

## Unit 1: Plane and Solid Figures

Dear Parents/Guardians,

Unit 1 integrates geometry and algebraic notation. In Lessons 1 and 2, students develop formulas for finding the volumes of cylinders, cones and spheres and use them to solve problems. In Lesson 3, students learn about angle relationships with triangles and parallel lines. They use these relationships to write and solve equations to find missing angle measures.

### Volume

Students solve problems involving volume of 3-D figures.

Example: A basketball used by the NCAA can be no more than 30 inches in circumference. Calculate the maximum volume.

Step 1: Determine the maximum radius of the basketball.	Step 2: Find the maximum volume of the basketball (sphere).
<p>Circumference = <math>2\pi r</math></p> <p>The basketball can be no more than 30 inches in circumference.</p> $2\pi r \leq 30$ <p>Divide both sides by <math>2\pi</math>.</p> $\frac{2\pi r}{2\pi} \leq \frac{30}{2\pi}$ $r \leq 4.78 \text{ in (approximately)}$	<p>Volume = <math>\frac{4}{3}\pi r^3</math></p> $V = \frac{4}{3}(3.14)(4.78)^3$ $V \approx 457.48 \text{ in}^3$ <p>The basketball can have a volume no more than <math>457.48 \text{ in}^3</math>.</p>

### Angle Measures

Students explore angle relationships to determine angle measures.

Example: Find the measures of angles  $x$  and  $y$ .

$|y|$  and  $|x|$  represent the measures of angles  $y$  and  $x$ .

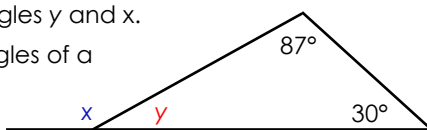
The sum of the measures of the interior angles of a triangle are  $180^\circ$ .

$$87^\circ + 30^\circ + |\angle y| = 180^\circ; |\angle y| = 63^\circ$$

Since  $x$  and  $y$  form a straight angle, they are supplementary.

$$|\angle x| + |\angle y| = 180^\circ$$

$$|\angle x| + 63^\circ = 180^\circ; |\angle x| = 117^\circ$$



### Parallel Lines

When parallel lines are intersected by a third line, the angles formed have the following relationships.

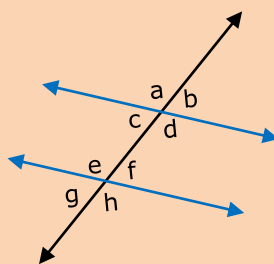
- Alternate interior angles have equal measures, such as  $|\angle c|$  and  $|\angle f|$ .
- Corresponding angles have equal measures, such as  $|\angle b|$  and  $|\angle f|$ .

Alternate exterior angles have equal measures, such as  $|\angle b|$  and  $|\angle g|$ .

We can use these relationships to find angle measures.

Example: If  $|\angle b| = 60^\circ$ , then

$ \angle a  = 120^\circ$ supplementary angles	$ \angle g  = 60^\circ$ alternate exterior angles
$ \angle f  = 60^\circ$ corresponding angles	$ \angle c  = 60^\circ$ alternate interior angle with $ \angle f $



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# Math Links

GRADE 8

By the end of the unit, your student should know...

- How to develop the formula for volume of cylinders and use it to solve problems [Lesson 1.1]
- How to develop the formulas for the volumes of cones and spheres and use them to solve problems [Lesson 1.2]
- How to use facts about angle relationships to find angle measures [Lesson 1.3]
- How to write and solve equations involving angle measures [Lesson 1.3]

### Additional Resources

- For definitions and additional notes please refer to Student Resources at the end of this unit.
- For more information about volume of a cylinder: <https://youtu.be/fxTsG4qkz1U>
- For more information about volume of a cone: <https://youtu.be/hC6zx9WAiC4>
- For more information about volume of a sphere: <https://youtu.be/leS2vg7JO8>
- For more information about angle relationships: <https://youtu.be/6RMN5Pf1fHU>