When multiplying or dividing, answer must be rounded to the same number of significant figures as the number with the fewest significant figures in the original numbers multiplying or dividing.

\[ 4.83 \text{ cm} \times 1.2076 \text{ cm} = \frac{5.83 \times 10^8 \text{ cm}^2}{5 \text{ sf.}} \quad \text{round to 3 s.f.} \]

\[ 5.83 \text{ cm}^2 \]

**Adding/subtracting**

- Find value with fewest decimal places.
- Answer rounded to that number of decimal places.

\[ 142.1 \text{ cm} \quad 1 \text{ dp} \]
\[ 2.108 \text{ cm} \quad 3 \text{ dp} \]
\[ + \quad 28.32 \text{ cm} \quad 2 \text{ dp} \quad \text{round to } 1 \text{ dp} \]

\[ 172.528 \text{ cm} \]

\[ 172.5 \text{ cm} \]
**Multiplication and Division**
- Round to the fewest significant figures.

**Addition and Subtraction**
- Round to the fewest decimal places.

**Combination**
- \( \frac{14.3 \text{ g} + 120 \text{ g}}{1.34 \text{ cm} \times 2.86 \text{ cm}} = \frac{134.3 \text{ g}}{3.8324 \text{ cm}^2} \)
- Approximate: \( \frac{135.09 \text{ g}}{3.5 \text{ cm}^2} \)
- "Grams per centimeters squared"

& # never actually round until you get a final answer. Only round once!

**Measurement Units**
- **SI units** (International System)
  - Similar to metric system
  - Scientists worldwide/engineers everywhere except US
<table>
<thead>
<tr>
<th>Quantity</th>
<th>Unit</th>
<th>Abbreviation</th>
<th>Measured With</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Meter</td>
<td>m</td>
<td>Ruler, meterstick, caliper</td>
</tr>
<tr>
<td>Mass</td>
<td>Kilogram</td>
<td>kg</td>
<td>Balance (not a scale)</td>
</tr>
<tr>
<td>Time</td>
<td>Second</td>
<td>s</td>
<td>Clock, stopwatch</td>
</tr>
<tr>
<td>Temperature</td>
<td>Kelvin</td>
<td>K</td>
<td>Thermometer</td>
</tr>
<tr>
<td>Number of particles</td>
<td>Mole</td>
<td>mol</td>
<td>Calculated</td>
</tr>
</tbody>
</table>

**Mass**: amount of matter present

Measured on a balance, not a scale

**Weight**: downward force due to gravity (measures weight)

![scale](image1.png)

![balance](image2.png)
often “mass” and “weight” are carelessly used interchangeably

\[ \text{SI unit} = \text{kg} \quad 1 \text{ kg} = 1000 \text{ g} \]

\[ \text{g (grams) more convenient unit (for chemistry)} \]

<table>
<thead>
<tr>
<th>SI prefix</th>
<th>Greek prefixes that indicate powers of 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>prefix</td>
<td>abbrev.</td>
</tr>
<tr>
<td>kilo</td>
<td>k</td>
</tr>
<tr>
<td>centi</td>
<td>c</td>
</tr>
<tr>
<td>milli</td>
<td>m, (\frac{m}{n})</td>
</tr>
<tr>
<td>nano</td>
<td>n</td>
</tr>
</tbody>
</table>

\[ 1 \text{ cm} = 0.01 \text{ m} \quad 1 \text{ nm} = 10^{-9} \text{ m} \]

\[ 1 \text{ mm} = 0.001 \text{ m} \quad 10^9 \text{ nm} = 1 \text{ m} \]
Human hair - thickness = \(0.0002 \text{ m}\) = \(0.2 \times 10^{-3} \text{ m}\) = \(0.2 \text{ mm}\)

\[
489,323 \text{ m} = 489.323 \times 10^3 \text{ m} \\
1 \text{ cm} = 10^{-2} \text{ m} \\
10^2 \text{ cm} = 1 \text{ m} \\
100 \text{ cm} = 1 \text{ m}
\]

\[
\text{Volume} \quad \text{how much space something takes up}
\]

\[
\text{SF unit} = \text{m}^3 \quad \text{Cubic meter}
\]

\[
\text{lm} \quad \text{lm} \\
\text{lm} \\
\text{lm}
\]