Find the volume and surface area of the cylinder.

\[ V = \pi r^2 h \]

\[ SA = 2\pi r^2 + 2\pi rh \]

\[ V = 3.14 \times (9)^2 \times 20 \]

\[ V = 3.14 \times (9 \text{ ft}) \times (9 \text{ ft}) \times (20 \text{ ft}) \]

\[ V = 5086.8 \text{ ft}^3 \]

\[ SA = 2 \times (3.14) \times (9)^2 + 2 \times (3.14)(9)(20) \]

\[ SA = 2 \times 3.14 \times 81 + 1130.4 \text{ ft}^2 \]

\[ SA = 508.60 + 1130.4 \text{ ft}^2 \]

\[ SA = 1639.08 \text{ ft}^2 \]
Why Was Shakespeare So Successful?

Cross out the letters above each correct answer (most answers are rounded). When you finish, write the remaining letters in the spaces at the bottom of the page. Use 3.14 for π.

Find both the lateral area and total surface area of the cylinder.

1. \[ \text{L.A.} = \text{3 ft.} \]
   \[ \text{B.T.A.} = \text{8 ft.} \]
   \[ \text{7.5 in.} \]

2. \[ \text{L.A.} = \text{9.2 in.} \]
   \[ \text{B.T.A.} = \text{15 cm} \]

3. \[ \text{L.A.} = \text{2 cm} \]
   \[ \text{B.T.A.} = \text{15 cm} \]

Find the total surface area of the cylinder given the radius \( r \) or diameter \( d \) and height \( h \).

4. \( r = 5 \text{ ft} \)
   \[ h = 12 \text{ ft} \]

5. \( r = 1.6 \text{ m} \)
   \[ h = 3.5 \text{ m} \]

6. \( d = 18 \text{ ft} \)
   \[ h = 7 \text{ ft} \]

7. \( d = 13 \text{ cm} \)
   \[ h = 2 \text{ cm} \]

Solve.

8. A can of pineapple juice is a cylinder with a radius of 2.4 in. and a height of 11 in. What is the area of the label around the can?

9. A steel water tank is a cylinder with a diameter of 30 ft and a height of 18 ft. How many square feet of steel were needed to make the tank?

10. Mr. Butterworth baked a cake in the shape of a cylinder. The cake had a diameter of 9 in. and a height of 5 in. He spread chocolate icing over the entire cake (except the bottom). How many square inches of icing did he use?

11. The net for a cylinder is shown at the right. If \( r = 6 \text{ cm} \) and \( h = 15 \text{ cm} \), find the following for the cylinder:
   a. \text{lateral area}
   b. \text{total area}

| TH | IN | HE | RE | AD | HA | RD | AT | BA | DW | BE | ST | IL | HE | LP | EN | SL | OW | UP | PL | ER | AY |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 594.3 ft² | 836.3 ft² | 549.6 ft² | 416.9 ft² | 189.3 in² | 165.8 in² | 178.3 in² | 156.7 ft² | 94.2 ft² | 48.7 ft² | 84.5 ft² | 67.4 ft² | 56.3 ft² | 50.4 ft² | 20.7 ft² | 51.2 ft² | 1294 cm² | 1570 cm² |

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Measurements in Geometry:
Surface Area of Cylinders
8. A can of pineapple juice is a cylinder with a radius of 2.4 in. and a height of 11 in. What is the area of the label around the can?

\[ S_A = 2 \pi r^2 + 2 \pi rh \]

\[ 2 \times (3.14) \times (2.4) \times (11) \]

\[ 165.8 \text{ in}^2 \]
9. A steel water tank is a cylinder with a diameter of 30 ft and a height of 18 ft. How many square feet of steel were needed to make the tank?

\[ 3108.6 \text{ ft}^2 \]
10. Mr. Butterworth baked a cake in the shape of a cylinder. The cake had a diameter of 9 in. and a height of 5 in. He spread chocolate icing over the entire cake (except the bottom). How many square inches of icing did he use?

\[
SA = 3.14(4.5)^2 + 2(3.14)(4.5)(5)

= 204.9 \text{ in}^2
\]
11. The net for a cylinder is shown at the right. If $r = 6\, \text{cm}$ and $h = 15\, \text{cm}$, find the following for the cylinder:

   a. lateral area
   b. total area

$$2(3.14)(6)(15)$$

$$565.2\, \text{cm}^2$$

$$791.3\, \text{cm}^2$$
What Kind of Music Do Astronauts Like?

Cross out the letter next to each correct answer (some answers are rounded). Use \( \pi = 3.14 \) when you finish, the answer to the title question will remain.

Find the volume of the cylinder.

1. \( \text{cm}^3 \)
2. \( \text{in.}^3 \)
3. \( \text{ft}^3 \)
4. \( \text{m}^3 \)

Find the volume of the cylinder given the radius (r) or diameter (d) and height (h).

4. \( r = 10 \text{ in.} \) \( h = 3 \text{ in.} \)
5. \( r = 4.4 \text{ cm} \) \( h = 8.5 \text{ cm} \)
6. \( d = 2.6 \text{ m} \) \( h = 0.75 \text{ m} \)

Solve.

7. A mug in the shape of a cylinder has a base with a radius of 4 cm. How many milliliters of liquid does it hold if filled to a height of 9 cm. (1 cm\(^3\) holds 1 mL)

8. A peanut butter jar has a height of 5.9 in. and diameter of 3.6 in. One cubic inch holds 0.45 oz of peanut butter. How many ounces will fit in the jar?

9. Jo was comparing two cylinders that both had a radius of 5 cm. The first had a height of 10 cm and the other a height of 20 cm. How many times greater was the volume of the larger cylinder?

10. Bo was comparing two cylinders that both had a height of 5 cm. The first had a radius of 10 cm and the other a radius of 20 cm. How many times greater was the volume of the larger cylinder?

11. The paperweight shown below is made of glass with a density of 3.5 grams per cubic centimeter. How much does the paperweight weigh?

12. Find the volume of copper in this copper pipe. (1 m = 100 cm)
Rectangular Prism - a 3D shape with 6 faces that are rectangles

\[ V = lwh \]
Surface area is the sum of the area of the surfaces (top, bottom, front, back, left, right)

\[ SA = 2lw + 2lh + 2wh \]
Find the volume and surface area.

Volume: $V = lwh = 12 \times 3 \times 4 = 144 \text{ cm}^3$

Surface Area: $SA = 2lw + 2lh + 2wh = 2(12)(3) + 2(12)(4) + 2(3)(4) = 72 + 96 + 24 = 192 \text{ cm}^2$
Why Did the Farmer’s Daughter Watch the Lazy Cows?

Note the two letters next to each correct answer (some answers are rounded). Write these letters in the two boxes above the exercise number at the bottom of the page.

Find the surface area of the prism.

1. \[ \text{Surface Area: } 115 \text{ ft}^2 \]
2. \[ \text{Surface Area: } 90 \text{ in}^2 \]
3. \[ \text{Surface Area: } 220 \text{ m}^2 \]
4. \[ \text{Surface Area: } 120 \text{ cm}^2 \]
5. \[ \text{Surface Area: } 150 \text{ ft}^2 \]
6. \[ \text{Surface Area: } 180 \text{ ft}^2 \]
7. A cereal box is 7.4 in. wide, 9.6 in. high, and 2.5 in. deep. How many square inches of cardboard are needed to make this box?
8. A steel cargo container is shaped like a cube measuring 5.2 ft on each edge. How much steel is needed to make this container?
9. How much canvas is needed to make an A-frame tent that is 4 ft high with a rectangular floor 6 ft wide and 9 ft long?
10. What is the surface area of the triangular prism made by folding up this net? Given:
   \[a = 20 \text{ cm}\]
   \[b = 25 \text{ cm}\]
   \[c = 28 \text{ cm}\]
11. A classroom measures 32 ft long, 25 ft wide, and 9 ft high. The combined area of doors and windows is 140 ft². What is the remaining area of the four walls of the room?
12. A cube with 2-inch sides is placed on a cube with 3-inch sides. Then a cube with 1-inch sides is placed on the 2-inch cube. What is the surface area of the three-cube tower?

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Measurements in Geometry: Surface Area of Prisms

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6.

- The surface area (SA) is given by the formula:
  \[ SA = hP + 2B \]

- The perimeter (P) is the sum of the sides:
  \[ P = 4 + 4 + 4 \]

- The base area (B) is calculated as:
  \[ B = \frac{1}{2} \cdot 4 \cdot (3.5) \]

- Substituting the values:
  \[ 7 \cdot 12 + 2 \cdot 7 \]
  \[ 84 + 14 \]
  \[ 98 \text{ ft}^2 \]
\[ S_A = hP + 2B \]
\[ 8(27) + 2(30) \]
\[ 216 + 60 \]
\[ 276 \text{ m}^2 \]

\[ P = 6 + 9 + 12 \]
\[ B = \frac{1}{2}(6)(10) \]
\[ \frac{1}{2}(60) \]
\[ 30 \]
5. \[ P = 10 + 6 + 8 \]
\[ B = \frac{1}{2} (6)(8) \]
\[ S = hP + 2B \]
\[ 9(24) + 2(24) \]
\[ 264 \text{ cm}^2 \]
What Did the Blind Old Buck Say to His Doe?

Write the exercise letter in the box above the answer at the bottom of the page.

Find the volume. Each cube represents 1 cm³.

Find the volume of the prism.

Solve. Round answers to one decimal place.

N Frosted Honey Krunch Cereal comes in a box that is 8.5 in. wide, 11.4 in. high, and 2.6 in. deep. What is the volume of the box?

H An aluminum cube measures 8 cm on each edge. Aluminum weighs 2.7 grams per cubic centimeter. How much does the cube weigh?

E Karina was comparing the volume of a 20-inch cube to the volume of a 10-inch cube. How many times greater is the volume of the larger cube?

V When water freezes, its density drops from 1.00 g/cm³ to 0.92 g/cm³. Find the mass in grams of an ice cube 1 meter on each edge. (1 m = 100 cm)

D An aquarium weighs 18.5 lb when empty. The aquarium is 30 in. long, 12 in. wide, and is filled with water to a depth of 16 in. Water weighs 0.036 pound per cubic inch. How much does the aquarium weigh when it is full of water?

Y Find the volume of concrete in the construction block shown at the right.