

Enrich

Volumes of Similar Solids

If two figures are similar with a scale factor of $\frac{a}{b}$, then the perimeters of the two figures have a ratio of $\frac{a}{b}$. If two figures are similar with a scale factor of $\frac{a}{b}$, then the areas of the two figures have a ratio of $\left(\frac{a}{b}\right)^2$.

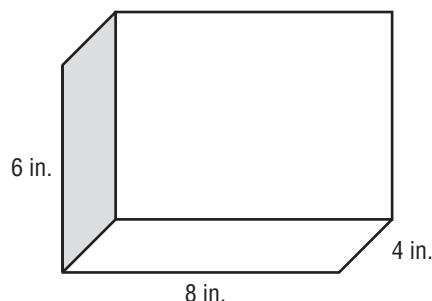
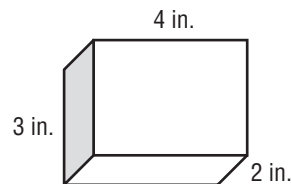
What about the ratio of volumes of similar solids?

The volume of the first rectangular prism shown is 2 inches • 3 inches • 4 inches = 24 cubic inches.

The volume of the second rectangular prism is 4 inches • 6 inches • 8 inches = 192 cubic inches.

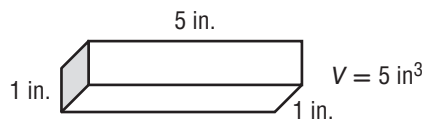
The lengths of the sides of the second rectangular solid are twice those of the first rectangular solid and the volume of the second rectangular solid is 8 times that of the first rectangular solid.

The scale factor of the first rectangular solid to the second rectangular solid is $\frac{1}{2}$ and the volume of the first rectangular solid to the second rectangular solid is $\frac{1}{8}$, which is the scale factor cubed, $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$.



Exercises

1. Draw a rectangular solid that is similar to the one shown that has a scale factor of $\frac{1}{3}$. Label the dimensions. Find the volume of the larger rectangular solid.



2. The lengths of the sides of two similar solids have a scale factor of $\frac{2}{3}$. Find the ratio of the volumes of the two solids.
3. Chad found the volume of two similar solids to be in the ratio $\frac{8}{125}$. Find the scale factor of the lengths of the sides.