**FRACTIONS**

Subject: *Multiplying Two Fractions* Grade: *5*

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| Common Core State Standards |
| **5.NF.4a:** Interpret the product ($\frac{a}{b}$ *x q)* as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operation *a x q ÷ b*. *For example, use a visual fraction model to show* $\frac{2}{3} x 4=\frac{8}{3}$*, and create a story context for this equation. Do the same with* $\frac{2}{3} x \frac{4}{5}=\frac{8}{15}$*. (In general,* $\frac{a}{b} x \frac{c}{d}=\frac{ac}{bd}.$ **5.NF.4b:** Find the area of a rectangle with fractional side lengths by tilting 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. |
| Objectives |
| Students will learn to not only multiply any two fractions, but also find the area of a rectangular shape with fractional side lengths.  |
| Launch Questions |
| **Q.** In what case(s) are you allowed to multiply two denominators?**Q.** How different is finding the area of fractional side lengths from finding the area of whole number lengths? |
| Definition/Properties To Know |
| **Rule for Multiplying Fractions:** To multiply any two fractions $\frac{a}{b}$and $\frac{c}{d}$, where $b,d \ne $0, we multiply the numerators and the denominators separately. Therefore $$\frac{a}{b}⋅\frac{c}{d}=\frac{a⋅c}{b⋅d}$$ |

*Warm-Up Activity:* See “WU 5”

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| Lesson (Introduction to Problem) |
| Your science teacher is giving a presentation on oil and to demonstrate its harmful effects, she put a splash of oil on a white tablecloth. Within seconds, the oil stain was increasing in size; the shape of the stain is circular. You teacher assigns you the same task and to record it area, in centimeters squared. Within a white tablecloth spread nicely across the table, you splash some oil and record its radius in the table below every 5 seconds.

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| Time (seconds) | 5 | 10 | 15 | 20 |
| Radius (cm) | $$\frac{6}{4}$$ | $$\frac{7}{3}$$ | $$\frac{11}{2}$$ | $$\frac{15}{2}$$ |

The formula for calculating the area of a circle is: $\frac{1}{2}⋅radius⋅radius$**Q.** What is the area of the circular stain after 5 seconds? 10 seconds? 15 seconds? 20 seconds? Express your answers as mixed numbers* This problem is pretty straightforward and very useful at the same time since it requires students to multiply fractions twice for every time interval. Students will apply the given formula for calculating the area of a circle.
* The final step for each subproblem is converting the improper fraction into a mixed number. This exercise serves as a practice of mixed number-improper fraction conversion.
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| Materials (If Needed) |
| * Paper and Pencil
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*Main Project:* See “MP 5”

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| Closure/Expectations |
| Students should feel comfortable multiply any two fractions and modeling the process. Students should also apply their knowledge of area with shapes of fractional side lengths. This topic is crucial because the next topic “division with fractions” will require students to multiply a fraction with the reciprocal of another fraction.  |