Using this Quick Start Guide

This guide will lead you through the simple steps of creating math illustrations and bringing them into another application, such as *Word* or *PowerPoint*.

For a complete reference, refer to the *Math Illustrations Manual* and the built-in Help system.

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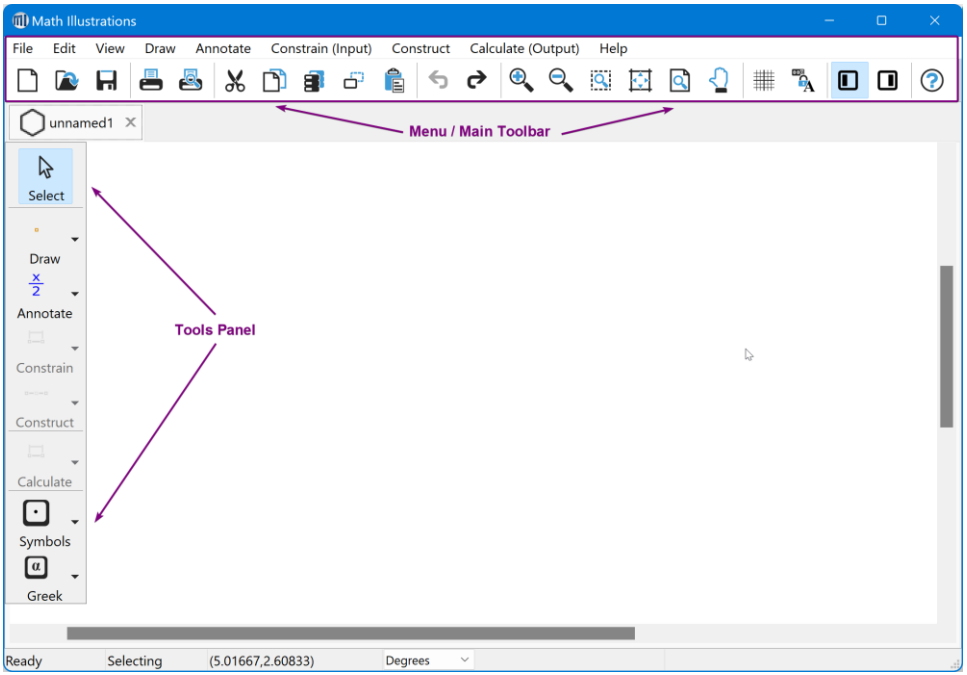
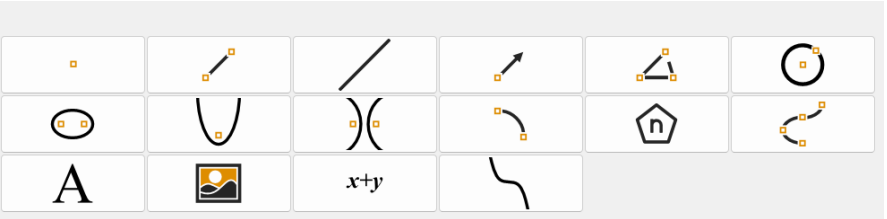
Getting Oriented

Math Illustrations lets you quickly create illustrations using familiar drawing tools and a natural constraint-based system. You can easily bring these illustrations into your worksheets, tests, and presentations.



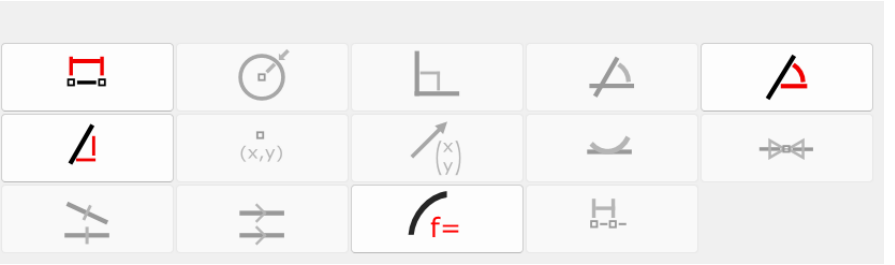
To create an illustration:

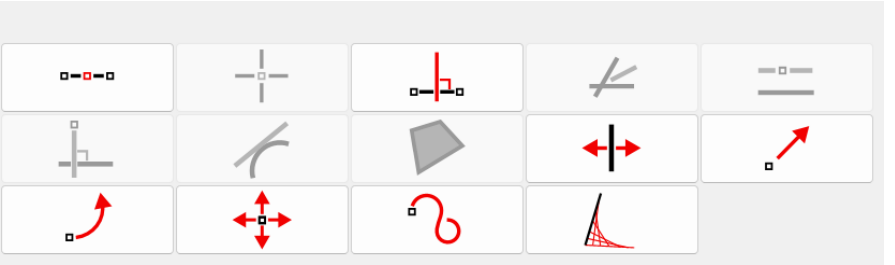
1. Draw with the tools in the **Draw** tool panel.



You can press ESC to stop drawing with a tool.

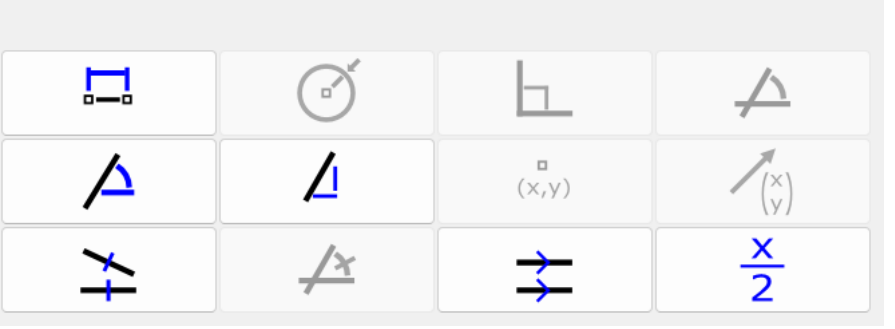
2. Once you've created the elements for your drawing, use the tools from the **Constrain** and **Construct** tool panels to specify their relationships. For example, you can set the length of a line segment or make two lines perpendicular.





Note that only the tools relevant to the current selection are available. So, if you've selected a line, you'll have the option to set the line length but no option to set the angle, since this isn't a relevant constraint for a single line.

3. Finally, label your illustration with tools from the **Annotate** tool panel. Annotations display like a constraint, but won't actually change any element in your drawing.



Understanding Constraints and Annotations

After you've set a few constraints, *Math Illustrations* can figure out the remaining constraints from the ones you've previously set. When the drawing is fully constrained, if you try to set an additional constraint, *Math Illustrations* will ask you if you want to create an annotation, or just discard the constraint.

Don't worry if this seems a little confusing at first. Once you've created a few drawings, it will come naturally.

Creating drawings

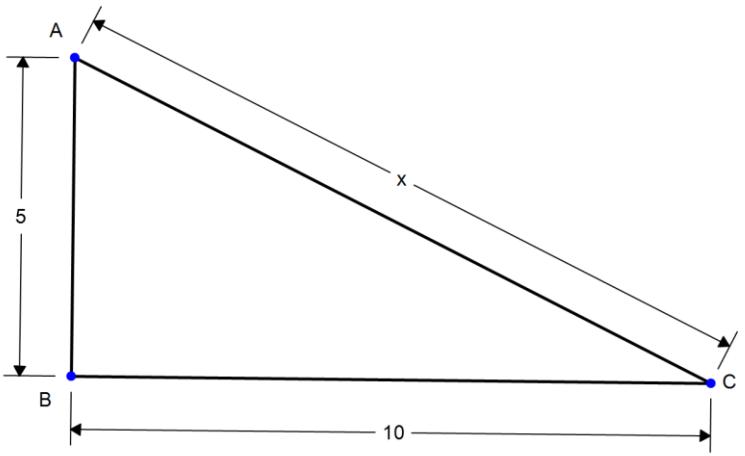
We're going to show you two different ways to create a math illustration. In the first example, we'll draw a figure and annotate all of the relationships to make a quick but inexact illustration. In the second example, we'll use a mixture of constraints and annotations to create an accurate drawing.

You can choose whichever method best suits your needs.

Creating a quick drawing

You can use *Math Illustrations* as a "math smart" drawing tool to quickly sketch out illustrations. In this section, you'll quickly sketch a triangle and add annotations, without worrying about whether the drawing is to scale.

Example of creating a sketch of a triangle:



1. Choose the **Line Segment** tool  and draw a triangle.

   Note that you can draw a perpendicular or horizontal line by holding down the Shift key as you're dragging.

   To create connected elements, move the cursor over an existing element until its highlight appears, indicating the start, end or center where the new element will "snap."

2. Label each line as indicated in the illustration by choosing the **Selection** tool , clicking on a line, then clicking on the **Annotate Distance/Length** tool and entering a label.

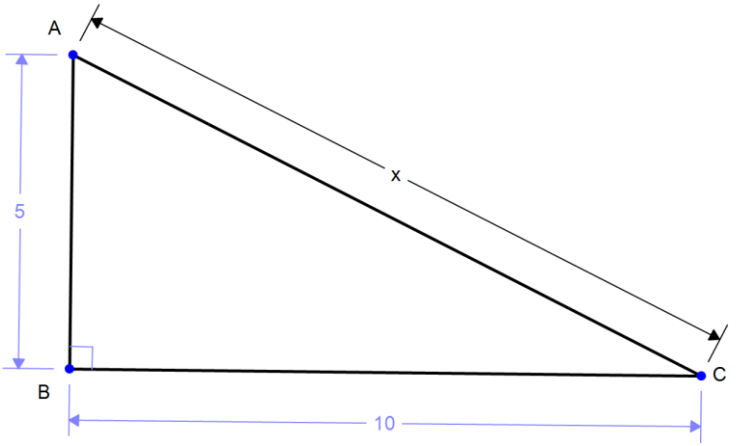
   If you make a mistake, you can use the **Undo** and **Redo** options on the **Edit** menu.

   Notice that the rough drawing above is not to scale and annotations have no effect on the geometry. You can drag any point or line to see that the triangle does not maintain its shape. In the next section, we'll show you how to create accurate drawings that maintain their shape.

Creating an accurate drawing

Math Illustrations can help you create accurate drawings by using constraints and constructs to specify relationships such as lengths and angles. In this section, you'll create an accurate drawing of a triangle using a mixture of constraints and annotations.

Example of creating an accurate drawing of a triangle:



1. Choose the **Line Segment** tool and draw a triangle, following the tips in the preceding section.

2. Make line segment AB and BC perpendicular by choosing the **Selection** tool , clicking to select line segment AB, and then holding down the Shift key and

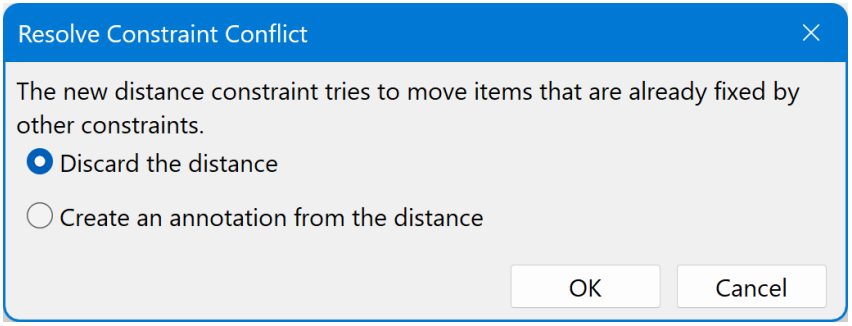
selecting line segment BC. Then, choose the **Constrain Perpendicular** tool  to make these two line segments perpendicular. Notice the perpendicular symbol that appears on your drawing.

You can test this constraint by dragging your drawing and noting that the two line segments remain perpendicular.

3. Set the length of line segments AB and BC as indicated in the illustration by selecting each line, choosing the **Constrain Distance/Length** tool  , and entering a length. Notice that when you set the second length, *Math Illustrations* scales it in proportion to the first length.

4. Set the length of line segment AC by choosing the **Constrain Distance/Length** tool  and entering "x" as the length.

The following dialog box appears:



When you specify a constraint that Math Illustrations can calculate from the information you've already provided, you're given the choice to discard the constraint or to change it to an annotation.

5. Change this constraint to an annotation by selecting "Create an annotation from the distance" and clicking OK.

Notice that this triangle retains the length and perpendicular constraints. If you try to drag the triangle, it will maintain its shape and proportions.

Controlling the Appearance of Your Illustration

In this section, we'll show you how to change the appearance of a particular element, and also how to set your preferences so that any element you create will have the appearance you want.

To change the appearance of a particular element:

1. Choose the **Selection** Tool  and select the element.
2. Right-click and select **All Properties** from the context menu.
3. Choose the property you want to change and provide the new setting.

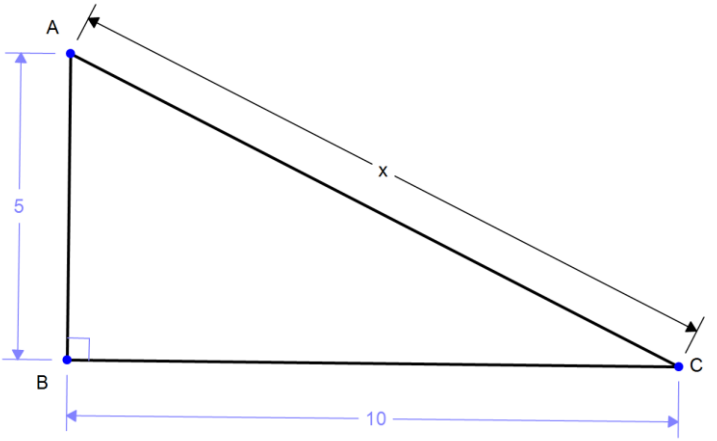
To change the default appearance of element types:

1. Choose **Preferences** from the **Edit** menu.
2. Select the element you want to change and make the desired changes.
3. Click OK to accept the change.

Changing the appearance of a particular element

We'll step you through the process of fine-tuning the triangle illustration you made previously.

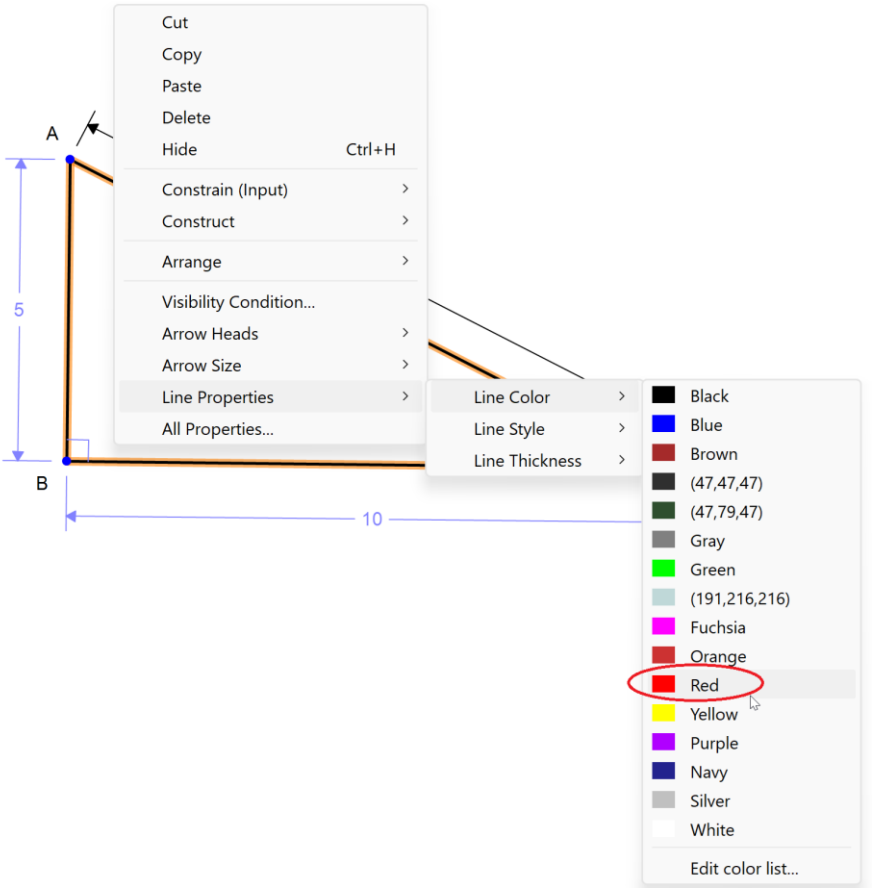
Example of changing line color, constraint color, and point size:



1. Use the accurate triangle drawing you created previously, or recreate it.

2. Choose the **Selection** tool , hold down the Shift key, and select all three line segments.

3. Right-click anyplace and choose **Line Properties** from the context menu



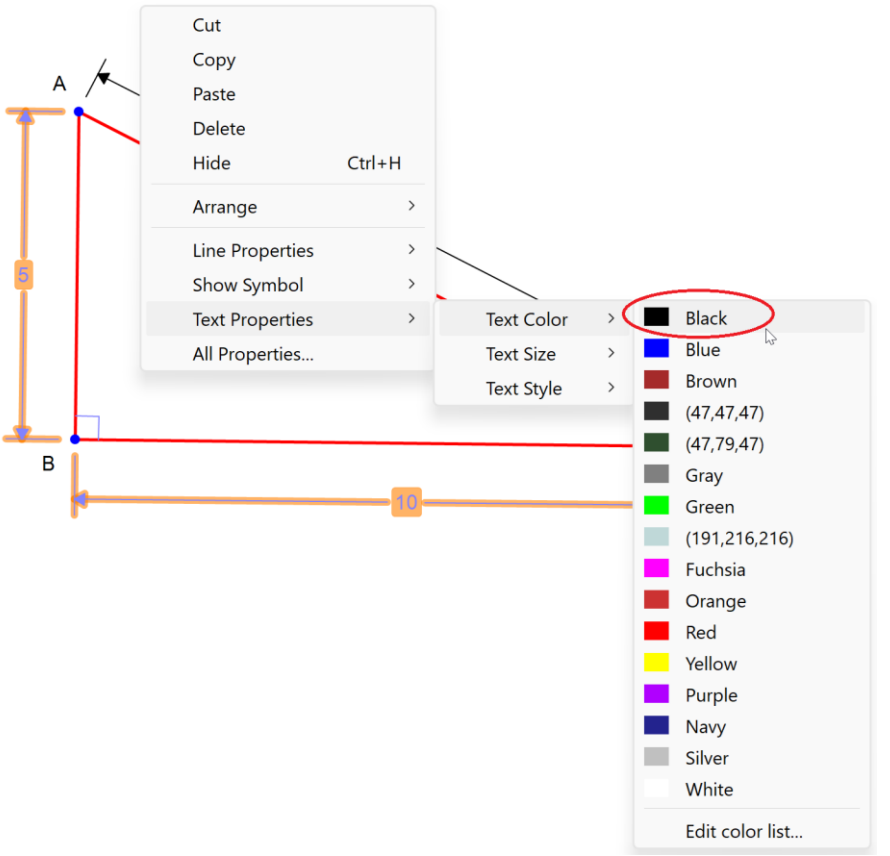
4. Click Line Color and select the red box.

   All of the lines turn red.

5. Hold down the Shift key and select the two constraint lines.

6. Right-click choose **Line Properties** from the context menu and proceed as in the steps above.

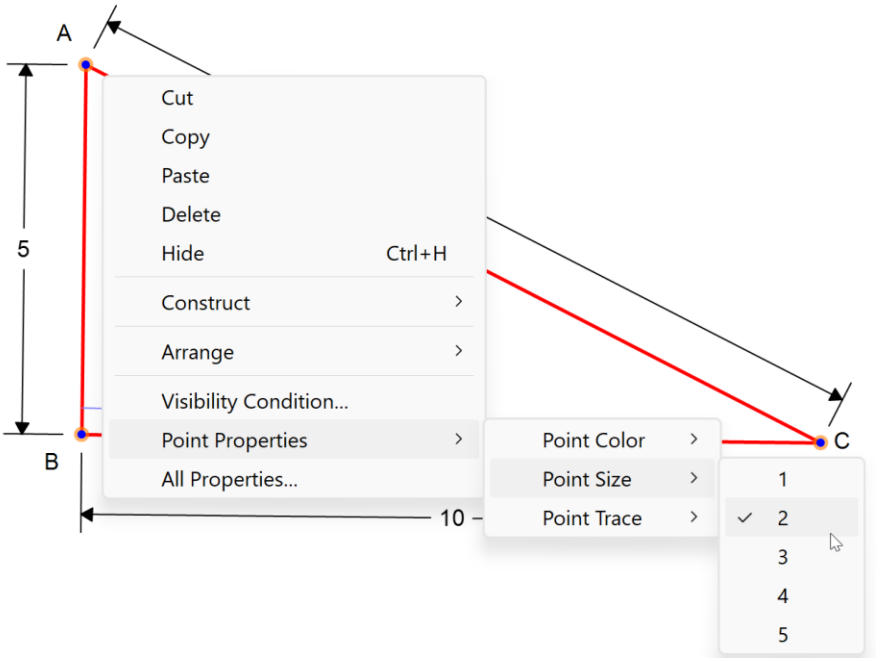
7. Click Text Properties, Text Color, and select the black box.



All of the constraints turn black.

8. Hold down the Shift key and select all three of the points (vertices) of the triangle.

9. Right-click and choose **Point Properties** from the context menu.



The points shrink in size.

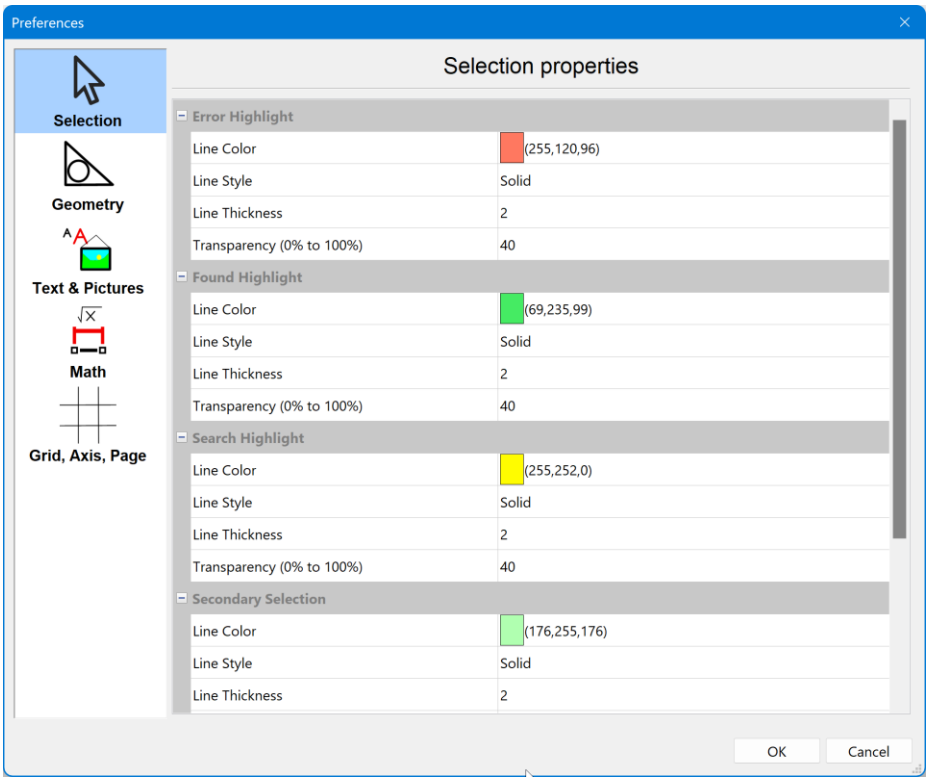
Changing the default appearance of elements

In the previous section, we showed you how to change a specific element. If you want an element to look a certain way whenever you draw it, you can set your preferences to control the default appearance of an element. Changing a default setting will not change the properties of elements already drawn.

We'll set the appearance changes you just made as the default settings.

Example of changing the default settings:

1. Choose **Preferences** from the **Edit** menu. Note the page tabs on the left side panel.



2. Click **Geometry**; in the **Point** window set the Point Size to 1; in the **Line** window set the Line Color to red.

3. Click **Math**; in the **Constraint** window set the Line Color and Font Color to black.

4. Click OK to close the **Preferences** dialog.

   Notice that when you draw now, the objects you create have the style you just specified.

Making other changes to your illustration display

You can change the size of your illustration by scaling it up or down. Note that scaling only changes the math elements and does not change the size of the text.

You can also hide or show various elements in your illustration

To scale your illustration up or down:

- Click the Scale Up icon  to increase the size of your illustration, or click the Scale Down icon  to decrease the size of your illustration.

  Note that you can use a combination of changing the zoom and changing the scale to quickly change the text size. For example to enlarge the text, press CTRL and = or CTRL and  to zoom in, and then press  or ALT and – to scale down everything but the text.

To hide or show elements in your drawing:

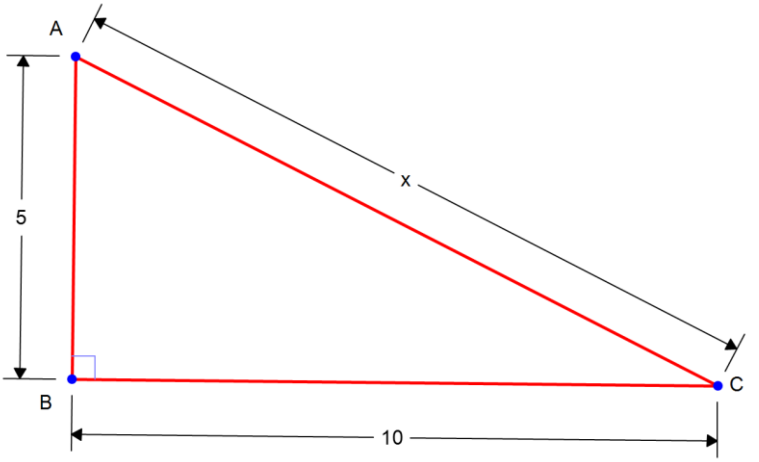
1. Choose the **Selection** tool  and select an element.
2. Right-click the element and choose **Hide** from the context menu.
3. Right-click over a blank area in the drawing window and choose **Show All** to show all hidden elements.

To redisplay individual hidden elements or hide others:

1. Select **Toggle Hidden** from the **View** or **Context** menu.
2. Faintly displayed elements are hidden. Click any drawing element with the magic wand  to change it's display status from hidden to displayed or *visa versa*.
3. Click the **Selection** tool  when you are finished.

In the following example, we'll show you how to hide the point labels using the first method.

Example hiding elements:



1. Using the triangle from the previous example, choose the **Selection** tool , hold down Shift, and select all of the point labels (A, B and C).

2. Right-click and select **Hide** from the context menu.

Changing your display

You can customize your display to meet your needs.

Showing the page boundary, grid, and axes

If you're bringing your finished illustrations into another application, such as a *Word* document, turning on page boundaries is an easy way to keep track of the size of your illustration.

You may also want to display the grid to align objects, or turn on the axes display.

To hide or show the page boundary:

- Choose **Page Boundaries** from the **View** menu to toggle the page boundary display. A checkmark by the menu item indicates the boundaries are displayed (on). Click it again to turn it off.

To hide or show the grid:

- Choose **Grid** from the **View** menu to toggle the grid display. A checkmark by the menu item indicates the grid is displayed (on). Click it again to turn it off.

To hide or show the axes:

- Choose **Axes** from the **View** menu to toggle the axes display. A checkmark by the menu item indicates the axes are displayed (on). Click it again to turn it off.

- Alternatively you can use the icon  . Click it until you get the desired configuration.

Show/hide Tools, Variables/Function panels and setting the zoom

By default, the **Tools** panel is shown on the left and the **Variables/Functions** on the right is hidden.

- To hide the Tools panel, click on the **Show/hide Tools** button  on the main toolbar or uncheck **Tools** option in the **View** menu. To show it, click on the button again or check the **Tools** option in the **View** menu.

- To show the Variables/Functions tool panel, click on the **Show/hide variables and functions** button on the main toolbar or check the **Variables/Functions** option in the **View** menu. To hide it, click on the button again or uncheck the **Variables/Functions** option in the **View** menu.

To zoom in or out of your illustration:

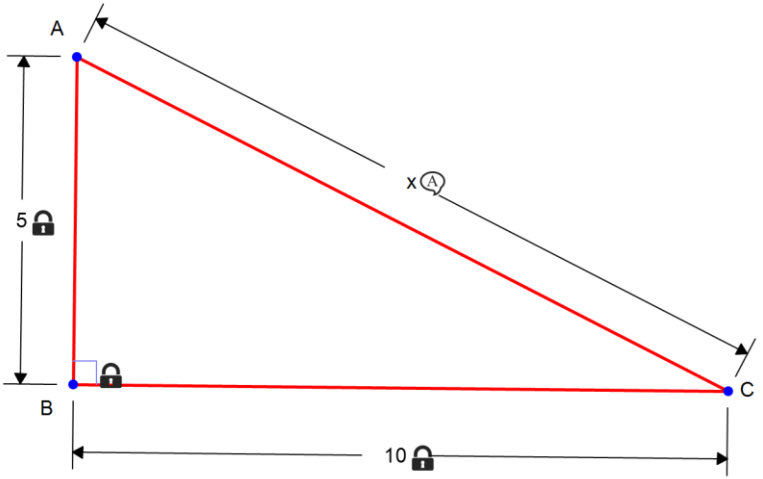
- Choose the desired zooming or scaling option from the **View** menu or one of the scaling / zooming icons on the icon bar.

Distinguishing between constraints and annotations

You may want to easily see which elements in your illustration are bound by constraints, and which ones are simply annotated.

To display annotated and constrained elements:

- Click on the **Distinguish Constraints/Annotations** icon to toggle the display of annotations and constraints. Annotations are indicated with an "A" while constraints are indicated with a padlock.



Bringing your Illustration into *Word* or *PowerPoint*

There are two methods of bringing a drawing into another application: Exporting the file to a compatible format and inserting the file into the other application, or copying and pasting the illustration.

Exporting your illustration

You can export your illustration into a bitmap format (such as PNG or JPEG) or into a vector format (EMF). EMF files tend to have a cleaner appearance, but not all applications can read them.

To export and import into Word using the EMF format:

1. Choose **Export** from the **File** menu, and then choose **Windows Enhanced Metafile** (emf).
2. Specify a file name and save the file.
3. Go into Word and insert the picture from a file.

Copying and pasting your drawing

You can copy and paste everything in the drawing window, or copy and paste a specified area of the illustration. Generally, copying the specified area will better maintain the scale of the illustration.

To copy and paste a specified area of your illustration into Word:

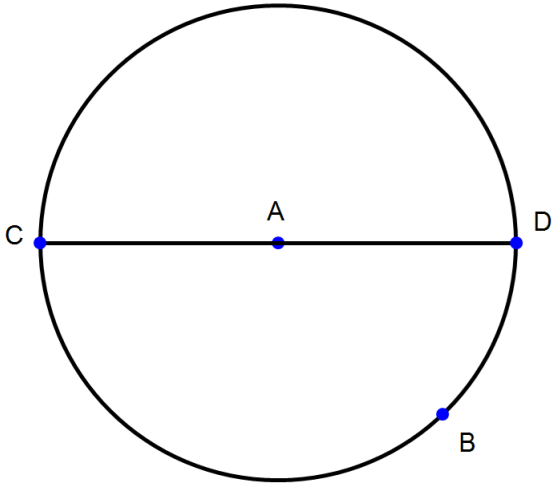
1. Choose the icon  or **Copy Region** from the **Edit** menu.
2. Position the corner of the selection square at the edge of the area you want to copy.
3. Click and drag the rectangle outline over the area you want to copy.
4. When you release the mouse button, the area is copied to the clipboard.
5. From *Word*, paste into your document.

More example illustrations

In this section, we'll step you through creating several more sample illustrations.

There is also a huge collection of examples in the **Figure Galley** found in the **File** menu.

Creating a circle and its diameter:



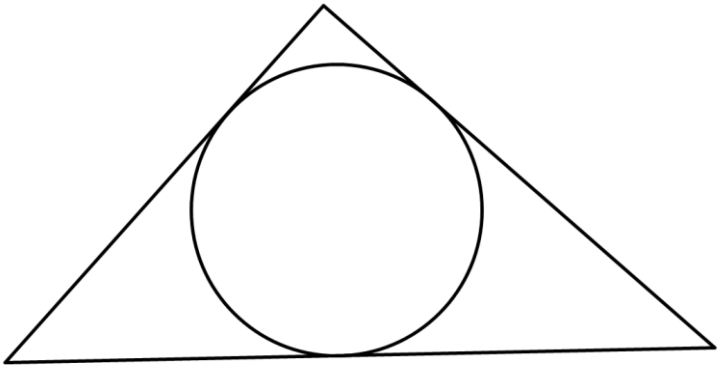
1. Choose the **Circle** tool  and create a circle.

2. Choose the **Line Segment** tool  and create a line that connects to both sides of the circle.

3. Choose the **Selection** tool  and hold down the Shift key to select both the line segment and the center of the circle (point A).

4. Choose the **Constrain Incident** tool  to place the center of the circle on the line segment, creating a diameter line.

Creating an incircle of a triangle:



1. Choose the **Line Segment** tool  and draw a triangle.

2. Choose the **Circle** tool  and create a circle inside the triangle.

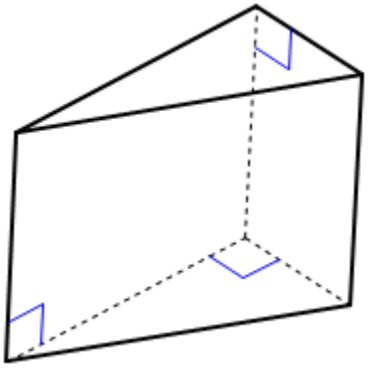
3. Choose the **Selection** tool  and select the circle, then hold down the Shift key and select one side of the triangle.

4. Choose the **Constrain Tangent** tool 

   The circle becomes tangent to the selected side.

5. Repeat steps 3 & 4 with the other two sides of the triangle.

Creating a "3D" illustration:



You can use translation to create an object that appears to be in three dimensions.

1. Create a triangle using the **Line Segment** tool  .

2. Select all three line segments with the **Selection** tool  .

3. Choose the **Construct Translation** tool  .

4. Draw a translation vector running north to south.

   Math Illustrations creates a second triangle. You can drag the endpoints of the translation vector to modify the position of this second triangle.

5. Using the **Line Segment** tool  , create the connecting lines between the two triangles.

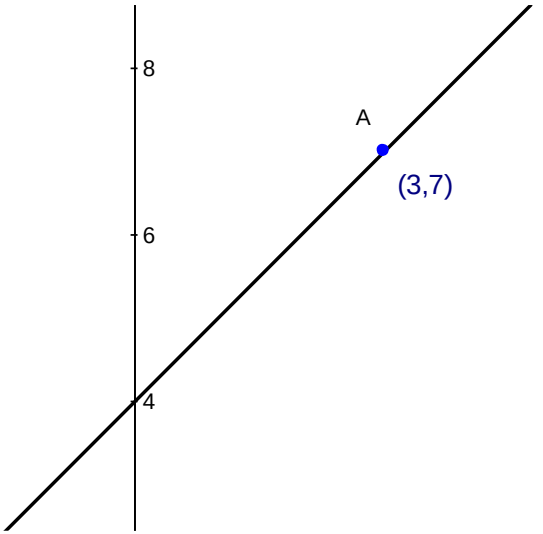
6. Select the three "inside" lines, right-click on one, and choose **All Properties** from the context menu.

7. Change the Line Style to a dotted line and choose OK.

8. Select and **Hide** all of the extraneous elements, including the translation line, points, and point labels.

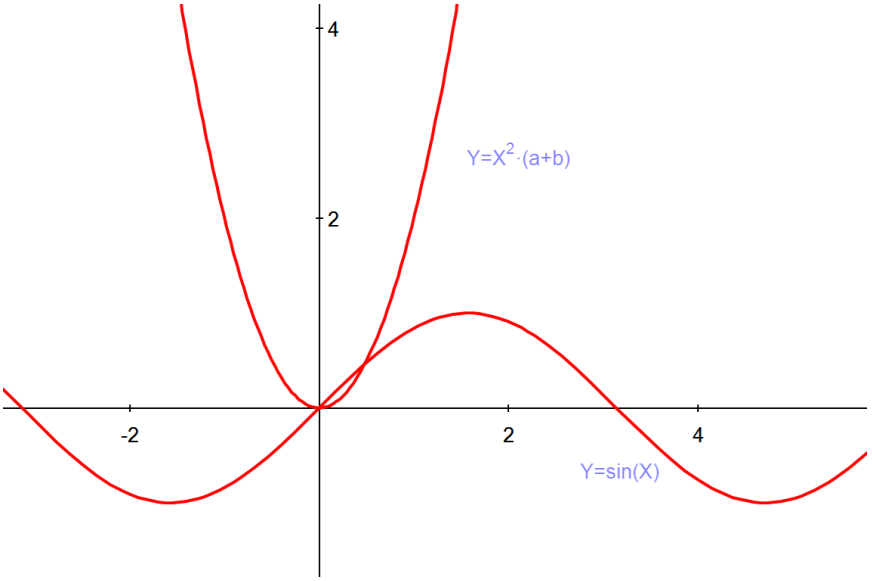
9. Select a pair of the dotted "inside" lines and click **Perpendicular** from the **Annotate** toolbox. Repeat for the other pairs.

Creating a line with a specified slope and coordinates:



1. Click the **Axes** icon or choose **Axes** from the **View** menu to display the axes.
2. Choose the **Infinite Line** tool and create a line.
3. Choose the **Point** tool and create a point on the line.
4. Choose the **Selection** tool and select the point.
5. Choose the **Constrain Coordinate** tool and enter the coordinates (3,7).
6. Choose the **Constrain Slope** tool and enter a slope of 1.
7. Select the slope, right-click and choose **Hide** from the context menu.

Graphing functions:



1. Click the **Axes** icon  or choose **Axes** from the **View** menu to display the axes.

2. Choose the **Function** tool  from the **Draw** toolbox.

3. In the **Y=** data entry line, type: **X^2*(a+b)** and press OK.

   Math Illustrations creates a parabola.

4. Choose the **Function** tool  from the **Draw** toolbox. In the **Y=** data entry line, type: **sin(x)** and press OK.

Math Illustrations creates a sine wave.