5 - Ratio and Proportion

**Ratio + Proportion**
- Always simplify as low as possible
- Always convert to common units when working out
- Remove units in final answer

e.g. 500p : £15
common unit ⟷ £5 : £15
simplify ⟷ £1 : £3
final answer ⟷ 1 : 3

**Compound Measures**
Involves 3 variables
These can be connected by a triangle

e.g. Pay ⟷ hours worked \times rate per hour
P = H \times R
H = P/R
R = P/H

**Unit Changes**

<table>
<thead>
<tr>
<th>Speed</th>
<th>Distance</th>
<th>Time</th>
<th>Mass</th>
<th>Density</th>
<th>Volume</th>
<th>Pressure</th>
<th>Force</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>mph</td>
<td>miles</td>
<td>minutes</td>
<td>g</td>
<td>g/cm³</td>
<td>cm³</td>
<td>Pa</td>
<td>N</td>
<td>m²</td>
</tr>
<tr>
<td>km/h</td>
<td>km/cm/m</td>
<td>hours</td>
<td>kg</td>
<td>kg/m³</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>m/s</td>
<td>yards</td>
<td>seconds</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Volume
  1 cm³ = 1,000 mm³
  1 m³ = 1,000,000 cm³
  1 km³ = 10⁹ m³

- Area
  1 cm² = 100 mm²
  1 m² = 10,000 cm²
  1 km² = 1,000,000 m²

If you go down a unit you \(\times\). If you go up you \(\div\).

\[
\begin{align*}
\text{cm}^3 & \quad \Rightarrow \times 1000 \\
1000 & \quad \Leftarrow \text{mm}^3 \\
\text{km}^3 & \quad \Rightarrow \times 10^9 \\
10^9 & \quad \Leftarrow \text{m}^3 \\
\text{m}^2 & \quad \Rightarrow \times 1,000,000 \\
1,000,000 & \quad \Leftarrow \text{cm}^3
\end{align*}
\]