

Meaningful Metric & Dramatic Demonstrations

I think it's helpful for students to remember a few easy approximate metric-to-English equivalents, so when they see measurements in metric, they can make a mental ballpark comparison. Also, I wait until they will be actually using metric measurements in regular labs before I introduce (or review) the appropriate units.

One thing I've done, in order to relate metric to what may be more familiar English units, I dramatically demonstrate to my students the closest English equivalents to some of the more common metric units, e.g., 1 meter is a little bit more than a yard, 1 liter = a little bit more than a quart, 1 kg = a little bit more than 2 pounds, and a kilometer is a little bit more than 1/2 a mile. After doing this (with a little "shout it out" repetition), the kids are expected to remember those closest equivalents (NOT precise numbers), and the fact that the metric unit is a little bit **more** than the nearest English equivalent, "and therefore, a little bit **better!**"

For the **meter-yard demo**, I hold a meter stick in one hand, off to the side, and the yardstick off to the other side, and ask "which is longer?" I might even ask for show of hands (commitment) for their guess. Ok, let's see: I put the ends side by side, with the lower ends below the demo bench, and slowly raise them until they can see that the meter stick is a little bit longer ("...and therefore, metric is BIGGER & BETTER!")

For the **quart-liter demo**, I have a tall glass 1 liter graduated cylinder with exactly 1 liter of green-dyed water. Over a sink, I carefully pour it into a quart milk bottle, which of course overflows! ("...and therefore, metric is BIGGER & BETTER!")

For **mass**, I place a kg weight on one side of a balance, and two pounds of butter on the other (two butter boxes with clay inside to weigh exactly 2 lbs, unless you like rancid butter every year!), and the kg weight side goes down. ("...and therefore, metric is BIGGER & BETTER!")

For the **km - 1/2 mile demo**, I show an enlarged scale on a map on the overhead, and say SEE! SEE! ("...and therefore, metric is BIGGER & BETTER!")

Convenient Dimensions: I also have them find some dimension on their "convenient" anatomy that is exactly 1 cm. Most find that the width of their little pinky fingernail (or one of their other fingernails) is very close. If not, then maybe they can find two creases in their fingers or palm that are 1 cm apart at a nearest (or farthest) point. Then I suggest that they find a similar dimension that's equal to an inch (the length of end segment of my pinky finger, for example). Now they all have a "rule of thumb (or finger...)", also "handy" and available when they go into a hardware store, or when they're asked to fill a test tube about 1 cm deep with some fluid. Yep... very handy! I do quiz them on these "rules of finger" and the approximate equivalents introduced.

Useful Objects: A dime is a slightly more than 1 mm thick, and weighs ~ 1 g. A penny is slightly less than 2 cm; a nickel is slightly more than 2 cm. If you have a sensitive electronic balance (.1 - .01 g, or 100-10 mg), have the kids predict the metric dimensions (linear and mass) for a variety of some common little things, then check them out. It's a good way to build a rough sense of those metric dimensions. I have also used calipers that are electronic, with digital metric readouts for quick and fairly reliable mini-measurements.

I'm attaching a fill-in "**Metric Demo**" worksheet that my students use as I walk them through the series of approximate equivalents, demonstrating each dramatically as we do. I'm also attaching a pdf file of "**The Metric Connections**," so they can see how linear, volume and mass measurements in metric are connected, and also a few of the commonly used multiples and fractions they are likely to encounter in the course. I don't try to do the whole series of kilo, mega, giga, and deca, centi, milli, prefixes for all three kinds of units, just the ones we will use, and then we proceed to USE them in labs, exclusively, no converting between English and metric. We may learn a few useful approximate conversions within metric, e.g., cm <--> mm, m <--> cm, ml = cc, 1 ml ==~1 g, 1 liter ==~ 1 kg.