

### 4.9 Using Formulas

A formula, or rule, describes a mathematical relationship between two or more quantities.

Here are some very well known formulas:

Perimeter:  $\rightarrow P = 2l + 2w$

Area:  $\rightarrow A = l \cdot w$

Volume:  $\rightarrow V = l \cdot w \cdot h$

Remember to consider units when you find perimeter, area, and volume.

• For perimeter, units have an exponent of 1.

Ex: cm m mi in ft

For area, units have an exponent of 2.

Ex cm<sup>2</sup> m<sup>2</sup> mi<sup>2</sup> in<sup>2</sup> ft<sup>2</sup>

For volume, units have an exponent of 3.

Ex: cm<sup>3</sup> m<sup>3</sup> mi<sup>3</sup> in<sup>3</sup> ft<sup>3</sup>

**Example:** Use the volume formula for a rectangular box to find the volume given the dimensions.

1.) length = 6 cm, width = 5 cm, height = 11 cm

$$V = l \cdot w \cdot h = 6 \cdot 5 \cdot 11$$

$$= 30 \cdot 11 = \boxed{330 \text{ cm}^3}$$

2.) length = 5.2 m, width = 3.5 m, height = 2 m

$$V = l \cdot w \cdot h = 5.2 \cdot 3.5 \cdot 2$$

$$= 18.2 \cdot 2 = \boxed{36.4 \text{ m}^3}$$

$$\begin{array}{r} 5.2 \\ \times 3.5 \\ \hline 260 \\ 1560 \\ \hline 1820 \end{array}$$

$$\begin{array}{r} 18.2 \\ \times 2 \\ \hline 36.4 \end{array}$$

**Example:** Use the perimeter formula for a rectangular box to find the perimeter given the dimensions.

3.) length = 4 ft, width = 2.75 ft

$$P = 2l + 2w = 2 \cdot 4 + 2 \cdot 2.75$$

$$= 8 + 2 \cdot 2.75 = 8 + 5.5$$

$$= \boxed{13.5 \text{ ft}}$$

$$\begin{array}{r} 2.75 \\ \times 2 \\ \hline 5.50 \end{array}$$

$$\begin{array}{r} 8.0 \\ + 5.5 \\ \hline 13.5 \end{array}$$

4.) length = 2.1 m, width = 1.8 m

$$P = 2l + 2w = 2 \cdot 2.1 + 2 \cdot 1.8$$

$$= 4.2 + 2 \cdot 1.8 = 4.2 + 3.6$$

$$= \boxed{7.8 \text{ m}}$$

$$\begin{array}{r} 2.1 \\ \times 2 \\ \hline 4.2 \end{array}$$

$$\begin{array}{r} 1.8 \\ \times 2 \\ \hline 3.6 \end{array}$$

$$\begin{array}{r} 4.2 \\ + 3.6 \\ \hline 7.8 \end{array}$$

**Example:** Use the area formula for a rectangular box to find the area given the dimensions.

5.) length = 5 cm, width = 5 cm

$$A = l \cdot w = 5 \cdot 5 = \boxed{25 \text{ cm}^2}$$

6.) length = 5.75 ft, width = 2 ft

$$\begin{array}{r} 5.75 \\ \times \quad 2 \\ \hline 11.50 \end{array} \quad A = l \cdot w = 5.75 \cdot 2 = \boxed{11.5 \text{ ft}^2}$$

**Example:** Describe the formula and evaluate.

7.)  $V = s^3$  when  $s = 2$  cm

\* this is the volume of a perfect cube

$$V = s^3 = (2)^3 = 2 \cdot 2 \cdot 2 = \boxed{8 \text{ cm}^3}$$

8.)  $A = s^2$  when  $s = 10$  m

\* this is the area of a perfect square.

$$A = s^2 = (10)^2 = 10 \cdot 10 = \boxed{100 \text{ m}^2}$$