

MANCHESTER REGIONAL HIGH SCHOOL

GEOMETRY



Adopted May, 2016

**Manchester Regional High School
District Mission Statement**

The mission of Manchester Regional High School is to produce respectful, responsible and well-rounded graduates who possess the knowledge and skills to become contributing members of society and life-long learners.

Highly qualified, collaborative and innovative staff address the needs of a diverse school community in a stimulating and nurturing environment.

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MANCHESTER REGIONAL HIGH SCHOOL

COURSE DESCRIPTION: Geometry

This is a rigorous study of modern Euclidean Geometry presented as a mathematical system founded on definitions, axioms and postulates used in proving and applying theorems. The course will include congruence, similarity, polygons, circles, coordinate geometry and exploration of solid geometry.

COURSE DATA:

Length of course: One year

Credits: 5.0

Periods per week: Five

Classification: Grade 10-11

Prerequisite: Algebra 1

EVALUATION:

The purposes of evaluation are to provide information about student progress and to determine whether students have learned the subject matter which has been taught. Teachers will evaluate student progress by utilizing common assessment tests, teacher-made quizzes and tests, oral questioning, class participation. Other evaluative criteria will include homework, special projects.

NOTE: The following pacing guide was developed during the creation of these curriculum units. The actual implementation of each unit may take more or less time. Time should also be dedicated to preparation for benchmark and State assessments, and analysis of student results on the same. A separate document is included at the end of this curriculum guide with suggestions and resources related to State Assessments (if applicable). The material in this document should be integrated throughout the school year, and with an awareness of the State Testing Schedule. It is highly recommended that teachers meet throughout the school year to coordinate their efforts in implementing the curriculum and preparing students for benchmark and State Assessments in consideration of both the School and District calendars.

Content Area: Mathematics	
Course Title: Geometry	Grade Level: 10-11

Unit 1 - Foundations of Geometry	20 days
Unit 2 - Parallel and Perpendicular Lines and Planes	20 days
Unit 3 - Triangle Congruence	20 days
Unit 4 - Quadrilaterals	15 days
Unit 5 - Similarity	15 days
Unit 6 - Right Triangles and Trigonometry	20 days
Unit 7 - Circles	20 days
Unit 8 - Transformational Geometry	15 days
Unit 9 - Extending Perimeter, Circumference, Area and Volume	20 days

Content Area – Mathematics
Geometry Unit One Foundations of Geometry
Grade Level: 10-11
Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.
Technology Integration – Calculator and cell phone, Promethean Board
21st Century Skills – Creativity/Innovation Critical Thinking/Problem Solving Life & Career Skills
Learning Targets Unit One Foundations of Geometry
Unit Proficiencies After completing this unit of study, the student will be able to: <ol style="list-style-type: none"> 1. Use the terms equidistant, collinear, coplanar, and intersection to define the relationship and position between points and lines 2. Apply concepts involving undefined terms (e.g., point, line, plane) 3. Summarize postulates and theorems relating points, lines, and planes 4. Classify and measure angles 5. State and apply the ruler, angle addition, and segment addition postulates 6. Use midpoint and angle bisector theorems 7. Apply definitions and theorems of perpendicular lines 8. Apply supplementary and complementary angle theorems
Common Core Standards G.CO.1, G.CO.9, G.CO.10, G.CO.12, G.GPE.7

Geometry Unit One Foundations of Geometry (continued)

Unit Essential Questions

- What are the underlying principles of Geometry?

Unit Enduring Understandings

- Students will be able to identify and label the different types of lines and angles and apply basic formulas.

Terminology: Students will be able to recognize and use the following terms in context:

Point	Line	Segment	Angle	Plane	Ray
Endpoint	Distance	Midpoint	Between	Congruent	Bisect
Vertex	Acute Angle	Obtuse Angle	Right Angle	Straight Angle	Supplementary
Complementary	Vertical Angles				

Diverse Learners (ELL, Special Ed, Gifted & Talented)- Differentiation strategies may include, but are not limited to, learning centers and cooperative learning activities in either heterogeneous or homogeneous groups, depending on the learning objectives and the number of students that need further support and scaffolding, versus those that need more challenge and enrichment. Modifications may also be made as they relate to the special needs of students in accordance with their Individualized Education Programs (IEPs) or 504 plans, or English Language Learners (ELL). These may include, but are not limited to, extended time, copies of class notes, refocusing strategies, preferred seating, study guides, and/or suggestions from special education or ELL teachers.

Resources - Text, calculator, electronic teaching tools, electronic lesson presentations. Teacher will incorporate chapter resources, study guides, guided notes, and standardized test prep.

Content Area – Mathematics
Geometry Unit Two Parallel and Perpendicular Lines and Planes
Grade Level: 10-11
Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.
Technology Integration – Calculator and cell phone, Promethean Board
21st Century Skills – Creativity/Innovation Critical Thinking/Problem Solving Life & Career Skills
Learning Targets Unit Two Parallel and Perpendicular Lines and Planes
<p>Unit Proficiencies</p> <p>After completing this unit of study, the student will be able to:</p> <ul style="list-style-type: none"> ● Distinguish among intersecting lines, parallel lines, and skew lines ● Apply the theorem regarding the intersection of two parallel planes by a third plane ● Identify angles formed when two lines are cut by a transversal line and solve related problems ● Apply postulates and theorems about parallel lines ● Apply theorems regarding parallels and perpendiculars to a given line through a point outside the line ● Plan and write a two column proof of the application of multiple theorems and/or postulates
<p>Common Core Standards</p> <p>G.CO.1, G.CO.9, G.CO.10, G.CO.12, G.GPE.5</p>

Geometry Unit Two Parallel and Perpendicular Lines and Planes (continued)

Unit Essential Questions

- How can the relationships between the angles formed by parallel lines cut by a transversal help prove theorems involving parallel and perpendicular lines?
- How can slope be applied to real-life situations?

Unit Enduring Understandings

- Students will be able to identify and label the different types of lines and angles and apply basic formulas

Terminology: Students will be able to recognize and use the following terms in context:

Parallel lines	Parallel planes	Perpendicular Lines	Skew Lines	Transversal	Alternate Interior Angles
Alternate Exterior Angles	Consecutive Interior Angles	Corresponding Angles	Slope		

Diverse Learners (ELL, Special Ed, Gifted & Talented)- Differentiation strategies may include, but are not limited to, learning centers and cooperative learning activities in either heterogeneous or homogeneous groups, depending on the learning objectives and the number of students that need further support and scaffolding, versus those that need more challenge and enrichment. Modifications may also be made as they relate to the special needs of students in accordance with their Individualized Education Programs (IEPs) or 504 plans, or English Language Learners (ELL). These may include, but are not limited to, extended time, copies of class notes, refocusing strategies, preferred seating, study guides, and/or suggestions from special education or ELL teachers.

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Content Area – Mathematics

Geometry Unit Three Triangle Congruence

Grade Level: 10-11

Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.

Technology Integration – Calculator and cell phone, Promethean Board

21st Century Skills – Creativity/Innovation
Critical Thinking/Problem Solving
Life & Career Skills

**Learning Targets Unit Three
Triangle Congruence**

Unit Proficiencies

After completing this unit of study, the student will be able to:

- Identify corresponding parts of congruent figures
- Prove two triangles are congruent by applying relevant theorems
- Apply principles of congruent triangles to contained line segments and angles
- Apply theorems and corollaries to recognize and identify isosceles triangles
- Illustrate that two overlapping triangles are congruent
- Demonstrate the principles of congruent triangles to problem-solving situations
- Apply the definitions of median and altitude of a triangle and the perpendicular bisector of a segment
- Apply the theorem that states any point on the bisector of an angle is equidistant from both sides of the angle

Common Core Standards

G.CO.1, G.CO.7-10, G.CO.12

Geometry Unit Three Triangle Congruence (continued)

Unit Essential Questions

- How can understanding the properties of triangles help find missing sides and angles?
- Why are SSS, SAS, ASA, AAS and HL valid methods for proving triangles congruent?

Unit Enduring Understandings

- Students will be able to apply their understanding of triangles and congruence to various triangle proofs and problems.

Terminology: Students will be able to recognize and use the following terms in context:

Congruent Triangles	Equiangular	Acute Triangle	Obtuse Triangle	Right Triangle	Scalene Triangle
Isosceles Triangle	Equilateral Triangle	Corresponding sides	Included Angle	Median	Altitude
Perpendicular Bisector	Angle Bisector	Remote Interior Angle			

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Content Area – Mathematics

Geometry Unit Four Quadrilaterals

Grade Level: 10-11

Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.

Technology Integration – Calculator and cell phone, Promethean Board

21st Century Skills – Creativity/Innovation
Critical Thinking/Problem Solving
Life & Career Skills

**Learning Targets Unit Four
Quadrilaterals**

Unit Proficiencies

After completing this unit of study, the student will be able to:

- properties of polygons including: square, rectangle, rhombus, trapezoid, parallelogram, and kite
- classify polygons
- find the sum of interior and exterior angles of polygons

Common Core Standards

G.CO.9, G.CO.11, G.CO.12, G.SRT.-5, G-MG.1

Geometry Unit Four Quadrilaterals (continued)					
Unit Essential Questions			Unit Enduring Understandings		
<ul style="list-style-type: none"> How does knowing about polygons and specific quadrilaterals assist in our reaction to the environment? 			<ul style="list-style-type: none"> The student will have an understanding of quadrilaterals and their properties and will be able to understand and use properties of polygons. 		
Terminology: Students will be able to recognize and use the following terms in context:					
diagonals	convex	concave	polygon	regular	parallelogram
rectangle	square	rhombus	kite	trapezoid	isosceles trapezoid

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<p>Resources - Text, calculator, electronic teaching tools, electronic lesson presentations. Teacher will incorporate chapter resources, study guides, guided notes, and standardized test prep.</p>

Content Area – Mathematics
Geometry Unit Five Similarity
Grade Level: 10-11
Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.
Technology Integration – Calculator and cell phone, Promethean Board
21st Century Skills – Creativity/Innovation Critical Thinking/Problem Solving Life & Career Skills
Learning Targets Unit Five Similarity
Unit Proficiencies After completing this unit of study, the student will be able to: <ul style="list-style-type: none"> ● how to set up and solve proportions ● how to use ratios in context ● SAS, SSS, AA properties of similar triangles
Common Core Standards G.CO.12, G.MG.1, G.SRT.2, G.SRT.4-6, G.CO.2

Geometry Unit Five Similarity (continued)					
<p>Unit Essential Questions</p> <ul style="list-style-type: none"> • How does knowing about similarity help us solve real life problems involving ratios, proportions, dilations, and scale factors? • In what other contexts can ratios and dilations be used and how? 	<p>Unit Enduring Understandings</p> <ul style="list-style-type: none"> • Students will have an understanding of similarities of polygons. 				
<p>Terminology: Students will be able to recognize and use the following terms in context:</p>					
Similar	ratio	proportion	indirect measurement	scale	scale factor

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Resources - Text, calculator, electronic teaching tools, electronic lesson presentations. Teacher will incorporate chapter resources, study guides, guided notes, and standardized test prep.

Content Area – Mathematics
Geometry Unit Six Right Triangles and Trigonometry
Grade Level: 10-11
Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.
Technology Integration – Calculator and cell phone, Promethean Board
21st Century Skills – Creativity/Innovation Critical Thinking/Problem Solving Life & Career Skills
Learning Targets Unit Six Right Triangles and Trigonometry
Unit Proficiencies After completing this unit of study, the student will be able to: <ul style="list-style-type: none"> ● calculate angles of elevation and depression ● use the calculator to find trigonometric ratios ● use trigonometric in real-world applications
Common Core Standards G.MG.1, G.SRT.6-8, G.SRT.10, G.CO.12

Geometry Unit Six Right Triangles and Trigonometry (continued)

Unit Essential Questions

- How can we apply general knowledge of triangles to properties of right triangles?
- How will the foundations of right triangles be used later in life (ie in Trigonometry)?
- What are real-world applications of right triangle measurements?

Unit Enduring Understandings

- Students will be able to apply trigonometric relationships to right triangles

Terminology: Students will be able to recognize and use the following terms in context:

Geometric
mean

Trigonometric
ratios

Angle of
elevation

Angle of
depression

Pythagorean
theorem

Altitude

Hypotenuse

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Resources - Text, calculator, electronic teaching tools, electronic lesson presentations. Teacher will incorporate chapter resources, study guides, guided notes, and standardized test prep.

Content Area – Mathematics
Geometry Unit Seven Circles
Grade Level: 10-11
Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.
Technology Integration – Calculator and cell phone, Promethean Board
21st Century Skills – Creativity/Innovation Critical Thinking/Problem Solving Life & Career Skills
Learning Targets Unit Seven Circles
Unit Proficiencies After completing this unit of study, the student will be able to: <ul style="list-style-type: none"> ● radius of a circle is half of its diameter. ● the similarities and differences between secant, chord, diameter, radius, and tangent. ● understand different pairs of circles such as congruent and tangent. ● if a line is tangent to a circle, it is perpendicular to the radius at the point of tangency. ● theorem- If two segments are tangent to a circle from the same external point, they are congruent ● minor arcs are named by 2 points while major arcs and semicircles are named by 3 points ● the measure of a central angle is equal to its intercepted arc ● the measure of an arc formed by 2 adjacent arcs is the sum of the measure of the 2 arcs (arc addition postulate) ● the difference between a central angle and an inscribed angle ● the measure of an inscribed angle is half the measure of its intercepted arc. ● an inscribed angle intercepts a semicircle if and only if the angle is a right angle. ● if a quadrilateral is inscribed in a circle, its opposite angles are supplementary.
Common Core Standards G.C.2-5, G.GPE.1, G.CO.12-13

Geometry Unit Seven Circles (continued)					
Unit Essential Questions			Unit Enduring Understandings		
<ul style="list-style-type: none"> • How can we make comparisons between polygons and circles? • How does knowing properties of circles help make connections to real life problems and situations? 			<ul style="list-style-type: none"> • Students will understand and apply theorems about circles 		
Terminology: Students will be able to recognize and use the following terms in context:					
diameter	radius	chord	secant	tangent	point of tangency
central angle	arc	major arc	minor arc	semicircle	sector
inscribed angle	arc length	circumscribed	inscribed		

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Resources - Text, calculator, electronic teaching tools, electronic lesson presentations. Teacher will incorporate chapter resources, study guides, guided notes, and standardized test prep.

Content Area – Mathematics
Geometry Unit Eight Transformational Geometry
Grade Level: 10-11
Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.
Technology Integration – Calculator and cell phone, Promethean Board
21st Century Skills – Creativity/Innovation Critical Thinking/Problem Solving Life & Career Skills
Learning Targets Unit Eight Transformational Geometry
Unit Proficiencies
<p>After completing this unit of study, the student will be able to:</p> <ul style="list-style-type: none"> ● a preimage is a shape that undergoes a transformation. ● two figures are congruent if and only if there is a transformation that maps one figure to the other. ● how reflecting a figure across the x-axis is different from reflecting a figure across the y-axis ● in a translation all points of a figure are moved the same distance in the same direction ● the center of rotation is called a fixed point because it does not move when a figure is rotated about that point. ● rotations can be clockwise or counterclockwise. ● a line of symmetry divides a figure into two congruent parts. ● a figure has rotational symmetry if it can be rotated about a point by an angle between 0 and 360 degrees so that the image matches the preimage. ● a tessellation is a repeating pattern that completely covers a plane with no gaps or overlaps. ● a dilation enlarges or reduces all dimensions proportionately ● a scale factor greater than 1 is an enlargement, while less than 1 is a reduction.
Common Core Standards
G.CO.2, G.CO.3, G.CO.5, G.CO.6

Geometry Unit Eight Transformational Geometry (continued)

Unit Essential Questions

- How does understanding transformations help to interpret and see patterns in our environment?
- Where can we find evidence of transformations in the real world?

Unit Enduring Understandings

- Students will have an understanding of the results of different types of transformations within the coordinate plane. They will identify, describe, and predict how transformations will change a particular pre-image to its image.

Terminology: Students will be able to recognize and use the following terms in context:

pre-image	image	transformation	rigid motion	reflection	translation
rotation	symmetry	line of symmetry	dilation	scale factor	

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Resources - Text, calculator, electronic teaching tools, electronic lesson presentations. Teacher will incorporate chapter resources, study guides, guided notes, and standardized test prep.

Content Area – Mathematics

Geometry Unit Nine Extending Perimeter, Circumference, Area, and Volume

Grade Level: 10-11

Rationale – In conjunction with their Algebra 1 class, students will learn additional methods of approaching PSAT type material and test taking techniques. Students will also learn basic Geometry topics and Algebra 2 topics which they will need for this test. Students will be able to see where their Math Skills will need to be.

Technology Integration – Calculator and cell phone, Promethean Board

21st Century Skills – Creativity/Innovation
Critical Thinking/Problem Solving
Life & Career Skills

**Learning Targets Unit Nine
Extending Perimeter, Circumference, Area, and Volume**

Unit Proficiencies

After completing this unit of study, the student will be able to:

- how formulas for the area of a parallelogram, triangle, trapezoid and rhombus relate to the formula for the area of a rectangle
- the height of a triangle is always measured along a segment perpendicular to the base.
- the area of an irregular shaped region can be broken down into familiar figures whose formula is known and then added together.
- how to find the area of a circle when given its circumference and how to find its circumference when given the circle's area
- similarities and differences between prisms, cylinders, pyramids and cones
- how to use volume formulas

Common Core Standards

G.GPE.7, G.GMD.1, G.GMD.3, G.GMD.4, G.MG.1-3

Geometry Unit Nine Extending Perimeter, Circumference, Area, and Volume (continued)

Unit Essential Questions

- How does knowledge about perimeter, circumference, and area translate to solving problems in real life (i.e. carpeting a room, planting a garden)?
- How can we build upon our knowledge of two-dimensional figures to understand three-dimensional figures?

Unit Enduring Understandings

- Students will understand how to develop and apply formulas to find area, perimeter or circumference of different geometric figures.
- Students will understand how to classify and apply formulas for volume of three dimensional figures.

Terminology: Students will be able to recognize and use the following terms in context:

perimeter	area	circumference	apothem	prism	cylinder
pyramid	cone	cube	net	volume	sphere

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