

Core Content

Cluster Title: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Standard 5: Interpret multiplication as scaling (resizing), by:

- b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

MASTERY Patterns of Reasoning:

Conceptual:

Students will understand that multiplying a fraction greater than 1 and a given number results in a product greater than the given number. Examples: $2 \times \frac{5}{4} = \frac{10}{4}$ OR $2 - \frac{1}{2}$ $\frac{10}{4} > 2$ OR $2 - \frac{1}{2} > 2$

Students will understand that multiplying a fraction less than 1 and a given number results in a product smaller than the given number. Examples: $3 \times \frac{1}{4} = \frac{3}{4}$ $\frac{3}{4} < 3$

Students will realize that multiplying a fraction less than 1 times a fraction less than 1 results in a number less than either fraction. Examples: $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ $\frac{1}{4} < \frac{1}{2}$

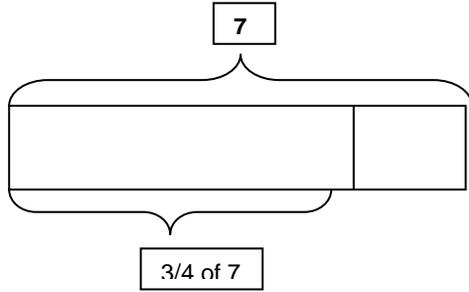
Procedural:

Students will practice multiplying fractions less than 1 by a whole number or fractions greater than 1 by a whole number to show how the products are affected. For example, $\frac{1}{6} \times 9$ is less than $\frac{1}{3} \times 9$ because $\frac{1}{6}$ is less than $\frac{1}{3}$.

Representational:

Students can draw models of multiplication of fractions by given numbers to compare the size of products.

Supports for Teachers

Critical Background Knowledge	
<p>Conceptual: Students will understand relationships between the size of the factors and products. Students will understand that a denominator indicates the number of pieces into which the whole is broken; therefore, as the size of the denominator increases, the size of the pieces decreases.</p> <p>Procedural: Students can multiply whole numbers.</p> <p>Representational: Students can multiply using area models or arrays.</p>	
Academic Vocabulary and Notation	
increase, decrease, product, factors, arrays, fraction greater than 1, improper fraction, fraction less than 1, proper fraction, mixed number	
Instructional Strategies Used	Resources Used
<p>Draw area models to illustrate the size of products in relationship to the size of the factors. Use estimation to check the reasonableness of your answers.</p> <p>Examples:</p> <p>$\frac{3}{4} \times 7$ is less than 7 because 7 is multiplied by a factor less than 1, so the product must be less than 7.</p> <div style="display: flex; align-items: center; justify-content: center;">  </div> <p>$2\frac{2}{3} \times 8$ must be more than 8 because 2 groups of 8 is 16 and $2\frac{2}{3}$ is almost 3 groups of 8. So the answer must be close to, but less than 24.</p>	<p>Numbers and Operations 3-5— Fractions Rectangular Multiplication: http://nlvm.usu.edu/en/nav/frames_asid_194_g_2_t_1.html?from=category_g_2_t_1.html</p>

Assessment Tasks Used	
<p>Skill-Based Task: Without multiplying, which product is larger and why?</p> <p>$12 \times \frac{1}{5}$ or $6 \times \frac{1}{5}$</p>	<p>Problem Task: Mrs. Bennett is planting two flower beds. The first flower bed is 5 feet long and $1\frac{1}{5}$ feet wide. The second flower bed is 5 feet long and $\frac{5}{6}$ feet wide. How do the areas of these two flower beds compare? Is the value of the area larger or smaller than 5 square feet for each flower bed? Draw pictures to prove your answer.</p>