



ESL  
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FINE & PERFORMING ARTS  
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HEALTH & PHYSICAL EDUCATION

RAHWAY PUBLIC SCHOOLS

# CURRICULUM & INSTRUCTION

**Content Area: Mathematics**

**Course: Geometry C**

**Grade Level: 11 -12**

This curriculum is part of the Educational Program of Studies of the Rahway Public Schools.

### **ACKNOWLEDGMENTS**

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**Dr. Tiffany Beer, Director of Curriculum & Instruction**

Subject/Course Title:  
**Geometry C**  
**Grade 10 - 12**

Date of Board Adoptions:  
**August 27, 2024**

# RAHWAY PUBLIC SCHOOLS CURRICULUM

## Geometry C - Grade 10 - 12

### *Pacing Guide*

<b>Unit</b>	<b>Title</b>	<b>Pacing</b>
1	Congruence, Proofs, and Constructions	13 weeks
2	Similarity, Right Angles, and Trigonometry	13 weeks
3	Extending to Three Dimensions	14 weeks

## ACCOMMODATIONS

### 504 Accommodations:

- Provide scaffolded vocabulary and vocabulary lists.
- Provide extra visual and verbal cues and prompts.
- Provide adapted/alternate/excerpted versions of the text and/or modified supplementary materials.
- Provide links to audio files and utilize video clips.
- Provide graphic organizers and/or checklists.
- Provide modified rubrics.
- Provide a copy of teaching notes, especially any key terms, in advance.
- Allow additional time to complete assignments and/or assessments.
- Provide shorter writing assignments.
- Provide sentence starters.
- Utilize small group instruction.
- Utilize Think-Pair-Share structure.
- Check for understanding frequently.
- Have student restate information.
- Support auditory presentations with visuals.
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages).
- Provide study sheets and teacher outlines prior to assessments.
- Quiet corner or room to calm down and relax when anxious.
- Reduction of distractions.
- Permit answers to be dictated.
- Hands-on activities.
- Use of manipulatives.
- Assign preferential seating.
- No penalty for spelling errors or sloppy handwriting.
- Follow a routine/schedule.
- Provide student with rest breaks.
- Use verbal and visual cues regarding directions and staying on task.
- Assist in maintaining agenda book.

### Gifted and Talented Accommodations:

- Differentiate reading levels of texts (e.g., Newsela).
- Offer students additional texts with higher lexile levels.
- Provide more challenging and/or more supplemental readings and/or activities to deepen understanding.
- Allow for independent reading, research, and projects.
- Accelerate or compact the curriculum.
- Offer higher-level thinking questions for deeper analysis.
- Offer more rigorous materials/tasks/prompts.
- Increase number and complexity of sources.
- Assign group research and presentations to teach the class.
- Assign/allow for leadership roles during collaborative work and in other learning activities.

### IEP Accommodations:

- Provide scaffolded vocabulary and vocabulary lists.
- Differentiate reading levels of texts (e.g., Newsela).
- Provide adapted/alternate/excerpted versions of the text and/or modified supplementary materials.
- Provide extra visual and verbal cues and prompts.
- Provide links to audio files and utilize video clips.
- Provide graphic organizers and/or checklists.
- Provide modified rubrics.
- Provide a copy of teaching notes, especially any key terms, in advance.
- Provide students with additional information to supplement notes.
- Modify questioning techniques and provide a reduced number of questions or items on tests.
- Allow additional time to complete assignments and/or assessments.
- Provide shorter writing assignments.
- Provide sentence starters.
- Utilize small group instruction.
- Utilize Think-Pair-Share structure.
- Check for understanding frequently.
- Have student restate information.
- Support auditory presentations with visuals.
- Provide study sheets and teacher outlines prior to assessments.
- Use of manipulatives.
- Have students work with partners or in groups for reading, presentations, assignments, and analyses.
- Assign appropriate roles in collaborative work.
- Assign preferential seating.
- Follow a routine/schedule.

### ELL Accommodations:

- Provide extended time.
- Assign preferential seating.
- Assign peer buddy who the student can work with.
- Check for understanding frequently.
- Provide language feedback often (such as grammar errors, tenses, subject-verb agreements, etc...).
- Have student repeat directions.
- Make vocabulary words available during classwork and exams.
- Use study guides/checklists to organize information.
- Repeat directions.
- Increase one-on-one conferencing.
- Allow student to listen to an audio version of the text.
- Give directions in small, distinct steps.
- Allow copying from paper/book.
- Give student a copy of the class notes.
- Provide written and oral instructions.
- Differentiate reading levels of texts (e.g., Newsela).
- Shorten assignments.
- Read directions aloud to student.
- Give oral clues or prompts.
- Record or type assignments.
- Adapt worksheets/packets.
- Create alternate assignments.
- Have student enter written assignments in criterion, where they can use the planning maps to help get them started and receive feedback after it is submitted.
- Allow student to resubmit assignments.
- Use small group instruction.

- Simplify language.
- Provide scaffolded vocabulary and vocabulary lists.
- Demonstrate concepts possibly through the use of visuals.
- Use manipulatives.
- Emphasize critical information by highlighting it for the student.
- Use graphic organizers.
- Pre-teach or pre-view vocabulary.
- Provide student with a list of prompts or sentence starters that they can use when completing a written assignment.
- Provide audio versions of the textbooks.
- Highlight textbooks/study guides.
- Use supplementary materials.
- Give assistance in note taking
- Use adapted/modified textbooks.
- Allow use of computer/word processor.
- Allow student to answer orally, give extended time (time-and-a-half).
- Allow tests to be given in a separate location (with the ESL teacher).
- Allow additional time to complete assignments and/or assessments.
- Read question to student to clarify.
- Provide a definition or synonym for words on a test that do not impact the validity of the exam.
- Modify the format of assessments.
- Shorten test length or require only selected test items.
- Create alternative assessments.
- On an exam other than a spelling test, don't take points off for spelling errors.

# RAHWAY PUBLIC SCHOOLS CURRICULUM

## *UNIT OVERVIEW*

**Content Area:** Geometry

**Unit Title:** Unit one - Congruence, Proofs, and Constructions

**Target Course/Grade Level:** Geometry C / Grade 10 -12

**Unit Summary:**

- Experiment with transformations in the plane.
- Understand congruence in terms of rigid motions.
- Prove geometric theorems.

**Approximate Length of Unit:** 13 weeks

## *LEARNING TARGETS*

**NJ Student Learning Standards:**

- 4.G.A: Draw and identify lines and angles, and classify shapes by properties of their lines and angles.
- 4.G.A.1: Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
- 8.G.A: Understand congruence and similarity using physical models, transparencies, or geometry software.
- 8.G.A.2: Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- 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.CO.A.3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
- G.CO.A.4: Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
- G.CO.A.5: Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
- G.CO.B.7: Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

**21<sup>st</sup> Century Life and Career Skills:**

- 9.1.2.FI.1: Differentiate the various forms of money and how they are used (e.g., coins, bills, checks, debit and credit cards).
- 9.1.2.PB.1: Determine various ways to save and places in the local community that help people save and accumulate money over time.
- 9.1.5.CP.1: Identify the advantages of maintaining a positive credit history.
- 9.1.5.FP.3: Analyze how spending choices and decision-making can result in positive or negative consequences.
- 9.1.5.FP.4: Explain the role of spending money and how it affects wellbeing and happiness (e.g., "happy money," experiences over things, donating to causes, anticipation, etc.).
- 9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors
- 9.1.8.CDM.2: Demonstrate an understanding of the terminology associated with different types of credit (e.g., credit cards, installment loans, mortgages, lines of credit) and compare and calculate the interest rates associated with each.

**Interdisciplinary Standards:**

- RST.6-8.9: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
- MS-ESS1-2: Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
- MS-ESS1-3: Analyze and interpret data to determine scale properties of objects in the solar system.
- MS-ESS1-4: Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

- MS-ESS3-1: Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
- MS-ESS3-5: Ask questions to clarify evidence of the factors that have caused climate change over the past century.
- MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions at the destination.

### Unit Understandings:

*Students will understand that...*

- Geometric properties can be used to construct geometric figures.
- Geometric relationships provide a means to make sense of a variety of phenomena.
- Shape and area can be conserved during mathematical transformations.
- Reasoning and/or proof can be used to verify or refute conjectures or theorems in geometry.

### Unit Essential Questions:

• Describe the result of applying each rule to a figure in the coordinate plane:

-  $A(x,y) = (x-6, y+7)$

-  $B(x,y) = (x, y - 14)$

-  $C(x,y) = (x + 5, y)$

-  $D(x,y) = (x, -y)$

-  $E(x,y) = (-x, y)$

-  $F(x,y) = (-x, -y)$

- Write the transformation that would translate a figure 5 units to the left and 12 units down
- Identify the properties of quadrilaterals and the relationships among the properties

### Knowledge and Skills:

*Students will know....*

- Point, line, ray, segment, plane, and angle
- Transformation, translation, reflection, axis of symmetry, rotation
- Congruent, congruence, corresponding parts
- Hypothesis, conclusion, conditional, converse, counterexample, bi-conditional, logical chain, proof, theorem
- Conjecture, theorem, postulate, proof, two-column proof, paragraph proof
- Vertical angles, adjacent angles, consecutive angles, complementary, supplementary, linear pair
- Right angle, acute angle, obtuse angle
- Transversal, alternate interior angles, alternate exterior angles, same-side interior angles, corresponding angles
- Parallel, perpendicular, bisect, perpendicular bisector
- Segment Addition and Angle Addition postulates
- Overlapping Segments and Overlapping Angles Theorems
- Linear Pair property
- Vertical Angles Theorem
- Transitive, Reflexive and Symmetric Properties
- Corresponding Angles Postulate and its converse
- Alternate Interior, Alternate Exterior, Same-Side Interior Theorems and their converses
- Triangle Sum Theorem

*Students will be able to ...*

- Use mathematical vocabulary fluently
- Use appropriate vocabulary to describe rotations and reflections
- Interpret and perform a given sequence of transformations and draw the result
- Accurately use geometric vocabulary to describe a sequence of transformations
- Use rigid motions to map one figure onto another
- Apply geometric properties to prove two figures are congruent
- Recognize why particular combinations of corresponding parts establish congruence and why others do not
- Construct proofs using a variety of methods: Two-column, paragraph, flowchart
- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Model with mathematics
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure

## ***EVIDENCE OF LEARNING***

### **Assessment:**

*What evidence will be collected and deemed acceptable to show that students truly “understand”?*

- Unit tests/quizzes,
- Open-ended problems that involve written responses
- Daily student work
- Student/group presentations
- Daily Homework

### **Learning Activities:**

*What differentiated learning experiences and instruction will enable all students to achieve the desired results?*

- Mathematical investigations
- Construct and analyze geometric figures
- Make conjectures from geometric figures and data and then prove or disprove them
- Work with tools of geometry
- Use geometric properties to solve real-world problems
- Design a piece of art that illustrates reflectional and/or rotational symmetry. Describe the symmetries in detail.
- Create a translation or rotation tessellation

## ***RESOURCES***

### **Teacher Resources:**

- Geometry Textbook: Teachers’ Edition & accompanying softcover workbook
- Teacher developed worksheets and activities
- Teacher developed lectures and guided notes
- Literature: Flatland: A Romance of Many Dimensions by E.A.Abbott
- Geometers Sketchpad
- Visual aids (suggestions) e.g. o Dominos for logical chains
- Mathspace, Freckle, and Khan Academy

### **Equipment Needed:**

- Rulers/straight edge
- Protractors
- Compasses
- Chromebook's
- Graph paper
- Geometers Sketchpad



# RAHWAY PUBLIC SCHOOLS CURRICULUM

## *UNIT OVERVIEW*

**Content Area:** Geometry

**Unit Title:** Unit two- Similarity, Right triangles, and Trigonometry

**Target Course/Grade Level:** Geometry/Grade 10 -12

**Unit Summary:**

- Understand similarity in terms of similarity transformations.
- Prove theorems involving similarity.
- Define trigonometric ratios and solve problems involving right triangles
- Apply geometric concepts in modeling situations.

**Approximate Length of Unit:** 13 weeks

## *LEARNING TARGETS*

**NJ Student Learning Standards:**

- 8.G.A: Understand congruence and similarity using physical models, transparencies, or geometry software.
- 8.G.A.1: Verify experimentally the properties of rotations, reflections, and translations.
- 8.G.A.1.a: Lines are transformed to lines, and line segments to line segments of the same length.
- 8.G.A.1.b: Angles are transformed to angles of the same measure.
- 8.G.A.4: Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
- 8.G.A.5: Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
- G.C.A.1: Prove that all circles are similar.
- F.IF.C.7.f: Graph trigonometric functions, showing period, midline, and amplitude.
- F.TF.B: Model periodic phenomena with trigonometric functions.
- F.TF.B.5: Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.
- F.TF.B.6: Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
- F.TF.B.7: Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.
- C.SRT.C.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.
- C.SRT.C.8: Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

**21<sup>st</sup> Century Life and Career Skills:**

- 9.1.5.CR.1: Compare various ways to give back and relate them to your strengths, interests, and other personal factors
- 9.1.8.CDM.3: Compare and contrast loan management strategies, including interest charges and total principal repayment costs.
- 9.1.5.CP.1: Identify the advantages of maintaining a positive credit history.
- 9.1.8.CDM.4: Evaluate the application process for different types of loans (e.g., credit card, mortgage, student loans).
- 9.1.5. EG.5: Identify sources of consumer protection and assistance.
- 9.1.8.PB.1: Predict future expenses or opportunities that should be included in the budget planning process.
- 9.1.8.PB.2: Explain how different circumstances can affect one's personal budget.

**Interdisciplinary Standards:**

- 5.PS.1.1: Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
- 3-5-ETS1-2: Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS1-3: Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
- MS-PS1-2: Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

**Unit Understandings:**

*Students will understand that...*

- Geometric properties can be used to establish similarity.
- Comparing similar figures is useful when there is a need for indirect measurement.
- Smaller scale models can be created by using similarity
- Geometric relationships provide a means to make sense of a variety of phenomena.
- Measurements can be used to describe, compare, and make sense of phenomena.

**Unit Essential Questions:**

- Show how to find the measure of a tree using indirect measurement.
- What properties do all triangles share? How are triangles classified?
- How are similarity and congruence established? Why is this important?
- Prove that two triangles are similar.
- Given a side and an angle of a right triangle, use the trigonometric ratios to find the remaining angles and sides of the triangle.

**Knowledge and Skills:**

*Students will know.....*

- Dilation, center of dilation
- Contraction, expansion, scale factor, similarity
- Proportionality, corresponding parts
- Isosceles triangle, vertex angle, base angle, base and legs of an isosceles triangle
- Corollary
- Altitude, base and height of a parallelogram, trapezoid and triangle
- Legs Of Trapezoid
- Apothem
- Trigonometric Ratios: SohCahToa
- Area of a triangle, parallelogram, trapezoid and a regular polygon
- Triangle Similarity Theorems And Postulate (ASA, SAS, SSS, the special case of ASS (HL) and AA)
- Side-splitting theorem
- Proportional Altitudes, Medians, Angle Bisectors and Segments Theorems
- Polygon similarity Postulate
- Pythagorean Theorem and its converse
- Pythagorean Inequalities
- Pythagorean triples
- 45-45-90 Triangle Theorem
- 30-60-90 Triangle Theorem
- Isosceles Triangle Theorem and its converse
- Triangle Mid segment Theorem
- Triangle Inequality Theorem

*Students will be able to ...*

- Develop a hypothesis based on observations
- Make connections between the definition of similarity and the attributes of two given figures
- Setup and use appropriate ratios and proportions
- Recognize why particular combinations of corresponding parts establish similarity and why others do not
- Construct a proof using one of a variety of methods
- Use information given in verbal or pictorial form about geometric figures to set up a proportion that accurately models the situation
- Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems
- Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with topographic grid systems based on ratios)
- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attention to detail

## ***EVIDENCE OF LEARNING***

### **Assessment:**

*What evidence will be collected and deemed acceptable to show that students truly “understand”?*

- Unit tests, quizzes,
- Open-ended problems that involve written responses
- Daily student work
- Student/group presentations
- Daily Homework

### **Learning Activities:**

*What differentiated learning experiences and instruction will enable all students to achieve the desired results?*

- Mathematical investigations
- Construct and analyze geometric figures
- Make conjectures from geometric figures and data and then prove or disprove them
- Use geometric properties to solve real-world problems
- Use proportions and at least two of the methods to find the dimensions of a building or other structure at your school or in your neighborhood.
- Measure the shadow of the building and the shadow of a person or object with a known height
- Use a mirror to create similar triangles
- Take a photograph of the building with a person or object of known height standing in front of it. Use the height of the person to determine the height of the building using geometric formulas.
- Build a scale model of your school and possibly the area around it.
- Khan Academy/Mathspace assignments
- Create real world situations in a word problem format and solve each other's problems
- Freckle

## ***RESOURCES***

### **Teacher Resources:**

- Geometry Textbook: Teacher's Edition accompanying softcover workbook
- Teacher developed worksheets and activities
- Teacher developed lectures and guided notes
- Geometer's Sketchpad
- Visual aids, geometric manipulatives
- Examples of scale models

### **Equipment Needed:**

- Chromebook's
- Ruler / Tape Measure
- Protractor
- Poster Board
- Scissors
- Tape
- Geometer's Sketchpad
- Graphing Calculator

# RAHWAY PUBLIC SCHOOLS CURRICULUM

## UNIT OVERVIEW

**Content Area:** Geometry

**Unit Title:** Unit Three – Extending to Three Dimensions

**Target Course/Grade Level:** Geometry/Grade 10 - 12

**Unit Summary:**

- Explain volume formulas and use them to solve problems.
- Visualize the relation between two-dimensional and three-dimensional objects.
- Apply geometric concepts in modeling situations.

**Approximate Length of Unit:** 13 weeks

## LEARNING TARGETS

**NJ Student Learning Standards:**

- N.CN.C.7: Solve quadratic equations with real coefficients that have complex solutions.
- N.CN.C.9: Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.
- A.REI.C.7: Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.
- G.MG.A.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.A.2: Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
- G.MG.A.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.GMD.B: Visualize relationships between two-dimensional and three-dimensional objects
- G.GMD.B.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.
- 5.G.B: Classify two-dimensional figures into categories based on their properties.
- 5.G.B.3: Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.
- 5.G.B.4: Classify two-dimensional figures in a hierarchy based on properties.
- 7.G.A.3: Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

**21st Century Life and Career Skills:**

- 9.1.2.FI.1: Differentiate the various forms of money and how they are used (e.g., coins, bills, checks, debit and credit cards).
- 9.1.2.PB.1: Determine various ways to save and places in the local community that help people save and accumulate money over time.
- 9.1.5.CP.1: Identify the advantages of maintaining a positive credit history.
- 9.1.5.FP.3: Analyze how spending choices and decision-making can result in positive or negative consequences.
- 9.1.5.FP.4: Explain the role of spending money and how it affects wellbeing and happiness (e.g., "happy money," experiences over things, donating to causes, anticipation, etc.).

**Interdisciplinary Standards:**

- MS-PS2-1: Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.
- MS-PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- MS-PS2-3: Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.
- RST.11-12.1: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- HS-PS3-1: Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.
- VA.HS.Cr.2: Use a sketchbook to develop and refine ideas through visual experimentation.

**Unit Understandings:**

*Students will understand that...*

- Three dimensional figures can be represented two dimensions by using the orthographic projections
- Three Dimensional Figures can be drawn/created by referring to orthographic projections of orthographic projections of the figure.
- Geometric properties can be used to construct geometric figures.

- Geometric relationships provide a means to make sense of a variety of phenomena in nature and contemporary structures.
- Coordinate geometry can be used to represent and verify geometric/algebraic relationships.

### Unit Essential Questions:

- Given a choice of two box designs with different dimensions, which of the two is better from the manufacturer's point of view. Justify your answer.
  - Give examples of when it is better to maximize the surface area to volume ratio and when it is better to minimize the surface area to volume ratio .
- Explain what make sit better, e.g. medication container design, storage facility dimensions.
- Calculate the volume, surface area or specific dimensions of a variety of polyhedra.

### Knowledge and Skills:

*Students will know.....*

- Orthographic projection, isometric drawing, parallel planes
- Polyhedron, faces, edges, vertices, dihedral angle, cross section,
- Prism, base, height, slant height, lateral height, lateral edge, lateral face, right prism, oblique prism, altitude
- Cylinder, pyramid, cone, sphere
- Surface area, volume, density
- Surface Area To Volume Ratio
- Area of a regular polygon
- Volume of prism, cylinder, pyramid, cone, sphere
- Surface Area of a right prism, right cylinder, right pyramid and right cone
- Diagonal of a right rectangular prism
- Distance Formula in Three Dimensions
- Cavalieri's Principle

*Students will be able to ...*

- Give an informal argument for the formulas for the circumference of a circle, the area of a circle, the volume of a cylinder, pyramids, and cones.
- Defend a mathematical argument using Cavalieri's principle.
- Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
- Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
- Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
- 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).
- Make connections between two-dimensional figures such as rectangles, squares, circles, triangles and three-dimensional figures such as cylinders, spheres, pyramids and cones.
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics
- Use appropriate tools strategically
- Attention to detail
- Look for and make use of structure

## ***EVIDENCE OF LEARNING***

### Assessment:

*What evidence will be collected and deemed acceptable to show that students truly "understand"?*

- Unit tests, quizzes
- Open-ended problems that involve written responses
- Daily student work
- Student/group presentations
- Daily Homework

### Learning Activities:

*What differentiated learning experiences and instruction will enable all students to achieve the desired results?*

- Mathematical investigations
- Construct and analyze geometric figures
- Make conjectures from geometric figures and data and then prove or disprove them
- Work With Tools Of Geometry
- Use geometric properties to solve real-world problems
- Product Packaging activity
- Mathspace assignments
- Fundraising activity
- Freckle Assignments

- Create real world situations in a word problem format and solve each other's problems.
- “Building a Castle” activity

## ***RESOURCES***

### **Teacher Resources:**

- Geometry Textbook: Teacher's Edition and accompanying softcover workbook.
- Teacher developed worksheets and activities
- Teacher developed lectures and guided notes
- Geometer's Sketchpad
- Visual aids e.g. Unit blocks, deck of cards, geometric solid manipulatives, everyday solids
- Cutouts made from Honeycomb balls to identify three-dimensional objects generated by rotations of two-dimensional objects.

### **Equipment Needed:**

- Isometric Dot paper
- Graph paper
- Rulers
- Calculators
- StudentsetofGeometricSolids
- Nets Of Solids
- Poster Board
- Scissors
- Tape/Glue
- Geometer's Sketchpad
- Chromebook's