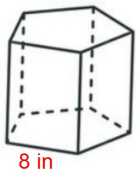
Thursday, June 4, 2020

Areas and Volumes of Similar Solids

Similar Solids: solids with the same shape and all corresponding dimensions are proportional.

Similarity Ratio of Similar Solids:

The ratio of corresponding dimensions



For example, the similarity ratio of these similar solids would be

$\frac{8}{5}$ or $\frac{5}{8}$

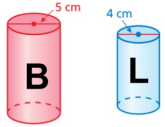
Theorem 11-12 Areas and Volumes of Similar Solids

If the similarity ratio of two similar solids is $\frac{a}{b}$, then

(1) the ratio of their areas is $\left(\frac{a}{b}\right)^2$ or $\frac{a^2}{b^2}$, and

(2) the ratio of their volumes is $\left(\frac{a}{b}\right)^3$ or $\frac{a^3}{b^3}$.

These two cylinders are similar.



a) What is the ratio of their SA?

similarity ratio: $\frac{4}{5}$ or $\frac{5}{4}$

Using $\frac{L}{B}$: Ratio of SA $= \left(\frac{4}{5}\right)^2 = \boxed{\frac{16}{25}}$

b) What is the ratio of their Vol?

Using $\frac{L}{B}$: Ratio of Vol $= \left(\frac{4}{5}\right)^3 = \boxed{\frac{64}{125}}$

The ratio of the SA of two similar solids is $\frac{144\ \text{cm}^2}{169\ \text{cm}^2}$

Find the similarity ratio of these two solids. $\sqrt{\frac{144\ \text{cm}^2}{169\ \text{cm}^2}} = \boxed{\frac{12}{13}}$

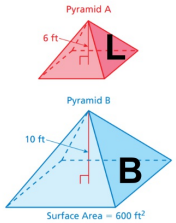
Find the ratio of their volumes. $\left(\frac{12}{13}\right)^3 = \boxed{\frac{1728}{2197}}$

The ratio of the Vol of two similar solids is $\frac{125\ \text{in}^3}{216\ \text{in}^3}$

Find the similarity ratio of these two solids. $\sqrt[3]{\frac{125\ \text{in}^3}{216\ \text{in}^3}} = \boxed{\frac{5}{6}}$

Find the ratio of their SA. $\left(\frac{5}{6}\right)^2 = \boxed{\frac{25}{36}}$

These two pyramids are similar. Find the SA of the smaller pyramid.

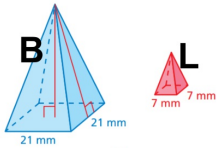


Similarity Ratio: $\frac{L}{B} = \frac{6}{10} = \frac{3}{5}$

Ratio of SA $= \left(\frac{3}{5}\right)^2 = \frac{9}{25}$

$\frac{9}{25} = \frac{x}{600\ \text{ft}^2}$ $\boxed{x = 216\ \text{ft}^2}$

These two pyramids are similar, find the volume of the smaller pyramid.

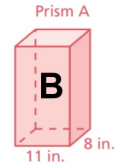


Similarity Ratio: $\frac{L}{B} = \frac{7}{21} = \frac{1}{3}$

Ratio of Vol = $\left(\frac{1}{3}\right)^3 = \frac{1}{27}$

$\frac{1}{27} = \frac{x}{1000 \text{ mm}^3}$ $\quad x = 37.04 \text{ mm}^3$

These two prisms are similar. Find the missing length of the smaller prism.



SA = 324 in²

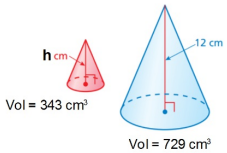
SA = 256 in²

Ratio of SA = $\frac{256 \text{ in}^2}{324 \text{ in}^2}$

Sim Ratio = $\sqrt{\frac{256 \text{ in}^2}{324 \text{ in}^2}} = \frac{16}{18} = \frac{8}{9}$

$\frac{8}{9} = \frac{l}{11}$ $\quad$ length = 9.78 in

These cones are similar. Find the height of the smaller cone.

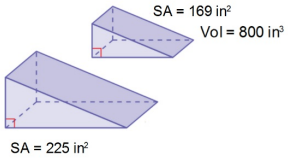


Ratio of Vol = $\frac{343 \text{ cm}^3}{729 \text{ cm}^3}$

Sim Ratio = $\sqrt[3]{\frac{343 \text{ cm}^3}{729 \text{ cm}^3}} = \frac{7}{9}$

$\frac{7}{9} = \frac{h}{12}$ $\quad$ h = 9.33 cm

These two solids are similar. Find the Volume of the larger solid.



Ratio of SA = $\frac{169 \text{ in}^2}{225 \text{ in}^2}$

Sim Ratio = $\sqrt{\frac{169 \text{ in}^2}{225 \text{ in}^2}} = \frac{13}{15}$

Ratio of Vol = $\left(\frac{13}{15}\right)^3 = \frac{2197}{3375}$

$\frac{2197}{3375} = \frac{800}{x}$ $\quad x = 1228.95 \text{ in}^3$

You can now finish problems 10-12 on Practice #27

This practice will be due on Sunday, June 7 by 10:00 pm