Mystery Point!

by – Steve Phelps

Activity overview

Students will discover the nature of the "Mystery Point" in a triangle. The Mystery Point is a triangle center, constructed though algebraic and vector means, so students can not "un-hide" the construction to discover the center. The students will have to test various center constructions to discover the Mystery Point.

Concepts

Triangle Centers – Incenter, Circumcenter, Centroid, Orthocenter, Nine-point Center, Excenter, Symmedian Point, Gergonne Point, Nagel Point.

Isogonal Congugates and Isotomic Conjugates

Special Segments in a triangle – Altitude, Perpendicular Bisector, Medians, Angle Bisectors

Teacher preparation

You (and your students) should be familiar with the construction of the various centers and the conjugates, as well as with the Euler Line. You can easily remove some of the pages from this document to focus on the traditional centers if you wish.

Classroom management tips

Partners rather than small groups are appropriate.

TI-Nspire Applications

Geometry Application

Step-by-step directions

Students simply work through each page of the document, dragging the vertices of the triangle to discover the dynamic behavior of the Mystery Point. Based on the dynamic behavior they observe, students should make a conjecture as to which center is the Mystery Point. Students should test their conjectures by constructing the conjectured center in the triangle on the page.

Students will be unable to determine the center by "un-hiding" the construction. All the centers were constructed by using exact trilinear coordinates or by using barycentric coordinates.

There is an introductory page at the beginning of the document, and a "hints" page at the end of the document.

Assessment and evaluation

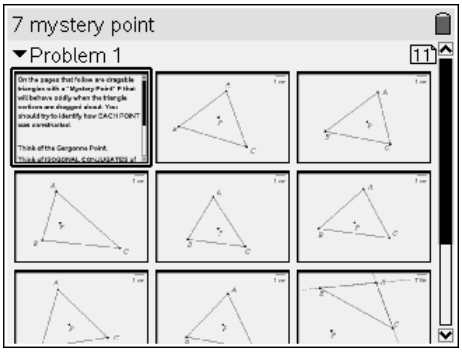
- *The assessment is very informal.*
- *Students should type in the name of the construction on the page.*
- *Students should perform the construction (without hiding the construction) on the page.*
- *Students should download the constructs to the teacher computer. The work should be assessed on how well they identified the points, and by how successful their construction were (did they pass the drag test?).*

Activity extensions

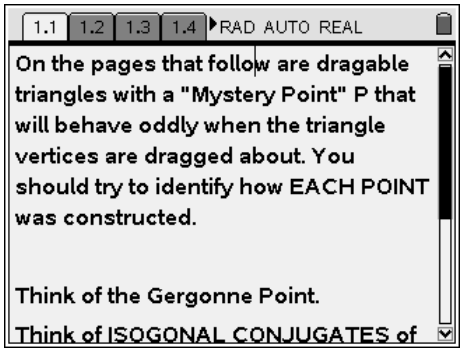
- *There are a number of other centers that could be explored, such as the Spieker Center, for example.*
- *This activity could be modified to include famous circles, such as the incircle, the nine-point circle, the excircles.*
- *This activity could be modified to include famous lines, such as the Euler Line, the Nagel Line, the Brocard Axis, or the Lemoine Axis.*
- *Students could learn about barycentric coordinates, and how they were used to construct these points.*
- *Students could learn about exact trilinear coordinates, and how they were used to construct these points.*

Student TI-Nspire Document

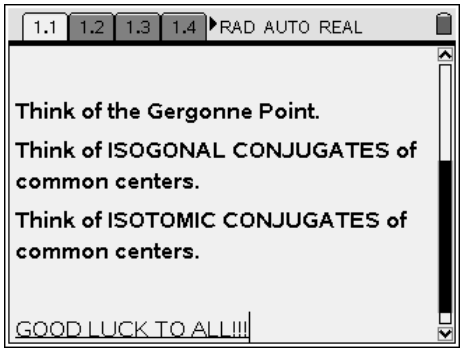
MysteryPoint.tns.



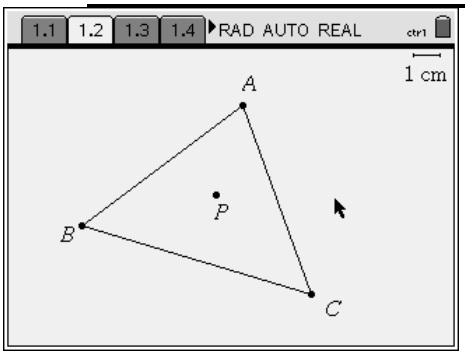
Overview



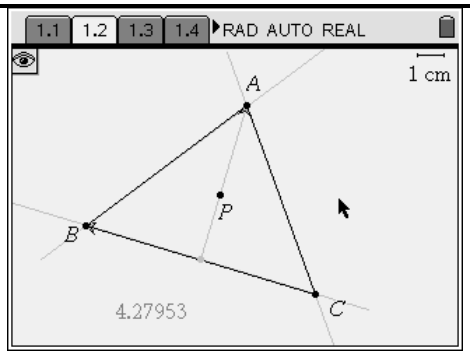
Page 1 – Intoduction



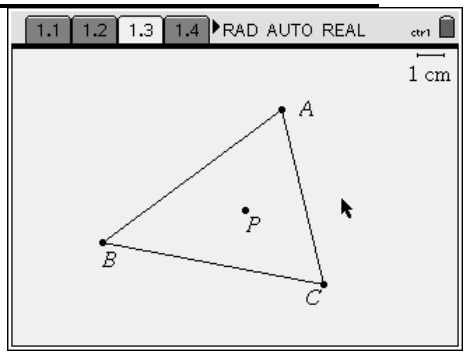
Page 1 – Introduction



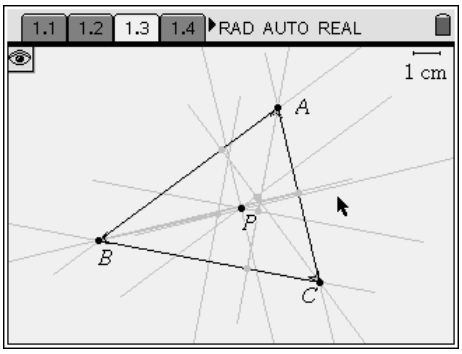
Page 2 – Nagel Point



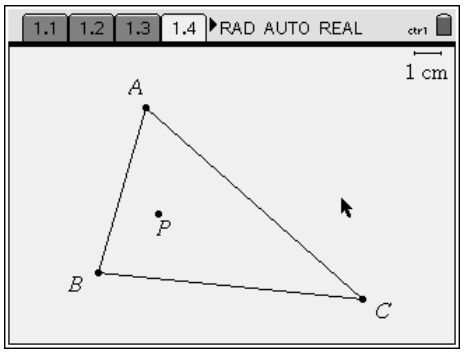
Page 2 – Nagel Point Un-Hidden



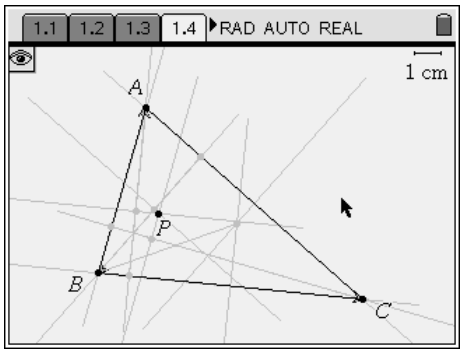
Page 3 – Incenter



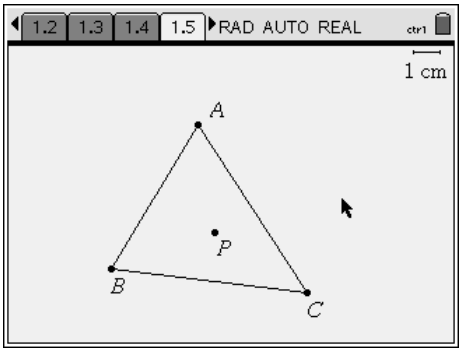
Page 3 – Incenter Un-Hidden



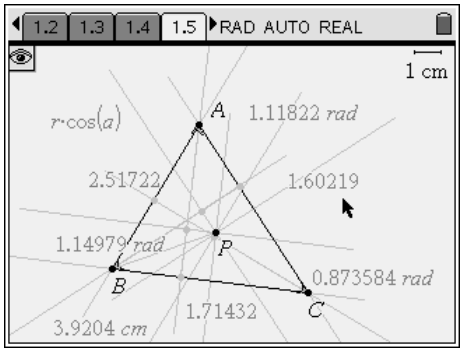
Page 4 – Symmedian



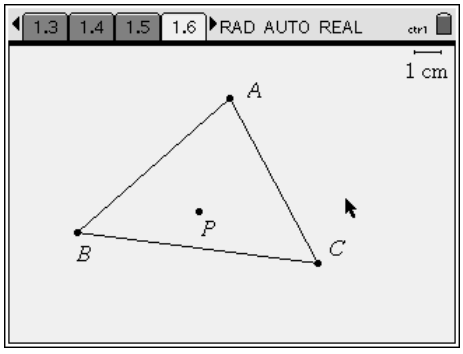
Page 4 – Symmedian Un-Hidden



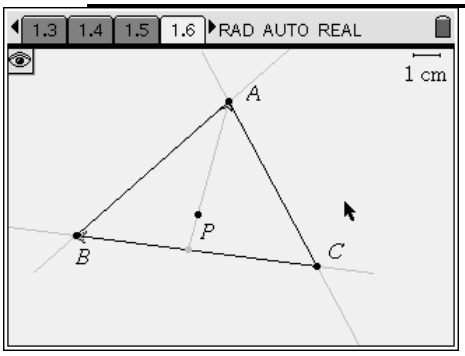
Page 5 – Circumcenter



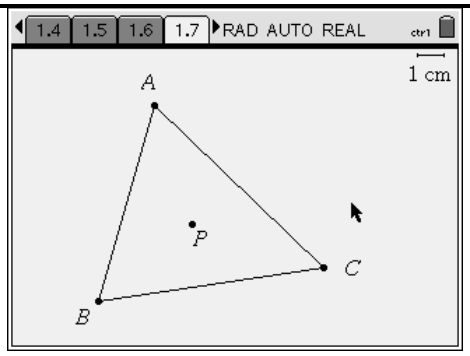
Page 5 – Circumcenter Un-Hidden



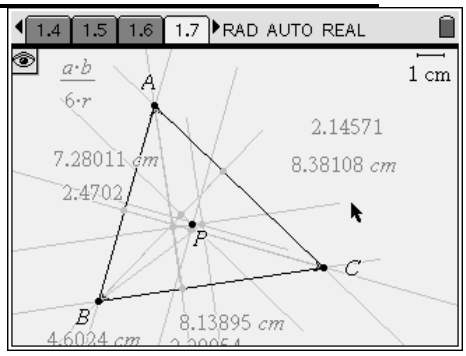
Page 6 – Gergonne Point



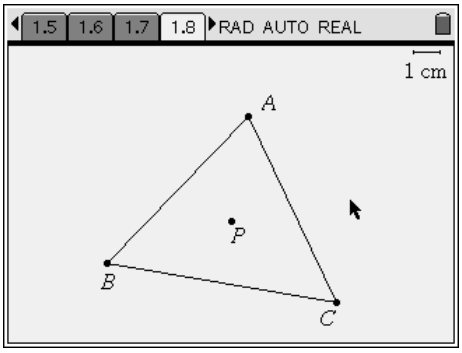
Page 6 – Gergonne Point Un-Hidden



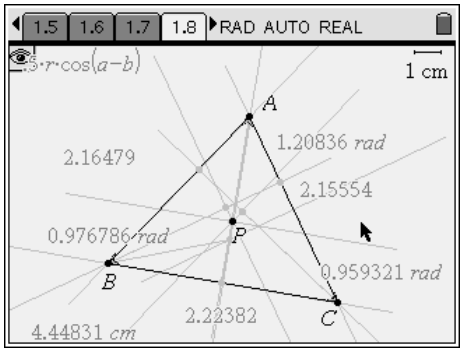
Page 7 – Centroid



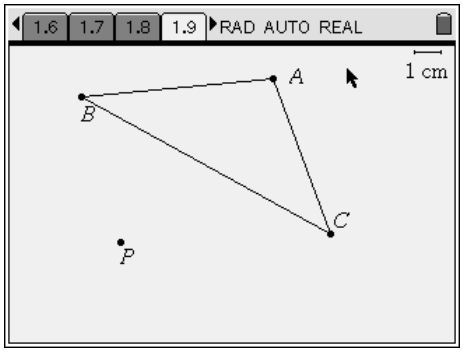
Page 7 – Centroid Un-Hidden



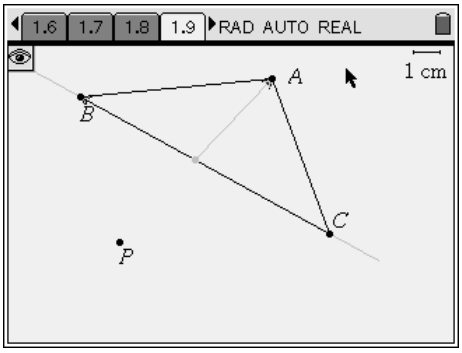
Page 8 – Nine-Point Center



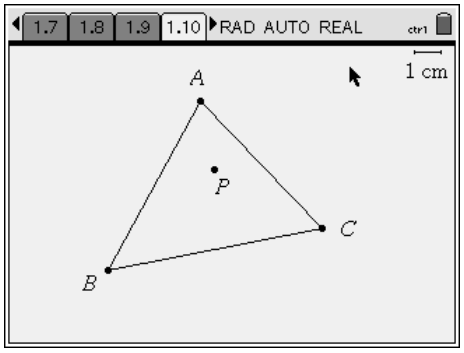
Page 8 – Nine-Point Center Un-Hidden



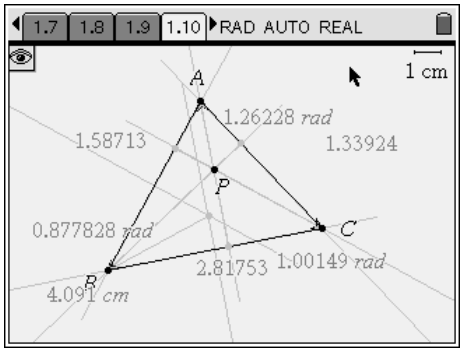
Page 9 - Excenter



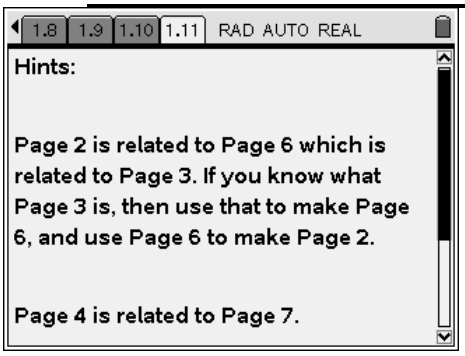
Page 9 – Excenter Un-Hidden



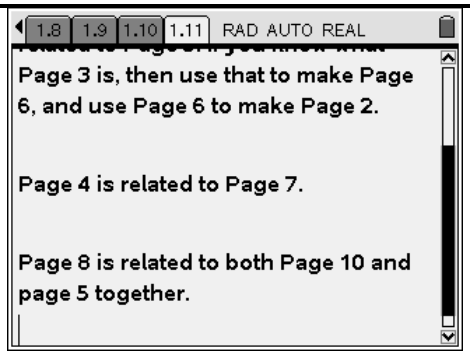
Page 10 – Orthocenter



Page 10 – Orthocenter Un-Hidden



Page 11 – Hints



Page 11 – More Hints