PROBLEM SOLVED
MAKING SENSE OF MATHEMATICS

Difficult Multiplication Facts
Check Your Understanding

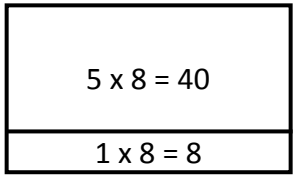
One indicator of how well a student understands the difficult multiplication facts is to compare a student's work and explanation for a problem with how other students have responded to the same problem. Students, teachers, and parents can use the following problem and sample responses to evaluate understanding.

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:

Mrs. Johnson baked brownies. She cut them into 6 rows of 8. How many brownies did she have?

Level of Understanding	Sample Student Response	Comments
Deep Understanding	**Student 1:** "It's 48, because 5 rows of eight is 40 and 1 more row of eight makes 48."  	This student may recall the fact from memory. But, the student also can explain by drawing a model to show how 6 x 8 can be split into a known fact, 5 x 8 = 40 plus 1 more eight. Using known facts to help solve unknown facts helps students become better problem solvers.
	Student 2: "If you take half of it, 3 eights and 3 eights is 24 + 24. So it's 48."	The student is thinking about half as much as 6 x 8. Since the student knows 3 x 8 = 24, the total is just 24 + 24, or 48. Using known facts to help solve unknown facts helps students become better problem solvers.

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Level of Understanding	Sample Student Response	Comments
Partial Understanding	**Student 3:** "Six and 6 is 12, 6 more is 18, and 6 is 24, 6 more is 30, then 6 more is 36, and 6 is 42, and one more 6 is 48."	This student is using repeated addition. Since the student is adding 6 eight times, the method is not particularly efficient. In fact, this thinking is not much help with problems involving larger numbers.
	Student 4: "Eight and 8 is 16, eight more is 24, and 8 is 30, eight more is 38, and 8 is 46."	The student knows that repeated addition can be used to solve the problem. But, like many students who use this procedure, an addition error was made before completing the problem.

Level of Understanding	Sample Student Response	Comments
Beginning Understanding	**Student 5:** "I think it's 48. ...No wait, maybe it's 42. ...No, 54."	Guessing is not an acceptable response to the basic facts. That response is an indicator that the student may have given up trying to make sense of multiplication and is just trying to get any answer so the task can be put away.
	Student 6: "I used my fingers and counted 6 groups of 8."	Although this student did get the correct answer, repeated addition is not an efficient way to multiply larger numbers. This students needs to begin to make sense of using known facts to help with unknown facts. Without learning those more efficient strategies, the student will struggle with multiplication of larger numbers.