Geometry

Unit #2 – Surface Area & Volume

Name: ___________________________

Hr: ____

Name______________________

srushingoe.weelby.com

Ch 1, 11, & 12 Calendar

Mrs. Rushing

Monday September 10	**Area and Perimeter (1-6)**
Tuesday September 11	**Area of Composite Figures (11-4)** DHQ Area and Perimeter
Block Wed/Thurs. Sept 12 & 13	**MAP Testing** Hour 1 – Room 503 Hour 5 – Room 601 Writing Lab Hour 6 – Room 601 Writing Lab 3-dimensional Vocabulary Wkst
Friday September 14	**Volume of Prisms (12-4)** Cavalieri's Principle DHQ Composite Area
Monday September 17	**Volume of Pyramids (12-5)** DHQ Volume of Prisms
Tuesday September 18	**Volume of Cylinders (12-4)** DHQ Volume of Pyramids
Block Wed/Thurs. Sept 19/20	**Volume of Cones (12-5)** **Volume Quiz Prisms/Pyramids** DHQ Volume of Cylinders
Friday September 21	**Volume and Surface Area of Spheres (12-6)** DHQ Volume of Cones
Monday September 24	**Review Unit 2** DHQ Spheres
Tuesday September 25	**Review Unit 2**
Block Wed/Thurs. Sept 26/27	**Unit 2 Test – Area and Volume** No Calculator Part Calculator Part Are you ready for Chapter 1?
Friday September 28	**No School – Teacher Work Day**

*This is not set in stone, things may change at the teacher's discretion.

Lesson 1-6 Two-Dimensional Figures (Area and Perimeter)

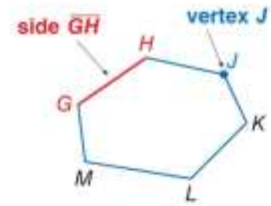
Objectives:
1. Identify and name polygons.
2. Find perimeter, circumference, and area of two-dimensional figures.

KeyConcept Polygons

A polygon is a closed figure formed by a finite number of coplanar segments called *sides* such that

- the sides that have a common endpoint are noncollinear, and
- each side intersects exactly two other sides, but only at their endpoints.

The vertex of each angle is a vertex of the polygon. A polygon is named by the letters of its vertices, written in order of consecutive vertices.



polygon *GHJKLM*

Side of the Polygon –

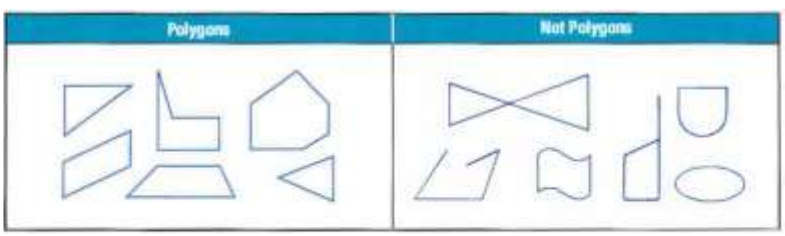
Diagonal –

Each endpoint of a side is a _____________ of the polygon. The plural is _____________.

Polygons are named by the number of sides they have.

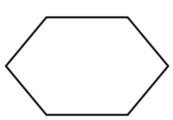
# of Sides	Type of Polygon
3	
4	
5	
6	
7	

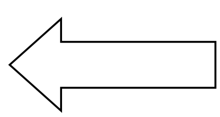
# of Sides	Type of Polygon
8	
9	
10	
12	
n	

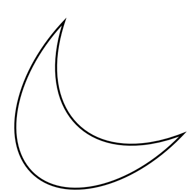


Polygons can be concave or convex. Suppose the line containing each side is drawn. If any of the lines contain any point in the interior of the polygon, then it is concave. Otherwise it is convex.

Tell whether each figure is a polygon. If it is a polygon, name it by the number of sides.

A. 

B. 

C. 

Regular Polygon

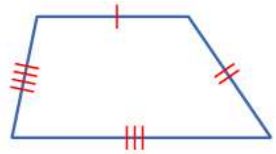
A polygon is ___________ if no line that contains a side of the polygon contains a point in the interior of the polygon.

A polygon that is not convex is called __________________ or _______________.

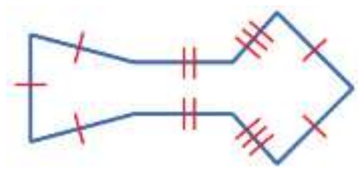
Example 1: **Name and Classify Polygons**

Name the polygon by its number of sides. Then classify it as *convex* or *concave* and *regular* or *irregular*.

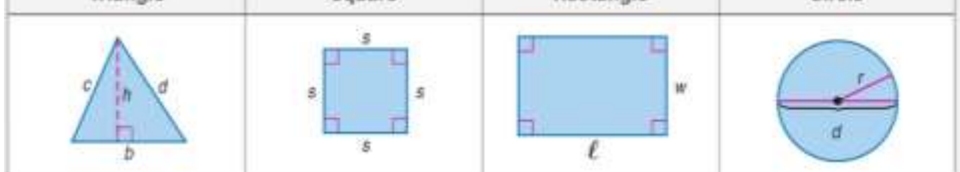
(a)



(b)



How does knowing the area formula for a rectangle help find the area of a triangle?



KeyConcept Perimeter, Circumference, and Area

Triangle	Square	Rectangle	Circle
$P = b + c + d$	$P = s + s + s + s$ $= 4s$	$P = \ell + w + \ell + w$ $= 2\ell + 2w$	$C = 2\pi r$ or $C = \pi d$
$A = \frac{1}{2}bh$	$A = s^2$	$A = \ell w$	$A = \pi r^2$

P = perimeter of polygon; b = base, h = height

A = area of figure; ℓ = length, w = width

C = circumference; r = radius, d = diameter

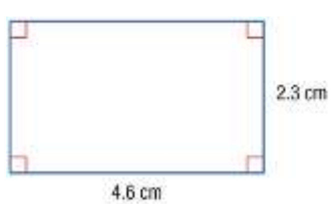
Pi (π) → ratio of circle's circumference to its diameter approximately 3.14 or 22/7

EXACT answers: answers left in terms of π (do NOT multiple out the value for π)

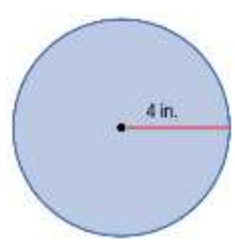
APPROXIMATE answers: use π key on a calculator or replace π with a number such as 3.14 or $\frac{22}{7}$

Example 2 – Find the perimeter and area

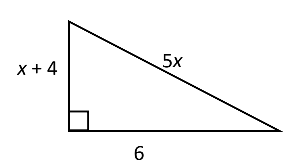
(a)



(b)



(c)



Example 3 – Standardized Test Example

Each of the following shapes has a perimeter of about 88 inches. Which one has the greatest area?

(a) a rectangle with a length of 26 inches and a width of 18 inches

(b) a square with side length of 22 inches

(c) a right triangle with each leg length of 26 inches

(d) a circle with radius of 14 inches

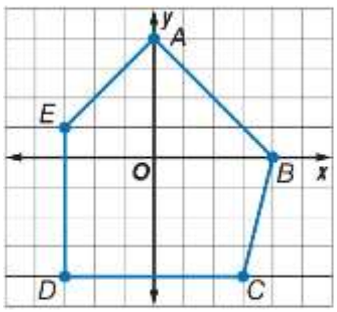
Example 5 – Working Backwards

a) Find the radius of a circle when the area is 72.38 in^2.

b) What is the height of a triangle with an area of 126.5 ft^2 and a base of 23ft?

Example 5 – Perimeter and Area on the Coordinate Plane

Find the perimeter and area of a pentagon *ABCDE* with $A(0, 4), B(4, 0), C(3, -4), D(-3, -4)$, and $E(-3, 1)$.



Perimeter: DE ____ + DC ____ + CB _____ + BA _____ + AE ______

Area:

11-4 Area of Composite Figures

Objective: Find areas of composite figures.

A composite figure is a figure that can be separated into regions that are basic figures. To find the area of a composite figure, use basic figures for which we know the area formulas. The sum of the areas of the basic figures is the area of the composite figure.

$A = lw$

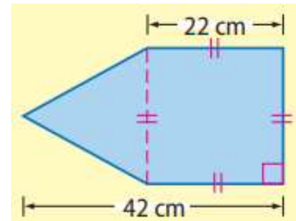
$A = \pi r^2$

$A = \frac{h(b_1 + b_2)}{2}$

$A = bh$

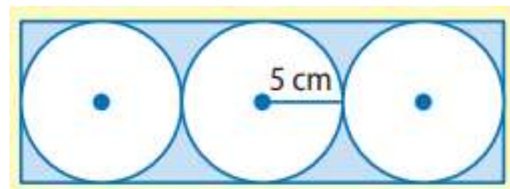
$A = \frac{bh}{2}$

Example 1: Find the area of the shaded region.

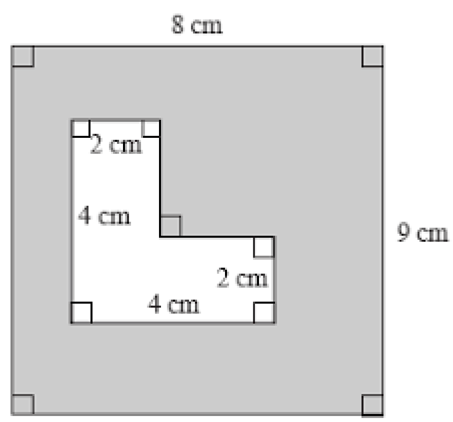


Sometimes you can use a difference of areas of basic figures to find the area of a complex figure.

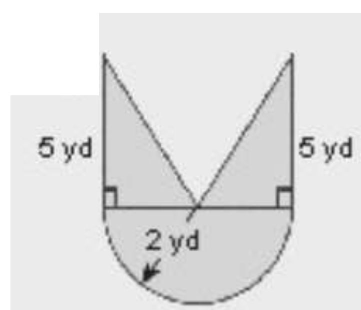
Example 2: Find the area of the shaded region.



Example 3: Find the area of the shaded region.



Example 4: Find the area of the shaded region.



Three Dimensional Figures and Vocabulary (1.7)

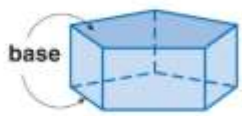
Objective:
- Identify and name three-dimensional figures.
- Find volume.

A solid with all flat surfaces that enclose a single region of space is called a polyhedron. Each flat surface or *face* is a polygon. The line segments where the faces intersect are called *edges*. The point where three or more edges intersect is called a *vertex*. Below are examples and definitions of polyhedrons and other types of solids.

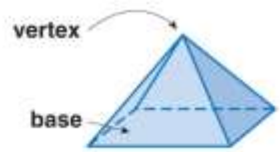
KeyConcept Types of Solids

Polyhedrons

A **prism** is a polyhedron with two parallel congruent faces called **bases** connected by parallelogram faces.

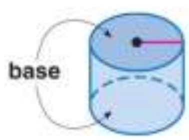


A **pyramid** is a polyhedron that has a polygonal base and three or more triangular faces that meet at a common vertex.

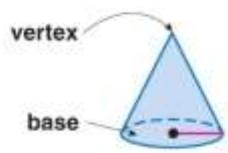


Not Polyhedrons

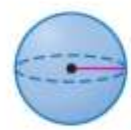
A **cylinder** is a solid with congruent parallel circular bases connected by a curved surface.



A **cone** is a solid with a circular base connected by a curved surface to a single vertex.



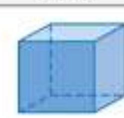
A **sphere** is a set of points in space that are the same distance from a given point. A sphere has no faces, edges, or vertices.



Polyhedrons or *polyhedra* are named by the shape of their bases.

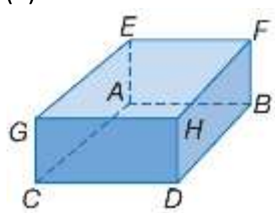
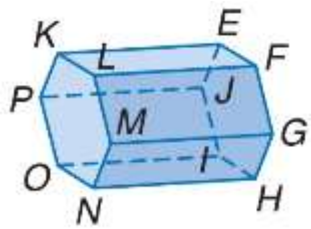
A polyhedron is a *regular Polyhedron* if all of its faces are regular congruent polygons and all of the edges are congruent. There are exactly five types of regular polyhedrons, called P1atonic Solids because Plato used them extensively.

KeyConcept Platonic Solids

Tetrahedron	Hexahedron or Cube	Octahedron	Dodecahedron	Icosahedron
				
4 equilateral triangle faces	6 square faces	8 equilateral triangular faces	12 regular pentagonal faces	20 equilateral triangular faces

Example 1: Identify Solids

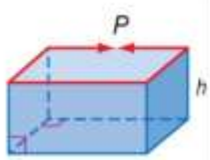
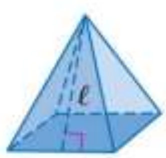
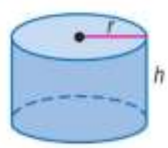
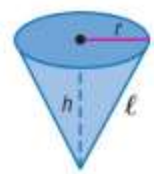
Determine whether the solid is a polyhedron. Then identify the solid. If it is a polyhedron, name the bases, faces, edges, and vertices.

(a)	(b)	(c)
		
Faces: Edges: Verticies:	Faces: Edges: Verticies:	Faces: Edges: Verticies:

Surface Area:

Volume:

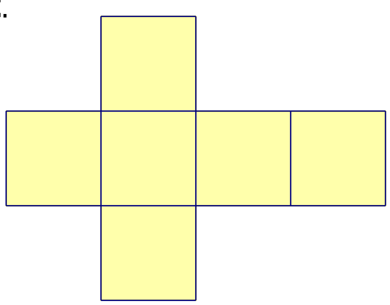
KeyConcept Surface Area and Volume

Prism	Regular Pyramid	Cylinder	Cone	Sphere
				
$T = Ph + 2B$	$T = \frac{1}{2}P\ell + B$	$T = 2\pi rh + 2\pi r^2$	$T = \pi r\ell + \pi r^2$	$T = 4\pi r^2$
$V = Bh$	$V = \frac{1}{3}Bh$	$V = \pi r^2 h$	$V = \frac{1}{3}\pi r^2 h$	$V = \frac{4}{3}\pi r^3$
T = total surface area		V = volume	h = height of a solid	
P = perimeter of the base		B = area of base	ℓ = slant height, r = radius	

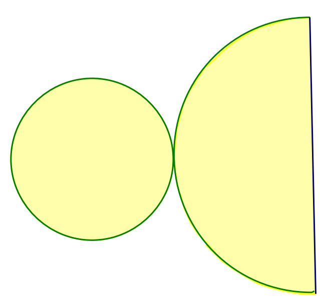
Net →

Describe the three-dimensional figure that can be made from the given net.

C.



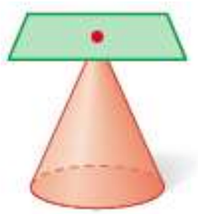
D.



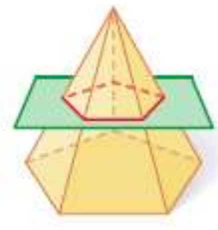
Cross section →

Describe each cross section.

E.



F.



Objective:
- Find the volume of a prism.

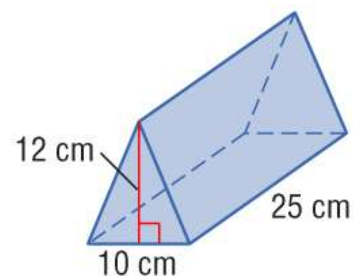
Volume of Prisms (12-4)

Recall that the volume of a solid is the measure of the amount of space the solid encloses. Volume is measured in cubic units.

Volume of a Prism	If a prism has a volume of *V* cubic units, a height of *h* units, and each base has an area of *B* square units, then *V* = *Bh*. Or V = lwh

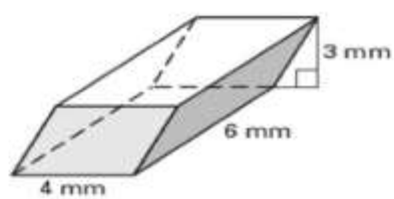
<u>Example 1: Volume of a Prism</u>

Find the volume of the prism.



<u>Example 2: Volume of a Prism</u>

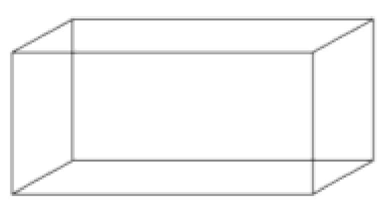
Find the volume of the prism.



<u>Example 3: Real World: Volume backwards</u>

Jenny has some boxes for shipping merchandise. Each box is in the shape of a rectangular prism with a length of 18 inches, a width of 14 inches, and a volume of 2520 inch^2. Find the height of the prism.

A. Draw, label and find the height.



Objective:

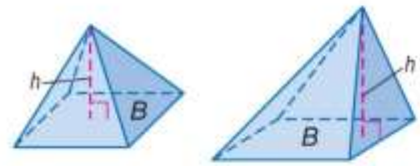
- Find the volume of a pyramid.

Volume of Pyramid (12-5)

KeyConcept Volume of a Pyramid

Words The volume of a pyramid is $V = \frac{1}{3}Bh$, where B is the area of the base and h is the height of the pyramid.

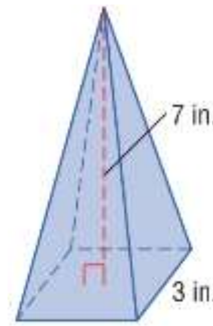
Models



Symbols $V = \frac{1}{3}Bh$

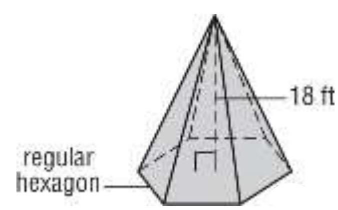
Example 1: Volume of square pyramid

Find the volume of the square pyramid.



Example 2: Volume of square pyramid

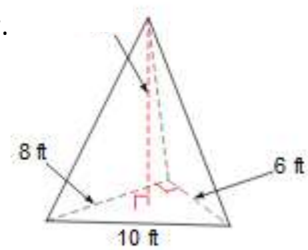
Find the volume of the hexagonal pyramid.



Base area = 31.2 ft^2

Example 2: Volume backwards

Find the height given the volume of the triangular pyramid is 96 ft^3.



Objective:

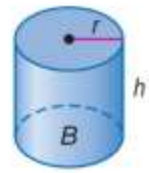
- Find the volume of a cylinder.

Volume of Cylinders (12-4)

KeyConcept Volume of a Cylinder

Words The volume V of a cylinder is $V = Bh$ or $V = \pi r^2 h$, where B is the area of the base, h is the height of the cylinder, and r is the radius of the base.

Model

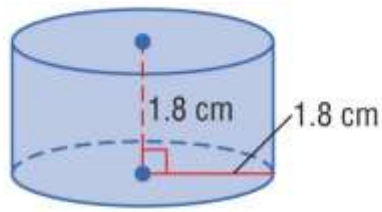


Symbols $V = Bh$ or $V = \pi r^2 h$

When a <u>solid is not a right solid</u>, use <u>**Cavalieri's Principle**</u> to find the volume. The principle states that if two solids have the same height and the same cross sectional area at <u>every</u> level, then they have the same volume.

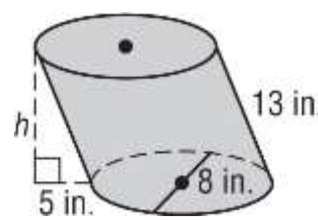
<u>**Example 1: Volume of a cylinders**</u>

Find the volume of the cylinder.



<u>**Example 2: Volume of a cylinders**</u>

Find the volume of the oblique cylinder.



<u>**Example 3: Volume Backwards**</u>

The volume of a cylinder is 3600π cm^3 and the height is 16 cm. Find the radius.

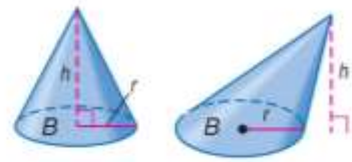
Volume of Cone (12-5)

Objective:
- Find the volume of a cone.

KeyConcept Volume of a Cone

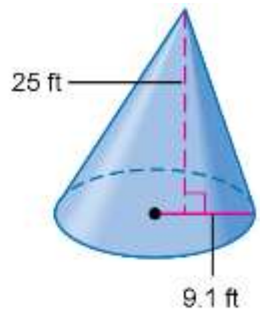
Words The volume of a circular cone is $V = \frac{1}{3}Bh$, or $V = \frac{1}{3}\pi r^2 h$, where B is the area of the base, h is the height of the cone, and r is the radius of the base.

Models

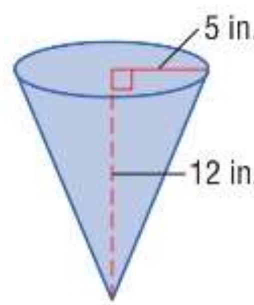


Symbols $V = \frac{1}{3}Bh$ or $V = \frac{1}{3}\pi r^2 h$

<u>Example 1: Volume of a cone</u>
Find the volume of the cone.



<u>Example 2: Find Surface Area and Volume</u>
Find the surface area and volume of the cone.

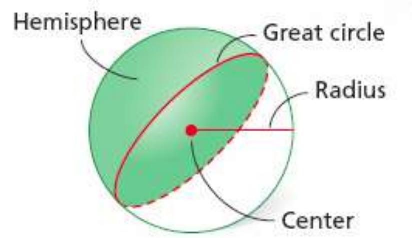


<u>Example 3: Volume Backwards</u>
The volume of a cone is 238 cm^3 with a height of 74 cm. What is the radius?

Spheres (12-6)

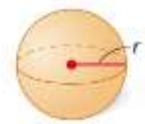
Objective:
- Find the volume of a sphere
- Find the surface area of a sphere

Great circle →



Volume of a Sphere

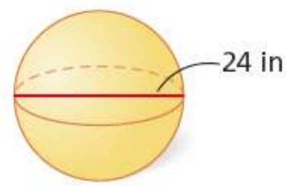
$$V = \frac{4}{3}\pi r^3$$



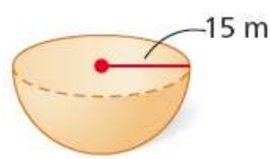
<u>EX 1</u>: Finding Volumes of Spheres

Find each measurement. Give your answers to the nearest tenth.

A. the volume of the sphere



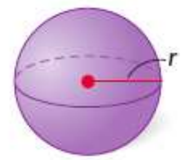
B. the volume of the hemisphere



C. Find the radius of a sphere with a volume ≈ 65.45 cm.

Surface Area of a Sphere

$$SA = 4\pi r^2$$

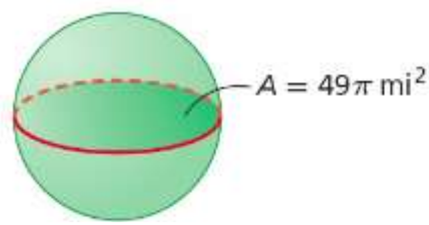


<u>EX 3</u>: Find Surface Area of Spheres

Find each measurement. Give your answers to the nearest tenth.

A. Sphere with a diameter 17 in.

B. the surface area of a sphere with a great circle that has an area of $49\pi\ mi^2$



C. Give the surface area of a sphere is 144π, find the volume.