

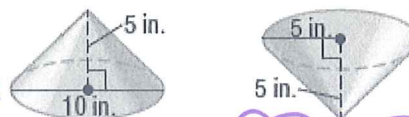
13.4 Similar Solids Notes

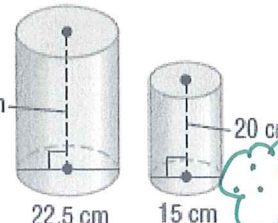
Key

- Similar solids are solids which have the same shape but different size.
- The ratio of corresponding parts is called the Scale Factor or SLR.
- In order for two solids to be similar, all corresponding parts must have the same Side length Ratio.

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Determine if the two solids are similar, congruent or neither.

1.  $\frac{H}{H} = \frac{5}{5} = 1$
 $\frac{R}{R} = \frac{10}{10} = 1$ SLR = 1
 $\therefore SF = 1$, they are similar and \cong

2.  $\frac{H}{H} = \frac{30}{20} = \frac{3}{2} = 1.5$ SLR = $\frac{3}{2}$
 $\frac{d}{d} = \frac{22.5}{15} = 1.5 = \frac{3}{2}$
 $\therefore SF = \frac{3}{2}$ so the solids are Similar

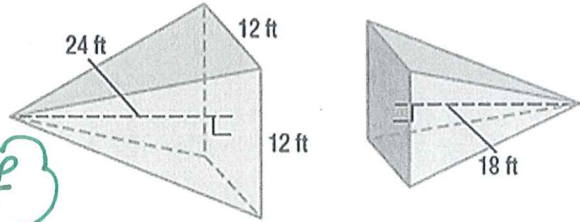
SLR = Perimeter Ratio = SF
 Area Ratio = SLR²
 Volume Ratio = SLR³
 $\sqrt{\text{Area Ratio}} = \text{SLR}$
 $\sqrt[3]{\text{Volume Ratio}} = \text{SLR}$

If two solids are similar and their scale factor is **a:b** then:
 The ratio of surface area is a²:b²
 The ratio of volumes is a³:b³

3. The two pyramids are similar.

A.) Find the scale factor of the two pyramids.

$\frac{24}{18} = \frac{4}{3}$ SF = $\frac{4}{3}$



B.) Find the ratios of the surface areas of the two pyramids.

AR = SLR² AR = $(\frac{4}{3})^2$ AR = $\frac{16}{9}$

C.) Find the ratios of the volumes of the two pyramids.

VR = SLR³ VR = $(\frac{4}{3})^3$ VR = $\frac{64}{27}$

D.) Find the volume of the larger pyramid. Use the volume ratio to algebraically find the volume of the second pyramid.

$V = \frac{1}{3} B \cdot H$
 $V = \frac{1}{3} 12 \times 12 \cdot 24$
 $V = 1152 \text{ ft}^3$

$VR = \frac{1152}{V}$
 $\frac{64}{27} = \frac{1152}{V}$
 $64V = 31104$
 $V = 486 \text{ ft}^3$

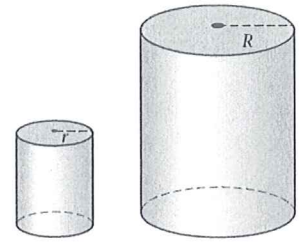
4. The cylinders are similar solids. The volume of the large cylinder is 64 cm^3 and the volume of the smaller cylinder is 8 cm^3 . If $r = 10 \text{ cm}$, find R .

$$VR = \frac{64}{8}$$

$$\sqrt[3]{VR} = SLR \quad \sqrt[3]{\frac{64}{8}} = \frac{4}{2}$$

Need SLR b/c they are 1D.
 $SLR = \frac{4}{2} \quad \frac{4}{2} = \frac{R}{10}$

$$R = 20 \text{ cm}$$



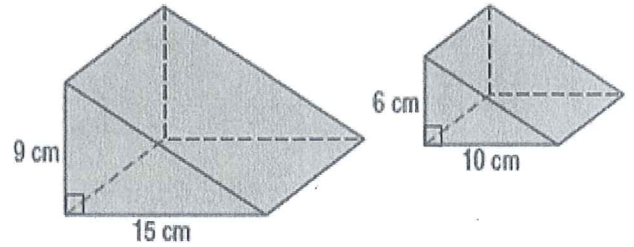
#5-7 Given that the two prisms are similar, complete the following.

5. Find the scale factor, area ratio and volume ratios.

$$SF = \frac{9}{6} = \frac{3}{2} \quad \text{SF} = \frac{3}{2}$$

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

$$VR = \left(\frac{3}{2}\right)^3 \quad VR = \frac{27}{8}$$



6. Suppose the volume of the larger prism is 810 cubic centimeters. Find the volume of the smaller prism.

Set $VR = VR$

↑ goes on top b/c 27 is larger

$$\frac{27}{8} = \frac{810}{V}$$

$$27V = 6480$$

$$V = 240 \text{ cm}^3$$

7. Suppose the surface area of the smaller prisms is 281.6 square centimeters. Find the surface area of the larger prism.

Set $AR = AR$

$$\frac{9}{4} = \frac{A}{281.6}$$

$$2534.4 = 4A$$

$$SA = 633.6 \text{ cm}^2$$

8. The corresponding heights of two similar cylinders is 2:5. What is the ratio of their volumes?

SF → $VR = \left(\frac{2}{5}\right)^3$

$$\frac{8}{125}$$

$$VR = \frac{8}{125}$$

9. The area ratio of a geometric solid is 9:16, find the volume ratio.

$$AR = \frac{9}{16}$$

① Find SLR

$$\sqrt{\frac{9}{16}}$$

$$SLR = \frac{3}{4}$$

②

$$VR = \left(\frac{3}{4}\right)^3 = \frac{27}{64}$$

$$VR = \frac{27}{64}$$

10. The volume ratio of a triangular prism (3D solid) is 512/216. Find the area ratio.

$$VR = \frac{512}{216}$$

① Find SLR

$$\sqrt[3]{\frac{512}{216}} = SLR = \frac{8}{6} = \frac{4}{3}$$

② Find AR

$$AR = SLR^2$$

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

$$AR = \frac{16}{9}$$

Homework:

Pg 754, #s: 7-31 odd

(You may have to do evens to get answers to odds).