In other words, the relative error is the difference between the experimental value and the accepted value divided by the accepted value. Because relative error takes the size of the quantity being measured into account, the accuracy of two different measurements can be compared by comparing their relative errors.

For example, consider two laboratory experiments in which you are determining values that are fairly well known. In the first, you determine that free-fall acceleration at Earth's surface is 10.31 m/s^2. In the second, you find that the speed of sound in air at 25°C is 355 m/s. The accepted values for these quantities are 9.81 m/s^2 and 346 m/s, respectively. Now we'll find the absolute and relative errors for each experiment.

For the first experiment, the absolute and relative errors can be calculated as follows:

$$\text{absolute error} = |\text{experimental} - \text{accepted}| = |10.31\ \text{m/s}^2 - 9.81\ \text{m/s}^2|$$

$$\boxed{\text{absolute error} = 0.50\ \text{m/s}^2}$$

$$\text{relative error} = \frac{(\text{experimental} - \text{accepted})}{\text{accepted}} = \frac{(10.31\ \text{m/s}^2 - 9.81\ \text{m/s}^2)}{9.81\ \text{m/s}^2}$$

$$\boxed{\text{relative error} = 0.051 = 5.1\%}$$

For the second experiment, the absolute and relative errors can be calculated as follows:

$$\text{absolute error} = |\text{experimental} - \text{accepted}| = |355\ \text{m/s} - 346\ \text{m/s}|$$

$$\boxed{\text{absolute error} = 9\ \text{m/s}}$$

$$\text{relative error} = \frac{(\text{experimental} - \text{accepted})}{\text{accepted}} = \frac{(355\ \text{m/s} - 346\ \text{m/s})}{346\ \text{m/s}}$$

$$\boxed{\text{relative error} = 0.026 = 2.6\%}$$

Note that the *absolute* error is less in the first experiment, while the *relative* error is less in the second experiment. The absolute error is less in the first experiment because typical values for free-fall acceleration are much smaller than typical values for the speed of sound in air. The relative errors take this difference into account. Thus, comparing the relative errors shows that the speed of sound is measured with greater accuracy than is the free-fall acceleration.