\frac{1}{4}$ and $\frac{1}{10}$ using like units.

3. Rewrite the subtraction expression using like units, then find the difference.

Consider the expression $\frac{4}{5} - \frac{1}{2}$.

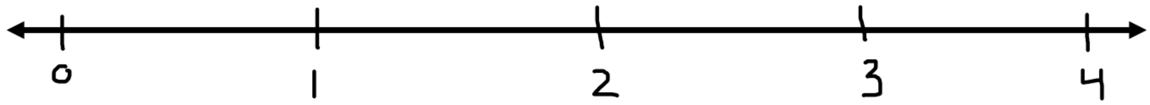
4. What like unit can you use? ____________________

5. Find equivalent fractions for $\frac{4}{5}$ and $\frac{1}{2}$ using like units.

6. Rewrite the subtraction expression using like units, then find the difference.

Consider the expression $2\frac{2}{3} - \frac{1}{2}$.

7. Use a number line to estimate the difference.



8. What two whole numbers is the difference between? ___________ and ___________

9. Rewrite the expression using like units, then subtract.

10. Is the answer you got reasonable? How do you know?

A family is filling a sandbox. They use a bag of sand that hold 7 ⅚ pounds of sand. They pour 5 ½ pounds of sand out of the bag.

11. Write an equation that can be used to find the amount of sand left in the bag.

12. Draw a number line to estimate your answer.

13. How much sand is left in the bag? Rewrite your equation with like units and solve.

1. Rename fractions to subtract with like units.

$\frac{7}{8} - \frac{1}{4}$ $\frac{7}{10} - \frac{2}{3}$

2. Rename fractions to subtract with like units.

$2\frac{2}{3} - 1\frac{1}{5}$ $6\frac{6}{7} - 2\frac{1}{4}$

3. Oliver makes $2\frac{5}{6}$ gallons of punch for a party. After the party, there is $\frac{1}{4}$ gallon of punch left in the punch bowl. How much punch did Oliver's guests drink during the party?

4. Ava and Chad both attempted to subtract the fractions shown below. Whose work is correct? How do you know?

$$\frac{5}{8} - \frac{1}{6} = ?$$

Ava

$$\frac{30}{48} - \frac{8}{48} = \frac{22}{48}$$

Chad

$$\frac{15}{24} - \frac{4}{24} = \frac{11}{24}$$

Name: KEY

Consider the expression $\frac{1}{4} - \frac{1}{10}$.

1. What like unit works for fourths and tenths? twentieths

2. Find equivalent fractions for $\frac{1}{4}$ and $\frac{1}{10}$ using like units.

$\frac{1 \times 5}{4 \times 5} = \frac{5}{20}$ $\frac{1 \times 2}{10 \times 2} = \frac{2}{20}$

3. Rewrite the subtraction expression using like units, then find the difference.

$\frac{5}{20} - \frac{2}{20} = \frac{3}{20}$

Consider the expression $\frac{4}{5} - \frac{1}{2}$.

4. What like unit can you use? tenths

5. Find equivalent fractions for $\frac{4}{5}$ and $\frac{1}{2}$ using like units.

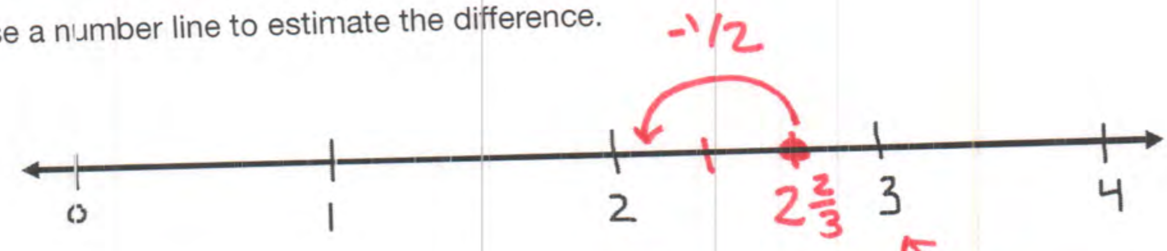
$\frac{4 \times 2}{5 \times 2} = \frac{8}{10}$ $\frac{1 \times 5}{2 \times 5} = \frac{5}{10}$

6. Rewrite the subtraction expression using like units, then find the difference.

$\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$

Consider the expression $2\frac{2}{3} - \frac{1}{2}$.

7. Use a number line to estimate the difference.



8. What two whole numbers is the difference between? 2 and 3

9. Rewrite the expression using like units, then subtract.

$\frac{2\times2}{3\times2} = \frac{4}{6}$ $\quad 2\frac{4}{6} - \frac{3}{6} = 2\frac{1}{6}$

$\frac{1\times3}{2\times3} = \frac{3}{6}$

10. Is the answer you got reasonable? How do you know?

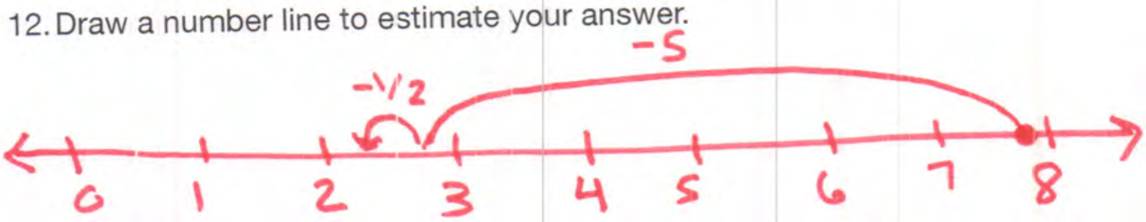
Yes! I estimated that the answer would be a little greater than 2.

A family is filling a sandbox. They use a bag of sand that hold 7 ⅚ pounds of sand. They pour 5 ½ pounds of sand out of the bag.

11. Write an equation that can be used to find the amount of sand left in the bag.

$7\frac{5}{6} - 5\frac{1}{2} = ?$

12. Draw a number line to estimate your answer.



13. How much sand is left in the bag? Rewrite your equation with like units and solve.

$\frac{1\times3}{2\times3} = \frac{3}{6}$ $\quad 7\frac{5}{6} - 5\frac{3}{6} = 2\frac{2}{6}$ lb. or $2\frac{1}{3}$ lb.

Name: KEY

1. Rename fractions to subtract with like units.

$\frac{7}{8} - \frac{1}{4}$

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

$\frac{7}{8} - \frac{2}{8} = \frac{5}{8}$

$\frac{7}{10} - \frac{2}{3}$

$\frac{7\times 3}{10\times 3} = \frac{21}{30}$

$\frac{2\times 10}{3\times 10} = \frac{20}{30}$

$\frac{21}{30} - \frac{20}{30} = \frac{1}{30}$

2. Rename fractions to subtract with like units.

$2\frac{2}{3} - 1\frac{1}{5}$

$\frac{2\times 5}{3\times 5} = \frac{10}{15}$

$\frac{1\times 3}{5\times 3} = \frac{3}{15}$

$2\frac{10}{15} - 1\frac{3}{15} = 1\frac{7}{15}$

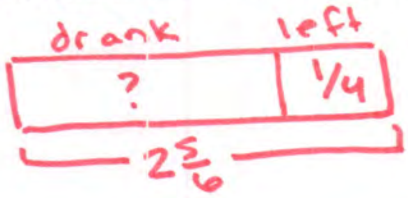
$6\frac{6}{7} - 2\frac{1}{4}$

$\frac{6\times 4}{7\times 4} = \frac{24}{28}$

$\frac{1\times 7}{4\times 7} = \frac{7}{28}$

$6\frac{24}{28} - 2\frac{7}{28} = 4\frac{17}{28}$

3. **Oliver makes $2\frac{5}{6}$ gallons of punch for a party. After the party, there is $\frac{1}{4}$ gallon of punch left in the punch bowl. How much punch did Oliver's guests drink during the party?**



$$\frac{5 \times 2}{6 \times 2} = \frac{10}{12}$$

$$\frac{1 \times 3}{4 \times 3} = \frac{3}{12}$$

$$2\frac{10}{12} - \frac{3}{12} = 2\frac{7}{12} \text{ gallons}$$

4. **Ava and Chad both attempted to subtract the fractions shown below. Whose work is correct? How do you know?**

$$\frac{5}{8} - \frac{1}{6} = ?$$

Ava →

$$\frac{30}{48} - \frac{8}{48} = \frac{22}{48}$$

Chad

$$\frac{15}{24} - \frac{4}{24} = \frac{11}{\cancel{48}\ 24}$$

They are both correct. They just used different common denominators. Their answers, $\frac{22}{48}$ and $\frac{11}{24}$, are equivalent fractions.

G5 U3 Lesson 11

Subtract fractions greater than or equal to 1

G5 U3 Lesson 11 - Students will subtract fractions greater than or equal to 1

Warm Welcome (Slide 1): Tutor choice

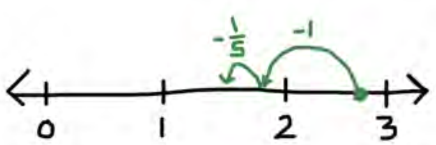
Frame the Learning/Connect to Prior Learning (Slide 2): In our previous lesson, we saw how we can rewrite subtraction problems with unlike units numerically to make equivalent fractions. Today, we'll use the same thinking. The only difference is that the problems will involve numbers greater than 1, and we may find it useful to decompose mixed numbers or rename mixed numbers as fractions greater than 1 in some instances. I'll show you what I mean when we get to that!

Let's Talk (Slide 3): Look at the two expressions shown here. Which expression would say is easier to evaluate and why? Possible Student Answers, Key Points:

- I'm not sure. They both have like units, and I know like units help me subtract.
- I think the first expression is easier. I can decompose and subtract the whole numbers to think about 2 - 1. Then the fractions would just be ¾ - ¼. In the other expression, the fraction parts would be ¼ - ¾, which seems trickier.

Let's see how we can use what we know to subtract fractions greater than or equal to 1.

Let's Think (Slide 4): This problem wants us to subtract 2 ¾ minus 1 ⅕. Let's use a number line to estimate before we calculate the actual difference.



(sketch and label number line from 0 to 3, and model subtraction while narrating) The total is 2 ¾, so I'll start by marking a point close to 3 wholes. I'm thinking of 1 ⅕ decomposed into 1 and a fractional part of ⅕. I'll make a hop back of 1, so now I'm around 2 ¾. Then I'll make a hop back of ⅕. ⅕ is a relatively small piece, so I'll only hop a little bit. I know I won't make it all the way back to the 1 on the number line. What does our number line estimate tell us about our answer? Possible Student Answers, Key Points:

- The answer should be about 1 ½.
- The answer will be between 1 whole and 2 wholes.

Let's calculate, and hopefully we end up with an answer that is reasonable based on our estimate. What's a common unit we can use to help us subtract 1 ⅕ from 2 ¾? (twentieths) I know 20 is a multiple of both denominators, so I can think of fifths and fourths as being partitioned into 20 pieces. Let's write equivalent fractions numerically. I won't bother with the whole number in each mixed number for now.

$$\frac{3\times5}{4\times5}=\frac{15}{20}$$

$$\frac{1\times4}{5\times4}=\frac{4}{20}$$

Starting with ¾, I know I can multiply the numerator by 5 and the denominator by 5 to represent an equivalent fraction partitioned into 20 pieces. *(write equation as shown)* What is ¾ as an equivalent fraction with a denominator of 20? (15/20) For ⅕, I can multiply both the numerator and denominator by what? (4, I know 5 x 4 makes 20) So ⅕ in terms of twentieths would be what? (4/20) *(write equation as shown)* ⅕ partitioned into twentieths is 4/20.

$$2\frac{15}{20}-1\frac{4}{20}=1\frac{11}{20}$$

(rewrite original equation using equivalent fractions) Now we can think of our problem as being 2 15/20 minus 1 4/20. Our difference is 1 and 11/20. Is this answer reasonable? Possible Student Answers, Key Points:

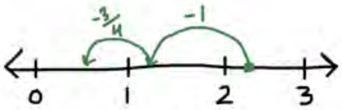
- Yes, on our number line we estimated that our answer would be between 1 and 2, or close to 1 ½. 1 and 11/20 matches our estimate.

Nice work! We just subtracted fractions greater than or equal to 1.

Let's Think (Slide 5): Take a look at this problem. What do you notice is the same or different compared to the previous problem? Possible Student Answers, Key Points:

- It's subtraction. It involves two mixed numbers. The whole numbers are the same as last time.
- I notice the fractional parts are just switched. The total now has a smaller fractional part than what we're subtracting. We can still use twentieths.

Excellent noticings. This problem looks similar, and in a lot of ways it is. We're going to notice something different about this problem in a couple minutes, and I'll show you two different ways we can think about it.



First, let's estimate like we did with the previous problem. *(draw and label a number line from 0 to 3, and model the subtraction as you narrate)* We'll start at 2 ⅕, which means I'll mark a point a little bit beyond 2 wholes. I'll subtract 1 ¾ in parts. I can hop back 1 whole, which I know lands me at 1 ⅕. Then I'll hop back ¾. What should that hop look like? Possible Student Answers, Key Points:

- ¾ is almost a whole, so it should be about the same size as our first hop, but a little less.
- You should hop over the 1 tick mark. We're only ⅕ away from that tick mark, and ¾ is more than ⅕. We'll want to cross over the 1 and land between 0 and 1.

We'll hop ¾, which will move us over the 1 whole tick mark. Our estimate for this problem looks like it's between 0 and 1, and maybe somewhere close to ½. Let's actually do the math and figure out if our answer is reasonable.

This problem doesn't have like units, so we know we'll need to make like units. The nice thing is, we've actually already converted these fractions into fractions with like units or common denominators. We don't need to do that work again, since we did it on the previous problem. How can I rewrite this problem with like units of twentieths? Keep in mind, the fractions are on different whole numbers than before. (2 4/20 minus 1 15/20) *(write the expression)*

$$2\frac{4}{20} - 1\frac{15}{20}$$

If I pause to think about this, I notice something different about this problem. I know I can subtract 2 - 1, that's no big deal. Look at the fractional parts. I can't subtract 4/20 minus 15/20, because I don't have enough to subtract. The first fractional part is smaller than the part I'm trying to take away. Don't worry! We can work with this. Let me show you two ways to think about it.

If I notice that my fractional parts cannot be subtracted because the fractional part on my total is smaller than the fractional part I'm trying to subtract, I can subtract the fractional part from the *whole number* instead of subtracting it from the fractional part. Let me show you what I mean.

$$2\frac{1}{5} - 1\frac{3}{4}$$
$$2 \quad \frac{1}{5}$$
$$2 - 1\frac{3}{4} = \frac{1}{4}$$

I'm going to go back to our original problem before we found equivalent fractions. *(write 2 ⅕ 1 ¾)* I'll decompose the 2 ⅕ into 2 and ⅕ using a number bond. *(show number bond)* Now, I'm going to think about 2 wholes - 1 ¾.

What is 2 - 1 ¾? *(2 - 1 ¾ =)* Possible Student Answers, Key Points:

- I can think of it as 2 - 1 - ¾. 2 minus 1 is 1. Then 1 - ¾ is ¼.
- I know 1 ¾ is only ¼ away from 2. So 2 - 1 ¾ is ¼.

$$\frac{1}{4} + \frac{1}{5}$$
$$\frac{5}{20} + \frac{4}{20} = \frac{9}{20}$$

We took everything we needed to away from the whole number. 2 - 1 ¾ leaves us with ¼. We can't forget that we also have ⅕ left that we didn't use to subtract. So to find our answer, we just have to add ¼ with the leftover ⅕. *(write ¼ + ⅕)* What is ¼ and ⅕ if we think of them with like units? Use your pencil and paper if that helps. (¼ is 5/20 and ⅕ is 4/20) *(write 5/20 + 4/20 =)* Great, so our answer is 5/20 + 4/20 = 9/20.

If we don't have enough fractional parts to subtract with, we can subtract from the whole number instead.

Let me show you one other way to think about a situation like this, that way you have options when you run into this same thing on your own. *(rewrite 2 ⅕ 1 ¾, and consider a different color for this strategy)*

$$2\frac{1}{5} - 1\frac{3}{4}$$

We know by now that the fractional unit in our total is too small to subtract the fractional unit in 1 ¾. Another strategy we can use in this case, is we can rewrite each mixed number as a fraction greater than 1, or improper fraction. When we write mixed numbers as fractions greater than 1, or improper fractions, it shows us how many fractional units are in the *entire* mixed number, which makes it easy to subtract.

$$2\frac{1}{5} \qquad 1\frac{3}{4}$$
$$\frac{10}{5} \quad \frac{1}{5} \qquad \frac{4}{4} \quad \frac{3}{4}$$

Let's think about 2 ⅕ first. How many fifths are in 2 wholes? (10 fifths, 10/5 = 2) 10/5 is the same as 2 wholes. *(write number bond showing 10/5 and ⅕)* So, we can think of 2 ⅕ as being 10/5 and ⅕ which means 2 ⅕ is the same as 11/5. What about 1 ¾? I know 1 whole is the same as 4/4. I can think of 1 ¾ as being 4/4 and ¼ *(write number bond showing 4/4 and ¾) 1 ¾ is the same as 7/4.*

We can rewrite our problem now using the improper fractions, or fractions greater than 1, instead of the mixed numbers. *(write 11/5 - 7/4)* Now, I don't have to worry about having enough fractional units, because I put each entire mixed number into a fraction showing all the fractional units in the mixed number. How can I subtract 11/5 - 7/4 now? Use pencil and paper if that helps before you explain. Possible Student Answers, Key Points:

$$\frac{11}{5} - \frac{7}{4}$$

$$\frac{44}{20} - \frac{35}{20}$$

$$\frac{9}{20}$$

- I know I need to get a like unit of 20. I can multiply 11/5 by 4/4 to make an equivalent fraction of 44/20. I can multiply 7/4 by 5/5 to make an equivalent fraction of 35/20. Once I have like units, I can subtract.

(write 44/20 - 35/20) 11/5 is equivalent to 44/20. 7/4 is equivalent to 35/20. 44 twentieths minus 35 twentieths is 9 twentieths or 9/20. That's the same answer we got when we used the other strategy.

When we're subtracting with mixed numbers, and the fractional unit we're subtracting from doesn't have enough units to subtract with, we can either subtract from the whole in our mixed number, OR we can rewrite both mixed numbers as fractions greater than 1. Either strategy works, so I encourage you to try both at some point during our practice to see which one you like best. You might find it depends on the problem.

Keep in mind, like we saw in our first problem today, the two strategies we just explored aren't always necessary. Sometimes you have enough fractional units to subtract without needing any additional steps. Stop and think about your solution pathway before you tackle each problem moving forward.

Let's Try it (Slides 6 - 7): Now let's work together on subtracting fractions greater than or equal to 1. To make sure our work makes sense, we can always estimate using a number line first. If we don't have enough fractional units to subtract, we know we can subtract the fractional unit from a whole *or* we can rewrite mixed numbers as fractions greater than 1. Either strategy will make sure we have enough fractional pieces to subtract with. Let's keep all this in mind and work carefully to complete a few more problems.

WARM WELCOME

Today we will subtract fractions greater than or equal to 1.

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Let's Talk:

$$2\frac{3}{4} - 1\frac{1}{4}$$

Which expression is easier to evaluate?

$$2\frac{1}{4} - 1\frac{3}{4}$$

Let's Think:

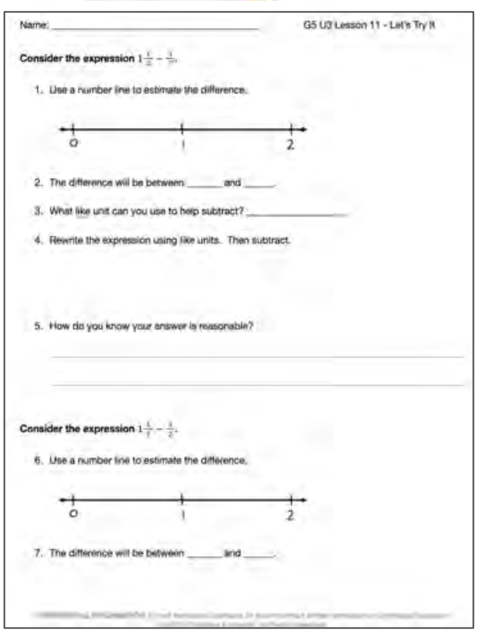
Estimate, then evaluate.

$$2\frac{3}{4} - 1\frac{1}{5}$$

Let's Think: **Estimate, then evaluate.**

$$2\frac{1}{5} - 1\frac{3}{4}$$

Let's Try It: **Let's explore subtracting fractions greater than or equal to 1 together.**



Name: ______________________ G5 U3 Lesson 11 - Let's Try It

Consider the expression [illegible].

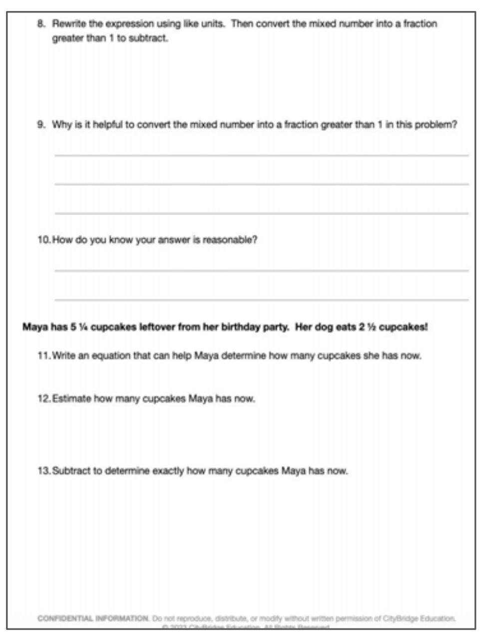
1. Use a number line to estimate the difference.

2. The difference will be between ______ and ______.
3. What like unit can you use to help subtract? ______________
4. Rewrite the expression using like units. Then subtract.
5. How do you know your answer is reasonable?

Consider the expression [illegible].

6. Use a number line to estimate the difference.

7. The difference will be between ______ and ______.



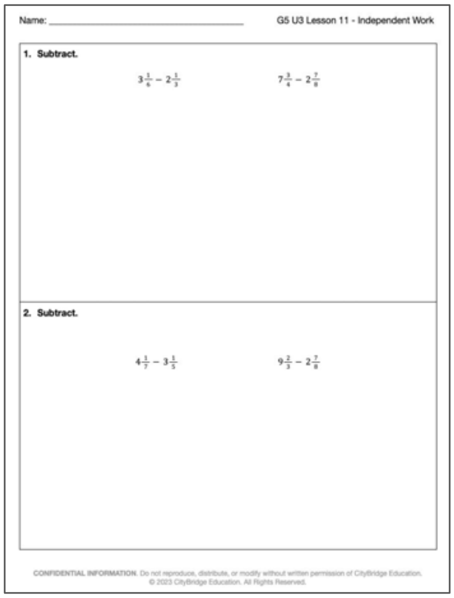
8. Rewrite the expression using like units. Then convert the mixed number into a fraction greater than 1 to subtract.
9. Why is it helpful to convert the mixed number into a fraction greater than 1 in this problem?
10. How do you know your answer is reasonable?

Maya has 5 ¼ cupcakes leftover from her birthday party. Her dog eats 2 ½ cupcakes!

11. Write an equation that can help Maya determine how many cupcakes she has now.
12. Estimate how many cupcakes Maya has now.
13. Subtract to determine exactly how many cupcakes Maya has now.

On your Own:

Now it's time to explore subtracting fractions greater than or equal to 1 on your own.

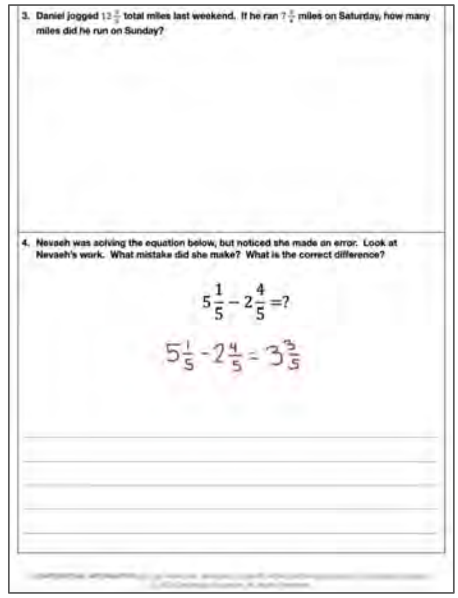

Name: ______________________________ G5 U3 Lesson 11 - Independent Work

1. Subtract.

$3\frac{1}{6} - 2\frac{1}{3}$ $7\frac{3}{4} - 2\frac{7}{8}$

2. Subtract.

$4\frac{1}{7} - 3\frac{1}{5}$ $9\frac{2}{3} - 2\frac{7}{8}$


3. Daniel jogged 12 [illegible] total miles last weekend. If he ran 7 [illegible] miles on Saturday, how many miles did he run on Sunday?

4. Nevaeh was solving the equation below, but noticed she made an error. Look at Nevaeh's work. What mistake did she make? What is the correct difference?

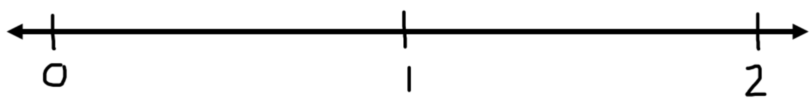
$$5\frac{1}{5} - 2\frac{4}{5} = ?$$

$$5\frac{1}{5} - 2\frac{4}{5} = 3\frac{3}{5}$$

Name: ____

Consider the expression $1\frac{1}{2} - \frac{1}{7}$.

1. Use a number line to *estimate* the difference.



2. The difference will be between ________ and _______.

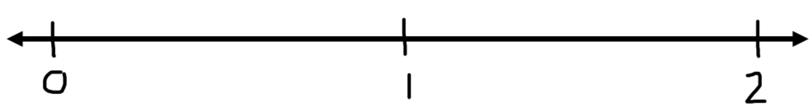
3. What like unit can you use to help subtract? ______________________

4. Rewrite the expression using like units. Then subtract.

5. How do you know your answer is reasonable?

Consider the expression $1\frac{1}{7} - \frac{1}{2}$.

6. Use a number line to *estimate* the difference.



7. The difference will be between ________ and _______.

8. Rewrite the expression using like units. Then convert the mixed number into a fraction greater than 1 to subtract.

9. Why is it helpful to convert the mixed number into a fraction greater than 1 in this problem?

10. How do you know your answer is reasonable?

Maya has 5 ¼ cupcakes leftover from her birthday party. Her dog eats 2 ½ cupcakes!

11. Write an equation that can help Maya determine how many cupcakes she has now.

12. Estimate how many cupcakes Maya has now.

13. Subtract to determine exactly how many cupcakes Maya has now.

1. Subtract.

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

$7\frac{3}{4} - 2\frac{7}{8}$

2. Subtract.

$4\frac{1}{7} - 3\frac{1}{5}$

$9\frac{2}{3} - 2\frac{7}{8}$

3. Daniel jogged $12\frac{3}{5}$ total miles last weekend. If he ran $7\frac{3}{4}$ miles on Saturday, how many miles did he run on Sunday?

4. Nevaeh was solving the equation below, but noticed she made an error. Look at Nevaeh's work. What mistake did she make? What is the correct difference?

$$5\frac{1}{5} - 2\frac{4}{5} = ?$$

$$5\frac{1}{5} - 2\frac{4}{5} = 3\frac{3}{5}$$

Name: KEY

Consider the expression $1\frac{1}{2} - \frac{1}{7}$.

1. Use a number line to *estimate* the difference.

2. The difference will be between 1 and 2.

3. What like unit can you use to help subtract? fourteenths

4. Rewrite the expression using like units. Then subtract.

$\frac{1 \times 7}{2 \times 7} = \frac{7}{14}$

$\frac{1 \times 2}{7 \times 2} = \frac{2}{14}$

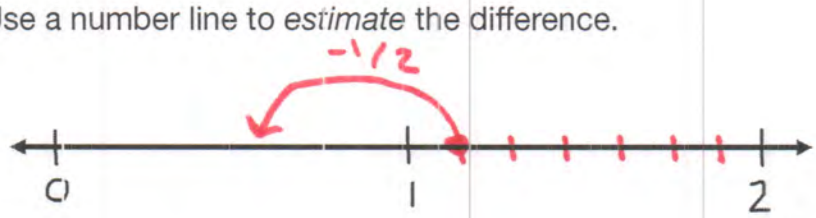
$1\frac{7}{14} - \frac{2}{14} = 1\frac{5}{14}$

5. How do you know your answer is reasonable?

I estimated my answer would be a little more than 1, but less than $1\frac{1}{2}$.

Consider the expression $1\frac{1}{7} - \frac{1}{2}$.

6. Use a number line to *estimate* the difference.



7. The difference will be between 0 and 1.

8. Rewrite the expression using like units. Then convert the mixed number into a fraction greater than 1 to subtract.

$\frac{1}{7} = \frac{2}{14}$

$\frac{1}{2} = \frac{7}{14}$

$1\frac{2}{14} - \frac{7}{14} \longrightarrow \frac{16}{14} - \frac{7}{14} = \frac{9}{14}$

$\frac{14}{14} \quad \frac{2}{14}$

9. Why is it helpful to convert the mixed number into a fraction greater than 1 in this problem?

When I made like units, I didn't have enough 14ths in the fractional part to take $\frac{7}{14}$ away. Rewriting as a fraction >1 fixed that!

10. How do you know your answer is reasonable?

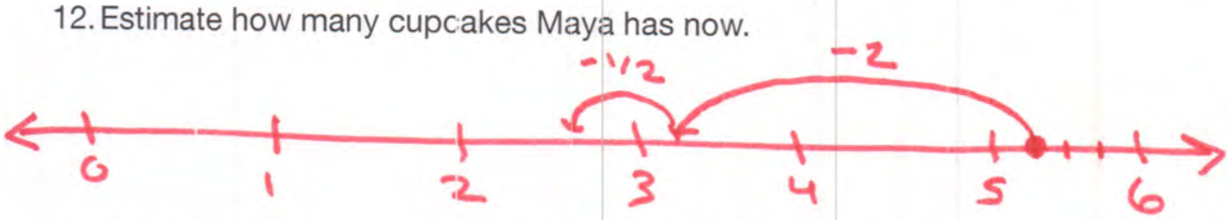
My number line estimate was about 1/2, so 9/14 is close.

Maya has 5 ¼ cupcakes leftover from her birthday party. Her dog eats 2 ½ cupcakes!

11. Write an equation that can help Maya determine how many cupcakes she has now.

$5\frac{1}{4} - 2\frac{1}{2} = ?$

12. Estimate how many cupcakes Maya has now.



13. Subtract to determine exactly how many cupcakes Maya has now.

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

$5\frac{1}{4} - 2\frac{2}{4}$

$4 \quad \frac{4}{4}$

$4\frac{5}{4} - 2\frac{2}{4} = 2\frac{3}{4}$

Name: KEY

1. Subtract.

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

$\frac{1\times2}{3\times2} = \frac{2}{6}$

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

$2\frac{6}{6}$

$2\frac{7}{6} - 2\frac{2}{6} = 0\frac{5}{6}$

$\frac{5}{6}$

$7\frac{3}{4} - 2\frac{7}{8}$

$\frac{3\times2}{4\times2} = \frac{6}{8}$

$7\frac{6}{8} - 2\frac{7}{8}$

$6\frac{8}{8}$

$6\frac{14}{8} - 2\frac{7}{8}$

$4\frac{7}{8}$

2. Subtract.

$4\frac{1}{7} - 3\frac{1}{5}$

$\frac{1\times5}{7\times5} = \frac{5}{35}$

$\frac{1\times7}{5\times7} = \frac{7}{35}$

$4\frac{5}{35} - 3\frac{7}{35}$

$3\frac{35}{35}$

$3\frac{40}{35} - 3\frac{7}{35} = 0\frac{33}{35}$

$\frac{33}{35}$

$9\frac{2}{3} - 2\frac{7}{8}$

$\frac{2\times8}{3\times8} = \frac{16}{24}$

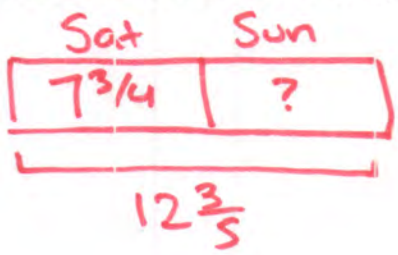
$\frac{7\times3}{8\times3} = \frac{21}{24}$

$9\frac{16}{24} - 2\frac{21}{24}$

$8\frac{24}{24}$

$8\frac{40}{24} - 2\frac{21}{24} = 6\frac{19}{24}$

3. **Daniel jogged $12\frac{3}{5}$ total miles last weekend. If he ran $7\frac{3}{4}$ miles on Saturday, how many miles did he run on Sunday?**



$12\frac{3}{5} - 7\frac{3}{4}$

$12\frac{12}{20} - 7\frac{15}{20}$

$11\frac{20}{20}$

$\frac{3\times4}{5\times4} = \frac{12}{20}$

$\frac{3\times5}{4\times5} = \frac{15}{20}$

$11\frac{32}{20} - 7\frac{15}{20}$

$4\frac{17}{20}$ miles

4. **Nevaeh was solving the equation below, but noticed she made an error. Look at Nevaeh's work. What mistake did she make? What is the correct difference?**

$$5\frac{1}{5} - 2\frac{4}{5} = ?$$

$5\frac{1}{5} - 2\frac{4}{5} = 3\frac{3}{5}$

$4\frac{5}{5}$

$4\frac{6}{5} - 2\frac{4}{5} = 2\frac{2}{5}$

Nevaeh subtracted even though she didn't have enough fifths. She should rewrite $5\frac{1}{5}$ as $4\frac{6}{5}$ so she has enough to subtract $\frac{4}{5}$. The actual answer is $2\frac{2}{5}$.

G5 U3 Lesson 12

Use fraction benchmark numbers to assess reasonableness of addition and subtraction equations

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G5 U3 Lesson 12 - Students will use fraction benchmark numbers to assess the reasonableness of addition and subtraction equations

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): We've been adding and subtracting fractions for several lessons now, and our skills are really growing. As we've added and subtracted, we've often used number lines to estimate sums and differences and to assess the reasonableness of our answers. Today we'll think about how we can use benchmark numbers like 0, halves, and wholes to estimate and quickly compare sums and differences.

Let's Talk (Slide 3): To get your brain warmed up, take a second and look at these expressions. Which expressions here would be greater than 1 whole? I don't want you to solve. You can use what you know about units. You can picture a visual model or a number line to help you. Use your best judgment and reason about which expressions are greater than 1 whole. Possible Student Answers, Key Points:

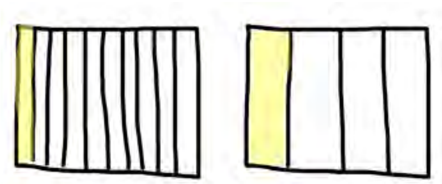
- I know ⅝ + ¾ would be greater than 1, because both addends are more than ½.
- ⅚ + ⅝ would be more than 1 whole, because both the addends are already close to 1 whole.
- 2 - 5/7 would be a whole, because 5/7 is less than 1. If I picture a number line, I'd start at 2 and I'd hop back less than 1 whole, so I know the difference would be greater than 1 whole.

NOTE: If the student misses an expression or selects an incorrect expression, that's okay at this point. You can use the reasoning below or something similar to clarify.

-½ + 3/10 would be less than 1 whole. 3/10 is less than ½. If I add ½ with something less than ½, I won't quite make a whole.
-⅝ + ¾ is greater than 1 whole, because ⅝ is greater than ½ and ¾ is greater than ½. If I combined them, I'll have more than 1 whole.
-1 ½ - ⅝ would be less than 1 whole. ⅝ is more than the ½. If I picture a number line, I'd start at 1 ½, then I'd have to hop back more than ½ which would put me at a point less than 1 whole.
-⅚ + ⅞ would be more than 1 whole, since both fractions are already close to being 1 whole.
-2 - 5/7 is more than 1 whole. I know 2 - 1 would be 1, so 2 minus something less than 1 will be a little more than 1 whole.

Let's use some of this thinking to help us answer a couple questions that involve using benchmark fractions to estimate.

Let's Think (Slide 4): Here we have two expressions. We are asked to determine whether each expression would be greater than, less than, or equal to ½. We could actually calculate each sum or difference, but today we'll focus on using estimation. Let's think about the first expression.



We need to think about whether 1/10 + ¼ is greater than, less than, or equal to ½. I can start by picturing each fraction in my head or with a quick sketch. I'll sketch what I'm picturing in my head, since you can't see what I'm thinking. *(sketch an area model showing 1/10 and another showing ¼)* I know 1/10 would be 1 piece out of 10. I know ¼ would be 1 piece out of 4. By picturing the units, I can already get a sense that if I put them together, this would be less than ½.

If I'm not sure, I can use this mental picture to help me consider benchmarks. What do you notice about the size of these two fractions? Possible Student Answers, Key Points:

- They're both unit fractions. They're both pretty small compared to a whole. 1/10 is almost 0.

$$\frac{1}{10} \approx 0$$

If I'm thinking about fraction benchmarks, I know that 1/10 is not a lot. I can think of it as being almost 0. *(write 1/10 ≈ 0)* Thinking of 1/10 as being approximately 0, can help me mentally calculate an estimate.

$$0 + \frac{1}{4} = \frac{1}{4}$$

I can think of the original expression as being about 0 + ¼. 0 + ¼ = ¼, so I know the sum would be close to ¼. *(write 0 + ¼ = ¼)* By estimating, I can see that the sum would be less than ½. I didn't need to calculate it exactly to answer the question.

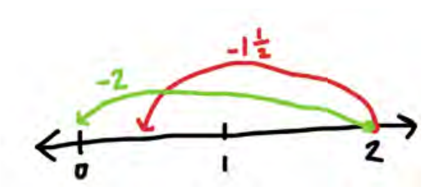
Based on what I just did, can you describe how we used a benchmark number to estimate the sum? Possible Student Answers, Key Points:

- We thought about both fractions we were adding and pictured them. When I pictured them, I knew that 1/10 was really close to 0. We thought of 1/10 as being 0, which made it easy to estimate our sum as being about 0 + ¼.

Let's try using similar thinking to consider the second expression, 2 - 1 ⅝ Let's start by thinking about both our numbers. The first number is 2. I can just leave that as 2, since 2 is a friendly benchmark number when dealing with fractions. Now I need to think about a benchmark that is close to 1 ⅝ I know I can think of 1 ⅝ as being pretty close to 1 ½, and I can also think of 1 ⅝ as being 1 piece away from 2 wholes. So 1 ⅝ is close to a benchmark of 1 ½ or 2. *(write 1 ⅝ ≈ 1 ½ or 2)*

$1\frac{2}{3} \approx 1\frac{1}{2}$ OR 2

Last time we visualized using area models. For this one, let's visualize a number line instead. I'm thinking about this problem using benchmarks in my head, but since you can't see what I'm thinking, I'll draw what I'm picturing. *(draw and label number line from 0 to 2)*



I can think of this problem as being about 2 - 2 or about 2 - 1 ½. I know 2 - 2 would be 0. *(draw -2 on the number line using one color)* If I used my other benchmark and thought of 1 ⅝ as 1 ½, I can picture starting at 2 and hopping back 1 then ½. I know 2 - 1 ½ would be ½. *(draw -1 ½ on the number line in a different color)* How can I use these estimates to determine whether the answer would be more or less than ½? Possible Student Answers, Key Points:

- If 2 - 2 = 0 and 2 - 1 ½ = ½. I can think of 0 as being a low estimate and ½ as being a high estimate, so my actual answer should be somewhere between those. That means the actual answer is going to be less than ½.

Our benchmark estimates made it easy to do some close calculations in our heads. We knew the answer would be about 0 or about ½ without needing to calculate it exactly. So 2 - 1 ⅝ will be less than ½.

Benchmark fractions are a helpful way to get us thinking about what our actual answer will be close to.

Let's Think (Slide 5): This next problem shows us two expressions. It wants us to use estimation to determine whether the first expression is less than, greater than, or equal to the other expression. Let's use benchmark numbers to help us think about each expression. The first expression shows 5 9/10 minus 2 ⅝ Picture each fraction in your mind as an area model or on a number line.

What benchmark fraction or whole number is really close to 5 9/10? How do you know? Possible Student Answers, Key Points:

- It's really close to 6.
- 5 and 9/10 is one small piece away from being 6 wholes.

$5\frac{9}{10} \approx 6$

$2\frac{1}{8} \approx 2$

$6 - 2 = 4$

We can think of 5 9/10 as being approximately 6 wholes. *(write 5 9/10 ≈ 6)* What benchmark fraction or whole number is really close to 2 1/8? How do you know? Possible Student Answers, Key Points:

- It's really close to 2.
- 2 ⅛ is just one small piece more than 2. It's a little bit past 2 on a number line.

We can think of 2 1/8 as being approximately 2 wholes. *(write 2 1/8 ≈ 2)* So, using our benchmarks, we can estimate that the difference between 5 9/10 and 2 ⅛ will be about the same as 6 - 2. The value should be about 4. *(write 6 - 2 = 4)*

Let's look at the other expression. This expression is asking for the sum of 1 ½ and 1 5/7. Let's leave 1 ½ alone, since halves are typically easy benchmarks to picture and think about. *(write 1 ½ and put a check by it)*

$1\frac{1}{2}$ ✓

What benchmark fraction or whole number is really close to 1 5/7? How do you know? Possible Student Answers, Key Points:

- It's close to 1 ½, because it's almost in the middle of 1 and 2 when I picture it on a number line.
- It's close to 2, because it's only 2 sevenths away from that being 2 wholes.

$1\frac{5}{7} \approx 2$

1 5/7 is close to 1 ½ and it's close to 2. Either benchmark would be appropriate. Let's use 2 for right now. *(write 1 5/7 ≈ 2)* Thinking of the expression in terms of benchmarks, I can think of it as being about 1 ½ + 2. What is 1 ½ + 2? (3 ½) Without calculating exactly, I know this expression is equal to about 3 ½.

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

We didn't calculate either expression's exact value, but using benchmark numbers, we are able to compare them with some degree of certainty. Based on our estimation, I know 4 is greater than 3 ½. So I know the first expression is greater than the second expression. *(fill in comparison with > symbol)*

Benchmark numbers help us get a close sense of a value without having to perform every calculation. They allow us to use mental math to get an idea of a sum or difference.

Let's Try it (Slides 6 - 7): Now let's work together on using fraction benchmark numbers to assess the reasonableness of addition and subtraction expressions. We'll think about whole numbers and halves that each fraction is close to. Picturing an area model or a number line can be a good way to find a close benchmark if you're not immediately sure which benchmark to use. You seem ready to give it a try!

WARM WELCOME

Today we will use fraction benchmark numbers to assess the reasonableness of addition and subtraction equations.

Let's Talk:

Without solving, which expressions would be greater than 1 whole?

$$\frac{1}{2} + \frac{3}{10}$$

$$\frac{5}{8} + \frac{3}{4}$$

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

$$\frac{5}{6} + \frac{7}{8}$$

$$2 - \frac{5}{7}$$

Let's Think:

Determine whether each expression below is greater than, less than, or equal to a half.

$$\frac{1}{10} + \frac{1}{4}$$

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

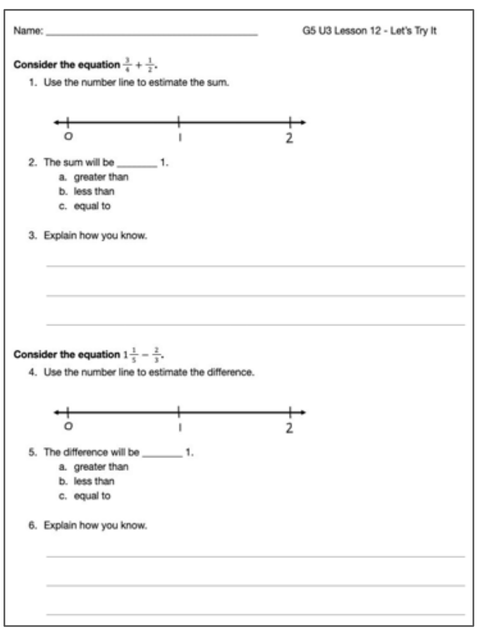
Let's Think:

Estimate the value of each expression to compare using <, >, or =.

$$5\frac{9}{10} - 2\frac{1}{8} \_\_\_\_\_ 1\frac{1}{2} + 1\frac{5}{7}$$

Let's Try It:

Let's explore using fraction benchmark numbers to assess the reasonableness of addition and subtraction equations together.



Name: ______________________ G5 U3 Lesson 12 - Let's Try It

Consider the equation $\frac{3}{4} + \frac{1}{2}$.

1. Use the number line to estimate the sum.

2. The sum will be _______ 1.
   a. greater than
   b. less than
   c. equal to

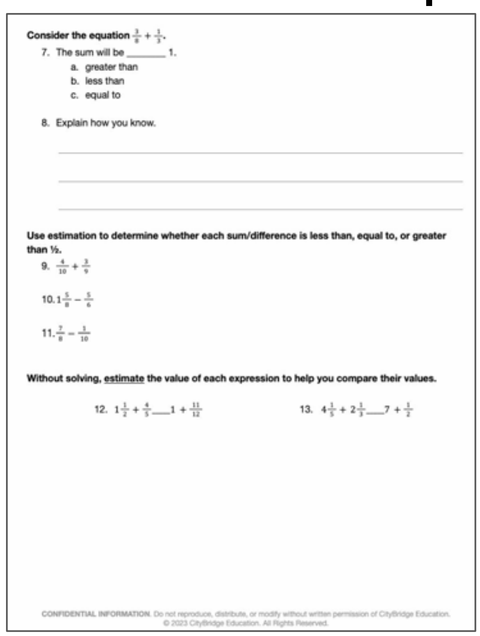
3. Explain how you know.

Consider the equation $1\frac{1}{5} - \frac{2}{3}$.

4. Use the number line to estimate the difference.

5. The difference will be _______ 1.
   a. greater than
   b. less than
   c. equal to

6. Explain how you know.



Consider the equation $\frac{3}{8} + \frac{1}{3}$.

7. The sum will be _______ 1.
   a. greater than
   b. less than
   c. equal to

8. Explain how you know.

Use estimation to determine whether each sum/difference is less than, equal to, or greater than ½.

9. $\frac{4}{10} + \frac{3}{9}$

10. $1\frac{5}{8} - \frac{5}{6}$

11. $\frac{7}{8} - \frac{1}{10}$

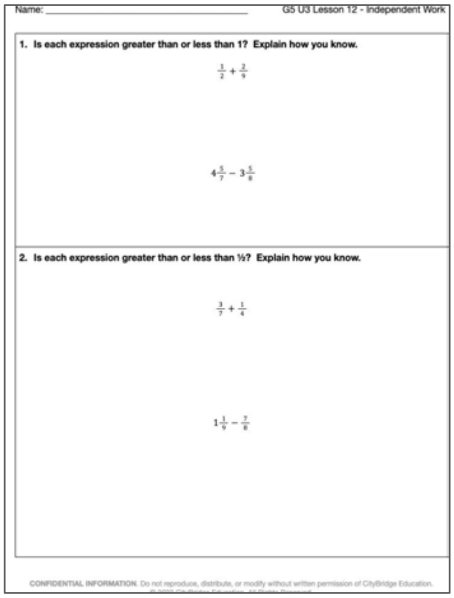
Without solving, estimate the value of each expression to help you compare their values.

12. $1\frac{1}{2} + \frac{4}{5}$ ___ $1 + \frac{11}{12}$

13. $4\frac{1}{5} + 2\frac{1}{3}$ ___ $7 + \frac{1}{2}$

On your Own:

Now it's time to explore using fraction benchmark numbers to assess the reasonableness of addition and subtraction equations on your own.



Name: ______________________ G5 U3 Lesson 12 - Independent Work

1. **Is each expression greater than or less than 1? Explain how you know.**

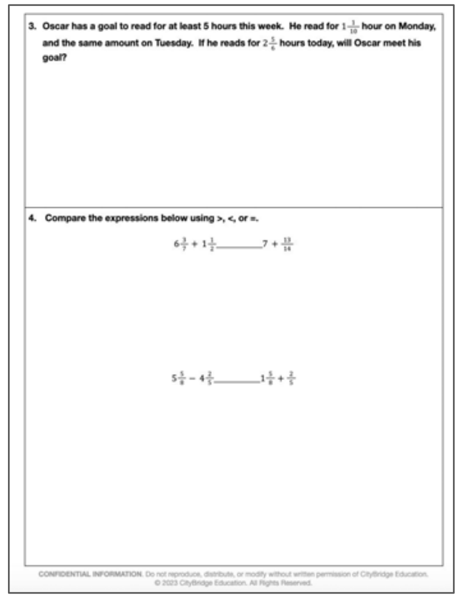
$\frac{1}{2} + \frac{2}{9}$

$4\frac{5}{7} - 3\frac{5}{8}$

2. **Is each expression greater than or less than ½? Explain how you know.**

$\frac{3}{7} + \frac{1}{4}$

$1\frac{1}{9} - \frac{7}{8}$



3. **Oscar has a goal to read for at least 5 hours this week. He read for $1\frac{1}{10}$ hour on Monday, and the same amount on Tuesday. If he reads for $2\frac{5}{6}$ hours today, will Oscar meet his goal?**

4. **Compare the expressions below using >, <, or =.**

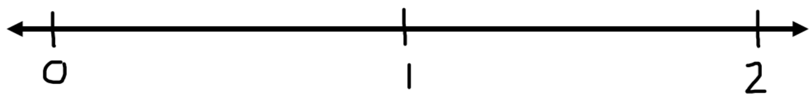
$6\frac{3}{7} + 1\frac{1}{2}$ ________ $7 + \frac{13}{14}$

$5\frac{5}{8} - 4\frac{2}{5}$ ________ $1\frac{5}{8} + \frac{2}{5}$

Name: ______________________________

Consider the equation $\frac{3}{4}+\frac{1}{2}$.

1. Use the number line to estimate the sum.



2. The sum will be _________ 1.
    a. greater than
    b. less than
    c. equal to

3. Explain how you know.

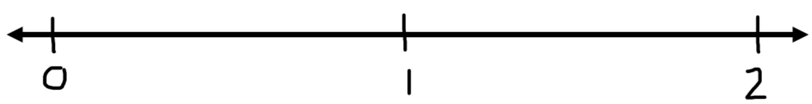
____

____

____

Consider the equation $1\frac{1}{5}-\frac{2}{3}$.

4. Use the number line to estimate the difference.



5. The difference will be _________ 1.
    a. greater than
    b. less than
    c. equal to

6. Explain how you know.

____

____

____

Consider the equation $\frac{3}{8}+\frac{1}{3}$.

7. The sum will be _________ 1.
    a. greater than
    b. less than
    c. equal to

8. Explain how you know.

Use estimation to determine whether each sum/difference is less than, equal to, or greater than ½.

9. $\frac{4}{10} + \frac{3}{9}$

10. $1\frac{5}{8} - \frac{5}{6}$

11. $\frac{7}{8} - \frac{1}{10}$

Without solving, estimate the value of each expression to help you compare their values.

12. $1\frac{1}{2} + \frac{4}{5}$ ____ $1 + \frac{11}{12}$

13. $4\frac{1}{5} + 2\frac{1}{3}$ ____ $7 + \frac{1}{2}$

1. Is each expression greater than or less than 1? Explain how you know.

$$\frac{1}{2}+\frac{2}{9}$$

$$4\frac{5}{7}-3\frac{5}{8}$$

2. Is each expression greater than or less than ½? Explain how you know.

$$\frac{3}{7}+\frac{1}{4}$$

$$1\frac{1}{9}-\frac{7}{8}$$

3. Oscar has a goal to read for at least 5 hours this week. He read for $1\frac{1}{10}$ hour on Monday, and the same amount on Tuesday. If he reads for $2\frac{5}{6}$ hours today, will Oscar meet his goal?

4. Compare the expressions below using >, <, or =.

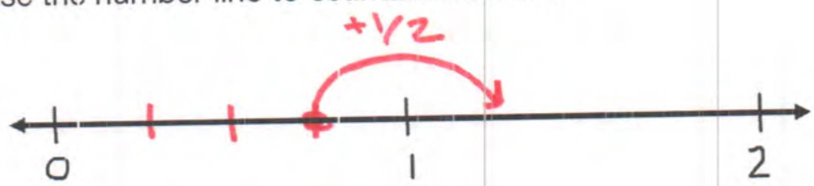
$$6\frac{3}{7} + 1\frac{1}{2} \underline{\qquad\qquad} 7 + \frac{13}{14}$$

$$5\frac{5}{8} - 4\frac{2}{5} \underline{\qquad\qquad} 1\frac{5}{8} + \frac{2}{5}$$

Name: KEY

Consider the equation $\frac{3}{4} + \frac{1}{2}$.

1. Use the number line to estimate the sum.



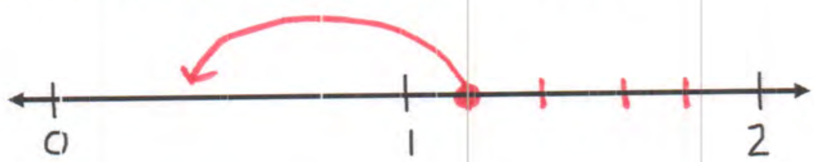
2. The sum will be ________ 1.
   a. greater than
   b. less than
   c. equal to

3. Explain how you know.

3/4 is almost 1 whole. I know if I add 1/2, I'll end up with a sum that's a little greater than 1.

Consider the equation $1\frac{1}{5} - \frac{2}{3}$.

4. Use the number line to estimate the difference.



5. The difference will be ________ 1.
   a. greater than
   b. less than
   c. equal to

6. Explain how you know.

$\frac{2}{3}$ is more than $\frac{1}{5}$, so if I'm 1/5 greater than 1 and I take away $\frac{2}{3}$, my answer will be less than 1.

Consider the equation $\frac{3}{8} + \frac{1}{3}$.

7. The sum will be ________ 1.
   a. greater than
   b. less than
   c. equal to

8. Explain how you know.

3/8 and 1/3 are both less than $\frac{1}{2}$.
I know $\frac{1}{2} + \frac{1}{2} = 1$, so adding two fractions
that are $< \frac{1}{2}$ will result in a total < 1.

Use estimation to determine whether each sum/difference is less than, equal to, or greater than ½.

9. $\frac{4}{10} + \frac{3}{9}$ $> \frac{1}{2}$

10. $1\frac{5}{8} - \frac{5}{6}$ $> 1/2$

11. $\frac{7}{8} - \frac{1}{10}$ $> 1/2$

Without solving, estimate the value of each expression to help you compare their values.

12. $1\frac{1}{2} + \frac{4}{5}$ > $1 + \frac{11}{12}$

$\frac{4}{5} \approx 1$

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

< 2

13. $4\frac{1}{5} + 2\frac{1}{3}$ < $7 + \frac{1}{2}$

$4\frac{1}{5} + 2\frac{1}{3}$ will be a little more than 6

$7\frac{1}{2}$

Name: KEY

1. Is each expression greater than or less than 1? Explain how you know.

$\frac{1}{2} + \frac{2}{9}$ LESS

$\frac{2}{9} < \frac{1}{2}$

$4\frac{5}{7} - 3\frac{5}{8}$ GREATER

$\frac{5}{8} < \frac{5}{7}$

so our answer would be a little more than 1

2. Is each expression greater than or less than ½? Explain how you know.

$\frac{3}{7} + \frac{1}{4}$ GREATER

$\frac{3}{7}$ is already really close to $\frac{1}{2}$

$1\frac{1}{9} - \frac{7}{8}$ LESS

$\frac{7}{8} \approx 1$

So $1\frac{1}{9} - 1 = \frac{1}{9}$

3. **Oscar has a goal to read for at least 5 hours this week. He read for $1\frac{1}{10}$ hour on Monday, and the same amount on Tuesday. If he reads for $2\frac{5}{6}$ hours today, will Oscar meet his goal?**

$1\frac{1}{10}$	$1\frac{1}{10}$	$2\frac{5}{6}$
M	T	today

$2\frac{2}{10}$

or

$2\frac{1}{5}$

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

4

this will be >1 since $\frac{1}{5}$ is more than the $\frac{1}{6}$ needed to make a whole

Yes! He will meet his goal.

4. **Compare the expressions below using >, <, or =.**

$6\frac{3}{7} + 1\frac{1}{2}$ = $7 + \frac{13}{14}$

$6\frac{6}{14} + 1\frac{7}{14}$

$7\frac{13}{14}$ $7\frac{13}{14}$

$5\frac{5}{8} - 4\frac{2}{5}$ < $1\frac{5}{8} + \frac{2}{5}$

$5\frac{25}{40} - 4\frac{16}{40}$ $1\frac{25}{40} + \frac{16}{40}$

$1\frac{9}{40}$ $1\frac{41}{40}$

$2\frac{1}{40}$

G5 U3 Lesson 13

Strategize to solve multi-term problems

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G5 U3 Lesson 13 - Students will strategize to solve multi-term problems

Warm Welcome (Slide 1): Tutor choice

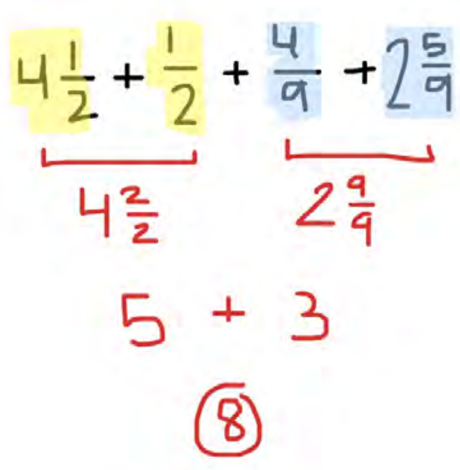
Frame the Learning/Connect to Prior Learning (Slide 2): There are only a couple more lessons left in our unit about adding and subtracting fractions. We'll use this lesson and the next one to pull all that we've learned together and apply it to multi-step problems and real-world application problems. The great thing is, you already know everything you ned to be successful when adding and subtracting fractions. Our goal today will be to think *strategically* about the problems we're given so that we can solve them in the most efficient way that works for us.

Let's Talk (Slide 3): A student, Wallace, was working on a math problem. I don't have all of his work, but I have his first step shown here. Take a second and review his first step. Don't worry about finding the answer. (*pause)* What do you notice he did? Why do you think he chose to do this first? Possible Student Answers, Key Points:

- He rearranged his addends. He moved halves next to halves and ninths next to ninths.
- He probably did this so his like units were next to each other, since we know it is easy to add with like units.

When I said our goal today was to think *strategically*, this is a great example of what I meant. We want to think about the problem we're given, and plan out a solution pathway that makes the math as easy as possible. Moving these addends so that he can think about like units is a simple, strategic move to make finding the answer more manageable. Wallace was thinking *strategically*. We'll use thinking similar to this throughout today's lesson.

Let's Think (Slide 4): For our first problem, let's actually work to solve Wallace's problem we just looked at. We'll strategize to solve this multi-term problem. Each fraction in this expression is a term, so how many terms does Wallace have to think about? (4 terms) Yes, this expression has 4 terms. Let's rearrange them like Wallace did so that our terms with like units are next to each other. We can do this, because the commutative property states that we can add in any order.



(rewrite expression similar to Wallace using a different color or highlighter to emphasize terms with like units) Now, I see the two terms with halves and the two terms with ninths next to each other.

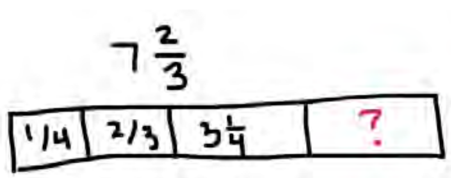
Let's think about the terms with halves. What is 4 ½ + ½? (4 2/2 or 5) If we add the fractional parts, we get a sum of 4 2/2. *(write 4 2/2 underneath the terms)* Since 2/2 is a whole, we can think of these two terms as having a sum of 5. *(write 5 underneath 4 2/2)*

Now, we can tackle the two terms with ninths. What is 4/9 plus 2 5/9? (2 9/9 or 3) If we add the fractional parts, we get a sum of 2 9/9. *(write 2 9/9 underneath the terms)* Since 9/9 is a whole, we can think of these two terms as having a sum of 3. *(write 3 underneath 2 9/9)*

Two of our terms added up to 5. The other two added up to 3. So the sum of all four terms is 5 + 3. The four terms add up to 8. Because we thought strategically, we were able to group parts of the problem in a way that made our math easier than if we had simply calculated from left to right. We didn't even have to make equivalent fractions with like units in this case. How cool is that? Thinking strategically can save a lot of time and energy.

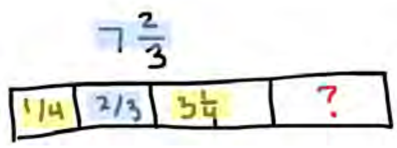
Let's Think (Slide 5): Take a look at our second problem. What do you notice about this problem? Possible Student Answers, Key Points:

- This problem involves subtraction.
- I see some terms with like units of thirds and some terms with like units of fourths. I think we can rearrange them to think strategically.



Time to be strategic. Let's picture this problem with a tape diagram to help us out. What is the total amount based on this tape diagram? (7 ⅔ I'll draw a rectangle and label the entire rectangle 7 ⅔ *(draw and label the rectangle, and partition it into 4 sections)* I know we're going to need to subtract ¼, ⅔and 3 ¼ *(fill each number in one section of the tape diagram)*, and then what's leftover will be our unknown. I'll write a question mark in the last section to represent the unknown. How can I be strategic when subtracting these values from 7 ⅔ Student Answers, Key Points:

- You can subtract the ⅔ first since the total already involves thirds.
- We can combine terms that have similar units. For example, we could combine the 3 ¼ with the ¼.



$$\left(7\tfrac{2}{3}-\tfrac{2}{3}\right)-\left(\tfrac{1}{4}+3\tfrac{1}{4}\right)$$

We should absolutely focus on terms that have like units, because we know like units make it easy to add and subtract. *(highlight terms with thirds in one color and terms with fourths in another)*

Considering this tape diagram, I know I could subtract out the part that is ⅔ first. That should be simple, because the total already involves thirds. Then I could subtract out the other two pieces. Rather than subtract them one at a time from the total, I could combine them before I subtract since they have like units. Here's how that expression might look if we rewrote it to match our strategy. *(write expression as shown, continuing to color-code the terms with like units)* I used parentheses to help me think about how I'm grouping the terms.

$$\underbrace{\left(7\tfrac{2}{3}-\tfrac{2}{3}\right)}_{7}-\underbrace{\left(\tfrac{1}{4}+3\tfrac{1}{4}\right)}_{3\frac{2}{4}}$$

$$7-3\tfrac{2}{4}$$

$$7-3-\tfrac{2}{4}$$

$$4-\tfrac{2}{4}=3\tfrac{2}{4} \text{ OR } 3\tfrac{1}{2}$$

Let's do the math, now that we have an efficient plan. What is 7 ⅔ minus ⅔? (7) *(write 7 with a bracket under the corresponding terms)*

What is ¼ + 3 ¼? (3 2/4 or 3 ½) *(write 3 2/4 with a bracket under the corresponding terms)*

Now we just need to subtract 7 - 3 2/4. Let's think of it as 7 - 3 - 2/4. *(rewrite the expression)* 7 minus 3 is 4. 4 minus 2/4 is 3 2/4. Our answer is 3 2/4 or 3 ½.

Think back to both the problems we strategized around. How did thinking about the terms ahead of time and rearranging the terms help us efficiently arrive at our answers? Student Answers, Key Points:

- Looking at our terms ahead of time helped us to think about how the numbers are related and which terms had similar units.
- Rearranging each expression helped us to group terms with like units which meant we were able to do many steps using mental math or quick computation.

Let's Try it (Slides 6 - 7): Now let's work together to solve multi-term problems strategically. There is no one correct way to strategize around a problem, but a few key moves can be useful under many circumstances. As we work, I encourage you to look for ways you can rearrange terms so that you can work easily with similar units. It can also be helpful to draw a model to help you think about how the numbers are related to one another. Let's get ready to strategize!

WARM WELCOME

Today we will strategize to solve multi-term problems.

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Let's Talk:

Wallace was trying to find the total. His first step is shown. Why do you think he did this?

$$4\frac{1}{2}+\frac{4}{9}+\frac{1}{2}+2\frac{5}{9} \longrightarrow 4\frac{1}{2}+\frac{1}{2}+\frac{4}{9}+2\frac{5}{9}$$

Let's Think:

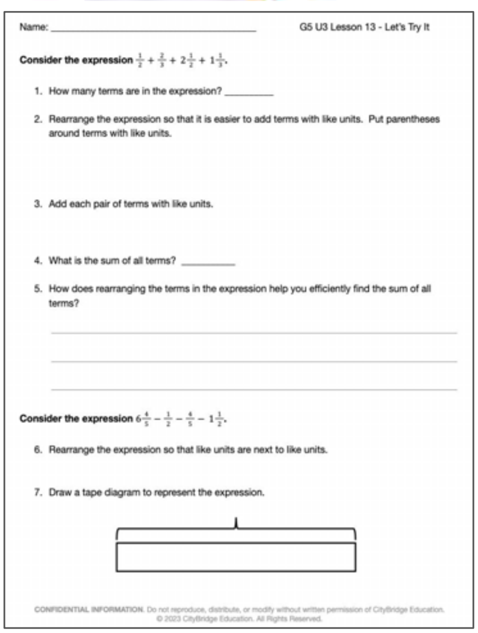
Strategize to find the sum.

$$4\frac{1}{2}+\frac{4}{9}+\frac{1}{2}+2\frac{5}{9}$$

Let's Think: Strategize to solve.

$$7\frac{2}{3} - \frac{1}{4} - \frac{2}{3} - 3\frac{1}{4} = ?$$

Let's Try It: Let's explore strategizing to solve multi-term problems together.



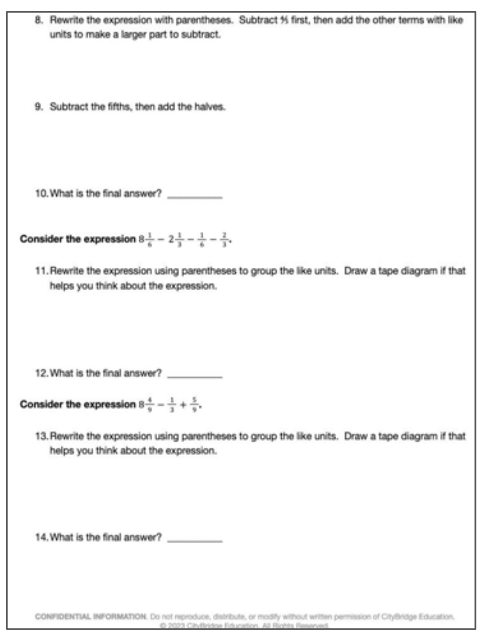
Name: ____________________ G5 U3 Lesson 13 - Let's Try It

Consider the expression $\frac{1}{2} + \frac{2}{3} + 2\frac{1}{2} + 1\frac{1}{3}$.

1. How many terms are in the expression? ________
2. Rearrange the expression so that it is easier to add terms with like units. Put parentheses around terms with like units.
3. Add each pair of terms with like units.
4. What is the sum of all terms? ________
5. How does rearranging the terms in the expression help you efficiently find the sum of all terms?

Consider the expression $6\frac{4}{5} - \frac{1}{2} - \frac{4}{5} - 1\frac{1}{2}$.

6. Rearrange the expression so that like units are next to like units.
7. Draw a tape diagram to represent the expression.



8. Rewrite the expression with parentheses. Subtract $\frac{4}{5}$ first, then add the other terms with like units to make a larger part to subtract.
9. Subtract the fifths, then add the halves.
10. What is the final answer? ________

Consider the expression $8\frac{1}{6} - 2\frac{1}{3} - \frac{1}{6} - \frac{2}{3}$.

11. Rewrite the expression using parentheses to group the like units. Draw a tape diagram if that helps you think about the expression.
12. What is the final answer? ________

Consider the expression $8\frac{4}{9} - \frac{1}{3} + \frac{5}{9}$.

13. Rewrite the expression using parentheses to group the like units. Draw a tape diagram if that helps you think about the expression.
14. What is the final answer? ________

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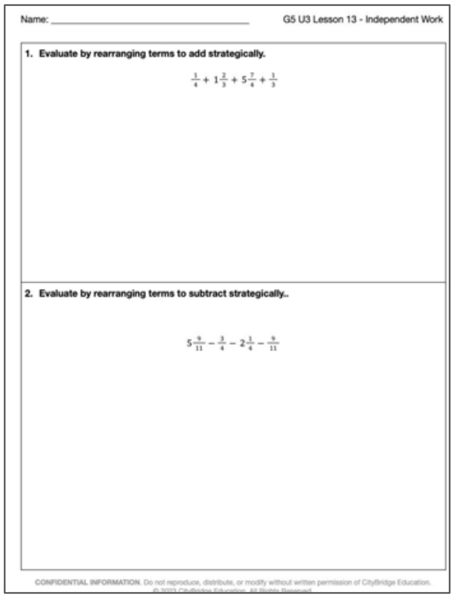
On your Own:

Now it’s time to strategize to solve multi-term problems on your own.



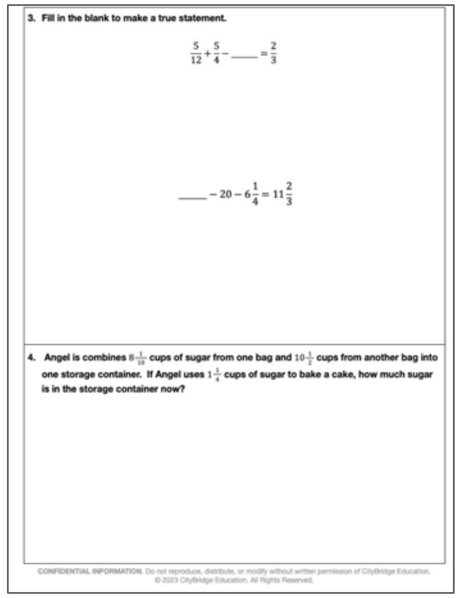
Name: ______________________ G5 U3 Lesson 13 - Independent Work

1. Evaluate by rearranging terms to add strategically.

$$\frac{1}{4} + 1\frac{2}{3} + 5\frac{7}{4} + \frac{1}{3}$$

2. Evaluate by rearranging terms to subtract strategically..

$$5\frac{9}{11} - \frac{3}{4} - 2\frac{1}{4} - \frac{9}{11}$$



3. Fill in the blank to make a true statement.

$$\frac{5}{12} + \frac{5}{4} - \_\_\_\_ = \frac{2}{3}$$

$$\_\_\_\_ - 20 - 6\frac{1}{4} = 11\frac{2}{3}$$

4. Angel is combines $8\frac{1}{10}$ cups of sugar from one bag and $10\frac{1}{2}$ cups from another bag into one storage container. If Angel uses $1\frac{1}{4}$ cups of sugar to bake a cake, how much sugar is in the storage container now?

Name: ______________________________ G5 U3 Lesson 13 - Let's Try It

Consider the expression $\frac{1}{2} + \frac{2}{3} + 2\frac{1}{2} + 1\frac{1}{3}$.

1. How many terms are in the expression? __________

2. Rearrange the expression so that it is easier to add terms with like units. Put parentheses around terms with like units.

3. Add each pair of terms with like units.

4. What is the sum of all terms? __________

5. How does rearranging the terms in the expression help you efficiently find the sum of all terms?

____

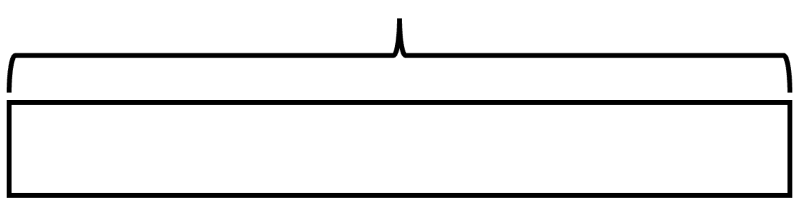
____

____

Consider the expression $6\frac{4}{5} - \frac{1}{2} - \frac{4}{5} - 1\frac{1}{2}$.

6. Rearrange the expression so that like units are next to like units.

7. Draw a tape diagram to represent the expression.



8. Rewrite the expression with parentheses. Subtract $\frac{4}{5}$ first, then add the other terms with like units to make a larger part to subtract.

9. Subtract the fifths, then add the halves.

10. What is the final answer? ____________

Consider the expression $8\frac{1}{6} - 2\frac{1}{3} - \frac{1}{6} - \frac{2}{3}$.

11. Rewrite the expression using parentheses to group the like units. Draw a tape diagram if that helps you think about the expression.

12. What is the final answer? ____________

Consider the expression $8\frac{4}{9} - \frac{1}{3} + \frac{5}{9}$.

13. Rewrite the expression using parentheses to group the like units. Draw a tape diagram if that helps you think about the expression.

14. What is the final answer? ____________

1. Evaluate by rearranging terms to add strategically.

$$\frac{1}{4} + 1\frac{2}{3} + 5\frac{7}{4} + \frac{1}{3}$$

2. Evaluate by rearranging terms to subtract strategically..

$$5\frac{9}{11} - \frac{3}{4} - 2\frac{1}{4} - \frac{9}{11}$$

3. Fill in the blank to make a true statement.

$$\frac{5}{12} + \frac{5}{4} - \_\_\_\_\_ = \frac{2}{3}$$

$$\_\_\_\_\_ - 20 - 6\frac{1}{4} = 11\frac{2}{3}$$

4. Angel is combines $8\frac{1}{10}$ cups of sugar from one bag and $10\frac{1}{2}$ cups from another bag into one storage container. If Angel uses $1\frac{1}{4}$ cups of sugar to bake a cake, how much sugar is in the storage container now?

Name: KEY

Consider the expression $\frac{1}{2} + \frac{2}{3} + 2\frac{1}{2} + 1\frac{1}{3}$.

1. How many terms are in the expression? 4

2. Rearrange the expression so that it is easier to add terms with like units. Put parentheses around terms with like units.

$$\left(\frac{1}{2} + 2\frac{1}{2}\right) + \left(\frac{2}{3} + 1\frac{1}{3}\right)$$

3. Add each pair of terms with like units.

$$3 + 2$$

4. What is the sum of all terms? 5

5. How does rearranging the terms in the expression help you efficiently find the sum of all terms?

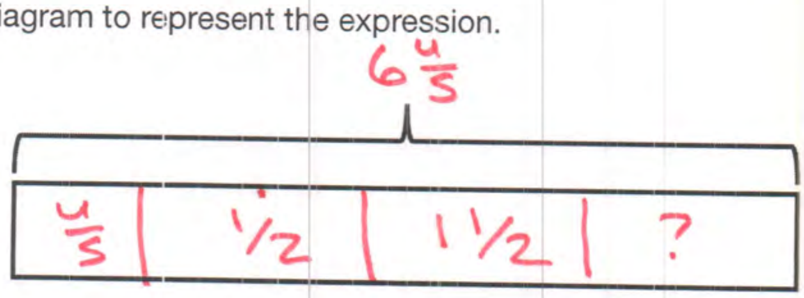
Rearranging the terms made it easy to combine terms that were related. In this case, we didn't even need to make like units!

Consider the expression $6\frac{4}{5} - \frac{1}{2} - \frac{4}{5} - 1\frac{1}{2}$.

6. Rearrange the expression so that like units are next to like units.

$$6\frac{4}{5} - \frac{4}{5} - \frac{1}{2} - 1\frac{1}{2}$$

7. Draw a tape diagram to represent the expression.



8. Rewrite the expression with parentheses. Subtract ⅘ first, then add the other terms with like units to make a larger part to subtract.

$\left(6\frac{4}{5} - \frac{4}{5}\right) - \left(\frac{1}{2} + 1\frac{1}{2}\right)$

9. Subtract the fifths, then add the halves.

$6 - 2$

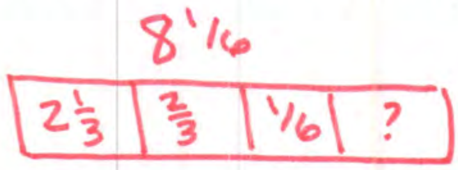
10. What is the final answer? 4

Consider the expression $8\frac{1}{6} - 2\frac{1}{3} - \frac{1}{6} - \frac{2}{3}$.

11. Rewrite the expression using parentheses to group the like units. Draw a tape diagram if that helps you think about the expression.

$\left(8\frac{1}{6} - \frac{1}{6}\right) - \left(2\frac{1}{3} + \frac{2}{3}\right)$

$8 - 3$



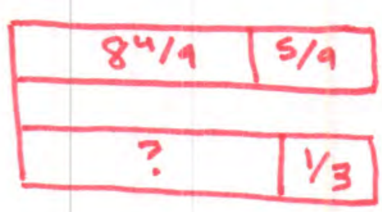
12. What is the final answer? 5

Consider the expression $8\frac{4}{9} - \frac{1}{3} + \frac{5}{9}$.

13. Rewrite the expression using parentheses to group the like units. Draw a tape diagram if that helps you think about the expression.

$\left(8\frac{4}{9} + \frac{5}{9}\right) - \frac{1}{3}$

$9 - \frac{1}{3}$



14. What is the final answer? $8\frac{2}{3}$

Name: KEY

1. Evaluate by rearranging terms to add strategically.

$$\frac{1}{4} + 1\frac{2}{3} + 5\frac{7}{4} + \frac{1}{3}$$

$$\left(1\frac{2}{3} + \frac{1}{3}\right) + \left(\frac{1}{4} + 5\frac{7}{4}\right)$$

$$1\frac{3}{3} + 5\frac{8}{4}$$

$$2 + 7$$

$$9$$

2. Evaluate by rearranging terms to subtract strategically..

$$5\frac{9}{11} - \frac{3}{4} - 2\frac{1}{4} - \frac{9}{11}$$

$$\left(5\frac{9}{11} - \frac{9}{11}\right) - \left(\frac{3}{4} + 2\frac{1}{4}\right)$$

$$5 - 3$$

$$2$$

3. Fill in the blank to make a true statement.

$$\frac{5}{12} + \frac{5}{4} - \_\_\_\_ = \frac{2}{3}$$

$\frac{5}{12} + \frac{15}{12}$

$\frac{20}{12} - \_\_\_\_ = \frac{8}{12}$

$\frac{12}{12}$ OR 1

$$\_\_\_\_ - 20 - 6\frac{1}{4} = 11\frac{2}{3}$$

?

20	$6\frac{1}{4}$	$11\frac{2}{3}$

$20 + 6\frac{3}{12} + 11\frac{8}{12}$

$26\frac{3}{12} + 11\frac{8}{12}$

$37\frac{11}{12}$

4. Angel is combines $8\frac{1}{10}$ cups of sugar from one bag and $10\frac{1}{2}$ cups from another bag into one storage container. If Angel uses $1\frac{1}{4}$ cups of sugar to bake a cake, how much sugar is in the storage container now?

$(8\frac{1}{10} + 10\frac{1}{2}) - 1\frac{1}{4}$

$(8\frac{2}{10} + 10\frac{5}{10}) - 1\frac{1}{4}$

$18\frac{7}{10} - 1\frac{1}{4} \longrightarrow 18\frac{14}{20} - 1\frac{5}{20} = 17\frac{9}{20}$ cups

G5 U3 Lesson 14

Solve multi-step word problems; assess reasonableness of solutions using benchmark numbers

Warm Welcome (Slide 1): Tutor choice

Frame the Learning/Connect to Prior Learning (Slide 2): Today is our last lesson of our unit that's been all about adding and subtracting fractions. What are some things that stand out to you about what we've been learning? What have you learned about adding and subtracting with fractions? Possible Student Answers, Key Points:

- It's important to add and subtract with like units. That means we have to sometimes find equivalent fractions.
- We can model adding and subtracting on number lines or with area models.
- We can use benchmark fractions to help us estimate sums and differences.
- It is sometimes helpful to add or subtract in parts. For instance, we can break apart mixed numbers into wholes and fractions. Or we can strategically rearrange expressions to add or subtract efficiently.

Those are all great takeaways. We're actually not going to learn anything brand new today. Instead, we're going to use everything we've been learning about and apply it to solve multi-step word problems about the world around us. Let's try a few out!

Let's Talk (Slide 3): Take a moment to look at this picture. What do you notice? Possible Student Answers, Key Points:

- I notice the person has \$20. I notice the person is at the circus. It looks like they are trying to pay for items. The circus has popcorn, cotton candy, and souvenir cups for sale.

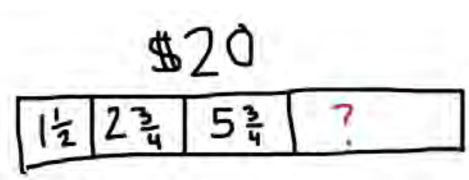
What math questions could we ask based on this picture? Possible Student Answers, Key Points:

- How much does it cost to buy all the items?
- How much money does the person need to buy certain items?
- How much money does the person have after buying certain items?

Today, we'll solve real-world problems involving fractions. Our first problem involves the information you see here. Let's take a look.

Let's Think (Slide 4): Let's read the problem all the way through once. *(read it)* Now, read it again to yourself. Once you're done, I want you to retell the story in your own words. Possible Student Answers, Key Points:

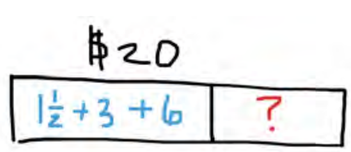
- Marcus is going to buy one of each item on the sign. He's going to pay with his twenty-dollar bill, and we want to know how much is left after he pays.



Let's visualize the story with a tape diagram, so we can see how the numbers are related and so we can be strategic about how we solve the problem. *(draw tape diagram as you narrate)* I know he has \$20 in all, so I'll draw a long rectangle labeled as \$20. I know part of his money goes toward cotton candy, part of his money goes toward popcorn, part goes toward a cup, and part will be leftover. I'll label each part with the amount he'll spend, and I'll put a question mark for the part that he has left. That's our unknown.

Now that we have a better picture of what is happening in the story, let's estimate using benchmark numbers. What benchmarks are each of our mixed numbers close to? Possible Student Answers, Key Points:

- 1 ½ is already a benchmark. 2 ¾ is close to 3, and 5 ¾ is close to 6.



$20 - 10\frac{1}{2}$

$20 - 10 - \frac{1}{2}$

We can use these benchmarks to estimate an answer. If we think of each item's cost as a benchmark, we know that the items will cost 1 ½ + 3 + 6 dollars. *(redraw tape diagram using benchmark numbers as shown)*

What is the sum of the benchmark numbers? (10 ½) To find the leftover amount, we can subtract 20 - 10 ½. *(write expression)* I know 20 - 10 is 10, and then I can subtract the remaining ½. *(write 20 - 10 - ½, then 10 - ½ under that)* What is 10 - ½? (9 ½) Our answer should end up being close to 9 ½ dollars. This quick estimation will ensure our answer is reasonable.

$$20 - \left(2\frac{3}{4} + 5\frac{3}{4} + 1\frac{1}{2}\right)$$

Now, let's calculate the exact answer. Let's add the three items together and subtract them from the 20-dollar bill. We can think of this as 20 minus the sum of all three items. *(write expression as shown)* What do you notice about how I wrote the expression? Possible Student Answers, Key Points:

- Your equation shows the 20 dollars minus the three items. You used parentheses to group the three items.
- I notice you rearranged the addends so that terms with like units were next to each other.

$$20 - \left(7\tfrac{6}{4} + 1\tfrac{1}{2}\right)$$

$$20 - \left(8\tfrac{2}{4} + 1\tfrac{1}{2}\right)$$

$$20 - 10 = \$10$$

We will add 2 ¾ plus 5 ¾ first. What is that sum? (7 6/4) *(rewrite expression to show 7 6/4)* That mixed number has a fraction greater than 1 whole, so we can decompose to make a new whole from four of the fourths. 7 6/4 is the same as 8 and 2/4, or 8 and ½. *(rewrite expression to show 8 2/4)*

Let's keep adding the parts in parentheses. What is 8 2/4 or 8 ½ plus 1 ½? (10) This means the total cost of all three items is $10. All we have left to do is determine Marcus's change. If he pays with a $20 bill, how much money will Marcus get back? *(write 20 - 10)* Correct! He'll get $10 back after buying all three items. Is this answer reasonable?
Possible Student Answers, Key Points:

- Our estimate was 9 ½ dollars, and our actual answer was $10. Since our actual answer is close to our estimate, then our answer is reasonable.

We just used a lot of what we learned this unit to estimate and then solve a multi-step problem. Well done!

Not every problem we see today will follow the same exact steps, but we can always draw a tape diagram and estimate to make sense of the story before attempting to solve.

Let's Try it (Slides 5 - 6): Now let's work together to solve multi-step word problems and assess the reasonableness of solutions using benchmark numbers. We'll draw models to help us visualize each story. Models also help us see how numbers in the story are related so that we can find an efficient solution pathway. We'll also use benchmarks like whole numbers and halves to make sure the answers we get are reasonable. Let's dive in.

WARM WELCOME

Today we will solve multi-step problems and assess the reasonableness of solutions using benchmark numbers.

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Let's Talk:

What do you notice?

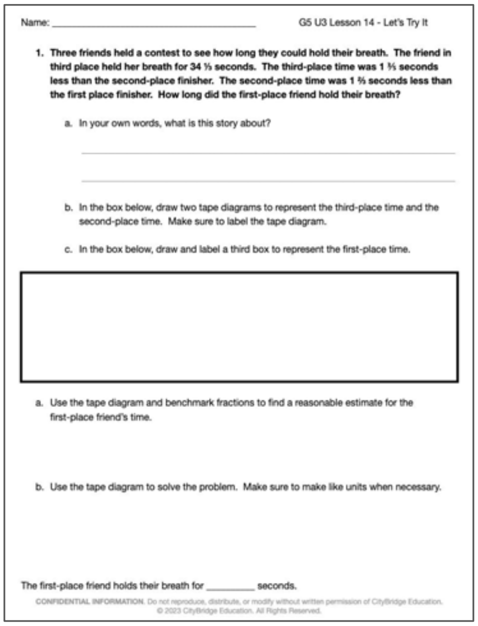
What math questions could we ask?

Let's Think:

Marcus buys a cotton candy, a popcorn, and a souvenir soda cup from the circus. If he pays with a $10-bill, how much money does Marcus have left?

Let's Try It:

Let's explore solving multi-step problems together.


Name: ______________________ G5 U3 Lesson 14 - Let's Try It

1. Three friends held a contest to see how long they could hold their breath. The friend in third place held her breath for 34 $\frac{1}{3}$ seconds. The third-place time was 1 $\frac{3}{5}$ seconds less than the second-place finisher. The second-place time was 1 $\frac{2}{3}$ seconds less than the first place finisher. How long did the first-place friend hold their breath?

a. In your own words, what is this story about?

b. In the box below, draw two tape diagrams to represent the third-place time and the second-place time. Make sure to label the tape diagram.

c. In the box below, draw and label a third box to represent the first-place time.

a. Use the tape diagram and benchmark fractions to find a reasonable estimate for the first-place friend's time.

b. Use the tape diagram to solve the problem. Make sure to make like units when necessary.

The first-place friend holds their breath for ________ seconds.

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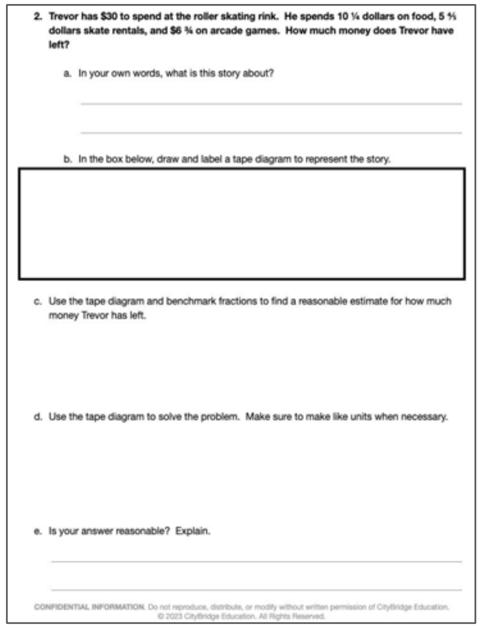
2. Trevor has \$30 to spend at the roller skating rink. He spends 10 $\frac{1}{4}$ dollars on food, 5 $\frac{4}{5}$ dollars skate rentals, and \$6 $\frac{3}{4}$ on arcade games. How much money does Trevor have left?

a. In your own words, what is this story about?

b. In the box below, draw and label a tape diagram to represent the story.

c. Use the tape diagram and benchmark fractions to find a reasonable estimate for how much money Trevor has left.

d. Use the tape diagram to solve the problem. Make sure to make like units when necessary.

e. Is your answer reasonable? Explain.

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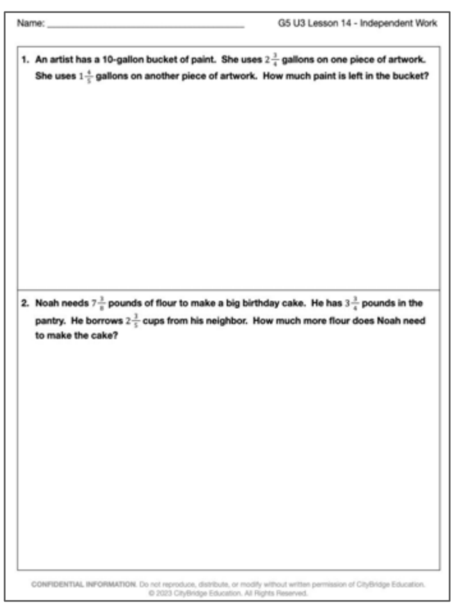
On your Own:

Now it's time to solve multi-step problems on your own.


Name: ______________________ G5 U3 Lesson 14 - Independent Work

1. An artist has a 10-gallon bucket of paint. She uses $2\frac{3}{4}$ gallons on one piece of artwork. She uses $1\frac{4}{5}$ gallons on another piece of artwork. How much paint is left in the bucket?

2. Noah needs $7\frac{3}{8}$ pounds of flour to make a big birthday cake. He has $3\frac{3}{4}$ pounds in the pantry. He borrows $2\frac{3}{5}$ cups from his neighbor. How much more flour does Noah need to make the cake?

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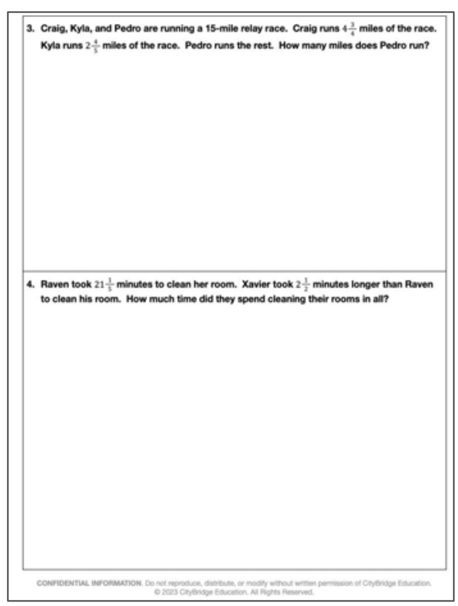
3. Craig, Kyla, and Pedro are running a 15-mile relay race. Craig runs $4\frac{3}{4}$ miles of the race. Kyla runs $2\frac{4}{5}$ miles of the race. Pedro runs the rest. How many miles does Pedro run?

4. Raven took $21\frac{1}{5}$ minutes to clean her room. Xavier took $2\frac{1}{2}$ minutes longer than Raven to clean his room. How much time did they spend cleaning their rooms in all?

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1. Three friends held a contest to see how long they could hold their breath. The friend in third place held her breath for 34 ⅓ seconds. The third-place time was 1 ⅗ seconds less than the second-place finisher. The second-place time was 1 ⅓ seconds less than the first place finisher. How long did the first-place friend hold their breath?

   a. In your own words, what is this story about?

   ____

   ____

   b. In the box below, draw two tape diagrams to represent the third-place time and the second-place time. Make sure to label the tape diagram.

   c. In the box below, draw and label a third box to represent the first-place time.

a. Use the tape diagram and benchmark fractions to find a reasonable estimate for the first-place friend's time.

b. Use the tape diagram to solve the problem. Make sure to make like units when necessary.

The first-place friend holds their breath for __________ seconds.

2. Trevor has $30 to spend at the roller skating rink. He spends 10 ¼ dollars on food, 5 ⅘ dollars skate rentals, and $6 ¾ on arcade games. How much money does Trevor have left?

   a. In your own words, what is this story about?

   ____

   ____

b. In the box below, draw and label a tape diagram to represent the story.

c. Use the tape diagram and benchmark fractions to find a reasonable estimate for how much money Trevor has left.

d. Use the tape diagram to solve the problem. Make sure to make like units when necessary.

e. Is your answer reasonable? Explain.

1. An artist has a 10-gallon bucket of paint. She uses $2\frac{3}{4}$ gallons on one piece of artwork. She uses $1\frac{4}{5}$ gallons on another piece of artwork. How much paint is left in the bucket?

2. Noah needs $7\frac{3}{8}$ pounds of flour to make a big birthday cake. He has $3\frac{3}{4}$ pounds in the pantry. He borrows $2\frac{3}{5}$ cups from his neighbor. How much more flour does Noah need to make the cake?

3. Craig, Kyla, and Pedro are running a 15-mile relay race. Craig runs $4\frac{3}{4}$ miles of the race. Kyla runs $2\frac{4}{5}$ miles of the race. Pedro runs the rest. How many miles does Pedro run?

4. Raven took $21\frac{1}{5}$ minutes to clean her room. Xavier took $2\frac{1}{2}$ minutes longer than Raven to clean his room. How much time did they spend cleaning their rooms in all?

Name: KEY

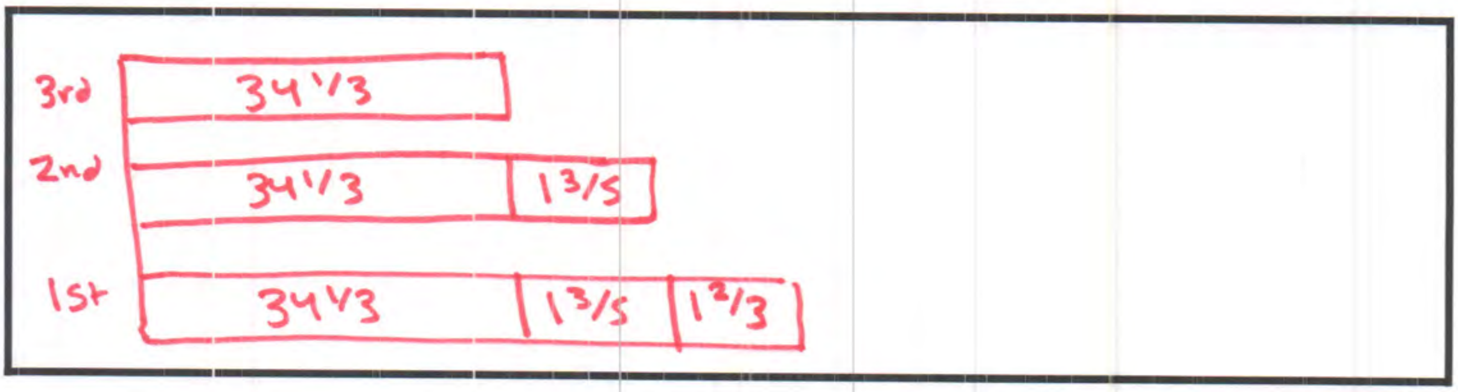
1. Three friends held a contest to see how long they could hold their breath. The friend in third place held her breath for 34 ⅓ seconds. The third-place time was 1 ⅗ seconds less than the second-place finisher. The second-place time was 1 ⅔ seconds less than the first place finisher. How long did the first-place friend hold their breath?

a. In your own words, what is this story about?

Three friends were holding their breath, and we are trying to find the winner's time.

b. In the box below, draw two tape diagrams to represent the third-place time and the second-place time. Make sure to label the tape diagram.

c. In the box below, draw and label a third box to represent the first-place time.



a. Use the tape diagram and benchmark fractions to find a reasonable estimate for the first-place friend's time.

$34\frac{1}{3} \approx 34$

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

$1\frac{3}{5} \approx 1\frac{1}{2}$

$34 + 1\frac{1}{2} + 1\frac{1}{2}$

$34 + 3$

≈ 37 sec

b. Use the tape diagram to solve the problem. Make sure to make like units when necessary.

$(34\frac{1}{3} + 1\frac{2}{3}) + 1\frac{3}{5}$

$35\frac{3}{3} + 1\frac{3}{5}$

$36 + 1\frac{3}{5}$

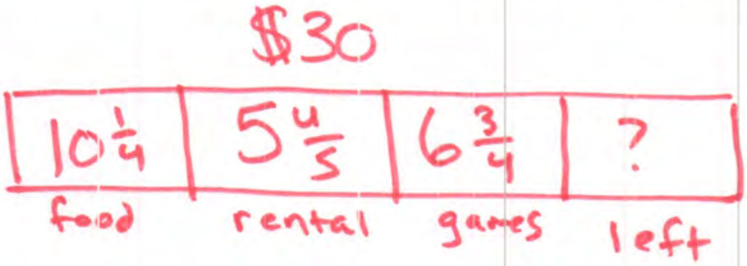
The first-place friend holds their breath for $37\frac{3}{5}$ seconds.

2. **Trevor has $30 to spend at the roller skating rink. He spends 10 ¼ dollars on food, 5 ⅘ dollars skate rentals, and $6 ¾ on arcade games. How much money does Trevor have left?**

a. In your own words, what is this story about?

Trevor bought 3 items with his money, and we want to know how much he has left.

b. In the box below, draw and label a tape diagram to represent the story.



c. Use the tape diagram and benchmark fractions to find a reasonable estimate for how much money Trevor has left.

$10\frac{1}{4} \approx 10$
$5\frac{4}{5} \approx 6$
$6\frac{3}{4} \approx 7$

$10+6+7$
23

$30-23=7$

≈ 7 dollars

d. Use the tape diagram to solve the problem. Make sure to make like units when necessary.

$30-(10\frac{1}{4}+6\frac{3}{4}+5\frac{4}{5})$
$30-(17+5\frac{4}{5})$
$30-22\frac{4}{5}$

$30-22-\frac{4}{5}$
$8-\frac{4}{5}$
$\$7\frac{1}{5}$

e. Is your answer reasonable? Explain.

Yes! $7\frac{1}{5}$ is close to my estimate of 7.

Name: KEY

1. An artist has a 10-gallon bucket of paint. She uses $2\frac{3}{4}$ gallons on one piece of artwork. She uses $1\frac{4}{5}$ gallons on another piece of artwork. How much paint is left in the bucket?

10

$2\frac{3}{4}$	$1\frac{4}{5}$	?
art #1	art #2	left

$10 - (2\frac{3}{4} + 1\frac{4}{5}) = ?$

$10 - (2\frac{15}{20} + 1\frac{16}{20}) = ?$

$10 - (3\frac{31}{20})$

$10 - 4\frac{11}{20}$

$10 - 4 - \frac{11}{20}$

$6 - \frac{11}{20} = 5\frac{9}{20}$ gallons

2. Noah needs $7\frac{3}{8}$ pounds of flour to make a big birthday cake. He has $3\frac{3}{4}$ pounds in the pantry. He borrows $2\frac{3}{5}$ cups from his neighbor. How much more flour does Noah need to make the cake?

$7\frac{3}{8}$

$3\frac{3}{4}$	$2\frac{3}{5}$	?
has	borrowed	needs

$7\frac{3}{8} - (3\frac{3}{4} + 2\frac{3}{5})$

$7\frac{3}{8} - (3\frac{15}{20} + 2\frac{12}{20})$

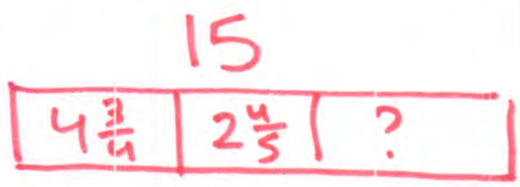
$7\frac{3}{8} - 5\frac{27}{20}$

$7\frac{3}{8} - 6\frac{7}{20}$

$7\frac{15}{40} - 6\frac{14}{40}$

$1\frac{1}{40}$ cup

3. **Craig, Kyla, and Pedro are running a 15-mile relay race. Craig runs $4\frac{3}{4}$ miles of the race. Kyla runs $2\frac{4}{5}$ miles of the race. Pedro runs the rest. How many miles does Pedro run?**



$15 - 4\frac{3}{4} - 2\frac{4}{5}$

$15 - 4 - \frac{3}{4} - 2\frac{4}{5}$

$11 - \frac{3}{4} - 2\frac{4}{5}$

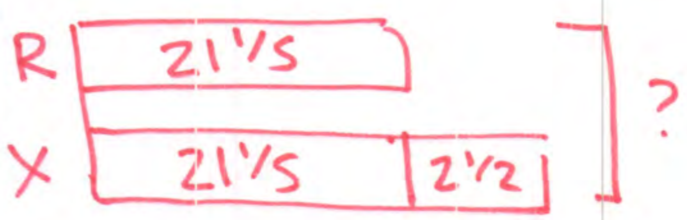
$10\frac{1}{4} - 2\frac{4}{5}$

$10\frac{5}{20} - 2\frac{16}{20}$

$9\frac{25}{20} - 2\frac{16}{20}$

$7\frac{9}{20}$ miles

4. **Raven took $21\frac{1}{5}$ minutes to clean her room. Xavier took $2\frac{1}{2}$ minutes longer than Raven to clean his room. How much time did they spend cleaning their rooms in all?**



$\underbrace{21\frac{1}{5} + 21\frac{1}{5}} + 2\frac{1}{2}$

$42\frac{2}{5} + 2\frac{1}{2}$

$42\frac{4}{10} + 2\frac{5}{10}$

$44\frac{9}{10}$ min