

Significant Figures Demonstration:

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Teacher's Guide

Goals

- To understand the meaning of making scientific measurements
- To learn to determine the significance of numbers that are measured

About the Demonstration

In this class demonstration, students get acquainted with the significance of measuring. Fluctuations around the zero value of an empty balance are used to make students realize that not every number that you see on a scale has significance for the measurement.

Materials

- 2-3 electronic balances, if available
- 2-3 stopwatches

Instructions

1. Turn on two or three electronic balances.
2. Sit a student next to each empty balance with a stopwatch in hand.
3. Instruct them to write down the readings they receive, and the times of the readings, for about 5 minutes.

Lecture Notes—Discussion

What should the balance read with nothing on it?

The true value, with nothing on the scale, should be 0.00 grams.

What are your conclusions from your observation?

What does that tell us about significant figures that we are reading?

Teaching Tips From Dr. Clarke

We talk about the scientific process. It is a process of comparing thoughts, hypotheses, some empirical data, and then evaluating your hypothesis as to whether it makes sense or not. It is about drawing logical conclusions.

Students can understand that if you buy something and it doesn't work, you take it back. But if you have several of them and they all don't work, maybe you're using them the wrong way, or maybe what you think it is supposed to do, is not really what it is supposed to do.

Our goal is to understand measurements. Students take words, which mean the same thing, but because they meet the word in the context of an academic class, they don't know how to deal with it.

What's important in understanding measurements is to understand what it means when we talk about significant figures. To understand that just because a number appears on the scale of a balance, it doesn't mean that this number is significant. Or more precisely, to understand the significance of that number.

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References: Links

<http://lectureonline.cl.msu.edu/~mmp/applist/sigfig/sig.htm>

An interactive Java Applet that allows students to practice recognizing significant figures.

References: Readings

DeLorenzo, R. (2001) "Presidential Elections and Significant Digits," *Journal of Chemical Education*, Vol. 78, No. 3, p: 311.

Pacer, Richard A. (2000) "How Can an Instructor Best Introduce the Topic of Significant Figures to Students Unfamiliar With the Concept?," *Journal of Chemical Education*, Vol. 77, No. 11, pp: 1435-1439.