PROBLEM SOLVED
MAKING SENSE OF MATHEMATICS

Multiplying Fractions
Check Your Understanding

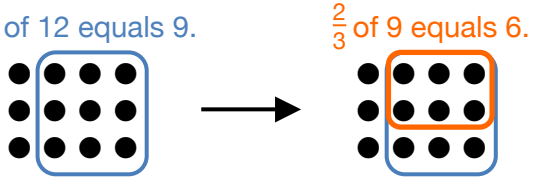
One indicator of how well a student understands multiplying fractions is to compare a student's work and explanation for a problem with how other students have responded to the same problem. Students, parents, or teachers can use the following problem and sample responses to evaluate understanding.

Directions for the Student:

1) Solve the following problem and explain your work and answer.
2) Compare your work to the sample responses in order to determine if your work indicates deep, partial, or beginning understanding.

Problem:

Mr. Rich made chocolate chip cookies using his special recipe, one he learned from his grandmother. His son, Jon, had some friends over and they ate $\frac{1}{4}$ of the cookies, so $\frac{3}{4}$ of the cookies were left. Mr. Rich took $\frac{2}{3}$ of the remaining cookies to his neighbor. What fraction of the cookies did he take to his neighbor?

Level of Understanding	Sample Student Response	Comments
Deep Understanding	**Student 1:** "If you had 12 cookies, and $\frac{1}{4}$ are gone, you have $\frac{3}{4}$, or nine left. Two thirds of nine is six. So if you started out with 12 and gave 6 to the neighbor, you gave $\frac{1}{2}$ away. 	This student drew a diagram of 12 cookies and removed $\frac{1}{4}$ of the cookies, so there were $\frac{3}{4}$, or 9 cookies left. The student then used the drawing to determine $\frac{2}{3}$ of the remaining 9 cookies. The student could have used the same process with a number other than 12 to determine the correct answer.
	Student 2: "One third of $\frac{3}{4}$ is just $\frac{1}{4}$. Since we want to find $\frac{2}{3}$, we need twice as much or $\frac{2}{4}$. That's just $\frac{1}{2}$."	This student used a number sense approach. The student knew that $\frac{1}{3}$ of $\frac{3}{4}$ is $\frac{1}{4}$, so twice as much is $\frac{1}{2}$.

MakingSense

Level of Understanding	Sample Student Response	Comments
Partial Understanding	**Student 3:** $\frac{2}{3} \times \frac{3}{4} = \frac{2+3}{3 \times 4}$ or $\frac{5}{12}$	This student understands to multiply but is using an incorrect algorithm. The student needs to make sense of the multiplication algorithm.
	Student 4: "Just multiply $\frac{2}{3} \times \frac{3}{4}$. When you cross multiply, you get $\frac{9}{8}$, so it's $1\frac{1}{8}$." $\frac{2}{3} \times \frac{3}{4} = \frac{9}{8}$	This student recognizes that the problem involves multiplication, but cross multiplies instead of using the correct multiplication algorithm. The student needs to make sense of the multiplication algorithm.

Level of Understanding	Sample Student Response	Comments
Beginning Understanding	**Student 5:** $\frac{8}{12} - \frac{3}{12} = \frac{5}{12}$	This student does not recognize that the problem involves multiplication.
	Student 6: "Three-fourths because it says he gave $\frac{3}{4}$ to his neighbor."	This student does not recognize that the problem involves multiplication of fractions.