PART III

SHORT PRESENTATIONS AND POSTERS

SHORT PRESENTATION ABSTRACTS

8.1 Volume of Solids with Known Cross Sections - Rasha Tarek, Staples High School, CT

Students often struggle with visualizing solids in 3D. This presentation will walk you through the process of creating 3D solids with known cross sections to help your students visualize them. We will start by creating the base of our solid using any two continuous functions, then we will construct infinitely many square or triangular cross sections that are perpendicular to the x-axis to form the solid.

8.2 Dynamic Illustrations and Validations of Geometric Theorems - Tim Brzezinski, Berlin High School, CT

In this session, participants will have the opportunity to interact with several GeoGebra applets Âthat dynamically illustrate definitions, concepts, theorems without words, segment lengths, and angle measures. Each applet contains a figure that the user can modify at any time. The main tool that controls all dynamics in each applet is the slider tool. These illustrationsÂprovide teachers with a powerful tool to foster student discovery and meaningful reinforcement of concepts.

8.3 Real Problems with Real Pictures - Ali Heery and Rob Belevich, Southern Connecticut State University, CT

In this presentation, we will showcase how we used real pictures to illustrate real-life problems. The activities that we propose allow students to interact with the problem and try different strategies. Other problems can be created using the same strategies, making the context of the problem more real and meaningful to students.

8.4 Geometric Constructions with Automatic Feedback - Jason Wofsey, Professional Childrenâ^s School, NY

I will present several applets that ask students to perform Euclidean constructions. The applets incorporate JavaScript with added listeners to check for the correct object and then provide affirmative feedback to students. I will explain how teachers can create their own such exercises and how to best make use of them in the classroom. I will also show how they can be used with the Moodle GeoGebra Quiz plugin to make automatically graded quizzes.

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8.5 Pythagoras in Converse - Hunter Smith, Engineering & Science University Magnet School, CT

In this presentation, we will look at multiple applets to explore the converse of the Pythagorean Theorem in a high school geometry class. The applets will offer hands-on demonstrations and ways to visualize the inequality.

8.6 Graphing Surfaces with Polygon Cross Sections in GeoGebra - Doug Hoffmann, Northwestern Community College, CT

The purpose of this presentation is to provide a method of graphing surfaces in GeoGebra with parameterizable cross sections. Specifically, we will focus on surfaces that do not have circular cross sections. For a relatively small number of sides, the coordinate functions are easy to code, but when the number of sides gets bigger, the piecewise functions get troublesome to code by hand. One way around coding the coordinate functions by hand is to use a Sequence command. For each coordinate function, a Sequence command creates a list of all the functions needed to define a coordinate function.

8.7 A Dynamic Definition of $\tan(t)$ - Doug Kuhlman, former teacher at Andover Philips Academy, MA

The short talk would be showing how to teach the tangent function using GeoGebra: attaching a tangent line, $x = 1$, to the unit circle and then drawing a line though $(0, 0)$ and $W(t)$, where W is the wrapping function. $\tan(t)$ is the second coordinate of the point of intersection of that line and the line $x = 1$.

8.8 Constructing Meaning in Geometry with GeoGebra - Sandra Ollerhead, Mansfield High School, MA

GeoGebra can serve as a powerful tool to developing a deeper understanding of geometric concepts behind straightedge and compass constructions. This presentation will show the benefits of using GeoGebra versus pencil and paper to teach students constructions.

INTERACTIVE POSTER ABSTRACTS

9.1 Triangle Similarity Shortcuts - Rasha Tarek, Staples High School, CT

This is an interactive activity in whichÂstudents utilize their knowledge of Similar Polygons to verify the validity of several triangle similarity shortcuts. Students will be presented with 5 different scenarios that they will investigate. They also have the opportunity to check their understanding at the end of the activity.

9.2 Slope Field Generator - Rasha Tarek, Staples High School, CT

Generate any slope field and graph particular solutions with ease using this slope fields generator. Students can use this worksheet to visualize solutions to certain differential equations or simply to check their work.

9.3 Graphing Polynomials Using Zeros and their Multiplicities - Janet Zupkus, Naugatuck Valley Community College, CT

This activity uses an existing geogebra applet to direct the studentâ^s exploration of polynomial functions and graphs. The activity explores polynomial end behavior and x-intercept behavior related to the multiplicity of factors. The activity lends itself to a flipped classroom environment as an independent exploration prior to a classroom lecture.

9.4 Characteristics of Quadratic Graphs - Rayigam Thevaraja Mathiyalagan, Tamil Vidyalayam, Sri Lanka

The applet is designed to help students investigate the characteristics of the graphs of quadratic functions.

9.5 Pythagorean Theorem Game - Matthew Krebs, Boston Public Schools, MA

This applet gives students the opportunity to (1) create a right triangle with the red side as the hypotenuse and (2) click on the sides and use the Pythagorean Theorem to arrive at the length of the side that is not given. Students can opt to click on the square root symbol to begin their work or after they have written everything else.

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9.6 Distance Game - Matthew Krebs, Boston Public Schools, MA

This applet gives students the opportunity to become comfortable with unbalanced axes. With each problem, the x and y axes change. As a result, students must be careful to create either a vertical line or a horizontal line to measure the appropriate length of a segment, or they must identify the length of a given segment according to the axes.

9.7 Proportions Game - Matthew Krebs, Boston Public Schools, MA

This applet gives students the opportunity to interpret problems using proportions through the creation of right triangles. Students make a right triangle based on the first situation, then make a similar right triangle that coincides with the second situation.

9.8 Jeopardy - Matthew Krebs, Boston Public Schools, MA

Every time a student plays this game, the applet will select a random five categories for Jeopardy, another five for Double Jeopardy, and another one for Final Jeopardy. The applet updates every time it is being played, so the problems will not be the same. Users get a new experience every time.

9.9 Interior Angles of Polygons - Ali Heery, Bridgeport Public Shools, CT

The applet is designed to help students make conjectures about the sum of the interior angles of polygons based on the number of triangles that can be built inside the polygon.

9.10 The Ambiguous Case - Ella Sayin, Southern Connecticut State University, CT

The applet is designed to help students learn about the ambiguous case of the law of sines.

9.11 Non-coplanar “Quad” Midpoints - Tim Brzezinski, Berlin High School, CT

Many geometry teachers and students are familiar with the theorem that states that the (four coplanar) midpoints of the segments of any quadrilateral form the vertices of a parallelogram. However, did you know this statement also holds true for any four non-coplanar points? That is, if segments are consecutively connected among 4 non-coplanar points, consecutive midpoints of these segments will always be vertices of a parallelogram!

9.12 9-point Circle Action (Part 1) - Tim Brzezinski, Berlin High School, CT

For any triangle, there are 9 special points that all lie on a circle (The midpoints of the triangleâ^s 3 sides, the points at which the triangleâ^s 3 altitudes meet the lines containing the triangleâ^s 3 sides, and the midpoints of the segments that connect the triangleâ^s orthocenter to each of its 3 vertices). This applet dynamically illustrates without words, segment lengths, or angle measures that the center of this 9-Point Circle is the midpoint of the segment that connects the triangleâ^s circumcenter and orthocenter.

9.13 Hexagonal Napolean Theorem? - Tim Brzezinski, Berlin High School, CT

If equilateral triangles are constructed off the 6 sides of any hexagon (convex or concave), then the midpoints of the segments that connect the centroids of an â^opposite pairâ^ of equilateral triangles will always form vertices of yet another equilateral triangle. (There are 3 such segments, seeing that there are 6 equilateral triangles.) Would you consider this to be a version of Napoleanâ^s Theorem for a hexagon? You be the judge!

9.14 Numerical Integration - Albert Navetta, University of New Haven, CT

This applet shows a visualization of 3 numerical integration techniques: Midpoint Rule, Trapezoid Rule, and Simpson's Rule. You can change the function, the number of divisions, and the limits of integration. To get the results for Simpson's Rule, the box must be checked. Simpson's rule takes a lot of processing, so be patient after checking the Simpson's Rule box. Your browser may even indicate that the script has stopped, but it is working, just wait. If you have a relatively new computer, it should not be a problem. Once Simpson's rule is displayed, you can cycle through the parabolas that make up the estimate.

9.15 Exploring Rotations - Sandra Ollerhead, Mansfield High School, MA

This applet and accompanying worksheet provide students the opportunity to develop a formal definition of rotations as well as to explore rotations on the coordinate plane.

9.16 Exploring reflections - Sandra Ollerhead, Mansfield High School, MA

This applet and accompanying worksheet provide students the opportunity to develop a formal definition of reflections as well as to explore reflections on the coordinate plane.