

# Surface Area & Volume

**Week 5 (5/18 - 5/22):**

**Topic:** Determine if a practical problem involving a rectangular prism or cylinder represents the application of volume or surface area.

## NOTES:

**Surface Area:** The surface area of a geometric figure is the total area of the surfaces added together.

**Volume:** The volume of a geometric figure is the measure of the amount of space inside solid figure.

*Directions: Read each statement below. Put a V for volume or a SA for surface area.*

<u>SA</u> Wrap Around	<u>SA</u> How much is needed to cover a 3D object?	<u>V</u> Cubic Units
<u>SA</u> Covers (3D Figures)	<u>V</u> Fill	<u>SA</u> Square Units
<u>V</u> How much will an object hold?	<u>SA</u> Wrapping Paper	<u>V</u> Filling a cooler with ice
<u>V</u> Filling a swimming pool with water	<u>SA</u> Covering a table with a tablecloth	<u>V</u> Pouring sand in a sandbox
<u>SA</u> Cardboard on a box	<u>SA</u> Wrapping a birthday present	<u>V</u> The paint in a gallon can

**Directions:** Label each scenario below as either Surface Area (SA) or Volume (V).

1. Putting water into a swimming pool  <u>Volume</u>	2. Wrapping a birthday present with wrapping paper  <u>Surface Area</u>	3. The lining and cover of a swimming pool  <u>Surface Area</u>	4. The paint held in the gallon paint can  <u>Volume</u>
5. Remodeling a bedroom using paint and carpet  <u>Surface Area</u>	6. The cardboard of a cereal box.  <u>Surface Area</u>	7. Pouring sand in a sandbox  <u>Volume</u>	8. Pouring cement to construct a sidewalk  <u>Volume</u>

Topic: Determine the surface area of rectangular prisms and cylinders using concrete objects, nets, diagrams, and formulas.

## NOTES:

**Surface Area:** The surface area of a geometric figure is the total area of the surfaces added together.

$$\pi = 3.14$$

Cylinder Formula:

$$SA = 2\pi r^2 + 2\pi rh$$

$r$  = radius

$h$  = height

Surface Area = unit<sup>2</sup>

Rectangular Prism Formula:

$$SA = 2lw + 2lh + 2wh$$

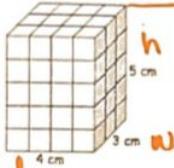
$l$  = length

$w$  = width

$h$  = height

Surface Area = unit<sup>2</sup>

Calculate the surface area.

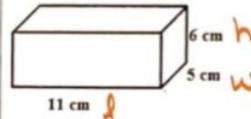


$$SA = 2lw + 2lh + 2wh$$

$$SA = 2 \cdot 4 \cdot 3 + 2 \cdot 4 \cdot 5 + 2 \cdot 3 \cdot 5$$

$$SA = 94 \text{ cm}^2$$

Calculate the surface area.

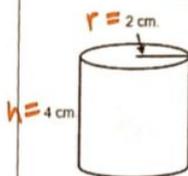


$$SA = 2lw + 2lh + 2wh$$

$$SA = 2 \cdot 11 \cdot 5 + 2 \cdot 11 \cdot 6 + 2 \cdot 5 \cdot 6$$

$$SA = 302 \text{ cm}^2$$

Calculate the surface area.

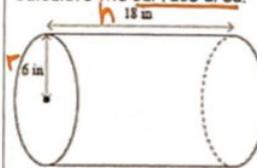


$$SA = 2\pi r^2 + 2\pi rh$$

$$SA = 2 \cdot 3.14 \cdot 2^2 + 2 \cdot 3.14 \cdot 2 \cdot 4$$

$$SA = 75.36 \text{ in}^2$$

Calculate the surface area.



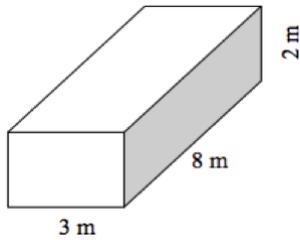
$$SA = 2\pi r^2 + 2\pi rh$$

$$SA = 2 \cdot 3.14 \cdot 6^2 + 2 \cdot 3.14 \cdot 6 \cdot 18$$

$$SA = 904.32 \text{ in}^2$$

Directions: Calculate the **surface area** for each of the following.

9.

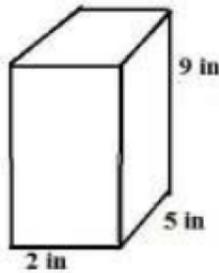


$$L = \underline{\quad} \quad w = \underline{\quad} \quad h = \underline{\quad}$$

$$SA = 2lw + 2lh + 2wh$$

92 m squared

10.

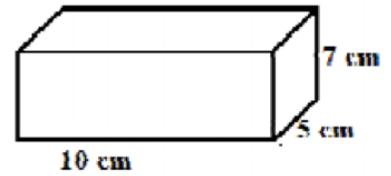


$$L = \underline{\quad} \quad w = \underline{\quad} \quad h = \underline{\quad}$$

$$SA = 2lw + 2lh + 2wh$$

146 in squared

11.

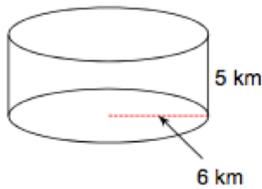


$$L = \underline{\quad} \quad w = \underline{\quad} \quad h = \underline{\quad}$$

$$SA = 2lw + 2lh + 2wh$$

310 cm squared

12.

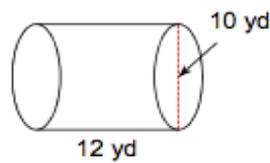


$$\pi = 3.14 \quad r = \underline{\quad} \quad h = \underline{\quad}$$

$$SA = 2\pi r^2 + 2\pi rh$$

414.48 km squared

13.

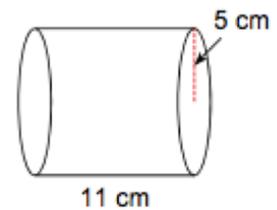


$$\pi = 3.14 \quad r = \underline{\quad} \quad h = \underline{\quad}$$

$$SA = 2\pi r^2 + 2\pi rh$$

533.8 yd squared

14.



$$\pi = 3.14 \quad r = \underline{\quad} \quad h = \underline{\quad}$$

$$SA = 2\pi r^2 + 2\pi rh$$

502.4 cm squared

Topic: Determine the volume of rectangular prisms and cylinders using concrete objects, diagrams, and formulas.

### NOTES:

**Volume:** The volume of a geometric figure is the measure of the amount of space inside solid figure.

Cylinder Formula:  $\pi = 3.14$

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

$r$  = radius

$h$  = height

$$\text{Volume} = \text{unit}^3$$

Rectangular Prism Formula:

$$V = lwh$$

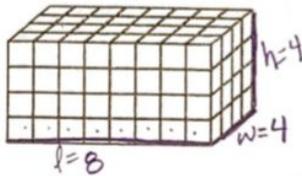
$l$  = length

$w$  = width

$h$  = height

$$\text{Volume} = \text{unit}^3$$

Calculate the volume.

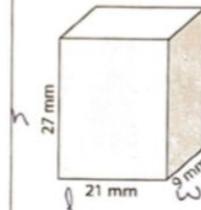


$$V = lwh$$

$$V = 8 \cdot 4 \cdot 4$$

$$V = 128 \text{ cm}^3$$

Calculate the volume.

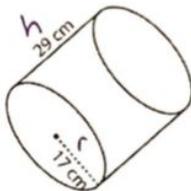


$$V = lwh$$

$$V = 21 \cdot 9 \cdot 27$$

$$V = 5103 \text{ mm}^3$$

Calculate the volume.

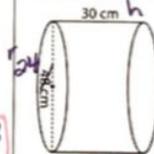


$$V = \pi r^2 h$$

$$V = 3.14 \cdot 17^2 \cdot 29$$

$$V = 26316.3 \text{ cm}^3$$

Calculate the volume.



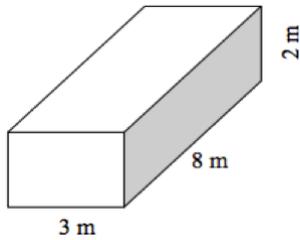
$$V = \pi r^2 h$$

$$V = 3.14 \cdot 24^2 \cdot 30$$

$$V = 54259.2 \text{ cm}^3$$

Directions: Calculate the volume for each of the following.

15.

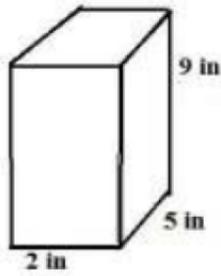


$$L = \underline{\quad} \quad w = \underline{\quad} \quad h = \underline{\quad}$$

$$V = lwh$$

48 m cubed

16.

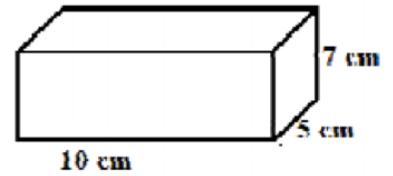


$$L = \underline{\quad} \quad w = \underline{\quad} \quad h = \underline{\quad}$$

$$V = lwh$$

90 in cubed

17.

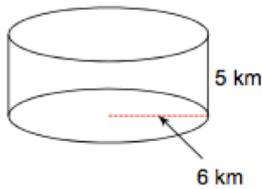


$$L = \underline{\quad} \quad w = \underline{\quad} \quad h = \underline{\quad}$$

$$V = lwh$$

350 cm cubed

18.

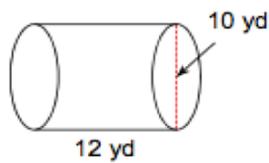


$$\pi = 3.14 \quad r = \underline{\quad} \quad h = \underline{\quad}$$

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

565.2 km cubed

19.

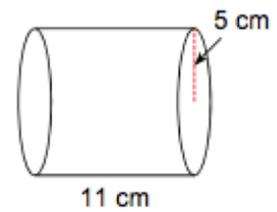


$$\pi = 3.14 \quad r = \underline{\quad} \quad h = \underline{\quad}$$

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

942 yd cubed

20.



$$\pi = 3.14 \quad r = \underline{\quad} \quad h = \underline{\quad}$$

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

863.5 cm cubed

**Week 6 (5/26 - 5/29):**

**NOTES:**

Part II: Word Problem Practice

A birthday present is packaged in a tube that has a length of 10 inches and a diameter of 4 inches. How much paper is needed to wrap the present?  $r = 2$   $h = 10$

Type of Measurement: SA of C

Formula:

$$\begin{aligned} SA &= 2\pi r^2 + 2\pi r h \\ &= 2 \cdot 3.14 \cdot 2^2 + 2 \cdot 3.14 \cdot 2 \cdot 10 \\ SA &= 150.72 \text{ in}^2 \end{aligned}$$

RP

A cereal box has a length of 8 inches, a width of  $1\frac{3}{4}$  inches, and a height of  $12\frac{1}{8}$  inches.

How much cereal is needed to fill the box?

Type of Measurement: V of RP

Formula:

$$\begin{aligned} V &= lwh \\ V &= 8 \cdot 1\frac{3}{4} \cdot 12\frac{1}{8} \\ V &= 169.75 \text{ in}^3 \end{aligned}$$

Find the surface area of a can with a radius of 4 centimeters and a height of 11 centimeters.

Type of Measurement: SA of C

Formula:

$$\begin{aligned} SA &= 2\pi r^2 + 2\pi r h \\ &= 2 \cdot 3.14 \cdot 4^2 + 2 \cdot 3.14 \cdot 4 \cdot 11 \\ SA &= 376.8 \text{ cm}^2 \end{aligned}$$

If a cylindrical water bottle has a radius of 7 centimeters and length of 14 centimeters, how many cubic centimeters of water will it hold?

Type of Measurement: V of C

Formula:

$$\begin{aligned} V &= \pi r^2 h \\ V &= 3.14 \cdot 7^2 \cdot 14 \\ V &= 2154.04 \text{ cm}^3 \end{aligned}$$

**Topic:** Solve practical problems that require determining the surface area of rectangular prisms and cylinders.

**\*\*Keywords have been underlined!**

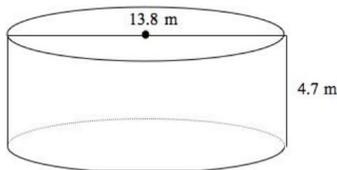
1. A packaging company needs to know how much cardboard will be required to make boxes 18 inches long, 12 inches wide, and 10 inches high. How much cardboard will be needed for each box if there is no overlap in the construction?

Circle one:      SA of a prism              SA of a cylinder              V of a prism              V of a cylinder

1032 in squared

2. Gasoline is stored in a cylindrical container that has a diameter of 13.8 meters and a height of 4.7 meters. Which is closest to the amount of plastic needed to cover the entire container?

Circle one:      SA of a prism              SA of a cylinder              V of a prism              V of a cylinder



D 502.65 m squared

A 299.14m <sup>2</sup>	B 450m <sup>2</sup>	C 500m <sup>2</sup>	D 502.65m <sup>2</sup>
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3. Tim is making a play block for his baby sister by gluing fabric over the entire surface of a foam block. If the length is 6.1 inches, width is 2.3 inches, and height is 2.3 inches, how much fabric will Tim need?

Circle one:      SA of a prism              SA of a cylinder              V of a prism              V of a cylinder

66.7 in squared

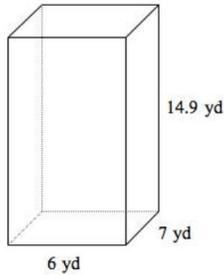
4. Find the surface area of the outside of a cylindrical barrel with a diameter of 10 inches and a height of 12 inches.

Circle one:      SA of a prism              SA of a cylinder              V of a prism              V of a cylinder

533.8 in squared

5. Sherri wants to cover a rectangular-shaped box with wrapping paper. Which is closest to the maximum amount of wrapping paper Sherri needs?

Circle one:      SA of a prism      SA of a cylinder      V of a prism      V of a cylinder

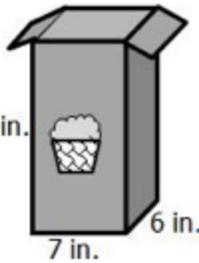


C 471.4 yd squared

A 235.7yd <sup>2</sup>	B 292.6yd <sup>2</sup>	C 471.4yd <sup>2</sup>	D 625.8yd <sup>2</sup>
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**Topic:** Solve practical problems that require determining the volume of rectangular prisms and cylinders.

1. Fran is given a box to put her cupcakes in. Each cupcake is 3 inches long, 3 inches wide and 2 inches tall. How many cupcakes will fit in the box?



Circle one:      SA of a prism      SA of a cylinder      V of a prism      V of a cylinder

Volume of box: 630 in cubed

Volume of cupcake: 18 in cubed

630 divided by 18 = 35 cupcakes

35 cupcakes can fit in the box.

2. A can of corn has a diameter of 6.6 centimeters and a height of 9.9 centimeters. How much corn can the can hold?

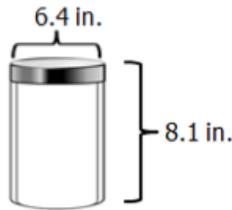
Circle one:      SA of a prism      SA of a cylinder      V of a prism      V of a cylinder

338.53 cm cubed

3.

Round to the nearest tenth.

Tracy would like to fill the glass container shown with pasta from a box.



Identify each box of pasta in which the entire content of the box will fit in the glass container.

Volume of glass container: 260.44 in cubed

<p>A</p> <p>10.6 in. 8 in. 3 in.</p>	<p>254.40 in cubed Correct answer!</p>
<p>B</p> <p>8 in. 8.2 in. 4 in.</p>	<p>262.40 in cubed</p>
<p>C</p> <p>10.1 in. 6 in. 4 in.</p>	<p>242.40 in cubed Correct answer!</p>

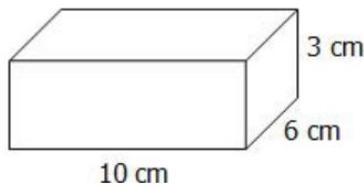
4. Nick wants to determine how much ice it will take to fill his cooler. If the cooler has a length of 22 inches, a width of 12 inches, and a height of 10½ inches, how much ice will his cooler hold?

Circle one: SA of a prism SA of a cylinder V of a prism V of a cylinder

2772 in cubed

5. Jenny's box of candy is empty. What is the closest amount needed to fill the box if two pieces of candy each one cubic centimeter?

Circle one: SA of a prism SA of a cylinder V of a prism V of a cylinder



Volume of candy box: 180 cm cubed

180 cm cubed x 2 = 360

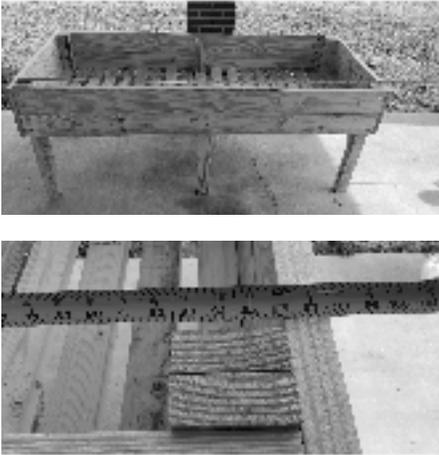
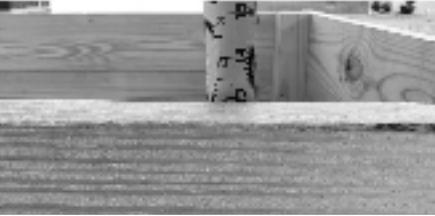
A 360 pieces

A 360 pieces	B 180 pieces	C 38 pieces	D 19 pieces
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### Real-World Application:

Mr. & Mrs. Williams built an elevated garden in March to grow vegetables. The picture below are actual pictures and measurements for the elevated garden.

**Step 1:** Calculate the volume of the elevated garden.

Length	Width	Height
		

$$\text{Volume} = 46176 \text{ in cubed}$$

**Step 2:** Calculate the number of soil bags needed to fill the entire elevated garden.

Store: Lowe's

Miracle-Gro 1.5 ft<sup>3</sup> Organic Raised Bed Soil



$$1 \text{ cubic ft} = 1728 \text{ cubic in}$$

$$46176 \text{ in cubed divided by } 1728 \text{ cubic in} = 26.72 \text{ ft cubed}$$

$$26.72 \text{ ft cubed divided by } 1.5 \text{ ft cubed} = 17.81 \text{ bags} \sim 18 \text{ bags}$$

**Step 3:** Calculate the total price of soil needed to fill the entire elevated garden.

Store: Lowe's

\$8.98 per bag

$$18 \text{ bags} \times \$8.98 = \$161.64 \text{ total price}$$

