# Proof by Counterexample of the SSA and AAA Cases

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## Activity overview

*Students will use the geometry functions of the nspire to create triangles with SSA and AAA details. Then counterexamples are used to disprove possible SSA and AAA conjectures.*

## Concepts

*Parallel lines, corresponding angles of parallel lines, radii of a circle, corresponding parts of triangles, counterexamples.*

## Teacher preparation

*Discussion of the SSA and AAA Cases usually comes after discussion and use of the SSS, SAS, ASA, and AAS Postulates. Counterexamples should also have been covered.*

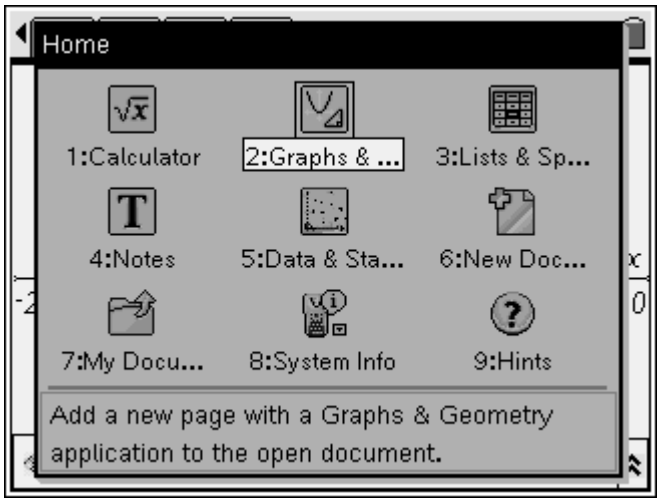
*Students should have copy of step by step instructions below.*

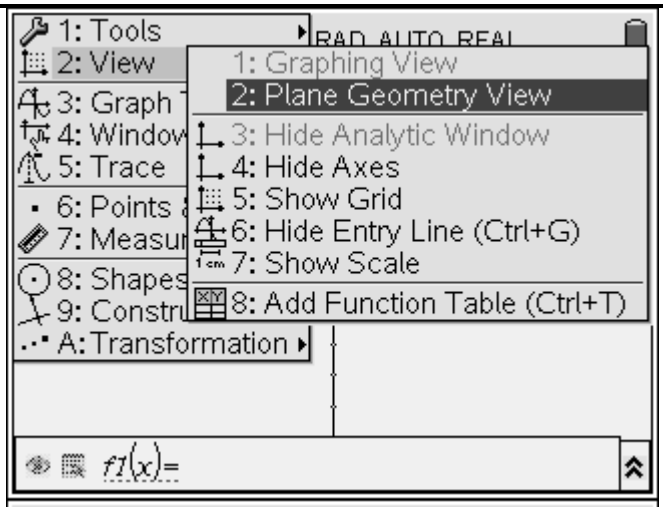
## Classroom management tips

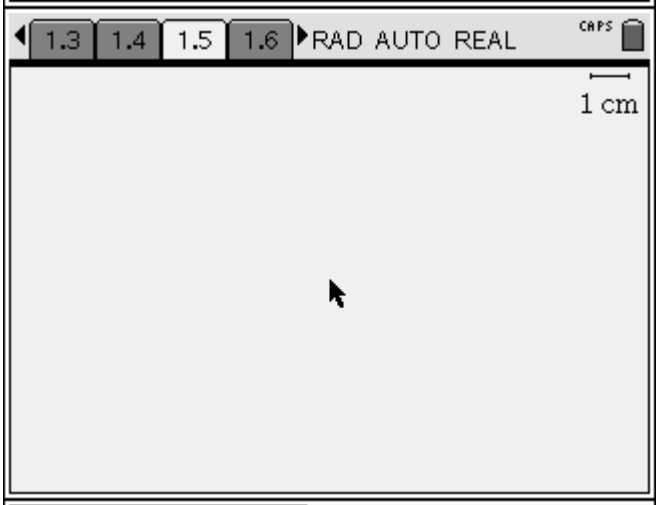
*Students with some Nspire experience should be able to work on this activity by themselves using the step by step explanation below. Groups could also be utilized so that students could see similar drawings with the same conclusions. Teachers could also do this as a large group activity and have all students working together.*

## Step-by-step directions

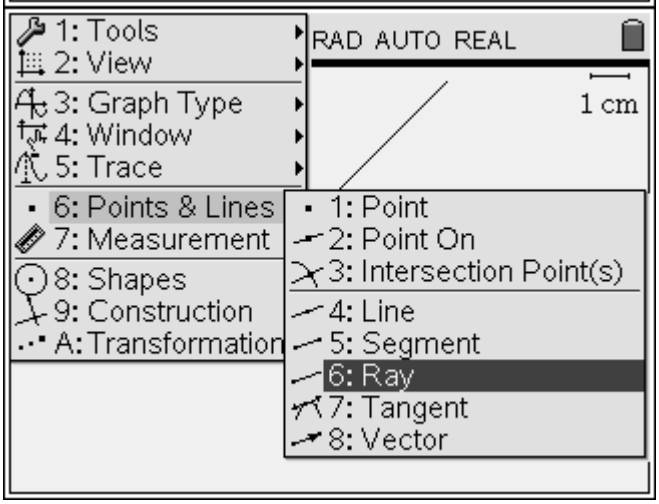
*1. From (home) open a new Graph page and under (menu) :View choose Plane Geometry View.*



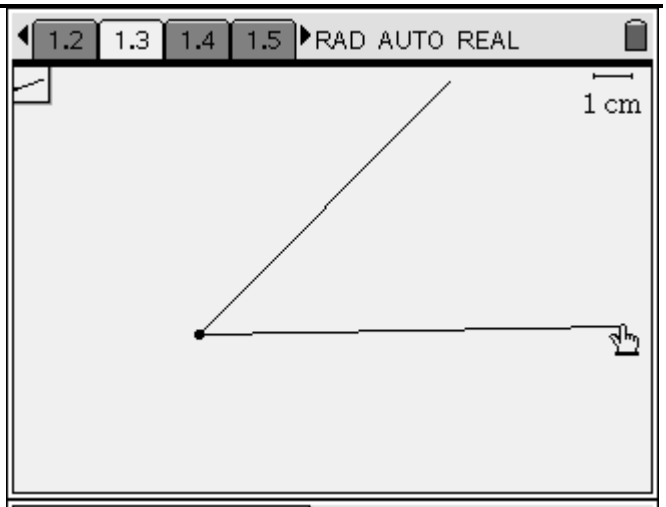


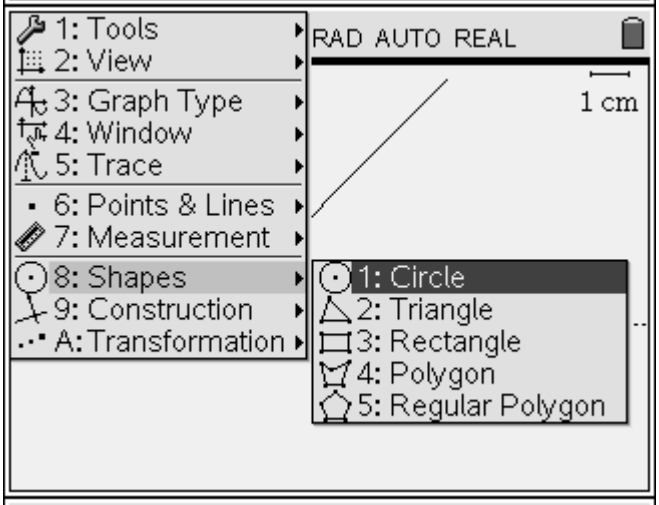



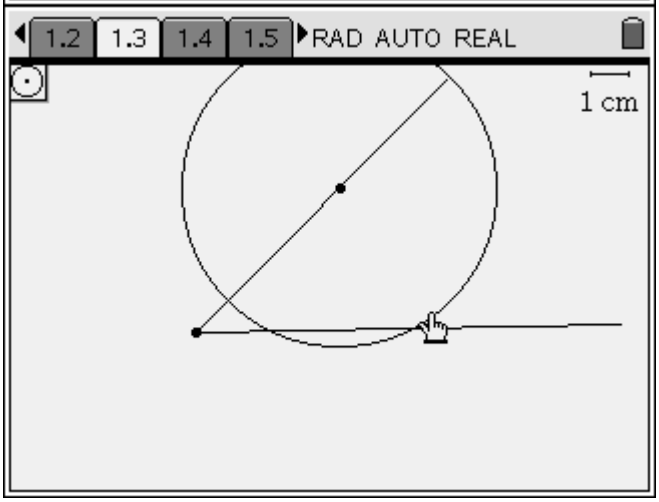

*2. Under (menu) : Points & Lines choose ray tool to draw an acute angle.*



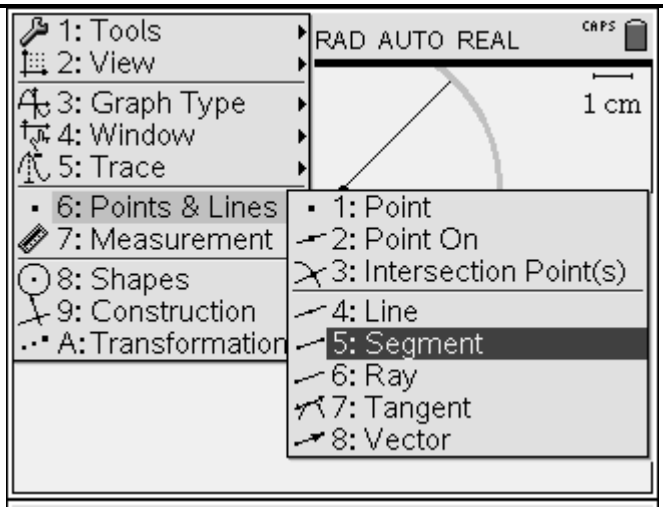
3. Under (menu) : Shapes choose the Circle tool to draw a circle with its center on one of the rays so that the other ray will be intercepted twice.

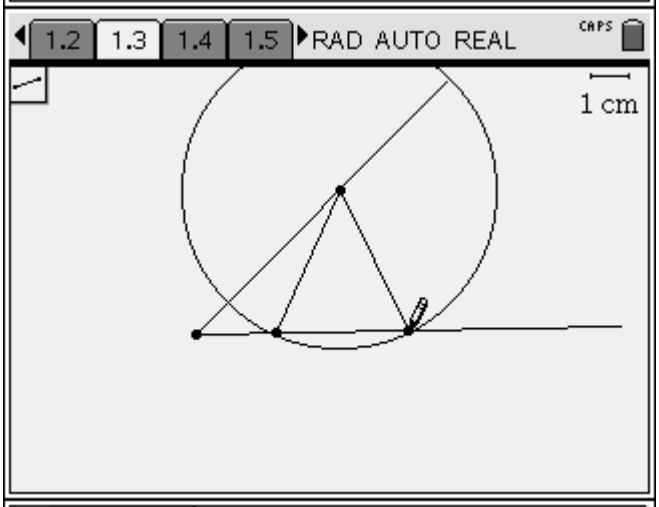


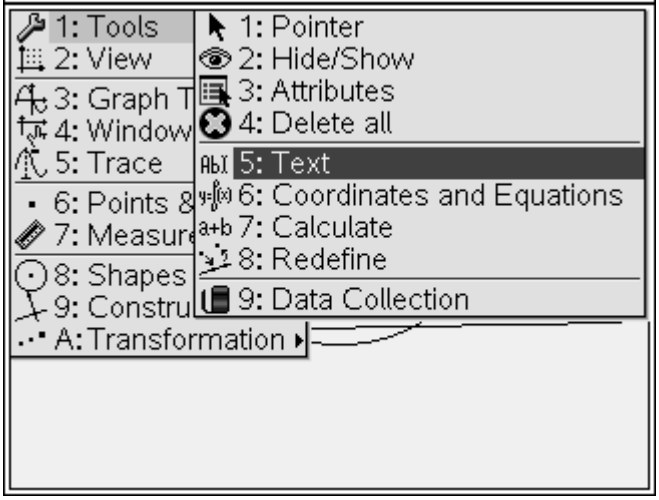



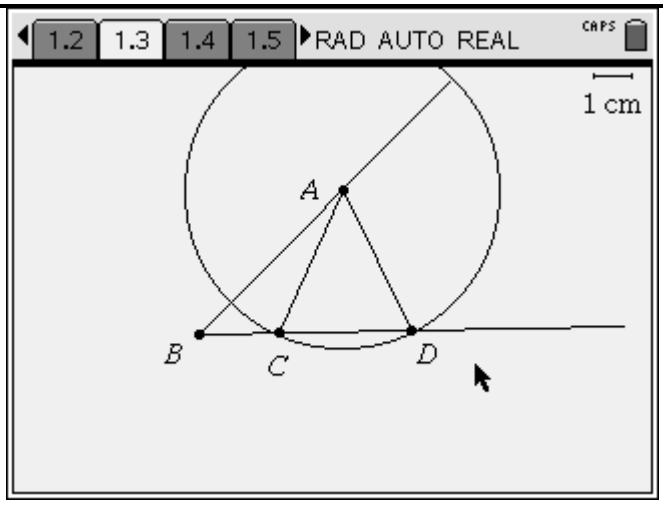
4. Under (menu) : Points & Lines choose the Segment tool to draw 2 segments to connect the center of the circle to the intersection points on the intersected ray.



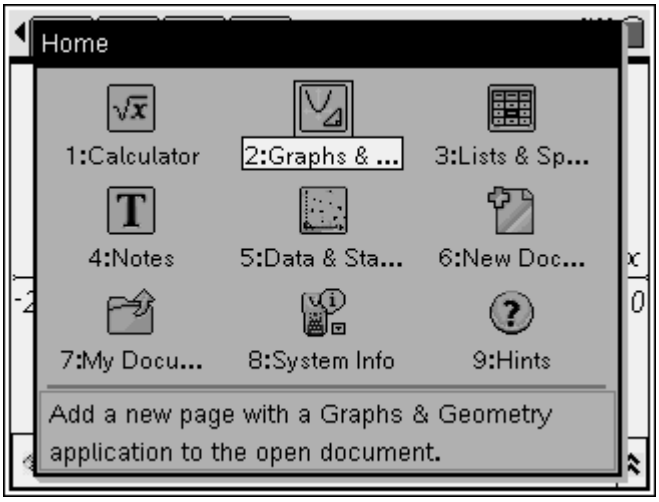

5. Under (menu) : tools choose the Text to label points on the drawing.

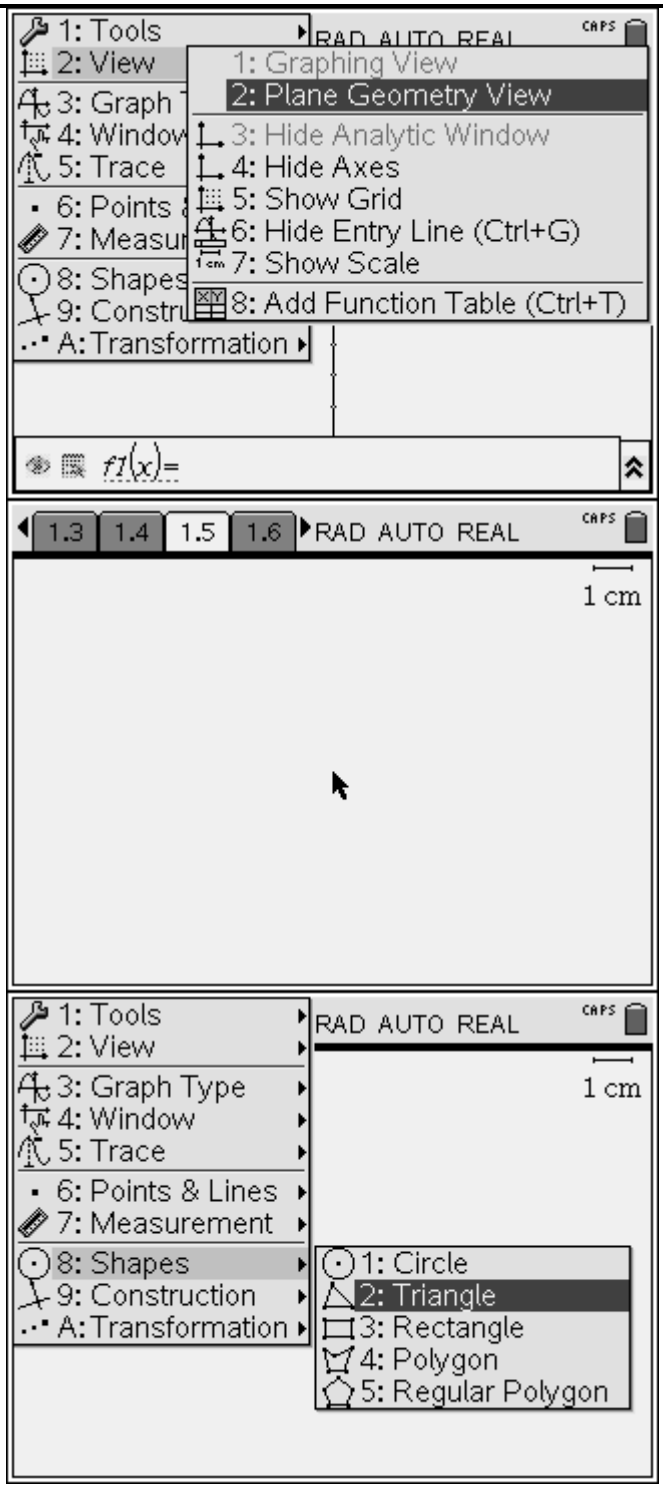





6. Now we need to study the 2 triangles ABC and ABD. Both triangles include angle B and side AB. They also have congruent sides AC and AD (why must they be congruent?). This means that each triangle has 2 sides and an angle (NOTE: not the included angle) congruent. What conclusion can be made from this information about SSA?

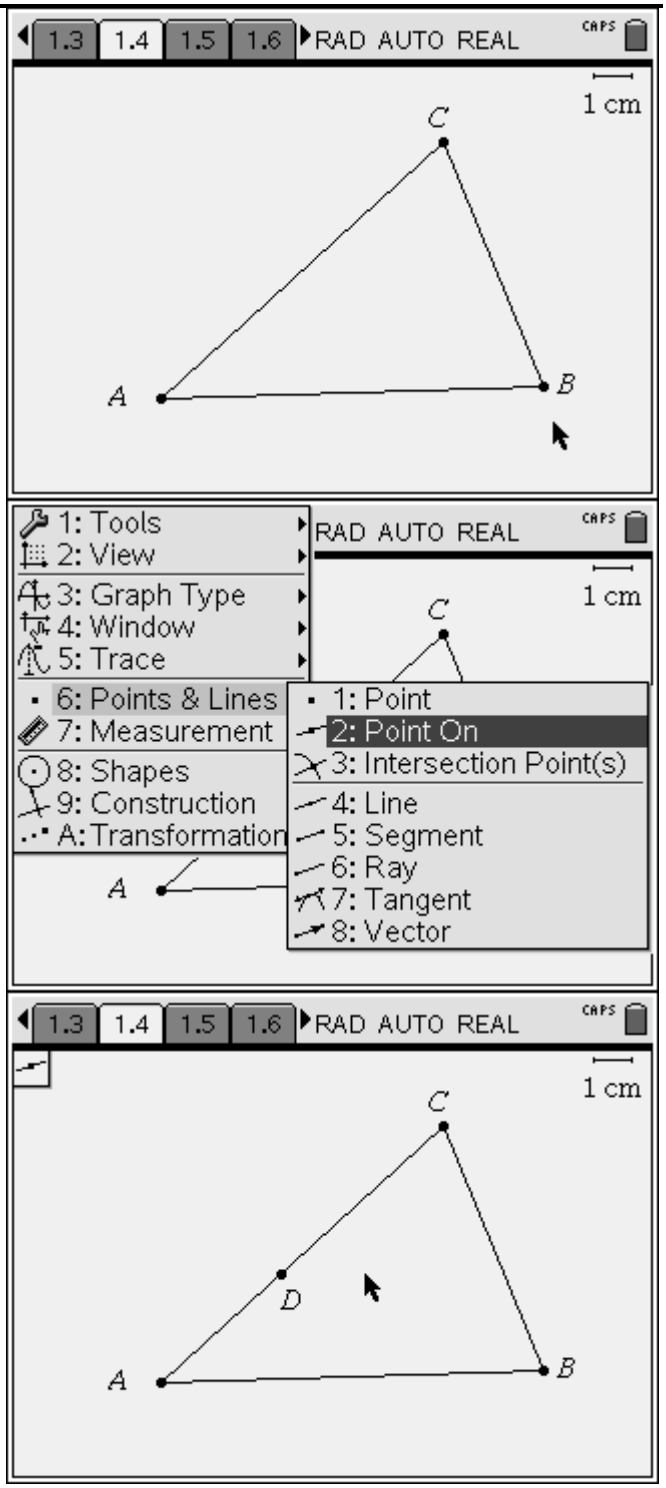
7. Now let's start a new Geometry page. Go to (home) and choose Graphs and then under (menu) : view choose Plane Geometry View. View.



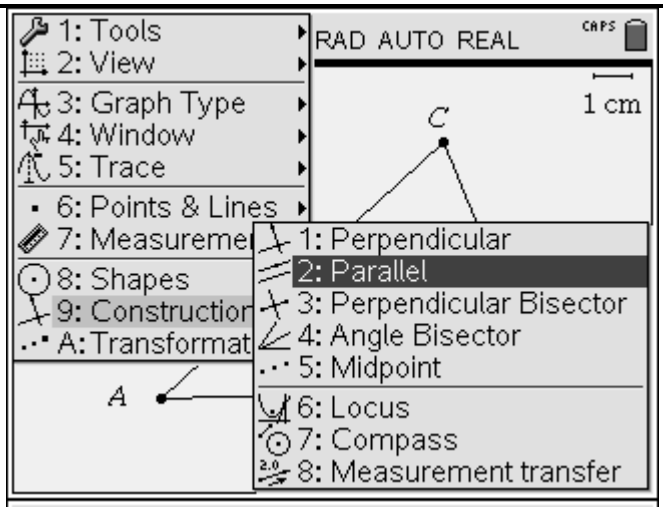


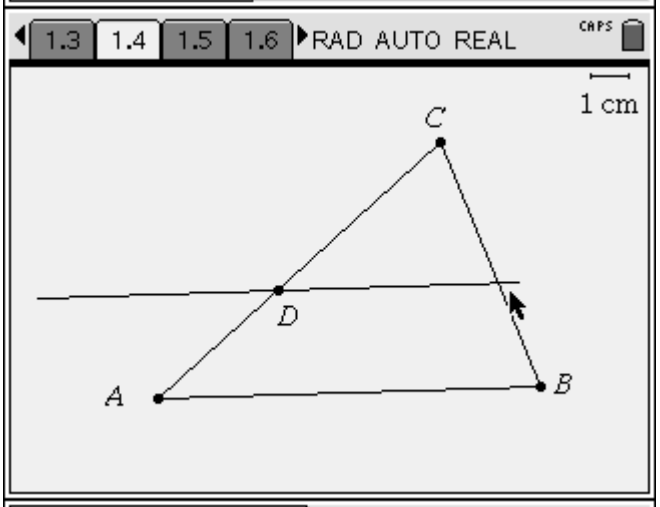

8. Next, draw a Triangle from the Shapes menu, labeling the vertices as you set the points, or add them with Text (Tools:Text) afterwards.

9. Draw and label a point D on side AC from the Points & Lines: Point On.

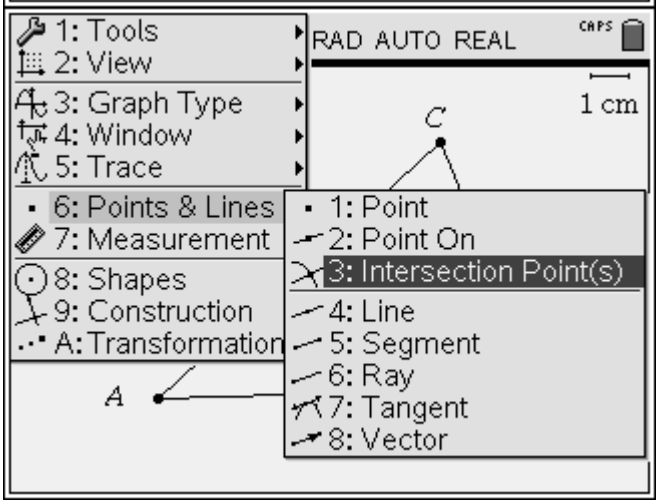


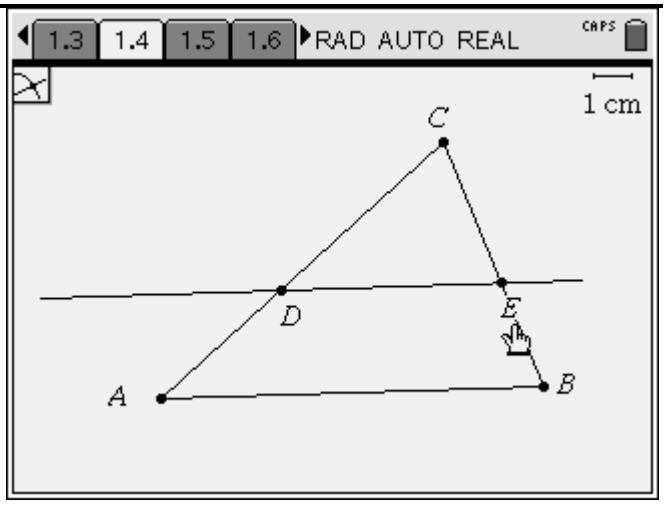
10. Next construct a line parallel to AB through D. To do this choose Construction: Parallel.




11. Find the intersection of this new line with side BC and label it E using Ponts & Lines: Intersection Point(s).






12. Let us now look at triangles ABC and DEC. What do you know about their angles? Note that they both contain angle C. Angle A and angle CDE are corresponding angles for what parallel lines? What about the 3rd angles? What conclusion can you make about AAA?

13. Write up explanations for the SSA and AAA Cases and your conclusions as discussed in steps 6 & 12.