

## Linear Equations Word Problems Use Table

Word problems for *systems of linear equations* are troublesome for most of the students in understanding the situations and bringing the word problem into equations. We tried to explain the trick of solving word problems for *equations with two variables* with an example.

### Example:

2000 tickets were sold in an exhibition on Saturday. The cost of a ticket for an adult is \$4 and for a child is \$2. The total amount collected on Saturday was \$6400. Find the number of adult tickets and child tickets sold on Saturday.

### Solution:

#### Step 1:

Total number of tickets sold = 2000

Cost of ticket for an adult = \$4

Cost of ticket for a child = \$2

Total amount collected = \$6400

We are asked to find the number of adult tickets and children tickets sold.

**Let x be the number of adult tickets sold and y the number of child tickets sold on Saturday.**

#### Step 2:

Total number of tickets sold = 2000

Number of adults tickets sold + Number of child tickets sold = 2000

$$x + y = 2000 \text{ ----- (1)}$$

Total amount collected = Amount collected from adult tickets + Amount collected from child tickets

Since there are x adults and the adult ticket cost is \$4 per, the amount collected from adult tickets is 4x and since there are y children and the child ticket costs \$2 per child, the amount collected from child tickets is 2y.

$$6400 = 4x + 2y$$

It can be written as  $4x + 2y = 6400 \text{ ----- (2)}$

Now, we got a **system of two linear equations in two variables.**

$$x + y = 2000 \text{ ----- (1)}$$

$$4x + 2y = 6400 \text{ ----- (2)}$$

	adult	child	
tickets	x	y	$x+y=2000$
costs	4x	2y	$4x+2y=6400$

### Step 3:

Solve the above two linear equations to find the value of  $x$  and  $y$ .

Multiply equation (1) with  $-2$  and add the resulting equation and equation (2) to **eliminate** the variable  $y$ .

$$\begin{array}{r} -2x - 2y = -4000 \\ (+) 4x + 2y = 6400 \\ \hline \end{array}$$

$$2x = 2400$$

Divide by 2 on both the sides and simplify.

$$x = 1200$$

### Step 4:

Now, **substitute** the value of  $x = 1200$  in either of the two equations.

Let us substitute in equation (1). So, it becomes

$$1200 + y = 2000$$

Subtract 1200 from both sides of the equation and simplify.

$$1200 + y - 1200 = 2000 - 1200$$

$$y = 800$$

### Step 5:

So, the solution for the given system of equations is  $(1200, 800)$ , which means 1200 adult tickets and 800 child tickets were sold on Saturday.

*Note: The above problem can be also solved using **substitution** method since the **coefficients** of  $x$  and  $y$  in the first **equation** is 1.*

### Practice Problems:

1. James bought 5 apples and 10 oranges for \$4. Donald bought 3 apples and 9 oranges for \$3. The shop keeper strictly told that there will not be any discounts. What is the cost of an apple and an orange?

2. Ana writes test to upgrade her level. The test has 25 questions for a total score of 150 points. Among the 25 questions, each multiple choice questions carries 3 points and the descriptive type questions carries 8 points. How many multiple choice questions and descriptive type questions are there in the test?

3. The sum of the digits of a two digit number is 7. When the digits are reversed, then number is decreased by 9. Find the number.

4. The perimeter of a rectangle is 12 meters. The length is 3 more than twice its width. Find the dimensions of the rectangle.(This can also be

solved just with one variable)

5. The sum of two numbers is 12. When three times the first number is added to 5 times the second number, the resultant number is 44. Find the two numbers.