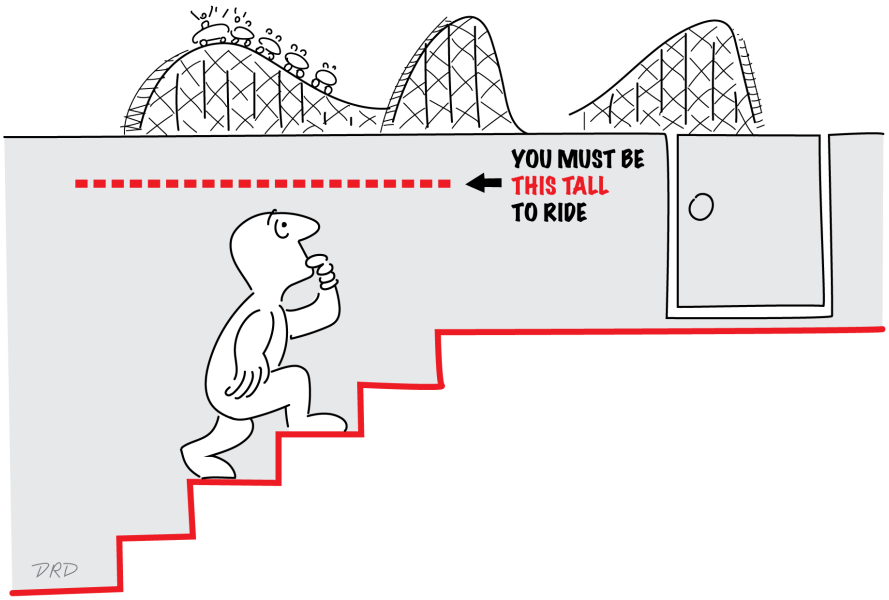
Teacher Tune-up

Quick Content Refresher for Busy Professionals

Baseline Measurements

A number of activities have students take "baseline measurements." What are these, and why are they important?



Many measurements are more meaningful in relation to something else. For example, if you take your temperature and get 99.5° F, how worried should you be? The answer is, it depends: different people have different "normal" temperatures. If your normal temperature is 97.8°, your thermometer reading may be a concern. But if your normal temperature is 99.5°, you're clearly fine. (Any general rule of thumb such as, "100.5° is a fever," assumes you have a *normal* normal temperature! Your personal fever threshold may be different from the norm!)

In a scientific experiment, we usually take the baseline measurement in a situation *where nothing is going on*. That way, when we take the "real" measurement, we can compare it to the "nothing" measurement.

For example, if students are measuring the volume of an object by submerging it in water and checking the water level, they need to measure the water level without the submerged object in order to make a useful comparison. Here they want to determine the *difference* between the experimental value and the baseline, so they subtract the baseline measurement from the experimental value.

The difference between experimental and baseline values isn't always as essential as it is for this kind of volume measurement, however. Consider a science activity where students measure how heart rate increases with activity. The students should determine the baseline "normal" heart rate—that is, the heart rate with no exercise—as well as the heart rate with exercise. Both of those measurements provide points to plot on a graph. However, you don't need to subtract the baseline heart rate from the exercising heart rate in order to get something to measure, even though the baseline comparison makes the other measurement more meaningful.

The idea of a baseline measurement is related to the idea of a control group. The terms are not quite the same, however. Suppose you're testing fertilizer on a group of plants. At the beginning of the experiment, you measure all the plants. *These are the baseline measurements*. Now you randomly split them into groups that will grow without fertilizer (the control group) and with fertilizer (the experimental group). At the end, you re-measure, calculating, for each plant, how much it has grown, by subtracting its baseline measurement from its current height. Finally, you compare the growth in the control group to that in the fertilizer group.