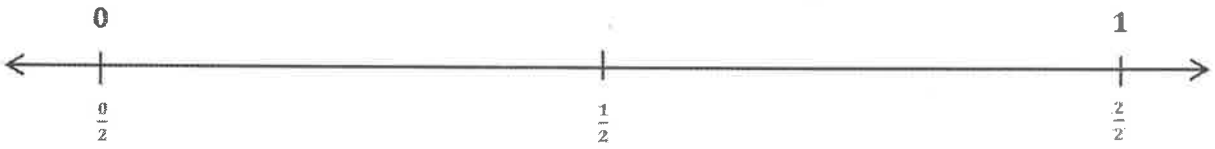
Homework Helpers

Grade 5 Module 3

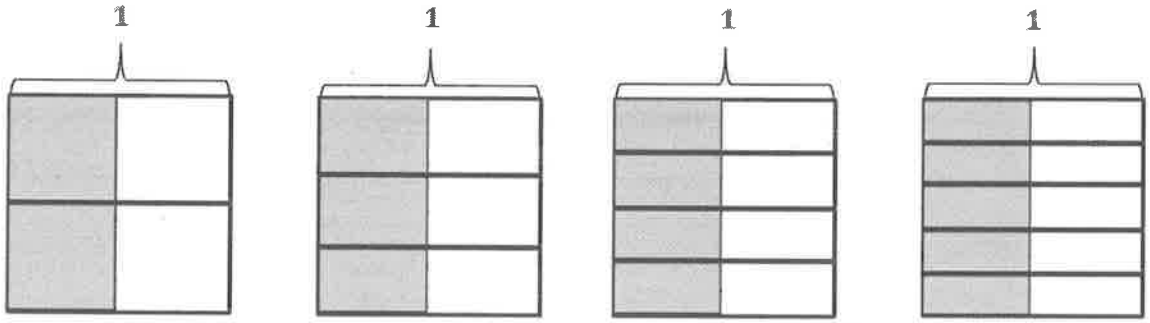
G5-M3-Lesson 1

If I don't have the folded paper strip from class, I can cut a strip of paper about the length of this number line. I can fold it in 2 equal parts. Then, I can use it to label the number line.

1. Use the folded paper strip to mark points 0 and 1 above the number line and $\frac{0}{2}$, $\frac{1}{2}$, and $\frac{2}{2}$ below it.



Draw one vertical line down the middle of each rectangle, creating two parts. Shade the left half of each. Partition with horizontal lines to show the equivalent fractions $\frac{2}{4}$, $\frac{3}{6}$, $\frac{4}{8}$, and $\frac{5}{10}$. Use multiplication to show the change in the units.

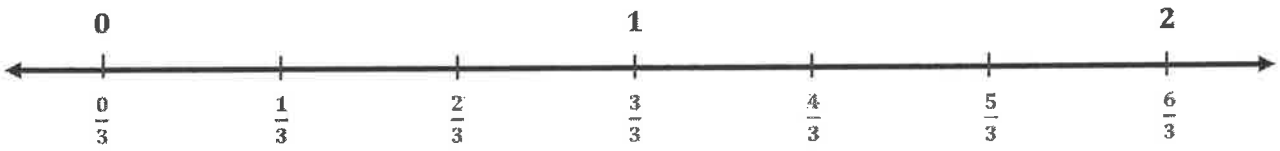


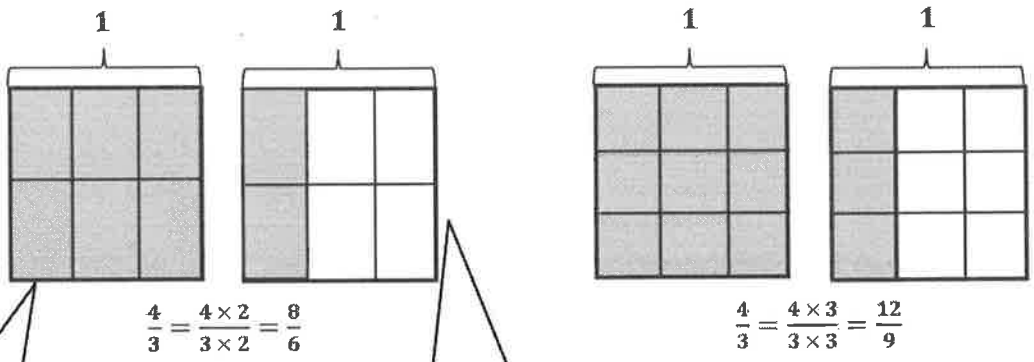
$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$ $\frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$ $\frac{1}{2} = \frac{1 \times 4}{2 \times 4} = \frac{4}{8}$ $\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10}$

I started with one whole and divided it into halves by drawing 1 vertical line. I shaded 1 half. Then, I divided the halves into 2 equal parts by drawing a horizontal line. The shading shows me that $\frac{1}{2} = \frac{2}{4}$.

I did the same with the other models. I divided the halves into smaller units to make sixths, eighths, and tenths.

2. Continue the process, and model 2 equivalent fractions for 4 thirds. Estimate to mark the points on the number line.





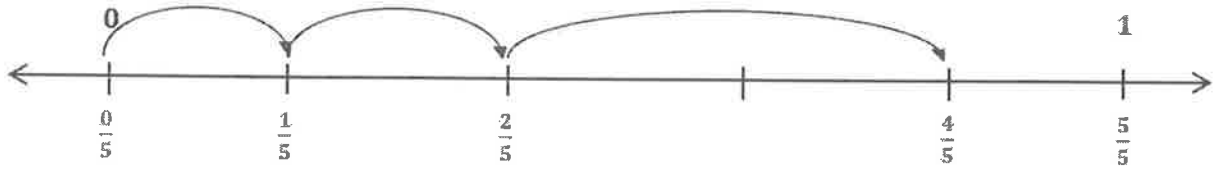
The same thinking works with fractions greater than one. I start by shading 1 and 1 third, which is the same as 4 thirds. To show thirds, I drew vertical lines.

Then, I partitioned the thirds into a smaller unit, sixths, by drawing horizontal lines.

G5-M3-Lesson 2

1. Show each expression on a number line. Solve.

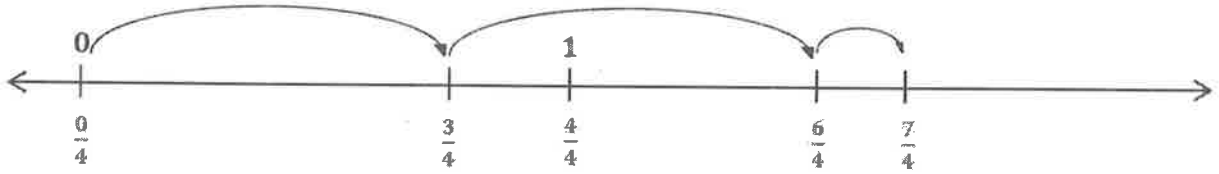
   a. $\frac{1}{5}+\frac{1}{5}+\frac{2}{5}$



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

I'm not too concerned about making the jumps on the number line exactly proportional. The number line is just to help me visualize and calculate a solution.

   b. $2\times\frac{3}{4}+\frac{1}{4}$



I can think of this problem in unit form: 2 times 3 fourths plus 1 fourth.

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

$$=\frac{6}{4}+\frac{1}{4}=\frac{7}{4}$$

The answer doesn't have to be simplified. Writing either $\frac{7}{4}$ or $1\frac{3}{4}$ is correct.

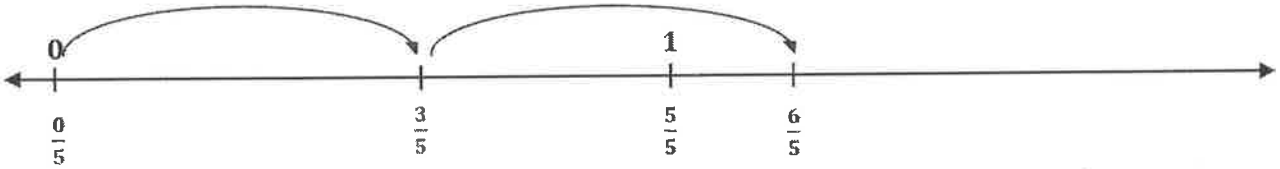
2. Express $\frac{6}{5}$ as the sum of two or three equal fractional parts. Rewrite it as a multiplication equation, and then show it on a number line.

Since the directions asked for a sum, I know I have to show an addition equation.

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

$2\times\frac{3}{5}$ is equivalent to $\frac{3}{5}+\frac{3}{5}$.

Another correct solution is $\frac{2}{5}+\frac{2}{5}+\frac{2}{5}=3\times\frac{2}{5}$.

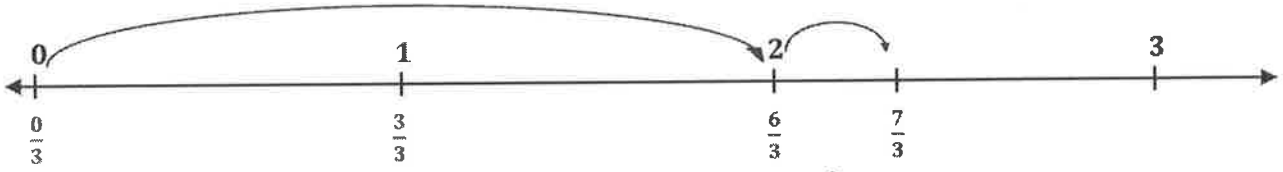


3. Express $\frac{7}{3}$ as the sum of a whole number and a fraction. Show on a number line.

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

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

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

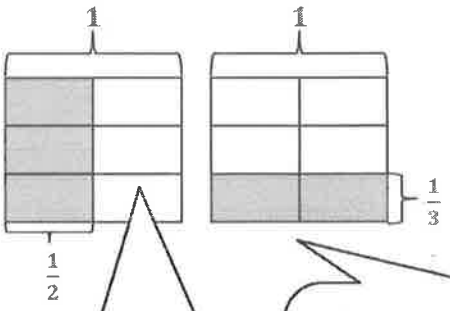


I know that $\frac{6}{3}$ is equivalent to 2. $\frac{6}{3}=\frac{3}{3}+\frac{3}{3}$. This is the same as 1 + 1.

G5-M3-Lesson 3

Draw a rectangular fraction model to find the sum. Simplify your answer, if possible.

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



First, I make 2 identical wholes. I shade $\frac{1}{2}$ vertically. In the other whole I can show $\frac{1}{3}$ by drawing 2 horizontal lines.

I need to make like units in order to add. I partition the halves into sixths by drawing 2 horizontal lines.

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

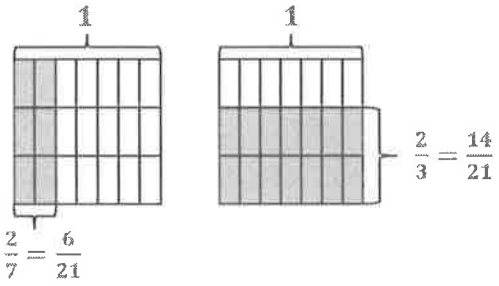
I divide the thirds into sixths by drawing a vertical line. In both models, I have like units: sixths.

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

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

b. $\frac{2}{7}+\frac{2}{3}=\frac{20}{21}$

These addends are non-unit fractions because both have numerators greater than one.



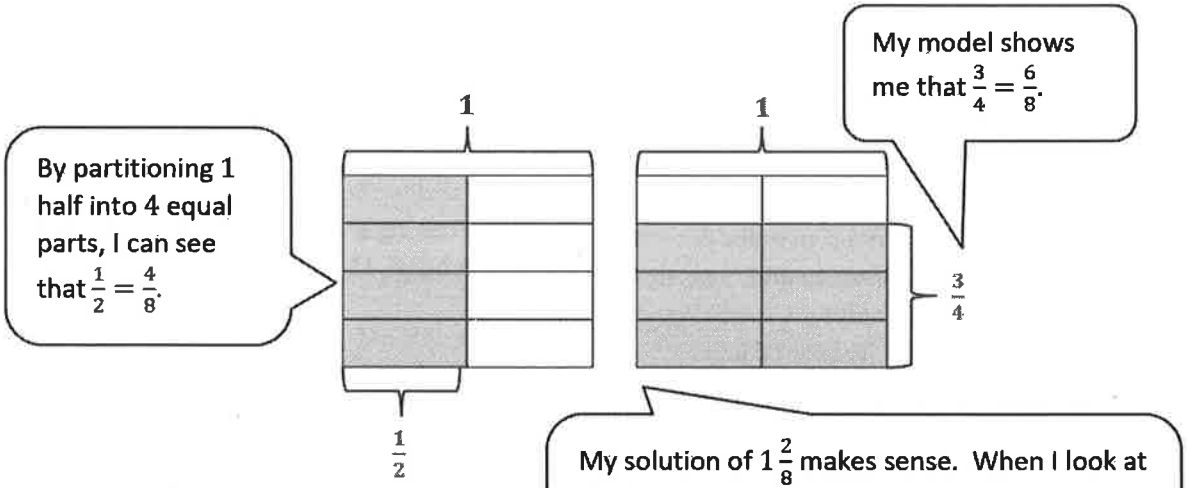
$$\frac{2}{7}+\frac{2}{3}=\frac{6}{21}+\frac{14}{21}=\frac{20}{21}$$

G5-M3-Lesson 4

For the following problem, draw a picture using the rectangular fraction model, and write the answer. If possible, write your answer as a mixed number.

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

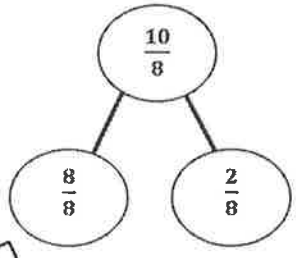
I need to make like units before adding.



My solution of $1\frac{2}{8}$ makes sense. When I look at the fraction models and think about adding them together, I can see that they would make 1 whole and 2 eighths when combined.

$\frac{1}{2}+\frac{3}{4}=\frac{4}{8}+\frac{6}{8}=\frac{10}{8}=1\frac{2}{8}$

I don't need to express my solution in simplest form, but if wanted to, I could show that $1\frac{2}{8}=1\frac{1}{4}$.



I can use a number bond to rename $\frac{10}{8}$ as a mixed number. This part-part-whole model shows that 10 eighths is composed of 8 eighths and 2 eighths.

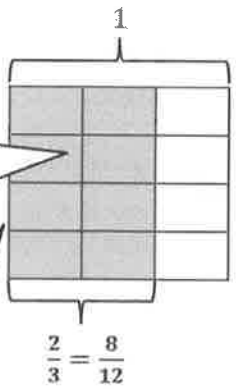
G5-M3-Lesson 5

1. Find the difference. Use a rectangular fraction model to find a common unit. Simplify your answer, if possible.

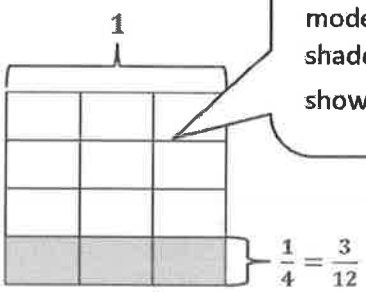
$\frac{2}{3} - \frac{1}{4} = \frac{5}{12}$

In order to subtract fourths from thirds, I need to find like units.

I draw 2 vertical lines to partition my model into thirds and shade 2 of them to show the fraction $\frac{2}{3}$.



I draw 3 horizontal lines to partition my model into fourths and shade 1 of them to show the fraction $\frac{1}{4}$.



In order to make like units, or common denominators, I draw 3 horizontal lines to partition the model into 12 equal parts. Now, I can see that $\frac{2}{3} = \frac{8}{12}$.

I still can't subtract. Fourths and twelfths are different units. But, I can draw 2 vertical lines to partition the model into 12 equal parts. Now, I have equal units and can see that $\frac{1}{4} = \frac{3}{12}$.

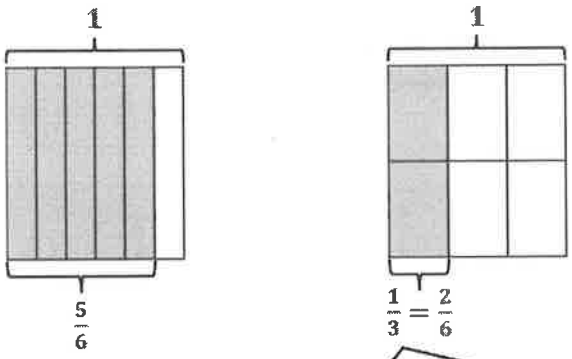
$\frac{2}{3} - \frac{1}{4} = \frac{8}{12} - \frac{3}{12} = \frac{5}{12}$

Once I have like units, the subtraction is simple. I know that 8 minus 3 is equal to 5, so I can think of this in unit form very simply.

8 twelfths − 3 twelfths = 5 twelfths

2. Lisbeth needs $\frac{1}{3}$ of a tablespoon of spice for a baking recipe. She has $\frac{5}{6}$ of a tablespoon in her pantry. How much spice will Lisbeth have after baking?

I'll need to subtract $\frac{1}{3}$ from $\frac{5}{6}$ to find out how much remains.



This was interesting! After drawing the $\frac{5}{6}$ that Lisbeth has in her pantry, I realized that thirds and sixths are related units. In this problem, I could leave $\frac{5}{6}$ as is and only rename the thirds as sixths to find a common unit.

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

I could also express $\frac{3}{6}$ as $\frac{1}{2}$ because they are equivalent fractions, but I don't have to.

Lisbeth will have $\frac{3}{6}$ of a tablespoon of spice after baking.

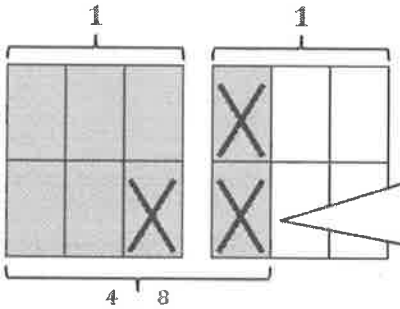
In order to finish the problem, I must make a statement to answer the question.

G5-M3-Lesson 6

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

a. $\frac{4}{3} - \frac{1}{2} = \frac{5}{6}$

In order to subtract halves from thirds, I'll need to find a common unit. I can rename them both as a number of sixths.



I can cross out the $\frac{3}{6}$ that I'm subtracting to see the $\frac{5}{6}$ that represents the difference.

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

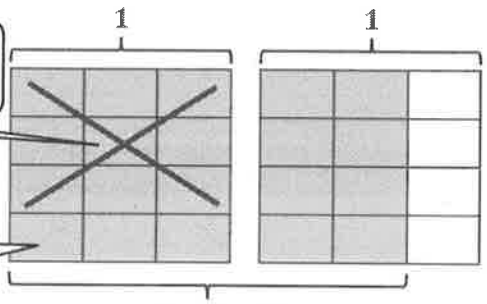
$\frac{4}{3} - \frac{1}{2} = \frac{8}{6} - \frac{3}{6} = \frac{5}{6}$

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

b. $1\frac{2}{3} - \frac{3}{4} = \frac{11}{12}$

In order to subtract fourths from thirds, I'll need to find a common unit. I can rename them both as a number of twelfths.

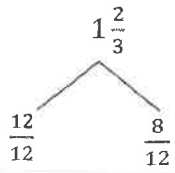
This time, I'll subtract $\frac{3}{4}$ (or $\frac{9}{12}$) all at once from the 1 (or the $\frac{12}{12}$).



Then, in order to find the difference, I can add these $\frac{3}{12}$ to the $\frac{8}{12}$ in the fraction model to the right.

$1\frac{2}{3} = \frac{5}{3} = \frac{20}{12}$

I can use the fraction model and this number bond to help me see that $1\frac{2}{3}$ is composed of $\frac{12}{12}$ and $\frac{8}{12}$.



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

G5-M3-Lesson 7

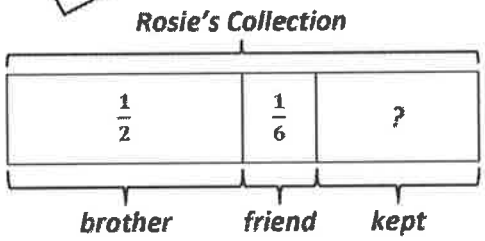
RDW means "Read, Draw, Write." I **read** the problem several times. I **draw** something each time I read. I remember to **write** the answer to the question.

Solve the word problems using the RDW strategy.

1. Rosie has a collection of comic books. She gave $\frac{1}{2}$ of them to her brother. Rosie gave $\frac{1}{6}$ of them to her friend, and she kept the rest. How much of the collection did Rosie keep for herself?

If I subtract $\frac{1}{2}$ and $\frac{1}{6}$ from 1, I can find how much of the collection Rosie kept for herself.

I can draw a tape diagram to model this problem.



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

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

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

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

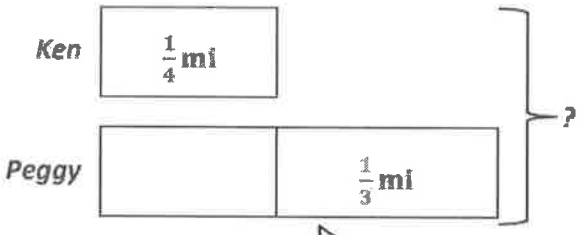
I've been doing so much of this that now I can rename some fractions in my head. I know that $\frac{1}{2} = \frac{3}{6}$.

Rosie kept $\frac{2}{6}$ or $\frac{1}{3}$ of the collection for herself.

When I think of this another way, I know that my solution makes sense. I can think $\frac{1}{2} + \frac{1}{6} +$ "how much more" is equal to 1?

$$\frac{1}{2} + \frac{1}{6} + ? = 1 \quad \rightarrow \quad \frac{3}{6} + \frac{1}{6} + \frac{2}{6} = \frac{6}{6} = 1$$

2. Ken ran for $\frac{1}{4}$ mile. Peggy ran $\frac{1}{3}$ mile farther than Ken. How far did they run altogether?



To find the distance they ran altogether, I'll add Ken's distance ($\frac{1}{4}$ mile) to Peggy's distance ($\frac{1}{4}$ mile + $\frac{1}{3}$ mile).

My tape diagram shows that Peggy ran the same distance as Ken plus $\frac{1}{3}$ mile farther.

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

I could rename all of these as a number of twelfths, but I know that $\frac{1}{4}+\frac{1}{4}=\frac{2}{4}$, which is equal to $\frac{1}{2}$.

Now, I can rename these halves and thirds as sixths. I can do this renaming mentally!

Ken and Peggy ran $\frac{5}{6}$ mile altogether.

G5-M3-Lesson 8

1. Add or subtract. Draw a number line to model your solution.

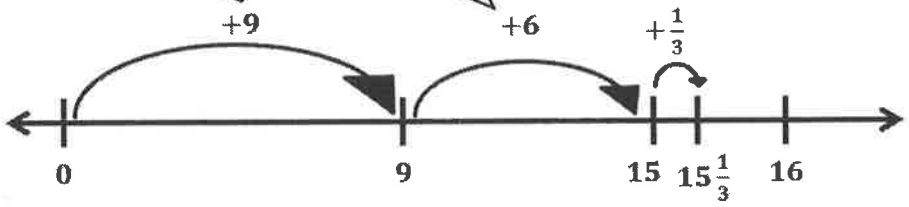
a. $9\frac{1}{3}+6=15\frac{1}{3}$

$9\frac{1}{3}$ is the same as $9+\frac{1}{3}$. I can add the whole numbers, $9+6=15$, and then add the fraction, $15+\frac{1}{3}=15\frac{1}{3}$.

I can model this addition using a number line. I'll start at 0 and add 9.

I add 6 to get to 15.

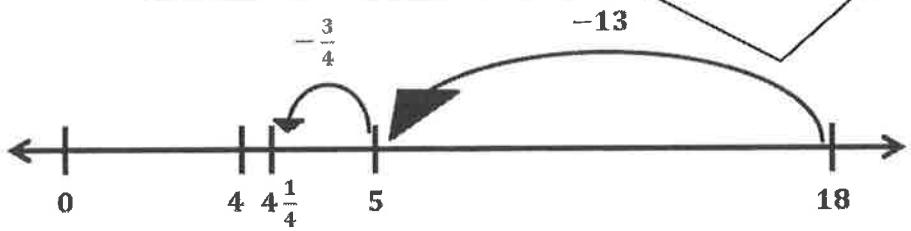
Then, I add $\frac{1}{3}$ to get to $15\frac{1}{3}$.



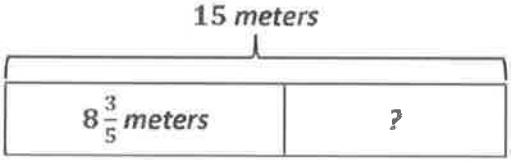
b. $18-13\frac{3}{4}=4\frac{1}{4}$

$13\frac{3}{4}$ is the same as $13+\frac{3}{4}$. I can subtract the whole numbers first, $18-13=5$. Then, I can subtract the fraction, $5-\frac{3}{4}=4\frac{1}{4}$.

I start at 18 and subtract 13 to get 5. Then, I subtract $\frac{3}{4}$ to get $4\frac{1}{4}$.



2. The total length of two strings is 15 meters. If one string is $8\frac{3}{5}$ meters long, what is the length of the other string?

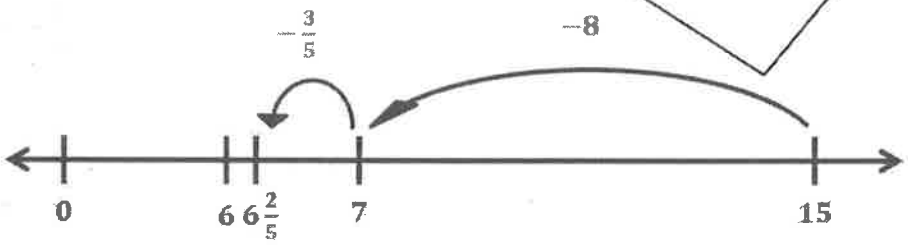


I can use subtraction, $15 - 8\frac{3}{5}$, to find the length of the other string.

My tape diagram models this word problem. I need to find the length of the missing part.

$15 - 8\frac{3}{5} = 6\frac{2}{5}$

I can draw a number line to solve. I'll start at 15 and subtract 8 to get 7. Then, I'll subtract $\frac{3}{5}$ to get $6\frac{2}{5}$.



The length of the other string is $6\frac{2}{5}$ meters.

Below is an alternative method to solve this problem.

I can express 15 as a mixed number, $14\frac{5}{5}$.

$15 - 8\frac{3}{5}$

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

$14\frac{5}{5} - 8\frac{3}{5} = 6\frac{2}{5}$

Now, I can subtract the whole numbers and subtract the fractions.

$14 - 8 = 6$

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

The difference is $6\frac{2}{5}$.

G5-M3-Lesson 9

1. First, make like units, and then add.

The denominators here are thirds and fifths. I can skip count to find a like unit.

3: 3, 6, 9, 12, **15**, 18, ...

5: 5, 10, **15**, 20, ...

15 is a multiple of both 3 and 5, so I can make like units of fifteenths.

I can multiply both the numerator and the denominator by 5 to rename $\frac{1}{3}$ as a number of fifteenths.

$\frac{1 \times 5}{3 \times 5} = \frac{5}{15}$

a. $\frac{1}{3} + \frac{2}{5} = \left(\frac{1 \times 5}{3 \times 5}\right) + \left(\frac{2 \times 3}{5 \times 3}\right)$

$= \frac{5}{15} + \frac{6}{15}$

$= \frac{11}{15}$

I can multiply both the numerator and the denominator by 3 to rename $\frac{2}{5}$ as a number of fifteenths.

$\frac{2 \times 3}{5 \times 3} = \frac{6}{15}$

5 fifteenths + 6 fifteenths = 11 fifteenths

The denominators here are sixths and eighths. I can skip count to find a like unit.

6: 6, 12, 18, **24**, 30, ...

8: 8, 16, **24**, 32, ...

24 is a multiple of both 6 and 8, so I can make like units of twenty-fourths.

I can multiply both the numerator and the denominator by 4 to rename $\frac{5}{6}$ as a number of twenty-fourths.

$\frac{5 \times 4}{6 \times 4} = \frac{20}{24}$

b. $\frac{5}{6} + \frac{3}{8} = \left(\frac{5 \times 4}{6 \times 4}\right) + \left(\frac{3 \times 3}{8 \times 3}\right)$

$= \frac{20}{24} + \frac{9}{24}$

$= \frac{29}{24}$

$= \frac{24}{24} + \frac{5}{24}$

$= 1\frac{5}{24}$

I can multiply both the numerator and the denominator by 3 to rename $\frac{3}{8}$ as a number of twenty-fourths.

$\frac{3 \times 3}{8 \times 3} = \frac{9}{24}$

$\frac{29}{24}$ is the same as $\frac{24}{24}$ plus $\frac{5}{24}$, or $1\frac{5}{24}$.

The like unit for ninths and halves is eighteenths.

c. $\frac{4}{9} + 1\frac{1}{2} = \left(\frac{4 \times 2}{9 \times 2}\right) + \left(\frac{1 \times 9}{2 \times 9}\right) + 1$

$= \frac{8}{18} + \frac{9}{18} + 1$

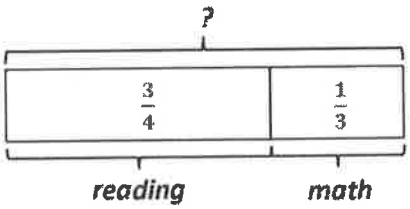
$= \frac{17}{18} + 1$

$= 1\frac{17}{18}$

I can add the 1 after adding the fractions.

$\frac{17}{18}$ plus 1 is the same as the mixed number $1\frac{17}{18}$.

2. On Tuesday, Karol spent $\frac{3}{4}$ of one hour on reading homework and $\frac{1}{3}$ of one hour on math homework. How much time did Karol spend doing her reading and math homework on Tuesday?



I'll add the time she spent on reading and math to find the total time.

I can rename fourths and thirds as twelfths.

$\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$

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

$$\frac{3}{4} + \frac{1}{3} = \left(\frac{3 \times 3}{4 \times 3}\right) + \left(\frac{1 \times 4}{3 \times 4}\right)$$
$$= \frac{9}{12} + \frac{4}{12}$$
$$= \frac{13}{12}$$
$$= 1\frac{1}{12}$$

9 twelfths + 4 twelfths = 13 twelfths, or $1\frac{1}{12}$.

Karol spent $1\frac{1}{12}$ hours doing her reading and math homework.

G5-M3-Lesson 10

1. Add.

I'll add the whole numbers first and then add the fractions. $4 + 2 = 6$

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

$= 6 + \left(\frac{2 \times 3}{5 \times 3}\right) + \left(\frac{1 \times 5}{3 \times 5}\right)$

I need to make like units before adding.

$= 6 + \frac{6}{15} + \frac{5}{15}$

I can rename these fractions as a number of fifteenths. $\frac{2}{5} = \frac{6}{15}$, and $\frac{1}{3} = \frac{5}{15}$.

$= 6 + \frac{11}{15}$

$= 6\frac{11}{15}$

The sum is $6\frac{11}{15}$.

I'll add the whole numbers together. $5 + 10 = 15$.

b. $5\frac{2}{7} + 10\frac{3}{4} = 15 + \frac{2}{7} + \frac{3}{4}$

$= 15 + \left(\frac{2 \times 4}{7 \times 4}\right) + \left(\frac{3 \times 7}{4 \times 7}\right)$

When I look at $\frac{2}{7}$ and $\frac{3}{4}$, I decide to use 28 as the common unit, which will be the new denominator.

$\frac{2}{7} = \frac{8}{28}$

$\frac{3}{4} = \frac{21}{28}$

$= 15 + \frac{8}{28} + \frac{21}{28}$

$= 15 + \frac{29}{28}$

$= 15 + \frac{28}{28} + \frac{1}{28}$

I know $\frac{29}{28}$ is more than 1. So, I'll rewrite $\frac{29}{28}$ as $\frac{28}{28} + \frac{1}{28}$.

$= 16\frac{1}{28}$

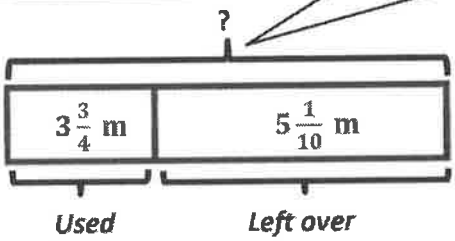
The sum is $16\frac{1}{28}$.

2. Jillian bought some ribbon. She used $3\frac{3}{4}$ meters for an art project and had $5\frac{1}{10}$ meters left. What was the original length of the ribbon?

I can add to find the original length of the ribbon.

I draw a tape diagram and label the used ribbon $3\frac{3}{4}$ meters and the leftover ribbon $5\frac{1}{10}$ meters.

I label the whole ribbon with a question mark because that's what I'm trying to find.



I'll add 3 plus 5 to get 8.

I need to rename fourths and tenths as a common unit before adding. When I skip-count, I know that 20 is a multiple of both 4 and 10.

$$3\frac{3}{4}+5\frac{1}{10}=8+\frac{3}{4}+\frac{1}{10}$$
$$=8+\left(\frac{3\times5}{4\times5}\right)+\left(\frac{1\times2}{10\times2}\right)$$
$$=8+\frac{15}{20}+\frac{2}{20}$$
$$=8\frac{17}{20}$$

$\frac{3}{4}=\frac{15}{20}$, and $\frac{1}{10}=\frac{2}{20}$.

The original length of the ribbon was $8\frac{17}{20}$ meters.

G5-M3-Lesson 11

1. Generate equivalent fractions to get like units and then, subtract.

a. $\frac{3}{4} - \frac{1}{3}$

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

I can rename fourths and thirds as twelfths in order to subtract. $\frac{3}{4} = \frac{9}{12}$ and $\frac{1}{3} = \frac{4}{12}$.

$= \frac{5}{12}$

9 twelfths − 4 twelfths = 5 twelfths

b. $3\frac{4}{5} - 2\frac{1}{2}$

I can rename halves and fifths as tenths to subtract. I can solve this problem in several different ways.

Method 1:

I can rewrite the mixed numbers with a common denominator of 10. $3\frac{4}{5} = 3\frac{8}{10}$, and $2\frac{1}{2} = 2\frac{5}{10}$.

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

$= 3\frac{8}{10} - 2\frac{5}{10}$

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

Now, I can subtract the whole numbers and then the fractions. $3 - 2 = 1$, and $\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$.

The answer is $1 + \frac{3}{10}$, or $1\frac{3}{10}$.

Method 2:

I can subtract the whole numbers first. $3 - 2 = 1$

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

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

$= 1\frac{8}{10} - \frac{5}{10}$

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

Then, I can rename the fractions using a common denominator of 10. $1\frac{4}{5} = 1\frac{8}{10}$, and $\frac{1}{2} = \frac{5}{10}$.

I can subtract the fractions. $\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$

The difference is $1\frac{3}{10}$.

Method 3:

I can also decompose $3\frac{4}{5}$ into two parts using a number bond.

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

$3 \quad \frac{4}{5}$

Now, I can easily subtract $2\frac{1}{2}$ from 3.
$3 - 2\frac{1}{2} = \frac{1}{2}$

After subtracting $2\frac{1}{2}$, I can add the remaining fractions, $\frac{1}{2}$ and $\frac{4}{5}$.

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

$= \frac{5}{10} + \frac{8}{10}$

I can rename these fractions as tenths in order to add.
$\frac{1}{2} = \frac{5}{10}$, and $\frac{4}{5} = \frac{8}{10}$.

$= \frac{13}{10}$

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

The sum of 5 tenths and 8 tenths is 13 tenths. $\frac{13}{10} = \frac{10}{10} + \frac{3}{10} = 1\frac{3}{10}$

Method 4:

I could also rename the mixed numbers as fractions greater than one.
$3\frac{4}{5} = \frac{15}{5} + \frac{4}{5} = \frac{19}{5}$, and
$2\frac{1}{2} = \frac{4}{2} + \frac{1}{2} = \frac{5}{2}$.

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

$= \frac{19}{5} - \frac{5}{2}$

Then, I can rename the fractions greater than one with the common denominator of 10.
$\frac{19}{5} = \frac{38}{10}$, and $\frac{5}{2} = \frac{25}{10}$.

$= \frac{38}{10} - \frac{25}{10}$

$= \frac{13}{10}$

38 tenths minus 25 tenths is 13 tenths.
$\frac{13}{10} = \frac{10}{10} + \frac{3}{10} = 1\frac{3}{10}$.

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

G5-M3-Lesson 12

1. Subtract.

I can subtract these mixed numbers using a variety of strategies.

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

I can rename these fractions as twelfths in order to subtract.

Method 1:

I can subtract the whole numbers. $3 - 2 = 1$

$$3\frac{1}{4} - 2\frac{1}{3}$$
$$= 1\frac{1}{4} - \frac{1}{3}$$
$$= 1\frac{3}{12} - \frac{4}{12}$$
$$= \frac{15}{12} - \frac{4}{12}$$
$$= \frac{11}{12}$$

I can rename the fractions with a common unit of 12.
$1\frac{1}{4} = 1\frac{3}{12}$, and $\frac{1}{3} = \frac{4}{12}$.

I can't subtract the fraction $\frac{4}{12}$ from $\frac{3}{12}$, so I can rename $1\frac{3}{12}$ as a fraction greater than one, $\frac{15}{12}$.

15 twelfths − 4 twelfths = 11 twelfths

Method 2:

Or, I could decompose $3\frac{1}{4}$ into two parts with a number bond.

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

3 $\frac{1}{4}$

Now, I can easily subtract $2\frac{1}{3}$ from 3.
$3 - 2\frac{1}{3} = \frac{2}{3}$

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

After subtracting $2\frac{1}{3}$, I can add the remaining fractions, $\frac{2}{3}$ and $\frac{1}{4}$.

I can rename these fractions as twelfths in order to add.
$\frac{2}{3} = \frac{8}{12}$, and $\frac{1}{4} = \frac{3}{12}$.

The sum of 8 twelfths and 3 twelfths is 11 twelfths.

Or, I could rename both mixed numbers as fractions greater than one.
$3\frac{1}{4} = \frac{13}{4}$, and $2\frac{1}{3} = \frac{7}{3}$.

Method 3:

$$3\tfrac{1}{4} - 2\tfrac{1}{3}$$
$$= \tfrac{13}{4} - \tfrac{7}{3}$$
$$= \tfrac{39}{12} - \tfrac{28}{12}$$
$$= \tfrac{11}{12}$$

And, I can rename the fractions greater than one using the common unit twelfths.
$\frac{13}{4} = \frac{39}{12}$, and $\frac{7}{3} = \frac{28}{12}$.

39 twelfths minus 28 twelfths is equal to 11 twelfths.

b. $19\frac{1}{3} - 4\frac{6}{7}$

Method 1:

I need to make a common unit before subtracting. I can rename these fractions using a denominator of 21.

$$19\tfrac{1}{3} - 4\tfrac{6}{7}$$
$$= 15\tfrac{1}{3} - \tfrac{6}{7}$$
$$= 15\tfrac{7}{21} - \tfrac{18}{21}$$
$$= 14\tfrac{28}{21} - \tfrac{18}{21}$$
$$= 14\tfrac{10}{21}$$

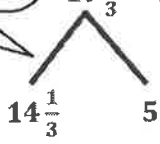
I can subtract the whole numbers, $19 - 4 = 15$

$$15\tfrac{7}{21} = 14 + 1 + \tfrac{7}{21}$$
$$= 14 + \tfrac{21}{21} + \tfrac{7}{21}$$
$$= 14 + \tfrac{28}{21}$$
$$= 14\tfrac{28}{21}$$

I can't subtract $\frac{18}{21}$ from $\frac{7}{21}$, so I rename $15\frac{7}{21}$ as $14\frac{28}{21}$.

Method 2:

I want to subtract $4\frac{6}{7}$ from 5, so I can decompose $19\frac{1}{3}$ into two parts with this number bond.



$$19\tfrac{1}{3} - 4\tfrac{6}{7} = \tfrac{1}{7} + 14\tfrac{1}{3}$$
$$= \tfrac{3}{21} + 14\tfrac{7}{21}$$
$$= 14\tfrac{10}{21}$$

$5 - 4\frac{6}{7} = \frac{1}{7}$
Now, I need to combine $\frac{1}{7}$ with the remaining part, $14\frac{1}{3}$.

In order to add, I'll rename these fractions using a common denominator of 21.

G5-M3-Lesson 13

1. Are the following expressions greater than or less than 1? Circle the correct answer.

a. $\frac{1}{2}+\frac{3}{5}$ (greater than 1) less than 1

I know that $\frac{1}{2}$ plus $\frac{1}{2}$ is exactly 1. I also know that $\frac{3}{5}$ is greater than $\frac{1}{2}$. Therefore, $\frac{1}{2}$ plus a number greater than $\frac{1}{2}$ must be greater than 1.

b. $3\frac{1}{4}-2\frac{2}{3}$ greater than 1 (less than 1)

I know that $3-2=1$, so this expression is the same as $1\frac{1}{4}-\frac{2}{3}$. I also know that $\frac{2}{3}$ is greater than $\frac{1}{4}$. Therefore, if I were to subtract $\frac{2}{3}$ from $1\frac{1}{4}$, the difference would be less than 1.

2. Are the following expressions greater than or less than $\frac{1}{2}$? Circle the correct answer.

$\frac{1}{3}+\frac{1}{4}$ (greater than $\frac{1}{2}$) less than $\frac{1}{2}$

I know that $\frac{1}{4}$ plus $\frac{1}{4}$ is exactly $\frac{1}{2}$. I also know that $\frac{1}{3}$ is greater than $\frac{1}{4}$. Therefore, $\frac{1}{4}$ plus a number greater than $\frac{1}{4}$ must be greater than $\frac{1}{2}$.

3. Use $>$, $<$, or $=$ to make the following statement true.

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

I know that 3 plus $3\frac{1}{3}$ is equal to $6\frac{1}{3}$, which is less than $6\frac{3}{4}$.
Therefore, a number less than 3 plus $3\frac{1}{3}$ is definitely going to be less than $6\frac{3}{4}$.

G5-M3-Lesson 14

1. Rearrange the terms so that you can add or subtract mentally, and then solve.

a. $2\frac{1}{3}-\frac{3}{5}+\frac{2}{3}=\left(2\frac{1}{3}+\frac{2}{3}\right)-\frac{3}{5}$

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

$=2\frac{2}{5}$

The associative property allows me to rearrange these terms so that I can add the like units first.

Wow! This is actually a really basic problem now!

b. $8\frac{3}{4}-2\frac{2}{5}-1\frac{1}{5}-\frac{3}{4}=\left(8\frac{3}{4}-\frac{3}{4}\right)-\left(2\frac{2}{5}+1\frac{1}{5}\right)$

$=8-3\frac{3}{5}$

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

$=4\frac{2}{5}$

This expression has fourths and fifths. I can use the associative property to rearrange the like units together.

Subtracting $2\frac{2}{5}$ and then subtracting $1\frac{1}{5}$ is the same as subtracting $3\frac{3}{5}$ all at once.

2. Fill in the blank to make the statement true.

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

In order to add fourths and thirds, I need a common unit. I can rename both fractions as twelfths.

$3\frac{3}{12}+2\frac{8}{12}+\_\_\_\_=9$

$5\frac{11}{12}+\_\_\_\_=9$

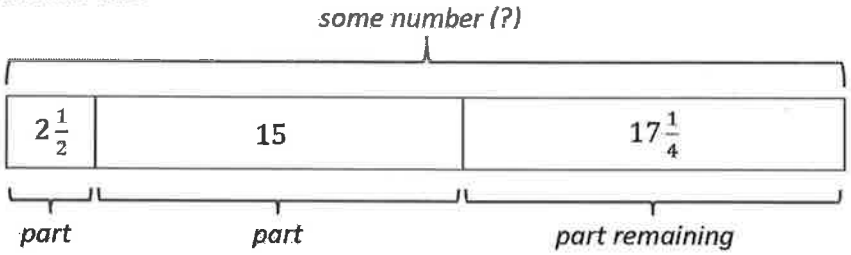
$5\frac{11}{12}+3\frac{1}{12}=9$

I could solve this by subtracting $5\frac{11}{12}$ from 9, but I'm going to count on from $5\frac{11}{12}$ instead.

$5\frac{11}{12}$ needs $\frac{1}{12}$ more to make 6. And then, 6 needs 3 more to make 9. So, $5\frac{11}{12}+3\frac{1}{12}=9$.

$5\frac{11}{12} \xrightarrow{+\frac{1}{12}} 6 \xrightarrow{+3} 9$

When I look at this equation, I think, "There is *some number* that, when I subtract $2\frac{1}{2}$ and 15 from it, there is still $17\frac{1}{4}$ remaining." This helps me to visualize a tape diagram like this:



b. $34\frac{3}{4} - 2\frac{1}{2} - 15 = 17\frac{1}{4}$

Therefore, if I add together these 3 parts, I can find out what that missing number is.

$$2\frac{1}{2} + 15 + 17\frac{1}{4}$$
$$= 34 + \left(\frac{1}{2} + \frac{1}{4}\right)$$
$$= 34\frac{3}{4}$$

I can add the whole numbers and then add the fractions.

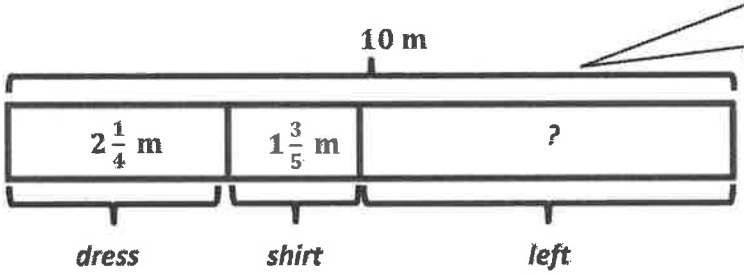
I can rename $\frac{1}{2}$ as $\frac{2}{4}$ in my head in order to add like units.

G5-M3-Lesson 15

1. Nikki bought 10 meters of cloth. She used $2\frac{1}{4}$ meters for a dress and $1\frac{3}{5}$ meters for a shirt. How much cloth did she have left?

There are different ways to solve this problem. I could subtract the length of the dress and the shirt from the total length of the cloth.

I'll draw a tape diagram and label the whole as 10 m and the parts as $2\frac{1}{4}$ m and $1\frac{3}{5}$ m.



I'll label the part that's left with a question mark because that's what I'm trying to find.

I can subtract the whole numbers first.
$10 - 2 - 1 = 7$

$$10 - 2\frac{1}{4} - 1\frac{3}{5}$$
$$= 7 - \frac{1}{4} - \frac{3}{5}$$
$$= 7 - \frac{5}{20} - \frac{12}{20}$$
$$= 6\frac{20}{20} - \frac{5}{20} - \frac{12}{20}$$
$$= 6\frac{3}{20}$$

I can rename these fractions as twentieths in order to subtract.
$\frac{1}{4} = \frac{5}{20}$, and $\frac{3}{5} = \frac{12}{20}$.

I need to rename 7 as $6\frac{20}{20}$ so I can subtract.

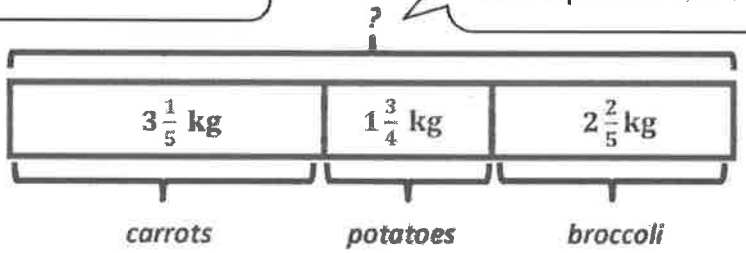
She had $6\frac{3}{20}$ meters of cloth left.

2. Jose bought $3\frac{1}{5}$ kg of carrots, $1\frac{3}{4}$ kg of potatoes, and $2\frac{2}{5}$ kg of broccoli. What's the total weight of the vegetables?

I'll use addition to find the total weight of the vegetables.

I can draw a tape diagram and label the parts as carrots, potatoes, and broccoli.

I have to find the total weight of all the vegetables, so I'll label the whole with a question mark.



I can add the whole numbers.

$3 + 1 + 2 = 6$

$$3\tfrac{1}{5} + 1\tfrac{3}{4} + 2\tfrac{2}{5}$$
$$= 6 + \tfrac{1}{5} + \tfrac{3}{4} + \tfrac{2}{5}$$
$$= 6 + \tfrac{4}{20} + \tfrac{15}{20} + \tfrac{8}{20}$$
$$= 6 + \tfrac{27}{20}$$
$$= 6 + \tfrac{20}{20} + \tfrac{7}{20}$$
$$= 7\tfrac{7}{20}$$

I need to rename the fractions with a common unit of twentieths.

$\frac{1}{5} = \frac{4}{20}$, $\frac{3}{4} = \frac{15}{20}$, and $\frac{2}{5} = \frac{8}{20}$.

$\frac{27}{20} = \frac{20}{20} + \frac{7}{20} = 1\frac{7}{20}$

The total weight of the vegetables is $7\frac{7}{20}$ kilograms.

G5-M3-Lesson 16

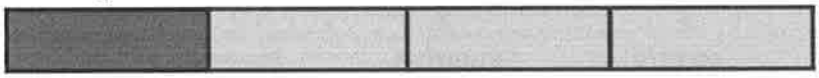
Draw the following ribbons.

I know $\frac{1}{4}$ plus $\frac{3}{4}$ is equal to $\frac{4}{4}$, or 1.

a. 1 ribbon. The piece shown below is only $\frac{1}{4}$ of the whole. Complete the drawing to show the whole ribbon.

This is 1 unit of $\frac{1}{4}$.

I can draw 3 more units of $\frac{1}{4}$ to complete the whole.



b. 1 ribbon. The piece shown below is $\frac{3}{5}$ of the whole. Complete the drawing to show the whole ribbon.

I know $\frac{3}{5}$ plus $\frac{2}{5}$ is equal to $\frac{5}{5}$, or 1.

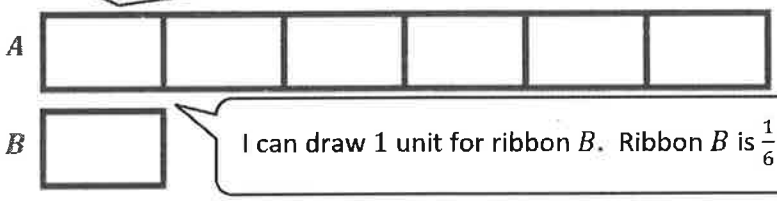
I can partition the shaded unit into 3 equal parts.

I need to draw 2 more units to make a total of 5 parts. Now, the shaded part represents $\frac{3}{5}$, and the unshaded part represents $\frac{2}{5}$.

c. 2 ribbons, A and B. One sixth of A is equal to all of B. Draw a picture of the ribbons.

I know that ribbon A must be longer than B. More specifically, ribbon B is just 1 sixth of A. This also means that ribbon A is 6 times longer than ribbon B.

I can draw one large unit to represent ribbon A. Then, I can partition it into 6 equal parts.



I can draw 1 unit for ribbon B. Ribbon B is $\frac{1}{6}$ of ribbon A.