Essential Question #3

A student needs to find the radius of a sphere with a Volume of 113.097 cubic meters. Explain how they would find the radius.

The dimensions are given below. The pyramids on either end are congruent. Organize and show all your work.

\[
\frac{\text{Prism}}{4 \cdot 8 \cdot 20} = \frac{2 \cdot \text{Pyramids}}{\frac{1}{3} \cdot 8.4 \cdot 10} = \left(\frac{3 \cdot 20}{3}\right) \cdot 2 = \frac{640}{3} \approx 853.3 \text{ cm}^3
\]

\[
\text{Total: } 640 + \frac{640}{3} \approx 853.3 \text{ cm}^3
\]
The dimensions are given below. There is a hemisphere that is cut out of the hexagonal prism. The circumference of the hemisphere is inscribed in the hexagon.

Displacement and Density

**Learning Targets:** Students will learn about
- finding volumes by displacement
- density and how to find/use it
A.  Displacement

**Displacement** is the change in the volume of water when a solid is sunk in the water. This change in volume is equal to the volume of the solid.

![Diagram showing displacement](image1)

\[
\text{Volume of Water} = 10 \times 5 \times 4 = 200 \text{ cm}^3
\]

Original is not always needed

Change in Vol. \(2 \times 10 \times 5 = 100 \text{ cm}^3\)

B.  Density

**Density** is the mass of a matter in a given volume. It is found by dividing the mass (weight) of the solid by its volume (or displaced volume).

\[
\text{Density} = \frac{\text{mass}}{\text{volume (displaced)}}
\]

Example

A clump of metal weighing 351.4 grams is dropped into a cylindrical container, causing the water level to rise 1.1 cm. The radius of the base of the container is 3.0 cm. What is the density of the metal?

\[
\frac{351.4 \text{ g}}{\left(3^2 \pi \right)1.1 \text{ cm}^3}
\]

Vol of small cylinder \(\left(3^2 \pi \right)1.1 \text{ cm}^3\)

\(D \approx 11.3 \text{ g/cm}^3\)
Example

A CSI agent has found a clump of metal that appears to be either silver or lead. She drops the clump into a 5cm x 5cm square-prism container filled halfway with water and observes the water level rise 2 cm.

a. Find the volume

\[ V = 5 \times 5 \times 2 = 50 \text{ cm}^3 \]

b. She weighs the clump and it is 525 gms. Find its density.

\[ D = \frac{525 \text{ g}}{50 \text{ cm}^3} = 10.5 \text{ g/cm}^3 \]

c. Silver has a density of 10.5 g/cm³ and lead has a density of 11.30 g/cm³. Which metal did she find?

Silver

Homework

Complete the Density-Displacement worksheet.