**Geometry 21/22**

**Intro: Geometry Tool Kit**

* Pythagorean theorem (8.1)
* Using a protractor (1.4)
* Algebra (solving equations, factoring)
* Basic Area (triangle, circle (area & circumference), rectangle/square, trapezoid)
* Naming Polygons
* Slope
* Parallel lines (3.2)
* Complementary & Supplementary (1.5)
* Congruence
* Graphing on a coordinate plane (points and lines) (p. 893)
* Types of triangles: equilateral, isosceles, scalene
* Types of angles: Acute, obtuse, right, straight angle (1.4)
* Solving proportions (7.1)
* Perimeter

**Unit 1: Parallel Lines/Angles (8-9 blocks)**

* Describe lines (using notation) (1.2)

**Skills needed:**

* Label a diagram with given information
* Set up and solve an equation given a diagram
* Notation
* Describe a point (using notation) (1.2)
  + Collinear (1.2)
* Define intersection (1.2)
  + The intersection of two lines is a point (1.2)
* Define postulate (1.2)
* Define rays and angles (using notation) & naming angles (1.2/1.4)
  + Define vertex of an angle (1.4)
  + Define adjacent angles (1.5)
* Angle addition postulate (1.4)
* Definition of a Linear Pair & Linear Pair Postulate
  + Define supplementary & complementary
* Define vertical angles and the property that vertical angles are equal (1.5)
* Proofs (simple either two-column or flow-chart) (2.5)
* Substitution Property
* Reflexive Property of Equality
* Transitive Property of Equality (2.5)
* Distributive Property
* Define Alternate Interior, Alternate Exterior, Same-side Interior, and Corresponding angles (3.2)
* Parallel lines and transversals (definitions) (3.2)
* Define congruence and notation
* Define a theorem
  + Alternate Interior Angles Theorem
  + Alternate Exterior Angles Theorem
  + Same-Side Interior Angles Theorem (3.2)
  + Corresponding Angles Postulate
  + Congruent Supplements/Complements Theorem (+) (2.6)
  + Vertical Angles Theorem (1.5)
* Define conditional and converses with truth values and counterexamples (2.2)
  + Converse of Alternate Interior Theorem
  + Converse of Alternate Exterior Theorem
  + Converse of Same-Side Interior Theorem (3.3)
  + Converse of Corresponding Theorem
* Biconditional Statements/What is a definition (2.3)

Student Expectations:

22: Students will be able to:

1. Describe point and line.
2. Define Collinear, postulate, ray, angle, vertex, adjacent, linear pair, supplementary, complementary and vertical angles.
3. Understand and use linear pair postulate and the property of vertical angles are congruent.
4. Use properties of equality.
5. Define angle pairs using parallel lines.
6. Define congruence.
7. Set up and solve an equation using their knowledge of angle pairs and justify their work using the appropriate theorem.
8. Students will be able to find the measures of missing angles given parallel lines cut by a transversal.
9. Students will complete a basic proof using parallel line theorems.
10. Define conditional statements and converses and deteremine their truth value. Provide counter examples for false statements.
11. Define biconditional statements and what makes a good definition.

21: Students meet all of the same criteria as 22 students in addition to the following:

1. Setting up and solving equations using factoring/quadratic formula.
2. Completing more complex proofs using parallel line theorems.
3. Students will prove theorems with angles and parallel lines.

Vocabulary to know:

Point, Line, parallel, transversal, angle, linear pair, alternate interior, alternate exterior, same-side interior, corresponding, vertical, conditional, converse, biconditional, definition, adjacent, complementary, supplementary, congruent, point, acute, obtuse, right, substitution, reflexive, transitive, distribution, postulate, theorem

**Unit 2: Triangles (7-8 blocks)**

* Define segments (using notation) (1.2)
  + Segment addition postulate (1.3)
  + Define Midpoint
  + Define Equidistant (5.2)
* Define a triangle (using notation) (4.4)
* Triangle inequality (5.6)
* Angles in a triangle
  + Triangle sum theorem (3.5)
  + Exterior angle of a triangle theorem (3.5)
  + Isosceles triangle theorem & converse (4.5)
  + Isosceles triangle theorem corollaries (4.5)
    - Define equilateral and equiangular (6.1)
  + Longest side is opposite the largest angle (8.1)
* Define Bisect (1.2)
* Define Perpendicular (1.6)
  + Perpendicular bisector (1.6)
  + Angle bisector (1.5)
  + Median (5.4)
  + Define Altitude (5.4)
    - The shortest distance between a point and a line is the perpendicular distance (5.2)
* Points of concurrency (+) (5.3) (optional)
* Graphing triangles in the coordinate plane (1.6)
  + Slopes of sides 🡪 showing sides are perpendicular (slopes are opposite reciprocals) (3.7/3.8)
    - Define right triangle
  + Distance formula (to show types of triangles) (1.7/6.7)
    - Pythagorean theorem (8.1)
  + Area and perimeter of triangles in the coordinate plane (6.7)
    - Midpoint Formula (1.7)
    - Triangle midsegment theorem (5.1)

Student Expectations:

22: Students will be able to:

1. Understand the concept of a point and define a segment including using proper notation.
2. Find and compare lengths of segments.
3. Use the segment addition postualte.
4. Define midpoint and equidistant.
5. Define triangles. Deteremine whether or not three sides can form a triangle.
6. Understand theorems using angles in a triangle.
7. Define bisect, perpendicular, perpendicular bisector, angle bisector, median, altitude.
8. Understand the shortest distance between a point and a line is the perpendicular distance.
9. Graph triangles in the coordinate plane and use slope to determine if sides are perpendicular, determine the type of triangle, and find the perimeter and area of triangles.
10. Define a right triangle.
11. Use the midpoint formula.
12. Use the midsegment triangle theorem.

21: Students meet all of the same criteria as 22 students in addition to the following:

1. Prove theorems in triangle unit.
2. Determine area of triangles in the coordinate plane that are not on a horizontal or vertical axis.
3. Understand points of concurrency in trianlges (optional).

**Unit 3: Transformations (Triangle Conguence & Similarity) (16-17 blocks)**

* Rigid transformations- define reflection, rotation, translation (9.1, 9.2, 9.3)
* Perform transformations in coordinate plane (ch. 9)
  + Define a sequence that would transform a figure onto another figure (9.5)
* Define congruence with triangles (using correct notation) & proofs with congruent triangles (two-column or flowchart)
  + SSS
  + SAS
  + ASA (4.2/4.3)
  + AAS
  + HL (4.6)
  + CPCTC (4.4)
* Non-rigid transformations- define dilations (9.6)
* Perform dilation in coordinate plane (9.6/9.7)
* Define similarity with triangles (using correct notation) & proofs with similar triangles (two-column or flowchart) (setting up & solving proportions)
  + SSS
  + SAS (7.3) \*Incorporate application problems throughout
  + AA
  + Side-splitting theorem (7.5)
  + Right triangle similarity (+) (7.4)
  + Triangle angle bisector theorem (+) (optional) (7.5)

Student Expectations:

22: Students will be able to:

1. Identify rigid motions.
2. Find translation images of figures.
3. Find reflection images of figures.
4. Find rotation images of figures.
5. Perform rigid transformations in the coordinate plane.
6. Define a single step sequence that maps one figure onto another.
7. Prove two triangles congruent using SSS postulate, SAS postulate, ASA postulate, AAS theorem, HL theorem
8. Use triangle congruence and CPCTC to prove that parts of two triangles are congruent.
9. Understand dilation images of figures.
10. Perform dilations in the coordinate plane.
11. Identify similarity transformations and verify properties of similarity.
12. Use AA Similarity postulate, SAS similarity postulate, SSS similarity postulate.
13. Use similarity to find indirect measurements.
14. To use the side-splitter theorem.

21: Students meet all of the same criteria as 22 students in addition to the following:

1. Define a multi-step sequence that maps one figure onto another.
2. Prove triangle congruence theorems.
3. To find and use relationships in similar right triangles.

**Unit 4: Trigonometry (9-10 blocks)**

* Special right triangles (8.2) \*Incorporate application problems throughout
  + Simplifying radicals
  + Rationalizing radicals \*Reincorporate Pythagorean theorem and distance formula
* SOH CAH TOA (8.3)
  + Angles of elevation and depression (8.4)
  + Area of triangles using trigonometry (+) (10.5)
* Law of Sines (+) (8.5), Law of Cosines (+) (8.6)

Student Expectations:

22: Students will be able to:

1. Use the properties of 45-45-90 and 30-60-90 right triangles.
2. Simplify radicals and rationalize the denominator.
3. Use sine, cosine, and tangent ratios to determine the side lengths and angle measures of right triangles.
4. Use angles of elevation and depression to solve problems.

21: Students meet all of the same criteria as 22 students in addition to the following:

1. Find the area of triangles using trigonometry.
2. Apply the law of sines and cosines to find missing sides or angles in non-right triangles.

**Unit 5: Circles (7-8 blocks)**

* Define a circle (using notation) and parts of circles (10.6)
  + Radius
  + Diameter
  + Chord (12.2) (10.6)
  + Secant line (12.4)
  + Tangent line (12.1)
    - Point of tangency (12.1)
  + Central Angle (10.6)
  + Inscribed Angle (12.3)
  + Arc (minor, major, semicircle. Intercepted arc) (degrees)
  + Arc Length
* Inscribed triangles & quadrilaterals in circles
* Circumscribed circle of a triangle
* Area of Sector (10.7)
* Area of Segment (+) (10.7)
* Graphing circles in the coordinate plane (12.5)
* Equations of circles (using distance formula/Pythagorean theorem) (12.5)
  + Completing the square (+)

Student Expectations:

22: Students will be able to:

1. Identify and use vocabulary of circles.
2. Use properties of tangent lines to a circle.
3. Find measures of central angles and arcs.
4. Find circumference of a circle and arc length.
5. Find areas of circles and sectors.
6. Find the measure of an inscribed angle.
7. Find the measure formed by an angle and chord.
8. Write the equation of a circle.
9. Determine the center and radius of a circle given an equation or graphed on the coordinate plane.

21: Students meet all of the same criteria as 22 students in addition to the following:

1. Apply circle properties and previous theorems to complete proofs with circles.
2. Find area of segments.
3. Complete the square to write the standard form of a circle.
4. Determine the equation given a two points that relate to a circle. (center and point or two points)

**Unit 6 Polygons & Quadrilaterals (12-13 blocks)**

* Identify concave versus convex polygons (1.8 pg. 58)
* Polygon angle sum theorem (6.1)
* Polygon Exterior angle sum theorem (6.1)
* Symmetry in polygons (rotational and reflection) (concept byte 9.3 pg. 568)
* Area of regular polygons (reviewing special rights and trig to find missing information in polygon) (10.3/10.5)
  + Define regular (6.1)
* Parallelograms (6.2)
  + 6 properties/theorems of a parallelogram
* Special Parallelograms and their properties
  + Rectangle
  + Rhombus (6.4)
    - Area of a rhombus (10.2)
  + Square
* Trapezoid
  + Isosceles trapezoid (6.6)
  + Trapezoid midsegment theorem (6.6)
  + Review Area (10.2)
* Kite \*Incorporate area of shaded region & composites throughout
  + Area of a kite (10.2)
* Identify quadrilaterals in the Coordinate Plane (6.7) \*Incorporate transformations of quads
  + Coordinate proofs (+) (6.8, 6.9)
  + Area and perimeter of quadrilaterals in the coordinate plane
* Proofs with Parallelograms (+)

Student Expectations:

22: Students will be able to:

1. Find the sum of the measures of interior and exterior angles in a polygon.
2. Classify a polygon as convex or concave.
3. Determine the rotations and reflection that carry the image onto itself.
4. Find the area of a trapezoid, rhombus, or kite.
5. Find the area of a regular polygon.
6. Use relationships among sides and angles of parallelograms.
7. Use relationships among diagonals of parallelograms.
8. Determine if a quadrilateral is a parallelogram.
9. Define and classify types of parallelograms (rectangle, rhombus, square).
10. Use properies of rectangles, rhombuses, and square.
11. Determine if a parallelogram is a rectangle, rhombus, or square.
12. Use properites of trapezoids and kites.
13. Use properties of a midsegment of a trapezoid.
14. Classify polygons in the coordinate plane.

21: Students meet all of the same criteria as 22 students in addition to the following:

1. Prove properties of parallelograms.
2. Complete coordinate proofs with variables.
3. Name coordinates of special figures using variables.
4. Find the area of a regular polygon using specifal right triangles and trigonometry.

**Unit 8: Surface Area and Volume (12-13 blocks)**

* Define Solids/Polyhedra and vocabulary (11.1)
  + Edge, vertices, face, lateral faces, bases, altitude, slant height (11.1 – 11.3)
* Define plane and its intersection with solids (1.2)
  + Cross-sections (11.1)
  + The intersection of two planes is a line (1.2)
  + Coplanar (1.2)
* Right versus Oblique prisms (11.2)
* Lateral Area/Surface Area and Volume of solids
  + Prisms
  + Cylinders
  + Pyramids
  + Cones (ch. 11)
  + Spheres
    - Cube & Cube root
* Surface Area and Volume of Composite Solids
* Cavalieri’s Principle (+) (11.4/11.5)
* Linear/Area/Volume Ratios (10.4/11.7)

Student Expectations:

22: Students will be able to:

1. Recognize polyheda and their parts.
2. Visualize cross-sections of space figures.
3. Understand vocabulary pertaining to planes.
4. Find the surface area and volume of a prism.
5. Find the surface area and volume of a cylinder.
6. Find the surface area and volume of a pyramid.
7. Find the surface area and volume of a cone.
8. Find the surface area and volume of a sphere.
9. Find the perimeters and areas of similar polygons.
10. Given the surface area or volume, work backwards to find a specific measurement (ex. Radius, height)

21: Students meet all of the same criteria as 22 students in addition to the following:

1. Use Cavalieri’s principle.
2. Incorporate more complex composite solids.
3. Given the surface area or volume, work backwards to find a specific measurement with factoring.