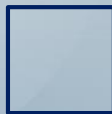# Lesson 33

Equivalent Figures and Solids

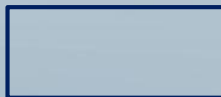---

Equivalent Figures

Two plane figures (ie 2 dimensional) are equivalent if they have the same area.

Ex.

6 cm

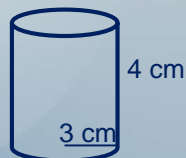9 cm

4 cm

$$A_{square} = 6 \times 6 = 36 \, cm^2 \qquad A_{rectangle} = 9 \times 4 = 36 \, cm^2$$

Equivalent Solids

Two solids are considered equivalent if they have the same volume.

Ex.
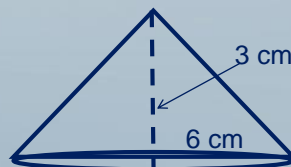
4 cm

3 cm

3 cm

6 cm

$$V = \pi r^2 h$$

$$= 36\pi$$

$$= 113.1\, cm^3$$

$$V = \frac{\pi r^2 h}{3}$$

$$= 36\pi$$

$$= 113.1\, cm^3$$

Example 1

The trapezoid and square below are equivalent. Find the perimeter of each figure.

Ex.

x - 2 cm

x cm

$2x$ - 4 cm

x cm

$$A = \frac{(B+b)h}{2}$$

$$= \frac{(2x-4+x-2)x}{2}$$

$$A = s^2$$

$$= x^2$$
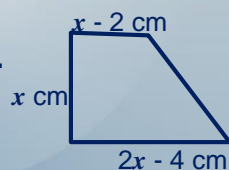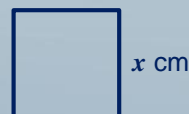
$$\Rightarrow \frac{3x^2 - 6x}{2} = x^2$$

Example 1

The trapezoid and square below are equivalent. Find the perimeter of each figure.

Ex.

x - 2 cm

x cm

2x - 4 cm

x cm

$$2\left(\frac{3x^2 - 6x}{2} = x^2 \right) \Rightarrow 3x^2 - 6x = 2x^2$$
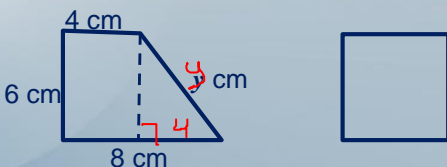$$x^2 - 6x = 0$$
$$x(x-6) = 0$$
$$\therefore x = 6$$

$$\therefore P_{square} = 24 \; cm$$

Example 1

The trapezoid and square below are equivalent. Find the perimeter of each figure.

Ex.

4 cm

6 cm

y cm

8 cm

4

$$6^2 + 4^2 = y^2 \quad \Rightarrow y = 7.07$$
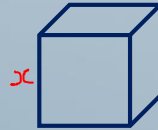
$$\therefore P_{trapezoid} = 25.07 \; cm$$

Example 2

A prism with a height of 4 cm has a rectangular base with dimensions 6 cm by 9 cm. What is the measure of a cube's edge that is equivalent to the prism?

$$V = A_b h$$
$$= 6(9)(4)$$
$$= 216$$

x

$$V = A_b h$$
$$= 5^3$$
$$= x^3$$

$$\sqrt[3]{216} = \sqrt[3]{x^3}$$
$$6 = x$$
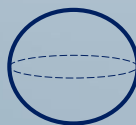
Example 3

A cone and a cylinder are equivalent. The radius and the height of the cone measure 6 cm and 10 cm respectively. What is the height of the cylinder if its radius measures 5 cm?

Example 4

A cone and a cylinder are equivalent. The radius and the height of the cone measure 6 cm and 10 cm respectively. What is the height of the cylinder if its radius measures 5 cm?

Homework

Workbook

P. 258 #4-8

P. 259 #10-14

P. 261 #4-10