First & Third Nine Weeks

Review (Algebra I Concepts)

- Evaluate/Simplify algebraic expressions, including those with exponents, absolute value, perfect square roots, and perfect cube roots.
- Solve, check, and graph multi-step equations and inequalities in one and two-variable with distributive property including rational coefficients in mathematical and real-world situations and interpret the solution.
- Differentiate among rational, irrational and real numbers.
- Calculate slope using graphs and formulas.
- Write equations of lines given a variety of information. (Examples: given a graph, two points, point and slope, slope and y-intercept and/or situation.)
- Solve formulas and equations for a specific variable.
- Represent polynomial operations with area models.
- Apply the concept of slope to determine if lines in a plane are parallel or perpendicular.
* Note: The standard for Simplifying Radicals is no longer a standard in the 2016 MS CCRS Framework. You will need to teach this skill while reviewing.

Shapes and Transformations (Chapter 1)

- Describe the different types of transformations including translations, reflections, rotations and dilations.
- Describe transformations as functions that take points in the coordinate plane as inputs and give other points as outputs.
- Compare transformations that preserve distance and angle to those that do not (for example, translation versus horizontal stretch).
- Write functions to represent transformations.
- Recall definitions of angles, circles, perpendicular and parallel lines and line segments.
- Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines and line segments.
- Given a geometric figure and a rotation, reflection or translation, draw the transformed figure using graph paper, tracing paper or geometry software.
- Draw transformed figure and specify the sequence of transformations that were used to carry the given figures onto the other.
- Use geometric descriptions of rigid motions to transform figures.
- Predict the effect of a given rigid motion on a given figure and describe the transformation.
- Define congruence in terms of rigid motions (i.e. two figures are congruent if there exists a rigid motion, or composition of rigid motions, that take one figure to the second).
- Use strategies to help visualize relationships between two-dimensional and three-dimensional objects.
- Relate the shapes of two-dimensional cross-sections to their three-dimensional object.
- Find the point on a line segment, given two endpoints, and divides the segment into a given ration.

Angles and Measurement (Chapter 2)

- Use inductive reasoning to identify patterns and make conjectures.
- Find counterexamples to disprove conjectures.
- Write and analyze bi-conditional statements.
- Write the inverse, converse, and contrapositive of a conditional statement.
- Interpret geometric diagrams and determine what can and cannot be assumed.
- Identify and use the properties of congruence and equality (reflexive, symmetric, transitive) in proofs.
- Order statements based on logic when constructing proofs.
- Prove vertical angles are congruent.
- Prove and apply theorems about the angles formed by parallel lines and a transversal.
- Identify and use properties of parallel lines with transversals, corresponding angles, and alternate interior and exterior angles to solve problems.
- Prove points on a perpendicular bisector of a line segment are exactly equidistant from the segment’s endpoints.
- Prove the sum of the measures of the interior angles of a triangle is equal to 180°.
- Prove the base angles of isosceles triangles are congruent.
- Prove the segment joining midpoints of two sides of a triangle is parallel to the third side (mid-segment).
- Prove the segment joining the midpoints to two sides of a triangle is half the length of the third side.
• Prove the medians of a triangle meet at a point called the centroid.
• Use Pythagorean Theorem to solve for unknown side length of a right triangle.

**Justification and Similarity (Chapter 3)**

- Use a variety of tools (i.e. dynamic Geometry software, compass/straightedge, tracing paper, etc.) to perform the following:
  - Bisect a segment and angle.
  - Construct perpendicular lines including the perpendicular bisector of a segment.
  - Construct a line parallel to a given line through a point not on the line.
- Perform a dilation with a given center and scale factor on a figure in the coordinate plane.
- Verify that when a side passes through the center of dilation, the side and its image lie on the same line.
- Verify that corresponding sides of the pre-image and images are parallel and proportional.
- Define similarity as a composition of rigid motions followed by dilations in which angle measure is preserved and side length is proportional.
- Identify corresponding sides and corresponding angles of similar triangles.
- Determine scale factor between two similar figures and use the scale factor to solve problems.
- Demonstrate that corresponding angles are congruent and corresponding sides are proportional in a pair of similar triangles.
- Determine that two figures are similar by verifying that angle measure is preserved and corresponding sides are proportional.
- Prove a line parallel to one side of a triangle divides the other two proportionally.
- Prove if a line divides two sides of a triangle proportionally; then it is parallel to the third side.
- Use angle congruence and proportional side relationships to prove similarity in geometric figures.
- Use triangle similarity theorems such as AA, SSS and SAS to prove two triangles are similar.
- Show and explain that when two angles measures (AA) are known, the third angle measure is also known. (Third Angle Theorem)
- Describe and illustrate rotations and reflections of a rectangle, parallelogram, trapezoid, or regular polygon that map each figure onto itself.

**Trigonometry and Probability (Chapter 4)**

- Prove the Pythagorean Theorem using triangle similarity.
- Use Pythagorean Theorem to solve for unknown side length of a right triangle.
- Calculate sine and cosine ratios for acute angles in a right triangle when two side lengths are given.
- Explain and use the relationship between the sine of an acute angle and the cosine of its complement.

**Completing the Triangle Toolkit (Chapter 5)**

- Recall right triangle trigonometry to solve mathematical problems.
- Calculate sine and cosine ratios for acute angles in a right triangle when two side lengths are given.
- Apply the area of a triangle formula by solving the formula \( A = \frac{1}{2}ab \sin(C) \) to solve real world problems.
- Derive the formula \( A = \frac{1}{2}ab \sin(C) \) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
- Use the Laws of Sines and Cosines to find missing angles or side length measurements.
- Prove the Law of Sines and Law of Cosines.
- Recognize when the Law of Sines and Law of Cosines can be applied to a problem and solve problems in context using them.
- Determine from given measurements in right and non-right triangles whether it is appropriate to use the Law of Sines or Cosines.
- Apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).

**Note:** State ACT (All Juniors): February 25, 2020
### Second & Fourth Nine Weeks

#### Congruent Triangles (Chapter 6)
- Identify the ASA, SAS, and SSS theorems.
- Identify corresponding sides and corresponding angles of congruent triangles.
- Explain that in a pair of congruent triangles, corresponding sides are congruent and corresponding angles are congruent.
- Justify that when congruent triangles distance and angles measures are preserved, the triangles must be congruent.
- Identify corresponding pairs of angles and sides of congruent triangles after rigid motions.
- Use definition of congruence in terms of rigid motions to show that two triangles are congruent if corresponding pairs of sides and corresponding pairs of angles are congruent.
- Justify congruency of two triangles using transformations.
- Predict the effects of a given rigid motion.
- Use congruency and similarity theorems for triangles to solve problems and prove relationships in geometric figures.
- Use the vertices of a polygon to find the necessary dimensions for computing the perimeter and area.
- Formulate a model of figures in contextual problems to compute area and/or perimeter.

#### Proof and Quadrilaterals (Chapter 7)
- Apply geometric methods to solve design problems.
###几何 semester pacing guide

- 使用归纳推理来识别模式并提出假设。
- 找到反例来推翻假设。
- 写出并分析条件语句的逆、逆否和等价命题。
- 写出正方形和等边三角形的性质。
- 在证明中根据逻辑排列语句。
- 证明中位线定理：连接三角形两边中点的线段平行于第三边。
- 证明中位线定理：连接三角形两边中点的线段等于第三边的一半。

####多边形和圆（章节 8）

- 计算凸多边形的内角和外角和。
- 描述圆的内积和外积。
- 在给定圆的周长和半径时，计算弧度。
- 使用相似性来推导扇区面积的计算公式。
- 使用相似性来计算弧长。

####固体和几何作图（章节 9）

- 计算棱柱、圆柱、棱锥、圆锥和球的表面积。
- 描述棱柱和圆锥的表面积的区别。
- 使用几何形状、其度量和其性质来描述物体。
- 开发计算三维图形体积的公式，包括球体、圆锥、棱锥和棱柱。

####圆（章节 10）* ACT

- 识别圆心角、半圆角、圆的内接和外接角。
- 描述圆心角与所对的圆周角的关系。
- 描述圆的切线和外切圆的关系。
- 证明圆心角与外切圆的关系。
- 证明圆心角与所对的圆周角的关系。
- 构造内切圆，其圆心是角平分线的交点（内心）。

####固体和几何作图（章节 11）

- 解释使用多种工具和方法构造几何图形。
- 应用线段、射线和角的定义、性质和定理来支持几何作图。
- 应用平行和垂直线的性质来支持作图。
- 计算棱柱、圆柱、棱锥、圆锥和球的表面积。
- 使用几何形状、其度量和其性质来描述物体。
- 开发计算三维图形体积的公式，包括球体、圆锥、棱锥和棱柱。
• Use the similarity ratio between two solids to find the volume.
• Identify the cross section of a plane with a 3-D solid.
• Recognize the solid formed by revolving a rectangle, a right triangle, and a circle about a line.
• Identify and draw rotations and transformations of figures.
• Inscription a regular polygon in a circle and break it into congruent triangles to find its area.
• Identify central angles, inscribed angles, circumscribed angles, diameters, radii, chords, and tangents.
• Describe the relationship between a central angle and its intercepted arc.
• Describe the relationship between an inscribed angle and its intercepted arc.
• Describe the relationship between a circumscribed angle and its intercepted arcs.
• Describe the relationship between two secants, a secant and a tangent or two tangents in relation to the intercepted circle.

This pacing calendar follows the CPM Geometry Textbook that the district has adopted as a resource to assist in teaching the MS College & Career Readiness Standards (MS CCRS) for Geometry. The specific lessons addressed in this pacing guide are aligned to the set standards. However, this pacing guide is not meant to be an exhaustive list nor is it a list that limits how the standards are taught in the classroom. This is a sample pacing to help teachers with planning and a guide to understand the knowledge and skills that define the standards.