# Scope and Sequence – Adv Geometry B          2019-20

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| **Course** | Adv Geometry B (.5 credits) |
| **Text** | *enVision Geometry Common Core, Pearson 2018,* by Kennedy, Dan, Milou, Eric, Thomas, Christine D., & Zbiek, Rose Mary. |
| **Prerequisite** | Algebra 1 |
| **Grade** | 9th, 10th, 11th and 12th |
| **Course Description** | This course covers the CCSS for Geometry A/B. During the first half of geometry, students will work with geometric tools for understanding geometry, parallel and perpendicular lines with proofs, transformations with constructions, and triangle congruency and proofs and quadrilateral relationships with proofs. During the second half of geometry, students will work with similarity, right triangle geometry, area, surface area and volume, trigonometry, and circle relationships. They will explore most topics numerically, graphically, and algebraically. |
| **Units** | Unit 6 (2 weeks): Quadrilaterals<br>Common Core State Standards Covered:<br>□ G-CO.C.10 □ G-SRT.B.5 □ G.GPE.4<br>□ G-CO.C.9 □ G.CO.11 □ G.GPE.5<br><br>Unit 7 (2 weeks): Similarity<br>Common Core State Standards Covered:<br>□ A.SSE.3a □ G.MG.1 □ G.MG.3<br>□ G.SRT.2 □ G.SRT.4 □ G.SRT.5<br><br>Unit 8 (2 weeks): Right Triangles and Trigonometry<br>Common Core State Standards Covered:<br>□ G.SRT.6 □ G.SRT.7 □ G.SRT.8<br>□ G.SRT.9 □ G.SRT.10<br><br>Unit 9 (1 week): Coordinate Geometry<br>Common Core State Standards Covered:<br>□ G.GPE.4 □ G.CA.3 □ G.CO.A.1<br>□ G.GPE.A.1 □ G.GPE.B.7 □ G.SRT.C.8<br><br>Unit 10 (2 weeks) Circles<br>Common Core State Standards Covered:<br>□ G.CO.1 □ G.C.1 □ G.C.2<br>□ G.C.5 □ G.MG.3 □ G.C.3<br>□ G.CO.12 □ G.C.4<br><br>Unit 11 (2 weeks): 2 and 3 Dimensional Models<br><br>□ G.GMD.4 □ G.GMD.1 □ G.MG.1<br>□ G.GMD.3 □ G.GMD.2 □ G.SRT.5 |
| **EA Opportunities** | None |

| CRLE Opportunities | None |
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| Work Sample(s) or Performance Task Opportunities | Work Samples/Performance Task:<br><br>□　1 in Geometry Strand |

Unit 6: Quadrilaterals

| Time Frame | 2 weeks |
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| Summary of Unit | ● Classifying Quadrilaterals<br>● Properties of Quadrilaterals<br>● Proving Quadrilaterals are Parallelograms<br>● Properties of Parallelograms, Rectangles and Rhombuses<br>● Properties of Kites and Trapezoids |
| Common Core State Standards | **Code** |
| | G-CO.C.10 | Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point. |
| | G-SRT.B.5 | Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. |
| | G-CO.C.9 | Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. |
| | G.GO.11 | Prove theorems about parallelograms. Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals. |
| | G.GPE.4 | Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$. |
| | G.GPE.5 | Prove the slope criteria for parallel and perpendicular lines and uses them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). |
| Major Assignments/ Learning Activities | Quadrilateral classification activity |
| Learning Targets | _LT 6.1_: I can find the sum of interior and exterior angles of a polygon as well as find an interior or exterior angle of regular polygons.<br>_LT 6.2_: I can use kite and trapezoid characteristics to find angle measures and segment lengths.<br>_LT 6.3_: I can use parallelogram characteristics to find angle measures and segment lengths<br>_LT 6.5_: I can use rhombus, square and rectangle characteristics to find angle measures and segment lengths. |

| Essential Questions | How are properties of parallelograms used to solve problems and to classify quadrilaterals? |
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| Common Summative Assessments | □   Unit 6 Exam |
| Academic Vocabulary | Quadrilateral, parallelogram, trapezoid, isosceles, kite, rhombus, rectangle, square, diagonal, parallel, congruent, perpendicular, bisect |
| Performance Tasks or Work Samples | None |
| Materials | |

### Unit 7: Similarity

| Time Frame | 2 weeks |
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| Summary of Unit | ● Factoring and Solving Quadratics<br>● Proportions and Ratios<br>● Solving similar triangles<br>● Proving triangles are similar<br>● Geometric Mean<br>● Proportions in triangles<br>● Perimeters and Areas of similar figures |

| Common Core State Standards | Code | Common Core State Standard |
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| | A.SSE.3a | Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.<br>a. Factor a quadratic expression to reveal the zeros of the function it defines. |
| | G.MG.1 | Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). |
| | G.MG.3 | Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). |
| | G.SRT.2 | Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. |
| | G.SRT.4 | Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity. |
| | G.SRT.5 | Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. |

| Major Assignments/ Learning Activities | □   Lesson worksheets and (a) Radicals and (b) Geometric Probability<br>□   Daily Warm-ups and/or lesson assignments and/or quizzes<br>□   Possible Khan Academy and/or IXL exercises |
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| Learning Targets | |
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| | LT1: I can solve algebraic proportions. |
| | LT2: I can identify the similarity ratio with similar polygons. |
| | LT3a: I can use the similarity ratio to find missing sides and angles. |
| | LT3b: I can prove triangles are similar with SSS, SAS or AA theorems. |

| | LT4a: I can use the geometric mean to find missing sides of a right triangle. |
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| | LT4b: I can find the geometric mean numerically of two numbers. |
| | LT5: I can use proportions in triangles to find missing lengths. |
| | LT6: I can use similarity and area ratios to determine missing perimeters, sides or areas. |

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| **Essential Questions** | How are properties of similar figures used to solve problems? |
| **Common Summative Assessments** | □ Unit 7 Exam |
| **Academic Vocabulary** | Proportion, similarity, ratio, similarity ratio, geometric mean |
| **Performance Tasks or Work Samples** | None |
| **Materials** | Ruler/Straight Edge, Protractor, Geometer Stencil |

| **Unit 8:** | Right Triangles and Trigonometry |
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| **Time Frame** | 2 weeks |
| **Summary of Unit** | <ul><li>Special Right Triangles</li><li>Identifying Sin, Cos and Tan ratios</li><li>Finding missing sides and angles using the trigonometric ratios</li><li>Using angle of depression and elevation to solve right triangle trigonometry problems</li><li>Using trigonometry to find areas of polygons</li></ul> |

| **Common Core State Standards** | Code | Common Core State Standard |
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| | G.SRT.6 | Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles. |
| | G.SRT.7 | Explain and use the relationship between the sine and cosine of complementary angles. |
| | G.SRT.8 | Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. |
| | G.SRT.9 | (+) Derive the formula $A = 1/2\ ab\ \sin(C)$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side. |
| | G.SRT.10 | (+) Prove the Laws of Sines and Cosines and use them to solve problems. |

| **Major Assignments/ Learning Activities** | □ Daily Warm-ups and/or lesson assignments and/or quizzes<br>□ Possible Khan Academy and/or IXL exercises<br>□ Lesson worksheets |
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| **Learning Targets** | *LT 8.1: I can classify triangles (special right triangles, acute, or obtuse) given side lengths or angle measures and determine missing side length(s) given a triangle's classification.*<br>*LT 8.2: I can determine the trigonometric ratio(s) of a right triangle given side lengths and use trigonometric ratios to determine missing side lengths or angle measures.*<br>*LT 8.3: I can apply the Law of Sines to calculate the area of a triangle.*<br>*LT 8.5: I can draw models of and solve trigonometric application problems.* |
| **Essential Questions** | How are the Pythagorean Theorem and trigonometry useful? |

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| ***Common Summative Assessments*** | ☐  Unit 8 Exam |
| ***Academic Vocabulary*** | Sine ratio, cosine ratio, tangent ratio, angle of depression and elevation, Law of Sines (area of triangle) |
| ***Performance Tasks or Work Samples*** | None |
| ***Materials*** | Ruler/Straight Edge, Protractor, Geometer Stencil |

| ***Unit 9:*** | Coordinate Geometry |
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| ***Time Frame*** | 1 week |
| ***Summary of Unit*** | ●  Classify shapes on the coordinate plane<br>●  Coordinate proofs using geometry<br>●  Equation of a circle |

| ***Common Core State Standards*** | Code | Common Core State Standard |
|---|---|---|
| | G.GPE.B.4 | Use coordinates to prove simple geometric theorems algebraically. Example: For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$. |
| | G.C.A.3 | Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. |
| | G.GPE.B.7 | Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula. |
| | G.CO.A.1 | Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. |
| | G.SRT.C.8 | Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. |
| | G.GPE.A.1 | Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. |

| ***Major Assignments/ Learning Activities*** | ☐  Lesson worksheets<br>☐  Daily Warm-ups and/or lesson assignments and/or quizzes<br>☐  Possible Khan Academy and/or IXL exercises |
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| ***Learning Targets*** | *LT 9.1: I can classify and verify a specific quadrilateral given four coordinates on a coordinate plane.*<br>*LT 9.3: I can graph and write equations of circles.* |
| ***Essential Questions*** | How can geometric relationships be proven by applying algebraic properties to geometric figures represented in the coordinate plane? |
| ***Common Summative Assessments*** | ☐  Unit 9 Exam |
| ***Academic Vocabulary*** | Coordinates, perpendicular, parallel, quadrilateral, parallelogram, rhombus, kite, distance formula, midpoint formula, proof, circle. |
| ***Performance Tasks or Work Samples*** | 'Classify the Quadrilateral' Work Sample |
| ***Materials*** | Ruler/Straight Edge, Geometer Stencil |

| Unit 10: | Circles |
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| **Time Frame** | 2 weeks |
| **Summary of Unit** | ● Arc measure and length<br>● Area of sectors and segments<br>● Tangent lines<br>● Chords<br>● Inscribed angles and segments in circles<br>● Secant lines |

| **Common Core State Standards** | Code | Common Core State Standard |
|---|---|---|
| | G.CO.1 | Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. |
| | G.C.1 | Prove that all circles are similar. |
| | G.C.2 | Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle. |
| | G.C.5 | Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector. |
| | G.MG.3 | Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios). |
| | G.C.3 | Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle. |
| | G.CO.12 | Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line. |
| | G.C.4 | (+) Construct a tangent line from a point outside a given circle to the circle. |

| **Major Assignments/ Learning Activities** | □ Lesson worksheets<br>□ Daily Warm-ups and/or lesson assignments and/or quizzes<br>□ Possible Khan Academy and/or IXL exercises |
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| **Learning Targets** | <u>LT 10.1</u>: I can find the length of an arc and find the area of sectors and segments givena central angle and radius.<br><u>LT 10.2</u>: I can identify lines that are tangent to a circle using angle measures and segment lengths in addition to solving problems involving tangent lines<br><u>LT 10.3</u>: I can identify chords and solve problems using relationships between chords, arcs and central angles.<br><u>LT 10.4</u>: I can identify and apply relationships between the measures of inscribed angles, arcs and central angles.<br><u>LT 10.5</u>: I can recognize and apply angle relationships formed by intersecting secants and tangents inside and outside a circle. |
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| **Essential Questions** | How are the figures formed related to the radius, circumference, and area of a circle when a line or lines intersect a circle? |
| **Common Summative Assessments** | □ Unit 11 Exam |

| Academic Vocabulary | Tangent line, secant line, inscribed circles, chord, radius, diameter, inscribed angle, arc, sector, segment |
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| Performance Tasks or Work Samples | None |
| Materials | Compass, Ruler/Straight Edge, Protractor, Geometer Stencil |

*Unit 11:*  Surface Area and Volume

| Time Frame | 2 weeks |
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| Summary of Unit | ● Space figures [Three-Dimensional]<br>● Surface areas of prisms and cylinders<br>● Surface areas of pyramids and cones<br>● Volumes of prisms and cylinders<br>● Volumes of pyramids and cones<br>● Surface areas and volumes of spheres<br>● Surface areas and volumes of similar figures |
| Common Core State Standards | **Code**    **Common Core State Standard** |

| Code | Common Core State Standard |
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| G.GMD.4 | Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects. |
| G.GMD.2 | Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures. |
| G.MG.1 | Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). |
| G.GMD.1 | Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments. |
| G.GMD.3 | Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. |
| G.SRT.5 | Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. |

| Major Assignments/ Learning Activities | □ Lesson worksheets<br>□ Daily Warm-ups and/or lesson assignments and/or quizzes<br>□ Possible Khan Academy and/or IXL exercises |
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| Learning Targets | |

| LT1: I can identify nets and cross sections as well as use Euler's Formula to find the number of faces, vertices or edges of a polyhedron. |
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| LT2: I can find the surface area of prisms and cylinders. |
| LT3: I can find the surface area of pyramids and cones. |
| LT4: I can find the volume of prisms and cylinders. |
| LT5: I can find the volume of pyramids and cones. |
| LT6: I can find the surface area and volume of spheres. |
| LT7: I can use similarity ratios of similar shapes to find linear measurements, areas or volumes. |

| Essential Questions | How is Cavalieri's Principle helpful in understanding the volume formulas for solids? |
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| ***Common Summative Assessments*** | □   Unit 11 Exam |
| ***Academic Vocabulary*** | Nets, cross sections, Euler's Formula, polyhedrons, prisms and cylinders, pyramids and cones, spheres, surface area, volume, surface area and volume ratio |
| ***Performance Tasks or Work Samples*** | None |
| ***Materials*** | Ruler/Straight Edge, Geometer Stencil |