

An Introduction to Mathcad

by S.E. Van Bramer (9/6/96)

I Perform most mathematical calculations using a program called Mathcad. Solutions to problems will often be posted as output of a Mathcad document. This introduction will show you how to read these. As new Mathcad techniques are developed, I will include further explanations.

Different types of Equations and their use:

$x := 5$ This defines the variable x as equal to 5. Notice the equals sign starts with a colon.

$x = 5$ The regular equals sign returns the current value of a variable. Here I am asking what x is equal to. The value (5) was set above.

$x \cdot 5 = 25$ Here I am asking what x times 5 is equal to. The small dot means multiply

$y := x + 10$ Notice the equals sign. I am defining a new variable (y) as equal to x plus 10.

$y = 15$ And this is asking what y is equal to.

Symbolic Calculations:

$x + y = 15$ To help you follow the algebra required for many calculations I will use "symbolic" calculations. Notice the equals sign is **bold** here.

has solution(s)
 $-x + 15$ This means that I am just setting up an equation. Mathcad can then manipulate this relationship (to rearrange the variables). In this example, the book may give the first equation. But now I want to rearrange it in terms of y. This would give the following solution ($-x+15$). Check out the algebra and verify this.

$x := 10$ Now I define a value for x

$y := -x + 15$ And using the equation derived above I define y in terms of x

$y = 5$ And this gives the value for y.

Although this is a simple example. It demonstrates how things will look.

Units:

$$\text{distance} := 10 \cdot \text{mi}$$

$$\text{time} := 20 \cdot \text{min}$$

$$\text{speed} := \frac{\text{distance}}{\text{time}}$$

$$\text{speed} = 13.411 \cdot \text{m} \cdot \text{sec}^{-1}$$

Mathcad also includes unit calculations. It knows most units and the appropriate conversion factors. Here I have defined the distance as 10 miles and the time as 20 minutes. Finally I define the speed as distance divided by time.

Here I have asked what the speed is equal to. The default is to provide the answer in SI units. Meters per second (It took care of converting miles to meters and minutes to seconds). Also note that the sec^{-1} (where -1 is a superscript) means per second. The negative one exponent is the same as divided by. If you do not remember this you need to review some math notation.

$$\text{speed} = 30 \cdot \frac{\text{mi}}{\text{hr}}$$

Here I just told mathcad to use different units and the numerical value is changed (using appropriate conversion factors). These two speeds are equivalent, just different units.

S.E Van Bramer
Widener University
Department of Chemistry
Chester, PA 19013
svanbram@science.widener.edu
<http://science.widener.edu/~svanbram>