# Secrets in the Triangle

Patricia Casey
Florida State University School
Tallahassee

## Activity overview

*Students will use the geometry screens of the nspire to find points of concurrency by constructing the altitudes, the perpendicular bisectors, and the medians in triangles. The Euler Line will be found and extensions given.*

## Concepts

*Find perpendicular bisectors, medians, altitudes, and angle bisectors in triangles. Find points of concurrency and Euler Line.*

## Teacher preparation

*Students should know definitions of altitude and medians of a triangle, also perpendicular bisectors and angle bisectors in triangles. Circumcenter, orthocenter, centroid and incenter will be defined in the activity. Secrets in the Triangle should be downloaded to calculators. Step-by-step directions are included below for new Nspire users.*

## Classroom management tips

*This activity can be completed by the student individually, with a small group, or together with the class. If students have a working knowledge of the Nspire then they can do the activity with just the Secrets in the Triangle file downloaded to their calculator. If more help is needed step by step instructions are below.*

## TI-Nspire Application

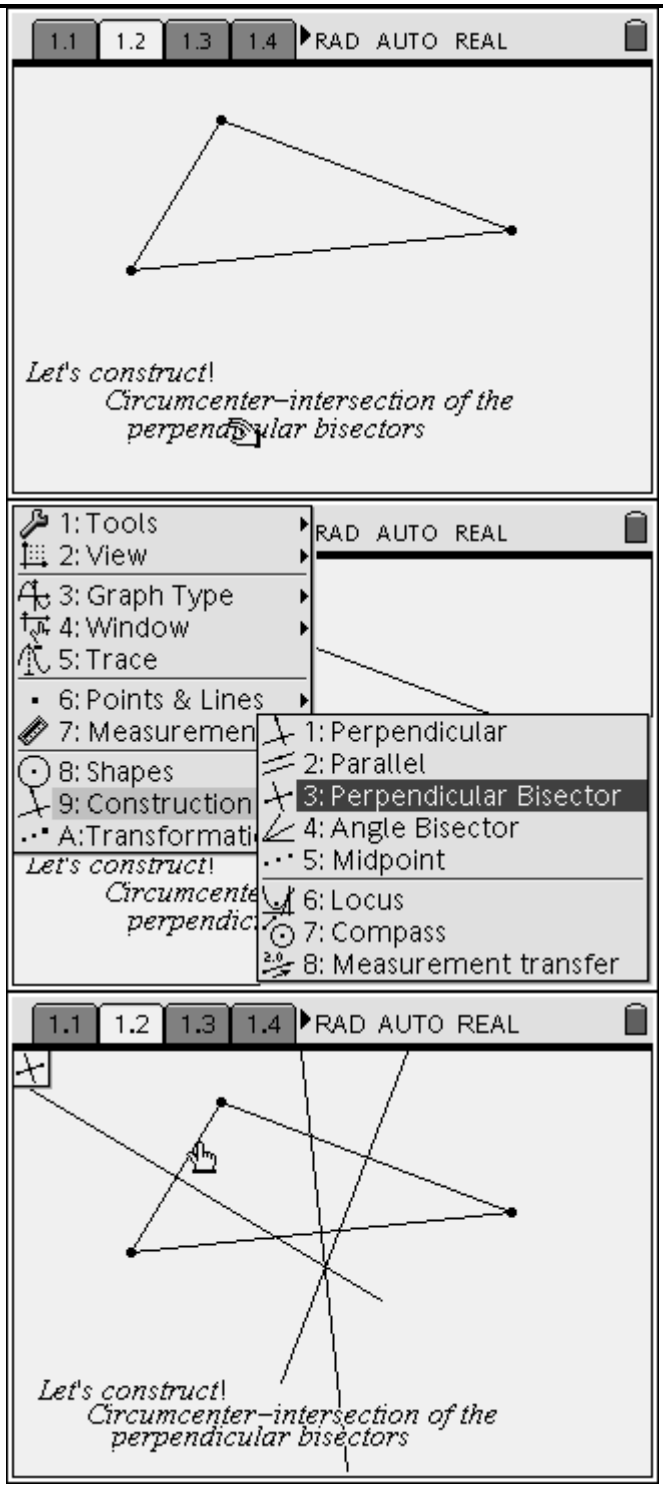
*Students will need to have Geometry_EulerLine_Casey.tns downloaded for this activity*

## Step-by-step directions

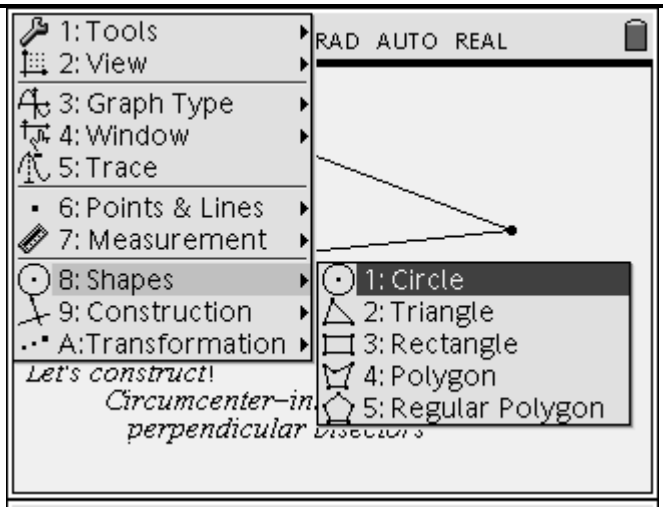
*1. Open Secrets in the Triangle by going to My Documents.*


2. Pressing ctrl Right Arrow to advances to next page.

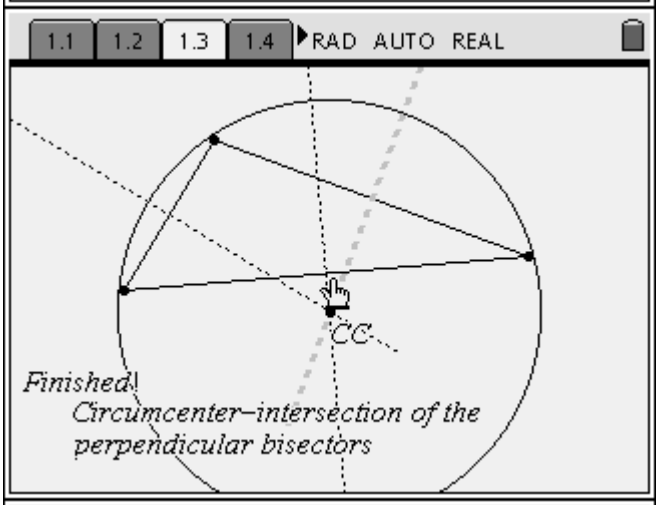
3. Construct the perpendicular bisectors and note the concurrent intersection of the three bisectors called the circumcenter. Use the Construction choice in (menu).



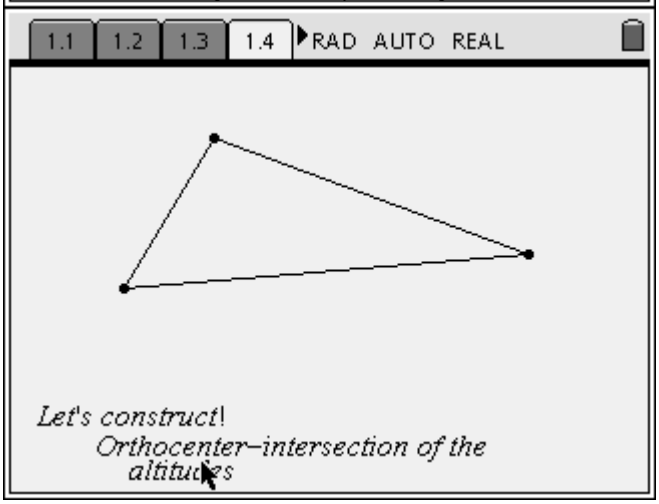
4. Find the circumscribed circle for the triangle using the circumcenter as the center. Go to (menu) to Shapes: Circle to find the circle maker. The circumcenter will be the center of the circle. Open the circle until it hits all 3 side of the triangle!



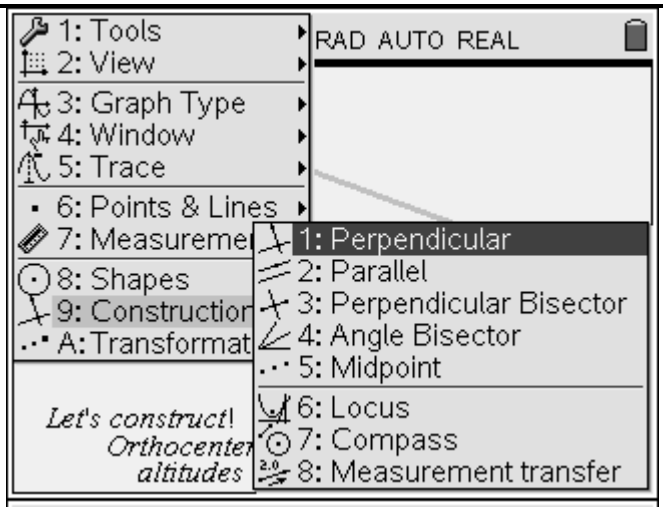

5. Check the next page to check your work.

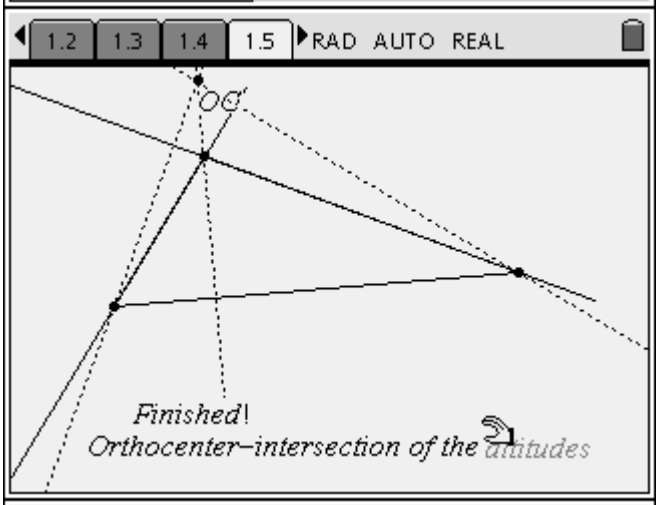



6. Continuing to next page, construct the altitudes and find the orthocenter. Find the altitudes by going to (menu) then construction:perpendicular. Choose a vertex and its opposite side for all three vertices.

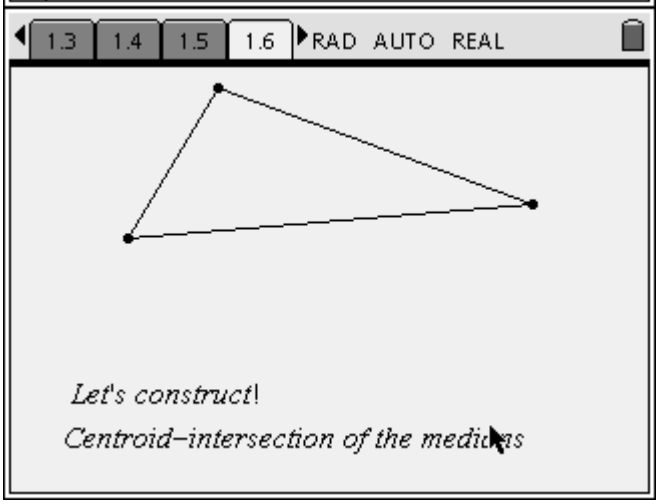


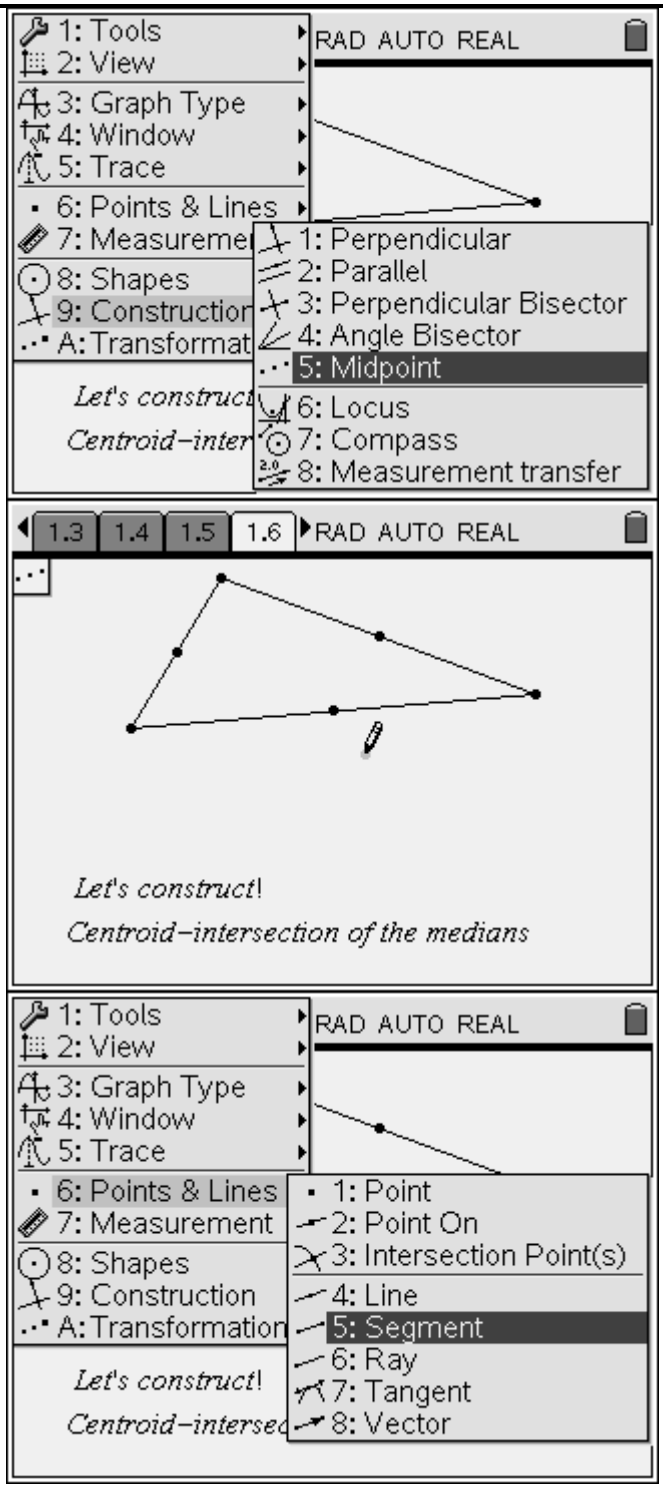
7. Check the next page to check your work.



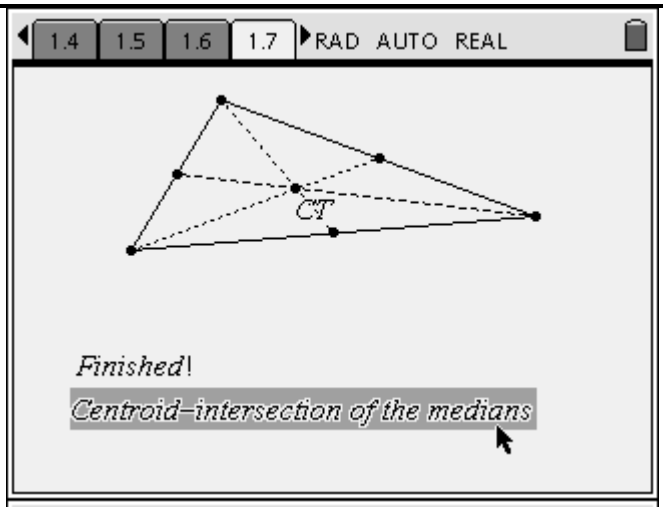




8. Continue to next page and construct the medians to find the centroid. This construction must be done in 2 parts. Use midpoint under the construction menu for all three sides. After finding the midpoints then use Points & Lines:Segment to connect the midpoints with the opposite vertices.

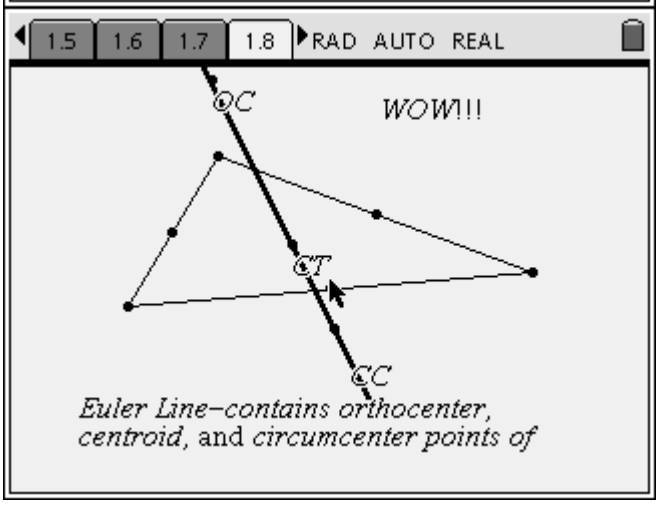



1: Tools
2: View
3: Graph Type
4: Window
5: Trace
6: Points & Lines
7: Measureme
8: Shapes
9: Construction
A: Transformat
RAD AUTO REAL
1: Perpendicular
2: Parallel
3: Perpendicular Bisector
4: Angle Bisector
5: Midpoint
6: Locus
7: Compass
8: Measurement transfer
Let's construct
Centroid–inter
1.3
1.4
1.5
1.6
RAD AUTO REAL
Let's construct!
Centroid–intersection of the medians
1: Tools
2: View
3: Graph Type
4: Window
5: Trace
6: Points & Lines
7: Measurement
8: Shapes
9: Construction
A: Transformation
RAD AUTO REAL
1: Point
2: Point On
3: Intersection Point(s)
4: Line
5: Segment
6: Ray
7: Tangent
8: Vector
Let's construct!
Centroid–intersec

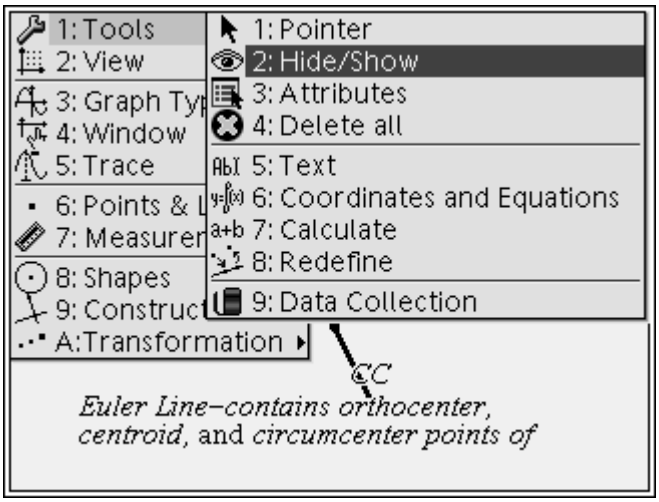
9. Check next page to check Line. Work for Centroid.

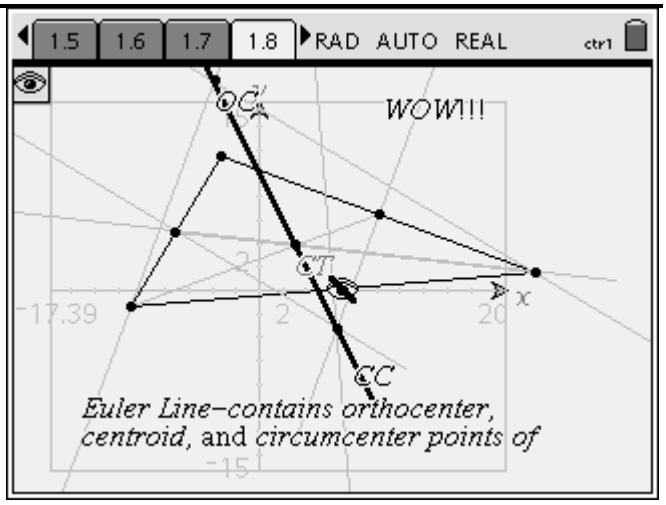



10. The next page shows all 3 points of concurrency and the line that goes through them called the Euler Line.

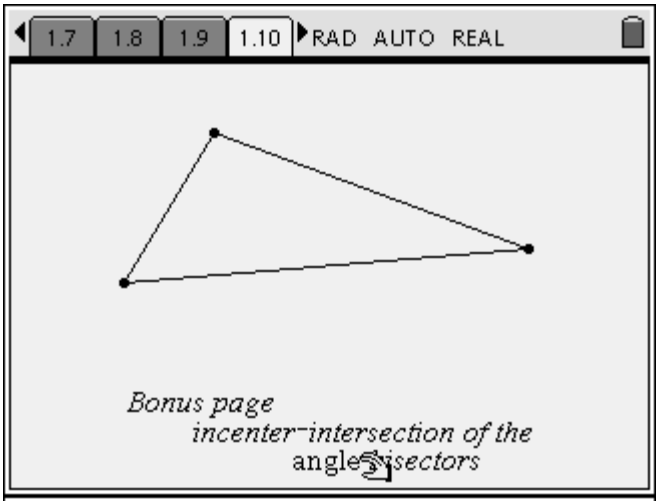


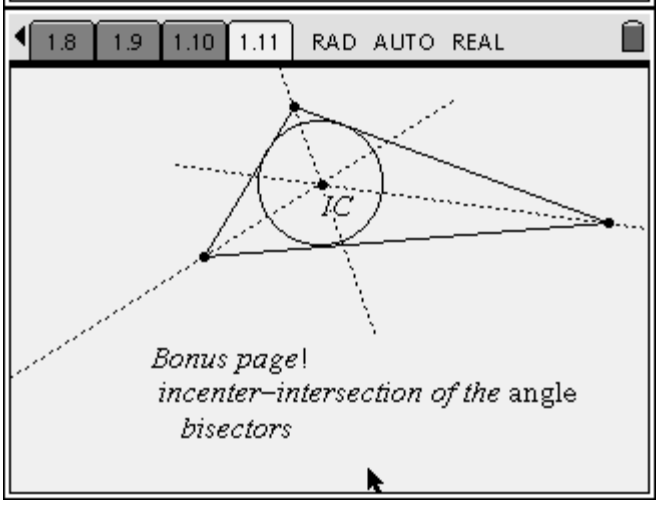

11. On this page go Menu and then Tools and then Hide/Show and select. The new screen shows all the hidden lines constructed to find the points of concurrency!






12. The next page suggests some extensions for this activity.
13. Bonus Page! Continue to final pages and construct the angle bisectors (find in the Construction menu!) to find the incenter. Use the incenter to draw the inscribed circle.




14. Now, try the activity again without use of these notes! Don't save your work and open the file Geometry_EulerLine_Casey again. Use the prompts to complete your work. How much did you learn?!