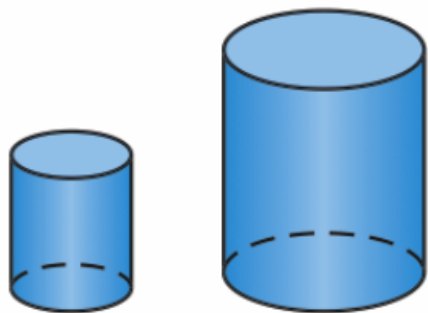
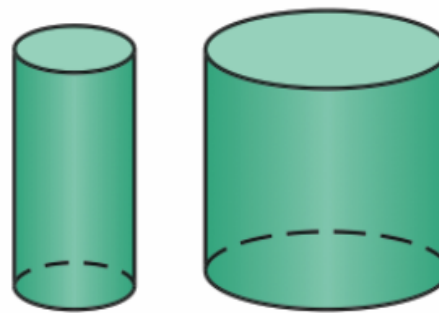


12.7 Explore Similar Solids

Two solids of the same type with equal ratios of corresponding linear measures, such as heights or radii, are called **similar solids**. The common ratio is called the *scale factor* of one solid to the other solid. Any two cubes are similar, as well as any two spheres.



Similar cylinders

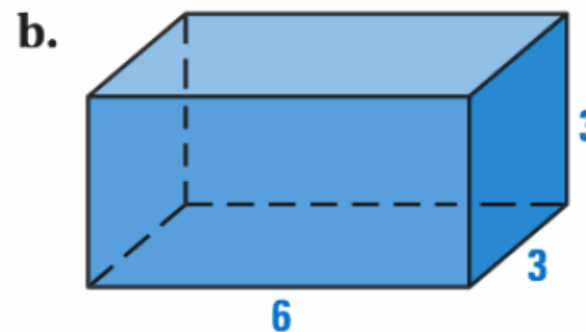
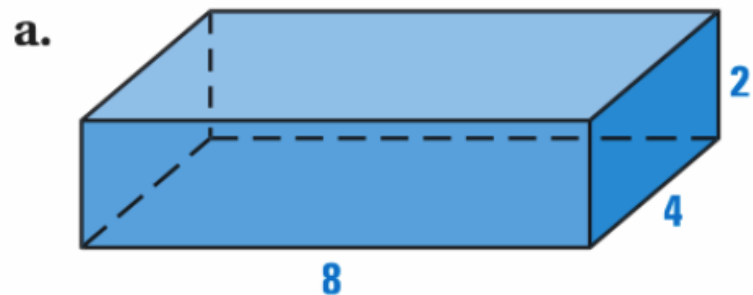
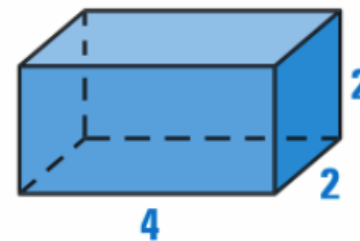


Nonsimilar cylinders

The green cylinders shown above are not similar. Their heights are equal, so they have a 1 : 1 ratio. The radii are different, however, so there is no common ratio.

EXAMPLE 1 Identify similar solids

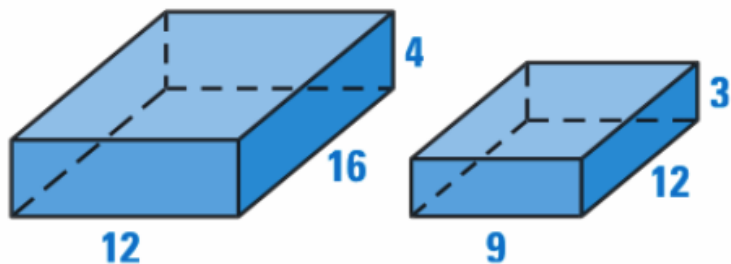
Tell whether the given right rectangular prism is similar to the right rectangular prism shown at the right.



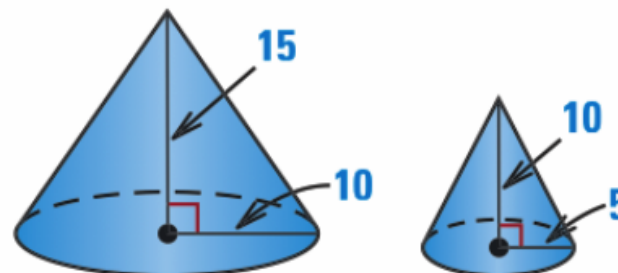
GUIDED PRACTICE for Example 1

Tell whether the pair of right solids is similar. *Explain* your reasoning.

1.

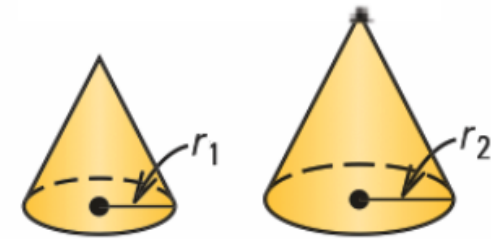


2.



THEOREM*For Your Notebook***THEOREM 12.13 Similar Solids Theorem**

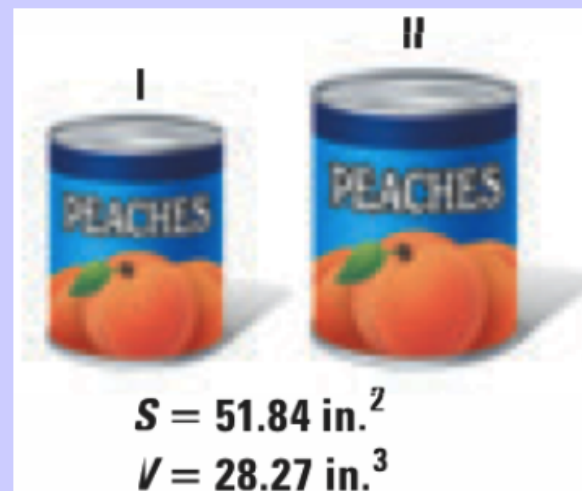
If two similar solids have a scale factor of $a:b$, then corresponding areas have a ratio of $a^2:b^2$, and corresponding volumes have a ratio of $a^3:b^3$.



$$\frac{r_1}{r_2} = \frac{a}{b}, \quad \frac{S_1}{S_2} = \frac{a^2}{b^2}, \quad \frac{V_1}{V_2} = \frac{a^3}{b^3}$$

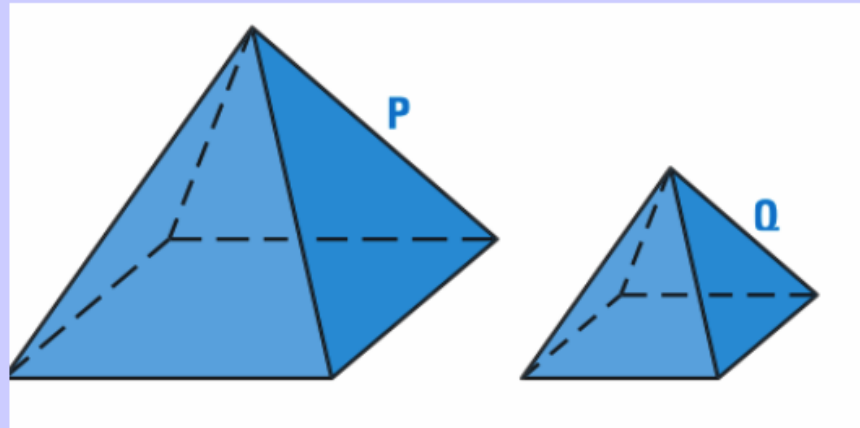
EXAMPLE 2 Use the scale factor of similar solids

PACKAGING The cans shown are similar with a scale factor of 87 : 100. Find the surface area and volume of the larger can.



EXAMPLE 3**Find the scale factor**

The pyramids are similar. Pyramid P has a volume of 1000 cubic inches and Pyramid Q has a volume of 216 cubic inches. Find the scale factor of Pyramid P to Pyramid Q.



EXAMPLE 4 Compare similar solids

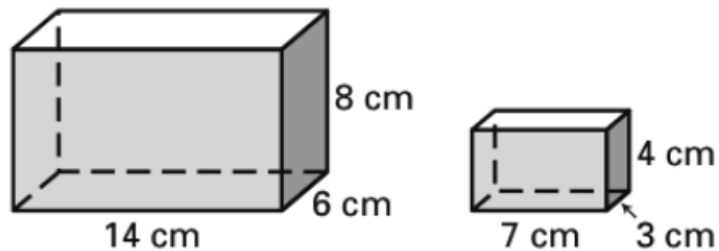
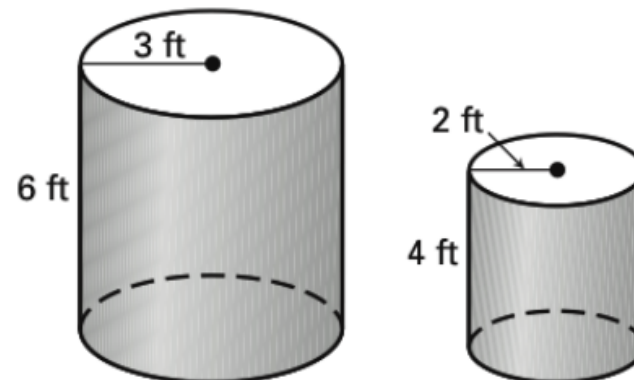
CONSUMER ECONOMICS A store sells balls of yarn in two different sizes. The diameter of the larger ball is twice the diameter of the smaller ball. If the balls of yarn cost \$7.50 and \$1.50, respectively, which ball of yarn is the better buy?

Assignment:

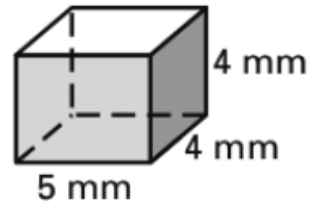
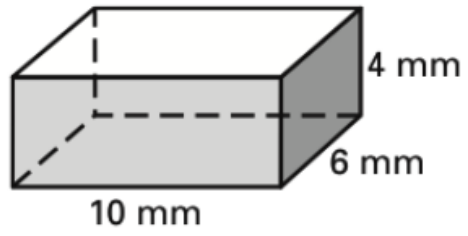
12.7 WS

LESSON
12.7**Practice***For use with pages 846–854*

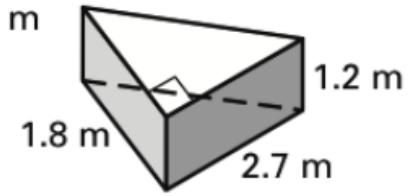
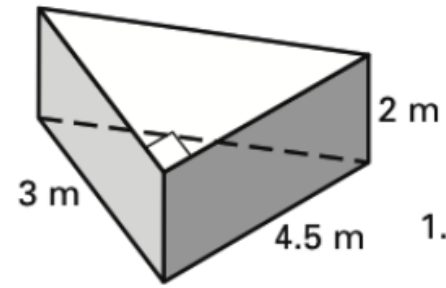
Tell whether the pair of right solids is similar. If so, determine the scale factor.

1.**2.**

3.



4.



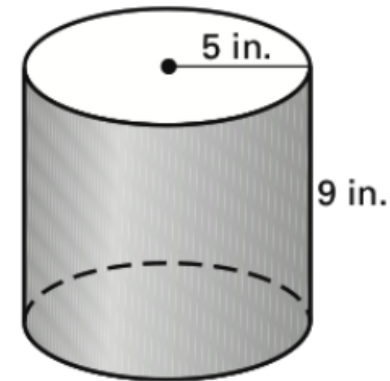
5. Multiple Choice Which set of dimensions corresponds to a right cylinder that is similar to the cylinder shown?

A. $r = 2, h = 5$

B. $r = 3, h = 7$

C. $r = 10, h = 19$

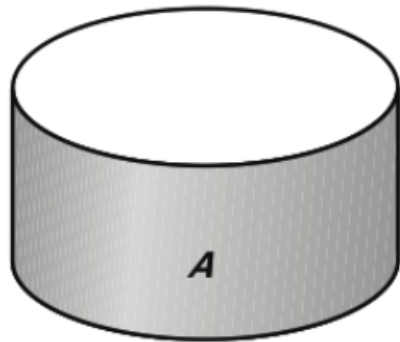
D. $r = 15, h = 27$



Solid A (shown) is similar to Solid B (not shown) with the given scale factor of A to B. Find the surface area and volume of Solid B.

6. Scale factor of 1 : 2

$$S = 42\pi \text{ ft}^2, V = 36\pi \text{ ft}^3$$



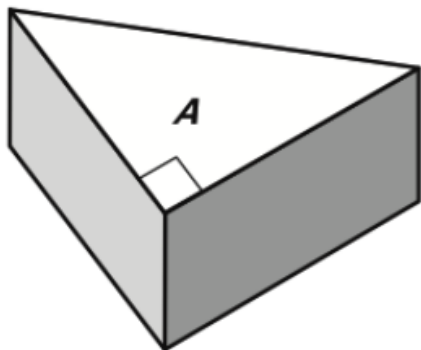
7. Scale factor of 1 : 3

$$S = 96\pi \text{ m}^2, V = 96\pi \text{ m}^3$$



8. Scale factor of 2 : 3

$$S = 75.6\pi \text{ cm}^2, V = 36 \text{ cm}^3$$



- 9. Finding Surface Area** Two spheres have a scale factor of $1 : 3$. The smaller sphere has a surface area of 16π square feet. Find the surface area of the larger sphere.

10. Multiple Choice Two right cylinders are similar. The surface areas are 24π and 96π . What is the ratio of the volumes of the cylinders?

A. $\frac{1}{4}$

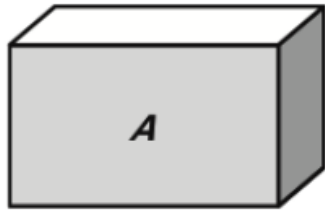
B. $\frac{1}{8}$

C. $\frac{1}{2}$

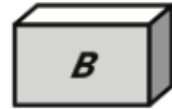
D. $\frac{2}{3}$

Solid A is similar to Solid B. Find the scale factor of Solid A to Solid B.

11.

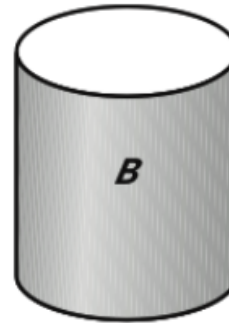


$$S = 208 \text{ m}^2$$



$$S = 52 \text{ m}^2$$

12.

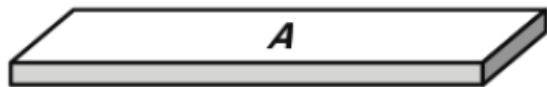


$$S = 63\pi \text{ cm}^2$$

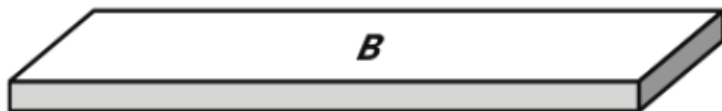


$$S = 28\pi \text{ cm}^2$$

13.

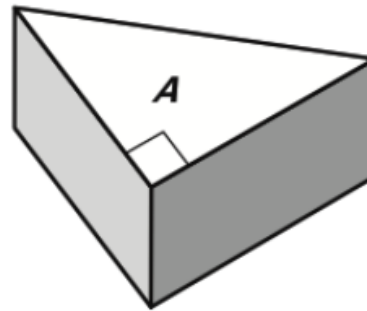


$$V = 27 \text{ ft}^3$$

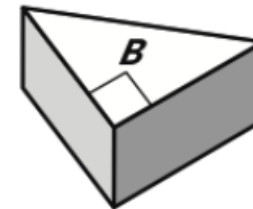


$$V = 64 \text{ ft}^3$$

14.



$$V = 54 \text{ in.}^3$$



$$V = 16 \text{ in.}^3$$