Geometry   Name _____

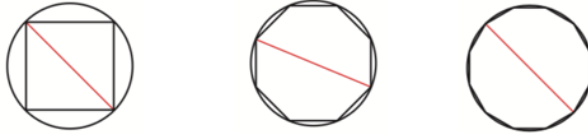   Date _____ Period _____

Chapter 11 Circumference, Area, and Volume

11.1 Circumference and Arc Length

Circumference is _____
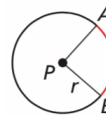

Increase the number of sides of a circumscribed polygon.

The ratio of _____ over _____ approaches _____ .

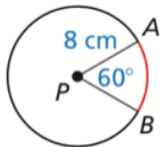$$\frac{C}{d} = \underline{\hspace{4cm}}$$

Formula for the Circumference: C =
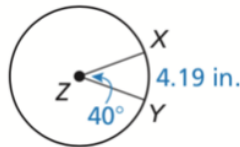
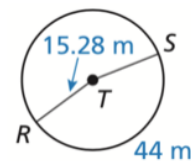**Arc Length** is a portion of the _____ .

            Arc length =

a) Arc length of $m\overset{\frown}{AB}$

b) Circumference of $\odot Z$

c) Arc angle $m\overset{\frown}{RS}$
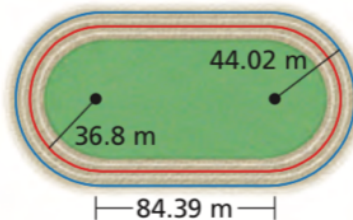

Real World

A runner runs around the track below. The ends of the track are semicircle arcs with each radius listed. How far is one lap around the track?
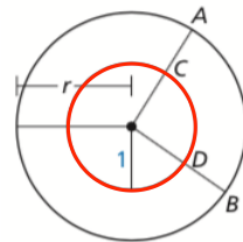
Using Circumference

The Unit Circle is _____

Arc Length of $\overarc{CD}$ =

Arc Length of $\overarc{AB}$ =

Radians

Radians is _____

Circumference of a unit circle = _____ radians.

Converting from degrees to radians:

Converting from radians to degrees:
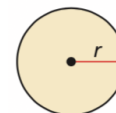
a) Convert 45˚ to radians

b) Convert $\dfrac{3\pi}{2}$ radians to degrees

c) Calculate the arc length on a circle with radius of 5 meters and arc angle of $\dfrac{2\pi}{3}$ radians.
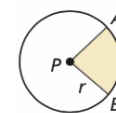
11.2 Areas of Circles and Sectors

Area of a Circle =

Example: A region with a 3-mile radius has a population density of about 6195 people per square mile. Find the number of people who live in the region.
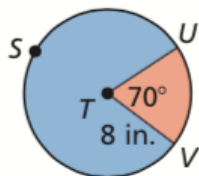
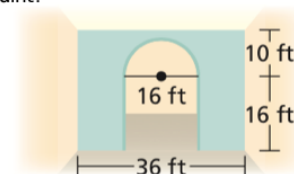A **Sector** is _____

Area of a Sector =

Example: Find the area of the sectors formed by $\angle UTV$.
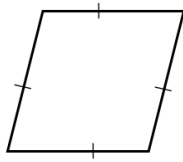
Real World

A rectangular wall has an entrance cut into it. You want to paint the wall. To the nearest square foot, what is the area of the region (green) you need to paint?
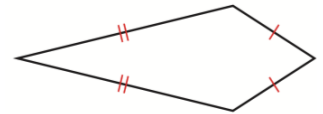
11.3 Areas of Polygons
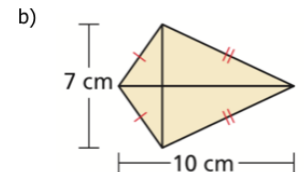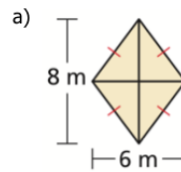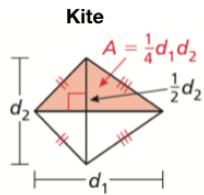
Rhombus
Name some properties:

Kite
Name some properties:
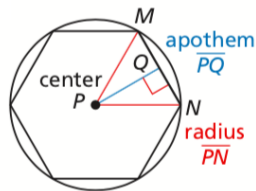
Area of Rhombus or Kite

A =

Compute each area

a)

8 m

├─6 m─┤

b)

7 cm

├──10 cm──┤

Rhombus
$A = \frac{1}{4}d_1d_2$
$\frac{1}{2}d_2$
d_2
d_1

Kite
$A = \frac{1}{4}d_1d_2$
$\frac{1}{2}d_2$
d_2
d_1
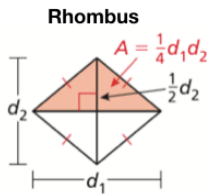
Regular Polygon

Center of a Regular Polygon:

Radius:
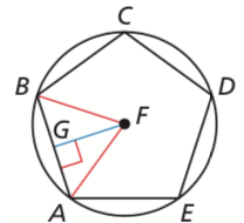
Apothem:

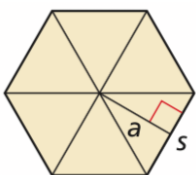Central Angle:

apothem $\overline{PQ}$

center P

radius $\overline{PN}$

What is special about ΔABF to the right?

Solve for these angles
a) $m\angle AFB$

b) $m\angle AFG$

c) $m\angle GAF$

Area of a regular polygon =
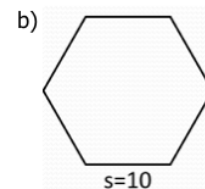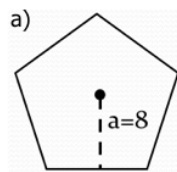
a s

Examples
Calculate the areas of these regular polygons.
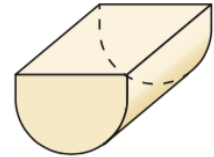
a)

$a=8$

b)

$s=10$

11.4 Three-Dimensional Figures
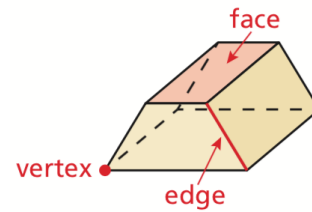
Solids
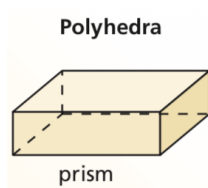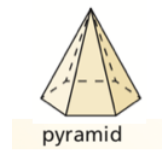
Face:

Edge:

Vertex:

Polyhedron:

Not Polyhedron:

Polyhedra
Prism
Definition:

Pyramid
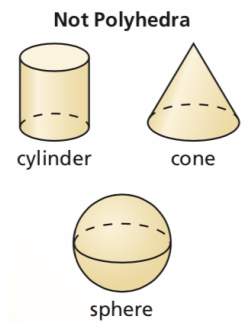Definition:

Name of solid uses _____

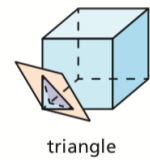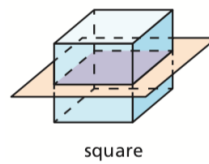**Non-Polyhedra**
Cylinder
Definition:

Cone
Definition:

Sphere
Definition:

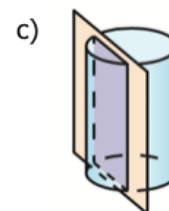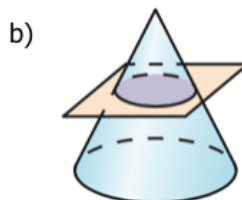**Cross Section**
Definition:
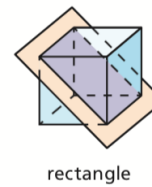
Describe the cross sections.

a)

b)

c)
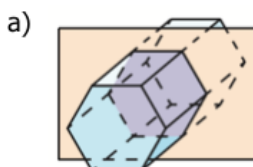
Solid of Revolution

A three-dimensional figure that is formed by _____.
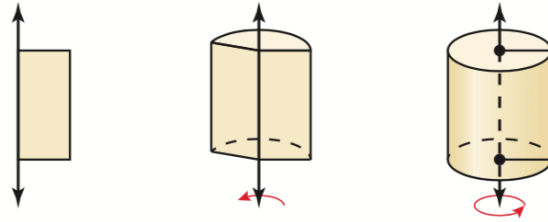
Example: Identify the solid created by revolving the triangle around the axis (figure on the right).

11.5 Volumes of Prisms and Cylinders

Definition of Volume:

Formula
Volume of a Prism: V =

Cavalieri's Principle:

Formula
Volume of a Cylinder: V =
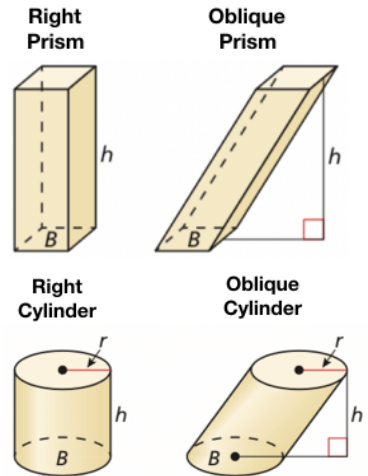
Calculate the volume of each solid.

a)   3 cm   14 cm

5 cm

6 cm

b)   4 cm

7 cm
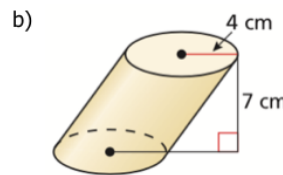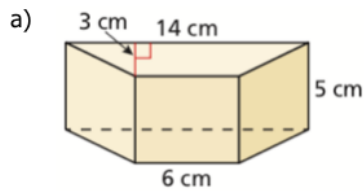
Density
Definition:

Formula
Density =

Example
The diagram shows the dimensions of a standard gold bar at Fort Knox. Gold has a density of 19.3 grams per cubic centimeter. Find the mass of a standard gold bar to the nearest gram.
(1 inch = 2.54 centimeters)

1.75 in.

7 in.

3.625 in.

Volume Example

You are building a rectangular chest. You want the length to be 6 feet, the width to be 4 feet, and the volume to be 72 cubic feet. What should the height be?

$V = 72 \text{ ft}^3$

Similar Solids

Two solids of the same type, like cylinders, with _____ of corresponding linear measures, such as

_____ or _____, are called _____.

The ratio of the corresponding linear measures of two similar solids is called the _____.

Example

Cylinders A and B are similar.   a) What is the scale factor?

b) What is the volume of cylinder B?
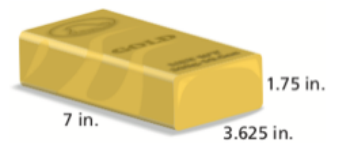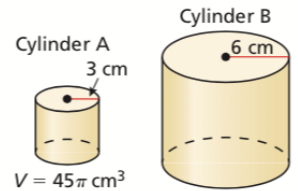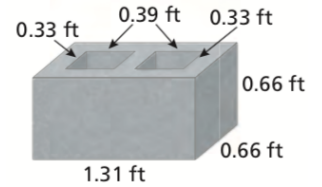
Cylinder B
Cylinder A
6 cm
3 cm
$V = 45\pi \text{ cm}^3$

Volume of Composite Solid

Compute the volume of the concrete block. The two holes go all the way through.

0.33 ft   0.39 ft   0.33 ft
0.66 ft
0.66 ft
1.31 ft

11.6 Volumes of Pyramids

Volume of a Pyramid

Formula   V =

Regular and _____ pyramids have the same _____ and the same

_____ area at every level, then _____ Principle

says they have the same _____.

Regular Pyramid   Oblique Pyramid

$V_{Right} = V_{Oblique}$
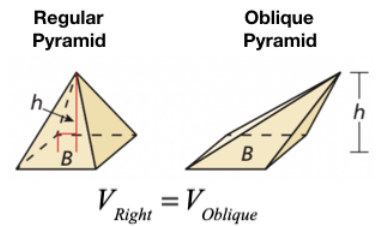
Example

Khafre's Pyramid had a height of about 144 meters and a volume of about 2,218,800 cubic meters. Find the side length of the square base.
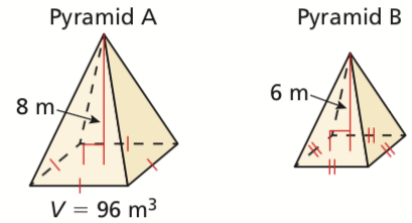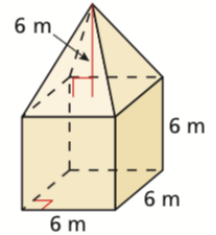
Example

Pyramids A and B are similar.

a) What is the scale factor?

b) What is the volume of pyramid B?

Pyramid A   **Pyramid B**

8 m

$V = 96$ m^3

6 m

Volume of Composite Solid

Compute the volume of the composite figure.

6 m

6 m

6 m

6 m

11.7 Surface Areas and Volumes of Cones

Cones

    Base: Slant Height (ℓ):

    Vertex: Lateral Surface:

    Height:

r

slant height

$2\pi r$

vertex

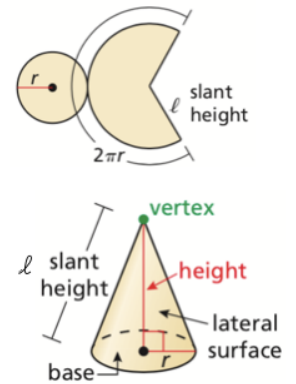ℓ slant height

height

lateral surface

base

Formulas
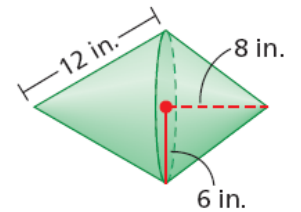
    Lateral Surface Area of a Right Cone = L =

    Surface Area of a Right Cone = S =

    Volume of a Cone = V =

Example

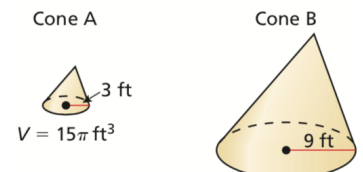Compute the surface area and volume of the composite figure to the right.

12 in.

8 in.

6 in.

Similar Solids

Example

Cones A and B are similar.

a) What is the scale factor?

b) What is the volume of cone B?

Cone A   **Cone B**

3 ft

$V = 15\pi$ ft^3

9 ft

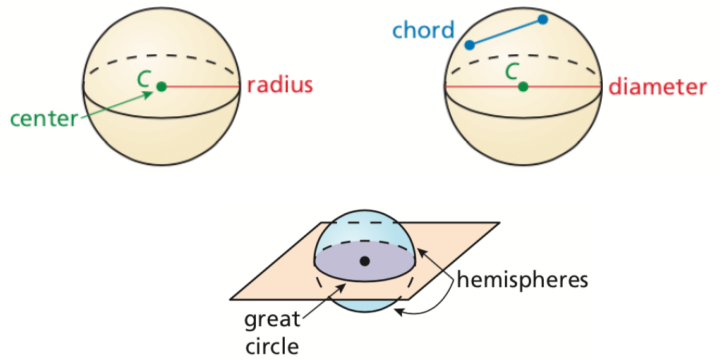# 11.8 Surface Areas and Volumes of Spheres

Definitions

Center:

Radius:

Chord:

Great Circle:

Hemisphere:

Formulas

Surface Area of a Sphere = S =

Volume of a Sphere = V =

a) Compute the surface area and volume of the soccer ball.

b) Compute the surface area and volume of the composite figure. (Cylinder with hemisphere cut out.)