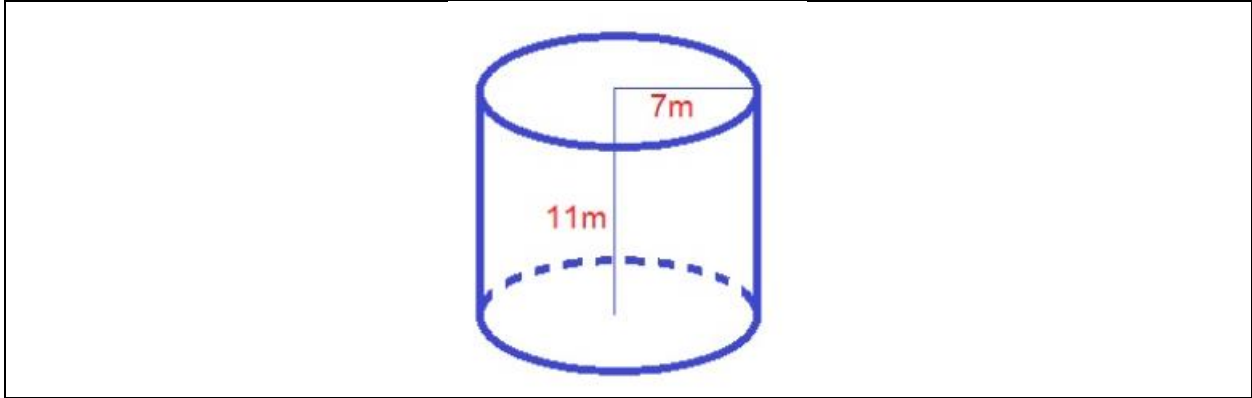## Surface Area and Volume of Cylinders Practice

Use the following information to answer the first question.

1. To determine the surface area of the cylinder, the correct work is
   A) SA = π(7)²(11)
   B) SA = π(11)²(7)
   C) SA = 2π(7)² + 2π(7)(11)
   D) SA = 2π(11)² + 2π(7)(11)

2. The diameter of a cylinder is 18 cm and its height is 15.5 cm. To the nearest hundredth, the surface area is _____.

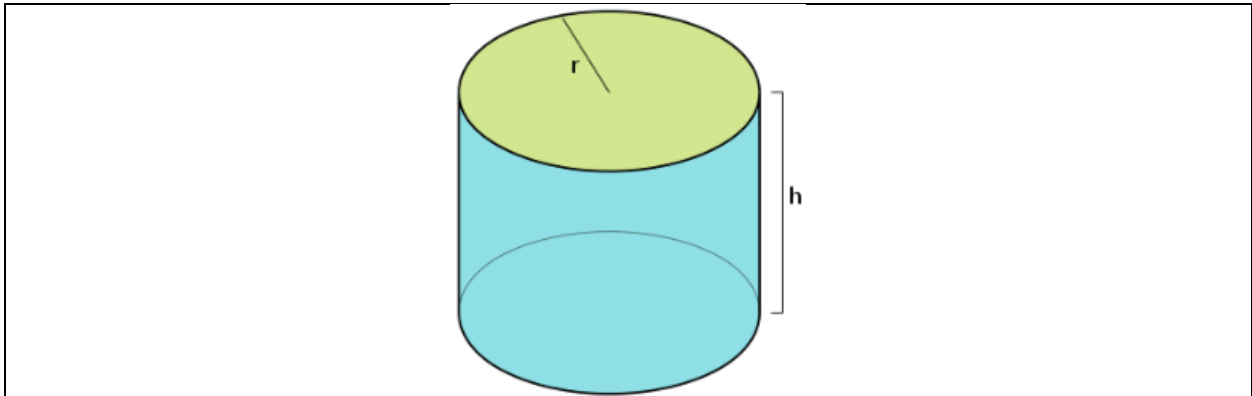Use the following diagram to answer the next question.
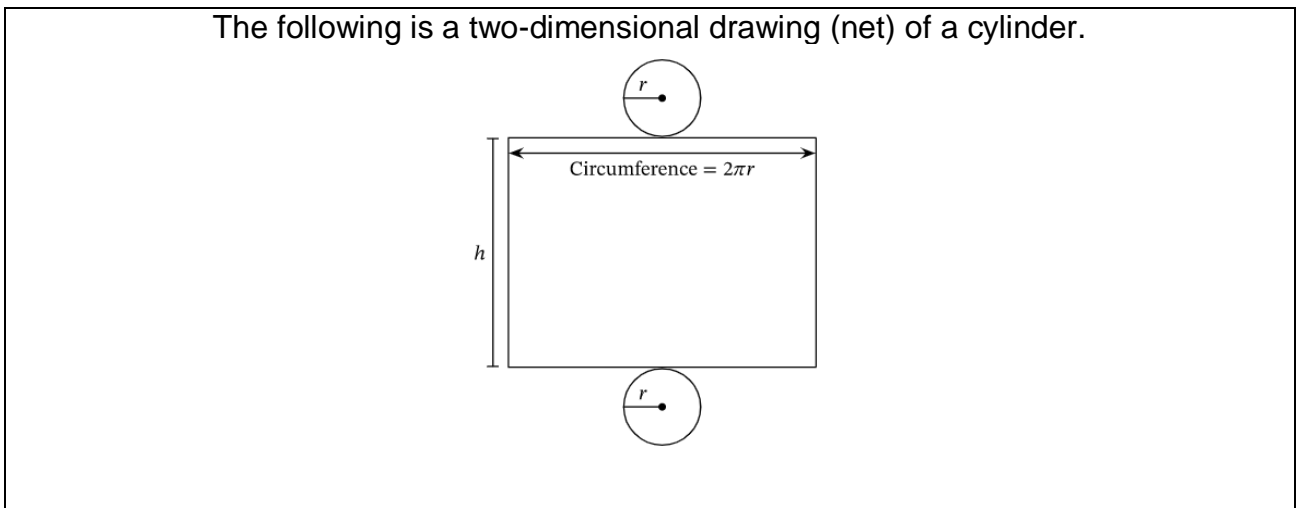
The following is a two-dimensional drawing (net) of a cylinder.

3. If the surface area of the cylinder is 1105.84 cm², and r = 8 cm, then the height, h, is
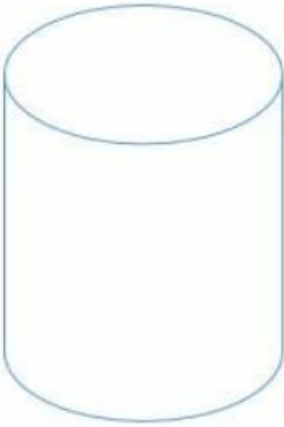
    A) 12 cm B) 14 cm C) 16 cm D) 18 cm

4. If the diameter of a cylinder is 38 cm and the height is 31 cm, the volume in cubic centimetres, to the nearest whole number is

    A) 35 158 B) 40 630 C) 135 158 D) 140 630

Use the following diagram to answer the next question.

5. The volume of the cylinder is 1194.59 cm³. If the height is 9 cm, then the radius, to the nearest tenth, is _____.

Use the following information to answer the next question.

Consider the following two cylinders	
Cylinder A	Cylinder B

Cylinder A
Height = 22 cm
Radius = 12 cm

Cylinder B
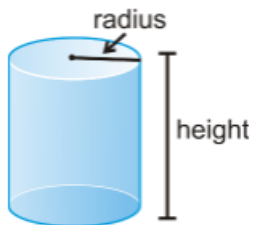Height = 25 cm
Radius = 18 cm

6. When cylinder A is filled with sand **twice** and each time poured into cylinder B, the volume of empty space remaining in cylinder B, to the nearest whole number, is

A) 3879 cm^3 B) 4407 cm^3 C) 5542 cm^3 D) 6216 cm^3

Use the following information to answer the next question.

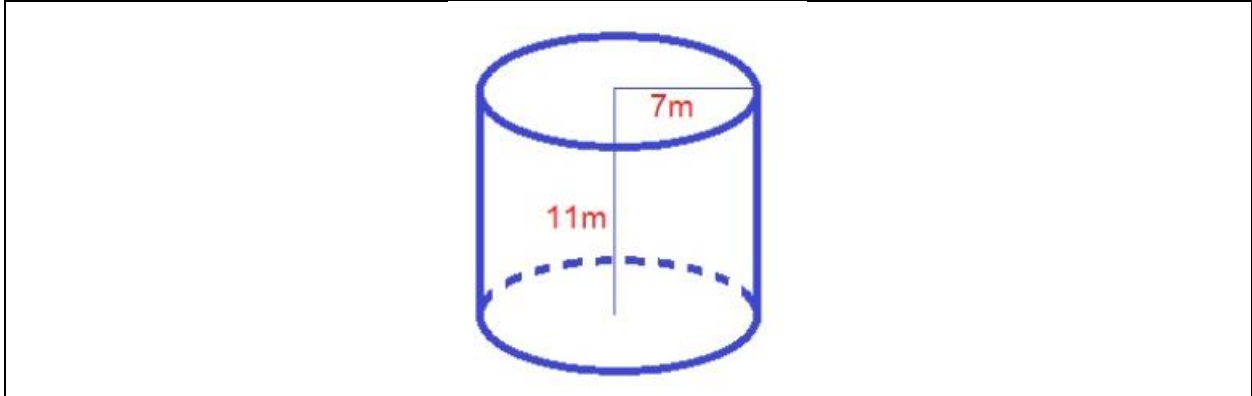| Box A	Box B
Radius = 6 cm Height = 15 cm	Radius = 6 cm Height = 15 cm

7. Determine the amount of green paper, in cm^2 to the nearest whole number, to cover the bottom and curved section of Box A (no lid) in order to look like Box B.

8. If the radius of the cylinder is doubled, is the volume doubled? Explain.

Use the following information to answer the first question.

1. To determine the surface area of the cylinder, the correct work is
   A) $SA = \pi(7)^2(11)$
   B) $SA = \pi(11)^2(7)$
   C) $SA = 2\pi(7)^2 + 2\pi(7)(11)$
   D) $SA = 2\pi(11)^2 + 2\pi(7)(11)$

Solution

The surface area of a cylinder is the sum of the areas of the two circular ends and the area of the curved section.

The area of a circle is determined by πr^2. When the curved section in rolled out to lay flat, it is a rectangle with dimensions of $2\pi r$ (circumference of a circle) and height, h.

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

With a radius of 7 m and a height of 11 m, substitute these values.

$SA = 2\pi(7)^2 + 2\pi(7)(11)$

The correct answer is C.

2. The diameter of a cylinder is 18 cm and its height is 15.5 cm. To the nearest hundredth, the surface area is ___1385.44 cm²___.

Solution

The diameter is given, but we require the radius. Divide the diameter by 2. The radius is 9 cm.
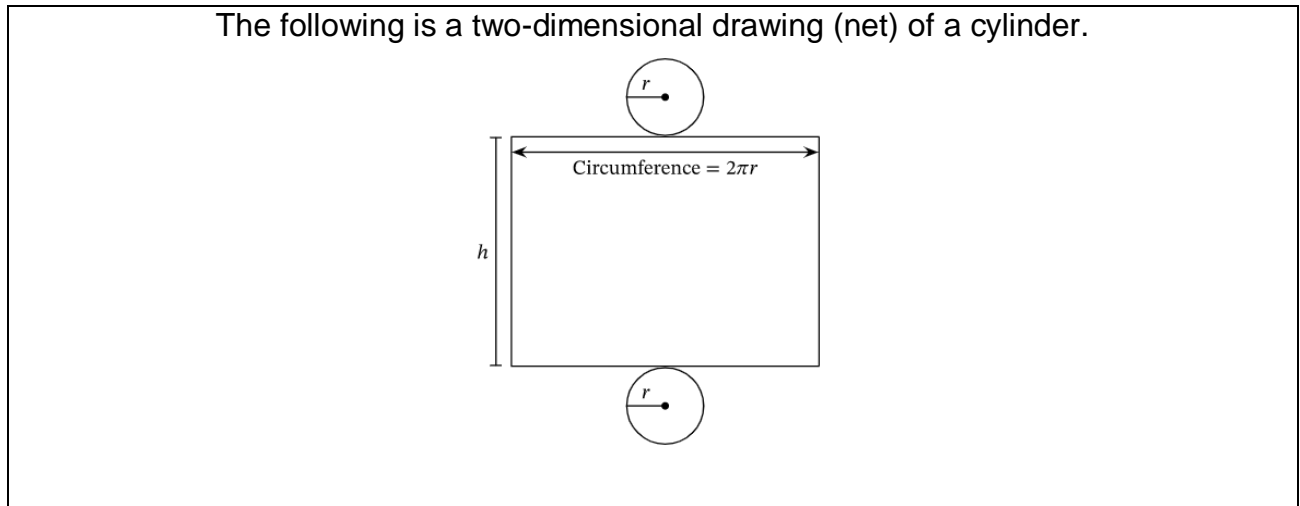
The formula is SA = 2πr² + 2πrh

SA = 2π(9)² + 2π(9)(15.5)

SA = 508.938… + 876.504…

SA = 1385.442…

Use the following diagram to answer the next question.

The following is a two-dimensional drawing (net) of a cylinder.

3. If the surface area of the cylinder is 1105.84 cm², and r = 8 cm, then the height, h, is

   A) 12 cm   B) 14 cm   C) 16 cm   D) 18 cm

Solution

SA = 2πr² + 2πrh

1105.84 = 2π(8)² + 2π(8)(h)

1105.84 - 2π(8)² = 2π(8)(h)

$$\frac{1105.84 - 2\pi(8)^2}{2\pi(8)} = h$$

h = 13.999…

h = 14 cm

The correct answer is B.

4. If the diameter of a cylinder is 38 cm and the height is 31 cm, the volume in cubic centimetres, to the nearest whole number is

A) 35 158   B) 40 630   C) 135 158   D) 140 630

Solution

Volume = (Area of the Base) (Height)

Since the diameter is 38 cm, the radius is half of this, or 19 cm.

The base is circular. The area of the base is πr^2.

Area of the Base = $\pi(19)^2$

The height is 31 cm.

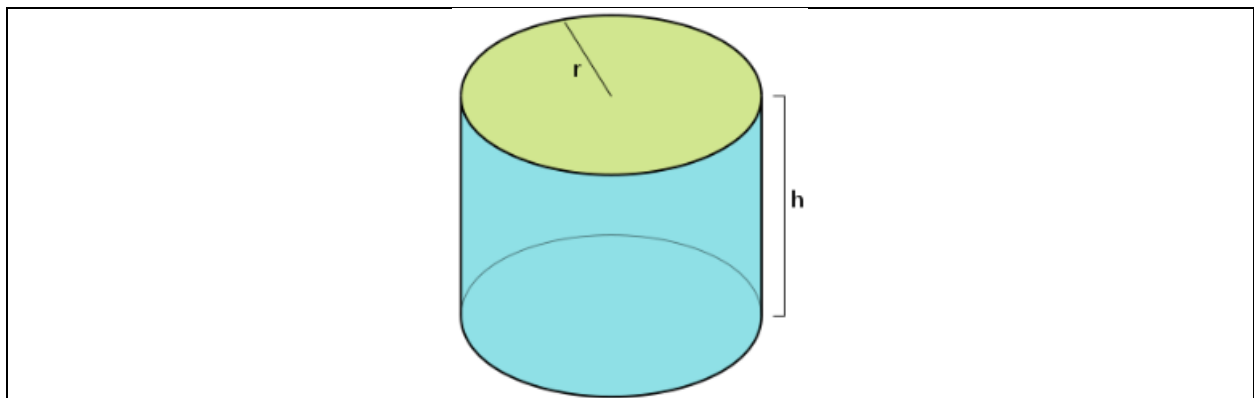Volume = $(\pi(19)^2)$ (31)

Volume = 35 157.563…

To the nearest whole number, the volume of this cylinder is 35 158 cm³.

The correct answer is A.

Use the following diagram to answer the next question.

5. The volume of the cylinder is 1194.59 cm³. If the height is 9 cm, then the radius, to the nearest tenth, is ___6.5 cm___.

Solution

Volume = (Area of the Base) (Height)

Substitute known values.

1194.59 = (πr²) (9)

Divide both sides of the equal sign by 9π, to isolate the variable.

$$\frac{1194.59}{9\pi} = \frac{(\pi r^2)9}{9\pi}$$

$$\frac{1194.59}{9\pi} = r^2$$

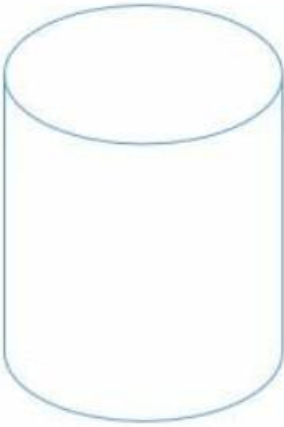Take the square root of both sides of the equal sign.

$$\sqrt{\frac{1194.59}{9\pi}} = r$$

6.499…

The radius is 6.5 cm.

Use the following information to answer the next question.

Consider the following two cylinders	
Cylinder A	Cylinder B
Height = 22 cm Radius = 12 cm	Height = 25 cm Radius = 18 cm

6. When cylinder A is filled with sand **twice** and each time poured into cylinder B, the volume of empty space remaining in cylinder B, to the nearest whole number, is

A) 3879 cm^3 B) 4407 cm^3 C) 5542 cm^3 D) 6216 cm^3

Solution

Volume$_{cylinderA}$ = $\pi(12)^2(22)$

                     = 9952.565… cm^3

Volume$_{cylinderB}$ = $\pi(18)^2(25)$

                     = 25 446.900… cm^3

Multiply the volume of cylinder A by 2, and then subtract this amount from the volume of cylinder B.

25 446.900… - (2)(9952.565…) = 5541.768…

The correct answer is C.

Use the following information to answer the next question.

Box A	Box B
Radius = 6 cm Height = 15 cm	Radius = 6 cm Height = 15 cm

7. Determine the amount of green paper, in cm^2 to the nearest whole number, to cover the bottom and curved section of Box A (no lid) in order to look like Box B.

Solution

Use the surface area formula but remove one of the circular ends (no lid).
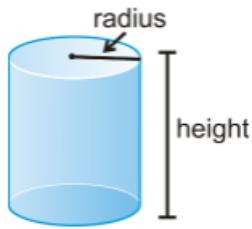
SA = πr^2 + 2πrh

SA = $\pi(6)^2$ + 2$\pi(6)(15)$

SA = 36π + 180π

SA = 678.584…

The amount of green paper required is 679 cm^2.

8. If the radius of the cylinder is doubled, is the volume doubled? Explain.

radius

height

Solution

Substitute some values and compare the volumes.

For example, first calculate the volume if the radius is 5 cm and the height is 15 cm.

$V = \pi r^2 h$

$V = \pi(5)^2(15)$

$V = 375\pi$

Double the radius to 10 cm.

$V = \pi r^2 h$

$V = \pi(10)^2(15)$

$V = 1500\pi$

Comparing the volumes:

$$\frac{1500\pi}{375\pi} = 4$$

By doubling the radius and maintaining the same height, the volume increases by a factor of 4. Therefore, the volume is not doubled when the radius is doubled.