GEOMETRY XL

GOALS: Students will develop skill and understanding in:

1. The use of formal logic in geometric and algebraic proofs
2. The meaning of points, lines, and planes
3. The concepts of congruency and congruent triangles
4. Properties of triangles
5. The classification and measure of polygons
6. Transformations
7. The concepts of similarity and dilations
8. Right triangle relationships
9. Evaluating trigonometric ratios and applications
10. Circles
11. The calculation of perimeters and areas of polygons
12. The calculation of space measurements
13. The exploration of loci
14. Laws of exponents and radicals, solve problems with polynomial and rational functions and inequalities

OBJECTIVES: Students will be able to:

(Parentheticals refer to Geometry, An Integrated Approach, Larson, Boswell, and Stiff, 1995)

Goal 1. The use of formal logic in geometric and algebraic proofs

1.1 Use inductive reasoning to find a pattern (2.1)
1.2 Identify and describe points, lines, rays, segments and planes (2.1)
1.3 Classify and identify angles by size - acute, right, obtuse, straight (2.1)
1.4 Utilize definitions, axioms, postulates and theorems (2.1 – 2.6)
1.5 Measure angles and segments (2.2)
1.6 Use the coordinate distance formula (2.3)
1.7 Determine the hypothesis and conclusion of a conditional statement (2.4)
1.8 Find a converse of a conditional statement (2.4)
1.9 Use algebraic and congruence properties (2.5)
1.10 Identify special pairs of angles – vertical, linear pair, complementary and supplementary (2.6)
1.11 Formulate direct proofs using deductive reasoning (2.6)

Goal 2. The meaning of points, lines, and planes

2.1 Identify relationships between lines and planes (3.1)
2.2 Find the equation of a line and slope of a line (3.2)
2.3 Identify and use properties of parallel and perpendicular lines (3.2)
2.3 Solve a system of linear equations (3.2)
2.4 Use the laws of logic in problem solving (3.3)
2.5 Use different styles of proof (3.4)
2.6 Identify angles formed by a transversal
2.7 Find relationship between measures of angles formed by transversal intersecting 2 parallel lines (3.5)
2.8 Prove lines are parallel using the relationships between the angle measures (3.6)
2.9 Write vectors as ordered pairs (3.7)
2.10 Find the sum and use the dot product of two vectors (3.7)

Goal 3. The concepts of congruency and congruent triangles

3.1 Classify triangles by angle measure and length of sides (4.1)
3.2 Measure the angles of a triangle (4.2)
3.3 Use the SSS, SAS, AAS, and ASA congruence patterns (4.3 – 4.6)
3.4 Use properties of isosceles, equilateral and right triangles (4.5 – 4.6)
3.5 Be able to construct: copying a segment, angle and triangle, bisecting a segment and angle (1.7,4.3)
3.6 Be able to construct: a perpendicular line, perpendicular bisector and parallel line (4.7,3.6)

Goal 4. Properties of triangles

4.1 Identify and use perpendicular bisectors, angle bisectors, medians, altitudes and midsegments of triangles (5.1 –5.3)
4.2 Locate the circumcenter, incenter, orthocenter, and centroid (5.2)
4.3 Inscribe and circumscribe a circle in / around a triangle (5.2)
4.4 Identify triangle inequalities (5.4)
4.5 Compare sides and angles of different triangles (5.5)
4.6 Use indirect proof (5.5)

Goal 5. The classification and measure of polygons and quadrilaterals

5.1 Identify types of polygons (6.1)
5.2 Find the measure of interior and exterior angles of polygons. (6.2)
5.3 Utilize properties of parallelograms (6.3)
5.4 Prove quadrilaterals to be parallelograms (6.4)
5.5 Identify and categorize rhombi, rectangles, and squares (6.5)
5.6 Identify isosceles and non-isosceles trapezoids and their characteristics (6.6)
5.7 Prove quadrilaterals are congruent using SASAS and ASASA congruence theorems (6.7)
5.8 Identify and use kites (5.7)

Goal 6. Transformations

6.1 Identify image, preimage, isometry, rigid and non-rigid transformations (7.1)
6.2 Use reflections and line symmetry (7.2)
6.3 Use rotations and rotational symmetry (7.3)
6.4 Use translations (7.4)
6.5 Use glide reflections and compositions (7.5)
6.6 Classify frieze patterns (7.6)

Goal 7. The concepts of similarity and similar triangle

7.1 Find and simplify the ratios of two quantities (8.1)
7.2 Solve problems using proportions (8.1- 8.2)
7.3 Identify similar polygons and use properties thereof (8.3)
7.4 Prove two triangles similar using AA, SSS, and SAS (8.4 - 8.5)
7.5 Use triangle proportionality theorems (8.6)
7.6 Identify and perform dilations (8.7)

Goal 8. Right triangle relationships

8.1 Prove right triangles congruent and properties of right triangles (9.1)
8.2 Find the geometric mean of two numbers (9.1)
8.3 Use the Pythagorean Theorem and converse (9.2 - 9.3)
8.4 Find the length of sides of 30º-60 º -90 º and 45 º -45 º -90 º triangles (9.4)
8.5 Find the trig ratios of acute angles (9.5)
8.6 Solve a right triangle (9.6)

Goal 9. Trigonometry (all from supplementary material)

9.1 Know standard position of an angle, quadrant diagram and find coterminal angles
9.2 Convert between degrees, minutes, seconds and decimal degrees
9.3 Convert between radians and degrees
9.4 Find arc length and area of sector
9.5 Discover properties of the unit circle and use unit circle to find trig values
9.6 Define sin, cos, tan, csc, sec and cot ratios and use them to solve right triangles
9.7 Draw graphs of sin, cos, tan, csc, sec and cot functions
9.8 Solve trigonometric equations
9.9 Use law of sines and cosines to solve triangles

Goal 10. Circles

10.1 Identify parts of circles (10.1)
10.2 Use properties of tangents (10.2)
10.3 Find the measure of central angles and arcs (10.3)
10.4 Identify and use properties of chords and arcs (10.4)
10.5 Use properties of inscribed angles (10.5)
10.6 Find the measure of angles formed by tangents, secants, chords, and angles (10.6)
10.7 Find the standard equation of a circle and utilize it to find the center and radius of a circle (10.7)

Goal 11. The calculation of perimeters and areas of polygons

11.1 Find the perimeter of a polygon (11.1)
11.2 Find the area of: a square and rectangle (11.1)
a parallelogram and triangle (11.2)
a trapezoid (11.3)
regular polygons (11.4)
circles and sectors (11.6)
11.3 Use properties of similar polygons to find areas and perimeters (11.7)
11.4 Find the circumference of a circle and length of an arc (11.5)

Goal 12. The calculation of space measurements

12.1 Identify polyhedra and parts thereof (12.1)
12.2 Find the surface area and volume of:
prisms and cylinders (12.2, 12.4)
pyramids and cones (12.3, 12.5)
spheres (12.6)
12.3 Use properties of similar solids to find dimensions and volumes (12.7)

Goal 13. The exploration of loci

13.1 Find a locus in a plane (13.1)
13.2 Find a locus in space (13.2)
13.3 Problem solving with loci (13.3)
13.4 Solve a system of linear equations and inequalities (13.4)
13.5 Find cross sections of a solid (13.5)

Goal 14. Algebra 2 Preview (all from supplementary material)

14.1 Know algebraic properties, domain of a function and absolute value
14.2 Graph linear inequalities involving a single variable
14.3 Utilize laws of exponents and radicals
14.4 Add, subtract, multiply and divide polynomials and rational expressions
14.5 Factor polynomials