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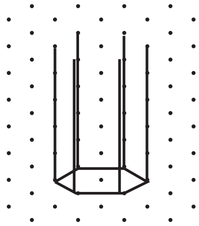
12–1 Study Guide

Solid Figures

Prisms have two parallel faces, called **bases**, that are congruent polygons. The other faces are called **lateral faces**. **Pyramids** have a polygon for a base and triangles for sides. Prisms and pyramids are named by the shape of their bases.

Example: Use isometric dot paper to sketch a hexagonal prism that is 5 units long.

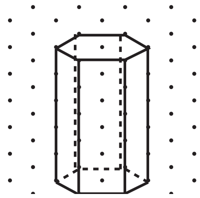


Step 1 Lightly draw a hexagon for a base.

Step 2 Lightly draw the vertical segments at the vertices of the base. Each segment is 5 units high.

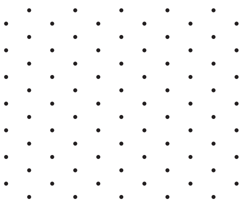
Step 3 Complete the top of the prism.

Step 4 Go over your lines. Use dashed lines for the edges of the prism you cannot see from your perspective and solid lines for the edges you can see.

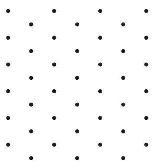


Use isometric dot paper to draw each solid.

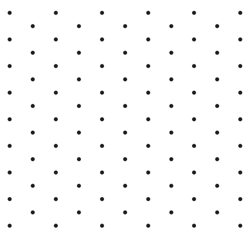
1. a rectangular prism that is 2 units high, 5 units long, and 3 units wide



2. a pentagonal prism that is 3 units high



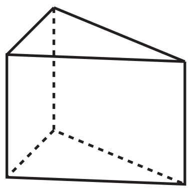
3. a square pyramid with a base that is 4 units wide



Name each solid.

4.

5.



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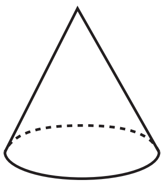

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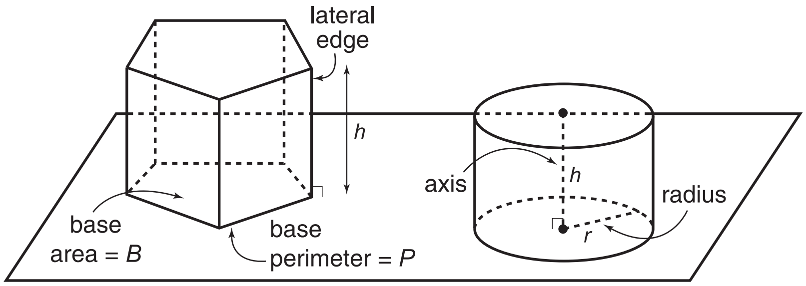
Study Guide

Surface Areas of Prisms and Cylinders

Prisms are polyhedrons with congruent polygonal bases in parallel planes. **Cylinders** have congruent and parallel circular bases. An **altitude** is a perpendicular segment joining the planes of the bases. The length of an altitude is the **height** of the figure. **Right prisms** have lateral edges that are altitudes. A right cylinder is one whose **axis** is an altitude.

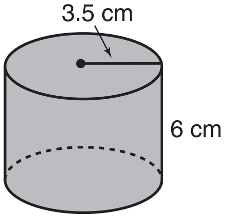


In the following formulas, L is lateral and S is surface area.

Prisms $L = Ph$
$S = Ph + 2B$

Cylinders $L = 2\pi rh$
$S = 2\pi rh + 2\pi r^2$

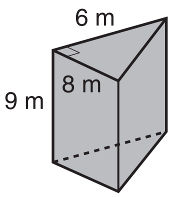
Example: Find the surface area of the cylinder.



$S = 2\pi rh + 2\pi r^2$
$S = 2\pi(3.5)(6) + 2\pi(3.5)^2$
$S = 66.5\pi$ or about 208.92 cm^2

Find the lateral area and the surface area of each solid. Round your answers to the nearest tenth, if necessary.

1.



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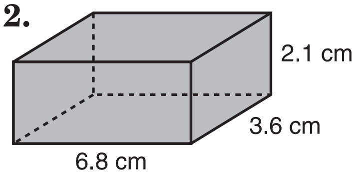

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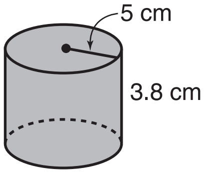

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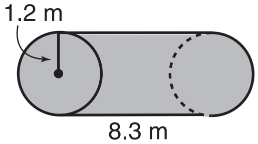

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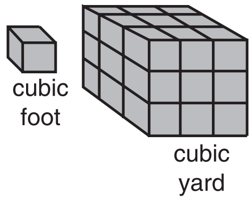
12–3 Study Guide

Volumes of Prisms and Cylinders

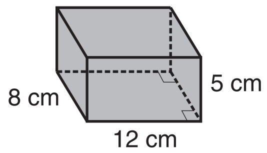
The measure of the amount of space that a figure encloses is the **volume** of the figure. Volume is measured in cubic units such as cubic yards or cubic feet. A cubic foot is equivalent to a cube that is 1 foot long on each side. A cubic yard is equivalent to 27 cubic feet.



Volume of a Prism	If a prism has a volume of V cubic units, a base with an area of B square units, and a height of h units, then $V = Bh$.
Volume of a Cylinder	If a cylinder has a volume of V cubic units, a height of h units, and a radius of r units, then $V = \pi r^2 h$.

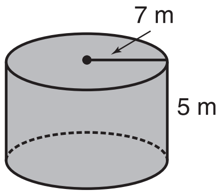
Examples: Find the volume of each solid.

1



$V = Bh$
$V = (8)(12)(5)$
$V = 480 \text{ cm}^3$

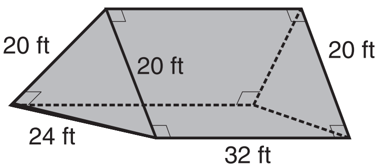
2



$V = \pi r^2 h$
$V = \pi(7)^2(5)$
$V = 245\pi$ or about 769.7 m^3

Find the volume of each solid. Round to the nearest hundredth, if necessary.

1.



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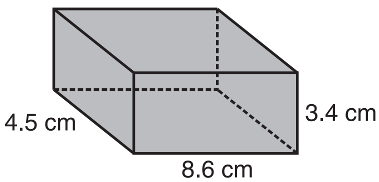

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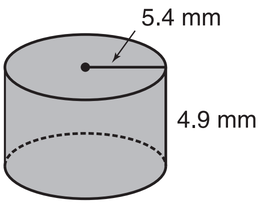

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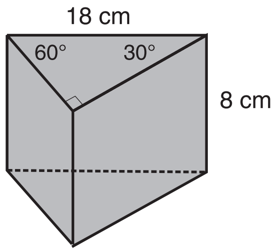


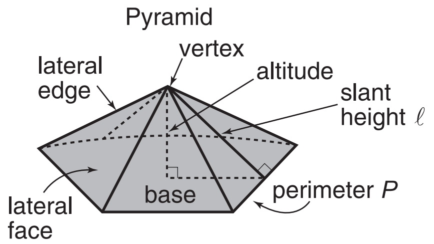
12–4

NAME ______________________ DATE __________ PERIOD ______

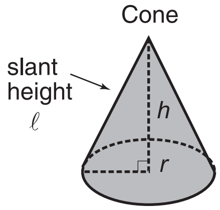
Study Guide

Surface Areas of Pyramids and Cones

All the faces of a **pyramid**, except one, intersect at a point called the **vertex**. A pyramid is a **regular pyramid** if its base is a regular polygon and the segment from the vertex to the center of the base is perpendicular to the base. All the lateral faces of a regular pyramid are congruent isosceles triangles. The height of each lateral face is called the **slant height**.



The slant height of a right circular cone is the length of a segment from the vertex to the edge of the circular base.



In the following formulas, L is lateral area, S is surface area, P is perimeter, and ℓ is slant height.

Regular Pyramids $L = \frac{1}{2}P\ell$

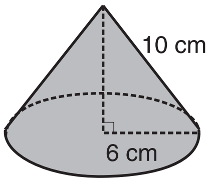
S = Lateral Area + Area of Base

Cones $L = \pi r\ell$

$S = \pi r\ell + \pi r^2$

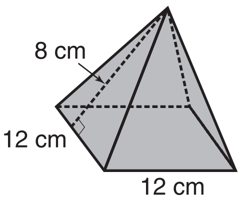
Example: Find the surface area of the cone.

$S = \pi r\ell + \pi r^2$
$S = \pi(6)(10) + \pi(6)^2$
$S = 60\pi + 36\pi$
$S = 96\pi$ or about 301.6 cm



Find the lateral area and the surface area of each regular pyramid or cone. Round your answers to the nearest tenth.

1.



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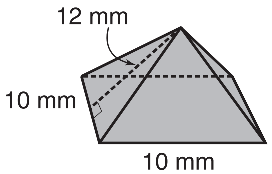

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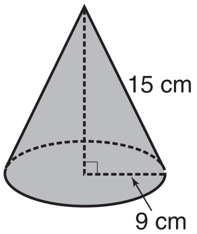

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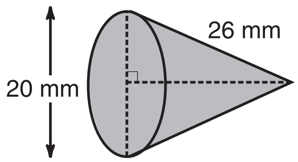

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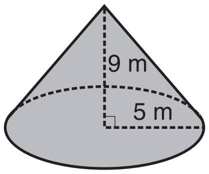
12–5 Study Guide

Volumes of Pyramids and Cones

Volume of a Cone	If a cone has a volume of V cubic units, a radius of r units, and a height of h units, then $V = \frac{1}{3}\pi r^2 h$.
Volume of a Pyramid	If a pyramid has a volume of V cubic units and a height of h units and the area of the base is B square units, then $V = \frac{1}{3}Bh$.

Examples: Find the volume of each solid.

1

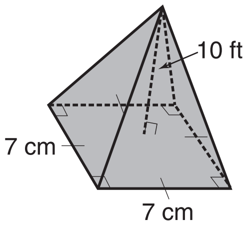


$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi (5^2)(9)$

$V = 75\pi$ or about 235.6 m^3

2



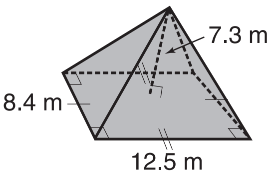
$V = \frac{1}{3}Bh$

$V = \frac{1}{3}(7 \cdot 7)\ 10$

$V = \frac{490}{3}$ or about 163.3 cm^3

Find the volume of each solid. Round your answers to the nearest tenth.

1.



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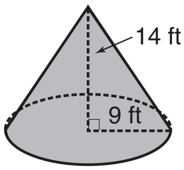

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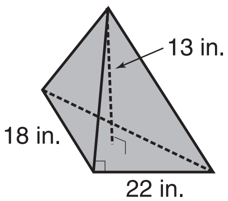

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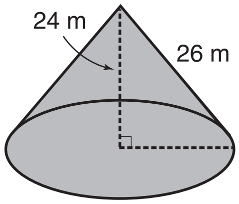

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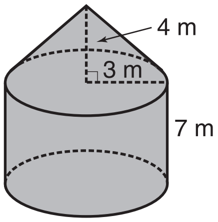

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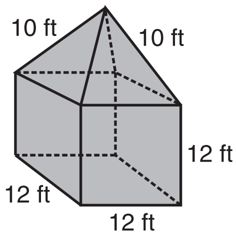

12–6

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Study Guide

Spheres

The following is a list of definitions related to the study of spheres.

Sphere the set of all points that are a given distance from a given point (center)

Radius a segment whose endpoints are the center of the sphere and a point on the sphere

Chord a segment whose endpoints are points on the sphere

Diameter a chord that contains the sphere's center

Tangent a line that intersects the sphere in exactly one point

Hemispheres two congruent halves of a sphere separated by a great circle

***Describe each object as a model of a* circle, sphere, *or* neither.**

1. tennis ball can **2.** pancake **3.** sun

4. basketball rim **5.** globe **6.** lipstick container

***Determine whether each statement is* true *or* false.**

7. All lines intersecting a sphere are tangent to the sphere.

8. The eastern hemisphere of Earth is congruent to the western hemisphere of Earth.

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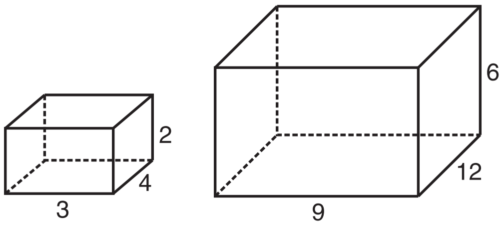
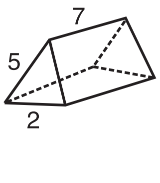
Study Guide

Similarity of Solid Figures

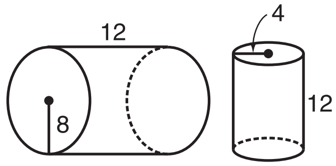
Solids that have the same shape but are different in size are said to be **similar**. You can determine if two solids are similar by comparing the ratios **(scale factors)** of corresponding linear measurements. If the scale factor is 1:1, then the solids are **congruent**.



similar



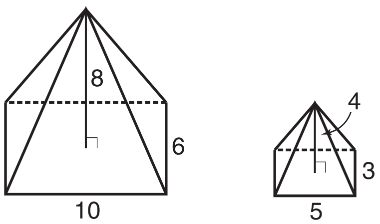
congruent



non-similar

Determine if each pair of solids is* similar, congruent*, or* neither*.

1.



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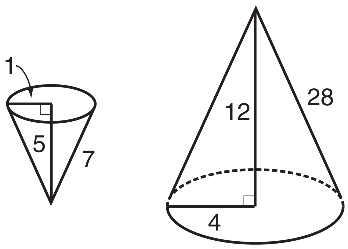

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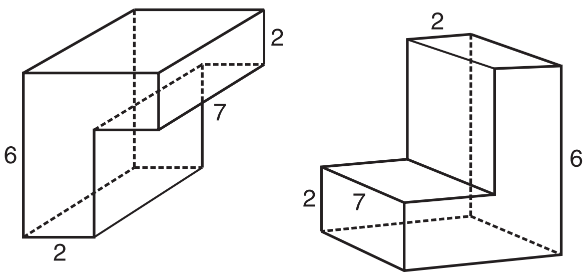

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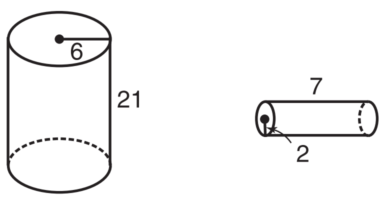

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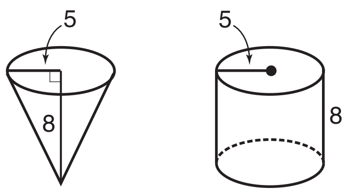

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