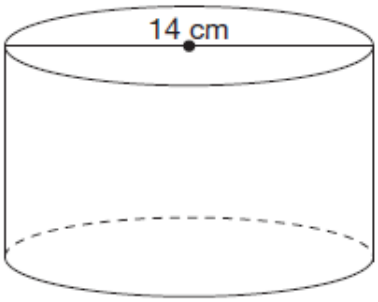
How High Is It?

The cylinder pictured below has a surface area of 660 cm^2.

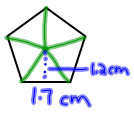


Use the following formula to determine the height of the cylinder:

Surface area = $2\pi r^2 + 2\pi rh$

Show your work.

1. Calculate area of base.



Area of Δ.

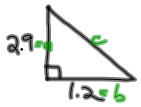
$A = (b \times h) \div 2$

$= (1.7 \times 1.2) \div 2$

$= 1.02 \times 5$

$= 5.10\ cm^2$

2. Use Pythagorean Theorem to solve for "L".

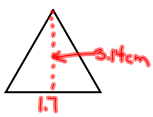


$a^2 + b^2 = c^2$

$2.9^2 + 1.2^2 = c^2$

$c = 3.14$

3. Calculate the area of the face.



$A = (b \times h) \div 2$

$= (1.7 \times 3.4) \div 2$

$= 2.89 \times 5$

$= 14.45\ cm^2$

4. Calculate Total Surface Area.

$S.A._{TOT} = A_{base} + A_{sides}$

$= 5.1 + 14.45$

$= 19.55 cm^2$

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$V_{sbp} = (A_s \times h) \div 3$

$100^{\times 3} = (40 \times h) \div 3^{\times 3}$

* Follow SAMDEB to isolate for "h".

$\frac{300}{40} = \frac{(40 \times h)}{40}$

$h = 7.5$ cm

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#3a) $P = 100$, $A = ?$

$P = 4s$

$\frac{100}{4} = \frac{4s}{4}$

$s = 25$

$A = s^2$

$A = 25^2$

$= 625$

3b) $P = ?$, $A = 1$

$P = 4s$

$= 4(1)$

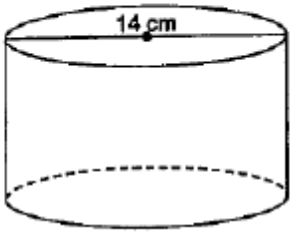
$= 4$

$A = s^2$

$\sqrt{1} = \sqrt{s^2}$

$s = 1$

The cylinder pictured below has a surface area of 660 cm^2.



Use the following formula to determine the height of the cylinder:

Surface area = $2\pi r^2 + 2\pi rh$

Show your work.

$660 = 2\pi(7)^2 + 2\pi(7)h$

$660 = 307.88 + 43.98h$

$660 - 307.88 = 43.98h$

$\frac{352.12}{43.98} = \frac{43.98h}{43.98}$

$8 = h$

∴ The height is 8

Learning Goals

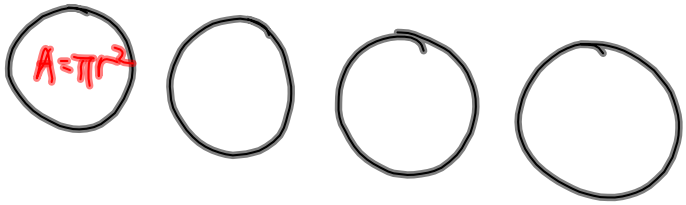
1. To understand how to calculate the surface area of a sphere.

2. To understand how to calculate the volume of a sphere.

8.6 Volume and Surface Area of a Sphere

The volume for the surface area of a sphere with radius r is:

$$SA = 4\pi r^2$$



Example One

Calculate the surface area of a sphere with a diameter of 8.0 cm.

$SA = 4\pi r^2$, $r = d \div 2$

$= 4\pi(4)^2$ $= 8 \div 2$

$\doteq 200.96\ cm^2$ $= 4$

The formula for the volume of a sphere with radius r is:

$$V = \frac{4}{3}\pi r^3$$

or

$$V = (4\pi r^3) \div 3$$

Example Two

Calculate the volume of a sphere with a radius of 3.5 mm.

$V = (4\pi r^3) \div 3$

$= (4\pi 3.5^3) \div 3$

$= 4 \times \pi \times 3.5$ [y^x] 3 [enter] $\div 3$

$= 179.6 \text{ mm}^3$

[^] [y^x] [x^y]

Example Three

Rachel must buy 100 spherical balloons for $0.08 each and enough helium to inflate them. Helium costs $0.024/L. Each balloon will inflate to a surface area of 900 cm^2. How much will it cost to buy and inflate them?

Hint: 1 cm^3 = 1 mL and 1000 mL = 1 L.

1. Cost of balloons.

$0.08 \times 100 = \$8.00$

2a) Calculate volume of each balloon.

$V = (4\pi r^3) \div 3$

2b) Calculate the radius.

$SA = 4\pi r^2$

$\frac{900}{4\pi} = \frac{4\pi r^2}{4\pi}$

$\sqrt{71.62} = \sqrt{r^2}$

$r = 8.5$

*Now go back & calculate the volume.

$V = (4\pi(8.5)^3) \div 3$

$= 2570.61\ cm^3$

3. Calculate how much volume is needed for 100 balloons.

$2570.61 \times 100 = 257\,061\ cm^3$

$1\ cm^3 = 1\ mL$

$257\,061\ cm^3 = 257\,061\ mL$

$\frac{257\,061}{1000} = 257.061\ L$

4. Calculate total cost.

$Cost = 8 + (257.061 \times 0.024)$

Complete: p. 470 - 471 #1 - 6.