

Name: _____

3-D Area and Volume Word Problems

Often, word problems are seen as one of the most difficult kind of problems. When it comes to three-dimensional area and volume, though, a word problem is actually simpler to figure out. Images of 3-D figures can be hard to visualize as a three-dimensional object, which makes identifying things like height versus slant height more difficult than it needs to be. In a word problem, however, it simply tells you which is which.

Identify the needed formula, determine the value of the parts, plug the values in and solve.

<p>EXAMPLE Determine the surface area of a right rectangular prism with height 10 in, length 4 in, and width 2 in.</p> <p><i>Surface area of prism:</i> $S = L + 2A$ (I need L & A) <i>Lateral area of a prism:</i> $L = PH$ (I need P & H) <i>P is base perimeter (rectangle—add sides)</i> $P = 4 + 2 + 4 + 2 = 20$ $H = 10$ $L = PH = (20)(10) = 200$ <i>Base area of a rectangle:</i> $A = bh$ (same as lengthxwidth) $A = lw = (4)(2) = 8$ <i>Plug it all into the first formula</i> $S = L + 2A = 200 + 2(8)$ $S = 200 + 16 = \boxed{216}$</p>	<p>EXAMPLE Determine the lateral area of a right pyramid with a pentagonal base with apothem 6.9, side length 10, and slant height of 18.</p> <p><i>Lateral area of a pyramid:</i> $L = \frac{Pl}{2}$ (I need P & l) <i>P is base perimeter. Pentagon has 5 sides, and all of them are 10, so...</i> $P = 5(10) = 50$ <i>l is slant height... l = 18</i> $L = \frac{Pl}{2} = \frac{(50)(18)}{2} = (50)(9) = \boxed{450}$</p>	<p>EXAMPLE Determine the volume of a sphere with a diameter of 30 cm. Leave your answer in terms of pi.</p> <p><i>Volume of a sphere:</i> $V = \frac{4\pi r^3}{3}$ <i>The diameter is 30, so the radius is 15.</i> $V = \frac{4\pi(15)^3}{3} = \frac{4\pi(15)(15)(15)}{3}$ $V = \frac{4\pi(225)(15)}{3} = 4\pi(225)(5)$ $V = 4\pi(1125) = \boxed{4500\pi}$</p>
<p>1. Determine the volume of a right cone with a height of 12 and a radius of 5. Leave your answer in terms of π.</p>	<p>2. Determine the volume of a sphere with a diameter of 24 ft. Leave your answer in terms of pi.</p>	<p>3. Determine the lateral area of a rectangular pyramid with a slant height of 4 in, a length of 5 in, and a width of 2 in.</p>
<p>4. Determine the surface area of a sphere with a diameter of 10 ft. Leave your answer in terms of pi.</p>	<p>5. Determine the surface area of a hexagonal pyramid with a slant height of 10 in, an apothem of 3.5 in, and a side length of 4 in.</p>	<p>6. Determine the volume of a right rectangular prism with height 10 cm, length 8 cm, and width 7 cm.</p>

<p>7. Determine the volume of a rectangular pyramid with a height of 8 in, a length of 6 in, and a width of 2 in.</p>	<p>8. Determine the lateral area of a right rectangular prism with height 2 cm, length 5 cm, and width 3 cm.</p>	<p>9. Determine the lateral area of a right cone with a height of 15, a slant height of 17, and a radius of 8. Leave your answer in terms of π.</p>
<p>10. Determine the volume of a right trapezoidal prism with height from trapezoid to trapezoid of 8 cm, base sides 2 cm and 5 cm, and base height of 3 cm.</p>	<p>11. Determine the surface area of a right cone with a height of 16 and a radius of 12. Leave your answer in terms of π.</p>	<p>12. Determine the surface area of a sphere with a diameter of 12 ft. Leave your answer in terms of pi.</p>
<p>13. Determine the lateral area of a right cone with a height of 4 and a radius of 3. Leave your answer in terms of π. (<i>Hint: use the Pythagorean theorem to find l</i>)</p>	<p>14. Determine the volume of a sphere with a diameter of 6 ft. Leave your answer in terms of pi.</p>	<p>15. Determine the surface area of a right rectangular pyramid with height 9 cm, slant height 15 cm, length 8 cm, and width 3 cm.</p>