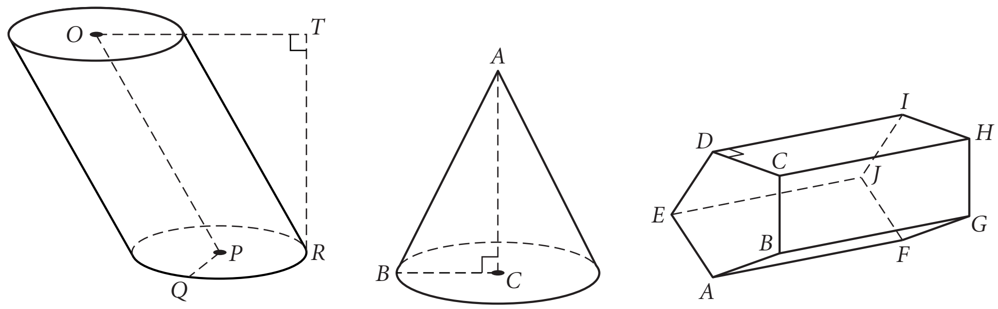
Lesson 10.1 • The Geometry of Solids

Name ________________________ **Period** __________ **Date** ____________

For Exercises 1–14, refer to the figures below.



1. The cylinder is (oblique, right).

2. $\overline{OP}$ is ________________ of the cylinder.

3. $\overline{TR}$ is ________________ of the cylinder.

4. Circles O and P are ________________ of the cylinder.

5. $\overline{PQ}$ is ________________ of the cylinder.

6. The cone is (oblique, right).

7. Name the base of the cone.

8. Name the vertex of the cone.

9. Name the altitude of the cone.

10. Name a radius of the cone.

11. Name the type of prism.

12. Name the bases of the prism.

13. Name all lateral edges of the prism.

14. Name an altitude of the prism.

In Exercises 15–17, tell whether each statement is true or false. If the statement is false, give a counterexample or explain why it is false.

15. The axis of a cylinder is perpendicular to the base.

16. A rectangular prism has four faces.

17. The bases of a trapezoidal prism are trapezoids.

For Exercises 18 and 19, draw and label each solid. Use dashed lines to show the hidden edges.

18. A right triangular prism with height equal to the hypotenuse

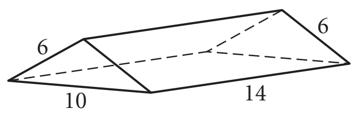
19. An oblique trapezoidal pyramid

Lesson 10.2 • Volume of Prisms and Cylinders

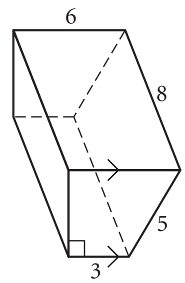
Name ______________________________ **Period** __________ **Date** ______________

In Exercises 1–3, find the volume of each prism or cylinder. All measurements are in centimeters. Round your answers to the nearest 0.01.

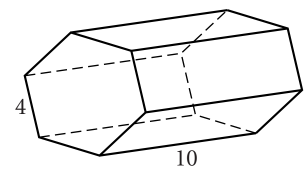
1. Right triangular prism



2. Right trapezoidal prism

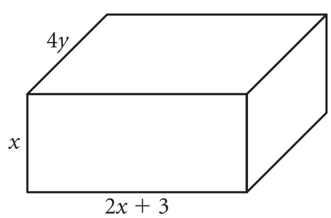


3. Regular hexagonal prism

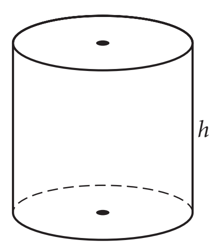


In Exercises 4–6, use algebra to express the volume of each solid.

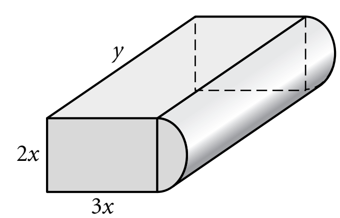
4. Right rectangular prism



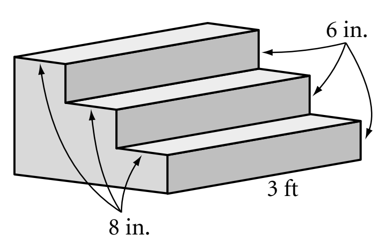
5. Right cylinder; base circumference = $p\pi$



6. Right rectangular prism and half of a cylinder



7. You need to build a set of solid cement steps for the entrance to your new house. How many cubic feet of cement do you need?

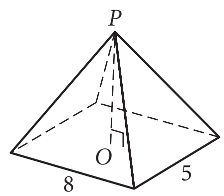


Lesson 10.3 • Volume of Pyramids and Cones

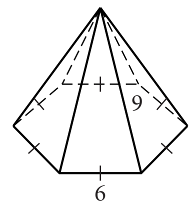
Name ____ **Period** _____________ **Date** __________________

In Exercises 1–3, find the volume of each solid. All measurements are in centimeters. Round your answers to two decimal places.

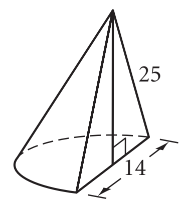
1. Rectangular pyramid; $OP = 6$



2. Right hexagonal pyramid

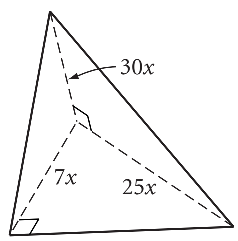


3. Half of a right cone

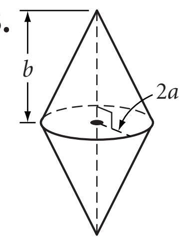


In Exercises 4–6, use algebra to express the volume of each solid.

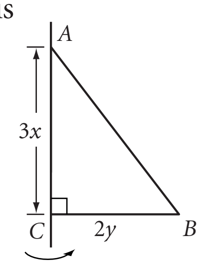
4.



5.

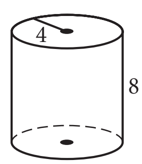


6. The solid generated by spinning $\triangle ABC$ about the axis

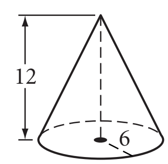


In Exercises 7–9, find the volume of each figure and tell which volume is larger.

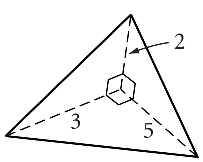
7. **A.**



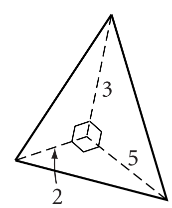
B.



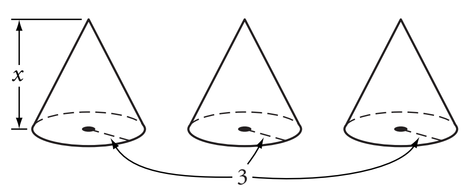
8. **A.**



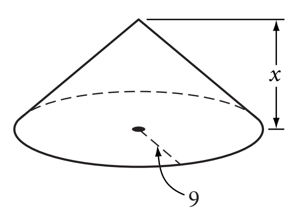
B.



9. **A.**



B.



Lesson 10.4 • Volume Problems

Name ______________________________ Period __________ Date ____________

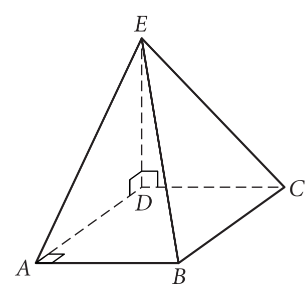
1. A cone has volume 320 cm^3 and height 16 cm. Find the radius of the base. Round your answer to the nearest 0.1 cm.

2. How many cubic inches are there in one cubic foot? Use your answer to help you with Exercises 3 and 4.

3. Jerry is packing cylindrical cans with diameter 6 in. and height 10 in. tightly into a box that measures 3 ft by 2 ft by 1 ft. All rows must contain the same number of cans. The cans can touch each other. He then fills all the empty space in the box with packing foam. How many cans can Jerry pack in one box? Find the volume of packing foam he uses. What percentage of the box's volume is filled by the foam?

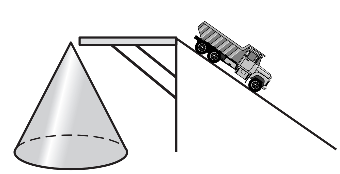
4. A king-size waterbed mattress measures 72 in. by 84 in. by 9 in. Water weighs 62.4 pounds per cubic foot. An empty mattress weighs 35 pounds. How much does a full mattress weigh?

5. Square pyramid *ABCDE*, shown at right, is cut out of a cube with base *ABCD* and shared edge $\overline{DE}$. $AB = 2$ cm. Find the volume and surface area of the pyramid.



6. In Dingwall the town engineers have contracted for a new water storage tank. The tank is cylindrical with a base 25 ft in diameter and a height of 30 ft. One cubic foot holds about 7.5 gallons of water. About how many gallons will the new storage tank hold?

7. The North County Sand and Gravel Company stockpiles sand to use on the icy roads in the northern rural counties of the state. Sand is brought in by tandem trailers that carry 12 m^3 each. The engineers know that when the pile of sand, which is in the shape of a cone, is 17 m across and 9 m high they will have enough for a normal winter. How many truckloads are needed to build the pile?



Lesson 10.5 • Displacement and Density

Name ______________________________ **Period** __________ **Date** ______________

1. A stone is placed in a 5 cm-diameter graduated cylinder, causing the water level in the cylinder to rise 2.7 cm. What is the volume of the stone?

2. A 141 g steel marble is submerged in a rectangular prism with base 5 cm by 6 cm. The water rises 0.6 cm. What is the density of the steel?

3. A solid wood toy boat with a mass of 325 g raises the water level of a 50 cm-by-40 cm aquarium 0.3 cm. What is the density of the wood?

4. For Awards Night at Baddeck High School, the math club is designing small solid silver pyramids. The base of the pyramids will be a 2 in.-by-2 in. square. The pyramids should not weigh more than $2\frac{1}{2}$ pounds. One cubic foot of silver weighs 655 pounds. What is the maximum height of the pyramids?

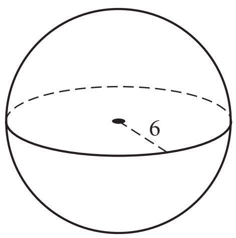
5. While he hikes in the Gold Country of northern California, Sid dreams about the adventurers that walked the same trails years ago. He suddenly kicks a small bright yellowish nugget. Could it be gold? Sid quickly makes a balance scale using his walking stick and finds that the nugget has the same mass as the uneaten half of his 330 g nutrition bar. He then drops the stone into his water bottle, which has a 2.5 cm radius, and notes that the water level goes up 0.9 cm. Has Sid struck gold? Explain your reasoning. (Refer to the density chart in Lesson 10.5 in your book.)

Lesson 10.6 • Volume of a Sphere

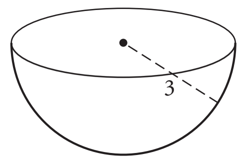
Name ______________________ **Period** __________ **Date** ____________

In Exercises 1–6, find the volume of each solid. All measurements are in centimeters. Write your answers in exact form and rounded to the nearest 0.1 cm^3.

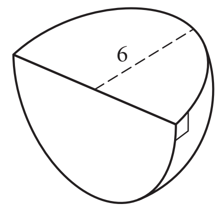
1.



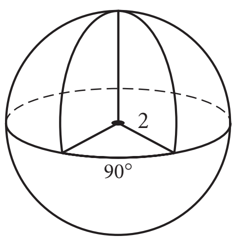
2.



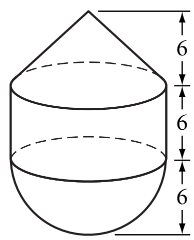
3.



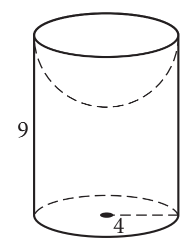
4.



5.



6. Cylinder with hemisphere taken out of the top



7. A sphere has volume $221\frac{5}{6}\pi$ cm^3. What is its diameter?

8. The area of the base of a hemisphere is 225π in^2. What is its volume?

9. Eight wooden spheres with radii 3 in. are packed snugly into a square box 12 in. on one side. The remaining space is filled with packing beads. What is the volume occupied by the packing beads? What percentage of the volume of the box is filled with beads?

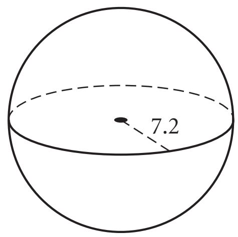
10. The radius of Earth is about 6378 km, and the radius of Mercury is about 2440 km. About how many times greater is the volume of Earth than that of Mercury?

Lesson 10.7 • Surface Area of a Sphere

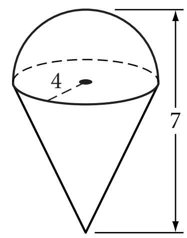
Name ______________________________ Period __________ Date ______________

In Exercises 1–4, find the volume and total surface area of each solid. All measurements are in centimeters. Round your answers to the nearest 0.1 cm.

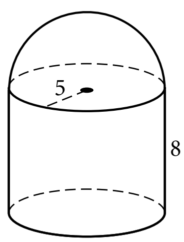
1.



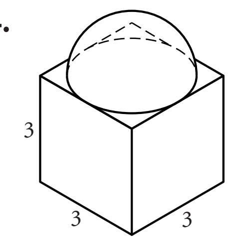
2.



3.



4.



5. If the surface area of a sphere is 48.3 cm^2, find its diameter.

6. If the volume of a sphere is 635 cm^3, find its surface area.

7. Lobster fishers in Maine often use spherical buoys to mark their lobster traps. Every year the buoys must be repainted. An average buoy has a 12 in. diameter, and an average fisher has about 500 buoys. A quart of marine paint covers 175 ft^2. How many quarts of paint does an average fisher need each year?