



1.2 FORMULAS AND APPLICATIONS



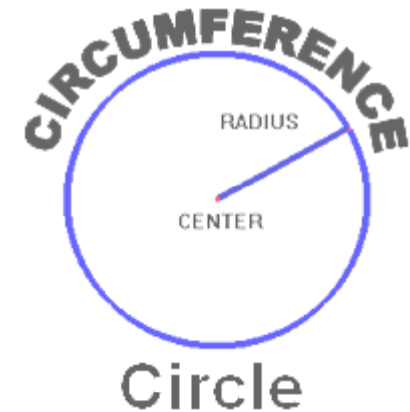
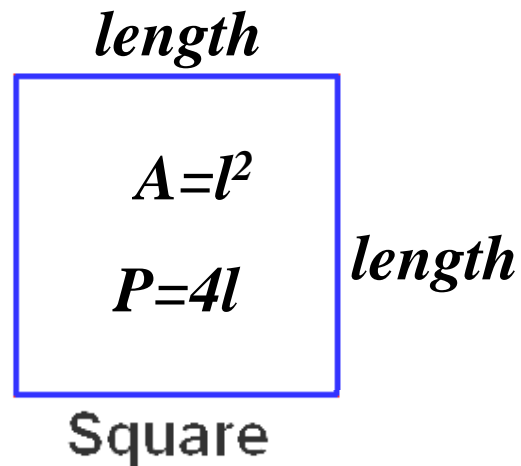
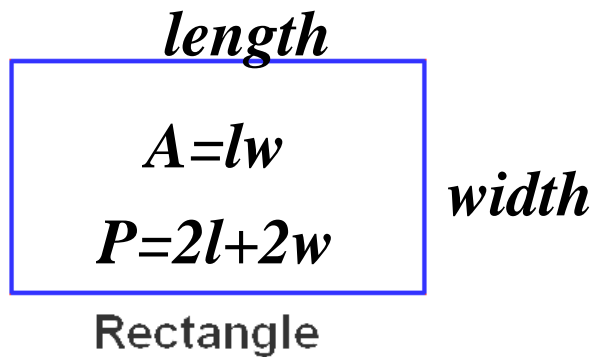
Objectives:

In this section, you will learn about:

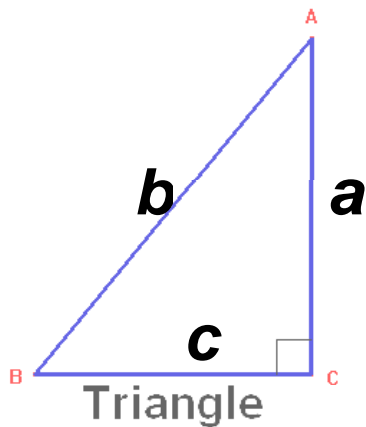
- How to solve Formulas
- How to solve simple word Problems

Formula *الصيغة*

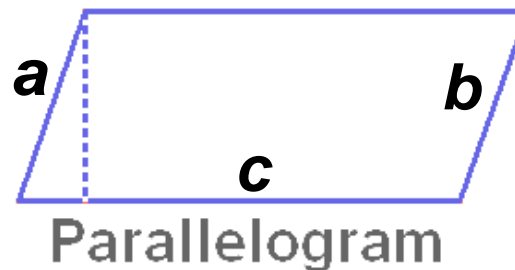
is an equation that expresses known relationships between two or more variables.



$$A = \pi r^2, \quad C = 2\pi r$$



$$A = \frac{1}{2}ac, \quad P = a + b + c$$



$$A = ac, \quad P = 2b + 2a$$

Ex1. Solve the formula $2l + 2w = P$ for w .

$$2l + 2w = P$$

$$2l - 2l + 2w = P - 2l$$

$$2w = P - 2l$$

$$\frac{2w}{2} = \frac{P - 2l}{2}$$

$$w = \frac{P - 2l}{2} \quad \text{or} \quad w = \frac{P}{2} - l$$

Strategy for Solving Formulas:

- 1) Simplify the formula by **opening parenthesis**, multiplying **both sides** by **LCD**.
- 2) Collect all terms involving the **wanted** variable in the **left hand side** and **others** in the **right hand side**
- 3) **Factor out** the **wanted** variable.
- 4) Divide **both sides** by the the coefficient of wanted variable

Ex2. Solve the formula $A = P + Prt$ for P .

$$A = P + Prt$$

$$A = P(1 + rt)$$

$$\frac{A}{1 + rt} = \frac{P(1 + rt)}{1 + rt}$$

$$\frac{A}{1 + rt} = \frac{P\cancel{(1 + rt)}}{\cancel{1 + rt}}$$



$$\frac{A}{1 + rt} = P$$

Strategy for Solving Formulas:

- 1) Simplify the formula by **opening parenthesis**, multiplying **both sides** by **LCD**.
- 2) Collect all terms involving the **wanted variable** in the **left hand side** and others in the **right hand side**
- 3) **Factor out** the **wanted variable**.
- 4) Divide **both sides** by the coefficient of wanted variable

Ex3. Solve the formula for the specified variable:

$$P = \frac{Ar}{1 + rt}, \quad \text{for } r$$

$$(1 + rt)P = \cancel{(1 + rt)} \frac{Ar}{\cancel{1 + rt}}$$

$$P + rtP = Ar$$

$$rtP - Ar = -P$$

$$\underbrace{(tP - A)} r = -P$$

$$\frac{\cancel{(tP - A)}}{\cancel{(tP - A)}} r = \frac{-P}{(tP - A)}$$

$$\Rightarrow r = \frac{-P}{(tP - A)}$$

$$\text{or} \quad \Rightarrow r = \frac{P}{(A - tP)}$$

Strategy for Solving Formulas:

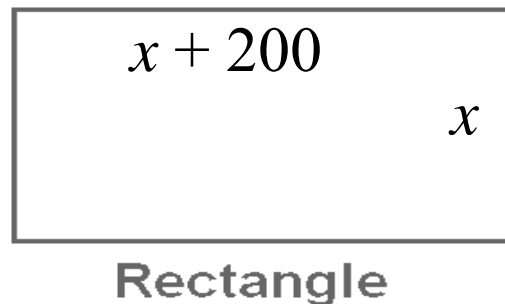
- 1) Simplify the formula by **opening parenthesis**, multiplying **both sides** by **LCD**.
- 2) Collect all terms involving the **wanted variable** in the **left hand side** and others in the **right hand side**
- 3) **Factor out** the **wanted variable**.
- 4) Divide **both sides** by the coefficient of wanted variable

Ex4. The length of a rectangle is 200 feet more than the width. If the perimeter of the rectangle is 1040 feet. Find the length and the width.

Sol:

Let x represents one of the quantities: Let $x =$ the width.

Represent other quantities in terms of x : $x + 200 =$ the length.



The Perimeter of the rectangle:

$$P = 2(\text{length} + \text{Width})$$

Strategy for solving word problems:

- 1) **Identify the Variable** that the problem asks about, read the problem carefully, especially the question posed at the end of the problem. Then call that quantity x or any other variable.
- 2) **Express All Unknown Quantities in Term of the variable** you found in step 1. Draw a diagram or make a table.
- 3) **Set Up the Model (Equation)**, by determining the relationship between the quantities you found in step 2.
- 4) **Solve the Equation and Check Your Answer.**



Write an equation in x that describes the conditions.

$$2(x + 200) + 2 \cdot x = 1040$$

$$x = 160$$

The width = 160 feet

The length = $160 + 200 = 360$ feet

Ex5. One fifth of a number plus one-fourth of the number is 5 less than one-half of the number. What is the number.

Sol:

Let x represent the number

One fifth of a number: $\frac{1}{5}x$


One fourth of a number: $\frac{1}{4}x$

One half of a number: $\frac{1}{2}x$

$$\frac{1}{5}x + \frac{1}{4}x = \frac{1}{2}x - 5$$

Strategy for solving word problems:

- 1) **Identify the Variable** that the problem asks about, read the problem carefully, especially the question posed at the end of the problem. Then call that quantity x or any other variable.
- 2) **Express All Unknown Quantities in Term of the variable** you found in step 1. Draw a diagram or make a table.
- 3) **Set Up the Model (Equation)**, by determining the relationship between the quantities you found in step 2.
- 4) **Solve the Equation and Check Your Answer.**


$$\frac{1}{5}x + \frac{1}{4}x = \frac{1}{2}x - 5$$

Multiply both sides by LCD = 20

$$4x + 5x = 10x - 100$$

$$x = 100$$

The number is 100