Teacher: **Celeste Domke** Subject: **Accel 7th Math** Dates: **Week 3: 5/4-5/8** 7-12 Weekly Planner

Welcome to our Distance Learning Classroom! **Student Time Expectation per day: 30 minutes**

Content Area & Materials	Learning Objectives	Tasks • Digital Option • Unplugged Option • Blended Combination	Check-in Opportunities • Video Call • Email • Messaging platform	Submission of Work for Grades • Expectation • Evidence: Log, Product • Method: Scan, photo, upload, or deliver
All homework is available on digits or through a paper packet from school All online work is available through computer, tablet, and phone. ***Save the lesson notes for next week you will use them again.** **Geometry: Topic 13: Surface Area and Volume of Right Prisms and Pyramids-** **Note: topic 13 is a regular 7th grade standard so you have the same assignments as 7th math.** Login to Digits, use your student id number followed by tusd for example: 10399999tusd Password to digits is digits54	7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. 7.G.B.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. Keywords: lateral, area, prisms, surfaces, cubes, regular, polygons, three-dimensional, figures, rectangular, triangular, hexagonal, right, Rectangles and Squares, volume, Right Triangles, compose, decompose, pyramids, height, other triangles supplementary, complementary, angles, straight, adjacent,	**Pearson Realize on digits** 1-watch assigned videos 2-complete the assigned Distance Learning 26-1, 26-2, 26-3, 26-4, 26-5, 26-6 3-complete 50 Prodigy problems each week. ***Pay Attention to due dates** **Packet Work** 1-Use the packet notes and complete the attached Close and Check homework relevant to digits topic 26 2-Complete 50 Prodigy problems each week. Week 3 Packets due to school if not uploading: May 15th	All communications will take place through one of these platforms: -Zoom.us -Loom videos -Microsoft teams -Remind -Email that is registered with Aeries My office hours are 10-12 each school day. If you need help with a concept email me and I will send out a zoom invitation. Check your school 365 email account regularly, and the email you used to sign up for Aeries. My email: cdomke@tusd.net To sign up for remind, the code for 7th math is: @accel7mat	IF USING ONLINE WORK: Complete the work online and submit. No paper copy needed. To submit Paperwork digitally use email (cdomke@tusd.net) or a picture on Remind. IF SUBMITTING THE PAPER PACKET, Deliver Hard copy work to Freiler according to the established calendar. LABEL WITH: • Mrs. Domke • Your full name • Class period All homework completed on time will receive 100% credit. Missing problems or late work will receive a reduced grade. Middle school late rules apply: On time: 100% 1 day late: 80% 2 days late: 50% 3+ days late: 0%

<u>Scheduled</u>, *if possible,* **Shared Experience** • Virtual Fieldtrip • Discussion	My office hours are 10-12 each school day. If you need help with a concept email me and I will send out a zoom invitation. If you think a class discussion will be beneficial, let me know and my invitation will include everyone in the class level. For one on one help, let me know. Use Remind for quick questions that need an answer right away.			
Scaffolds & Supports	All of our concepts can be found on www.khanacademy.org			
Teacher Office Hours *2 hours daily (all classes):* • Contact • Platform	**Monday** **10-12**	**Tuesday** **10-12**	**Wednesday** **10-12**	**Thursday** **10-12**	**Friday** **10-12**

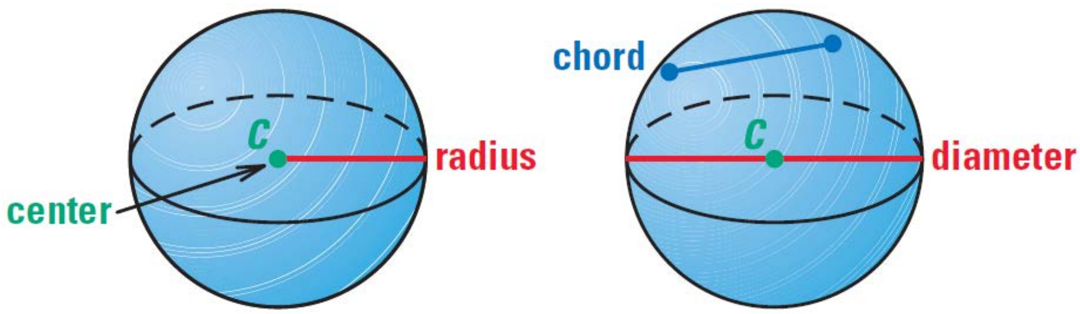
SURFACE AREA AND VOLUME OF SPHERES

Surface Area and Volume of Spheres:

In this section, we are going to see, how to find surface area and volume of spheres.

Finding the Surface Area of a Sphere

A circle was described as the locus of points in a plane that are a given distance from a point. A sphere is the locus of points in space that are a given distance from a point. The point is called the center of the sphere. A radius of a sphere is a segment from the center to a point on the sphere.



A chord of a sphere is a segment whose endpoints are on the sphere. A diameter is a chord that contains the center. As with circles, the terms radius and diameter also represent distances, and the diameter is twice the radius.

Theorem (Surface Area of a Sphere):

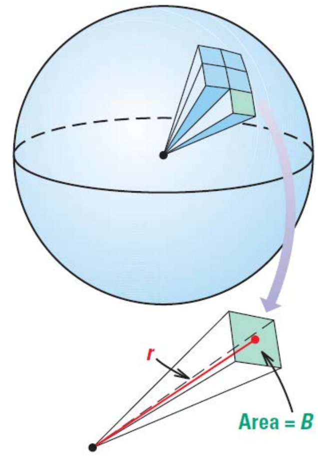
The surface area S of a sphere with radius r is

$$S = 4\pi r^2$$

Notes for 26-5 & 26-6

Finding the Volume of a Sphere

Imagine that the interior of a sphere with radius r is approximated by n pyramids, each with a base area of B and a height of r, as shown below.
The volume of each pyramid is = $1/3 \cdot Br$
and the sum of the base areas is = nB

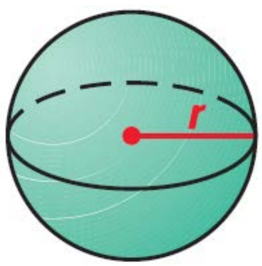


The surface area of the sphere is approximately equal to nB, or $4\pi r^2$.
So, we can approximate the volume V of the sphere as follows.
Each pyramid has a volume of $1/3 \cdot Br$

	$V \approx n \cdot 1/3 \cdot Br$
Regroup factors.	$V = 1/3 \cdot (nB)r$
Substitute $4\pi r^2$ for nB.	$V \approx 1/3 \cdot (4\pi r^2)r$
Simplify.	$V = 4/3 \cdot \pi r^3$

Theorem (Volume of a Sphere) :

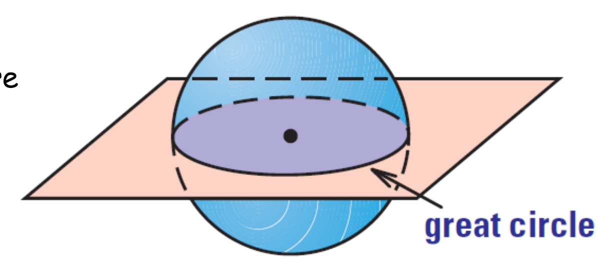
The volume V of a sphere with radius r is $V = 4/3 \cdot \pi r^3$



Great Circle of a Sphere

If a plane intersects a sphere, the intersection is either a single point or a circle. If the plane contains the center of the sphere, then the intersection is a great circle of the sphere.

Every great circle of a sphere separates a sphere into two congruent halves called hemispheres.



Notes for 26-5 & 26-6

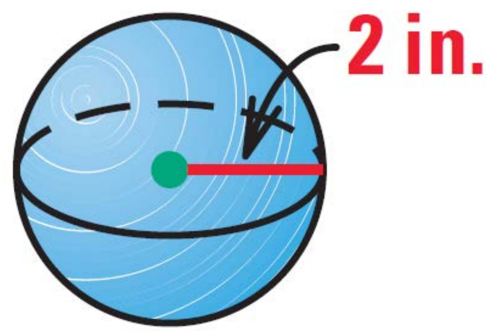
Finding the Surface Area of a Sphere

Example:

(a) Find the surface area of the sphere shown below.

(b) When the radius doubles, does the surface area double?

Solution:



Solution (a):

Formula for surface area of a sphere :

$$S = 4\pi r^2$$

Substitute 2 for r. $S = 4\pi\,(2^2)$

$$S = 4\pi\,(4)$$

$$S = 16\pi$$

The surface area of the sphere is 16π square inches.

Solution (b):

When the radius doubles,

$$r = 2 \cdot 2$$

$$r = 4 \text{ inches}$$

Formula for surface area of a sphere :

$$S = 4\pi r^2$$

Substitute 4 for r. $S = 4\pi\,(4^2)$

$$S = 4\pi\,(16)$$

$$S = 64\pi \ \text{in}^2$$

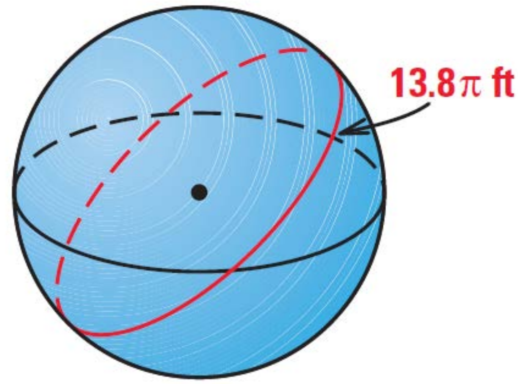
Because $16\pi \cdot 4 = 64\pi$, the surface area of the sphere in part (b) is four times the surface area of the sphere in part (a).

So, when the radius of a sphere doubles, the surface area does not double.

Notes for 26-5 & 26-6

Using a Great Circle

Example: The circumference of a great circle of a sphere is 13.8π feet. What is the surface area of the sphere?



Solution: Draw a sketch.

Begin by finding the radius of the sphere.
Formula for circumference of a circle: $C = 2\pi r$

Substitute 13.8π for C. $13.8\pi = 2\pi r$

Divide each side by 2π. $6.9 = r$

Formula for surface area of a sphere : $S = 4\pi r^2$

Substitute 6.9 for r. $S = 4\pi(6.9)^2$

Simplify. $S = 4\pi(47.61)$

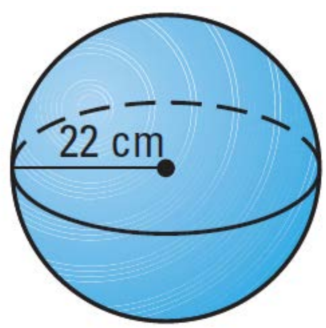
Use calculator. $S \approx 598 \text{ ft}^2$

So, the surface area of the sphere is about 598 square feet.

Finding the Volume of a Sphere

Example: Find the volume of the sphere shown below.

Solution:



Formula for volume of a sphere : $V = 4/3 \cdot \pi r^3$

Substitute 22 for r. $V = 4/3 \cdot \pi(22^3)$

Simplify. $V = 4/3 \cdot \pi(10648)$

$V = 42592/3 \cdot \pi$

Use calculator. $V \approx 44602 \text{ cm}^2$

The volume of the sphere is about 44602 cubic cm.

www.onlinemath4all.com

VOLUME OF PRISMS AND CYLINDERS

The volume of a solid is the number of cubic units contained in its interior.
Volume is measured in cubic units, such as cubic meters (m^3).

Volume Postulates

Postulate 1 (Volume of a Cube):

The volume of a cube is the cube of the length of its side.
That is: $V = s^3$

Postulate 2 (Volume Congruence Postulate):

If two polyhedra are congruent, then they have the same volume.

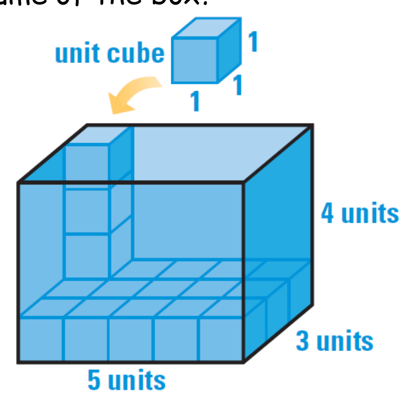
Postulate 3 (Volume Addition Postulate):

The volume of a solid is the sum of the volumes of all its non-overlapping parts.

Finding the Volume of a Rectangular Prism

Example:

The box shown below is 5 units long, 3 units wide, and 4 units high. How many unit cubes will fit in the box? What is the volume of the box?



Solution:

The base of the box is 5 units by 3 units. This means 5 • 3 or 15 unit cubes, will cover the base.

Solution (a): Three more layers of 15 cubes each can be placed on top of the lower layer to fill the box. Because the box contains 4 layers with 15 cubes in each layer, the box contains a total of 4 • 15, or 60 unit cubes.

Solution (b): Because the box is completely filled by the 60 cubes and each cube has a volume of 1 cubic unit, it follows that the volume of the box is 60 • 1, or 60 cubic units.

Notes for Week 3 Topic 26-2

Note:

In the above example, the area of the base, 15 square units, multiplied by the height, 4 units, yields the volume of the box, 60 cubic units. So, the volume of the prism can be found by multiplying the area of the base by the height. This method can also be used to find the volume of a cylinder.

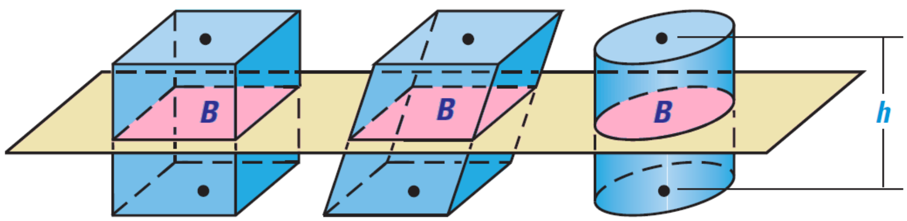
Cavalieri's Principle

Theorem (Cavalieri's Principle):

If two solids have the same height and the same cross-sectional area at every level, then they have the same volume.

The above Theorem is named after mathematician Bonaventura Cavalieri (1598–1647). To see how it can be applied, consider the solids below.

All three have cross sections with equal areas, B, and all three have equal heights, h. By Cavalieri's Principle, it follows that each solid has the same volume.



Volume Theorems

Theorem 1 (Volume of a Prism):

The volume V of a prism is $V = Bh$

where B is the area of a base and h is the height.

Theorem 2 (Volume of a Cylinder):

The volume V of a prism is

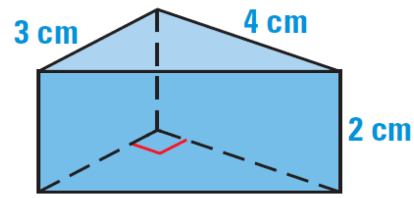
$$V = Bh$$
$$V = \pi r^2 h$$

where B is the area of a base, h is the height, and r is the radius of a base.

Notes for Week 3 Topic 26-2

Finding Volumes

Example 1: Find the volume of the right prism shown.



Solution:

The area of the base is

$$B = 1/2 \cdot (3)(4)$$
$$B = 6\ cm^2$$

The height is $h = 2$ cm

Formula for volume of a right prism is

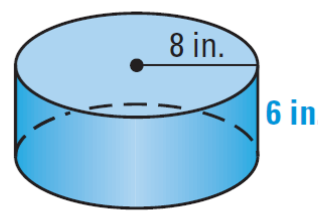
$$V = Bh$$

Substitute 6 for B and 2 for h. $V = (6)(2)$

$$V = 12$$

So, the volume of the right prism is 12 cubic cm.

Example 2: Find the volume of the right cylinder shown.



Solution:

Formula for volume of a right cylinder is

$$V = \pi r^2 h$$

Substitute 8 for r and 6 for h. $V = \pi(8^2)(6)$

Simplify. $V = 384\pi$

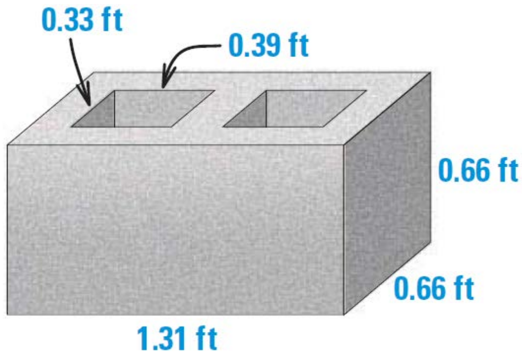
Use calculator. $V \approx 1206.37$

So, the volume of the right cylinder is about 1206.37 cubic inches.

Notes for Week 3 Topic 26-2

Using Volumes in Real Life

Example: If a concrete weighs 145 pounds per cubic foot, find the weight of the concrete block shown below.



Solution :

To find the weight of the concrete block shown, we need to find its volume.
The area of the base can be found as follows :

$$B = \text{Area larger rectangle} - 2 \cdot \text{Area of small rectangle}$$
$$B = (1.31)(0.66) - 2(0.33)(0.39)$$
$$B \approx 0.61 \text{ ft}^2$$

Using the formula for the volume of a prism, the volume is

$$V = Bh$$
$$V \approx 0.61(0.66)$$
$$V \approx 0.40 \text{ ft}^3$$

To find the weight of the block, multiply the pounds per cubic foot, 145 lb/ft^3, by the number of cubic feet, 0.40 ft^3.

$$\text{Weight} = [145 \text{ lb/ft}^3] \cdot [0.40 \text{ ft}^3]$$

Simplify. $$\text{Weight} \approx 58 \text{ lb}$$

So, the weight of the concrete block is about 58 pounds.

Adapted from onlinemath4all.com

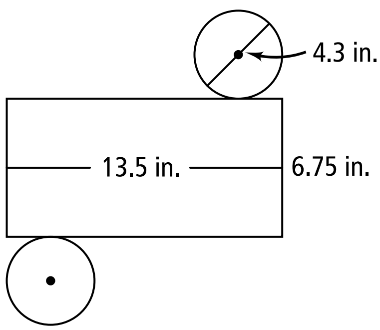
Close and Check

Focus Question

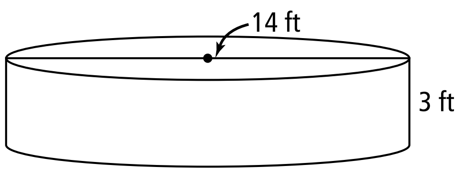
What types of things can you model with a cylinder? Why might you want to find the surface area of a cylinder?

Do you know HOW?

1. Use the net to find the surface area of the cylindrical can to the nearest tenth. Use 3.14 for π.



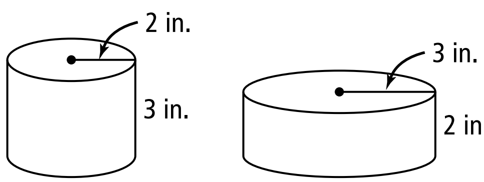
2. Find the surface area of the cylinder to the nearest tenth. Use 3.14 for π.



Do you UNDERSTAND?

3. Writing Explain how using the calculator key for π rather than 3.14 affects the solution to a surface area problem.

4. Error Analysis Your friend decides that the 2 cylinders have the same surface area. Do you agree? Explain.



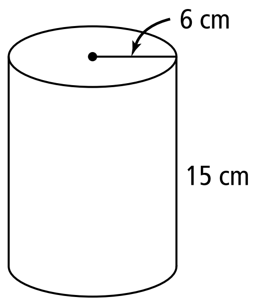
Close and Check

Focus Question

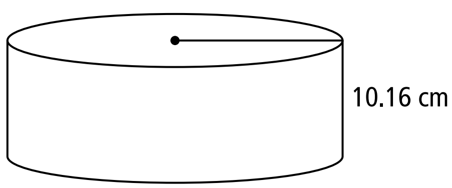
Why might you want to find the volume of a cylinder?

Do you know **HOW?**

1. Find the volume. Leave the answer in terms of π.



2. The volume of a can of tuna is 562.76 cm^3. Find the radius of the can to the nearest tenth. Use 3.14 for π.



Do you **UNDERSTAND?**

3. Reasoning A pitcher holds 1,614.7 $in.^3$ of liquid. Each can of punch is 15 in. tall with a diameter of 8 in. How many full cans will the pitcher hold? Explain.

4. Error Analysis A large can of beans has twice the radius and height of a small can of beans. Your friend says that the large can has twice the volume of the small can. Is he correct? Explain.

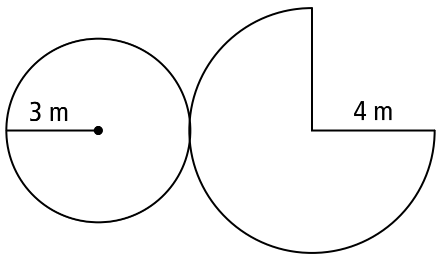
Close and Check

Focus Question

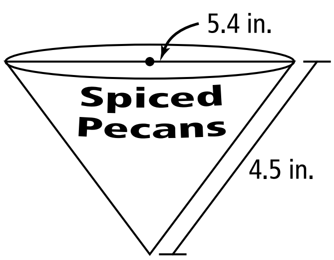
What types of things can you model with a cone? Why might you want to find the surface area of a cone?

Do you know HOW?

1. Use the net to find the surface area of the cone to the nearest square meter. Use 3.14 for π.



2. Spiced pecans are sold in cone-shaped containers that include a circular lid. Find the surface area of the container to the nearest square inch. Use 3.14 for π.



Do you UNDERSTAND?

3. Compare and Contrast Explain the difference between the height of a cone and the slant height of a cone. How do the measures compare?

4. Reasoning Explain the differences between the surface areas of a cylinder and a cone with the same diameter.

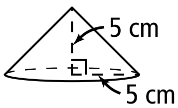
Close and Check

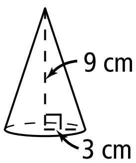
Focus Question

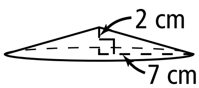
Why might you want to find the volume of a cone?

Do you know HOW?

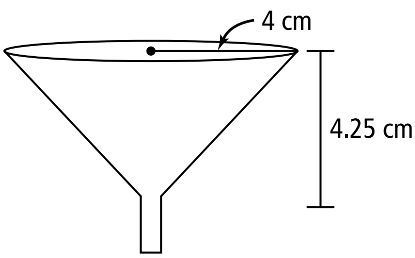
1. Number the cones from 1 to 3 in order from least to greatest volume.







2. Find the volume of the funnel to the nearest cubic centimeter. Use 3.14 for π.



Do you UNDERSTAND?

3. Reasoning A juice company repackages individual juice cans in cone-shaped containers with the same volume. The can is 3 in. tall with a diameter of 2 in. What could be the dimensions of the cone container? Explain.

4. Writing A baker pours sugar into a cylindrical jar using the funnel from Exercise 2. If the jar holds 850 cm^3, about how many times will he have to fill the funnel before the jar is full? Explain.

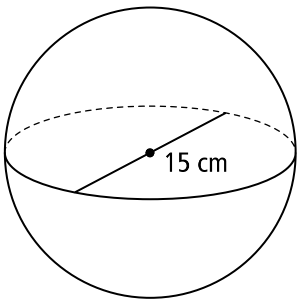
Close and Check

Focus Question

What types of things can you model with a sphere? Why might you want to find the surface area of a sphere?

Do you know HOW?

1. Find the surface area of the sphere to the nearest tenth of a square centimeter. Use 3.14 for π.



2. The circumference of a giant beach ball is 383.08 cm. Find the surface area of the beach ball to the nearest tenth of a centimeter. Use 3.14 for π.

3. The surface area of a sphere is 651 ft^2. Find the radius of the sphere to the nearest tenth of a square foot. Use 3.14 for π.

Do you UNDERSTAND?

4. Writing Explain how to use the circumference to find the surface area of a sphere.

5. Error Analysis A classmate says it is impossible to find an exact solution for the surface area of a sphere because π is an irrational number. Do you agree? Explain.

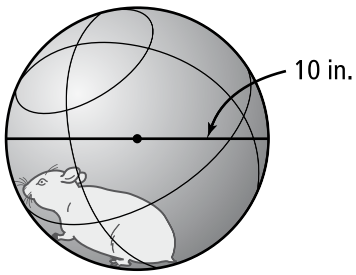
Close and Check

Focus Question

Why might you want to find the volume of a sphere?

Do you know **HOW?**

1. To the nearest cubic inch, how much space is there inside the ball for the hamster? Use 3.14 for π.



2. A gazing ball in the center of a garden has a volume of 904.3 cm^3. To the nearest centimeter, find the diameter of the gazing ball.

3. To the nearest tenth of a cubic foot, find the volume of a 9 ft diameter inflatable ball.

Do you **UNDERSTAND?**

4. Writing The height and diameter of a cylinder is equal to the diameter of a sphere. Explain the relationship between the volume of the sphere and the volume of the cylinder.

5. Reasoning A ball of twine has a diameter of 3.4 m. More twine is added until the diameter is 12 m. A classmate subtracts the diameters and uses the result to find the change in volume of the sphere. Is he correct? Explain.