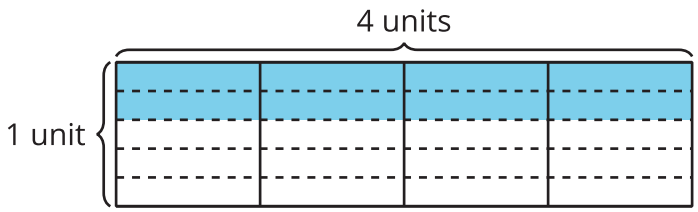
Assessment : End-of-Unit Assessment

Problem 1

Students find the area of a rectangle with one side of integer length and the other side of fractional length. The numbers are small enough in this item that students can count that there are 8 shaded parts so the main work here is identifying that each of those parts represents $\frac{1}{5}$ square unit. Students could also say that the rectangle is 4 units long and $\frac{2}{5}$ units wide and find the product but the numbers are deliberately made small to encourage thinking concretely about the meaning of each shaded part.

Statement

Find the area of the shaded region. Explain or show your reasoning.



Solution

$\frac{8}{5}$ square units since there are 8 shaded parts and each is $\frac{1}{5}$ of a square unit.

Aligned Standards

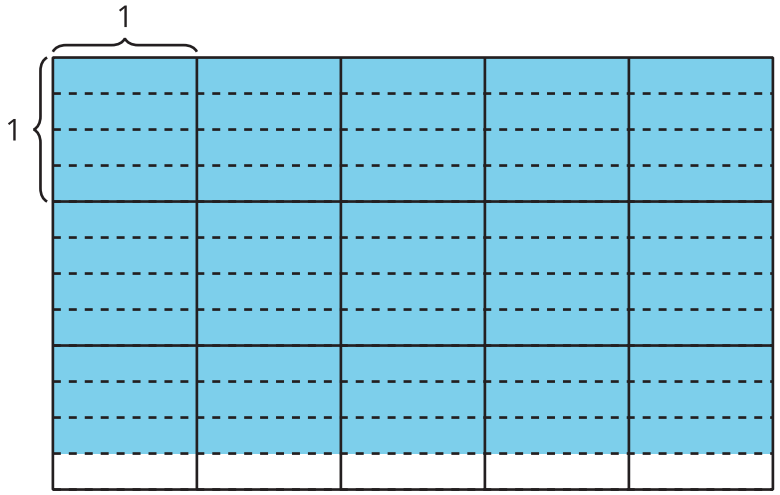
5.NF.B.4.b

Problem 2

Students identify expressions that represent a shaded area with one fractional side length and one whole-number side length. Answers C and E are the essential ones for students to see to test their understanding of the standard 5.NF.B.4.b. Answers A and D assess their understanding of expressions and they will have many opportunities over the year to further develop these skills. Students who select B or F need more work finding fractional areas as B represents the number of parts while F represents only some of the area.

Statement

Select **all** of the expressions that represent the area of the shaded region.



A. $(5 \times 3) - \left(5 \times \frac{1}{4}\right)$

B. 5×11

C. $\frac{11}{4} \times 5$

D. $55 \times \frac{1}{4}$

E. $2\frac{3}{4} \times 5$

F. $5 \times 2 + \frac{5}{4}$

Solution

["A", "C", "D", "E"]

Aligned Standards

5.NF.B.4.b, 5.OA.A.2

Problem 3

Students solve a problem involving a product of a whole number and a fraction. Students may select A if they correctly find $\frac{1}{3}$ of 8 ounces and do not multiply by 2. Students may select C if they subtract $\frac{2}{3}$ from 8 rather than finding the product. They may select D if they perform multiplication incorrectly and find $\frac{3}{2} \times 8$.

Students can also solve this problem using general number sense. Response A is too small as it is less than $\frac{1}{2}$ of 8. Response C is too large as it is very close to 8. Response D is larger than 8 so it is definitely too large. This kind of number sense is a valuable skill and students who solve this problem via a process of elimination and this line of reasoning will have opportunities to address their understanding of a fraction of a whole number directly in other items.

Statement

There are 8 ounces of pasta in the package. Jada cooks $\frac{2}{3}$ of the pasta. How many ounces of pasta did Jada cook?

A. $2\frac{2}{3}$

B. $5\frac{1}{3}$

C. $7\frac{1}{3}$

D. 12

Solution

B

Aligned Standards

5.NF.B.4.a, 5.NF.B.6

Problem 4

Students represent the result of division of two whole numbers in multiple ways: a fraction, a mixed number, and a division expression. Students who select A or B (and fail to select C or D) need more practice interpreting division situations and understanding the relationship between division and fractions. Students may fail to select E if they do not write the answer to the question as a mixed number or if they do so but do not recall that $\frac{2}{4}$ and $\frac{1}{2}$ are equivalent. These students may need more practice writing fractions in different forms.

Statement

A piece of string is 18 inches long. Jada cuts it into 4 equal parts. What is the length of each part in inches? Select **all** that apply.

A. $\frac{4}{18}$

B. $4 \div 18$

C. $\frac{18}{4}$

D. $18 \div 4$

E. $4\frac{1}{2}$

Solution

["C", "D", "E"]

Aligned Standards

5.NF.B.3

Problem 5

Students multiply a whole number by a fraction to solve a story problem. No representation for the problem is requested so students may draw a tape diagram (or discrete diagram), or an area diagram, or they may reason about the quantities without a picture.

Statement

A hiking trail is 7 miles long. Han hikes $\frac{1}{2}$ of the trail and then stops for water. Jada hikes $\frac{2}{3}$ of the trail and then stops for water.

1. How many miles did Han hike before stopping for water? Explain or show your reasoning.
2. How many miles did Jada hike before stopping for water? Explain or show your reasoning.

Solution

1. Han hiked $3\frac{1}{2}$ or $\frac{7}{2}$ miles. Half of 7 is $3\frac{1}{2}$ or $7 \div 2 = \frac{7}{2}$.
2. Jada hiked $\frac{14}{3}$ miles or $4\frac{2}{3}$ miles since $\frac{2}{3}$ of 7 is $\frac{14}{3}$.

Aligned Standards

5.NF.B.4.a, 5.NF.B.6

Problem 6

Students multiply a whole number by a fraction with no context. Some of the fractions are listed as mixed numbers and some are listed as fractions. While students are not expected to convert between these forms, the way they write their answer may help reveal how they are thinking about the products.

Statement

Find the value of each expression.

1. $\frac{1}{7} \times 28$
2. $15 \times 3\frac{2}{5}$
3. $\frac{2}{5} \times 6$
4. $3\frac{9}{10} \times 4$

Solution

1. 4 or equivalent
2. 51 or equivalent
3. $\frac{12}{5}$ or $2\frac{2}{5}$ or equivalent

4. $15\frac{6}{10}$ or equivalent

Aligned Standards

5.NF.B.4

Problem 7

Students solve a problem about area. There are different ways students might draw a diagram.

- They might divide one side of the rectangular farm into 5 equal pieces, using the relationship between division and fractions.
- They could also shade $\frac{1}{5}$ of each square kilometer.

The provided solution uses the previous approach but either solution will have $\frac{6}{5}$ of a square kilometer shaded.

If students draw an incorrect diagram for the second question and answer the third question correctly based on the diagram, they still demonstrate an understanding of fractions. A common error for the drawing may be to shade $\frac{1}{5}$ of a kilometer for the width or length of the part of the farm where corn is grown. Note that students can use the meaning of division to answer the last question, independent of their diagram: one out of 5 equal parts of 6 square kilometers is $6 \div 5$ or $\frac{6}{5}$ square kilometers.

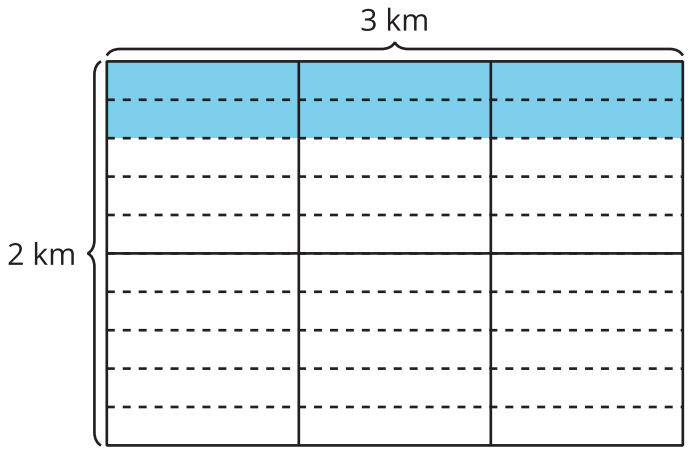
Statement

A farm is rectangular in shape. It is 2 km long and 3 km wide.

1. What is the area of the farm? Explain or show your reasoning.
2. The farm is divided into 5 equal parts. Corn is grown in one of the parts. Draw a diagram to show where the corn is grown.
3. What is the area of the part of the farm where corn is grown? Explain or show your reasoning.

Solution

1. 6 square kilometers because $2 \times 3 = 6$.
2. Sample response: I decided to cut the side that is 2 km into 5 equal parts and each of those is $\frac{2}{5}$ of a kilometer wide since $2 \div 5 = \frac{2}{5}$.



3. Sample response: The area where the corn is grown is $\frac{6}{5}$ square kilometers. There are 6 shaded parts and each one represents $\frac{1}{5}$ square kilometer.

Aligned Standards

5.NF.B.3, 5.NF.B.4.a, 5.NF.B.6