ME 08 Understand the difference between surface area and volume, and demonstrate that two objects may have the same surface area, but different volumes or they may have the same volume, but different surface areas.

Volume of Prisms

The volume of a 3-dimensional object is the amount of space that it takes up.

Volume describes the number of cubes an object can hold, so it is measured in cubic units.

Labeled as cubic units.

ex: cm³, ft³
Formula for volume of prisms

\[ V = B \cdot h \]

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1. \[ V = B \cdot h \]

\[ = 10 \cdot 10 \cdot 10 \]

\[ V = 1,000 \text{ m}^3 \]
Which rectangular prism has the same volume as the following cube?

A) 8 cm x 8 cm x 8 cm
B) 4 cm x 4 cm x 16 cm
C) 16 cm x 16 cm x 4 cm
D) 12 cm x 10 cm x 6 cm
4. \[ V = B \cdot h = 10.5 \times 6 \times 3 \]
\[ V = 189 \text{ mm}^3 \]

2. \[ V = \pi r^2 h = \pi \times (5 \text{ yd})^2 \times 15 \text{ yd} \]
What is the volume of a rectangular prism with length 10 cm, height 5 cm and width 5 cm?

Find the volume.

\[ V = B \cdot h = 12 \cdot 12 \cdot 12 = 1,728 \text{ ft}^3 \]
Find the volume.

\[ V = Bh \]
\[ = 3 \times 3 \times 30 \]
\[ V = 270 \text{ cm}^3 \]

Volume of a triangular prism is found the same way. Find the area of the base, then multiply by the height. You can think of volume as layers.
Describe the difference between the volume and the surface area of a box.

Can two objects have the same volume, but different surface areas?

To find two objects that have the same volume, but different surface areas:
1. Make up a volume.
   \[10 \times 10 \times 10\]
2. Then cut one number in half, and double another number.
   \[5 \times 20 \times 10\]
3. Do they still have the same volume?
   yes! both get 1000 when you multiply so same volume.
4. Now find their surface areas. They will be different, so you made two objects with the same volume, but different surface areas!
Can two objects have the same surface area, but different volume?

To find two objects that have the same surface area, but different volumes is much harder, but all we really need to be able to do is tell if they do or not.

What happens to the surface area of a box when the sides are all doubled?

What happens to the volume of a box when the sides are all doubled?