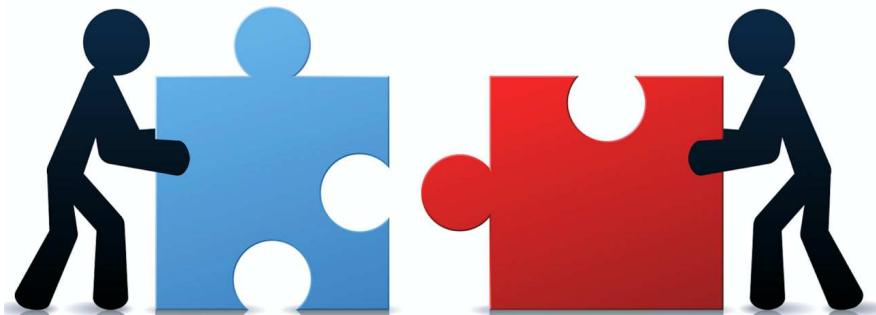


How to Do Word Problems



Parts & Whole

In this topic, we concentrate on a whole which is given in the form of some relationship amongst its parts. The main idea is that the whole is always equal of the sum of its parts.

Part	+	Part	=	Whole
The number of female students	+	The number of male students	=	The total number of students
The number of nickels	+	The number of dimes	=	The total number of coins
The number of red balls	+	The number of green balls	=	The total number of balls

Example:

There are 32 students in the classroom. The number of female students is 4 fewer than twice the number of male students. How many female students are in the classroom?

Solution:

The parts on this problem are the number of females and the number of males, so if we let x be the number of males students, then the number of female students should be $2x - 4$ based the information provided.

Part	+	Part	=	Whole
The number of female students	+	The number of male students	=	The total number of students
$2x - 4$	+	x	=	32

Solution(continued):

$$2x - 4 + x = 32 \quad (\text{Original Equation})$$

$$3x - 4 = 32 \quad (\text{Simplify})$$

$$3x - 4 + 4 = 32 + 4 \quad (\text{Addition Property})$$

$$3x + 0 = 36 \quad (\text{Inverse \& Simplify})$$

$$3x = 36 \quad (\text{Identity Property})$$

$$x = 12 \quad (\text{Division Property})$$

Since the number of female students was $2x - 4$, then we evaluate this for $x = 12$, that is $2(12) - 4 = 20$.

There are 20 female students in the classroom.

Example:

Jose has 45 coins in nickels and dimes. The number of dimes is 5 more than three times the number of nickels. How many of each coin does Jose have?

Solution:

The parts on this problem are the number of nickels and the number of dimes, so if we let x be the number of nickels, then the number of dimes should be $3x + 5$ based the information provided.

Part	+	Part	=	Whole
The number of nickels	+	The number of dimes	=	The total number of coins
x	+	$3x + 5$	=	45

Solution(continued):

$$x + 3x + 5 = 45 \quad \text{(Original Equation)}$$

$$4x + 5 = 45 \quad \text{(Simplify)}$$

$$4x + 5 - 5 = 45 - 5 \quad \text{(Subtraction Property)}$$

$$4x + 0 = 40 \quad \text{(Inverse \& Simplify)}$$

$$4x = 40 \quad \text{(Identity Property)}$$

$$x = 10 \quad \text{(Division Property)}$$

So Jose has 10 nickels, and since the number of dimes was $3x + 5$, then we evaluate this for $x = 10$, that is $3(10) + 5 = 35$.

Jose has 10 nickels and 35 dimes.

Example:

A piece of wood is cut into three pieces. The second piece is 3 times the first piece. The third piece is 10 inches longer than the first piece. Find all three pieces if the wood is 60 inches long.

Solution:

Let x be the length of the first piece, then $2x$ is the length of the second piece and $x + 10$ is the length of the third piece, based on the information provided.

Part	+	Part	+	Part	=	Whole
First		Second		Third		Total
piece	+	piece	+	piece	=	length
x	+	$2x$	+	$x + 10$	=	60

Solution(continued):

$x + 2x + x + 10 = 60$	(Original Equation)
$4x + 10 = 60$	(Simplify)
$4x + 10 - 10 = 60 - 10$	(Subtraction Property)
$4x + 0 = 50$	(Inverse & Simplify)
$4x = 50$	(Identity Property)
$x = 12.5$	(Division Property)

So the first piece is 12.5 inches, the second piece is $2(12.5) = 25$ inches, and the third piece is $12.5 + 10 = 22.5$ inches.

The three pieces are 12.5 inches, 25 inches, and 22.5 inches.

Example:

Maria is 5 years older than Mike. Mike is 5 times as old as Lisa. How old is Maria if the sum of their ages is 27 years?

Solution:

The parts on this problem are the ages of Maria, Mike, and Lisa, so if we let x be Lisa's age, then Mike is $5x$ and Maria is $5x + 5$ based the information provided.

Part	+	Part	+	Part	=	Whole
Age of Maria	+	Age of Mike	+	Age of Lisa	=	Sum of their ages
$5x + 5$	+	$5x$	+	x	=	27

Solution(continued):

$$5x + 5 + 5x + x = 27 \quad \text{(Original Equation)}$$

$$11x + 5 = 27 \quad \text{(Simplify)}$$

$$11x + 5 - 5 = 27 - 5 \quad \text{(Subtraction Property)}$$

$$11x + 0 = 22 \quad \text{(Inverse & Simplify)}$$

$$11x = 22 \quad \text{(Identity Property)}$$

$$x = 2 \quad \text{(Division Property)}$$

So Lisa is 2 years old, Mike is $5(2) = 10$ years old, and Maia is $5(2) + 5 = 15$ years old.

Lisa is 2, Mike is 10, and Maria is 15 years old.