Similar Polygons & Solids

Name _____

**If the scale factor between 2 similar polygons is $\frac{a}{b}$, then

- the ratio of their perimeters is $\frac{a}{b}$ and the ratio of their areas is $\frac{a^2}{b^2}$.

**So...in 3-dimensions: If the scale factor between 2 similar solids is $\frac{a}{b}$, then

- the ratio of their surface areas is $\frac{a^2}{b^2}$ and the ratio of their volumes is $\frac{a^3}{b^3}$.

Shape	Scale Factor/ Ratio of Perimeters	Ratio of Surface Areas	Ratio of Volumes
Cone	$\frac{2}{3}$	$\frac{(2)^2}{3^2} = \frac{4}{9}$	$\frac{(2)^3}{3^3} = \frac{8}{27}$
Sphere	$\frac{4}{6}$	$\frac{16}{36}$	$\frac{64}{216}$
Pyramid	$\frac{\sqrt{9}}{\sqrt{16}} = \frac{3}{4}$	$\frac{9}{16}$	$\frac{27}{64}$
Prism	$\frac{2}{4} = \frac{1}{2}$	$\frac{1}{4}$	$\frac{8}{64} = \frac{1}{8}$
Cylinder	$\frac{7}{8}$	$\frac{\sqrt{49}}{\sqrt{64}}$	$\left(\frac{7}{8}\right)^3 = \frac{343}{512}$
Cube	$\frac{5}{6}$	$\frac{25}{36}$	$\frac{125}{216}$

$\frac{x^3 = 8}{y^3 = 64}$

1. Triangle A is similar to Triangle B. If the scale factor of ΔA to ΔB is 4 to 5, what is the ratio of the perimeters of ΔA to ΔB? $\frac{4}{5}$ What is the ratio of the areas of ΔA to ΔB? $\frac{16}{25}$
   ↳ Square

2. Pyramid X is similar to Pyramid Y. If the scale factor of X:Y is 3:7, what is the ratio of the surface areas of X:Y? 9:49 What is the ratio of the volumes of X:Y? 27:343
   Square Cube

3. The ratio of the surface areas of two similar cones is 16:49. What is the scale factor between the similar cones? $\frac{4}{7}$ What is the ratio of the volumes of the similar cones? $\frac{64}{343}$

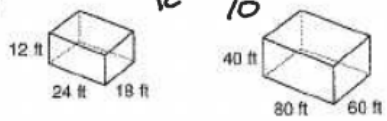
Kuta Software - Infinite Geometry Name_____

Similar Solids

Date_____ Period____

Are the two figures similar? If so, state the scale factor.

1)

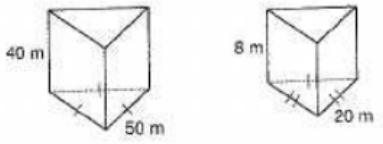


$k = \frac{3}{10}$

$\frac{12}{40} = \frac{24}{80} = \frac{18}{60}$

.3 .3 .3

2)

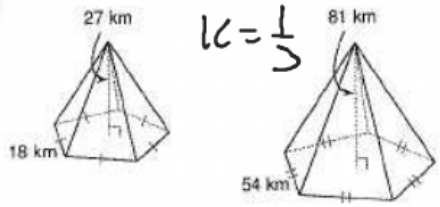


$\frac{40}{8} = \frac{50}{20}$

$5 \neq 2.5$

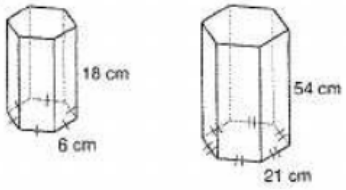
Not Similar

3)



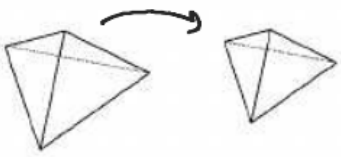
$k = \frac{1}{3}$

4)



Each pair of figures is similar. Use the information given to find the scale factor of the figure on the left to the figure on the right.

5)



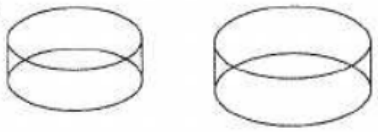
SA = 396 cm²

SA = 275 cm²

$k = \frac{5}{6}$

$\frac{275}{396} = \frac{25}{36}$

6)



SA = 7π in²

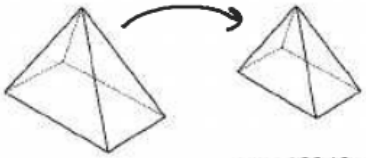
SA = 175π in²

$\frac{175\pi}{7\pi}$

$\frac{25}{1}$

$k = \frac{5}{1}$

7)



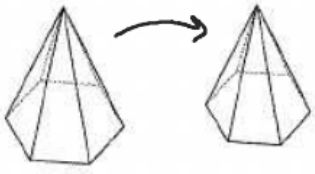
V = 20000 mi³

V = 10240 mi³

$\frac{10240}{20,000} = \frac{64}{125}$

$k = \frac{4}{5}$

8)



V = 3240 in³

V = 120 in³

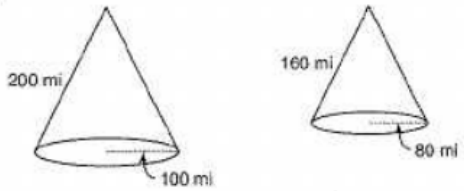
$\frac{120}{3240}$

$\frac{1}{27}$

$k = \frac{1}{3}$

Each pair of figures is similar. Find the scale factor of the figure on the left to the figure on the right. Then find the ratio of surface areas and the ratio of volumes.

9)



$\frac{160}{200} = \frac{4}{5}$, $\frac{16}{25}$, $\frac{64}{125}$

10)

$\frac{24}{42} = \frac{4}{7}$ $\frac{16}{49}$ $\frac{64}{343}$

The scale factor between two similar figures is given. The surface area and volume of the smaller figure are given. Find the surface area and volume of the larger figure.

11) scale factor = 1 : 2 $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{8}$
SA = 90 yd²
V = 216 yd³

$\frac{1}{4} = \frac{90}{SA}$ $\frac{1}{8} = \frac{216}{V}$

$SA = 360\,yd^2$ $V = 1728\,yd^3$

12) scale factor = 4 : 9 $\frac{4}{9}$ $\frac{16}{81}$ $\frac{64}{729}$
SA = 256 km²
V = 1536 km³

$\frac{16}{81} = \frac{256}{SA}$ $\frac{64}{729} = \frac{1536}{V}$

$\frac{16\,SA}{16} = \frac{20,736}{16}$

$SA = 1296\,km^2$

Some information about the surface area and volume of two similar solids has been given. Find the missing value.

13) Solid #1: SA = 1088 km², V = 13312 km³ Solid #2: SA = 425 km², V = ?

14) Solid #1: SA = 1100 yd², V = 19000 yd³ Solid #2: SA = 176 yd², V = ?

15) Solid #1: SA = 468 ft², V = 1944 ft³ Solid #2: SA = ?, V = 9 ft³

16) Solid #1: SA = 54 m², V = 648 m³ Solid #2: SA = ?, V = 8232 m³