TCAP/CRA

2014

4

Phase III

Walter's Claim Task

Anchor Set

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a.   Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

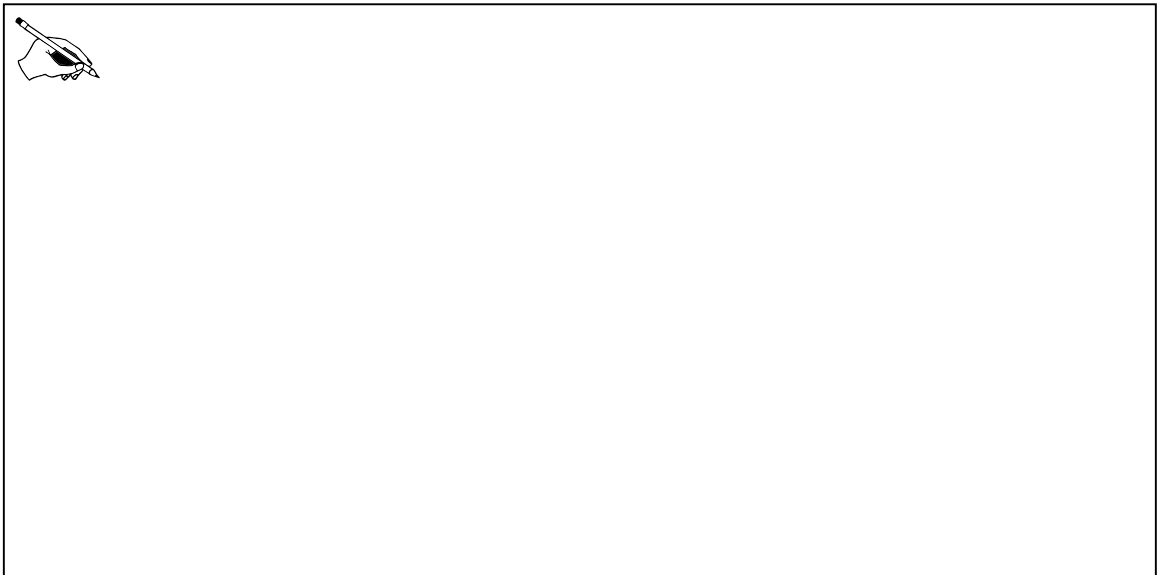Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$5 \times \frac{1}{6} =$$

$$3 \times \frac{1}{8} =$$

$$6 \times \frac{1}{9} =$$

Solve the three multiplication expressions.

c.   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

Scoring Guide

The CCSS for Mathematical Content (2 points)

4.NF.B.4a(x) Draws a diagram or indicates through an example or explanation in part a that $a \times \dfrac{1}{b} = \dfrac{a}{b}$.

(1 Point)

4.NF.B.4a(z) Solves the three multiplication problems correctly.

(1 Point)

The CCSS for Mathematical Practice (2 points)

MP3 Provides an explanation or diagram that supports if Walter is correct or not.

(1 Point)

(MP3: Construct viable arguments and critique the reasoning of others.)

MP7 Writes a statement or indicates through an example that when multiplying a unit fraction by a number less than the denominator of the unit fraction, the product is less than 1.

(1 Point)

(MP7: Look for and make use of structure.)

TOTAL POINTS: 4

The CCSS for Mathematical Content Addressed In This Task

Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.	
4.NF.B.4a	Understand a fraction a/b as a multiple of 1/b. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*

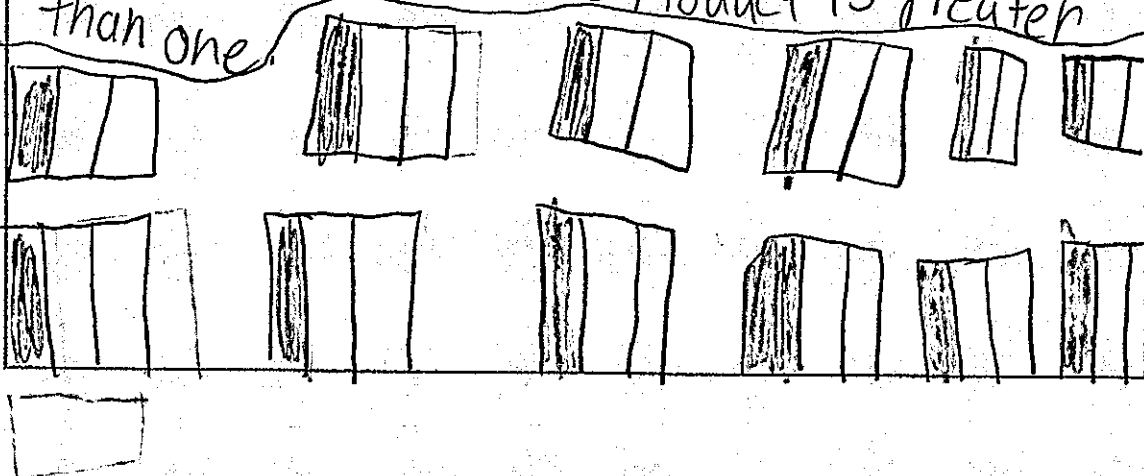| **The CCSS for Mathematical Practice*** |
|---|
| 1. Make sense of problems and persevere in solving them. |
| 2. Reason abstractly and quantitatively. |
| **3. Construct viable arguments and critique the reasoning of others.** |
| 4. Model with mathematics. |
| 5. Use appropriate tools strategically. |
| 6. Attend to precision. |
| **7. Look for and make use of structure.** |
| 8. Look for and express regularity in repeated reasoning. |
| * Gray type indicates Mathematical Practices not addressed in this assessment. |

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a.   Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

Correct, because $\frac{1}{2} \times 12 = \frac{6}{1} = 6$ or $\frac{1}{3} \times 12 = \frac{4}{1} = 4$ it is more then the denominator and the product is greater than one.

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$\frac{5}{1} \times \frac{1}{6} = \frac{5}{6}$$

$$\frac{3}{1} \times \frac{1}{8} = \frac{3}{8}$$

$$\frac{6}{1} \times \frac{1}{9} = \frac{6}{9}$$

Solve the three multiplication expressions.

c.   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

It makes the product less than one whole, lik $5 \times \frac{1}{6} = \frac{5}{6}$ but if you multiplied by a whole that is greater than the denominator.

Anchor 1   Litho 00704200171

Total Content Points: 2   (4.NF.B.4a(x), 4.NF.B.4a(z))

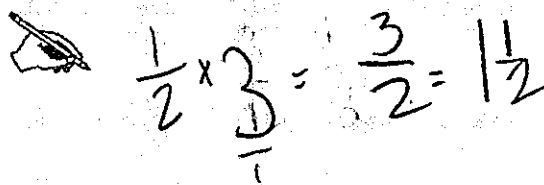Total Practice Points: 2   (MP3, MP7)

In Part A, the student uses the equation $\frac{1}{2} \times 12 = \frac{6}{1} = 6$ and uses a drawing to show twelve thirds, indicating that $a \times \frac{1}{b} = \frac{a}{b}$ when $a = 12$ and $b = 3$ (4.NF.B.4a(x)). The student correctly answers the three multiplication expressions in Part B (4.NF.B.4a(z)). By saying, "the product is greater than one" in Part A, and by illustrating the argument with a drawing, the student shows that Walter is correct (MP3). The student states, "It makes the product less than one whole" in Part C, referring to a unit fraction being multiplied by a whole number less than the denominator (MP7).

Total Awarded Points: 4 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a. Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

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

Walter is correct because when you multiply a whole greter than the denominator you get an answer where the value is greter than 1. $\frac{1}{2} \times 3 = \frac{3}{2} = 1\frac{1}{2}$, so the answer is greter than 1.

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$\frac{5}{1} \times \frac{1}{6} = \frac{5}{6}$$

$$\frac{3}{1} \times \frac{1}{8} = \frac{3}{8}$$

$$\frac{6}{1} \times \frac{1}{9} = \frac{6}{9}$$

Solve the three multiplication expressions.

c.   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

It compares because when you multiply a unit fraction by a whole number less than the denominator it is less than 1. $\frac{6}{1} \times \frac{1}{7} = \frac{1 \cdot 6}{7}$, and this answer is less than 1, and the denominator is multiplied by a number less than the denominator.

Anchor 2   Litho 00824200171

Total Content Points: 2   (4.NF.B.4a(x), 4.NF.B.4a(z))

Total Practice Points: 2   (MP3, MP7)

The student uses the equation $\frac{1}{2} \times 3 = \frac{3}{2} = 1\frac{1}{2}$ in Part A, showing that $a \times \frac{1}{b} = \frac{a}{b}$ (4.NF.B.4a(x)). The student correctly answers the three multiplication expressions in Part B (4.NF.B.4a(z)). The student explains that "Walter is correct because when you multiply a whole greter than the denominator you get an answer where the value is greter than 1" in Part A (MP3). In Part C, the student writes the statement, "It compares because when you multiply a unit fraction by a whole number less than the denominator it [the product] is less than 1" (MP7).
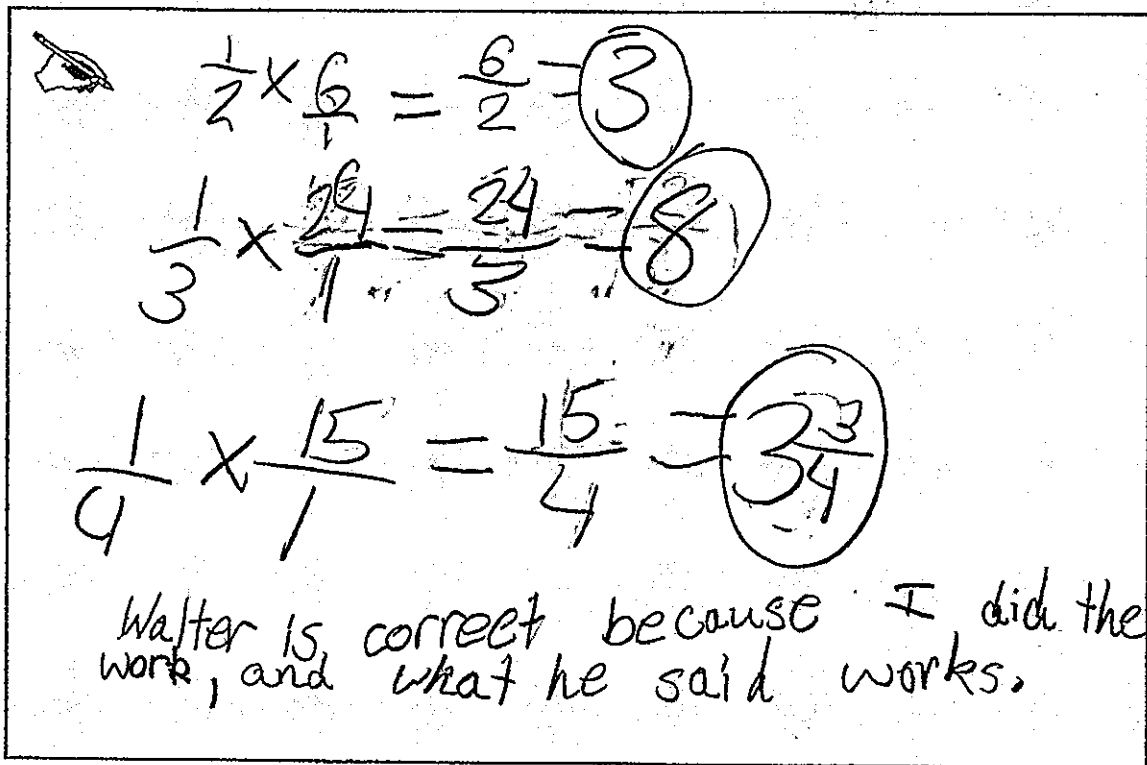
Total Awarded Points: 4 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a.   Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

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

$$\frac{1}{3} \times \frac{24}{1} = \frac{24}{3} = \boxed{8}$$

$$\frac{1}{4} \times \frac{15}{1} = \frac{15}{4} = \boxed{3\tfrac{3}{4}}$$

Walter is correct because I did the work, and what he said works.

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$\frac{5}{1} \times \frac{1}{6} = \boxed{\frac{5}{6}}$$

$$\frac{3}{1} \times \frac{1}{8} = \boxed{\frac{3}{8}}$$

$$\frac{6}{1} \times \frac{1}{9} = \frac{6}{9} - \boxed{\frac{2}{3}}$$

Solve the three multiplication expressions.

c.   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

$$\frac{4}{1} \times \frac{11}{6} = \frac{4}{6} - \frac{24}{3} = \frac{7}{1}$$

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

Anchor 3   Litho 00784200171

Total Content Points: 2   (4.NF.B.4a(x), 4.NF.B.4a(z))

Total Practice Points: 1   (MP7)

The student uses three equations in Part A, showing that $a \times \dfrac{1}{b} = \dfrac{a}{b}$ (4.NF.B.4a(x)). In Part B, the student solves the three multiplication expressions correctly (4.NF.B.4a(z)). In Part A, the student states "Walter is correct because I did the work, and what he said works," which is not a clear explanation of why Walter is correct (no credit for MP3). The student writes the equation $\dfrac{4}{1} \times \dfrac{1}{6} = \dfrac{4}{6} = \dfrac{2}{3}$ and the statement $\dfrac{2}{3} < 1$ to show that the product of the unit fraction multiplied by a number less than the denominator is less than 1 (MP7).

Total Awarded Points: 3 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a. Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

$$\frac{5}{4} \times \frac{1}{4} = \frac{5}{4} = 1\frac{1}{4}$$

He is correct due to the order of operation.

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

do multiply a ... fraction ... this it won't ... than one.

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

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$\frac{5}{1} \times \frac{1}{6} = \frac{5}{6}$$

$$\frac{3}{1} \times \frac{1}{8} = \frac{3}{8}$$

$$\frac{6}{1} \times \frac{1}{9} = \frac{6}{9} = \frac{2}{3}$$

Solve the three multiplication expressions.

c.   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

This shows it won't be greater than one when you do this

$1 \bigcirc > \frac{5}{6}$

$1 \bigcirc > \frac{3}{8}$

$1 \bigcirc > \frac{6}{9}$

Anchor 4   Litho 00714200171

Total Content Points: 2   (4.NF.B.4a(x), 4.NF.B.4a(z))

Total Practice Points: 1   (MP7)

The student uses the equations $\frac{5}{1} \times \frac{1}{4} = \frac{5}{4} = 1\frac{1}{4}$, $\frac{4}{1} \times \frac{1}{3} = \frac{4}{3} = 1\frac{1}{3}$, and $\frac{3}{1} \times \frac{1}{2} = \frac{3}{2} = 1\frac{1}{2}$ as examples in Part A, showing that $a \times \frac{1}{b} = \frac{a}{b}$ (4.NF.B.4a(x)). The student solves the three multiplication expressions correctly in Part B (4.NF.B.4a(z)). The student provides the explanation that "He is correct due to the order of operations" in Part A, which is not sufficient to explain why Walter's statement is correct (no credit for MP3). In Part C, the student states, "This shows it won't be greater than one when you do this" and provides the examples $1 > \frac{5}{6}$, $1 > \frac{3}{8}$, and $1 > \frac{6}{9}$ from Part B to show that the product of the unit fraction is less than 1 (MP7).

Total Awarded Points: 3 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a. Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

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

$2\overline{)3} \quad \frac{1}{2}$

Yes they all are greater than one,

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

$3\overline{)4} \quad \frac{1}{3}$

$\frac{3}{}$

If you multiply all of them which is shown, you will get a hire number than one

$$\frac{1}{4} \times \frac{5}{1} = \frac{5}{4}$$

$4\overline{)5} \quad \frac{1}{4}$

$1\frac{1}{2}$

$1\frac{1}{3}$

$1\frac{1}{4}$

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$\frac{5}{1} \times \frac{1}{6} = \frac{5}{6}$$

$$\frac{3}{1} \times \frac{1}{8} = \frac{3}{8}$$

$$\frac{6}{1} \times \frac{1}{9} = \frac{6}{9}$$

Solve the three multiplication expressions.

c.)   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

$$\frac{5}{6} \times \frac{5}{1} = \frac{25}{6}$$

$$\frac{3}{8} \times \frac{7}{1} = \frac{21}{8}$$

$$\frac{6}{9} \times \frac{8}{1} = \frac{48}{9}$$

$6\overline{)25}$ $\frac{24}{1}$ $4\frac{1}{6}$

$8\overline{)21}$ $\frac{16}{}$ $2\frac{4}{8} = 2\frac{1}{2}$

$9\overline{)48}$ $\frac{45}{3}$ $5\frac{3}{9} = 5\frac{1}{3}$

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

Anchor 5   Litho 00014200171

Total Content Points: 2   (4.NF.B.4a(x), 4.NF.B.4a(z))

Total Practice Points: 1   (MP3)

The student shows three examples where $a \times \dfrac{1}{b} = \dfrac{a}{b}$ in Part A (4.NF.B.4a(x)). In Part B, the student solves the three multiplication expressions correctly (4.NF.B.4a(z)). In Part A, the student provides the explanation, "Yes, they all are greater than one. If you multiply all of them which is shown you will get a hire [higher] number than one," and uses an arrow pointing to his equations as a diagram, which supports that Walter is correct (MP3). The student writes multiplication equations in Part C, but the equations shown do not involve unit fractions, and the student does not explicitly compare the products found to 1 whole (no credit for MP7).

Total Awarded Points: 3 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a. Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

$$\frac{1}{2} \times \frac{7}{6} = \boxed{\frac{7}{12}}$$

Walter is incorrect because I multiply $\frac{1}{2}$ by $\frac{7}{6}$ and the answer is $\frac{7}{12}$ which is less than One whole.

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b. Walter writes the following expressions:

$$5 \times \frac{1}{6} = \frac{5}{1} \quad \boxed{\frac{5}{6}}$$

$$3 \times \frac{1}{8} = \boxed{\frac{3}{8}}$$

$$\frac{6}{1} \times \frac{1}{9} = \boxed{\frac{6}{9}} = \boxed{\frac{2}{3}} \qquad \frac{100}{1} \times \frac{7}{8} \quad \frac{700}{8}$$

Solve the three multiplication expressions.

c. How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

If the numerator is ones
!... one   your product is less than
one

Anchor 6   Litho 00044200171

Total Content Points: 2   (4.NF.B.4a(x), 4.NF.B.4a(z))

Total Practice Points: 1   (MP7)

The student writes the equation $\frac{1}{2} \times \frac{7}{6} = \frac{7}{12}$ in Part A. Although the equation does not represent multiplying a unit fraction by a number greater than the denominator, the expression is accurately solved, indicating an understanding of multiplication of fractions (4.NF.B.4a(x)). The student solves the three multiplication expressions correctly in Part B (4.NF.B.4a(z)). The student states in Part A that Walter is incorrect, and the explanation does not relate to Walter's claim, as the student has not multiplied a unit fraction by a number greater than the fractions' denominator (no credit for MP3). In Part C, the student writes the statement, "If the numerator is one your product is less than one," supporting the claim that when multiplying a unit fraction by a number less than the denominator of the unit fraction, the product is less than 1 (MP7).

Total Awarded Points: 3 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a.   Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

Walter is rite. $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$

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

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

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

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$\frac{5}{1} \times \frac{1}{6} = \frac{5}{6}$$

$$\frac{3}{1} \times \frac{1}{8} = \frac{3}{8}$$

$$\frac{6}{1} \times \frac{1}{9} = \frac{6}{9} = \frac{2}{3}$$

$$3\overline{)6} \quad 3\overline{)9}$$

Solve the three multiplication expressions.

c.   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

One is grater than a fraction that is $\frac{5}{7}$.

Anchor 7   Litho 00494200171

Total Content Points: 2   (4.NF.B.4a(x), 4.NF.B.4a(z))

Total Practice Points: 0

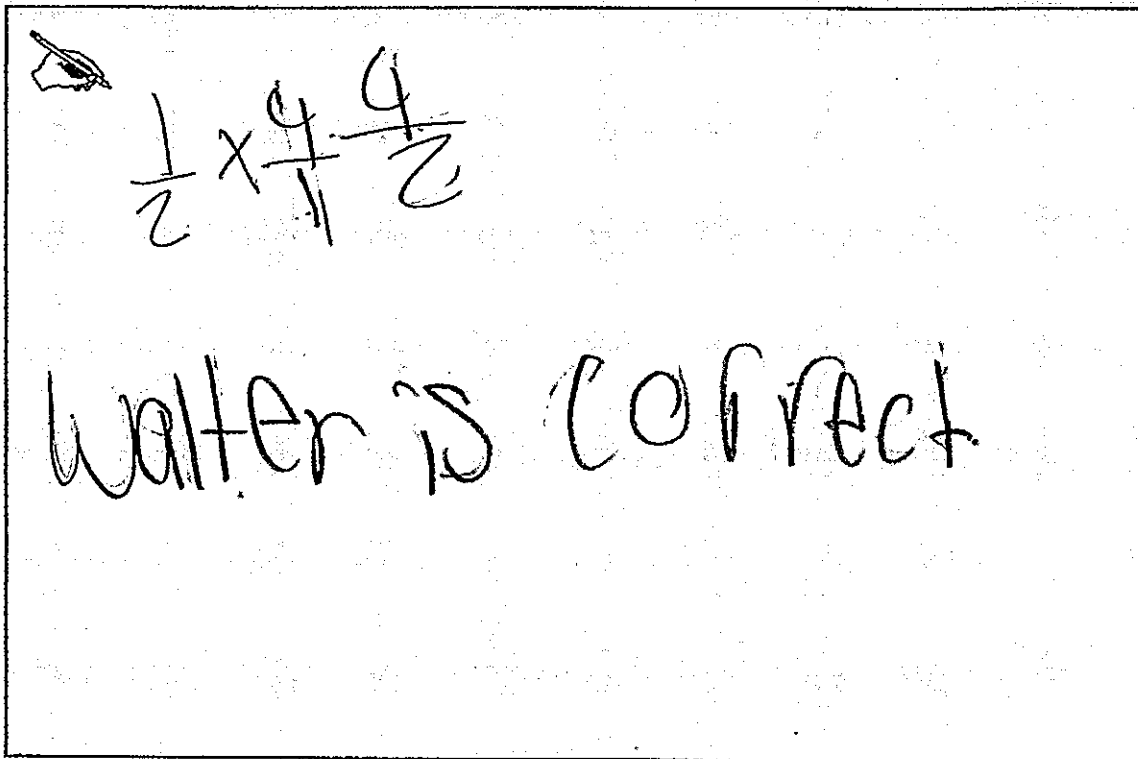The student uses the equation $\frac{1}{4} \times \frac{3}{1} = \frac{3}{4}$ as an example in Part A, demonstrating $a \times \frac{1}{b} = \frac{a}{b}$. Although the other equations shown do not show a unit fraction multiplied by a whole number, the student demonstrates an understanding of the content (4.NF.B.4a(x)). The student correctly solves the three multiplication expressions in Part B (4.NF.B.4a(z)). In Part A, the student states that Walter is correct, but does not provide an explanation to support that statement (no credit for MP3). The student writes, "One is grater than a fraction that is $\frac{5}{7}$" in Part C, but does not clearly explain that when multiplying a unit fraction by a number less than the denominator, the product is less than 1 (no credit for MP7).

Total Awarded Points: 2 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a.   Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

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

Walter is correct

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b. Walter writes the following expressions:

$$\frac{1}{5} \times \frac{1}{6} = \frac{1}{30}$$

$$\frac{1}{3} \times \frac{1}{8} = \frac{1}{24}$$

$$\frac{1}{6} \times \frac{1}{9} = \frac{1}{54}$$

Solve the three multiplication expressions.

c. How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

Because it is bigger than 1 after you multiply a fraction by a whole number.

Anchor 8   Litho 01064200171

Total Content Points: 1   (4.NF.B.4a(x))

Total Practice Points: 0

In Part A, the student uses the equation $\frac{1}{2} \times \frac{4}{1} = \frac{4}{2}$ as an example of $a \times \frac{1}{b} = \frac{a}{b}$ (4.NF.B.4a(x)).
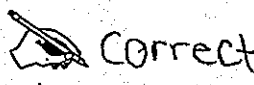The student incorrectly solves the three multiplication expressions in Part B (no credit for 4.NF.B.4a(z)). The student states that Walter is correct in Part A, but does not provide an explanation to support the argument (no credit for MP3). The student writes the statement, "Because it is bigger than 1 after you multiply a fraction by a whole number," which does not support the claim that when multiplying a unit fraction by a number less than the denominator of the unit fraction, the product is less than 1 (no credit for MP7).

Total Awarded Points: 1 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a. Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

Correct

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$5 \times \frac{1}{6} = \frac{5}{6}$$

$$3 \times \frac{1}{8} = \frac{3}{8}$$

$$6 \times \frac{1}{9} = \frac{6}{9}$$

Solve the three multiplication expressions.

c.   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

One is less then.

Anchor 9   Litho 00014200175

Total Content Points: 1   (4.NF.B.4a(z))

Total Practice Points: 0

The student does not draw a diagram or explain through an example equation in Part A that $a \times \dfrac{1}{b} = \dfrac{a}{b}$ (no credit for 4.NF.B.4a(x)). The student solves the three multiplication expressions correctly in Part B (4.NF.B.4a(z)). The only explanation the student gives in Part A is "correct," which does not explain why Walter is correct (no credit for MP3). The student writes "One is less then" in Part C, which does not support the claim that when multiplying a unit fraction by a number less than the denominator of the unit fraction, the product is less than 1 (no credit for MP7).

Total Awarded Points: 1 out of 4

Walter's Claim Task

Walter claims if you multiply a unit fraction, such as $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$, by a number greater than the denominator, the product is a value greater than one.

a. Is Walter correct or incorrect? Give an example. Then explain in words or draw a diagram to support your answer.

> He is correct because if you use
> multiply $\frac{1}{2} \times \frac{1}{3} \times \frac{1}{4} = \frac{1}{9}$ and thats why it is
> correct.

Walter's Claim Task

Walter wants to find out what happens when he multiplies a unit fraction by a whole number less than the denominator.

b.   Walter writes the following expressions:

$$5 \times \frac{1}{6} = \frac{1}{32}$$

$$3 \times \frac{1}{8} = \frac{1}{26}$$

$$6 \times \frac{1}{9} = \frac{1}{40}$$

Solve the three multiplication expressions.

c.   How does the product compare to 1 when a unit fraction is multiplied by a whole number less than the denominator?

the answer is correct because when I multiplyed $5 \times \frac{1}{6} =$ it gave me $\frac{1}{32}$ and thats how I got my answer.

Litho#: 00154200175

Anchor 10   Litho 00154200175

Total Content Points: 0

Total Practice Points: 0

In Part A, the student uses the equation $\frac{1}{2} \times \frac{1}{3} \times \frac{1}{4} = \frac{1}{9}$, which is incorrect, and does not represent through example the equation $a \times \frac{1}{b} = \frac{a}{b}$ (no credit for 4.NF.B.4a(x)). The student solves the three multiplication expressions incorrectly in Part B (no credit for 4.NF.B.4a(z)). The student does state that Walter is correct in Part A, but the reasoning ("And thats why it is correct") is insufficient to create a viable argument (no credit for MP3). In Part C, the student's incorrect solution to $5 \times \frac{1}{6}$ ("it gave me $\frac{1}{32}$") and unclear reasoning do not indicate an understanding of the structure of fractions or an understanding that multiplying a unit fraction by a number less than the denominator will result in a product of less than one whole (no credit for MP7).

Total Awarded Points: 0