Quality Standard #1: Fundamentals of Geometry

Benchmark(s):

1.1 The student will understand and use the language of Geometry.
   - Undefined terms of point, line, and plane
   - Use appropriate notation
   - Identify, name, and draw basic geometric shapes
   - Know angle relationships (supplementary, complementary, linear pair, vertical)
   - Use algebraic properties to solve geometric problems (Supplemental pairs, vertical pairs)
   - Measure line segments and angles
   - Do basic constructions: copy a segment, copy an angle, bisect a segment, bisect an angle

1.2 The student will understand the basics of proof.
   - Construct proofs (i.e., one or more of the following: flow-chart method, paragraph form, two-column form)
   - Write and analyze conditional statements (converse, inverse, contrapositive)
   - Use inductive and deductive reasoning

Vocabulary Unit 1: point, line, plane, line segment, ray, inductive, deductive, protractor, compass, straight edge, ruler, angle measure, degree, angle, bisect, parallel, perpendicular, Angles (complementary, supplementary, acute, obtuse, right, straight, vertical, linear pair), collinear, coplanar, endpoint, intersection, postulate, theorem, vertex, adjacent, conjecture, counterexample, conditional statement, hypothesis, conclusion, converse, inverse, contrapositive, statement, reason, bi-conditional

Suggested timeline: 10 to 15 days of instruction
QUALITY STANDARD #2: COORDINATE GEOMETRY

Benchmark(s):

2.1 The student will understand how to work in the coordinate plane.
   • Find the midpoint
   • Use the distance formula
   • Find the slope

2.2 The student will understand how to work with basic transformations.
   • Identify and perform basic transformations (rotations, translations, reflections, dilation, shear)
   • Represent transformations algebraically or graphically

2.3 The student will understand and apply properties related to parallel and perpendicular lines
   • Identify and construct parallel and perpendicular lines
   • Use slope to test for parallel lines/perpendicular lines
   • Know angle-pair relationships of parallel lines
   • Know properties of perpendicular lines, parallel lines, and transversals

Vocabulary Unit 2: slide, reflection, rotation, translation, transformation, midpoint, parallel lines, perpendicular lines, skew, transversal, corresponding angles, alternate interior angles, alternate exterior angles, same-side interior, slope, reciprocal, opposite, symmetry, dilation, tessellation, pre-image, image

Suggested timeline: 20 to 25 days of instruction
QUALITY STANDARD # 3: TRIANGLES AND THEIR PROPERTIES

Benchmark(s):

3.1 The student will understand the properties of triangles
   • Classify types of triangles by sides and/or angles.
     o Sides (scalene, isosceles, equilateral)
     o Angles (right, obtuse, acute, equiangular)
   • Identify or draw special segments (perpendicular bisector, angle bisector, altitude, median)
   • Use triangle inequality theorem
   • *Proofs involving special segments*
   • Use the angle sum and exterior angle theorem

3.2 The student will be able to prove and use triangular congruency
   • Apply SAS, ASA, SSS, AAS, HL, HA, CPCTC
   • Show congruency by using properties of coordinate geometry

3.3 The student will be able to prove and use triangular similarity.
   • Apply SSS (proportionality), AA Similarity, and SAS Similarity
   • Use ratios and proportions to find missing sides (indirect measurement)
   • Find geometric mean

3.4 The student will be able to understand the properties of right triangles
   • Find and use the basic trigonometric functions (sine, cosine, tangent)
   • Apply the Pythagorean Theorem and its converse
   • Use and know special angle relationships for the 30-60-90 and the 45-45-90 right triangles
   • Solve basic right triangles
   • *Pythagorean Inequalities*

3.5 The student will be able to understand and apply measurement with respect to triangles
   • Find Perimeter
   • Find Area
   • Use appropriate units to label each
   • Use dimensional analysis (unit conversion) to convert between measures
   • *Heron’s Formula*
   • $A = \frac{1}{2} ap$

Vocabulary Unit 3: isosceles, scalene, right, obtuse, acute, equilateral, equiangular, congruent, congruence, similarity, perimeter, area, altitude, angle bisector, median, means,
extremes, hypotenuse, legs, opposite, adjacent, perpendicular bisector, sine, cosine, tangent, Pythagorean Triple, angle of elevation, angle of depression, orthocenter, incenter, circumcenter, centroid, midsegments

Suggested timeline: 35 to 40 days of instruction
QUALITY STANDARD #4: OTHER POLYGONS

Benchmark(s):

4.1 The student will understand, apply, compare and contrast properties of regular and irregular polygons
   • Identify types of regular/irregular polygons by number of sides
   • Find perimeter and area
   • Find measures of interior/exterior angles

4.2 The student will understand and apply the properties of quadrilaterals
   • Identify/classify different types of quadrilaterals
     o Trapezoid
     o Parallelogram
     o Rectangle
     o Rhombus
     o Square
   • Find area and perimeter
   • Know and apply properties and relationships
   • Classify quadrilaterals by using the properties of coordinate geometry

Vocabulary Unit 4: polygon, sides, vertex, vertices, concave, regular polygon, diagonal, parallelogram, opposite sides, opposite angles, consecutive angles, rhombus, rectangle, square, trapezoid, bases, base angles, legs, isosceles trapezoid, mid-segment, kite, n-gon, center of a polygon, radius of a polygon, apothem of a polygon, central angle of a polygon, irregular polygon, hexagon, octagon, quadrilaterals, pentagon, hexagon, heptagon, nonagon, dodecagon, decagon, convex, geometric probability

Suggested timeline: 20 to 25 days of instruction
QUALITY STANDARD # 5: CIRCLES

Benchmark(s):

5.1 The student will understand circle terminology and relationships
- Identify radius, diameter, chord, secant, tangent, major arc, minor arc, center, sector, central angle, inscribed angle, point of tangency

5.2 The student will understand and apply measurement to a circle
- Find area and circumference of a circle
- Find arc length
- Find angle measurements (central, inscribed)
- Find area of a sector
- Apply congruence and similarity properties
- Know and use angle arc, segment relationships

5.3 The student will understand the basic equation of a circle in the coordinate plane
- Find the equation of a circle at the origin
- Graph circles given an equation

Vocabulary for Unit 5: circle, arc, semicircle, radius, sector, diameter, circumference, chord, secant, tangent, arc length, central angle, inscribed angle, clockwise, counterclockwise, major arc, minor arc, concentric, common tangent, point of tangency, interior, exterior, measure of a major/minor arc, intercepted arc, circumscribed

Suggested timeline: 20 to 25 days of instruction
QUALITY STANDARD # 6: SOLIDS
Benchmark(s):

6.1 The student will be able to identify and name the parts of a solid
- Identify prism, pyramid, cone \(\text{parts of the cone...conic sections}\), cylinder, or sphere
- Label all parts (faces, edges, vertices, etc)
- Represent three dimensional objects
- Visual perspective (dot paper)

6.2 The students will be able to find measures of a solid
- Find surface area
- Find lateral area
- Find volume
- Solve problems with more than one geometric shape involved
- Maximizing area and volume

Vocabulary for Unit 6: lateral edge, pyramid, prism, concave, convex, surface area, cylinder, slant height, cone, conic sections, great circle, hemisphere, sphere, edge, altitude, lateral face, rectangular solid, cube, volume, lateral area, base, vertex, vertices, parallel faces, skew line, coplanar, right, oblique, polyhedron, regular polyhedron, cross section, Platonic solid, tetrahedron, octahedron, dodecahedron, icosahedrons, center of a sphere, radius of a sphere, chord of a sphere, diameter

Suggested timeline: 15 to 20 days of instruction
QUALITY STANDARD # 7: VERTEX-EDGE GRAPHS

Benchmark(s):

7.1 The student will understand that graphs can be used to model something other than functions

- Know basic terms of paths, circuits, and networks
- Determine whether a graph has an Euler or Hamiltonian path or circuit
- Use vertex-edge graphs to solve conflict resolution problems (color to solve problems)
- Understand what vertices and line segments represent
- Find shortest (most efficient) route

Vocabulary for Unit 7: Vertices, edge, Euler circuit/path, Hamiltonian circuit/path, network, conflict, node, coloring, Konigsberg Bridge

Suggested timeline: 5 to 10 days of instruction

***NOTE: Those topics that are in italics and underlined are to be included IF time permits. They are part of our “nice to know” if we have time.