

Unit 9: Length, Area, and Volume

Dear Parents/Guardians,

Unit 9 introduces students to measurements with circles, and area and volume of composite figures. In Lesson 1, students discover approximations for pi (π) and use them to solve problems involving circumferences of circles. In Lesson 2, students review areas of two-dimensional shapes. They use this knowledge to derive the formula for the area of a circle and calculate areas of figures. In Lesson 3, students calculate the surface areas and volumes of three-dimensional figures.

Circles

A circle is a closed curve in a plane consisting of all points at a fixed distance (called the **radius**) from a specified point (called the center).



Two radii create a diameter.

$$d = 2r \text{ or } r = \frac{d}{2}$$

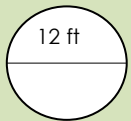
The **circumference** is the length of the circle, or the distance around it. The exact number of diameters that go around the circumference length is pi, or π . Students approximate pi as 3.14 or $\frac{22}{7}$.

$$C = \pi d \text{ or } C = 2\pi r$$

The area of a circle is the square of its radius multiplied by pi.

$$A = \pi r^2$$

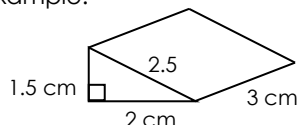
Students solve problems involving circumference and area of circles.

Example: Find the circumference and area of this circle.		Circumference $C = 2d$ $C = 2(12) = 24 \text{ ft}$	Area $A = \pi r^2$ $A = 3.14(6^2) = 3.14(6)(6)$ $A = 113.04 \text{ ft}^2$
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Surface Area and Volume

Students calculate surface areas and volumes of 3-D figures.

Example:



This triangular prism is made with two bases that are right triangles and three lateral sides that are rectangles.

Surface Area (SA) Find the total of the areas of each polygon that create the prism.	Volume (V) Find the area of the base (denoted as B) and multiply by the prism's height.
Area of each triangle: $(A = \frac{1}{2}bh)$ $A = \frac{1}{2}(1.5)(2) = 1.5 \text{ cm}^2$ Area of a rectangle: $(A = lw)$ Front: $A = (2.5)(3) = 7.5 \text{ cm}^2$ Bottom: $A = (2)(3) = 6 \text{ cm}^2$ Side: $A = (1.5)(3) = 4.5 \text{ cm}^2$ Surface Area = $1.5 + 1.5 + 7.5 + 6 + 4.5$ $SA = 21 \text{ cm}^2$	Area of base triangle: $(B = \frac{1}{2}bh)$ $A = \frac{1}{2}(1.5)(2) = 1.5 \text{ cm}^2$ Volume = $(1.5)(3) = 4.5 \text{ cm}^3$ $V = (1.5)(3) = 4.5 \text{ cm}^3$



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

- How to solve problems involving the circumference of circles. [Lesson 9.1]
- Common approximations for π , and what this number represents. [Lesson 9.1]
- How to solve problems that involving circumference and area of circles. [Lessons 9.1, 9.2]
- How to find areas of composite two-dimensional figures [Lesson 9.3]
- How to find surface areas and volumes of various three-dimensional figures [Lesson 9.3]

Additional Resources

- For definitions and additional notes please refer to Student Resources at the end of this unit.
- For more information on circumference:
<https://youtu.be/2fC6vxszhHk>
- For more information on area of a circle:
<https://youtu.be/YokKp3pwVFc>