Just in Time Quick Check

Standard of Learning 4.CE.3

Strand: Computation and Estimation

Standard of Learning 4.CE.3

The student will estimate, represent, solve, and justify solutions to single-step problems, including those in context, using addition and subtraction of fractions (proper, improper, and mixed numbers with like denominators of 2, 3, 4, 5, 6, 8, 10, and 12), with and without models; and solve single-step contextual problems involving multiplication of a whole number (12 or less) and a unit fraction, with models.

Students will demonstrate the following Knowledge and Skills:

a) Estimate and determine the sum or difference of two fractions (proper or improper) and/or mixed numbers, having like denominators limited to 2, 3, 4, 5, 6, 8, 10, and 12 (e.g., $\frac{3}{8} + \frac{3}{8}$, $2\frac{1}{5} + \frac{4}{5}$, $\frac{7}{4} - \frac{5}{4}$) and simplify the resulting fraction. Addition and subtraction with fractions may include regrouping.*

b) Estimate, represent, solve, and justify solutions to single-step contextual problems using addition and subtraction with fractions (proper or improper) and/or mixed numbers, having like denominators limited to 2, 3, 4, 5, 6, 8, 10, and 12, and simplify the resulting fraction. Addition and subtraction with fractions may include regrouping.

c) Solve single-step contextual problems involving multiplication of a whole number, limited to 12 or less, and a unit fraction (e.g., $6 \times \frac{1}{3}$, $\frac{1}{5} \times 8$, $2 \times \frac{1}{10}$), with models.*

d) Apply the inverse property of multiplication in models (e.g., use a visual fraction model to represent $\frac{4}{4}$ or 1 as the product of $4 \times \frac{1}{4}$).

* **On the state assessment, items measuring this objective are assessed without the use of a calculator.**

[Just in Time Quick Check]

[Just in Time Quick Check Teacher Notes]

Supporting and Prerequisite SOL: 4.NS.3, 4.NS.5, 3.NS.3d (compose and decompose fractions in multiple ways using models)

Just in Time Quick Check 4.CE.3

1. Estimate to determine whether each sum or difference will be less than 1 whole, between 1 and 2 wholes, or greater than 2 wholes. Justify your reasoning.

   a) $\frac{4}{8} + \frac{7}{8}$

   b) $\frac{10}{6} + \frac{5}{6}$

   c) $1\frac{2}{10} - \frac{7}{10}$

   d) $\frac{12}{5} - \frac{5}{5}$

2. Determine each sum or difference. Write your answer in simplest form.

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

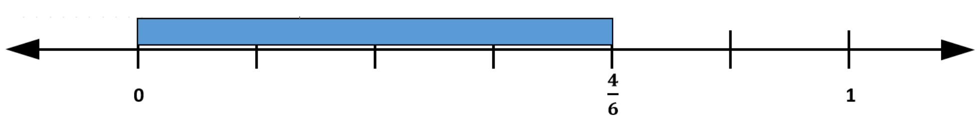
   b) $\frac{11}{12} - \frac{7}{12}$

   c) $\frac{4}{3} + \frac{2}{3}$

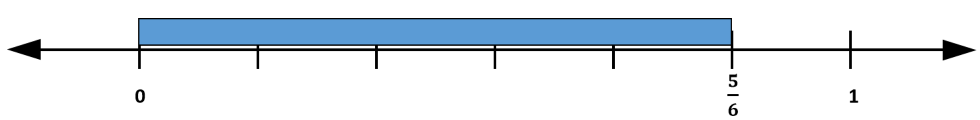
   d) $1\frac{1}{8} - \frac{5}{8}$

3. Casey and Madeline will combine some ribbon to make a bow. The models below show how much ribbon, in feet, they each have.

   Casey has $\frac{4}{6}$ foot of ribbon.



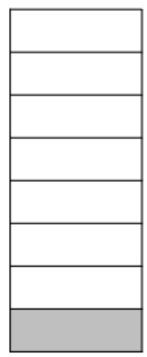
   Madeline has $\frac{5}{6}$ foot of ribbon.



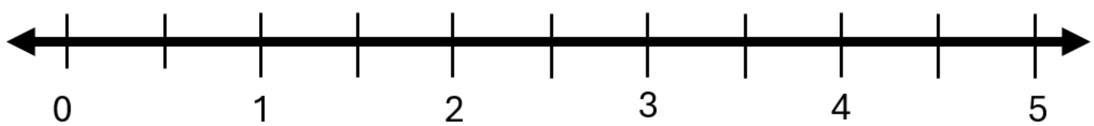
   How much ribbon do Casey and Madeline have altogether?

4. Sid and Matt each have a pizza. Their pizzas are the same size. Sid ate $\frac{3}{6}$ of his pizza. Matt ate $\frac{5}{6}$ of his pizza. What is the difference between the fraction of pizza Matt ate and the fraction of pizza Sid ate? Write your answer in simplest form.

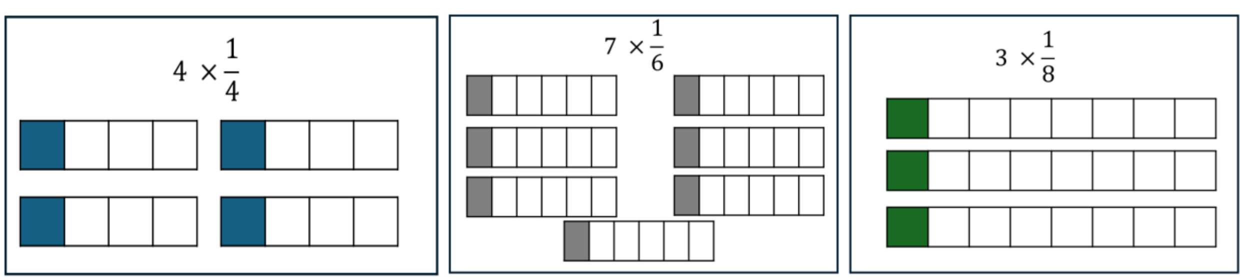
5. Each morning, Ellen's cat eats $\frac{1}{8}$ of a box of cat food. The model below shows how much food the cat eats in one day. How much food does the cat eat after 7 days?



6. Kevin walked $\frac{1}{2}$ of a mile every day for 9 days. What is the total distance Kevin walked in 9 days?



7. Which of the following problems has a product of exactly 1?



4.CE.3 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

1. Estimate to determine whether each sum or difference will be less than 1 whole, between 1 and 2 wholes, or greater than 2 wholes. Justify your reasoning.

   a) $\frac{4}{8}+\frac{7}{8}$

   b) $\frac{10}{6}+\frac{5}{6}$

   c) $1\frac{2}{10}-\frac{7}{10}$

   d) $\frac{12}{5}-\frac{5}{5}$

   Students may have difficulty estimating sums or differences when working with fractions because they may not understand how numerators and denominators relate to one whole. For example, students may not recognize that $\frac{10}{6}$ is greater than one whole or that $\frac{12}{5}$ is greater than two wholes. Students may also try to apply whole number reasoning and add or subtract the numerators and denominators, resulting in incorrect estimates. For example, incorrectly adding $\frac{4}{8}+\frac{7}{8}$ to get $\frac{11}{16}$ may result in a student saying the sum is less than one whole.

   Students who have difficulty estimating sums and differences using fractions may benefit from using benchmarks to support their reasoning. The benchmarks of $\frac{1}{2}$, 1 whole, $1\frac{1}{2}$, 2 wholes, etc. may be especially helpful when estimating fraction computation problems. . It may be helpful for students to think about each fraction in relation to a benchmark number prior to estimating the sum or difference. For example, when estimating the sum of $\frac{4}{8}+\frac{7}{8}$, students should recognize that $\frac{4}{8}$ is equivalent to $\frac{1}{2}$, and $\frac{7}{8}$ is slightly less than one whole, so the sum will be more than one whole but less than two wholes.

2. Determine each sum or difference. Write your answer in simplest form.

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

   b) $\frac{11}{12}-\frac{7}{12}$

   c) $\frac{4}{3}+\frac{2}{3}$

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

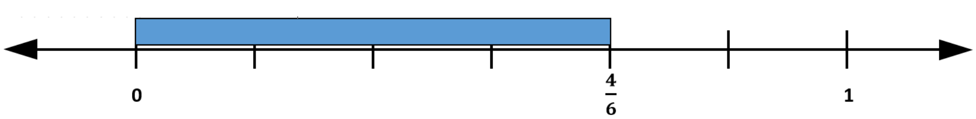
   Students may have difficulty determining sums or differences when adding and subtracting fractions. One common error is for students to incorrectly add/subtract the numerators and the denominators instead of only adding/subtracting the numerators. For example, students may subtract $\frac{11}{12}-\frac{7}{12}$ and *get a difference of $\frac{4}{0}$ or they may add $\frac{4}{3}+\frac{2}{3}$ and get a sum of $\frac{6}{6}$. Another common error is to neglect to simplify the fraction after finding the answer. For example, students may correctly subtract $\frac{11}{12}-\frac{7}{12}$ and get $\frac{4}{12}$ but they do not recognize that this fraction can be simplified to $\frac{1}{3}$. Another common error occurs when students neglect to add or subtract the whole numbers and fractional parts separately, leading to incorrect totals. For example, when adding $1\frac{3}{4}+\frac{2}{4}$, students may forget to include the one whole, resulting in an incorrect sum of $\frac{5}{4}$ or $1\frac{1}{4}$. Students may also struggle to regroup when the fractional part of the subtrahend is larger than the fractional part of the minuend, causing errors in subtraction problems. For example, when solving $1\frac{1}{8}-\frac{5}{8}$, students may not recognize that they need to regroup the one whole (i.e., $\frac{9}{8}-\frac{5}{8}$) before subtracting.*

For students who demonstrate these errors, it may be helpful to use visual models (e.g., fraction strips or circles) to represent each problem. Helping students understand that the denominator represents the units that are being used (e.g., fourths, sixths, tenths) and that the unit does not change when adding or subtracting fractions with like denominators (e.g., adding fourths plus fourths will result in fourths) may help reinforce why the denominators are not added or subtracted.

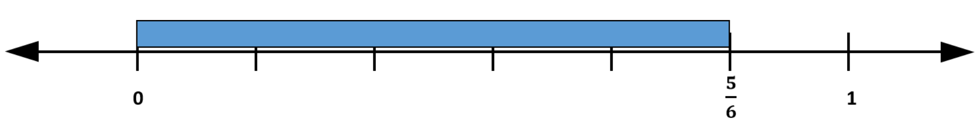
Students should also be encouraged to use benchmark fractions to help determine whether their sums and differences are reasonable. For example, students who incorrectly add $\frac{4}{3}+\frac{2}{3}$ and get a sum of $\frac{6}{6}$ (or 1 whole) should recognize that this is not reasonable because $\frac{4}{3}$ is greater than 1 whole, thus the sum of $\frac{4}{3}$ and another positive fraction cannot be equal to 1 whole.

3. Casey and Madeline will combine some ribbon to make a bow. The models below show how much ribbon, in feet, they each have.

Casey has $\frac{4}{6}$ foot of ribbon.



Madeline has $\frac{5}{6}$ foot of ribbon.



How much ribbon do Casey and Madeline have altogether?

Students who find the answer to be $\frac{9}{12}$ have incorrectly added the numerator and the denominator. These students may benefit from using estimation to consider the reasonableness of a sum. For these two fractions, since each is more than one-half but less than one, the sum will be between 1 and 2; thus, $\frac{9}{12}$ is not a reasonable total. These students may also benefit from using the number line to count on unit fractions to find the sum. For this problem students could start at $\frac{5}{6}$ and count on the additional four-sixths ($\frac{6}{6}, \frac{7}{6}, \frac{8}{6}, \frac{9}{6}$). Students who have difficulty when they reach the "end" of the number line given may need more experiences with number lines that extend past one whole.

Students may answer $\frac{9}{6}$ but struggle with forming a mixed number. While both the improper fraction and mixed number are correct responses for this situation, teachers may want to ask students questions such as: "Does $\frac{9}{6}$ represent less than one foot of ribbon or more than one foot of ribbon?" "Do you know another way to name or write that fraction?"

Students may answer 9, using whole numbers rather than fractions. These students would benefit from more experience using a variety of length/measurement models (fraction bars and strips or number lines) to solve problems involving fractions with like denominators.

In each of these situations, students will benefit from more exposure to and practice with a variety of practical problem-solving strategies presented by their peers. These experiences may help students develop flexible strategies for computation and problem solving with fractions.

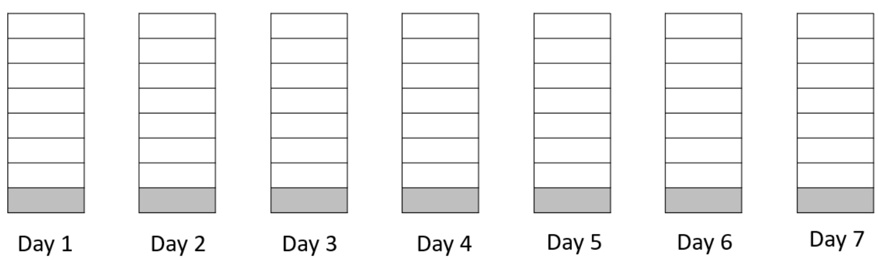
4. Sid and Matt each have a pizza. Their pizzas are the same size. Sid ate $\frac{3}{6}$ of his pizza. Matt ate $\frac{5}{6}$ of his pizza. What is the difference between the fraction of pizza Matt ate and the fraction of pizza Sid ate? Write your answer in simplest form.

A common error is for students to find the sum instead of the difference. This may indicate that students need additional opportunities to solve contextual problems where they must make sense of the context and the question. Strategies such as "three reads" will help students strengthen their ability to make sense of and solve practical problems. The three reads strategy encourages students to read the problem three times: the first read is to understand the context, the second is to understand the math, and the third is meant to elicit questions based on the scenario. As students solve and explain their thinking and/or strategies during problem solving, listen for opportunities to model this for students.

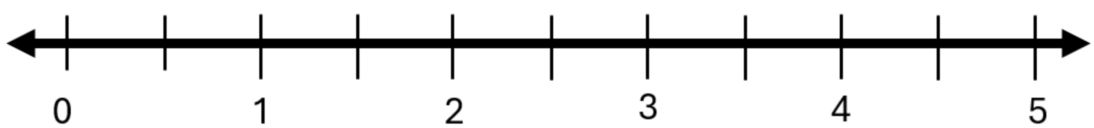
Some students may recognize that they must subtract but do so incorrectly. The most common error is for students to subtract the numerators and denominators, resulting in an incorrect difference of $\frac{2}{0}$. It may be helpful for students to use manipulatives (e.g., fraction circles) or to draw a picture to help them understand what is happening in the problem.

5. Each morning, Ellen's cat eats $\frac{1}{8}$ of a box of cat food. The model below shows how much food the cat eats in one day. How much food does the cat eat after 7 days?

Some students may answer that 7 boxes of cat food are needed. This misconception may indicate that students have difficulty multiplying the fraction by 7. It may be helpful for students to draw a picture to represent the problem (see below). This can help them visualize the repeated addition that is represented (i.e., $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}$). Students can then connect this to 7 groups of $\frac{1}{8}$ or $7 \times \frac{1}{8}$.



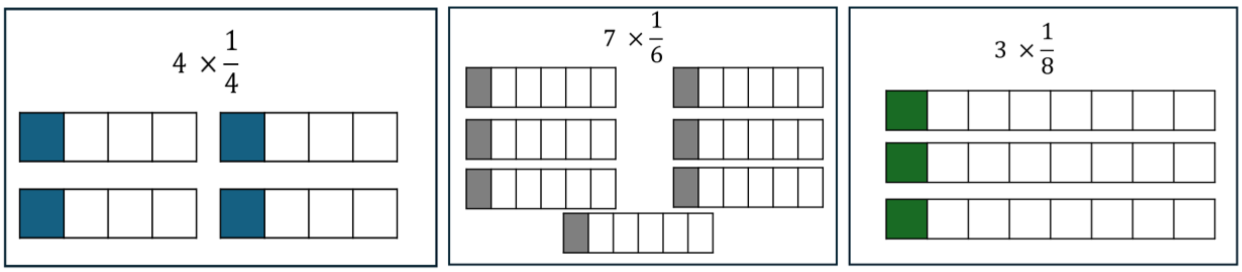
6. Kevin walked $\frac{1}{2}$ of a mile every day for 9 days. What is the total distance Kevin walked in 9 days?



One common misconception when multiplying a fraction by a whole number is that students may multiply both the numerator and denominator by the whole number or add the denominators through repeated addition. For example, if students get an answer of $\frac{9}{18}$, this may indicate that students need additional support representing multiplication of fractions through models such as fraction strips, pattern blocks, repeated addition, or area and number line models.

There are several different strategies to use when solving this problem. Some students may use the given number line to make jumps of $\frac{1}{2}$ nine times. Other students may use repeated addition to solve this problem (i.e., $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$). Other students might recognize the repeated addition as multiplication and solve $9 \times \frac{1}{2}$. It may be helpful for the teacher to highlight the work of students who used each of these strategies, sequencing the strategies from concrete to abstract. This will allow students to see other strategies and will give them an opportunity to consider using more efficient problem solving methods.

7. Which of the following problems has a product of exactly 1?



Students should be able to apply the inverse property of multiplication by recognizing that every number has a multiplicative inverse and the product of the number and its multiplicative inverse is 1. If students are unable to identify the problem that has a product of 1, this may indicate that students will need additional practice modeling multiplication of fractions with a focus on applying the inverse property of multiplication. An activity to help develop a greater understanding is to explore models such as fraction strips or fractions circles, identifying the number of unit fractions needed to equal a whole, and then connecting this model to a number sentence.