

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.

4.4 cm

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

1728 in^3

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?

(box) (cans)
 $10,368 - 2160 \approx$
 3582 in^3
 (volume foam)

24 cans $V = \frac{2582 \text{ in}^3}{3} = 207 \text{ ft}^3$ ~~34.6%~~ $\approx 34\%$

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?

$72 \times 84 \times 9 = 54,432 \text{ in}^3 = 31.5 \text{ ft}^3$

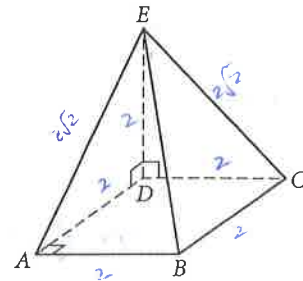
$31.5 \times 62.4 = 1965.6$

$1965.6 + 35 = 2000.6 \text{ lbs}$

2000.6 lb

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

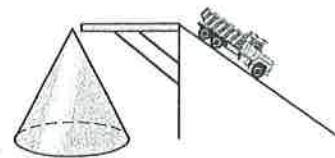
$V = \frac{8}{3} \text{ cm}^3$ $SA = (8 + 4\sqrt{2}) \text{ cm}^2 \approx 13.7 \text{ cm}^2$



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?

$\approx 110,447 \text{ gallons}$

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?



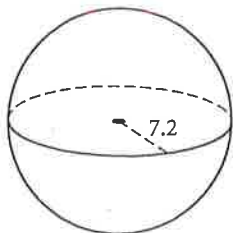
57 truck loads

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.

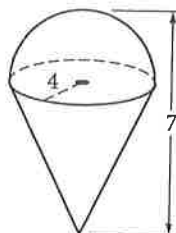
1.



$$V = 1563.5 \text{ cm}^3$$

$$S = 651.4 \text{ cm}^2$$

2.



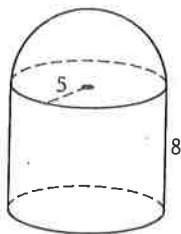
$$V = 184.3 \text{ cm}^3$$

$$S = 163.4 \text{ cm}^2$$

($52\hat{\pi}$)

$$SA_{\text{cone}} = \pi r (r + l)$$

3.



$$V = 890.1 \text{ cm}^3$$

$$S = 486.9 \text{ cm}^2$$

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

$$D \approx 3.9 \text{ cm}$$

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

$$SA \approx 357.3 \text{ cm}^2$$

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?

9 quarts