

POLYGONS AND SOLIDS

This unit is about polygons such as triangles, quadrilaterals, and multi-sided polygons. In addition, the properties of solids are examined. Nets are used to show how to lay out solids in two dimensions. The unit concludes with solving problems in a logical and systematic method.

Intervention Math

Lesson 15: Polygons and Solids

REPRODUCED WITH
SCREENCAST
MATIC

Polygons

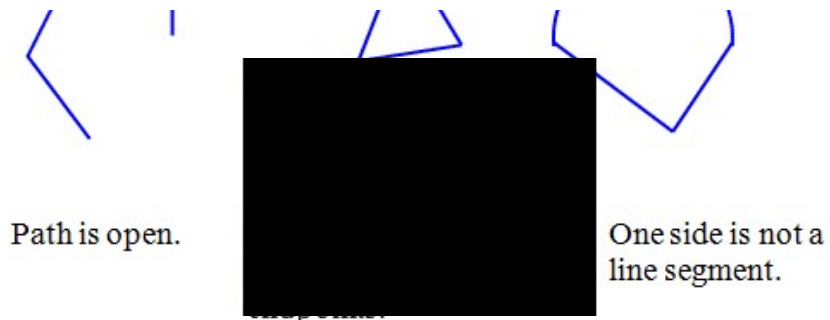
polygon - A polygon is a closed figure made up of line segments that lie in the same plane and each side of the polygon intersects with two other sides at its endpoints.

Polygons

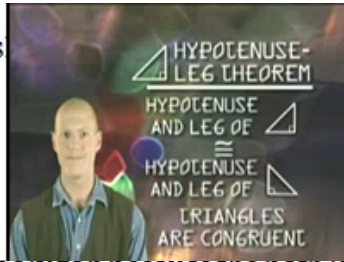


Not Polygons





Example 1: Is the shape a polygon? Why or why not.



The shape is not a polygon because the path is open.

In general a polygon with n sides is called an " n -gon". The names of several common polygons are listed in the table below.



Number of Sides	Name
3	triangle
4	quadrilateral
5	pentagon
6	hexagon
7	heptagon



Practice Worksheet: Identify Polygons
 Answer Key (Password Protected)

Triangles

Classifying Triangles by Types of Angles

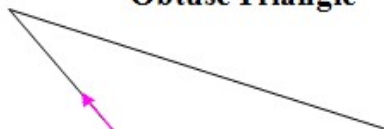
A triangle may be classified by the types of angles that are formed by its three sides.

- A **right** triangle is a triangle that has ONE right angle.
- An **obtuse** triangle is a triangle that has ONE obtuse angle.
- An **acute** triangle is a triangle with ALL acute angles.

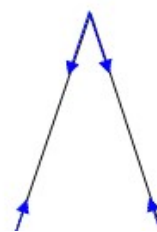
Right Triangle

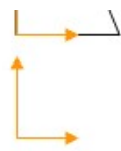


Obtuse Triangle



Acute Triangle

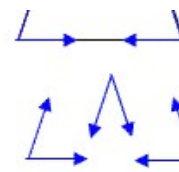




right angle (90°)



obtuse



All are acute angles, angles that measure less than 90° .

Classifying Triangles by Length of Sides

Practice Worksheet: Classify Triangles by Length



A triangle may be classified by the length of its sides.

A **scalene** triangle is a triangle where **all three sides** measure **different** lengths.

An **isosceles** triangle is a triangle where **two sides** are the **same** length.

Quadrilaterals

quadrilateral - A quadrilateral is a polygon with four sides.



Some quadrilaterals are given other names because of the special angles and line segments that make up the shape.

Specific quadrilaterals are shown below and their properties are listed within the shape.

Trapezoid

- One pair of opposite sides are parallel.

Parallelogram

- Both pairs of opposite sides are parallel.
- Both pairs of opposite sides are congruent.

Rectangle

- Both pairs of opposite sides are parallel.
- Both pairs of opposite sides are congruent.

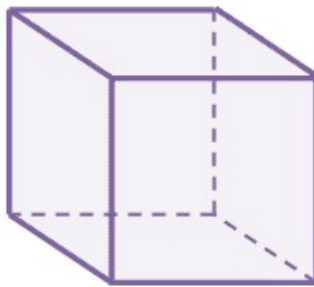
- Both pairs of opposite sides are congruent.
- All four angles are right angles.



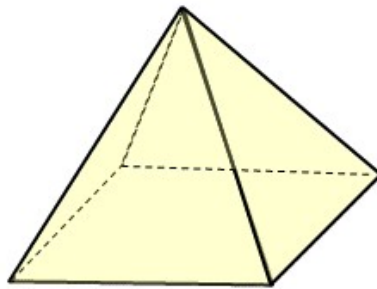
opposite sides are
parallel.

Solids

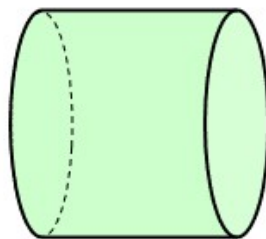
cube – A cube is a prism in which all of its faces are congruent squares.



pyramid - A pyramid is a polyhedron where all of the triangular faces meet at a point and the base is either a square or a rectangle.



cylinder – A cylinder is a solid with congruent circular bases and a curved rectangle as its lateral face.

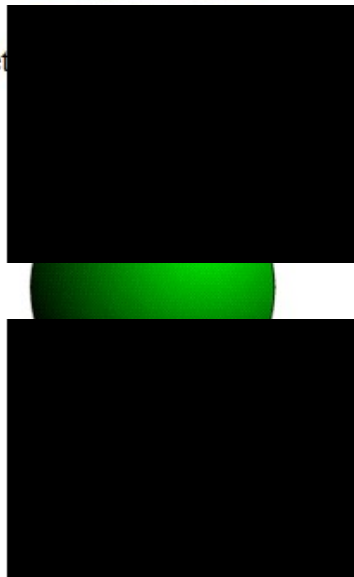


cone – A cone is a solid that has one circular base, a vertex point that does

not lie in the same plane as the base, and a curved lateral surface area that is made up of all points that lie on segments connecting the vertex and the edge of the base.



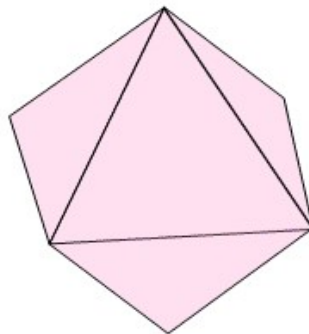
sphere – A sphere is a set of all points in space that are ALL equidistant from a given point.



Three-Dimensional Figures

polyhedron – A polyhedron is a solid with all flat faces that enclose a single region of space.

Polyhedron



polyhedra – Polyhedra is the plural of polyhedron.

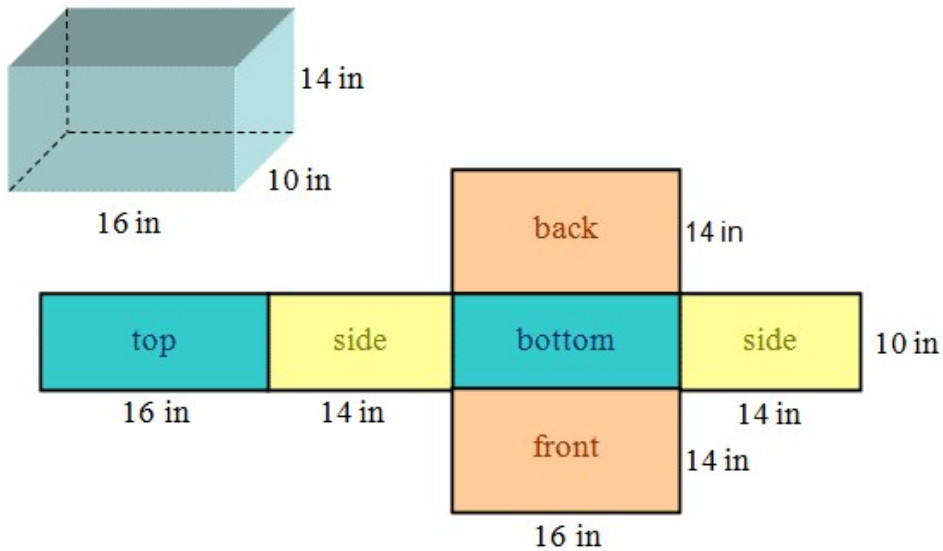
prism – A prism is a polyhedron with two congruent bases that are polygons contained in parallel planes.

Nets

A **net** is a two-dimensional representation of a solid.

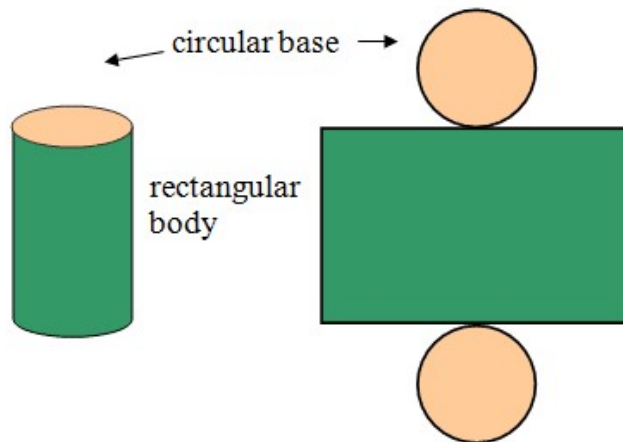
Rectangular Prism

A rectangular prism and its net are shown below.



Cylinder

A cylinder and its net are shown below.



*Notice that the curved body is simply a rectangle when laid flat. The two bases are circles.

Pyramid

A pyramid and its net are shown below.

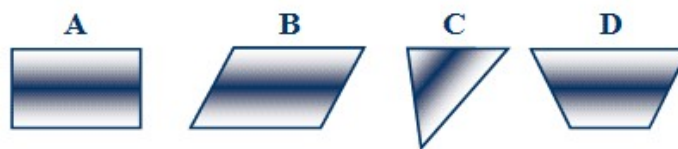
A pyramid and its net are shown below.

Use Logical Reasoning

Many types of problems may be solved by using logical reasoning. There are four basic steps involved in using this strategy.

- Explore the problem.
- Plan the problem.
- Solve the problem.
- Examine the answer.

Example: Which figure does not belong in the group below?



Step 1: Explore the problem.

What is given? → Four different polygons

What is asked? → Which polygon does not belong?

Step 2: Plan the problem.

Look at the polygons and decide:

- What characteristics do polygons have in common?
- What characteristic distinguishes one polygon from the rest of the group?
- Use logical reasoning.

Step 3: Solve the problem.

- All figures are about the same size.
- All figures are the same color pattern.
- All of the figures are polygons.
- Both pairs of opposite sides are parallel for figures A and B only.
- Figures A, B, and D have four sides.
- Figure C has three sides.

Therefore, Figure C does not belong in the group.

Step 4: Examine the answer.

All four figures are polygons and have the same color pattern. There is only one figure that has three sides. Therefore, the answer is reasonable.

reasonable.

