What's Going On?

Checking In

Minds on The Volume Formulas

Action! Problem Solving with Exponentials

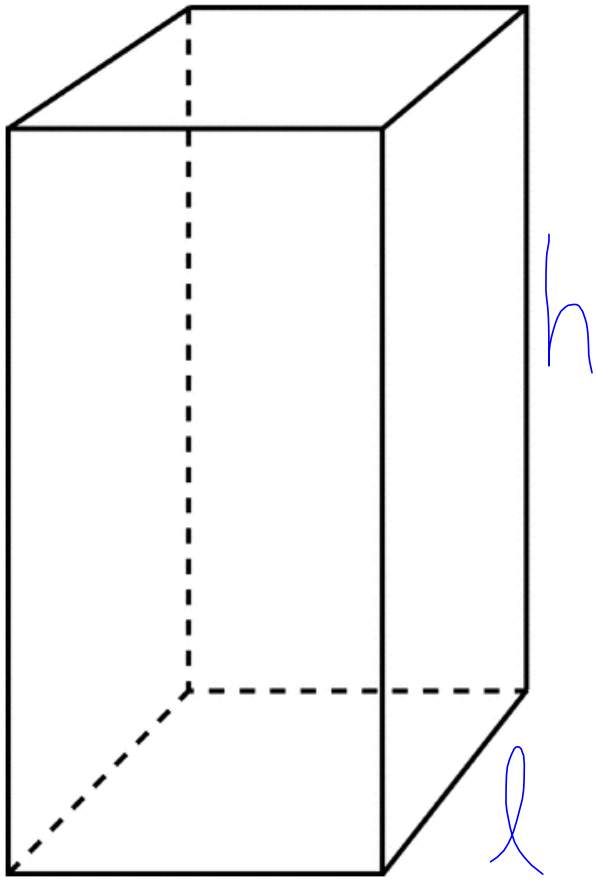
Consolidation Fill 'er Up!

Learning Goal - I will be able to solve equations involving exponents.

Minds on

The Volume Formulas

Rectangular Prism

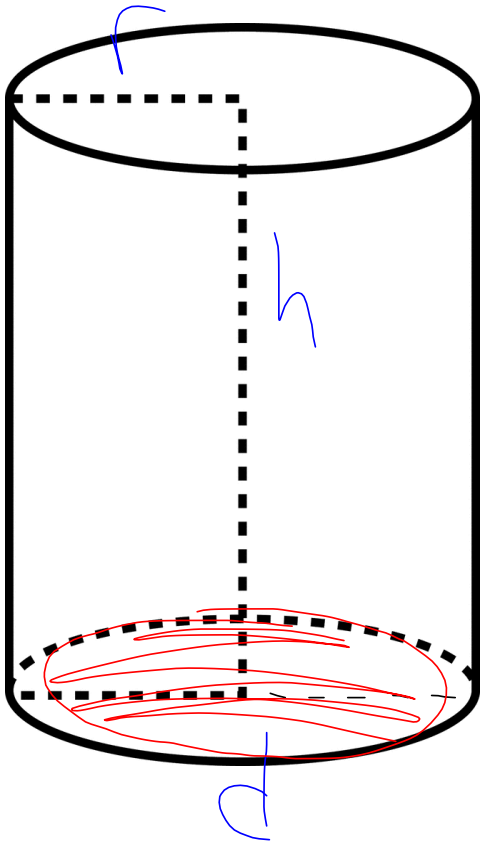


$V = l \times w \times h$

Minds on

The Volume Formulas

Cylinder

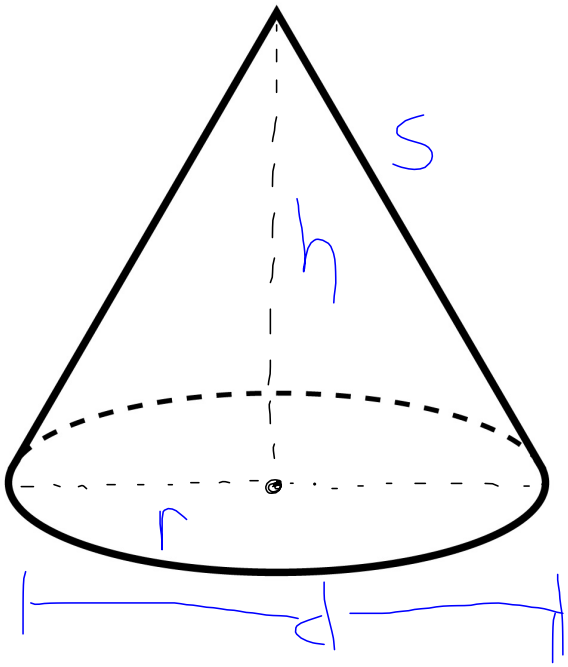


$$V = \pi r^2 h$$

Minds on

The Volume Formulas

Cone



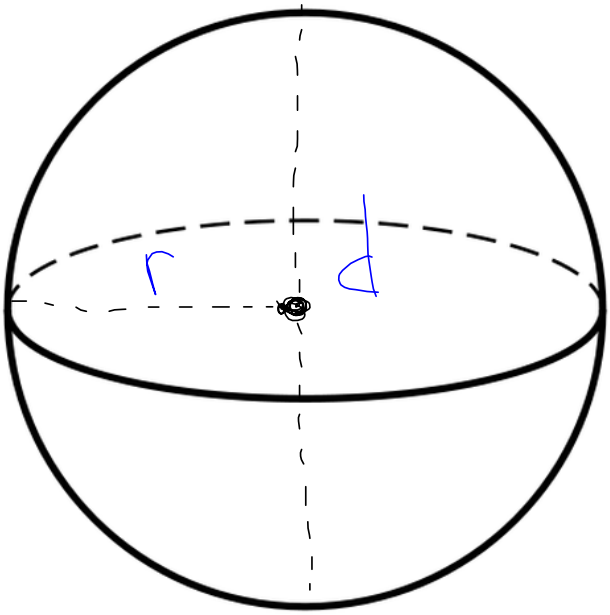
$$V = \frac{\pi r^2 h}{3}$$

$$V = \frac{1}{3}\pi r^2 h$$

Minds on

The Volume Formulas

Sphere



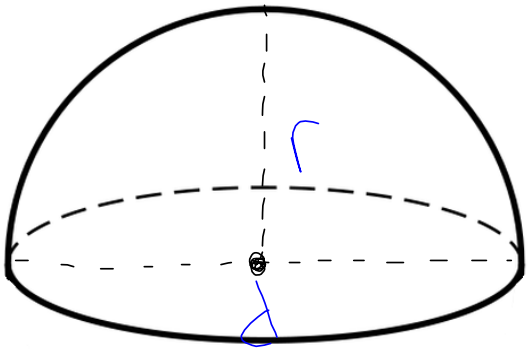
$$V = \frac{4\pi r^3}{3}$$

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

Minds on

The Volume Formulas

Hemisphere



$$V_{sphere} = \frac{1}{2}\frac{4\pi r^3}{3} \text{ or } \frac{4}{3}\pi r^3$$

$$V_{hemisphere} = \frac{2\pi r^3}{3} \text{ or } \frac{2}{3}\pi r^3$$

Action!

Problem Solving with Exponentials

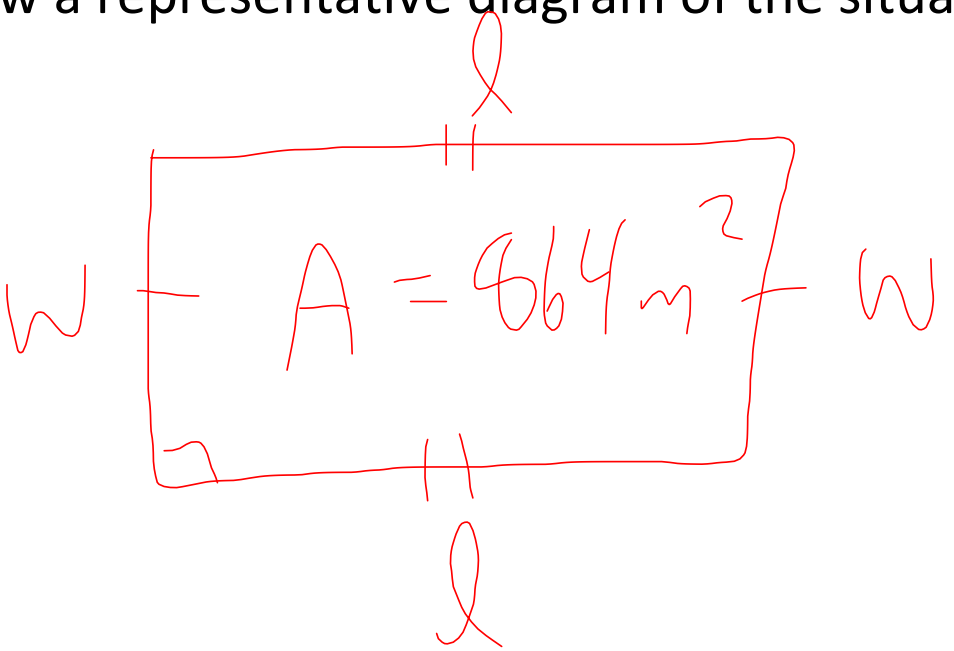
The area of a rectangular housing lot is 864 m^2. If the width of the lot is 2/3 the length, what are the dimensions of the lot?

Action!

Problem Solving with Exponentials

The area of a rectangular housing lot is 864 m^2. If the width of the lot is 2/3 the length, what are the dimensions of the lot?

1. Draw a representative diagram of the situation.



$A = l \times w$

Action!

Problem Solving with Exponentials

The area of a rectangular housing lot is 864 m^2. If the width of the lot is 2/3 the length, what are the dimensions of the lot?

2. Choose an appropriate formula to solve the problem.

Action!

Problem Solving with Exponentials

The area of a rectangular housing lot is 864 m^2. If the width of the lot is 2/3 the length, what are the dimensions of the lot?

3. Write an equation that relates one dimension in terms of another.*
*May need to be repeated

$$w = \frac{2}{3}l$$

(or)

$$w = \frac{2l}{3}$$

Action!

Problem Solving with Exponentials

The area of a rectangular housing lot is 864 m^2. If the width of the lot is 2/3 the length, what are the dimensions of the lot?

4. Substitute all known values and expressions into the formula to get an equation in only one variable.

$w = \frac{2}{3}l$

$A = l \times w$

$864 = l \times \frac{2}{3}l$

Action!

Problem Solving with Exponentials

The area of a rectangular housing lot is 864 m^2. If the width of the lot is 2/3 the length, what are the dimensions of the lot?

5. Solve the equation for the remaining variable.

$$864 = l \times \frac{2}{3} l$$

$$3 \times 864 = \frac{2}{3} l^2 \times 3$$

$$\frac{2592}{2} = \frac{2l^2}{2}$$

$$\sqrt{l^2} = \sqrt{1296}$$

$$l = 36$$

Action!

Problem Solving with Exponentials

The area of a rectangular housing lot is 864 m^2. If the width of the lot is 2/3 the length, what are the dimensions of the lot?

6. Use your equation(s) from #3 to determine any missing dimensions.

$l = 36$

$w = \frac{2}{3} l$

$w = \frac{2}{3}(36)$

$w = 24$

Action!

Try It!

The area of a triangle is 54 cm^2. If the base of the triangle is 1/3 the height, what are the dimensions of the triangle?

$A = \frac{b \times h}{2}$

$b = \frac{1}{3}h$

$b = \frac{h}{3}$

$2 \times 54 = \frac{\frac{h}{3} \times h}{2} \times 2$

$108 = \frac{h^2}{3} \times 3$

$324 = h^2$

$h = 18$

$b = 6$

Action!

Station Rotation!

You will be rotating through 4 stations solving 4 different problems with different groups of people.

Make sure you follow your "circuit"

You will have ___ minutes at each station, go get 'em!

You need: pencil, some paper, calculator

A sports ball has a volume of 1 000 cm^3. What is the diameter of the ball?

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

$$3 \times 1000 = \frac{4\pi r^3}{3} \times 3$$

$$\frac{3000}{4\pi} = \frac{4\pi r^3}{4\pi}$$

$$\sqrt[3]{r^3} = \sqrt[3]{\frac{3000}{4\pi}}$$

$$r = 6.2$$

$$\therefore \text{diameter} = 12.4$$

A shoebox has a volume of 1 000 cm^3. The width of the shoebox is double the height and the length is triple the height. What is the height of the box?

$V = \ell \times w \times h$

$w = 2h$

$\ell = 3h$

$1000 = 3h \times 2h \times h$

$1000 = 6h^3$

$\frac{1000}{6} = \frac{6h^3}{6}$

$\sqrt[3]{h^3} = \sqrt[3]{166.67}$

$h = 5.5$

∴ the height is 5.5 cm

A juice can has a volume of 1 000 cm^3. The height of the can is equal to the diameter.

What is the radius of the can?

$V = \pi r^2 h$

$h = d$

$h = 2r$

$1000 = \pi r^2 (2r)$

$\frac{1000}{2\pi} = \frac{\pi \times 2r^3}{2\pi}$

$r^3 = 159.2$

$r = 5.4$

A waffle cone has a volume of 1 000 cm^3. The radius of the cone is one quarter of the height. What is the height of the cone?

$$V = \frac{\pi r^2 h}{3} \qquad r = \frac{1}{4}h \qquad r = \frac{h}{4}$$

$$3(1000) = \frac{\pi\left(\frac{h}{4}\right)^2 h}{3} \times 3$$

$$3000 = \pi\left(\frac{h}{4}\right)^2 h$$

$$3000 = \pi\left(\frac{h^2}{16}\right) h$$

$$16(3000) = \frac{\pi h^3}{16} \times 16$$

$$\frac{48000}{\pi} = \frac{\pi h^3}{\pi}$$

$$\sqrt[3]{h^3} = \sqrt[3]{15276.9}$$

$$h = 24.8$$

A waffle cone has a volume of 1 000 cm^3. The radius of the cone is one quarter of the height. What is the height of the cone?

$$V = \frac{\pi r^2 h}{3}$$

$$4 \times r = \frac{h}{4} \times 4$$

$$h = 4r$$

$$3 \times 1000 = \frac{\pi r^2 (4r)}{3} \times 3$$

$$\frac{3000}{4\pi} = \frac{\pi \times 4r^3}{4\pi}$$

$$r^3 = 238.7$$

$$r = 6.2$$

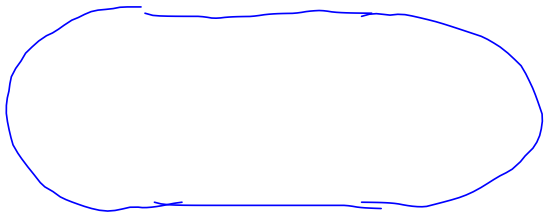
$$\therefore h = 24.6$$

Consolidation

Fill 'er Up!

A propane storage tank consists of two hemispheres attached to the ends of a cylinder. The length of the cylindrical part is equal to the diameter of the hemispherical ends. If the tank holds 10 000 m^3 of propane, what are the dimensions of the tank?

$V_{CYL} = \pi r^2 h \quad V_{SPH} = \frac{4\pi r^3}{3}$



$h = 2r$

$V = \pi r^2 h + \frac{4\pi r^3}{3}$

$V = \pi r^2 (2r) + \frac{4\pi r^3}{3}$

$$V = \pi r^2(2r) + \frac{4\pi r^3}{3}$$

$$V = \pi \times 2r^3 + \frac{4\pi r^3}{3}$$

$$V = 2\pi r^3 + \frac{4\pi r^3}{3}$$

$$V = 6.28r^3 + 4.19r^3$$

$$V = 10.47r^3$$

$$\frac{10000}{10.47} = \frac{10.47r^3}{10.47}$$

$$\sqrt[3]{r^3} = \sqrt[3]{955.1}$$

$$r = 9.8$$

$$h = d = 19.6$$

The fuel consumption of a particular make of small car is related to the car's speed by the equation: $F = 6.0 + 0.001(v - 90)^3$ where F is the fuel consumption in L/100 km and v is the average speed in km/h. The formula is only valid for speed in excess of 90 km/h. If this car is consuming 7.2 L/100km what is its average speed?

$7.2 = 6.0 + 0.001(v-90)^3$

$-6.0 \quad -6.0$

$\frac{1.2}{0.001} = \frac{0.001(v-90)^3}{0.001}$

$\sqrt[3]{1200} = \sqrt[3]{(v-90)^3}$

$10.6 = v - 90$

$+90 \quad +90$

$v = 100.6 \text{ km/h}$