Computational Fluency

When one is computationally fluent, one can apply accurate methods to solve problems, such as determining the product of twenty-five and thirty-eight.

This problem may be a skill problem, or it may represent a needed step in solving an application or real-world problem. This is an example of an efficient, generalizable method that produces an accurate product.

This record of work shows a typical algorithm for multiplying two numbers.

Computational fluency includes knowing and applying mental math strategies that students may choose to use instead of a typical algorithm if the mental math strategy appears to be more efficient.

This is a record of mental math used to determine the product of twenty-five and thirty-eight.

The product of twenty-five and thirty-eight is close to the product of twenty-five and forty. Forty is four tens, so the product of twenty-five and forty is the same as the product of twenty-five, four, and ten. Twenty-five times four is one hundred. One hundred times ten is one thousand.

This is two twenty-fives more than twenty-five times thirty-eight, so one subtracts fifty from one thousand with a result of nine hundred fifty.

This record of work reveals place value considerations, commonly called partial products. Forty is the product of 5 and 8, the ones digits of both numbers. One hundred sixty is the product of 20, the value of the tens digit in the first factor, and 8, the value of the ones digit in the second factor. One hundred fifty is the product of 5, the value of the ones digit in the first factor, and 30, the value of the tens digit in the second factor. Six hundred is the product of 20, the value of the tens digit in the first factor, and 30, the value of the tens digit in the second factor. The sum of these partial products is 950, the product of the two factors.

A person with computational fluency connects conceptual and procedural understandings. In this example, two of the partial products based on place value, 40 and 160, are connected to 200 in the algorithm recorded on the right. The remaining two partial products based on place value, 150 and 600, are connected to 750 in the algorithm on the right.

Connections are also made with place value and regrouping as noted with the digits highlighted with green and red triangles.

Students who are able compute using mental math strategies, algorithms that connect concepts and procedures, and algorithms that are accurate, efficient, and generalizable demonstrate computational fluency.