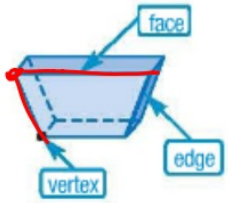
Geometry 1.7

(some new vocab)

Identify and name three-dimensional figures

Find surface area and volume*



*SA & V formulas (mostly)
8th grade standards

polyhedron 3-d shape polygons

face flat polygons

edge faces join (segments)

vertex -ices edges join (corners)

prism - box (faces rect.)

pyramid - base (polygon) (faces Δs)

cylinder

cone

sphere

regular polyhedron

platonic solid

surface area

volume

height

slant height

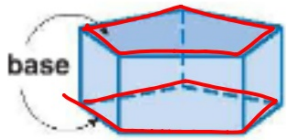
activity: rice solids

All straight sides
(faces are polygons)

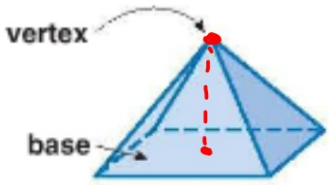
Polyhedrons

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

2 ≅ + // (usually)



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



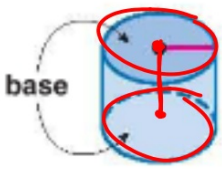
(Faces: triangles)

(Faces: Usually rectangles, but not always)

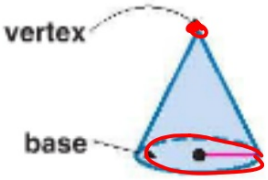
Can have curves...

Not Polyhedrons

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



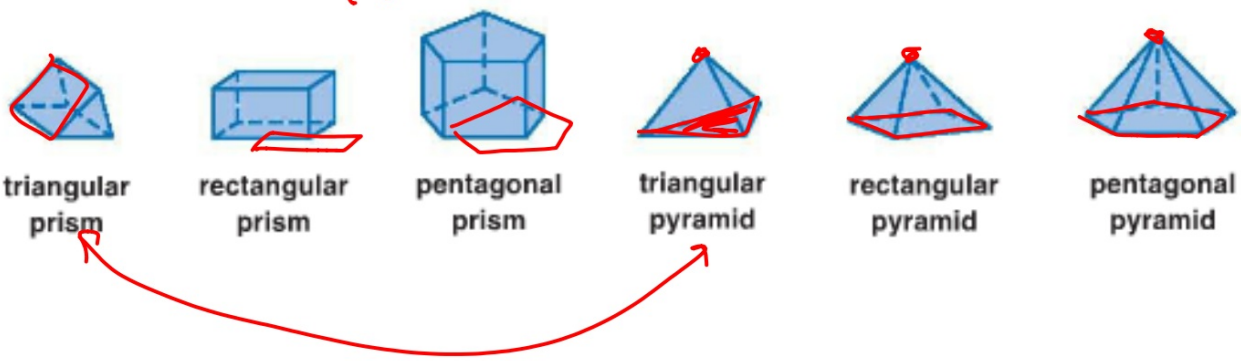
A **cone** is a solid with a circular base connected by a curved surface to a single vertex.



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.

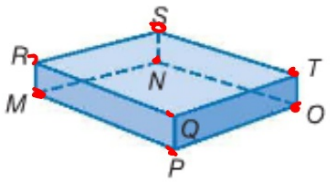
base...category

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



Example 1 Identify Solids

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

a. 

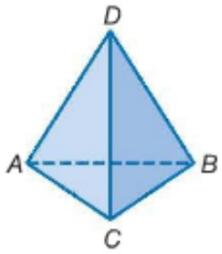
yes
rect. prism

Use a table (?) to organize...

bases	MNOP, RSTN
faces	RQPM, QTOPSTON, RSNM
edges	MP, PQ, QR, RM, RS, NM, SN, NO, OT, TS, QT, PO
vertices	A, M, P, Q, O, T, S, N

b. 

no, cylinder

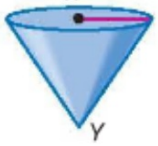
c. 

yes
tri. pyr.

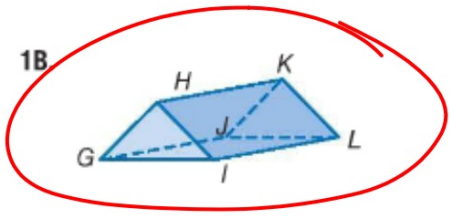
GuidedPractice

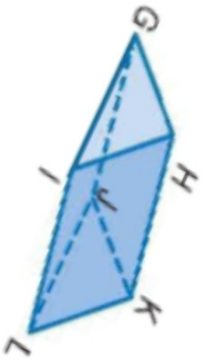
e the bases?

1A.



1B

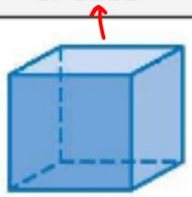


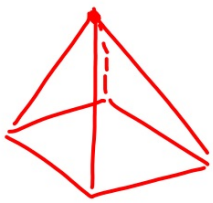


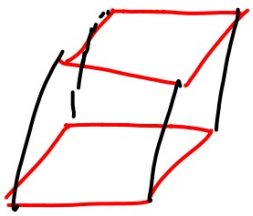
Plato

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 **Platonic 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

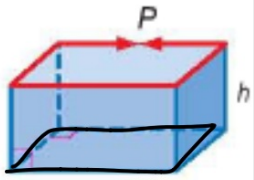
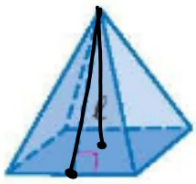
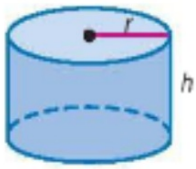
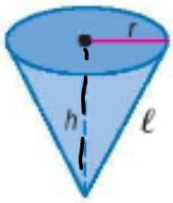




icosahedron: long i

p. 69

KeyConcept Surface Area and Volume

Prism *	Regular Pyramid *	Cylinder *	Cone *	Sphere *
				
$SA = ph + 2B$	$SA = \frac{1}{2}pl + B$	$SA = ph + 2B$	$SA = \frac{1}{2}pl + B$	$SA = 4\pi r^2$
$V = Bh$	$V = \frac{1}{3}Bh$	$V = Bh$	$V = \frac{1}{3}Bh$	$V = \frac{4}{3}\pi r^3$

*Mostly 8th grade standards: know the formulas!

How to show work*
1. What formula are you using?
2. Substitute in relevant numbers.
3. What answer did you get?

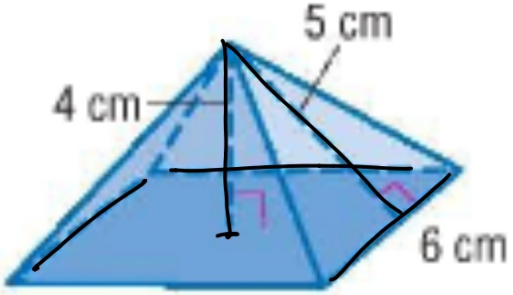
*No credit without work shown

Example 2 Find Surface Area and Volume

Find the surface area and volume of the square pyramid.

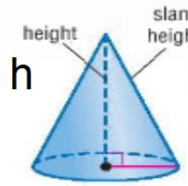
$V = \frac{1}{3}Bh$

$SA = B + \frac{1}{2}pl$



WatchOut!

Height vs. Slant Height The *height* of a pyramid or cone is not the same as its *slant height*.



h l (lateral)

$SA = 6 \cdot 6 + \frac{1}{2} \cdot 24 \cdot 5 = 96\ cm^2$

$36 + 60$

$V = \frac{1}{3} \cdot 6 \cdot 6 \cdot 4 = 48\ cm^3$

h: height, used for V

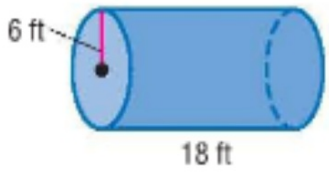
l: lateral (slant) height, used for SA

GuidedPractice

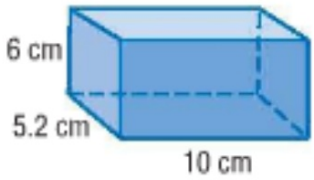
TA

Find the surface area and volume of each solid to the nearest tenth.

2A.



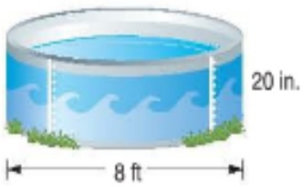
2B.



2C.

Real-World Example 3 Surface Area and Volume

POOLS The diameter of the pool Mr. Sato purchased is 8 feet. The height of the pool is 20 inches. Find each measure to the nearest tenth.



a. surface area of the pool

base + sides

b. the volume of water needed to fill the pool to a depth of 16 inches

GuidedPractice

3. **CRAFTS** Jessica is making spherical candles using a mold that is 10 centimeters in diameter. Find each measure to the nearest tenth.

   A. the volume of wax needed to fill the mold

   B. the surface area of the finished candle

1.7 p.71

7-27 odd

28-33