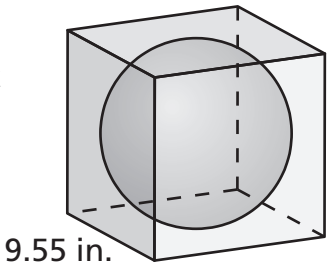
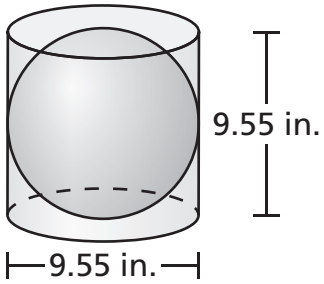
11.8 Start Thinking

You buy a friend a basketball as a gift. You want to construct a container to put the ball in to disguise it when it is wrapped. You construct the two containers shown in the diagram. Find the surface area of each container. Do the containers have the same surface area as the ball? If not, which container has a surface area that is closer to that of the ball?



Cube

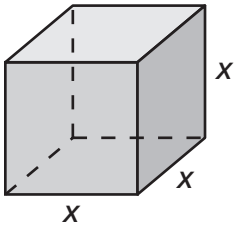


Cylinder

11.8 Warm Up

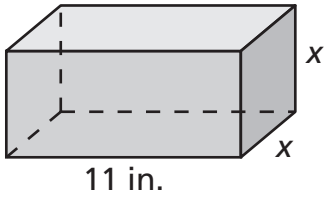
Use the diagram and the given surface area to find the value of *x*.

1. $S = 1350$ in.^{2}



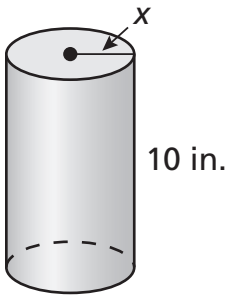
Cube

2. $S = 270$ in.^{2}



Rectangular solid

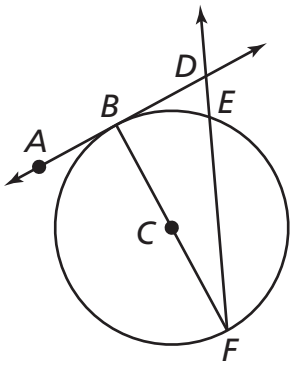
3. $S = 78\pi$ in.^{2}



Cylinder

11.8 Cumulative Review Warm Up

Tell whether the line, ray, or segment is best described as a radius, chord, diameter, secant, or tangent of $\odot C$.



1. $\overline{CF}$

2. $\overrightarrow{AB}$

3. $\overline{FB}$

4. $\overline{EF}$

5. $\overleftrightarrow{DF}$

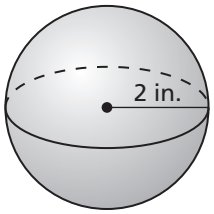
6. $\overline{BC}$

Name _____ Date _____

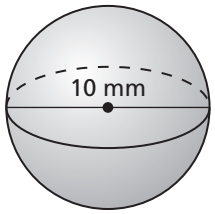
11.8 Practice A

In Exercises 1–3, find the surface area of the sphere.

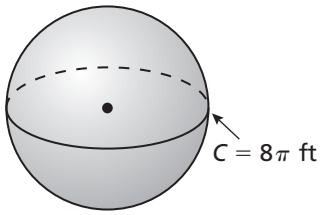
1.



2.



3.



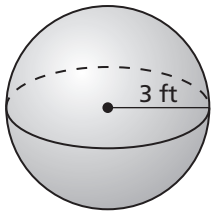
In Exercises 4 and 5, find the indicated measure.

4. the radius of a sphere with a surface area of 36π square meters

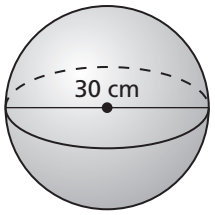
5. the diameter of a sphere with a surface area of 81π square yards

In Exercises 6–8, find the volume of the sphere.

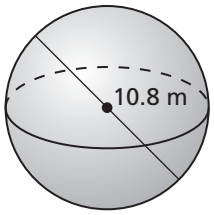
6.



7.



8.



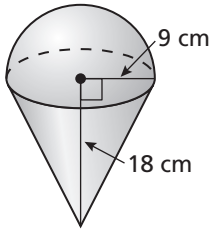
In Exercises 9 and 10, find the volume of the sphere with the given surface area.

9. Surface Area $= 4\pi$ in.^{2}

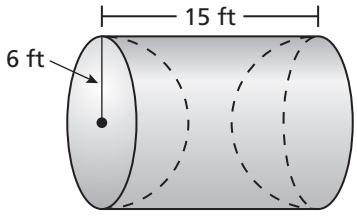
10. Surface Area $= 676\pi$ km^2

In Exercises 11 and 12, find the volume of the composite solid.

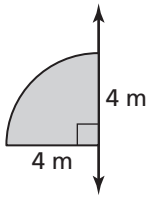
11.



12.



13. Find the surface area and volume of the solid produced by rotating the figure at the right around the given axis.



14. A sphere is inscribed in a cube with a volume of 8 cubic yards. What is the surface area of the sphere? Explain your reasoning.

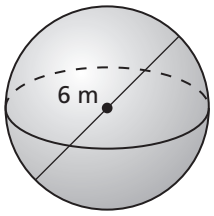
15. In 2000, the International Table Tennis Federation changed the official diameter of a table tennis ball from 38 millimeters to 40 millimeters. Without calculating surface areas and volumes, determine how the surface area and volume of the ball changed. Explain your reasoning. Find the surface areas and volumes to check your answer.

Name_____ Date _____

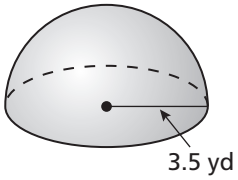
11.8 Practice B

In Exercises 1–3, find the surface area of the sphere or hemisphere.

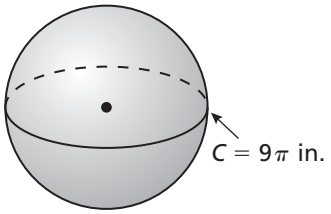
1.



2.



3.



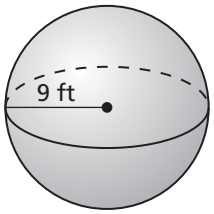
In Exercises 4 and 5, find the indicated measure.

4. the radius of a sphere with a surface area of 100π square centimeters

5. the diameter of a sphere with a surface area of 6.25π square inches

In Exercises 6–8, find the volume of the sphere or hemisphere.

6.



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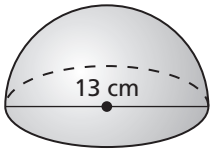

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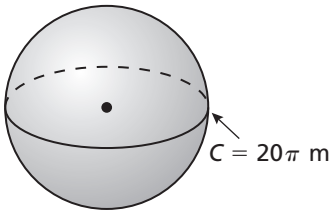


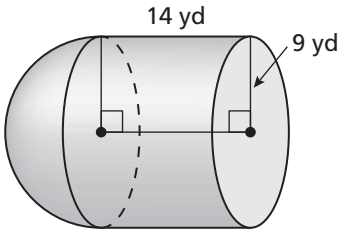
In Exercises 9 and 10, find the volume of the sphere with the given surface area.

9. Surface Area $= 144\pi$ ft^2

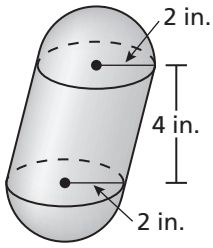
10. Surface Area $= \pi$ mi^2

In Exercises 11 and 12, find the volume of the composite solid.

11.



12.



13. The diameter of a spherical balloon shrinks to one-half of its original size. Describe how the surface area and volume of the balloon change.

14. A museum has two spherical cannonballs on display. Each cannonball is made of a type of iron that weighs about 463 pounds per cubic foot.

a. The diameter of the smaller cannonball is 1 inch less than the diameter of the larger cannonball. Can you determine how much less the smaller cannonball weighs than the larger cannonball? Explain your reasoning.

b. The smaller cannonball displaces 33.5 cubic inches of water when dropped in a bucket full of water. To the nearest pound, how much less does the smaller cannonball weigh than the larger cannonball?

Name _____ Date _____

11.8 Enrichment and Extension

Surfaces Areas and Volumes of Spheres

1. Four balls, each with a radius of 1 inch, fit snugly into a 2-inch by 2-inch by 8-inch box. Is the total volume left over inside the box greater than or less than the volume of a fifth ball? Justify your answer.

2. A vessel is in the shape of a hemisphere mounted on a cylinder of same radius of 8 meters. The height of the cylindrical portion is 4 meters. Determine the approximate capacity of the tank in liters. Round your answer to the nearest liter.

3. The top of a gumball machine is a sphere with a diameter of 18 inches. The machine holds a maximum capacity of 3300 gumballs, which leaves about 43% of the space in the machine empty. Estimate the diameter of each gumball. Round your answer to the nearest tenth.

4. The surface area of a sphere can be used to determine its volume.

   a. Solve the surface area formula of a sphere to obtain an expression for r in terms of S.

   b. Substitute your result from part (a) into the volume formula to find the volume V of a sphere in terms of its surface area S.

   c. Graph the relationship between volume and surface area with S on the horizontal axis and V on the vertical axis. What shape is the graph?

5. A sphere has a radius r. Draw a composite figure made up of a square prism (not a cube) and a square pyramid that has the same volume as the sphere.

6. Find the surface area of the composite figure from Exercise 5.

7. Consider a composite figure made up of a cylinder and a cone that has the same volume as a sphere with radius r. Find the figure's surface area.

Name_____ Date _____

11.8 Puzzle Time

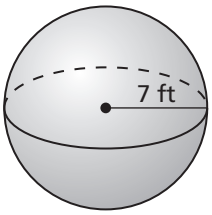
What Do Chickens Collect On The Beach?

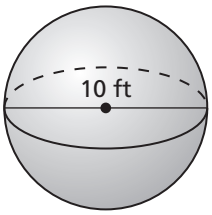
Circle the letter of each correct answer in the boxes below. The circled letters will spell out the answer to the riddle.

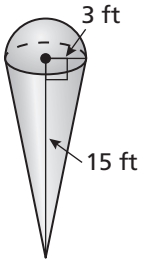
Complete the sentence.

1. A(n) _____ is the set of all points in space equidistant from a given point.
2. A chord of a sphere is a(n) _____ whose endpoints are on the sphere.
3. If a plane contains the center of a sphere, then the intersection is a(n) _____ circle of the sphere.
4. Find the radius (in feet) of a sphere with a surface area of 8π square feet.
5. Find the diameter (in centimeters) of a sphere with a surface area of 156π square centimeters.

Find the volume in cubic feet. Round your answer to the nearest tenth.

6. 

7. 

8. 

9. Sphere A is similar to Sphere B. The scale factor of the lengths of the radii of Sphere A to Sphere B is 1 to 4. Sphere A has a radius of 6 units and a volume of 288π cubic units. Find the volume (in cubic units) of Sphere B.

A	**M**	**E**	**I**	**G**	**N**	**G**	**S**	**O**
line	718.0	sphere	6.7	1436.8	147	523.6	$18{,}432\pi$	4365.6
R	**H**	**E**	**G**	**L**	**E**	**M**	**L**	**S**
big	great	$2\sqrt{39}$	circle	$\sqrt{2}$	3.4	2304π	197.9	segment