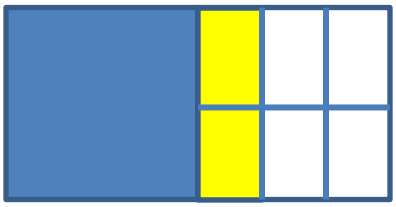
CCSS.Math.Content.4.NF.B.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

1) Chef Brolly made 1 large cake, but Sidney the Silly only eats 6 and he wouldn't eat just 1. Brolly cut the cake into 12 equal pieces and gave 1/2 of the cake (6/12) to the palace butler. Brolly now had six equal pieces. He ate 2. How much was left?

12/12 – 6/12 = 6/12 6/12 - 2/12 = 4/12 4/12 = 1/3

This is best done with an area model:



2) Mr. Hatch made a pan of brownies for his friends. As soon as they were frosted he gave 1/8 of the pan of brownies to his friend the newspaper man and 1/8 of the pan of brownies to his neighbor. How much did he give away? How much was left?

1/8 + 1/8 = 2/8 or 1/4 8/8 – 2/8 = 6/8 alternatively 4/4 – 1/4 = 3/4

You could do this using only eighths, then point out the equivalent fractions of 1/4. Again, use an area model.

3) The wizards made a gallon of secret party punch. They stored 1/3 in the wizard ice room. They drank 1/3 themselves. How much was left for the wizard winter party?

1/3 + 1/3 = 2/3 3/3 – 2/3 = 1/3 This area model could look like a cylinder. You might also use a gallon container.

CCSS.Math.Content.4.NF.B.4c Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* *n × (a/b) = (n × a)/b.*

1) 5 friends each give Pooh Bear 1/2 of a cup of honey. How much honey does Pooh have?

5 × 1/2 = 5/2 Pooh has 2 ½ cups of honey.

2) Square Bear had a birthday party. He decided that each of his friends, Triangle Prince, Rectangle Horse, Polygon Princess, and Round Hound, would eat 1/4 of a pint of ice cream. He wanted to eat 1/4 of a pint of ice cream, too. How much ice cream would he need for the party?

5 × 1/4 = 5/4 and **1/4 × 5 = 5/4** (Multiplication is commutative!)

Bear would need to buy more than 1 pint. He must buy 2 pints. How much would he have left after the party?

3) A pizza is cut into 10 equal pieces. Each student at the class pizza party will eat 2 slices or 2/10 of a pie. How many pizzas do we need for 24 students?

24 × 2/10 = 48/10 We will have to buy 5 pizzas, but we will have 2 slices left—for the teacher. You might also point out that 2/10 = 1/5 so 2 slices = 1/5 of a pie.

24 × 1/5 = 24/5 You will need 5 pies and have 1/5 left.

Area models will work for each of these problems, but the area model for the last will require five whole sheets of paper cut into ten pieces. A number line model could look like this:

CCSS.Math.Content.5.NF.A.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2*.

1) In the inky secret garden, Ladybug was crawling through a maze, but Ladybug was very slow. In one hour she only crawled 1/8 of the way through the maze. The next hour she was faster and crawled 3/10 farther. How far had Ladybug gone in two hours?

1/8 + 3/10

This is a fun problem because it can eventually involve addition and subtraction as Ladybug discovers she must turn back at some points in the maze.

2) Tom and Harry use 2/3 of their Legos to build an intergalactic power station. Then they use 1/7 more to build a space craft. Do they have any Legos left? Will it be enough for a second space craft?

Again, addition and subtraction, but if you simply want addition, skip the second and third question.

2/3 + 1/7 = 14/21 + 3/21 = 17/21

21/21 – 17/21 = 4/21

Is 4/21 greater than 1/7? **1/7 = 3/21 3/21 < 4/21**

Comparison is also involved in problems such as these.

CCSS.Math.Content.5.NF.B.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

1) Batty Penderwick (any favorite character will do) had 3 huge pans of brownies. She gave the brownies to her 5 friends. Her friends shared their brownies equally. What portion did each friend have?

$3 \div 5 = 3/5$ $3/5 \times 5 = 15/5 = 3$

This could be seen in an area model. Each friend receives less than a full pan of brownies.

2) Harry Potter and 3 of his friends share 7 vials of magic potion. What portion does each receive?

$7 \div 4 = 7/4$ $7/4 \times 4 = 7$

In this problem we see that each wizard receives more than one vial. It might be fun to use cups and water to estimate how much potion each wizard has, but an area model could be more precise.

CCSS.Math.Content.5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

1) Stargirl has 1/2 a square of lovely, melty chocolate. She wants to give1/4 of the half to her pet rat….

What is 1/4 of 1/2? How many times do we have 1/2? Not 1 time, only ¼ of that.

1/2 × 1/4 = 1/8

Children should think about this. Stargirl has only half of the bar. If she divides the 1/2 into 4 pieces, each piece is only 1/4 of the 1/2. Each piece is only 1/8 of the entire bar. Area models work well for this.

But it can be confused with the next standard:

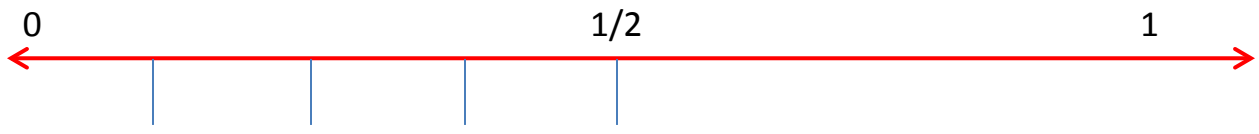
CCSS.Math.Content.5.NF.B.7a Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3*.

Back to Stargirl:

1) Stargirl has 1/2 a square of lovely, melty chocolate. She divides the 1/2 bar into 4 pieces and gives 1 to her pet rat. What portion of the entire bar does rat receive?

1/2 ÷ 4 = 1/8

Again, take those rectangular fraction models and see! Put it on the number line, too.



CCSS.Math.Content.5.NF.B.7b Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4*.

1) Luke Skywalker has 7 star cakes. (Does Luke eat cake? Maybe he eats quiche.) He divides them into 1/2 cake portions. How many portions does he have?

7 ÷ 1/2 = 14 **14 × 1/2 = 7**

Aha, a greater number of smaller parts. One look at the area models from third grade and this is clear.

2) The Incorrigible Children of Ashton Place (or, goodness, anyone that interests your class: Derek Jeter; Maniac McGee) have 8 something. They divide them into 1/3 size slices. How many slices do they have?

8 ÷ 1/3 = 24 **24 × 1/3 = 8** Remember, we are only working with unit fractions. Sometimes it helps to point out that **1 ÷ 1/a** always yields **a** smaller parts (1 ÷ 1/3 yields 3 smaller portions), so **q ÷ 1/a** yields **q × a** smaller parts (2 ÷ 1/3 yields 6 smaller portions).

CCSS.Math.Content.5.NF.B.7c Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb. of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

1/2 ÷ 3 = 1/6 lb. **2 ÷ 1/3 = 6** servings

This seems redundant and the standard could be confusing because it's a repeat of exactly what we've been doing. Real world problems? We could move from favorite characters to sports or classroom pizzas, but in the real world of children, literature makes fractions more appealing.