polyhedron

face

edge

vertex

prism

pyramid

cylinder

cone

sphere

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

(some new vocab)
regular polyhedron

platonic solid

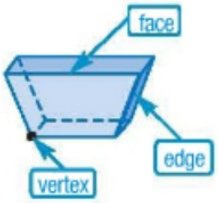
surface area

volume

height

slant height

activity: rice
solids

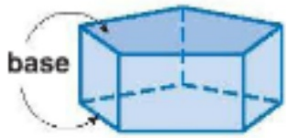


p.67

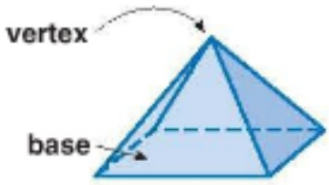
All straight sides
(faces are polygons)

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.



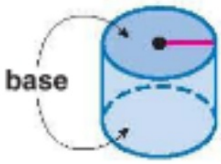
(Faces: triangles)

(Faces: Usually rectangles, but not always)

prism

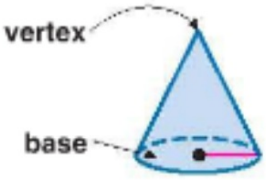
Not Polyhedrons

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



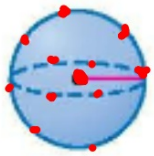
pyramid

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



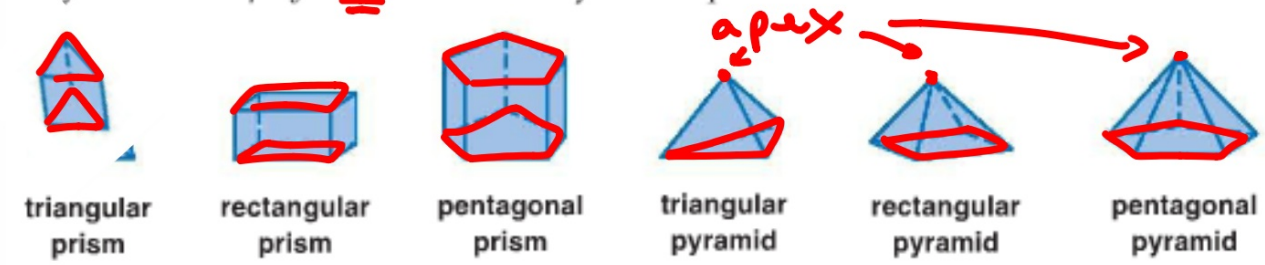
Can have curves...

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.



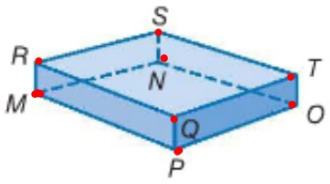
base + prism

base + pyramids

Example 1 Identify Solids

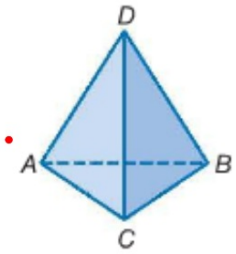
Determine whether each solid is a polyhedron. Then identify the solid. If it is a polyhedron, name the bases, faces, edges, and vertices.

a.



b.

c.



Use a table (?) to organize...

yes rectangular prism

bases : RSTQ MNOP

faces: RQPN, PQTO, TONS,

edges RS ST TQ QR MNOP

vertices

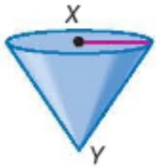
↓

R, S, T, Q, M, N, O, P

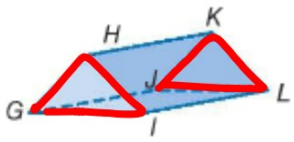
Is it a pyramid or prism? What are the bases?

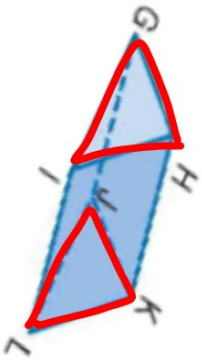
GuidedPractice

1A.



1B.

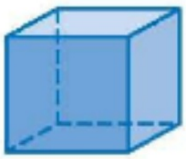




A polyhedron is a **regular polyhedron** if all of its faces are regular congruent polygons and all of the edges are congruent. There are exactly five types of regular polyhedrons, called **Platonic Solids** because Plato used them extensively.

p. 68

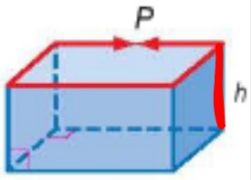
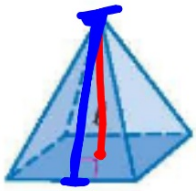
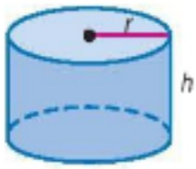
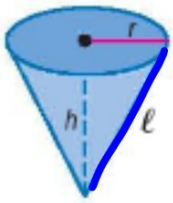
KeyConcept Platonic Solids

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 *
				
$SA = 2B + ph$	$B + \frac{1}{2}pl$	$2B + ph$ $* \pi r^2 + \pi d \cdot h$	$B + \frac{1}{2}pl$ $* \pi r^2 + \frac{1}{2}\pi d \cdot l$	$4\pi r^2$
$V = B \cdot h$	$\frac{1}{3}Bh$	$B \cdot h$ $\pi r^2 h$	$\frac{1}{3}Bh$ $* \frac{1}{3}\pi r^2 l$	$\frac{4}{3}\pi r^3$

*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

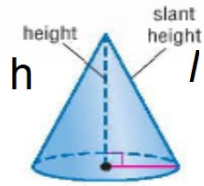
Example 2 Find Surface Area and Volume

Find the surface area and volume of the square pyramid.

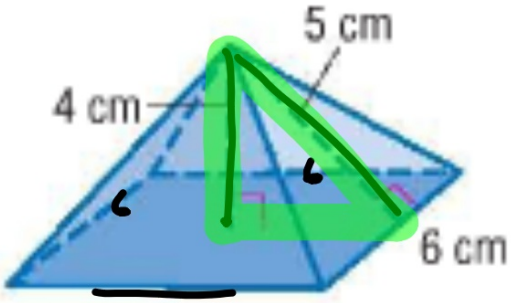
PT

WatchOut!

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



h / (lateral)



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

$= 6 \cdot 6 + \frac{1}{2} \cdot 24 \cdot 5 = 36 + 60$

$= 96\ cm^2$

$V = \frac{1}{3}B \cdot h$

$= \frac{1}{3} \cdot 36 \cdot 4 = 48\ cm^3$

h: height, used for V

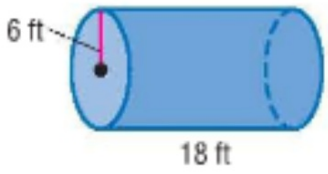
l: lateral (slant) height, used for SA

But they are related...

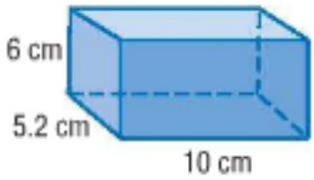
GuidedPractice

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

2A.



2B.

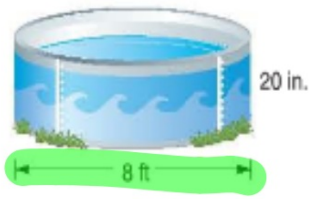


2C.

$\pi \approx 3.14$

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

B + per. h

$\pi(48)^2 + \pi(96)20$

$72382.56 + 6028.8$ $\quad 13263.36\ in^2$

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

$V = \pi r^2 \cdot h$

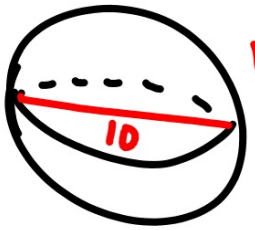
$= \pi \cdot 48^2 \cdot 16$ $\quad 115752.96\ in^3$

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



$r = 5$

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

$= \frac{4}{3}\pi \cdot 5^3$ $523.33\ cm^3$

$SA = 4\pi r^2$

$= 4\pi \cdot 5^2$ $= 314\ cm^2$

7-27 odds

p. 71