

Math Skills

Scientific Measurements and Significant Digits

When making scientific measurements, you must be aware of how many digits in the number representing a measurement are significant. The following rules apply when determining the number of significant digits:

1. All nonzero digits are significant. For example, 1,343 has four significant digits.
2. Any zeros between significant digits are also significant. For example, 1,406 has four significant digits.
3. Zeros at the end of a number but to the left of a decimal point are significant if they have been measured or are the first estimated digit. Otherwise, they are not significant. For example, 1,000 may contain from one to four significant digits, but in this worksheet it will be assumed to have one significant digit.
4. If a value has no significant digits to the left of a decimal point, any zeros to the right of the decimal point and to the left of a significant digit are not significant. For example, 0.0012 has only two significant digits.
5. If a value ends with zeros to the right of a decimal point, those zeros are significant. For example, 0.1200 has four significant digits.
6. When adding or subtracting two measurements, the answer can only have as many decimal positions as the number with the fewest decimal places. For instance, when you add 15.4598 g and 14.23 g, the number with the fewest decimal places is 14.23. Therefore, the answer is 29.69.
7. When multiplying or dividing two measurements, the answer can have only as many significant digits as the value that has the fewest number of significant digits. For instance, when you multiply 3.86 by 2.2, the number with the fewest number of significant digits is 2.2. Therefore, the answer is 8.5.

SAMPLE PROBLEM:

Multiply 6.42 g by 1.5 g. Then, determine how many significant digits there are in the answer.

SOLUTION

Step 1: $6.42 \times 1.5 = 9.63$

Step 2: Determine the number of significant digits for each measurement. Rule 7 states that when multiplying, the answer can have only as many significant digits as the value that has the fewest number of significant digits. In this case, the value with the fewest significant digits is 1.5.

Step 3: The number of significant digits in the answer should be 2.

Step 4: The answer is 9.6.

