# What is Snow Water Equivalency?

Snow Water Equivalency is the amount of water contained within the snowpack. It can be thought of as the depth of water that would theoretically result if you melted the entire snowpack instantaneously.

For example, say there is a swimming pool that is filled with 36 inches of new powdery snow at 10% snow water density. If you could turn all the snow into water magically, you would be left with a pool of water 3.6 inches deep. In this case, the SWE of your snowpack would equal 36" x 0.10 = 3.6 inches.

To determine snow depth from SWE you need to know the density of the snow. The density of **new** snow ranges from about 5% when the air temperature is 14° F, to about 20% when the temperature is 32° F. After the snow falls its density increases due to gravitational settling, wind packing, melting and recrystallization.

Most snow that falls in the Cascade Mountains of Washington and Oregon tends to be higher density snow. In the Cascades, snowpack densities are around 20-30% in the winter to 30-50% in the spring. However, east of the Cascades, the snowpack density is much less. Typical values are 10- 20% in the winter and 20-40% in the spring.

Snow density is reliant on how much water the snow contains. We categorize snow as dry, moist, and wet. Snow is considered dry if you are unable to form a snowball. Moist snow makes incredible snowballs, and when the snow is wet you can literally squeeze water out of the snow with your hands. Have the students pick up the snow and hypothesize how wet the snow is.

To determine the depth of snow using snow water equivalent and density, use the following formula:

[SWE] ÷ [Density] = Snow Depth

(Density must be in decimal form. For example: 25% = 0.25)

# Example:

On March 25, 1996, at the Mt. Hood SNOTEL site:

SWE was measured at 48.1 inches.

Snow Density was estimated to be 40% (spring snow pack).

Therefore, the snow depth can be estimated by the following calculation: 48.1" ÷ 0.40 = 120"

Therefore, the snow depth is estimated to be 120 inches for Mt Hood SNOTEL on March 25, 1996.

**How to Measure SWE**

Snow Water Equivalence (SWE) is measured using carefully calibrated SWE tubes. The units used on the SWE tube are both empirical and inches, cm/mm and inches. Use the metric system, as those are the units used in the students’ field journal. Capture the height of the snow using the snow level indicated on the tube (cm), and the SWE by using the scale (mm). Specific sampling direction and another example can be found [here](http://snowmetrics.com/wp-content/uploads/2014/10/how-to-snow-board.pdf).