# Introduction to Surface Area and Volume

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**Example 1.** Define the following terms and draw a picture of each one.

- Surface Area

- Lateral Surface Area

- Unit cube

- Volume

**Example 2.** A rectangular prism has a width of 3 centimeters, a length of 4 centimeters, and a height of 12 centimeters.

- Find its surface area, in square centimeters.

- Find its volume, in cubic centimeters.

- Find the length of its diagonal, in centimeters.

**Example 3.** A cylindrical soda can is 4.8 inches high and has a diameter of 2.6 inches.

- Find its surface area, to the nearest square inch.

- Find its volume, in fluid ounces. (There are 1.805 cubic inches in a fluid ounce.)

**Volume of a Pyramid.** A pyramid with a base area of $B$ and a height of $h$ has a volume of

$$\frac{B \times h}{3}.$$

**Example 4.** The Great Pyramid is a square pyramid whose base length is 230 meters and whose height is 147 meters.

- Find its lateral surface area. Round your answer to the nearest square meter.

- The stone used to build the Great Pyramid has an average density of 2400 kilograms per cubic meter. Find the mass of the Great Pyramid.

**Sphere Formulas.** A sphere with radius $r$ has surface area

$$4 \cdot r^2$$

and volume

$$\frac{4}{3} \cdot r^3.$$

**Example 5.** An ice cream cone has an edge length of 5 inches and a diameter of 2.8 inches. The cone is filled with ice cream, and a hemispherical scoop of ice cream is placed on top of the cone.

- Find the area of the exposed surface of the ice cream. Express you answer to the nearest tenth of a square inch.

- Find the volume of the ice cream. Express your answer to the nearest tenth of a cubic inch.

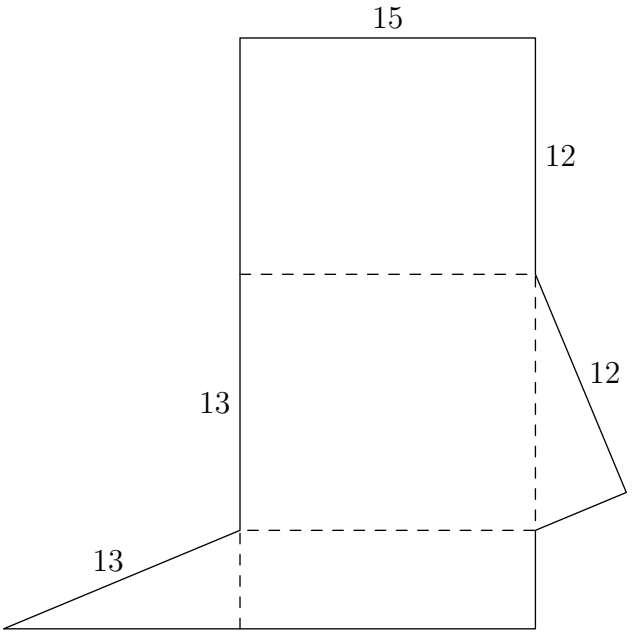
# Problems

**Problem 1.** A pirate has a 10 foot long sword and a case with dimensions of 3 feet, 3 feet, and 9 feet. Will the sword fit in the case?

**Problem 2.** How many 5-inch cubes can fit inside a 2 feet by 3 feet by 4 feet rectangular prism?

**Problem 3.** A box has a surface area of 2019 square meters. If its width is 3 meters and its height is 4 meters, what is its volume in cubic meters?

**Problem 4.** Find the surface area and volume of the solid with the following net:




**Problem 5.** A square pyramid has a height of 2 and a base of side length 3. Find its volume and its surface area.

**Problem 6.** Three tennis balls are placed inside a cylinder such that the balls fit snugly in the cylinder. What fraction of the cylinder do the balls occupy?

**Problem 7.** The areas of three faces of a rectangular box are 18, 24, and 75 square feet, respectively. What is the volume of the box?

**Problem 8.** There are 10 cubes with edges of lengths 1 inch, 2 inches, 3 inches, ..., 10 inches. They are stacked to form a tower such that the cubes increase in size from top to bottom.

- Find the tower's volume.

- Find the tower's surface area, not including its base.