

## StudyWorks™ Reference Sheet

Symbols	Palette	Meaning
$=\square$	Math $\square$	Used to request a StudyWorks calculation. Typing $x=$ will cause StudyWorks to print the value of $x$ .
$:=\square$	Math $\square$	Used to define an expression. For example $f(x) := 2x - 1$ defines the function $f(x)$ . Note that the colon followed by the equal sign MUST be gotten from the menu; it can not be typed in.
$\equiv$		Used to define an expression globally. It supersedes the above regular definition in order of calculation, allowing you to place it later in the worksheet.
$\geq$ or $\leq$	Math Inequalities	
$\neq$	Math Inequalities	
m..n	Math	Used to create an arithmetic sequence. For example $x := 3, 3.5..8$ will form the sequence starting with 3 where 3.5 is the second term and continuing in this pattern until it gets to 8 where it will stop. Note that the double dot portion of this symbol MUST be gotten from the menu; it can not be typed in.
$x^y$	Math	For typing exponents. Type the base, click on this button, type the subscript, then press the space bar or right arrow key to exit.
$\sqrt{x}$	Math	Square root of $x$ .
$ x $	Math	Absolute value of $x$ . To exit the expression, use the space bar.
$x_i$	Math	For typing subscripts. Type the base, click on this button, type the subscript, then press the space bar to exit.
$\pi$	Math	Value for pi. Do not confuse it with a similar symbol on menu 2.
$\theta$	Math Greek Letters	Theta
$\Delta$	4	Delta

Other Greek letters	Math Greek Letters	□
$\infty$	Math Calculus	Infinity symbol
$\frac{d}{dx}$	Math Calculus	Numerical derivative
$\sum$	Math Calculus	Summation
$\int$	Math Calculus	Definite integral

### General StudyWorks Instructions

StudyWorks is often referred to as an electronic scratchpad. You can write text on it, calculate mathematical expressions, and graph functions on it. At the top of almost every StudyWorks worksheet you will need an expression similar to this:  $x := -10, -9.9..12$ . It tells StudyWorks what values  $x$  will take on. Unlike your graphing calculator, StudyWorks does not choose the values for  $x$  itself when doing calculations or drawing a graph. You must tell it every value to consider. The notation should be thought of as specifying an arithmetic sequence which will begin at  $-10$ . The next value will be  $-9.9$  and so on until it gets to  $12$  where it is to stop.

The placement of information on a StudyWorks worksheet is of utmost importance. It calculates from left to right and from top to bottom. Thus the values for  $x$  must be stated above the expression for  $f(x)$  because it needs to know what values of  $x$  to use to substitute into  $f(x)$ . Whenever you click outside of a region, StudyWorks will automatically recalculate the worksheet.

### Typing and Editing Formulas

You do not have to type in multiplications. For example,  $2(5x + 3)$  will be properly understood. However, if a calculation does not seem to be coming out correctly, it is always safer to type in the multiplication signs. When entering an exponent or subscript, you can exit the exponent or subscript by using the space bar or the right arrow key. For example, to enter the expression  $x^2 + 3$ , type  $x$ , click on the exponent symbol on the Math Palette, type a  $2$ , press the space bar, then type  $+3$ .

To edit a formula, click close to the region you wish to edit. Suppose you wish to edit the  $5$  in the expression  $2(5x + 3)$ . Click close to the  $5$  so that a thin vertical blue bar appears. You can move the bar left and right with the arrow keys. If you are in front of the  $5$ , use the Del key on the key board to remove the  $5$  and then type the desired replacement. If you are behind the  $5$ , use the Backspace key on the keyboard to remove the  $5$  and then type the desired replacement.

## Moving or Separating Regions

To move a region (text, graph, or calculation), place the cursor just inside the region and click once with the mouse. Then slide the cursor towards the edge of the black box that appears around the region. The cursor will appear in the shape of a hand. Hold down the mouse button and use the mouse to move the hand in the direction you want to move the region. You will see the frame move with you. Release the mouse button when the frame is positioned where you want the region to be.

If two regions become linked together, click on one of them. Then click on *Format, Separate Regions*.

## Text Regions: Typing, Editing, and Formatting

To begin a text region, place the cursor where you wish to begin typing. You may then begin typing much as you would with a word processor.

To use special editing and formatting features in text that is already typed, move the cursor to any location in the text. Hold down the mouse button and drag the cursor across the text. It will appear on the screen in highlighted form. The Text and Edit menus can then be used to delete, copy, change font, change size of type, etc. on this highlighted text.

To change the size of a text region, click once inside the region. Move the cursor to a corner of the box. The cursor will appear in the shape of a two-headed arrow. Put the hand over the small black box at the corner of the frame, hold down the mouse button, and drag the frame to the desired shape.

## Graph Regions: Creating and Editing

To begin a graph, click on the Graphs button on the math Palette. Then click on XY Plot. A graph region will appear which has several highlighted boxes along the horizontal and vertical axes. In the center box along the vertical axis, type the expression you want graphed on the vertical axis. In the center box along the horizontal axis, type the expression you want graphed on the horizontal axis. The boxes near the corners are used to set the extent of the graphing window. You may type in values for each of these or allow StudyWorks to do the selection for you. (Generally, it is best for you to make the choices.) When you are ready for StudyWorks to draw the graph, just click anywhere outside the region.

To graph more than one function in a single graph plot, go to the functional expression you typed on the vertical axis and just to its right type a comma followed by the second functional expression. Do the same for the horizontal axis.

To format the graph, move the cursor inside the graph region and double click. From the format menu you can choose the color and type of graph.

To enlarge a graph, click on the graph region and move the cursor towards a corner where it will take on the shape of a two-headed arrow. Hold down the mouse button and drag the corner of the frame until it is the desired size.