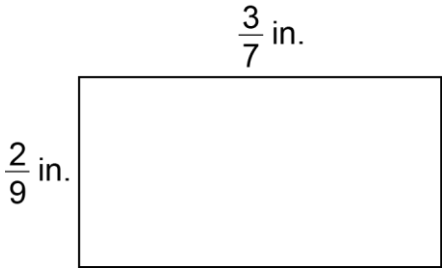
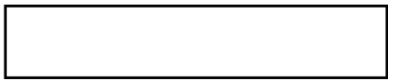
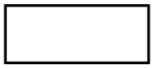
Content Standard	***MAFS.5.NF*** *Number and Operations – Fractions* ***MAFS.5.NF.2*** *Apply and extend previous understanding of multiplication and division to multiply and divide fractions.* **MAFS.5.NF.2.4** Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. **MAFS.5.NF.2.4a** Interpret the product $\left(\frac{a}{b}\right) \times q$ as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show* $\left(\frac{2}{3}\right) \times 4 = \frac{8}{3}$, *and create a story context for this equation. Do the same with* $\left(\frac{2}{3}\right) \times \left(\frac{4}{5}\right) = \frac{8}{15}$. *(In general,* $\left(\frac{a}{b}\right) \times \left(\frac{c}{d}\right) = \frac{ac}{bd}$*).* **MAFS.5.NF.2.4b** Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
Assessment Limits	Multiply whole numbers by fractions or fractions by fractions. Visual models: • Any appropriate fraction model (e.g., circles, tape, polygons, etc.) • Rectangle models only, tile with unit squares For tiling, the dimensions of the tile should be unit fractions with the same denominator as the given rectangular shape (see p. 13 of the progression document for demonstration). Do not use the term "simplify" or "lowest terms."
Calculator	No
Acceptable Response Mechanisms	Equation Response Graphic Response – Drag and Drop, Drawing/Graphing, Hot Spot Multiple Choice Response Multi-Select Response

Context	Allowable
Example	
Context	Multiply two proper fractions, with denominator(s) between 5 and 10.
Context easier	Include a fraction multiplied by a whole number. Fractions with denominator less than or equal to 5. Include unit fractions. Items where the final answer is a step in the process.
Context more difficult	Multiply two fractions, which can include improper fractions. At least one fraction has a double-digit denominator.

Sample Item Stem	Response Mechanism	Notes, Comments
An expression is shown. $\frac{1}{3} \times \frac{2}{5}$ What is the value of the expression?	Equation Response	
An expression is shown. $\frac{3}{8} \times \frac{4}{9}$ Which expression is equivalent?	Multiple Choice Response	
An expression is shown. $\frac{8}{3} \times \frac{5}{12}$ What is the value of the expression?	Equation Response	
A baker has 5 pounds of sugar. She divides them equally into 3 containers. She then uses 1 container to bake pies. Which expression shows how many pounds of sugar the baker used?	Multiple Choice Response	
A rectangle is shown with dimensions in inches (in.).  What is the area of the rectangle in square inches?	Equation Response	

Select all the rectangles that have an area of $\frac{15}{24}$ square inches. ○ $\frac{5}{8}$ in. by $\frac{10}{3}$ in.  ○ $\frac{5}{3}$ in. by $\frac{3}{8}$ in.  ○ $\frac{8}{6}$ in. by $\frac{7}{4}$ in.  ○ $\frac{3}{6}$ in. by $\frac{5}{4}$ in.  ○ $\frac{5}{15}$ in. by $\frac{3}{9}$ in. 	Multi-Select Response	

Content Standard	***MAFS.5.NF*** *Number and Operations – Fractions* ***MAFS.5.NF.2*** *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.* **MAFS.5.NF.2.6** Solve real-world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.
Assessment Limits	Items should require student to interpret the context to determine operations.
Calculator	No
Acceptable Response Mechanisms	Equation Response Multiple Choice Response
Context	Required

Example	
Context	Multiply a non-unit fraction by a non-unit fraction, proper or improper.
Context easier	Multiply a fraction by a whole number. Multiply a fraction by a unit fraction.
Context more difficult	Multiply a fraction by a mixed number.

Sample Item Stem	Response Mechanism	Notes, Comments
Roger has $\frac{3}{4}$ gallon of milk. He gives $\frac{1}{2}$ of it to a friend. How many gallons of milk does Roger have left?	Equation Response	
Roger has $\frac{3}{4}$ gallon of milk. He gives $\frac{3}{7}$ of it to a friend. How many gallons of milk does Roger have left?	Equation Response	
Roger has $2\frac{3}{4}$ gallons of milk. He gives $\frac{3}{7}$ of it to a friend. How many gallons of milk does Roger have left?	Equation Response	

Roger has 6 gallons of milk. He uses $\frac{1}{2}$ of it to make hot chocolate. Then, he uses $\frac{2}{3}$ of the milk he has left to make cookies. How many gallons of milk does Roger have left after making hot chocolate and cookies?	Equation Response	