

SETTING UP EQUATIONS



This sheet is designed as a review aid. If you have not previously studied this concept or after reviewing the contents you still don't pass you should enroll in the appropriate math class.

Setting up equations is converting information (i.e. from tables, graphs, word problems, etc.) with one or more variables to a math formula. Use the review sheet on word problems to help. You will also need to be familiar with various math rules and properties such as cumulative, distributive, inverse, reciprocal, etc.

Below are several example problems of varying difficulty similar to those you may see on the test.

Example 1:

The **sum of two numbers is 12**. The first number is represented by the **variable "x."** What is the **product of the two numbers?** *(The key data in this problem have been bolded to help recognize them. They will not be bolded on the test.)*

In this problem there is a variable represented by "x" and another variable (?) that must be expressed using the data available.

$$\text{If } x + ? = 12, \quad \text{then } 12 - x = ?. \quad \text{Therefore: } x + (12 - x) = 12$$

This creates an equation into which you only need to insert one variable to solve.

The product of the two numbers can be expressed as:

$$x(12 - x) = 12x - x^2 \quad - \quad \text{Answer}$$

Any real number can be substituted for "x" to make the equation true.

Example 2:

A garden is **12 feet wider than it is long**. **What is the area** of the garden? Let "L" represent the length of the garden.

$$\text{Area} = \text{Length (L)} \times \text{Width (L + 12)}$$

$$\text{Area} = L(L+12) \quad - \quad \text{Answer}$$

Example 3:

The largest of 4 consecutive even integers is "x". The sum of these integers is 60. Write an equation that is true using the information provided.

The **first integer is x**. The **second is 2 less than x or x-2**, the third is 4 less or x-4, etc. Add all four together:

$$x + (x - 2) + (x - 4) + (x - 6) = 60 \quad - \quad \text{Equation}$$

This can be reduced if required by combining like terms:

$$x + x + x + x = 4x \quad \text{and } -2 + (-4) + (-6) = -12 \quad \text{so } 4x - 12 = 60$$

At this point it is easy to solve for x:

$$4x - 12 = 60 \quad \text{to } 4x = 72 \quad \text{to } x = 18$$

Example 4:

2 times the reciprocal of $(x + \frac{1}{4})$ is 4. What is x ?

A reciprocal is the inverse of an expression: The reciprocal of x is $1/x$; The reciprocal of $1/4$ is 4.

The reciprocal of $x + 1/4$ is $\frac{1}{x + \frac{1}{4}}$

The equation would read: $2\left(\frac{1}{x + \frac{1}{4}}\right) = 4$

Divide both sides by 2: $\frac{1}{x + \frac{1}{4}} = 2$

Multiply both sides by $x + \frac{1}{4}$: $1 = 2x + \frac{1}{2}$

Subtract $\frac{1}{2}$ from both sides: $\frac{1}{2} = 2x$

Divide both sides by 2: $\frac{1}{4} = x$