6th Basic

7th Advanced

Helping With Math

USA GRADES

Surface Area of a Cylinder

Suitable for student

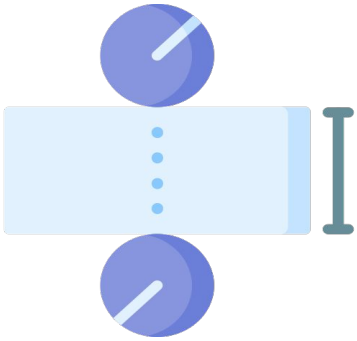
Aged 10-12

This pack is suitable for learners aged 10-12 years old or 6th and 7th graders (USA). The content covers fact files and relevant basic and advanced activities involving finding surface area of a cylinder.

Surface Area is the total area covering the surface or outside part of a three-dimensional object.

To get the surface area of a **cylinder**, you have to get the measures of the area occupied by its bases and curved surface.

If we flatten out a cylinder into a net-like figure on the right, the surface area would be the total area of all the shapes that make up the cylinder.

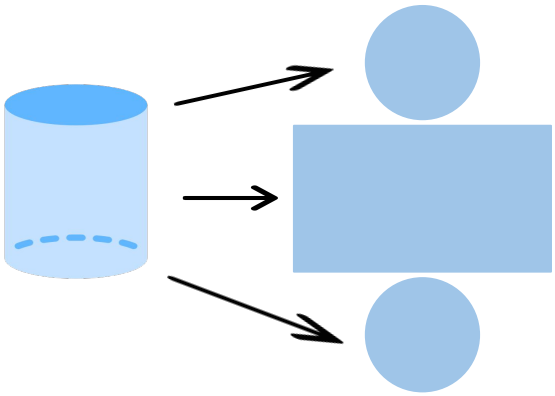


Formulas for Getting the Surface Area of a Cylinder

- Curved Surface Area (C)
  $C = 2\pi rh$
- Total Surface Area (T)
  $T = 2\pi rh + 2\pi r^2$

UNDERSTANDING THE FORMULAS

A cylinder is composed of a curved surface and two flat circular bases. There are two types of surface area in a cylinder: the curved surface area and total surface area.



The **curved surface area** of a cylinder is the area occupied by the curved surface. As you can see in the figure, when flattened, the curved surface becomes a rectangle with its length as the circumference of the base and its width as the height of the cylinder.

Therefore, to get the curved surface area (C), we simply multiply the circumference of the base and the height of the cylinder.

$$C = 2\pi rh$$

The **total surface area** of a cylinder is the sum of the areas of the curved surface and the two circular bases. Therefore, to get the total surface area (T), we add the curved surface area and twice the area of a circular base.

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

For both equations,

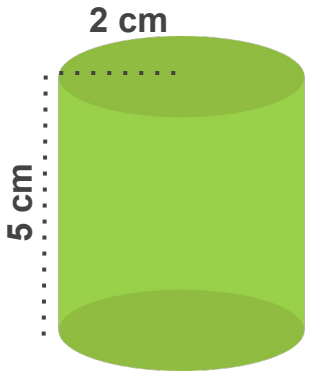
r = radius of the base

h = height of the cylinder

GETTING THE SURFACE AREA OF A CYLINDER

Examples:

What is the curved surface area and total surface area of the following cylinders? Use π = 3.14.

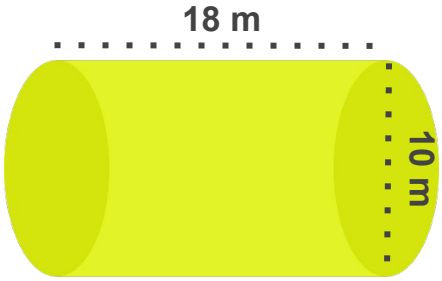


$C = 2\pi rh$
$C = 2(3.14)(2)(5)$
$C = \mathbf{62.8\ cm^2}$

$T = 2\pi rh + 2\pi r^2$
$T = 2(3.14)(2)(5) + 2(3.14)(2)^2$
$T = 62.8 + 25.12$
$T = \mathbf{87.92\ cm^2}$

Therefore, the curved surface area is 62.8 cm^2 and the total surface area is 87.92 cm^2.

Remember to always write the unit of measurement on your final answers! Since we're talking about areas, the answers should be in **square units**.



Radius is half of diameter, so the radius of the base of this cylinder is 10 ÷ 2 = 5 m.

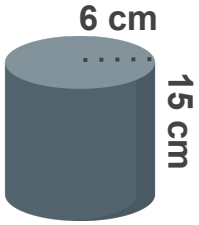
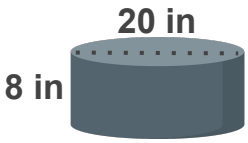
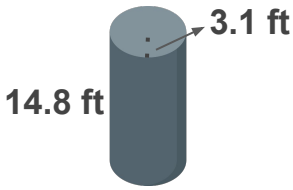
$C = 2\pi rh$
$C = 2(3.14)(5)(18)$
$C = \mathbf{565.2\ m^2}$

$T = 2\pi rh + 2\pi r^2$
$T = 2(3.14)(5)(18) + 2(3.14)(5)^2$
$T = 565.2 + 157$
$T = \mathbf{722.2\ m^2}$

Therefore, the curved surface area is 565.2 m^2 and the total surface area is 722.2 m^2.

EXERCISE: SURFACE AREA OF A CYLINDER

A. Complete the table below. Use π = 3.14.

Cylinder	Radius	Height	Curved Surface Area	Total Surface Area
				
				
				
	9 m	9 m		
	2.5 in	6.3 in		

B. Answer the following problem.

What is the total area of the surfaces of a can of cranberries with radius of 43 mm and height of 42 mm?

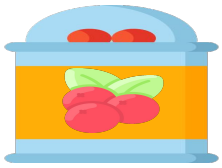
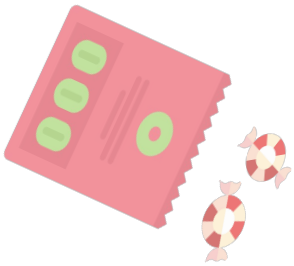


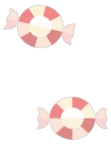
TABLE OF ACTIVITIES

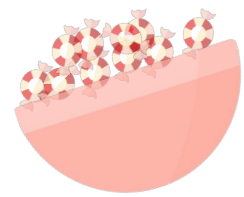
PEPPERMINT CANDIES IN A TUBE

G6
Basic

Suppose that you bought a pack of mini peppermint candies and wanted to repack them into small cylindrical tube containers with the following net. Using a ruler, measure the dimensions of the cylinder in inches, and compute the total area of materials that you have to use to make a tube container.





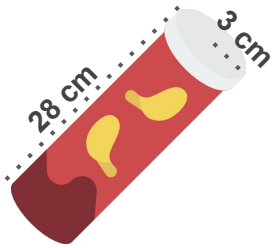


What is the total area of materials needed for a tube container?	How much materials are needed to make 5 of these tube containers?

WRAP IT AROUND

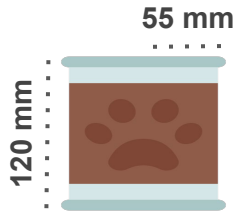
G6 Basic

For the Christmas holiday season, some companies plan to release new limited-edition labels for their products. If the labels would cover the entire curved surface of the product, compute for the area of each paper label that they will use. Use π = 3.14.



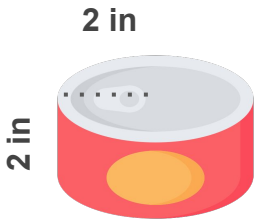
Solution:

Answer: _____



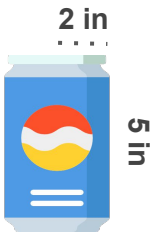
Solution:

Answer: _____



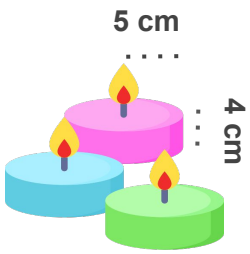
Solution:

Answer: _____



Solution:

Answer: _____



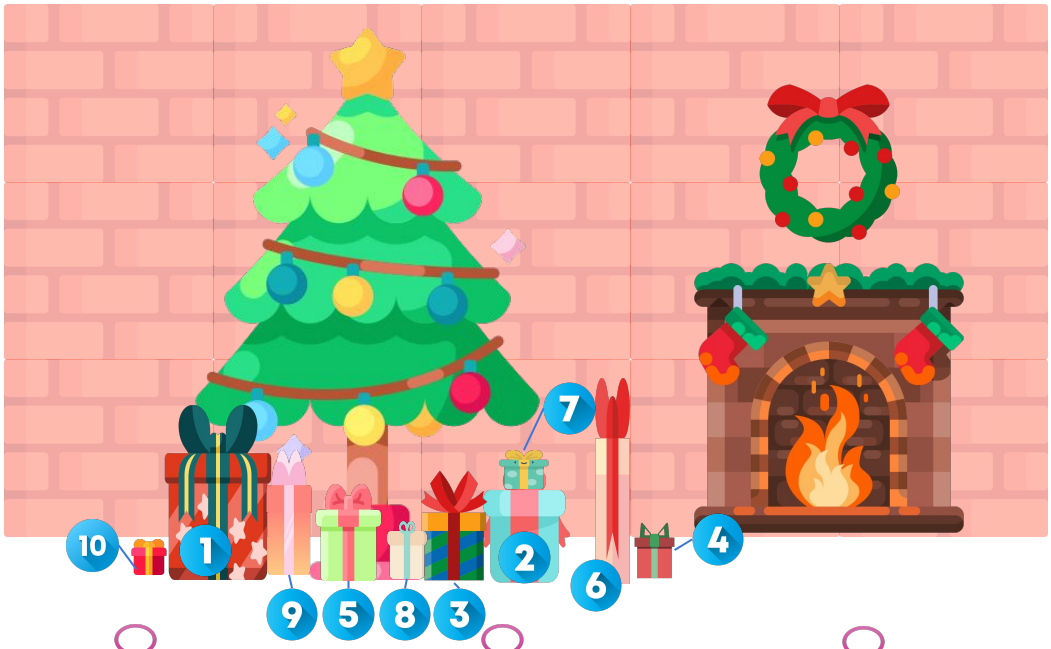
Solution:

Answer: _____

JOSHUA'S GIFTS

G6 Basic

Joshua is quite excited about Christmas eve, so he asks his mom to tell him which gifts are for him. His mom gave him a list of the gifts and their corresponding total surface area. All gifts are in cylindrical gift boxes, and the ones with the correctly listed total surface area are for him. Encircle all Joshua's gifts.



1
r = 11 cm
h = 24 cm
T = 2,417.8 cm²

2
r = 7 cm
h = 16 cm
T = 1,011.08 cm²

3
r = 6 cm
h = 7 cm
T = 565.2 cm²

4
r = 4 cm
h = 10 cm
T = 331.68 cm²

5
r = 2 in
h = 6 in
T = 10.48 in²

6
r = 1.5 in
h = 14 in
T = 246.01 in²

7
d = 3.5 in
h = 2.5 in
T = 40.71 in²

8
r = 25 mm
h = 100 mm
T = 19,625 mm²

9
d = 80 mm
h = 170 mm
T = 43,708.8 mm²

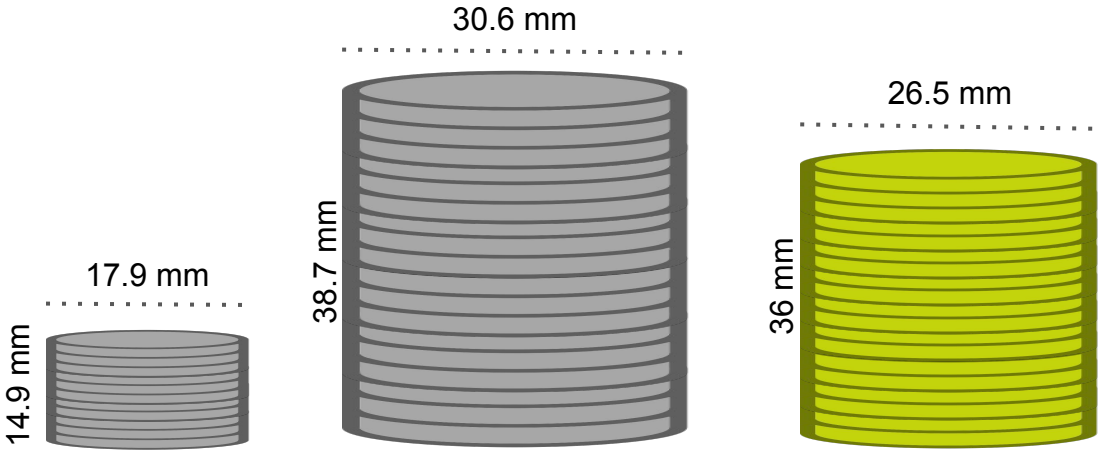
10
d = 60 mm
h = 50 mm
T = 15,072 mm²

LOOSE CHANGE

G6 Basic

After buying Christmas gifts for your friends using your piggy bank savings, you are only left with a few loose change. You decided to pile up these coins according to value and put a sticky tape around each curved surface of the stacks.

Find the minimum area of sticky tape to cover the curved surface of the stacks completely. Round off your answers to the nearest hundredths. Use π = 3.14.



dimes **half-dollar coins** **dollar coins**

Coin Stack	Area of Sticky Tape
dime	
half-dollar	
dollar	

Solution:

CYLINDERS FOR GIFTS

G6 Basic

Make a trip to a gift shop and look for 10 cylindrical items that you can gift someone on Christmas. Bring a measuring tape and measure each of their diameter and height, then solve for the radius and total surface area. Use π = 3.14.

Object	Diameter	Radius	Height	Total Surface Area
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				
10)				

Solution:

GIFT WRAPPING

G7 Advanced

Santa Claus assigned one of his elves to wrap 5 cylindrical tumblers as gifts. Given the dimensions of the tumblers, identify whether the corresponding gift wrappers Santa gave the elf are enough to wrap them completely.

	Radius	Height	Total Surface Area	Gift Wrap Dimensions	Is the gift wrap enough?
1)	40 mm	110 mm		300 mm by 126 mm	
2)	5.5 cm	17 cm		30 cm by 25 cm	
3)	3.3 cm	19 cm		35 cm by 23 cm	
4)	1.75 in	6.2 in		12 in by 7 in	
5)	0.2 ft	1.1 ft		1.4 ft by 1.3 ft	

Solution:

CHRISTMAS CANDLES

G7 Advanced

A certain shop displayed candles of different sizes for Christmas decoration. Fill in the missing measures of the candles. Round off your answers to the nearest tenth.

	Diameter	Radius	Height	Curved Surface Area
1)			3 in	43.4 in^2
2)			1.5 ft	9.4 ft^2
3)		22 mm		12,440.7 mm^2
4)	9 cm			424.1 cm^2
5)			13.7 cm	111.9 cm^2

Solution:

CHRISTMAS FOOD DRIVE

G7 Advanced

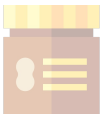
You decided to participate in a Christmas food drive this year and bought several jars of peanut butter and strawberry jam. Read and solve the following related problems. Write your answers in the space provided.

1) At least how many square inches of plastic wrap is needed to completely cover a jar of strawberry jam with a base radius of 2.3 in and a height of 9.2 in? How much plastic wrap is needed to cover 8 jars of strawberry jam?

Answer: _____

Solution:

2) After wrapping the jars you bought, you are left with 150.9 in^2 of the plastic wrap. With this amount left, you are able to wrap the curved surface of exactly one jar of peanut butter without excess. If the height of the peanut butter jar is 8 inches, what is the diameter of its base?



Answer: _____

Solution:

POTTED POINSETTIAS

G7 Advanced

A flower shop is preparing to sell poinsettia plants for the Christmas holidays. Analyze each of the following situations and solve the problem. Write your answers in the space provided.

1) They have to paint the surfaces of cylindrical plant pots that each measures 10.5 inches in diameter and 9.5 inches in height. What is the total surface area of each pot? Explain how you got your answer. (Hint: A pot has only one base surface.)

Answer:

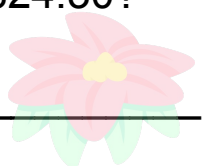
_____

_____

2) If there are 50 cylindrical plant pots to be used for their poinsettias, what is the total area of the surfaces that they need to paint?

Answer: _____

3) If a can of paint can cover up to 10,000 square inches, how many cans do they need to buy for the 50 plant pots? How much is the total cost of paint that they will use if each can cost $24.30?



Answer: _____

4) Will they spend less money buying new paint if they only have to paint 40 plant pots? Why or why not?

Answer:

_____

_____

SIMPLE SCALE DRAWING

G7 Advanced

Draw the cylindrical holiday products that are described in each item. Label the measures of the base radius, height, and surface area of your items. Make sure that the scale of the measures is as accurate as possible.

1) A can of eggnog ice cream with a base radius of 3 inches and curved surface area of at least 95 square inches	
2) A single-layered Christmas cake with height of 100 mm and curved surface area of at least 45,000 mm^2	
3) A gingerbread cookie with a diameter of 9 cm and a total surface area of at least 3,000 cm^2	

ANSWER GUIDE

Activity 1

one tube container: 22.37 in^2
5 tube containers: 111.85 in^2

Activity 2

1) 527.52 cm^2
2) 41,448 mm^2
3) 25.12 in^2
4) 62.8 in^2
5) 125.6 cm^2

Activity 3

The following gifts should be encircled:

1, 2, 5, 8, 9, 10

Activity 4

1) dime: 276.04 mm^2
2) half-dollar: 3,718.45 mm^2
3) dollar: 2,995.56 mm^2

Activity 5

Answers may vary.

ANSWER GUIDE

Activity 6

1) C = 37,680 mm^2; yes
2) C = 777.15 cm^2; no
3) C = 462.15 cm^2; yes
4) C = 87.37 in^2; no
5) C = 1.63 ft^2; yes

Activity 7

1) 4.6 in; 2.3 in
2) 2.0 ft; 1.0 ft
3) 44 mm; 90 mm
4) 4.5 cm; 15 cm
5) 2.6 cm; 1.3 cm

Activity 8

1) 166.11 in2 for one jar; 1,328.88 in2 for 8 jars
2) 6 in

Activity 9

1) 399.76 in^2
2) 19,988 in^2
3) 2 cans; $48.60
4) No because 40 plant pots has total surface area of 15,990.4 in^2, which means they still have to buy 2 cans of paint.

Activity 10

Answers may vary.

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