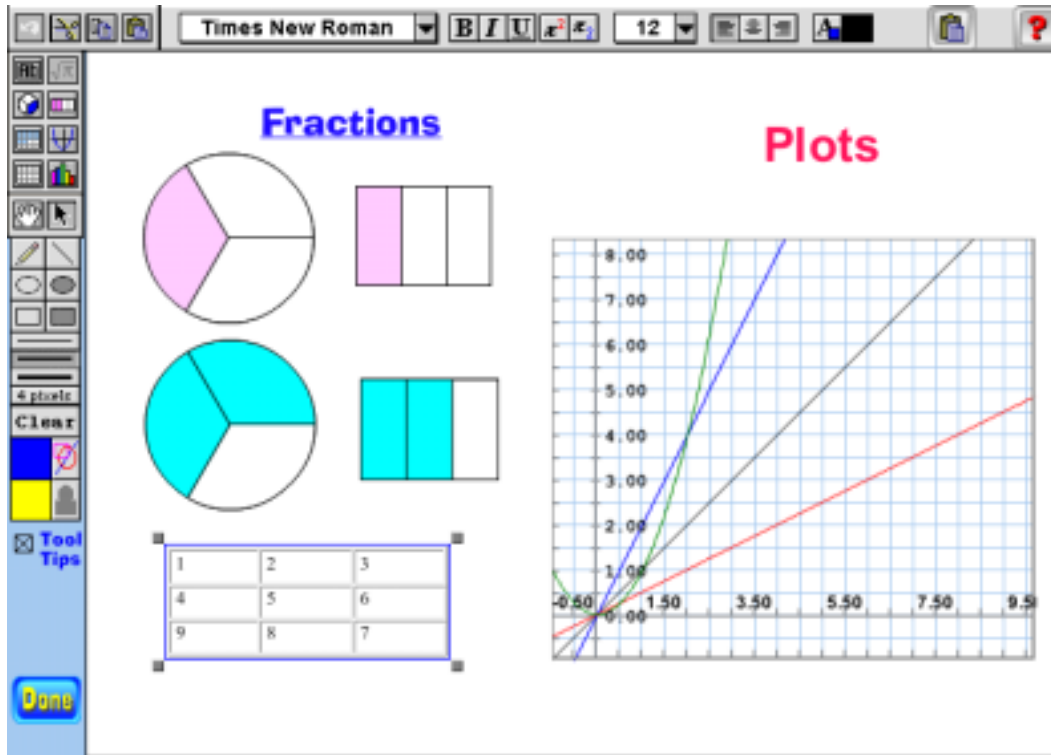


MathRealm Math Tool

MathRealm's Math Tool is a workspace where you can include text, fractions, percents tables, graphs, plots and drawing. You can use it to work math problem. You can then copy the workspace to the clipboard and paste it to a document and print it.



Inserting Objects

To get any object onto a page it must be inserted. You can insert Text Fields, Fraction Graphs (2 types), Percent Graphs, Plots, Tables and Graphs. To select the object to insert use the toolbar buttons. If the **Tool Tips** option is checked then holding the cursor over an insert button will display a box describing what they allow you to insert.



Once the object to insert is selected the cursor will change to a cross hair (+) over the page. Click and Drag on the page and a blue box where the object will be inserted will be displayed as you drag. When you let up on the mouse button the object will be inserted in the blue box and become the selected object. Text Fields and Tables can be edited right on the screen, but all other objects are edited in a pop up dialog box. See the object's respective chapter for details about editing and formatting.

Canceling Insert: If you click anywhere not on the page work area, but still in the window, the insert is canceled. If while clicking and dragging, you drag the insert pointer off the page, the insert is canceled. The object can also be deleted once inserted or any time thereafter. You can cancel the insert of a Fraction, Percent, Graph, Plot, or Table in their pop up dialog boxes using the **Cancel** button.



Objects can be resized or moved after the initial insertion. Thus it is not necessary to be overly concerned with exact placement on insertion. See Resizing and Moving Objects for more details.

Note: *You can only have 12 Text Fields, and 6 each for other objects at a time.*

Moving Object

To move any and all objects on the screen click the hand button in the tool pallet on the left. Click and drag objects on the screen to move them. Objects can not be dragged off the page.

Click hand to move objects:



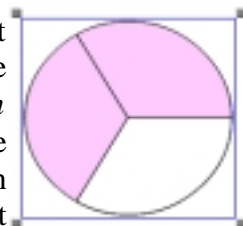
Click the arrow for all other editing.

Edit Mode

Click the arrow, seen above, to be in edit mode. In this mode you can resize objects or double-click them to edit. Edit Mode is the default mode. Pressing any insert button will put you in edit mode for insertion.

Resizing Objects


To resize an object it must be selected first. To select it simply click it once with the cursor. The object is outlined in **blue** and has resize handles (■) around it when selected. (*Note: A double-click will begin editing.*) After an object is selected click on resize handles (■) at the corner of the object and simply drag it while continuing to hold down the mouse button. When you let go of the mouse button, the object will be resized. Graphs and plots will redraw adjusting to their new size and shape, text fields and tables will reformat, other objects will also resize.




Object Commands




Undo Edit

The Undo button, , will undo the last edit of an object. You can undo Cuts, editing, and resizing. You can only undo the last object edited.


Delete or Cut Objects

To delete an object, select the object and then use the **Cut**,  button on the toolbar, above the insert tools. The Cut command also copies the object to the clipboard where it can then be pasted onto the page again.

Copying Objects

Use the copy command if you want to copy an object to the program's clipboard and then paste it onto the page – the way to duplicate an object. The **Copy**,  button on the toolbar, above the insert tools. An object needs to be selected before it can be copied.



Pasting Objects

If you have previously copied or cut an object you can then paste it onto the current page. The paste option will be dimmed if there is nothing to paste. To paste you press the **Paste**,  button on the toolbar, above the insert tools.

Editing Objects

To edit any object after the initial insertion just double-click it. You can use the resize handles to resize the object. Click an object just once to select. With it selected you can cut it, copy it or resize it.

Text Fields & Tables

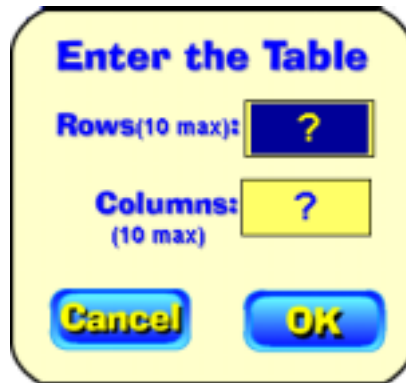
Editing text in a Text Field or Table is the same as in most text editing programs and should be familiar to most. Use the  button to insert a Text Field or the  button to insert a table. To learn how to insert a Text Field or table see **Inserting Objects**, above. There can be up to 12 Text Fields in a on the screen at once. This allows you to use them as labels if needed.

When a Text Field is first inserted it is ready for typing. Just start typing and the typed text will automatically replace the highlighted text, "Type text over me."
When inserting a Table the whole table is highlighted, click on the cell you want to type into. Editing the text in a Table and Text Field is the same except where noted.

To edit a Text Field or Table after the initial insertion just double-click it. It will become editable and the text will become highlighted.

Table Size

When inserting a table the following dialog box appears. Each table can have a maximum of 10 rows and 10 columns. Press OK to accept your size entries and insert the table or press the Cancel button to cancel the insert.



Editing Text

In order to type text the blinking insertion point (|) must be placed where you want the text to go. Just single-click the location and the blinking insertion point will move there. Just type the text you want to add. To highlight text, click-and-drag over the text you want highlighted. Highlight text and type over it if you want to replace it.

Note: *There is no cut and pasting text in the editor. Undo will undo the whole object editing session, not just the last text typing or formatting.*

Text Formatting

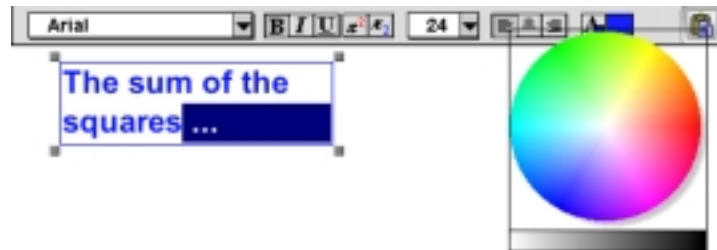
In order to format text it must be highlighted by clicking and dragging around the desired text. You can change the font, font size, and font style (**bold**, *italic*, underline, superscript, or subscript), and color of any selected text. Below is the text formatting tool bar. The tools from left to right are font name, bold, italic, underline, superscript, subscript, font size, left justify, center justify, right justify, and text color.



To use any of these tools, highlight the text you want to format and use the tools to change its format. When you select text its current format will be represented in this tool bar.

Color



To change the color of selected text, just click on the text color chip – far right. When you mouse up a color wheel will appear under your cursor, and the cursor will turn to an eye dropper -- to pick up a color. Simply click to select a color. The color wheel will disappear when you move the cursor away from it.



Text Fields Only: The **Text Alignment** buttons on the toolbar will left, center or right justify the text within the width of the Text Field.

To learn about changing a Text Field or Table width see **Resizing Objects**, above. You can only change the width, the height is determined by the amount and size of text in the field or rows in a table.

Fraction Diagrams


You can insert circle and bar fraction diagrams with the   buttons. To learn how to insert see **Inserting Objects**, above. There can be up to 6 each of circle or bar fraction diagrams on the screen at once.

When inserting a fraction diagram the pop-up dialog below appears. Simply enter in the desired numerator and denominator values and press OK. Click Cancel to cancel the insert. The diagram will appear where you insert it. The maximum numerator and denominator values allowed is 100.

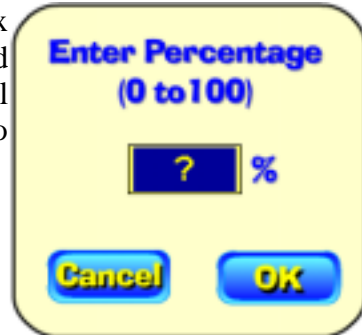
A yellow dialog box with rounded corners. The title is "Enter Fraction." in blue. Below the title are two input fields: "Numerator:" with a blue box containing a question mark, and "Denominator:" with a yellow box containing a question mark. Below the denominator field is the text "(≠ 0)". At the bottom are two buttons: "Cancel" and "OK", both in blue with yellow text.

To edit a fraction diagram simply double-click the diagram. The above dialog will appear with the values filled in to edit. Press OK when done to accept the edits or Cancel.

Percent Diagrams

You can insert a percent diagram with the  button. To learn how to insert see **Inserting Objects**, above. There can be up to 6 percent diagrams on the screen at once.


When inserting a fraction diagram the pop-up dialog box right appears. Simply enter in the desired percent values and press OK. Click Cancel to cancel the insert. The diagram will appear where you insert it. Only percents less than or equal to 100 are accepted.



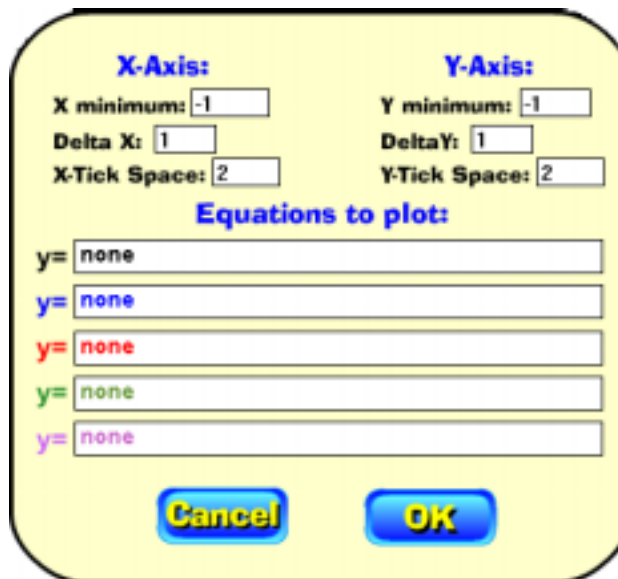
A yellow dialog box with rounded corners. At the top, it says "Enter Percentage (0 to 100)" in blue. Below that is a text input field containing a question mark followed by a percent sign. At the bottom, there are two buttons: "Cancel" and "OK", both in yellow with blue text.

To edit a percent diagram simply double-click the diagram. The above dialog will appear with the percent value filled in to edit. Press OK when done to accept the edits or Cancel.

Plots

You can insert a plot with the  button. To learn how to insert see **Inserting Objects**, above. There can be up to 6 plots on the screen at once. Each plot can plot 5 equations.

When inserting a plot the pop-up dialog box below appears. Use this dialog to determine what area of the coordinate plane will be plotted. You do this by modifying the x-axis and y-axis parameters. The parameters are detailed below. You can enter up to 5 equations of x to plot. Details of the equation format are below.



A yellow dialog box with rounded corners. It is divided into two columns: "X-Axis:" and "Y-Axis:". Under "X-Axis:", there are three input fields: "X minimum:" with value "-1", "Delta X:" with value "1", and "X-Tick Space:" with value "2". Under "Y-Axis:", there are three input fields: "Y minimum:" with value "-1", "Delta Y:" with value "1", and "Y-Tick Space:" with value "2". Below these is a section titled "Equations to plot:" with five input fields. The first field is labeled "y=" and contains "none". The second field is labeled "y=" and contains "none". The third field is labeled "y=" and contains "none" in red text. The fourth field is labeled "y=" and contains "none" in green text. The fifth field is labeled "y=" and contains "none" in purple text. At the bottom, there are two buttons: "Cancel" and "OK", both in yellow with blue text.

The following table outlines the coordinate plane setup parameters. The maximum values of each axis is determined by the size of the plot on the page. The bigger the plot on an axis the larger the maximum.

| <i>Parameter</i> | <i>Function</i> |
|----------------------|---|
| X minimum | The minimum ordinate (x-axis), or horizontal axis, value of the plot. This value appears at the lower left of the plot area. Default value is -1. |
| Delta X: | The value between tick marks on the x-axis. Default value is 1. |
| X-Tick Space | The number of tick marks between the axis's labeled values. For example, if Delta X = 1, X minimum is 0, and X-Tick Space is set to 5 , then x-axis labeling will be 0, 5, 10, 15, etc. every 5 tick marks. Default is 2. |
| Y minimum | The minimum abscissa (y-axis), or vertical axis, value of the plot. This value appears at the lower left of the plot area. Default value is -1. |
| Delta Y: | The value between tick marks on the y-axis. Default value is 1. |
| Y-Tick Spaces | The number of tick marks between the axis's labeled values. For example, if Delta Y = 2, Y minimum is 2, and this is set to 4 , then the y-axis labeling will be 2, 8, 14, 20, etc. every 4 tick marks. Default is 2. |

Equations to Plot

The only variable allowed is x. Thus, the equations you plot have to be a function of x alone.

All terms **MUST** be separated by an operator. For example, $y = 2x - 3$ you must enter $2*x-3$, where * is the multiply operator. The following are valid functions that you can plot:

Trigonometry: SIN(), COS(), TAN(), PI(), ASIN(), ACOS(), ATAN()

Absolute Value: ABS()

Exponent & Logarithm: EXP(), LOG()

$\text{base}^{\text{exp}} = \text{POWER}(\text{base}, \text{exp})$

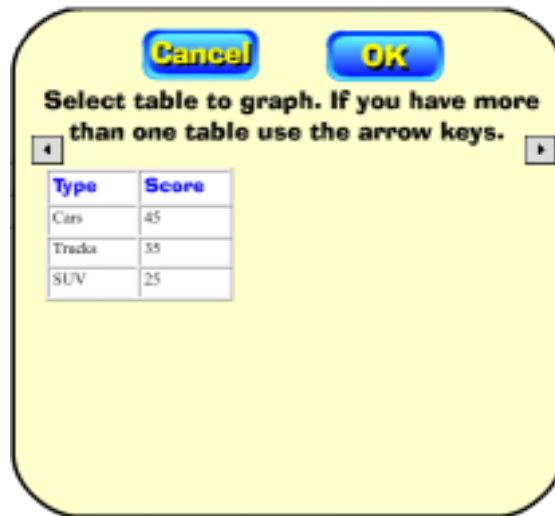
Square Root: SQRT()

Example: $2x^3-x^2+5 = 2*\text{power}(x, 3)-x*x+5$

Graphs

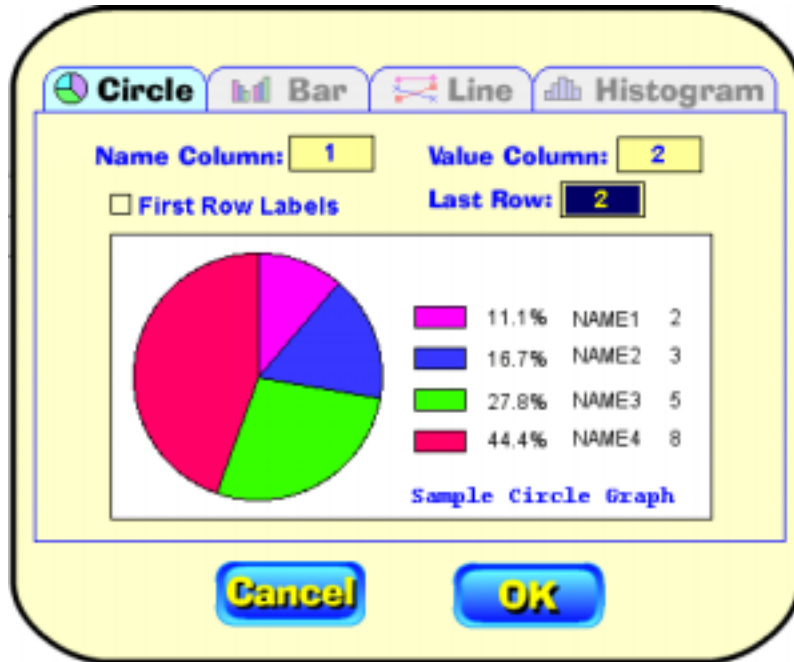
Graphs are used to visually display tables of data. Therefore, at least one table needs to already be on the screen in order to insert a graph. You can insert a graph with the button. To learn how to insert see **Inserting Objects**, above. There can be up to 6 graphs on the screen at once.

When inserting a graph a pop-up dialog box to select a table appears first, as seen below. If there is more than one table to graph use the arrow buttons to select the desired table. Press OK when the desired table is visible to go to the graph dialog box.



Note: *You can delete a table after it has been graphed and the graph will still be drawn from the table data selected.*

After the table to graph is selected, the graph dialog box below appears. Use the tabs at the top of the box to select the desired graph type. Each graph type has different parameters to enter to format the graph. There are four graph types, Circle, Bar, Line or Histogram.

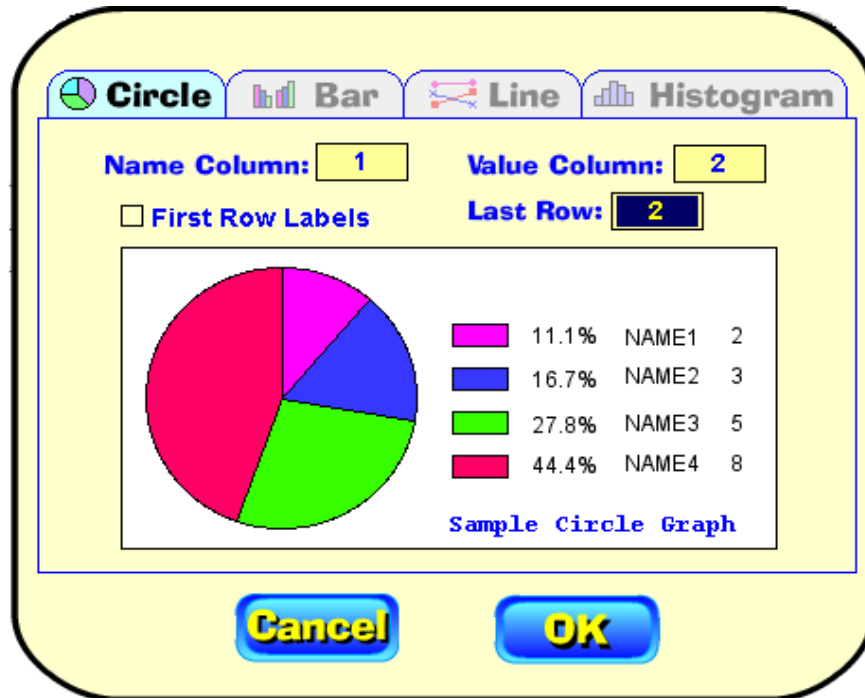


Editing Graphs

To edit a graph double-click the graph and the dialog box with the graph's parameters to edit will appear. Edit the parameters and press the OK button to redraw the graph, or press Cancel to cancel editing.

Circle or Pie Graph

A **pie** or **circle** graph is used to show the relationship of each part to a whole. This graph visually represents the percentage of each item of a whole (the sum of all items). In order to make a pie graph the values to graph **MUST** be in columns.



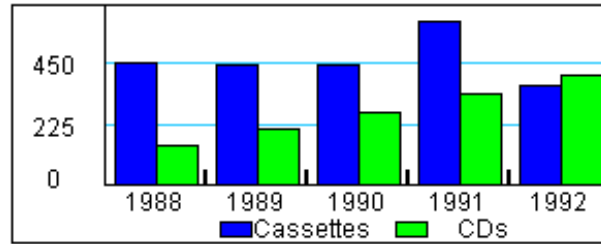
For a circle (or pie) graph there are options to choose the **Value Column** and the **Name Column**. Just type in the column number desired. It defaults to the values in the diagram above, 1 for names and 2 for values. Being able to choose the columns allows flexibility in using one table for multiple pie graphs and using one table to list multiple relationships. If the first row of the table is column labels, like the example below, check the **First Row Labels** check box to skip this row when generating the graph. It defaults to being checked. You can enter the last row to include in the graph (*up to 20 rows*) using the **Last Row** field. This allows you to not include a row such as the column total or average.

The **Name Column** is the column that has the labels of the values in the **Value Column**. The content in the **Name Column** are treated as text. The content in the **Value Column** are treated as values – if they are not numbers their value will be zero for the graph.

Bar Graph

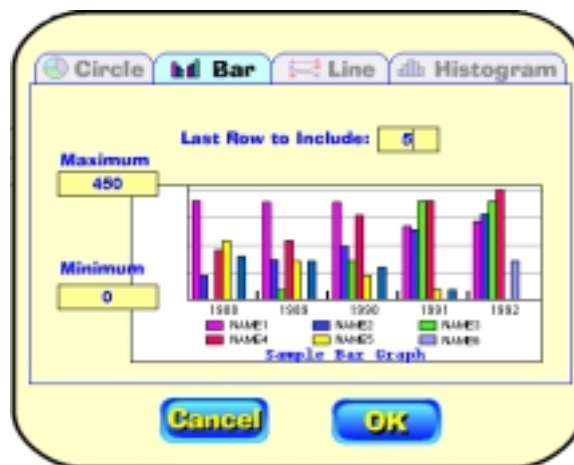
A **bar graph** is used to show comparisons among categories. A **multiple bar graph** shows more than one category of comparisons changing over time or some other variable. The table used to create a line graph **MUST** be in a specific layout. As the diagram below, left, shows, row one (1) must contain labels of the data in the columns. Column one **MUST** be the variable (labels) on the horizontal axis. Examples could include time, temperature, location or any variable that corresponds to the values in the following columns. The data to be graphed is in the columns under their corresponding labels. A color coded legend is displayed below the graph region.

| Year | Cassettes | CDs |
|------|-----------|-----|
| 1988 | 450 | 150 |
| 1989 | 446 | 207 |
| 1990 | 442 | 268 |
| 1991 | 350 | 334 |
| 1992 | 368 | 407 |



The above example graphs the number of CDs and Cassettes sold from 1988 to 1990. The table goes up to 1992, but the **Last Row to Include** is set to 4, limiting the years.

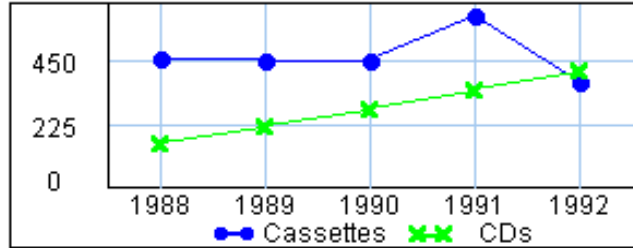
Below is the the dialog box for entering Line Graph parameters. The parameters that can be changed are the **Last Row to Include** and the **Minimum** and **Maximum** values of the vertical axis of the graph. The **Last Row to Include** allows you to not include rows after this value, such as column sums which would often be the last row of a table. The **Last Row to Include** defaults to the last row of the selected table. Zero is the default **Minimum** and the **Maximum** is the largest value in the columns, including the last row. Adjust these values to zoom in on a region of the graph, changing the values displayed on the vertical axis.



Line Graph

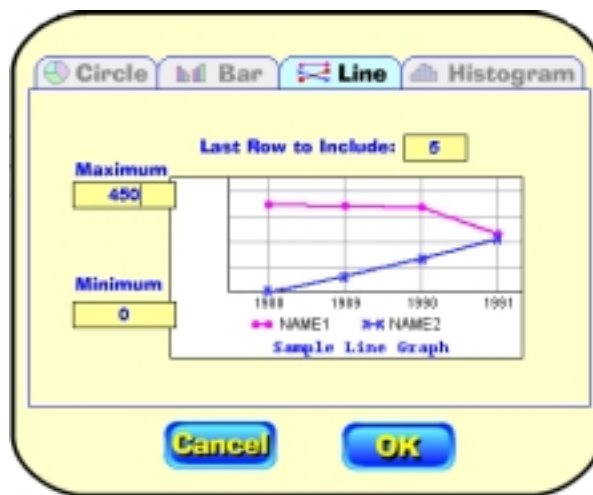
A **line** or **multiple line graph** shows more than one category changing over time or some other variable. (**Note:** *the bar and line graphs have the same table format requirements.*) The table used to create a line graph **MUST** be in a specific layout. As the diagram below, left, shows, row one (**1**) must contain labels of the data in the columns. Column one **MUST** be the variable (labels) on the horizontal axis. Examples could include time, temperature, location or any variable that corresponds to the values in the following columns. The data to be graphed is in the columns under their corresponding labels. A color coded legend is displayed below the graph region.

| Year | Cassettes | CDs |
|------|-----------|-----|
| 1988 | 450 | 150 |
| 1989 | 446 | 207 |
| 1990 | 442 | 268 |
| 1991 | 350 | 334 |
| 1992 | 368 | 407 |



The above example (*same as bar example*) graphs the number of CDs and Cassettes sold from 1988 to 1990. The table goes up to 1992, but the **Last Row to Include** is set to 4, limiting the years.

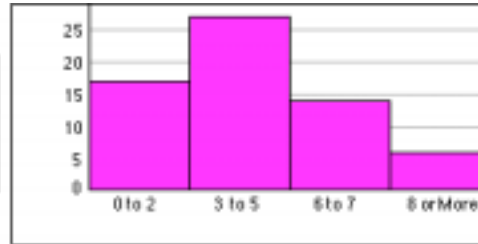
Below is the the dialog box for entering Line Graph parameters. The parameters that can be changed are the **Last Row to Include** and the **Minimum** and **Maximum** values of the vertical axis of the graph. The **Last Row to Include** allows you to not include rows after this value, such as column sums which would often be the last row of a table. The **Last Row to Include** defaults to the last row of the selected table. Zero is the default **Minimum** and the **Maximum** is the largest value in the columns, including the last row. Adjust these values to zoom in on a region of the graph, changing the values displayed on the vertical axis.



Histogram

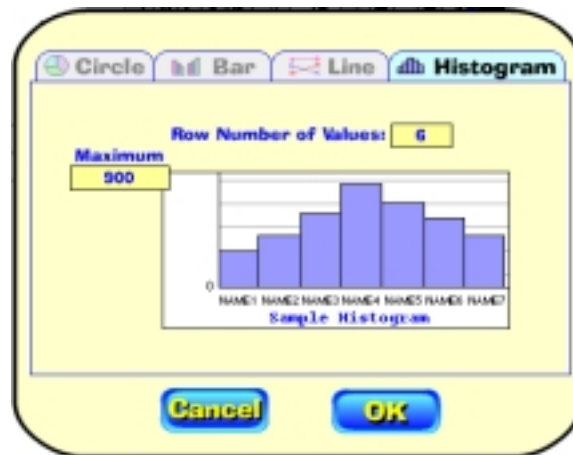
A **histogram** is a special type of bar graph used to show the frequency of data. There is no space between the bars and the height of the bars gives the frequency of the data. The table format for a histogram graph **MUST** be in rows. Row one labels the horizontal axis and the frequency intervals. The first cell of the row is the label for the frequency axis. The other rows of the table contain count or frequency information, with the first column being the label for the values in that row. The columns contain the counts or frequencies.

| Books | 0 to 2 | 3 to 5 | 6 to 7 | 8 or More |
|---------|--------|--------|--------|-----------|
| Grade 6 | 6 | 10 | 2 | 1 |
| Grade 7 | 4 | 8 | 4 | 3 |
| Grade 8 | 7 | 9 | 8 | 2 |
| TOTAL | 17 | 27 | 14 | 6 |



The above example histogram is a graph of the number of books a middle school's grades read in a month. Each row is the total number of students that read the given range of books per month. The range, or interval, is labeled in the column headers (1st row). These are used as the horizontal axes labels. Each grade is counted separately and the total of all grades is summed in the last row, the TOTAL row. The total is used as the frequency values graphed in this example. The **Row Number of Values** is set to 5, the TOTAL row, setting the row to graph.

Below is the the dialog box for entering Histogram parameters. Two parameters in a histogram graph can be changed. The first is the **Row Number of Values** of the frequencies to graph. The **Row Number of Values** defaults to the last row of the selected table. Rows between the first and the last might be used to count some values. The last row would then be set to the sum or total frequency to be graphed. The **Maximum** value of the vertical axis of the graph is set to a default of the maximum value of the default **Row Number of Values**.

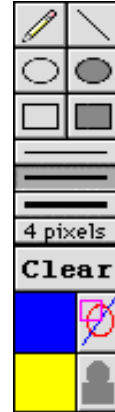










Drawing

The Math Tool editor has the ability to draw on the page using the tools in the tool pallet shown to the right. Drawing is done over the top of all other items on a page.

Edit Tools

The following table has the tool pallet icons and their function description. The line color for drawing is the color of the top color chip shown to the right and the fill color is the bottom color chip. See below for more details.



| <i>Icon</i> | <i>Function</i> |
|---|--|
|  | Click and drag on the page to draw freehand. Cursor becomes pencil over the page, with tip being the drawing point. |
|  | Click and drag on the page to draw a line. A gray line will follow the cursor until mouse button is released. Once mouse button is released the line becomes the color of the selected line color. Cursor becomes, +, over the page. |
|  | Click and drag on the page to draw a framed ellipse. A gray ellipse will outline the ellipse until mouse button is released. Once mouse button is released the ellipse becomes the color of the selected line color. Cursor becomes, +, over the page. |
|  | Click and drag on the page to draw a filled ellipse. A filled gray ellipse will outline the ellipse until mouse button is released. Once mouse button is released the ellipse outline becomes the color of the selected line color and is filled color of the selected fill color. Cursor becomes, +, over the page. |
|  | Click and drag on the page to draw a framed rectangle. A gray rectangle will outline the rectangle until mouse button is released. Once mouse button is released the rectangle becomes the color of the selected line color. Cursor becomes, +, over the page. |
|  | Click and drag on the page to draw a filled rectangle. A filled gray rectangle will outline the rectangle until mouse button is released. Once mouse button is released the rectangle outline becomes the color of the selected line color and is filled color of the selected fill color. Cursor becomes, +, over the page. |
|  | The line width buttons on the Tool Pallet. Tool Pallet has width of one to four pixels. The buttons to the left has two pixel line width selected. |
|  | Clears the page of all drawing. |

Color Wheel

Click on either the line or the fill color chips to bring up a color wheel to select a color. Moving the cursor over the Color Wheel will change it to an eye dropper. The eye dropper tip of will pick up the color under it when the mouse button is depressed. The new color will be displayed in the selected color chip. Moving the cursor off the color wheel will make it disappear.

