ICE2.1. What is the difference in meaning between the length 4.2 meters and 4.20 meters?

The difference is in the measuring device. To measure 4.2 meters the last digit has some uncertainty. So the measuring device was probably marked in meters with no marks in between.

The measuring device that measured 4.20 meters had 10 marks between each meter mark.

ICE2.2. Which of the following measurements are inconsistent with precision of the graduated cylinder in your locker? Explain.

30 mL, 42.56 mL, 35 mL, 92.5 mL

ICE2.3 Round off the following numbers to the indicated number of sig figs.

a) 0.350763 (3 sig figs)          0.351
b) 22.55555 (5 sig figs)         22.556
c) 653.899 (4 sig figs)          653.9
d) 5.0499 x 10^{-5} (4 sig figs)  5.050 x 10^{-5}
e) 5.0499 x 10^{-5} (2 sig figs)  5.0 x 10^{-5}
f) 235,000 (2 sig figs)           2.4 x 10^5
ICE2.4. Determine the result to the correct number of significant figures.

a) \(4.5 \times 4.05 \times 4.50 = 82\)

b) \(\frac{655000}{6.5500} = 1.00 \times 10^5\)

c) \(\frac{6.00}{33.000} = 0.182\)

d) \(\frac{4.5 \cdot 6.3}{7.22} = 3.9\)

e) \(\frac{112 \cdot 20}{30 \cdot 63} = 1\)

ICE2.5. Determine the result to the correct number of significant figures.

a) \(12.1 + 23.1 + 127.01 = 162.2\)

b) \(43.65 - 23.7 = 20.0\)

c) \(1237.6 + 23 + 0.12 = 1.2376 \times 10^3 + 2.3 \times 10^1 + 1.2 \times 10^{-1} = 1.2376 \times 10^3 + 0.023 \times 10^3 + 0.00012 \times 10^3 = 1.261 \times 10^3\)

d) \(4650 + 25 + 200 = 4.65 \times 10^3 + 2.5 \times 10^1 + 2 \times 10^2 = 4.65 \times 10^3 + 0.025 \times 10^3 + 0.2 \times 10^3 = 4.9 \times 10^3\)

e) \(4.72 - 3.908 = 0.81\)

f) \(\frac{12.376 + 12.374}{2.13} = 11.6\)

g) \(5.0499 \times 10^{-5} + 6.012 \times 10^{-4} = 6.517 \times 10^{-4}\)

h) \(1.35 \times 10^3 - 6.234 \times 10^2 = 7.3 \times 10^2\)

ICE2.6. Perform the following conversions;

a) \(73.5 \text{ km} \text{ to miles} \) (use at least 3 conversion factors)

\[73.5 \text{ km} \left(\frac{1000 \text{ m}}{1 \text{ km}}\right) \left(\frac{100 \text{ cm}}{1 \text{ m}}\right) \left(\frac{1 \text{ in}}{2.54 \text{ cm}}\right) \left(\frac{1 \text{ ft}}{12 \text{ in}}\right) \left(\frac{1 \text{ mile}}{5280 \text{ ft}}\right) = 45.7 \text{ mile}\]
b) liquid nitrogen boils at –196 °C, calculate the temperature in °F and K.

\[ °F = \frac{9}{5} °C + 32 = \frac{9}{5}(-196) + 32 = -321 °F \]

\[ K = °C + 273 = -196 + 273 = 77 K \]

c) a fertilizer suggests an application of \(2.06 \times 10^{-1}\ \text{kg/m}^2\). Convert to \(\text{pounds/foot}^2\).

\[
2.06 \times 10^{-1} \text{kg/m}^2 \left(\frac{1000\ g}{1\ \text{kg}}\right) \left(\frac{1\ lb}{454\ g}\right) \left(\frac{1\ m}{100\ cm}\right)^2 \left(\frac{2.54\ cm}{1\ \text{inch}}\right)^2 \left(\frac{12\ \text{in}}{1\ \text{ft}}\right)^2
\]

\[ = 4.22 \times 10^3 \text{lb/ft}^2 \]

d) How many gallons in a 575 mLs?

\[
575\ mL \left(\frac{1\ L}{1000\ mL}\right) \left(\frac{1.0567\ \text{quart}}{1\ L}\right) \left(\frac{1\ gal}{4\ \text{quart}}\right) = 1.52 \times 10^{-1}\ \text{gallons}
\]

ICE 2.7. What is the formula for the compound formed from the following combination of elements;

a) Na and bromine \(\text{NaBr}\)

b) magnesium and oxygen \(\text{MgO}\)

c) aluminum and \(\text{Cl}_2\) \(\text{AlCl}_3\)

d) iron and sulfur \(\text{FeS or Fe}_2\text{S}_3\)
ICE2.8. Complete the following table.

<table>
<thead>
<tr>
<th>Name of the compound</th>
<th>Formula of the compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>diphosphorus pentoxide</td>
<td>( P_2O_5 )</td>
</tr>
<tr>
<td>Lead sulfide</td>
<td>PbS</td>
</tr>
<tr>
<td>Hydrogen fluoride</td>
<td>HF(g)</td>
</tr>
<tr>
<td>ammonia</td>
<td>NH(_3)</td>
</tr>
<tr>
<td>diboron trioxide</td>
<td>B(_2)O(_3)</td>
</tr>
<tr>
<td>copper(I) chloride</td>
<td>CuCl</td>
</tr>
<tr>
<td>silver sulfide</td>
<td>Ag(_2)S</td>
</tr>
<tr>
<td><strong>Dinitrogen tetrabromide</strong></td>
<td>N(_2)Br(_4)</td>
</tr>
<tr>
<td>potassium peroxide</td>
<td>K(_2)O(_2)</td>
</tr>
</tbody>
</table>