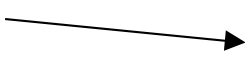



Geometer's Sketchpad Investigation: Angle Bisectors and Incenters of Triangles


In this investigation, you will discover the **incenter** of a triangle. The incenter is the point of intersection of all three angle bisectors in a triangle.

Step 1: Open up **Geometer's Sketchpad** by clicking on the icon on your desktop 

Step 2: On the left hand side is a tool bar that looks like this: . Click on the second button from the top . This button called the **Point Tool** allows you to draw points on the screen. Draw a point by clicking the mouse anywhere on the screen. Do this two more times so that there are three non-collinear points on your screen and make sure to keep them somewhat spaced apart.

Draw what is on your screen:



Step 3: Click on the first button on the tool bar . This is called the **Selection Arrow Tool**. Click any two of the points that you have constructed in step 2. Once you have selected two points, they will be highlighted in pink.

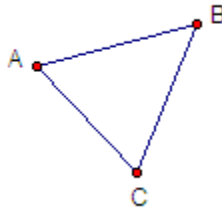
Step 4: Click on the **Construct** menu at the top of your screen. Scroll down and select **segment**. The two points that you selected in step 3 will now be connected by a segment. Click on a blank space on the screen to unhighlight the segment.

| Construct | |
|--------------------------|---------------|
| Point On Object | |
| Midpoint | Ctrl+M |
| Intersection | Ctrl+I |
| Segment | Ctrl+L |
| Ray | |
| Line | |
| Parallel Line | |
| Perpendicular Line | |
| Angle Bisector | |
| Circle By Center +Point | |
| Circle By Center +Radius | |
| Arc On Circle | |
| Arc Through 3 Points | |
| Interior | Ctrl+P |
| Locys | |

Step 5:

Connect all the points by repeating steps 3 and 4. Your ending result will be a triangle! Select all three points using the Selection Arrow Tool and go to the **Display** menu. Scroll down and click on **Show Labels**. This will label the points you selected. You can move labels by clicking on the letter and moving your mouse.

Draw what is on your screen:

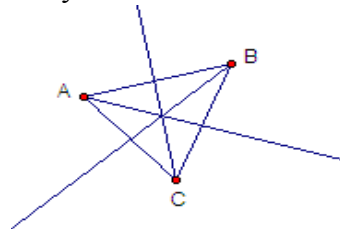


| Display | Construct | Transform | Measure |
|------------------------|-----------|--------------|---------|
| Line Width | | | |
| Color | | | |
| Text | | | |
| Hide Points | | Ctrl+H | |
| Show All Hidden | | | |
| Show Labels | | Ctrl+K | |
| Label Points... | | Alt+/, | |
| Trace Points | | Ctrl+T | |
| Erase Traces | | Ctrl+B | |
| Animate Points | | Alt+` | |
| Increase Speed | | Alt+] | |
| Decrease Speed | | Alt+[| |
| Stop Animation | | | |
| Show Text Palette | | Shift+Ctrl+T | |
| Show Motion Controller | | | |
| Hide Toolbox | | | |

Step 6:

Select angle ΔBAC . Since three points determine an angle, you must click on all three points in that order: BAC. Go to the **Construct** menu and scroll down to **Angle Bisector**. This will draw the angle bisector of ΔBAC . Click on a blank space to deselect the line and construct an angle bisector for ΔABC and ΔACB .

Draw what is on your screen:



| Construct | Transform | Measure | Graph |
|--------------------------|-----------|---------|-------|
| Point On Object | | | |
| Midpoint | | Ctrl+M | |
| Intersection | | Ctrl+I | |
| Segments | | Ctrl+L | |
| Rays | | | |
| Lines | | | |
| Parallel Line | | | |
| Perpendicular Line | | | |
| Angle Bisector | | | |
| Circle By Center +Point | | | |
| Circle By Center +Radius | | | |
| Arc On Circle | | | |
| Arc Through 3 Points | | | |
| Triangle Interior | | Ctrl+P | |
| Locus | | | |

Step 7:

Highlight any two lines and go to the **Construct** menu. Scroll down and select **Intersection**. This marks the intersection of all three points.

Select any point and move it.
What happens to the triangle?

What happens to the point of intersection?

What is this intersection called?

| Construct | Transform | Measure | Graph |
|--------------------------|-----------|---------|-------|
| Points On Bisectors | | | |
| Midpoint | | Ctrl+M | |
| Intersection | | Ctrl+I | |
| Segment | | Ctrl+L | |
| Ray | | | |
| Line | | | |
| Parallel Line | | | |
| Perpendicular Line | | | |
| Angle Bisector | | | |
| Circle By Center +Point | | | |
| Circle By Center +Radius | | | |
| Arc On Circle | | | |
| Arc Through 3 Points | | | |
| Interior | | Ctrl+P | |
| Locus | | | |