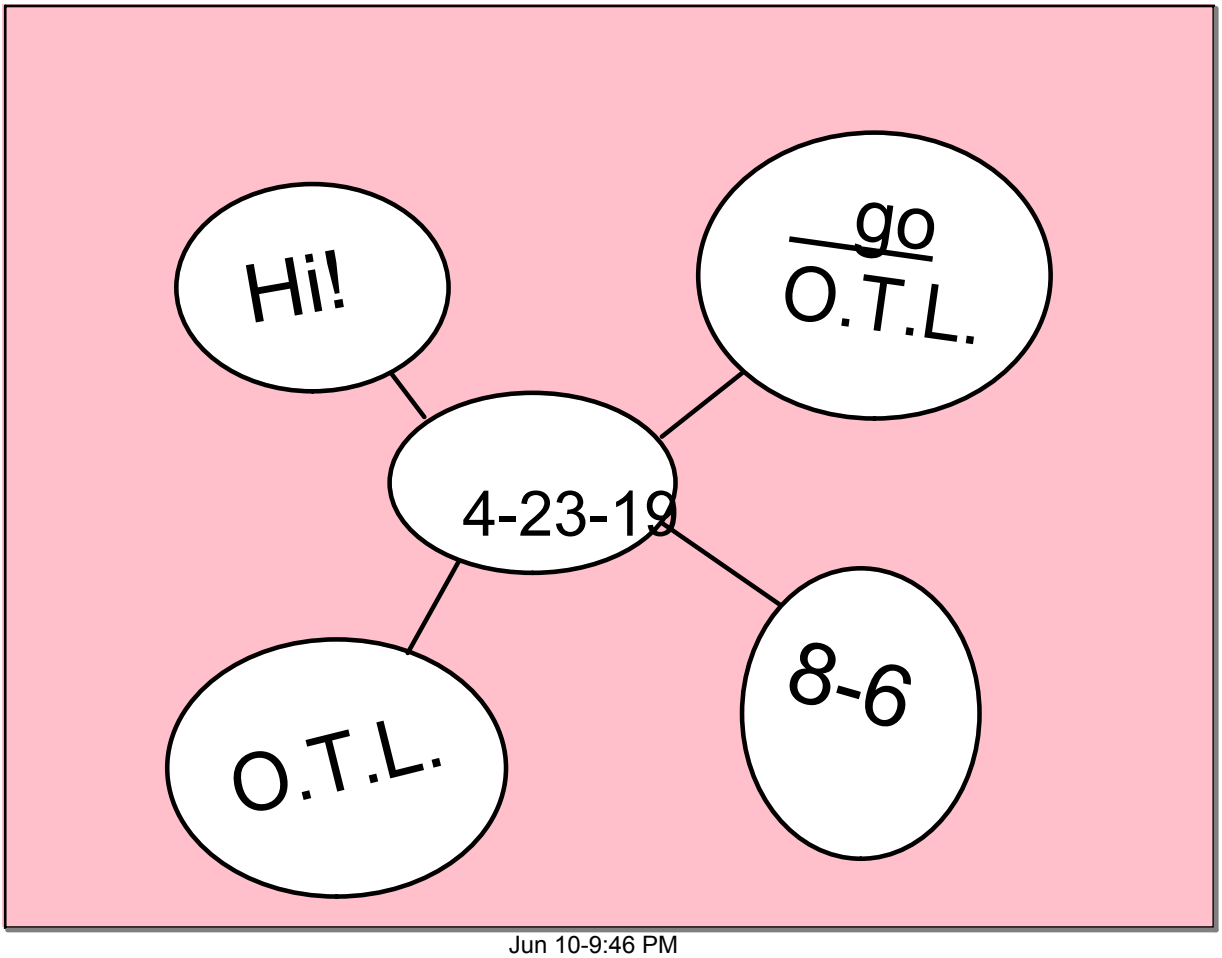


Jun 10-9:46 PM

1.) $\frac{1}{2} \cdot b \cdot h$

$\frac{1}{2} \cdot 34 \cdot 57.6$

$= 979.2\ ft^2$

2.) .576 ft } model slant height

3.) .34 ft } model base

4.) $\frac{1}{2} bh$

$= \frac{1}{2} \cdot .576 \cdot .34$

$= .09792\ ft^2$

5.) $\frac{.09792}{979.2} \cdot \frac{1}{10000}$

$\frac{1}{10,000} = \left(\frac{1}{100}\right)^2$

Apr 23-1:04 PM

8-6

Changes in Dimensions

Jun 10-9:47 PM

BFF

Surface Area Changes:

S.A. · (scale factor)^2

Volume Changes:

V · (scale factor)^3

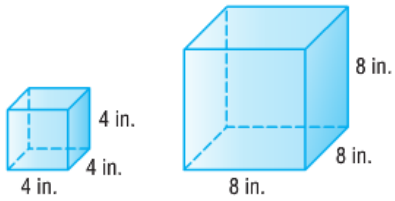
Apr 23-1:16 PM

Surface Area of Similar Solids

If Solid X is similar to Solid Y by a scale factor, then the surface area of X is equal to the surface area of Y times the *square* of the scale factor.

Cubes are **similar solids** because they have the same shape and their corresponding linear measures are proportional.

The cubes at the right are similar. The ratio of their corresponding edge lengths is $\frac{8}{4}$ or 2. The scale factor is 2. How are their surface areas related?



S.A. of Small Cube

$S.A. = 6(4 \cdot 4)$

There are 6 faces.

S.A. of Large Cube

$S.A. = 6(\mathbf{2} \cdot 4)(\mathbf{2} \cdot 4)$

$= \mathbf{2} \cdot \mathbf{2}(6)(4 \cdot 4)$

$= \mathbf{2^2}(6)(4 \cdot 4)$

To find the surface area of the large cube, multiply the surface area of the small cube by the *square* of the scale factor, 2^2 or 4. This relationship is true for any similar solids.

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a. The surface area of a triangular prism is 34 square inches. What is the surface area of a similar prism that is twice as large?

b. The world's largest box of raisins has a surface area of 352 square feet. If a similar box is smaller than the largest box by a scale factor of $\frac{1}{48}$, what is its surface area?

a.) S.A = 34

twice as big (k = 2)

$34 \cdot 2^2 = 136 \text{ in}^2$

b.) SA = 352

scale factor = $\frac{1}{48}$

$352 \cdot \left(\frac{1}{48}\right)^2 = .15 \text{ ft}^2$

$= \frac{11}{72} \text{ ft}^2$

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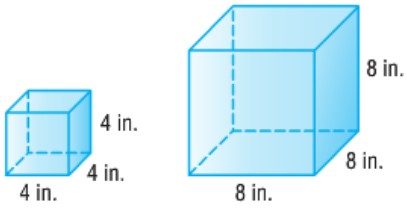
Volume of Similar Solids

If Solid X is similar to Solid Y by a scale factor, then the volume of X is equal to the volume of Y times the *cube* of the scale factor.

Refer to the cubes below.



Volume of Small Cube

$V = 4 \cdot 4 \cdot 4$

Volume of Large Cube

$V = (2 \cdot 4)(2 \cdot 4)(2 \cdot 4)$

$= 2 \cdot 2 \cdot 2(4 \cdot 4 \cdot 4)$

$= 2^3(4 \cdot 4 \cdot 4)$

The volumes of similar solids are related by the *cube* of the scale factor.

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c. A square pyramid has a volume of 512 cubic centimeters. What is the volume of a square pyramid with dimensions one-fourth of the original?

d. A cylinder has a volume of 432 cubic meters. What is the volume of a cylinder with dimensions one-third of the original?

c) $V = 512$

scale $= \frac{1}{4}$

$512 \cdot \left(\frac{1}{4}\right)^3 = 8 cm^3$

d) $V = 432$

scale $= \frac{1}{3}$ $\quad 432 \cdot \left(\frac{1}{3}\right)^3 =$

$16 m^3$

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The surface area of a rectangular prism is 35 square inches. What is the surface area of a similar solid that has been enlarged by a scale factor of 7? (Example 1)

$35 \cdot 7^2$

$1715 in^2$

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The volume of a cylinder is about 425 cubic centimeters. What is the volume, to the nearest tenth, of a similar solid that is smaller by a scale factor of $\frac{1}{3}$? (Example 2)

$425 \cdot \left(\frac{1}{3}\right)^3$

$\approx 15.7 cm^3$

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A sink with a sliding lid in Josh's art studio measures 16 inches by 15 inches by 6 inches. A second sink used just for paintbrushes has a similar shape and is smaller by a scale factor of $\frac{1}{2}$. Find the volume and surface area of the second sink. (Example 3) $180 in^3$ $213 in^2$

Volume

$V = 16 \cdot 15 \cdot 6$

$= 1440$

$1440 \cdot \left(\frac{1}{2}\right)^3 =$

$180 in^3$

Surface Area

$2B + Ph$

16
15
6

$852 \cdot \left(\frac{1}{2}\right)^2$

$213 in^2$

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O.T.L.

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