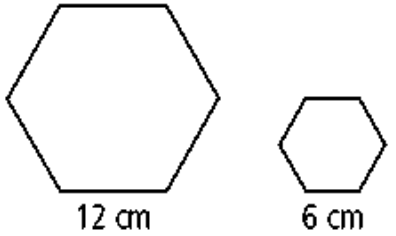
8.4

SURFACE AREAS AND VOLUMES OF SIMILAR SOLIDS

Lesson Revisited:

Ratio of Sides	Ratio of Perimeters	Ratio of Areas

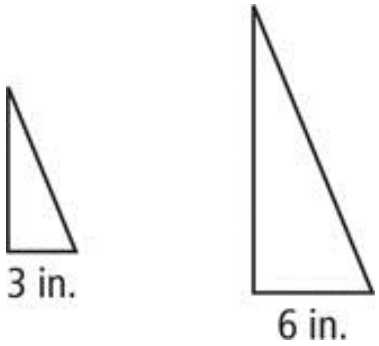
1) **The hexagons at the right are similar. What is the ratio (smaller to larger) of their perimeters and their areas?**



Ratio of Sides	Ratio of Perimeters	Ratio of Areas

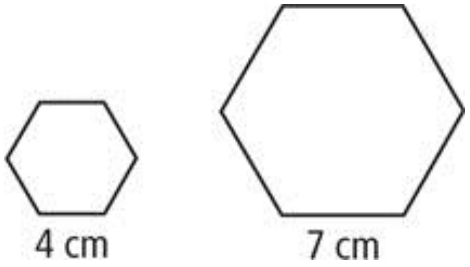
The figures in each pair are similar. Compare the first figure to the second. Give the ratio of the perimeters and the ratio of the areas.

2)



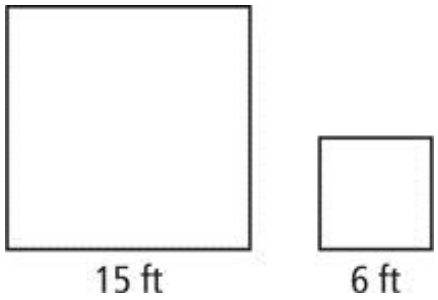
Ratio of Sides	Ratio of Perimeters	Ratio of Areas

3)



Ratio of Sides	Ratio of Perimeters	Ratio of Areas

4)

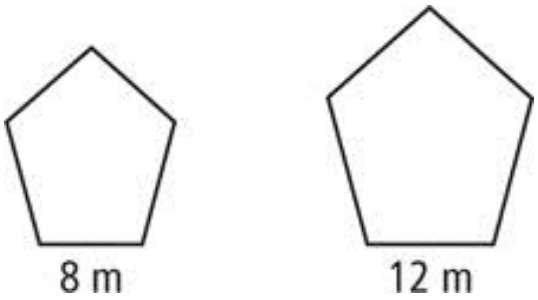


Ratio of Sides	Ratio of Perimeters	Ratio of Areas

Finding the missing perimeter:

The figures in each pair are similar. The perimeter of one figure is given.

5)



Perimeter of smaller pentagon = 40 m

Write a proportion:

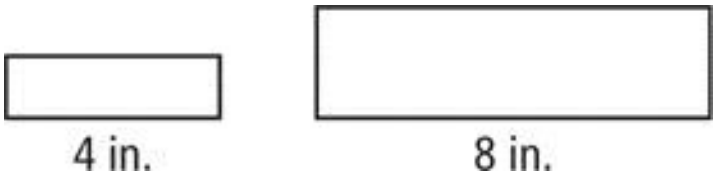
Ratio of perimeters (using sides) = **Ratio of ACTUAL perimeters**

$$\frac{\quad}{\quad} = \frac{\quad}{\quad}$$

ON YOUR OWN

The figures in each pair are similar. The perimeter of one figure is given.

6)



Write a proportion:

Ratio of perimeters (using sides) = **Ratio of ACTUAL perimeters**

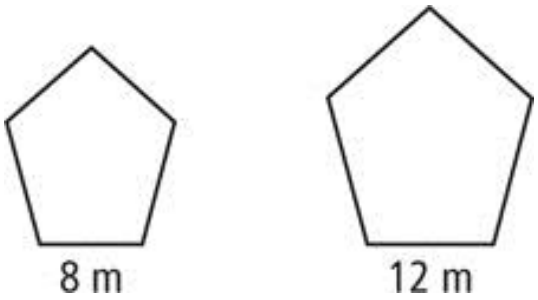
Perimeter of smaller rectangle = 12 in.

$$\frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Finding the missing area:

The figures in each pair are similar. The perimeter of one figure is given.

7)



Area of smaller pentagon = 80 m²

Write a proportion:

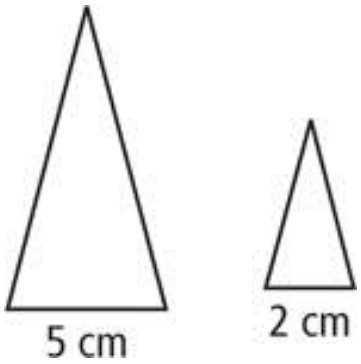
Ratio of areas (simplified) = **Ratio of ACTUAL areas**

$$\frac{\quad}{\quad} = \frac{\quad}{\quad}$$

ON YOUR OWN

The figures in each pair are similar. The perimeter of one figure is given.

8)



Area of large triangle = 75 cm^2

Write a proportion:

Ratio of areas (simplified) = **Ratio of ACTUAL areas**

$$\frac{\quad}{\quad} = \frac{\quad}{\quad}$$

Name_____Date_____

8.4 – Practice

Let's say that the ratio of two polygons and two 3D figures is $\frac{a}{b}$. Complete the following table:

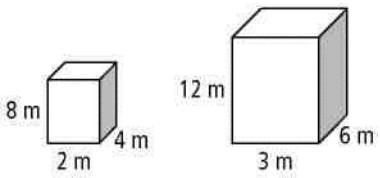
Ratio (Scale factor) of Sides	Ratio of Perimeters	Ratio of Areas	Ratio of Surface Areas	Ratio of Volumes
$\frac{a}{b}$				

Reviewing the concepts

When two solids are similar, their corresponding dimensions are proportional.

Rectangular prisms *A* and *B* are similar because the ratio of their corresponding dimensions is $\frac{2}{3}$.

height: $\frac{8\text{m}}{12\text{m}} = \frac{2}{3}$ length: $\frac{2\text{m}}{3\text{m}} = \frac{2}{3}$ width: $\frac{4\text{m}}{6\text{m}} = \frac{2}{3}$

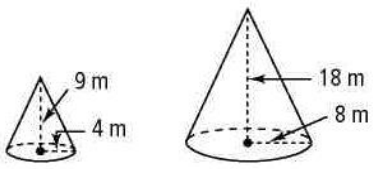


The ratio of the corresponding dimensions of similar solids is called the ***scale factor***. All the linear dimensions (length, width, and height) of a solid must have the same scale factor for the solids to be similar.

Surface Area	**Volume**
• The ratio of corresponding areas of similar solids is the ***square*** of the scale factor. • The ratio of the surface areas of prisms *A* and *B* is $\frac{2^2}{3^2}$, or $\frac{4}{9}$.	• The ratio of the volumes of similar solids is the ***cube*** of the scale factor. • The ratio of the volumes of prisms *A* and *B* is $\frac{2^3}{3^3}$, or $\frac{8}{27}$.

Do you understand? Are the two figures similar? If so, give the scale factor.

1)



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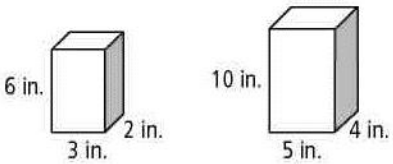
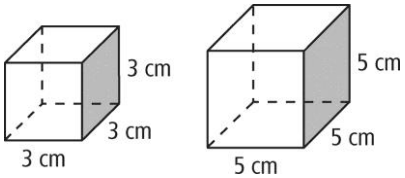


Each pair of figures is similar. Use the given information to find the (a) the ratio of their surface areas and (b) the ratio of their volumes.

3)

a) _____

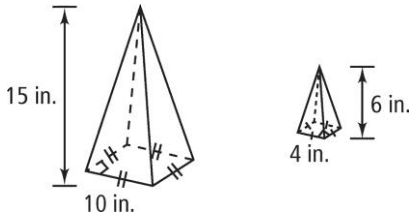
b) _____



4)

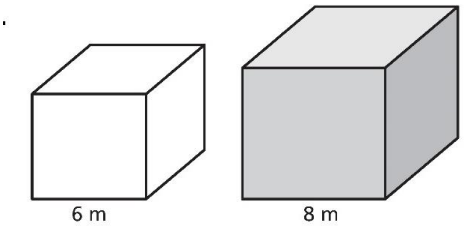
a) _____

b) _____



Reviewing the concepts - FINDING SURFACE AREA USING THE DIMENSIONS

The solids are similar. Find the surface area of the shaded solid.



Surface Area = 198 m^2

Step 1
Find the ratio (scale factor) of the dimensions

Step 2
Find the ratio of their surface areas

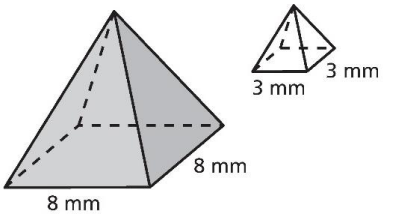
Step 3
Set up a proportion with the ratio of their surface area and the given surface area above

Step 4
Solve for the missing surface area

Reviewing the concepts - FINDING VOLUME USING THE DIMENSIONS

The solids are similar. Find the volume of the shaded solid.

Volume = 54 mm^3



Step 1
Find the ratio (scale factor) of the dimensions

Step 2
Find the ratio of their volumes

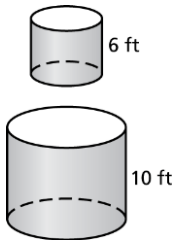
Step 3
Set up a proportion with the ratio of their volume and the given volume above

Step 4
Solve for the missing volume

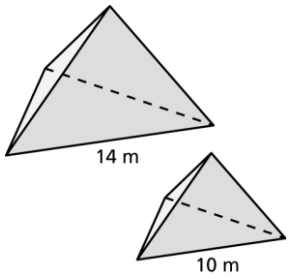
Do you understand?

The solids are similar. Find the surface area of the **bottom** solid. Round your answers to the nearest tenth.

5) Surface Area = 130 ft^2

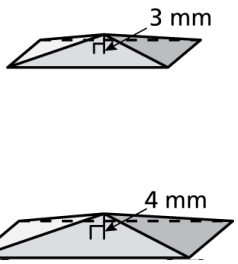


6) Surface Area = 294.7 m^2

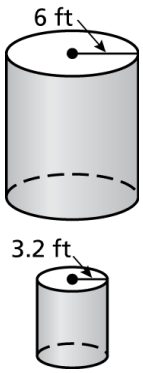


The solids are similar. Find the volume area of the **bottom** solid. Round your answers to the nearest tenth.

7) Volume = 250 mm^3



8) Volume = 1500 ft^3



9) The ratio of the corresponding heights of two similar cans of cat food is 4 : 3.

a) The larger can has a surface area of 100 square inches. Find the surface area of the smaller can. Round your answer to the nearest tenth.

b) The larger can has a volume of 150 cubic inches. Find the volume of the smaller can. Round your answer to the nearest tenth.