Task Model 1a **Response Type: Equation/Numeric** **DOK Level 1** **4.NF.B.3** Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*. **Evidence Required:** 1. The student adds and subtracts fractions with like denominators by joining and separating parts referring to the same whole. **Tools:** None	**Prompt Features:** The student is prompted to solve an addition or subtraction fraction problem. **Stimulus Guidelines:** • The student is presented with either an addition or subtraction fraction equation with a box for an unknown number. • In addition problems, the unknown will be the sum. • In subtraction problems, the unknown will be the difference. • Item difficulty can be adjusted via these example methods: ○ The location of the unknown in the equation (on the left or right side of the equal sign) ○ How "friendly" the numbers are to work with ○ Using mixed numbers that have to be broken into parts prior to doing an operation (e.g., $1\frac{2}{5}-\frac{4}{5}=\frac{5}{5}+\frac{2}{5}-\frac{4}{5}=\frac{7}{5}-\frac{4}{5}=\frac{3}{5}$) **TM1a** **Stimulus:** The student is presented with a fraction addition or subtraction equation with a box to represent an unknown result. **Example Stem 1:** Enter the unknown number that makes the equation true. $\frac{1}{8}+\frac{4}{8}=\square$ **Example Stem 2:** Enter the unknown number that makes the equation true. $\square=\frac{4}{8}-\frac{1}{8}$ **Rubric:** (1 point) The student shows understanding of addition and subtraction of fractions by entering the correct sum or difference of two fractions with like denominators (e.g., $\frac{5}{8}$; $\frac{3}{8}$). **Response Type:** Equation/Numeric

Task Model 1b **Response Type: Equation/Numeric** **DOK Level 2** **4.NF.B.3** Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*. **Evidence Required:** 1. The student adds and subtracts fractions with like denominators by joining and separating parts referring to the same whole. **Tools:** None	**Prompt Features:** The student is prompted to solve an addition or subtraction fraction problem. **Stimulus Guidelines:** • The student is presented with either an addition or subtraction fraction equation with a box for an unknown number. • In addition problems, the unknown will be an addend. • In subtraction problems, the unknown will be the minuend or subtrahend. • Item difficulty can be adjusted via these example methods: ○ The location of the unknown in the equation ▪ In addition problems, the first or second addend ▪ In subtraction problems, the minuend or subtrahend ○ The location of the result in the equation (on the left or right side of the equal sign) ○ How "friendly" the numbers are to work with ○ Using mixed numbers that have to be broken into parts prior to doing an operation (e.g., $1\frac{2}{5}-\frac{4}{5}=\frac{5}{5}+\frac{2}{5}-\frac{4}{5}=\frac{7}{5}-\frac{4}{5}=\frac{3}{5}$) **TM1b** **Stimulus:** The student is presented with a fraction addition or subtraction equation with a box for an unknown number. **Example Stem 1:** Enter the unknown number that makes the equation true. $\frac{7}{5}-\square=\frac{4}{5}$ **Example Stem 2:** Enter the unknown number that makes the equation true. $\frac{4}{5}=\square+\frac{2}{5}$ **Rubric:** (1 point) The student shows understanding of addition and subtraction of fractions by entering the correct sum or difference of two fractions with like denominators (e.g., $\frac{3}{5}$; $\frac{2}{5}$). **Response Type:** Equation/Numeric

Task Model 2a

Response Type: Matching Tables

DOK Level 2

4.NF.B.3
Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*.

Evidence Required:
2. The student expresses an equivalent form of a fraction or mixed number by considering each as a sum of fractions with the same denominator.

Tools: None

Prompt Feature: The student is prompted to select an expression that represents a decomposition of a fraction into a sum of fractions with the same denominator.

Stimulus Guidelines:

- The table will contain addition expressions with two or more fractions each that have the same denominator.
- Item difficulty can be adjusted via these example methods:
  - Presenting a proper fraction, improper fraction, or mixed number as the given fraction
  - Decomposing the given fraction into a greater or lesser number of terms
  - Ordering the addends in the expression by value or not (e.g., putting it as a middle or end term instead of the initial term in the expression)

TM2a
Stimulus: The student is presented with a fraction and three fraction addition expressions. The number 1 may be used in place of a fraction with like denominator.

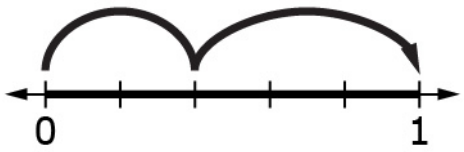
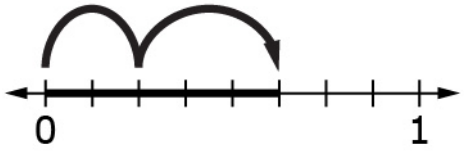
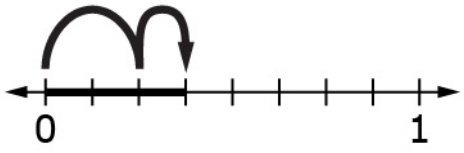
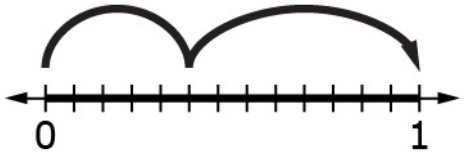
Example Stem: Decide whether each expression is equal to $1\frac{5}{8}$. Click in the table to respond.

	Equal to $1\frac{5}{8}$	**Not Equal to $1\frac{5}{8}$**
$1+\frac{5}{8}$		
$\frac{8}{8}+\frac{3}{8}+\frac{2}{8}$		
$1+\frac{3}{8}+\frac{1}{8}+\frac{2}{8}$		

Rubric: (1 point) The student correctly identifies all three expressions as either equal or not equal to the given fraction (e.g., Equal, Equal, Not Equal).

Response Type: Matching Tables

Task Model 2b **Response Type:** **Drag and Drop** **DOK Level 2** **4.NF.B.3** Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*. **Evidence Required:** 2. The student expresses an equivalent form of a fraction or mixed number by considering each as a sum of fractions with the same denominator. **Tools:** None **Accessibility Note:** Drag and Drop items are not currently able to be Brailled. Minimize the number of items developed to this TM.	**Prompt Features:** The student is prompted to enter two different ways to decompose a fraction into a sum of fractions with the same denominator. **Stimulus Guidelines:** • Item difficulty can be adjusted via these example methods: ○ The number of addends that the given fraction is decomposed into ○ The number of numerators the student must provide **TM2b** **Stimulus:** The student is presented with two equations representing the decomposition of a fraction or mixed number. **Example Stem:** Drag numbers to the numerators of the fractions to show **two different** correct equations. $\frac{7}{8} = \frac{\square}{8} + \frac{\square}{8} + \frac{\square}{8}$ $\frac{7}{8} = \frac{\square}{8} + \frac{\square}{8} + \frac{\square}{8}$ **Rubric:** (1 point) The student correctly completes the equations provided (e.g., 2, 1, 4 and 4, 3, 0). **Response Type:** Drag and Drop

Task Model 2c
 	
Response Type: Multiple Choice, single correct response
 	
DOK Level 2
 	
4.NF.B.3
Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*.
 	
Evidence Required:
2. The student expresses an equivalent form of a fraction or mixed number by considering each as a sum of fractions with the same denominator.
 	
Tools: None
	Prompt Features: The student is prompted to identify the decomposition of a fraction represented by a visual fraction model.
	
	Stimulus Guidelines:
	• The answer choices should be in the form of one of these types of visual fraction models:
	  ○ Parts of a whole
	  ○ Parts of a set
	  ○ Intervals on a number line diagram
	• Item difficulty can be adjusted via this example method:
	  ○ Number of addends/jumps used in each equation/model
	
	TM2c
	Stimulus: The student is presented with an addition equation representing the decomposition of a fraction.
	
	Example Stem: Select the model that matches this equation.
	$\frac{5}{8} = \frac{2}{8} + \frac{3}{8}$
	
	A.
	 
	
	B.
	 
	
	C.
	 
	
	D.
	 
	
	Rubric: (1 point) The student selects the correct visual representation of the decomposition of a fraction (e.g., B).
	
	Response Type: Multiple Choice, single correct response

Task Model 2d **Response Type: Equation/Numeric** **DOK Level 2** **4.NF.B.3** Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*. **Evidence Required:** 2. The student expresses an equivalent form of a fraction or mixed number by considering each as a sum of fractions with the same denominator. **Tools:** None	**Prompt Features:** The student is prompted to express the sum of unit fractions with the same denominator as a fraction or mixed number. **Stimulus Guidelines:** • All addends in the expression are unit fractions. • Item difficulty can be adjusted via this example method: ○ Number of addends in the expression **TM2d** **Stimulus:** The student is presented with an expression representing the decomposition of a fraction into unit fractions. **Example Stem:** Enter the fraction that is equivalent to the expression: $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}$. **Rubric:** (1 point) The student enters the correct fraction (e.g., $\frac{3}{8}$). **Response Type:** Equation/Numeric

Task Model 3a **Response Type: Equation/Numeric** **DOK Level 1** **4.NF.B.3** Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*. **Evidence Required:** 3. The student solves contextual problems involving addition and subtraction of fractions referring to the same whole and having like denominators by using visual fraction models and equations to represent the problem. **Tools:** None	**Prompt Features:** The student is prompted to solve a contextual problem involving the addition and subtraction of fractions. **Stimulus Guidelines:** • The wording of the item provides a clue to the type of operation needed to solve the problem (e.g., item may use words like "combine," "separate," "altogether," "more than," "less than," etc.). • Items may reflect Add To/Take From, Put Together/Take Apart, or Compare situations (refer to Operations and Algebraic Thinking Progression document, Table 1, pg. 7). • Item difficulty can be adjusted via this example method: ○ Using mixed numbers that have to be broken into parts prior to doing an operation (e.g., $1\frac{2}{5}-\frac{4}{5}=\frac{5}{5}+\frac{2}{5}-\frac{4}{5}=\frac{7}{5}-\frac{4}{5}=\frac{3}{5}$) **TM3a** **Stimulus:** The student is presented with a contextual problem involving the addition or subtraction of fractions referring to the same whole and having like denominators. **Example Stem 1:** John has $\frac{5}{6}$ of a liter of juice. Jill has $\frac{3}{6}$ of a liter of juice. How many liters of juice do John and Jill have together? Enter the number. **Example Stem 2:** Eric has $\frac{7}{8}$ of a pound of nuts. Jill has $\frac{2}{8}$ of a pound of nuts. How many more pounds of nuts does Eric have than Jill? Enter the number. **Rubric:** (1 point) The student enters the correct fraction (e.g, $\frac{8}{6}$ or $\frac{4}{3}$ or $1\frac{2}{6}$ or $1\frac{1}{3}$; $\frac{5}{8}$). **Response Type:** Equation/Numeric

Task Model 3b **Response Type: Equation/Numeric** **DOK Level 2** **4.NF.B.3** Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*. **Evidence Required:** 3. The student solves contextual problems involving addition and subtraction of fractions referring to the same whole and having like denominators by using visual fraction models and equations to represent the problem. **Tools:** None	**Prompt Features:** The student is prompted to solve a contextual problem involving the addition and subtraction of fractions. **Stimulus Guidelines:** • The wording of the item does not provide a clue to the type of operation needed to solve the problem (e.g., item does not use words such as "combines," "altogether," etc.). • Items may reflect Add To/Take From, Put Together/Take Apart, or Compare situations (refer to Operations and Algebraic Thinking Progression document, Table 1, pg. 7). • Item difficulty can be adjusted via this example method: ○ using mixed numbers that have to be broken into parts prior to doing an operation (e.g., $1\frac{2}{5}-\frac{4}{5}=\frac{5}{5}+\frac{2}{5}-\frac{4}{5}=\frac{7}{5}-\frac{4}{5}=\frac{3}{5}$). **TM3b** **Stimulus:** The student is presented with a contextual problem involving the addition or subtraction of fractions referring to the same whole and having like denominators. **Example Stem 1:** Jack has $2\frac{3}{4}$ feet of rope. Together, Jack and Diane have $4\frac{1}{4}$ feet of rope. How many feet of rope does Diane have? Enter your answer in the response box. **Example Stem 2:** A baker has $3\frac{3}{4}$ cups of sugar. She has $2\frac{1}{4}$ more cups of sugar than cups of flour. How many cups of flour does she have? Enter your answer in the response box. **Rubric:** (1 point) The student enters the correct fraction (e.g, $1\frac{2}{4}$, $1\frac{2}{4}$). **Response Type:** Equation/Numeric

Task Model 3c

Response Type:
Hot Spot

DOK Level 1

4.NF.B.3
Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*.

Evidence Required:
3. The student solves contextual problems involving addition and subtraction of fractions referring to the same whole and having like denominators by using visual fraction models and equations to represent the problem.

Tools: None

Accessibility Note: Hot Spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.

Prompt Features: The student is prompted to manipulate a model representing the addition or subtraction of fractions.

Stimulus Guidelines:

- Items may reflect Add To/Take From, Put Together/Take Apart, or Compare situations (refer to Operations and Algebraic Thinking Progression document, Table 1, pg. 7).
- Item difficulty can be adjusted via this example method:
  - Using mixed numbers that have to be broken into parts prior to doing an operation (e.g., $1\frac{2}{5} - \frac{4}{5} = \frac{5}{5} + \frac{2}{5} - \frac{4}{5} = \frac{7}{5} - \frac{4}{5} = \frac{3}{5}$)

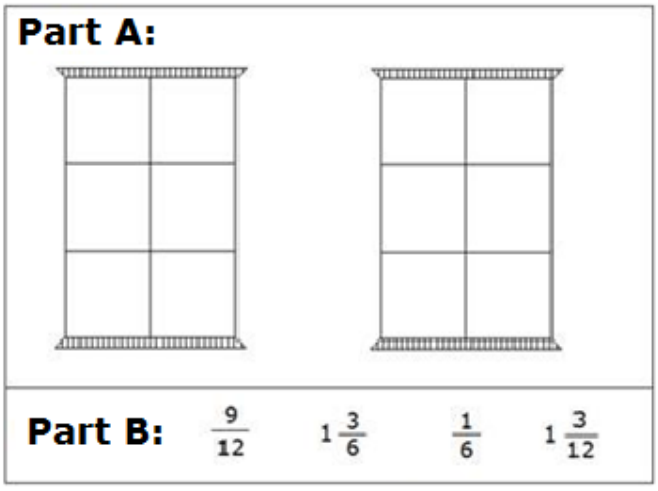
TM3c
Stimulus: The student is presented with a contextual problem involving the addition or subtraction of fractions.

Example Stem 1: Michael eats $\frac{4}{6}$ of a bar of chocolate. Erin eats $\frac{5}{6}$ of a bar of chocolate.

 represents one bar of chocolate

Part A: Shade the model to show how many bars of chocolate Michael and Erin eat together.

Part B: Click on the total number of bars of chocolate Michael and Erin eat together.



Task Model 3c

Response Type:
Hot Spot

DOK Level 1

4.NF.3
Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*.

Evidence Required:
3. The student solves contextual problems involving addition and subtraction of fractions referring to the same whole and having like denominators by using visual fraction models and equations to represent the problem.

Tools: None

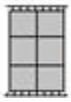
Accessibility Note: Hot Spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.

TM3c (continued)

Rubric:
Part A: (1 point) The student builds a model that correctly represents a fraction addition or subtraction problem (e.g., $1\frac{3}{6}$).
Part B: (1 point) The student selects the correct number (e.g., $1\frac{3}{6}$).

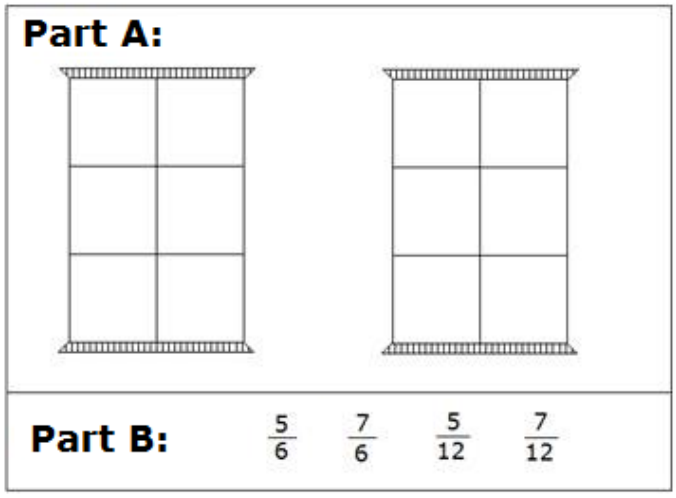
Response Type: Hot Spot

Example Stem 2: Michael and Erin have 2 bars of chocolate. Together they eat $1\frac{1}{6}$ bars of chocolate.

 represents one bar of chocolate

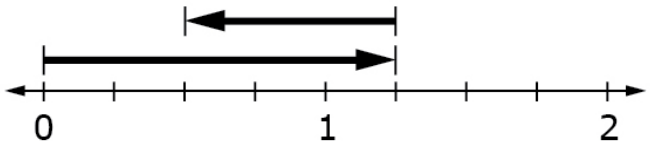
Part A: Shade the model to show the amount of chocolate they did **not** eat.

Part B: Click on the fraction that shows the amount of chocolate they did **not** eat.



Rubric:
Part A: (1 point) The student builds a model that correctly represents a fraction addition or subtraction problem (e.g., $\frac{5}{6}$).
Part B: (1 point) The student selects the correct number (e.g., $\frac{5}{6}$).

Response Type: Hot Spot

Task Model 3d **Response Type: Equation/Numeric** **DOK Level 1** **4.NF.B.3** Understand a fraction *a/b* with *a* > 1 as a sum of fraction *1/b*. **Evidence Required:** 3. The student solves contextual problems involving addition and subtraction of fractions referring to the same whole and having like denominators by using visual fraction models and equations to represent the problem. **Tools:** None **Version 3 Update:** Added new TM3d.	**Prompt Features:** The student is prompted to solve a contextual problem involving the addition and subtraction of fractions. **Stimulus Guidelines:** same as TM3a,b,c **TM3d** **Stimulus:** The student is presented with a model of a contextual problem involving the addition or subtraction of fractions. **Example stem:** José has $1\frac{1}{4}$ cups of a sports drink. He gives $\frac{3}{4}$ cup of his drink to his sister. How much sports drink, in cups, does José has left?  **Cups of Sports Drink** **Rubric:** (1 point) The student enters the correct amount (e.g., $\frac{2}{4}$ or $\frac{1}{2}$ or equivalent). **Response Type:** Equation/Numeric

Task Model 4a **Response Type: Equation/Numeric** **DOK Level 1** **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **Evidence Required:** 4. The student understands that a fraction *a*/*b* is a multiple of 1/*b*. **Tools:** None	**Prompt Features:** The student is prompted to enter the value of an unknown number in a fraction multiplication equation. **Stimulus Guidelines:** • Item difficulty can be adjusted via this example method: ○ The product is a whole number or a fraction. **TM4a** **Stimulus:** The student is presented with a multiplication equation of the form $\square = a \times \frac{1}{b}$. **Example Stem:** Enter the unknown number that makes the equation true. $\square = 4 \times \frac{1}{12}$ **Rubric:** (1 point) The student identifies the equivalent fraction or whole number which will make the equation true (e.g., $\frac{4}{12}$). **Response Type:** Equation/Numeric

Task Model 4b **Response Type: Equation/Numeric** **DOK Level 2** **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **Evidence Required:** 4. The student understands that a fraction *a*/*b* is a multiple of 1/*b*. **Tools:** None	**Prompt Features:** The student is prompted to enter the value of an unknown number in a fraction multiplication equation. **Stimulus Guidelines:** • The unknown number is one of the factors. • Item difficulty can be adjusted via these example methods: ○ The product is a whole number or a fraction. ○ The whole number factor (*a*) is replaced with a box (□). ○ The fractional factor ($\frac{1}{b}$) is replaced with a box (□). **TM4b** **Stimulus:** The student is presented with a multiplication equation of the form $\frac{a}{b} = a \times \frac{1}{b}$ with an unknown value. **Example Stem:** Enter the unknown number that makes the equation true. $\frac{4}{12} = \square \times \frac{1}{12}$ **Rubric:** (1 point) The student identifies the equivalent fraction or whole number which will make the equation true (e.g., 4). **Response Type:** Equation/Numeric

Task Model 4c

Response Types: Matching Tables

DOK Level 2

4.NF.4
Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

Evidence Required:
4. The student understands that a fraction *a*/*b* is a multiple of 1/*b*.

Tools: None

Prompt Features: The student is prompted to identify expressions that are equivalent to an expression of the form $c \times \frac{a}{b}$.

Stimulus Guidelines:

- Fractions presented in stem should have a denominator of 2, 3, 4, 5, 6, 8, 10, 12, or 100.
- Item difficulty may be adjusted via these example methods:
  - Use of fractions with denominators that are multiples of 2, 3, 4, 5, 6, 8, 10, 12, or 100
  - Use of an expression in the numerator or denominator

TM4c
Stimulus: The student is presented with a fraction multiplication expression of the form $c \times \frac{a}{b}$.

Example Stem 1: Decide whether each expression is equal to $5 \times \frac{2}{4}$. Click in the table to respond.

	Equal to $5 \times \frac{2}{4}$	**Not Equal to** $5 \times \frac{2}{4}$
$2 \times \frac{1}{20}$		
$4 \times \frac{2}{5}$		
$10 \times \frac{1}{4}$		

Example Stem 2: Decide whether each expression is equal to $5 \times \frac{2}{4}$. Click in the table to respond.

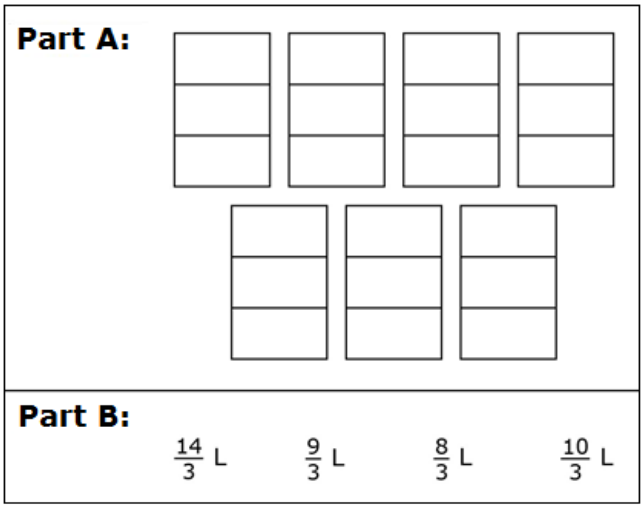
	Equal to $5 \times \frac{2}{4}$	**Not Equal to** $5 \times \frac{2}{4}$
$2 \times \frac{1}{20}$		
$2 \times \frac{5}{4}$		
$\frac{5 \times 2}{10}$		

Rubric: (1 point) The student correctly identifies the expressions as Equal or Not Equal (e.g., Not Equal, Not Equal, Equal; Not Equal, Equal, Not Equal).

Response Type: Matching Tables

Task Model 5
 	
Response Type: Equation/Numeric
 	
DOK Level 1
 	
4.NF.B.4
Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
 	
Evidence Required:
5. The student multiplies a fraction by a whole number.
 	
Tools: None
	Prompt Features: The student is prompted to write the correct product of a fraction and a whole number.
	
	Stimulus Guidelines:
	• All items have an unknown product ($c \times \frac{a}{b} = \square$).
	• Items may present proper or improper fractions, but not mixed numbers.
	• Item difficulty may be adjusted via these example methods:
	  ○ Unit fraction times a whole number, product is a whole number
	  ○ Unit fraction times a whole number, product is not a whole number
	  ○ Non-unit fraction times a whole number, product is a whole number
	  ○ Non-unit fraction times a whole number, product is not a whole number
	
	TM5
	Stimulus: The student is presented with a fraction multiplication equation with an unknown product.
	
	Example Stem: Enter the unknown number that makes the equation true.
	$6 \times \frac{5}{8} = \square$
	
	Rubric: (1 point) The student multiplies a fraction and a whole number and enters the correct product (e.g., $\frac{30}{8}$ or $3\frac{6}{8}$ or $3\ \frac{3}{4}$ or equivalent).
	
	Response Type: Equation/Numeric

Task Model 6a **Response Type: Equation/Numeric** **DOK Level 2** **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **Evidence Required:** 6. The student solves contextual problems involving the multiplication of a fraction by a whole number by using visual fraction models and equations to represent the problem. **Tools:** None	**Prompt Features:** The student is prompted to solve contextual problems involving the multiplication of a fraction by a whole number. **Stimulus Guidelines:** • All items have an unknown product ($c \times \frac{a}{b} = \square$). • Items may present proper or improper fractions, but not mixed numbers. • Item difficulty can be adjusted via these example methods: ○ Unit fraction times a whole number, product is a whole number ○ Unit fraction times a whole number, product is not a whole number ○ Non-unit fraction times a whole number, product is a whole number ○ Non-unit fraction times a whole number, product is not a whole number **TM6a** **Stimulus:** The student is presented with a contextual problem involving the multiplication of a fraction by a whole number. **Example Stem:** A bottle holds $\frac{3}{5}$ liter of water. Sam needs 8 bottles of water to fill his fish tank. How many liters of water does Sam need to fill the fish tank? Enter the number of liters. **Rubric:** (1 point) The student enters the correct product (e.g., $\frac{24}{5}$ or $4\frac{4}{5}$). **Response Type:** Equation/Numeric

Task Model 6b **Response Type:** **Hot Spot** **DOK Level 2** **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **Evidence Required:** 6. The student solves contextual problems involving the multiplication of a fraction by a whole number by using visual fraction models and equations to represent the problem. **Tools:** None **Accessibility Note:** Hot Spot items are not currently able to be Brailled. Minimize the number of items developed to this TM.	**Prompt Features:** The student is prompted to solve contextual problems involving the multiplication of a fraction by a whole number using visual fraction models to solve the problem. **Stimulus guidelines:** Same as for TM6a. **TM6b** **Stimulus:** The student is presented with a contextual problem involving the multiplication of a fraction by a whole number. **Example Stem:** There are 7 people at a picnic. Each person drinks $\frac{2}{3}$ of a liter of lemonade. **Part A:** Each pitcher holds 1 liter. Click on the pitchers to shade the amount of lemonade needed for the picnic. Use the fewest number of pitchers possible. **Part B:** Click the total amount of lemonade that is needed.  **Rubric:** **Part A:** (1 point) The student correctly shades the model to represent the product (e.g., $4\frac{2}{3}$). **Part B:** (1 point) The student selects the correct product (e.g., $\frac{14}{3}$). **Response Type:** Hot Spot