

Geometry

Chapter 11

Section 11-7

Similar solids have the same shape, and all their corresponding dimensions are proportional. The ratio of corresponding linear dimensions of two similar solids is the scale factor. Any two cubes are similar, as are any two spheres.

Theorem 11-12 Areas and Volumes of Similar Solids

→ If the scale factor of two similar solids is $a : b$, then

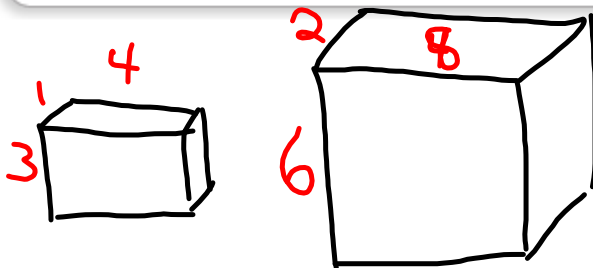
→ the ratio of their corresponding areas is $a^2 : b^2$

→ the ratio of their volumes is $a^3 : b^3$

1 : 2

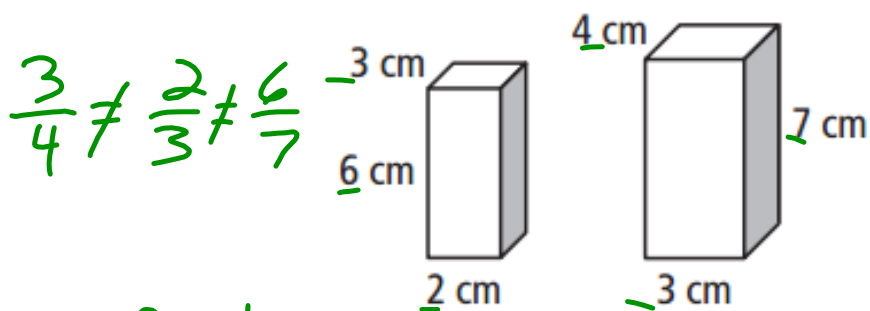
1 : 4

1 : 8



Determine if the figures are similar.

If so, write the scale factor.



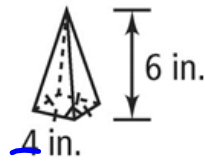
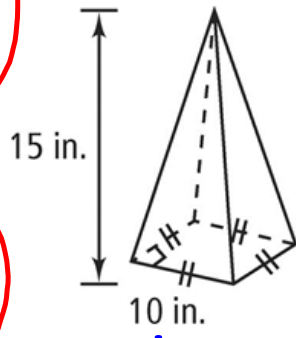
not
similar

Determine if the figures are similar.

If so, write the scale factor.

base
 $\frac{4}{10} = \frac{2}{5}$

height
 $\frac{6}{15} = \frac{2}{5}$





Similar

The pair of figures is similar. Determine the scale factor and the ratio of the surface areas.

$\frac{a}{b} \rightarrow \frac{a^2}{b^2} \rightarrow \frac{a^3}{b^3}$

Volume
 $\frac{64}{216} \div 8 = \frac{8}{27}$


 $V = 64 \text{ cm}^3$


 $V = 216 \text{ cm}^3$

Scale
 $\sqrt[3]{\frac{8}{27}} = \frac{2}{3}$

areas
 $\left(\frac{2}{3}\right)^2 = \frac{4}{9}$

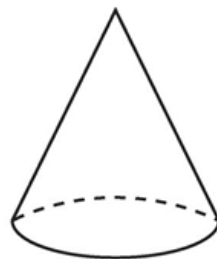
The pair of figures is similar. Determine the scale factor and the ratio of the volumes.

areas

$$\frac{36\pi}{121\pi} = \frac{36}{121}$$



S.A. = ~~36~~ π ft²



S.A. = 121 π ft²

scale

$$\sqrt{\frac{36}{121}} = \frac{6}{11}$$

volume

$$\frac{6^3}{11^3} = \frac{216}{1331}$$

The surface areas of two similar cylinders are $100\pi \text{ m}^2$ and $196\pi \text{ m}^2$. If the volume of the larger cylinder is $343\pi \text{ m}^3$ find the volume of the smaller cylinder.

$$\frac{\text{Areas}}{\frac{100\pi}{196\pi}} = \frac{50}{98} = \frac{25}{49}$$

$$\frac{\text{Scale}}{\sqrt{\frac{25}{49}}} = \frac{5}{7}$$

$$\frac{\text{Volume}}{\left(\frac{5}{7}\right)^3} = \frac{125}{343}$$

$$\frac{125}{343} = \frac{x}{343\pi}$$

$$125\pi \text{ m}^3$$

The volumes of two similar pyramids are 35 in^3 and 40 in^3 .
What is the scale factor of the pyramids?

$$\frac{\text{Vol}}{40} = \frac{35}{8}$$

Scale

$$\frac{\sqrt[3]{7}}{\sqrt[3]{8}} \approx \frac{1.9}{2}$$

exact

$$\frac{\sqrt[3]{7}}{2}$$

If... Area

$$\frac{\sqrt[3]{7}^2}{2^2} = \frac{\sqrt[3]{49}}{4}$$

A stadium is giving away replica baseball bats that are half the length of a regulation bat with a volume of about 100 in³. If the replica is similar to the original, estimate the volume of the replica bat to the nearest tenth of an inch.

$$\frac{\text{Scale}}{\frac{1}{2}}$$

$$\frac{\text{Volume}}{\left(\frac{1}{2}\right)^3} = \frac{1}{8}$$

$$\frac{1}{8} = \frac{x}{100}$$

$$\frac{100}{8} = \frac{8x}{8}$$

$$x = 12.5 \text{ in}^3$$

Homework

Pages 746 - 747

6 - 24 even