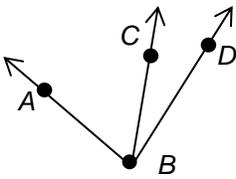
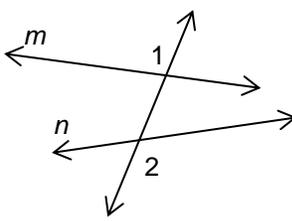
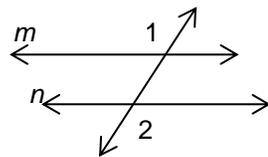
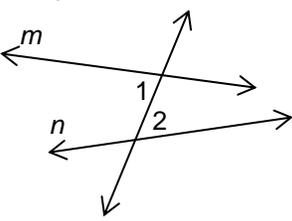
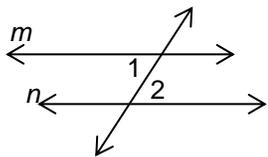
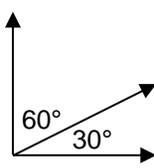
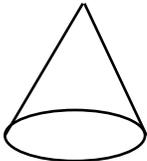
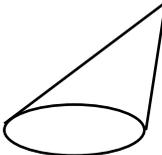
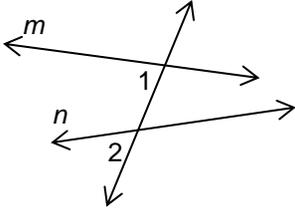
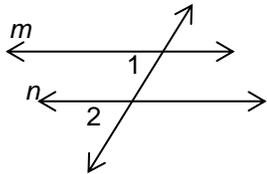
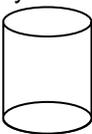
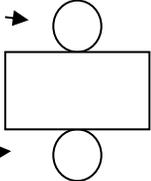
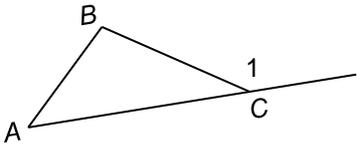
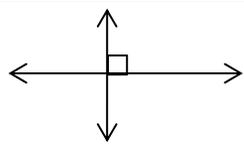
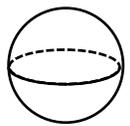
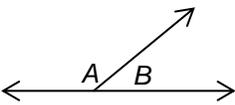
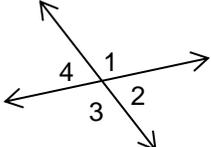


# STUDENT RESOURCES

Word or Phrase	Definition
<p>adjacent angles</p>	<p>Two angles are <u>adjacent</u> if they have the same vertex and share a common ray, and they lie on opposite sides of the common ray.</p> <p style="text-align: center;"><math>\angle ABC</math> and <math>\angle CBD</math> are adjacent angles.</p> <div style="text-align: right; margin-top: 10px;">  </div>
<p>alternate exterior angles</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Line <math>m</math> is not parallel to line <math>n</math>.</p>  <p><math>\angle 1</math> and <math>\angle 2</math> are alternate exterior angles.</p> </div> <div style="text-align: center;"> <p>Line <math>m</math> is parallel to line <math>n</math>.</p>  <p><math>\angle 1</math> and <math>\angle 2</math> are alternate exterior angles.</p> <p><math> \angle 1  =  \angle 2 </math></p> </div> </div>
<p>alternate interior angles</p>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Line <math>m</math> is not parallel to line <math>n</math>.</p>  <p><math>\angle 1</math> and <math>\angle 2</math> are alternate interior angles.</p> </div> <div style="text-align: center;"> <p>Line <math>m</math> is parallel to line <math>n</math>.</p>  <p><math>\angle 1</math> and <math>\angle 2</math> are alternate interior angles.</p> <p><math> \angle 1  =  \angle 2 </math></p> </div> </div>
<p>complementary angles</p>	<p>Two angles are <u>complementary</u> if the sum of their measures is <math>90^\circ</math>.</p> <p style="text-align: center;">Two angles that measure <math>30^\circ</math> and <math>60^\circ</math> are complementary.</p> <div style="text-align: right; margin-top: 10px;">  </div>

Word or Phrase	Definition
cone	<p>A circular <u>cone</u> is a figure in space consisting of a circle in a plane (called the <u>base</u> of the cone), a point off the plane (called the <u>vertex</u> of the cone), and all the straight line segments joining the vertex to the base. If the line joining the vertex of the cone to the center of its base is perpendicular to the base, the cone is a <u>right circular cone</u>. Otherwise it is an <u>oblique circular cone</u>.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>right circular cone</p> </div> <div style="text-align: center;">  <p>oblique circular cone</p> </div> </div>
corresponding angles	<p>When two lines in a plane are cut by a transversal, two angles that appear on the same side of the transversal in the same relative location are referred to as <u>corresponding angles</u>. When parallel lines are cut by a transversal, corresponding angles have the same measure.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Line <math>m</math> is not parallel to line <math>n</math>.</p>  <p><math>\angle 1</math> and <math>\angle 2</math> are corresponding angles.</p> </div> <div style="text-align: center;"> <p>Line <math>m</math> is parallel to line <math>n</math>.</p>  <p><math>\angle 1</math> and <math>\angle 2</math> are corresponding angles.</p> <p><math> \angle 1  =  \angle 2 </math></p> </div> </div>
cylinder	<p>A (right circular) <u>cylinder</u> is a figure in three-dimensional space that has two parallel circular bases. These circles are connected by a curved surface, called the <u>lateral surface</u>, which is a “rolled up” rectangle.</p> <p>Most soup cans have the shape of a right circular cylinder.</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;">  <p>cylinder</p> </div> <div style="margin: 0 20px;"> <p>← circular base</p> <p>← lateral surface</p> <p>← circular base</p> </div> <div style="text-align: center;">  <p>net of a cylinder</p> </div> </div>
exterior angle of a triangle	<p>An <u>exterior angle</u> of a triangle is an angle formed by a side of the triangle and an extension of its adjacent side.</p> <p><math>\angle 1</math> is an exterior angle of <math>\triangle ABC</math>.</p> <div style="text-align: right;">  </div>

Word or Phrase	Definition
parallel	Two lines in a plane are <u>parallel</u> if they do not meet. Two line segments in a plane are parallel if the lines they lie on are parallel. 
perpendicular	Two lines are <u>perpendicular</u> if they intersect at right angles. 
sphere	A <u>sphere</u> is a closed surface in three-dimensional space consisting of all points at a fixed distance (the radius) from a specified point (the center). 
supplementary angles	Two angles are <u>supplementary</u> if the sum of their measures is $180^\circ$ .  Any two right angles are supplementary, because the sum of their measures is $90^\circ + 90^\circ = 180^\circ$ .  Angles <i>A</i> and <i>B</i> are supplementary because they determine a straight line, or $180^\circ$ . 
transversal	A <u>transversal</u> is a line that passes through two or more other lines.
vertical angles	Two angles are <u>vertical angles</u> if they are the opposite angles formed by a pair of intersecting lines. When two lines intersect at a point, they form two pairs of vertical angles with vertex at the point.  $\angle 1$ and $\angle 3$ are vertical angles. $\angle 2$ and $\angle 4$ are vertical angles. 

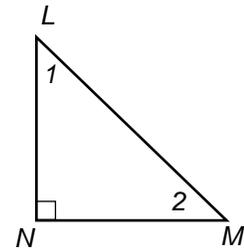
<b>Some Properties of Equality</b>	
Properties of equality govern the manipulation of equations (mathematical sentences).	
For any three numbers <i>a</i> , <i>b</i> , and <i>c</i> :	
<ul style="list-style-type: none"> <li>✓ Addition property of equality (Subtraction property of equality) If <math>a = b</math> and <math>c = d</math>, then <math>a + c = b + d</math>.</li> <li>✓ Multiplication property of equality (Division property of equality) If <math>a = b</math> and <math>c = d</math>, then <math>ac = bd</math></li> </ul>	<ul style="list-style-type: none"> <li>✓ Reflexive property of equality <math>a = a</math></li> <li>✓ Symmetric property of equality If <math>a = b</math>, then <math>b = a</math></li> <li>✓ Transitive property of equality (Substitution property) If <math>a = b</math>, and <math>b = c</math>, then <math>a = c</math></li> </ul>

**Geometry Notation**

Here are some geometry notations used in these lessons.

- Points are named by capital letters.
- The symbol for triangle is  $\Delta$ .
- The symbol for angle is  $\angle$ .
- Absolute value signs are used to denote nonnegative quantities that measure the “size” of something, such as length or angle measure.

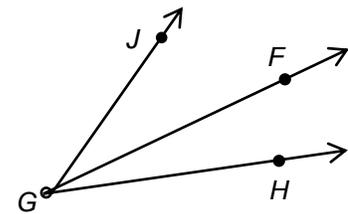
The measure of an angle called  $\angle N$  is denoted by  $|\angle N|$ . The small square at  $N$  indicates that  $\angle LNM$  is a right angle, that is, that  $|\angle LNM| = 90^\circ$ .



In naming a triangle, vertices may be listed in either a clockwise or counter-clockwise direction. For example, the triangle may be named  $\Delta LMN$  or  $\Delta LNM$ .

In naming an angle, vertices may be listed in either a clockwise or counterclockwise direction. In the triangle above, the angle at the top can be denoted by  $\angle NLM$ ,  $\angle MLN$ ,  $\angle L$  or  $\angle 1$ .

The pair of adjacent angles to the right are  $\angle FGJ$  and  $\angle HGF$ . Using  $\angle G$  to name an angle is unclear. They share the common ray  $\overrightarrow{GF}$ . The two adjacent angles together form the angle  $\angle JGH$ .



The arrows on the lines  $m$  and  $n$  indicate that they are parallel.

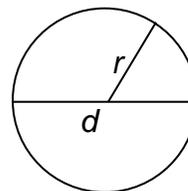


**Formulas for Circles**

Let  $r$  = radius of a circle.  
Let  $d$  = diameter of a circle.

Circumference:  $C = \pi d$  or  $C = 2\pi r$

Area:  $A = \pi r^2$



### Volume Formulas

Here are some volume formulas from this unit.

#### Volume of a Rectangular Prism

Let  $l$  = length and  $w$  = width of rectangular base.

$$V = Bh$$

$$\text{Area of base } (B) = lw$$

$$\text{Therefore, } V = lwh$$

#### Volume of a Cylinder

Let  $r$  = radius of the circular base.

$$V = Bh$$

$$\text{Area of base } (B) = \pi r^2$$

$$\text{Therefore, } V = \pi r^2 h$$

#### Volume of a Cone

Through experimentation, observe that the volume of a cone is  $\frac{1}{3}$  of the volume of a cylinder with the same height and base.

Let  $r$  = radius of the circular base

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

$$\text{Area of base } (B) = \pi r^2$$

$$\text{Therefore, } V = \frac{1}{3} \pi r^2 h$$

#### Volume of a Sphere

Through experimentation, observe that the volume of a sphere is  $\frac{2}{3}$  of the volume of a cylinder whose diameter and height are the same as the diameter of the sphere. Use substitution to derive the formula of a sphere.

Let  $r$  = radius of the sphere and cylinder

Then height ( $h$ ) of cylinder =  $2r$

$$\text{Volume of cylinder} = \pi r^2 (2r) = 2\pi r^3$$

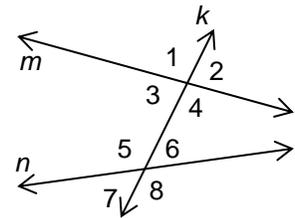
Observe that volume of sphere is  $\frac{2}{3}$  of the volume of a cylinder.

$$\text{Therefore, } V_{\text{sphere}} = \frac{2}{3} \cdot 2\pi r^3 = \frac{4}{3} \pi r^3$$

**Transversals and Parallel Lines**

In this figure, line  $k$  is a transversal. Lines  $m$  and  $n$  are NOT parallel.

When two lines in a plane are cut (crossed) at two points by a transversal, eight angles are created. Some of these pairs of angles have special names.



**corresponding angles**

$\angle 1$  and  $\angle 5$

$\angle 2$  and  $\angle 6$

$\angle 3$  and  $\angle 7$

$\angle 4$  and  $\angle 8$

**alternate interior angles**

$\angle 3$  and  $\angle 6$

$\angle 4$  and  $\angle 5$

**alternate exterior angles**

$\angle 1$  and  $\angle 8$

$\angle 2$  and  $\angle 7$

Here are three important properties of the angles formed when a transversal cuts two parallel lines.

1. If two parallel lines are cut by a transversal, then alternate interior angles have the same measure.

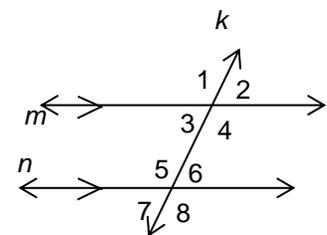
Example:  $|\angle 3| = |\angle 6|$  and  $|\angle 4| = |\angle 5|$

2. If two parallel lines are cut by a transversal, then alternate exterior angles have the same measure.

Example:  $|\angle 1| = |\angle 8|$  and  $|\angle 2| = |\angle 7|$

3. If two parallel lines are cut by a transversal, then corresponding angles have the same measure.

Example:  $|\angle 2| = |\angle 6|$  and  $|\angle 4| = |\angle 8|$



**Interior and Exterior Angles in Triangles**

Here are two important facts about angle sums in triangles.

1. The sum of the measures of the angles in a triangle is equal to  $180^\circ$ .

$$|\angle d| + |\angle b| + |\angle e| = 180^\circ$$

2. The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles.

$$|\angle b| + |\angle e| = |\angle f|$$

