

Geometer's Sketchpad

Discovering the incenter of a triangle

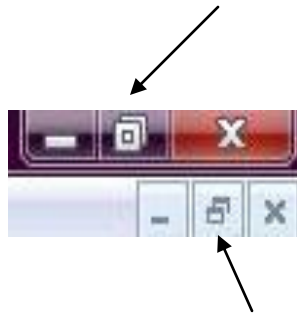
Name: _____ Date: _____

1.) Open Geometer's Sketchpad (GSP 4.02) by double clicking the icon in the

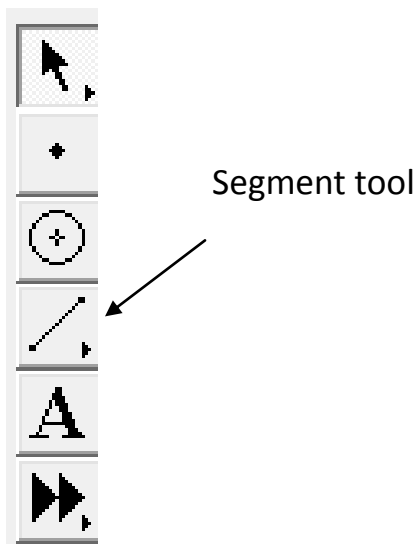
Start menu. The icon looks like this:



2.) Once the program loads, you will need to maximize the window to get the full effectiveness. You can maximize the window by clicking on the buttons in the upper right hand corner with two boxes (as shown in figure below)



3.) Next choose the segment tool from the toolbar on the left hand side.



4.) Using the segment tool, click a point on the screen, and then click a different point to create a segment.

After you have drawn your first segment, click on the point you ended on again and create another segment.

Do the same process a third time to create a triangle. You should have a total of three points and three sides.

Now that you have created a triangle on Geometer's Sketchpad, draw it below:

Good Job!

5.) Next, we need to label our points so we can easily identify them. To do this, we will use the text tool from the toolbar on the left hand side.



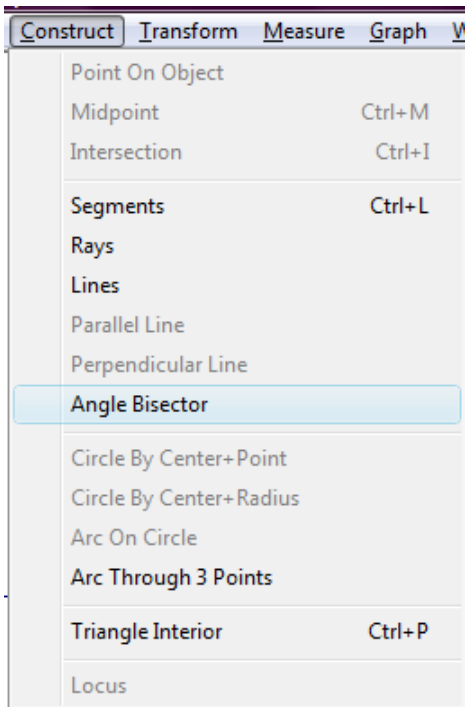
Using the text tool, click on each point in your triangle. A letter should be assigned to each vertex of your triangle. If you need to move the letter because it is on top of one of your lines, you can click on the letter and drag it so it is not crossing any lines. Add your labels to your picture in #4.

6.) Now it is time to create the angle bisectors. Using the pointer tool



from your toolbar on the left hand side, you will choose an angle of your triangle by clicking on the three points in your triangle in a specific order. The point in the middle is the angle you are using. For example, if you want to construct an angle bisector of angle A from triangle ABC, you would choose the points in this order: BAC or CAB. (A will be the center point.)

To do this, you will click on Construct from the toolbar on the top and then scroll down to choose Angle Bisector.



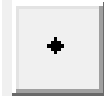
Draw what you now see on your screen below:

You are to repeat this step until you have bisected all three angles.

Complete your drawing above with all three angle bisectors.

7.) Now we are going to create the point where the angle bisectors intersect.

Click on the point tool from the toolbar on the left hand side of the

sketchpad. 

Now align the mouse until two of the three angle bisectors are highlighted, then click on that point. Label that point you just created the same way you labeled the vertices of your triangle.

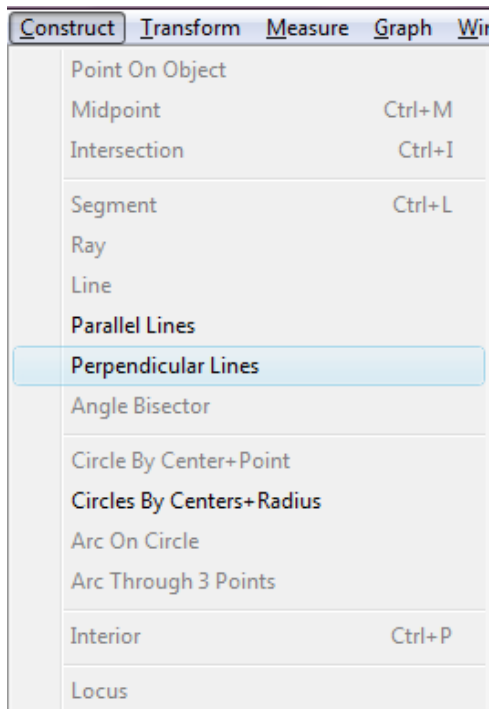
Congratulations! You have just found the incenter of your triangle!

Now, with the pointer tool, drag a vertex of your triangle and notice what happens to the point in the middle (incenter) as you move the vertex around.

What did you notice?

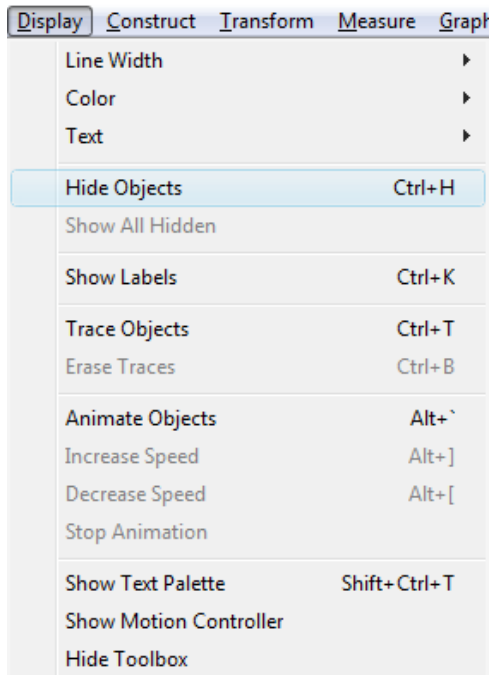
8.) Now we are going to draw a perpendicular line from the incenter to a side of your triangle. Click on a blank space to deselect everything. Using the

pointer tool, click on the incenter, and click on one of the sides of your triangle. We are going to use the toolbar on the top of the page to click Construct, and then choose Perpendicular Lines.



Your diagram looks pretty cluttered right now, since we have a triangle, three angle bisectors, an incenter, and now an extra perpendicular line. To fix this, we are going to hide our angle bisectors, so we can focus on the rest of the drawing.

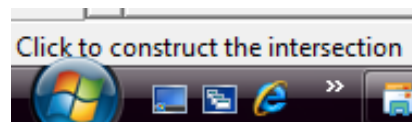
9.) To hide our angle bisectors, we will use our pointer tool to highlight one of the angle bisectors. Go to the toolbar at the top of your page and choose Display, and then choose Hide Objects.



You will see the angle bisector disappear. Do the same thing to hide the other two angle bisectors. Draw what is left on your screen below:

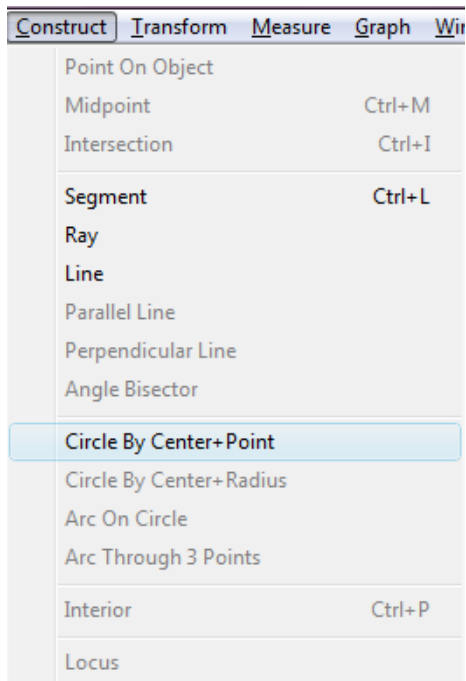
- 10.) Now we need to create the point where the perpendicular line meets the side of your triangle. To do this, use the pointer tool to center in on the point where the two lines cross each other. At the bottom left of your screen, a message will appear that says “Click to construct the intersection”. You want to click on the point of intersection when the

message says that.



This will make a point on the intersection of those two lines. Label this point.

- 11.) Now we are going to create a circle inscribed inside the triangle. To do this, we are going to use the pointer tool again. Click on the incenter of the triangle. Then click on the point we just created that intersects the perpendicular line with the side of the triangle. Once those two points are highlighted, go to the toolbar on the top of your screen. Under the Construct option, choose Circle by Center + Point. This will create a circle inscribed in your triangle.



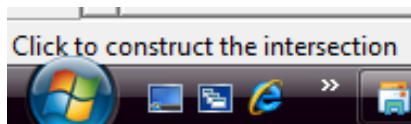
Draw what is now on your screen below:

Congratulations! You have just drawn a circle inscribed in your triangle!

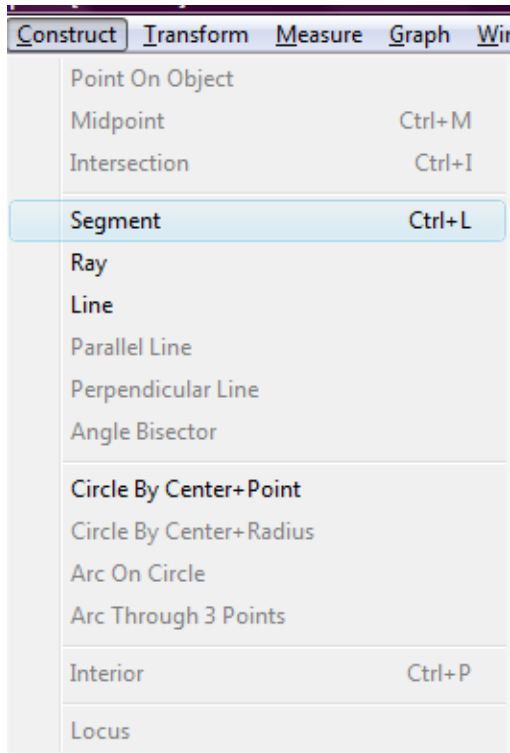
12.) Now, using the pointer tool, drag a vertex of your triangle and move it around.

What happens to the circle when you make the circle big or small?

13.) Now we are going to create another point. The circle inside of your triangle lies tangent to (touches) each of the sides. Using the pointer tool, move your mouse over the intersection point of the circle and any one of the sides of your triangle. You will again see in the bottom left hand corner of your screen a message that says "Click to construct the intersection." Click on that point when you see the message. Label the point you just created.



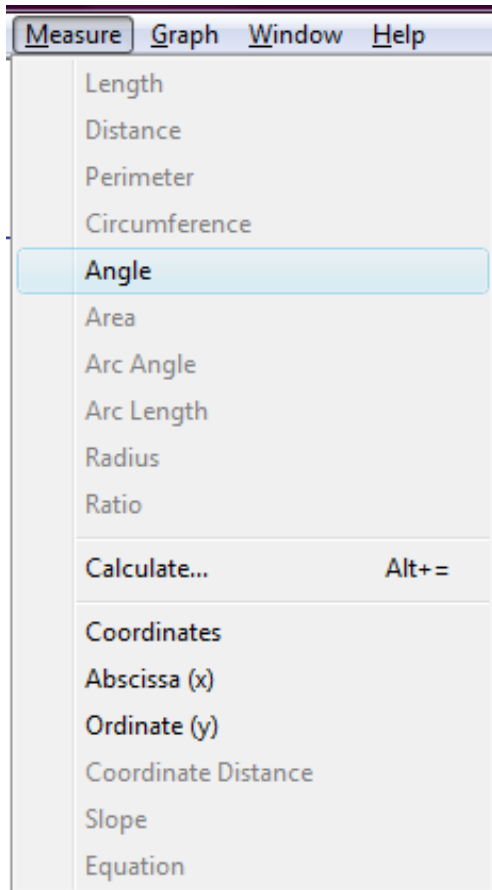
14.) Now create a segment from the incenter of your triangle to the point you just created. To do this, click on both points and choose Construct from the toolbar at the top of the page, then the Segment option.



Draw what your figure looks like below:

- 15.) Measure the angle of the segment you just created with the side it touches. You can do this by clicking on (1) a vertex of the triangle on that side, then clicking on (2) the point you created that is the intersection of the circle and the side, and (3) the incenter. Once all three of these points

are highlighted, we will measure the angle by choosing the Measure option on the toolbar located on the top of your screen. Then choose Angle.



What is the measure of the angle?

What can you discover about the segment you created and the side of the triangle?

Move a vertex around on the screen using your pointer tool. What happens to the measure of the angle?

What can you conclude about the incenter of a triangle after doing this activity?

Why do you think the intersection point of angle bisectors is called the incenter?

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