

Similar rules apply to multiplication. Suppose that you calculate the area of a room by multiplying the width and length. If the room's dimensions are 4.6 m by 6.7 m, the product of these values would be 30.82 m^2 . However, this answer contains four significant figures, which implies that it is more precise than the measurements of the length and width. Because the room could be as small as 4.55 m by 6.65 m or as large as 4.65 m by 6.75 m, the area of the room is known only to be between 30.26 m^2 and 31.39 m^2 . The area of the room can have only two significant figures because each measurement has only two. So, the area must be rounded off to 31 m^2 . **Table 5** summarizes the two basic rules for determining significant figures when you are performing calculations.

Table 5 Rules for Calculating with Significant Figures

Type of calculation	Rule	Example
addition or subtraction	Given that addition and subtraction take place in columns, round the final answer to the <i>first column from the left containing an estimated digit</i> .	$\begin{array}{r} 97.3 \\ + 5.85 \\ \hline 103.15 \end{array} \xrightarrow{\text{round off}} 103.2$
multiplication or division	The final answer has the same number of significant figures as the measurement having the <i>smallest number of significant figures</i> .	$\begin{array}{r} 123 \\ \times 5.35 \\ \hline 658.05 \end{array} \xrightarrow{\text{round off}} 658$

Calculators do not pay attention to significant figures

When you use a calculator to analyze problems or measurements, you may be able to save time because the calculator can compute faster than you can. However, the calculator does not keep track of significant figures.

Calculators often exaggerate the precision of your final results by returning answers with as many digits as the display can show. To reinforce the correct approach, the answers to the sample problems in this book will always show only the number of significant figures that the measurements justify.

Providing answers with the correct number of significant figures often requires rounding the results of a calculation. The rules listed in **Table 6** on the next page will be used in this book for rounding, and the results of a calculation will be rounded after each type of mathematical operation. For example, the result of a series of multiplications should be rounded using the multiplication/division rule before it is added to another number. Similarly, the sum of several numbers should be rounded according to the addition/subtraction rule before the sum is multiplied by another number. Multiple roundings can increase the error in a calculation, but with this method there is no ambiguity about which rule to apply. You should consult your teacher to find out whether to round this way or to delay rounding until the end of all calculations.