

Measurement HW #2 Answers

1. A quantitative measurement requires numbers and units.
A qualitative measure is just a description.
Examples of each are 22.4 Liters of helium gas; helium gas is colorless.
2. A student measures the volume of a piece of iron to be 23.5 cm³. The actual volume is 24.0 cm³. Determine the student's percent error.

[MV is measured value; AV is actual value]

$$\%E = \frac{MV-AV}{AV} \times 100\%$$

$$\%E = \frac{23.5 \text{ cm}^3 - 24.0 \text{ cm}^3}{24.0 \text{ cm}^3} \times 100\% = \frac{-0.5 \text{ cm}^3}{24.0 \text{ cm}^3} \times 100\%$$

$$\%E = -0.0208 \times 100\% = -2.10\% \text{ error}$$

3. Accurate measures are close to the actual values, most nearly correct.
Precise measurements are all close together, but not necessarily correct.
Precise measurements show correct techniques of measuring by students.
Accurate measures are "perfect".
4. According to Table S of your reference tables, the list in order of highest density to lowest density of these six metals is:

metal symbol - name	density in g/cm ³
Pt - platinum	21.450
Hg - mercury	13.546
Pb - lead	11.350
Ag - silver	10.500
Nb - niobium	8.570
Ti - titanium	4.454