Volume of Similar Solids

1. a. Build three cubes using the centimeter cubes. The cubes should have the following dimensions:

   Cube A 1 1 1, Cube B 2 2 2, and Cube C 3 3 3.

   b. Determine the volume of each cube.

   c. Fill in the table below:

Comparing	Ratio of edge lengths	Ratio of volumes
Cube A to Cube B		
Cube A to Cube C		
Cube B to Cube C		

   d. How does the ratio of volumes compare to the ratio of edge lengths?

2. Draw a rectangular prism 2 cm by 3 cm by 4 cm resting on its largest face on the isometric grid paper on the next page. Draw a second prism that has dimensions that are double the dimensions of the first prism and should also rest on its largest face.

   a. What are the dimensions of the second prism?

   b. What are the volumes of the prisms?

   c. What is the similarity ratio of corresponding lengths of the similar prisms?

   d. What is the ratio of the volumes of the similar prisms?

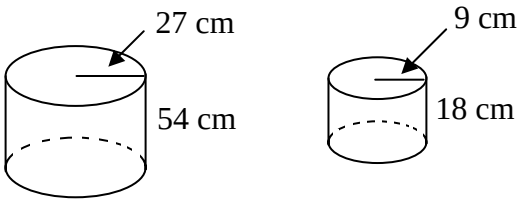
   e. How does the ratio of volumes compare to the ratio of edge lengths of the prisms?

Volume of Similar Solids (Continued)

Volume of Similar Solids (Continued)

3. The cylinders below are similar.

Note: Figures are not drawn to scale.



a. What is the similarity ratio of the dimensions of the cylinder on the left to the cylinder on the right?

b. Determine the volume of each cylinder. Use mathematics to explain how you determined your answers. Use words, symbols, or both in your explanation.

left cylinder: right cylinder:

c. What is the ratio of the volume of the left cylinder to the volume of the right cylinder?

d. How does the ratio of volumes compare to the similarity ratio of the dimensions of the cylinders?

4. Fill-in the blanks:

If two similar solids have corresponding dimensions in the ratio of $\frac{a}{b}$, then their **volumes** are in the ratio of _____.

Answers:

1. b. A: 1 cm^3, B: 8 cm^3, C: 27 cm^3

c.

Comparing	Ratio of edge lengths	Ratio of volumes
A to B	1:2	1:8
A to C	1:3	1:27
B to C	2:3	8:27

d. The ratio of the volumes of the similar cubes equals the cube (third power) of the ratio of the edge lengths.

2. a. 4 by 6 by 8 cm

b. first prism: 24 cm^3, second prism: 192 cm^3

c. 1:2

d. 24:192 or 1:8

e. The ratio of the volumes of the similar rectangular prisms equals the cube (third power) of the ratio of the edges lengths.

3. a. 3:1

b. left cylinder: 39366 = 123671.94 cm^3

right cylinder: 1458 = 4580.44 cm^3

c. 39366 :1458 or 27:1

d. The ratio of the volumes of the similar cylinders equals the cube (third power) of the ratio of the corresponding dimensions.

4. If two similar solids have corresponding dimensions in the ratio of $\frac{a}{b}$, then their volumes are in the ratio of $\left(\frac{a}{b}\right)^3$ $or \frac{a^3}{b^3}$.