

## Lesson 1.3 - Using Formulas to Solve Story Problems

### What is a Formula?

- A formula is an equation that describes how two or more variables are related.

For Example:

$$\underline{d=rt}$$

This formula tells us how Rate, Time, and Distance are related.

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Before we can use the formulas, we need to pick out what we need from the story problem. So let's practice translating.

Ex. 1:

*Translate the verbal description into a mathematical formula.*

The Area  $A$  of a circle is the product of the number  $\pi$  (pi) and the square of its radius.

$$A = \pi r^2$$

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### Ex. 2:

*Translate the verbal description into a mathematical formula.*

The daily cost  $C$  of manufacturing computers is \$175 times the number of computers manufactured,  $x$ , plus \$7000.

$$C = 175x + 7000$$

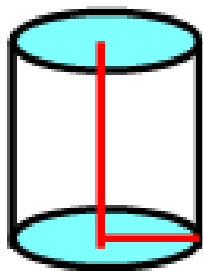
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### Ex. 3:

*Translate the verbal description into a mathematical formula.*

The volume **V** of a right circular cylinder is the product of the number  $\pi$  (pi), the square of its radius **r**, and its height **h**.

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



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### Solving for a Variable:

Solving for a Variable means we need to get the variable by itself on one side of the equation with all other variables and constants on the other side.

Ex:

$4x - 3y = 7$ , solve for  $y$

$$\begin{array}{r} -4x \qquad \qquad -4x \\ \hline -3y = -4x + 7 \\ \hline \frac{-3y}{-3} = \frac{-4x + 7}{-3} \end{array}$$

$$y = \frac{4}{3}x - \frac{7}{3}$$

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Ex 4:

The volume  $V$  of a cone is given by the formula, where  $r$  is the radius and  $h$  is the height of the cone.

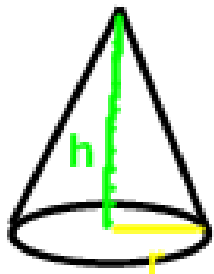
a.) Solve for  $h$

$$3(V) = \left( \frac{1}{3} \pi r^2 h \right) \cdot 3$$

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

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

b.) Use the result from part a.) to find the height of the cone if its volume is  $50\pi$  cubic feet and its radius is 5 feet.



$$h = \frac{3(50\pi)}{\pi(5)^2} = \frac{150}{25} = 6$$

$$h = 6 \text{ ft}$$

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Look at pages 81-82.

This is where most of the formulas you will use are listed.

Any questions with regard to the formulas here?

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### Ex 5:

The formula  $Y = C + bY + I + G + N$  is a model used in economics to describe the total income of an economy. In the model,  $Y$  is income,  $C$  is consumption,  $I$  is investment in capital,  $G$  is government spending,  $N$  is net exports, and  $b$  is a constant. Solve for  $Y$ .

$$\begin{array}{r} Y = C + bY + I + G + N \\ \quad -by \quad -by \\ \hline Y - bY = C + I + G + N \\ \frac{Y(1-b)}{(1-b)} = \frac{C + I + G + N}{(1-b)} \end{array}$$

$$Y = \frac{C + I + G + N}{(1-b)}$$



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### Ex 6:

The perimeter of a rectangular picture window is 466 inches. The length of the window is 55 inches more than the width. Find the dimensions of the window.

$$P = l + w + l + w$$

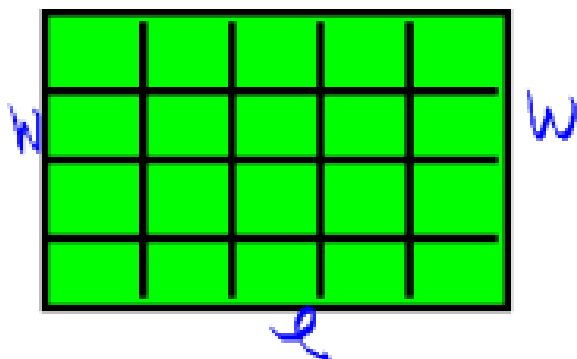
$$P = 2l + 2w$$

$$466 = 2(55 + w) + 2w$$

$$466 = 110 + 2w + 2w$$

$$466 = 110 + 4w$$

$$l = 55 + w$$



$$\begin{array}{r} 466 = 110 + 4w \\ -110 \quad -110 \\ \hline \end{array}$$

$$\begin{array}{r} 356 = 4w \\ \hline 4 \quad 4 \end{array}$$

$$89 = w$$

$$\begin{array}{l} l = 89 + 55 \\ l = 144 \end{array}$$

The width is 89 in.  
The length is 144 in.

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Homework:

Pg 86-89: # 7-10 all, 11, 14, 19,  
27-31 all, 33, 43, 45, 47-50 all

(18 Problems)