

7.5 The student will

- describe volume and surface area of cylinders;
- solve practical problems involving the volume and surface area of rectangular prisms and cylinders; and
- describe how changing one measured attribute of a rectangular prism affects its volume and surface area.

| UNDERSTANDING THE STANDARD (Background Information for Instructor Use Only) | ESSENTIAL UNDERSTANDINGS | ESSENTIAL KNOWLEDGE AND SKILLS |
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| <ul style="list-style-type: none"> The area of a rectangle is computed by multiplying the lengths of two adjacent sides. The area of a circle is computed by squaring the radius and multiplying that product by π ($A = \pi r^2$, where $\pi \approx 3.14$ or $\frac{22}{7}$). A rectangular prism can be represented on a flat surface as a net that contains six rectangles — two that have measures of the length and width of the base, two others that have measures of the length and height, and two others that have measures of the width and height. The surface area of a rectangular prism is the sum of the areas of all six faces ($SA = 2lw + 2lh + 2wh$). A cylinder can be represented on a flat surface as a net that contains two circles (bases for the cylinder) and one rectangular region whose length is the circumference of the circular base and whose width is the height of the cylinder. The surface area of the cylinder is the area of the two circles and the rectangle ($SA = 2\pi r^2 + 2\pi rh$). The volume of a rectangular prism is computed by multiplying the area of the base, B, (length times width) by the height of the prism ($V = lwh = Bh$). The volume of a cylinder is computed by multiplying the area of the base, B, (πr^2) by the height of the cylinder ($V = \pi r^2 h = Bh$). | <ul style="list-style-type: none"> How are volume and surface area related? Volume is a measure of the amount a container holds while surface area is the sum of the areas of the surfaces on the container. How does the volume of a rectangular prism change when one of the attributes is increased? There is a direct relationship between the volume of a rectangular prism increasing when the length of one of the attributes of the prism is changed by a scale factor. | <p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to</p> <ul style="list-style-type: none"> Determine if a practical problem involving a rectangular prism or cylinder represents the application of volume or surface area. Find the surface area of a rectangular prism. Solve practical problems that require finding the surface area of a rectangular prism. Find the surface area of a cylinder. Solve practical problems that require finding the surface area of a cylinder. Find the volume of a rectangular prism. Solve practical problems that require finding the volume of a rectangular prism. Find the volume of a cylinder. Solve practical problems that require finding the volume of a cylinder. Describe how the volume of a rectangular prism is affected when one measured attribute is multiplied by a scale factor. Problems will be limited to changing attributes by scale factors only. Describe how the surface area of a rectangular prism is affected when one measured attribute is multiplied by a scale factor. Problems will be limited to changing attributes by scale factors only. |

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| <ul style="list-style-type: none"> There is a direct relationship between changing one measured attribute of a rectangular prism by a scale factor and its volume. For example, doubling the length of a prism will double its volume. This direct relationship does not hold true for surface area. | | |