



**SUBJECT: MATHEMATICS HIGH SCHOOL**

**Cliffside Park Public Schools**

**GRADE: 10**

**BOE APPROVAL: August 2018**

# **Cliffside Park Public Schools**

## **COURSE OF STUDY UNIT PLANNING GUIDE FOR: Geometry - Unit 4**

Grade Level:  
10th

Cliffside Park School District  
Cliffside Park, NJ 07010  
[www.cliffsidepark.edu](http://www.cliffsidepark.edu)



## Course Overview:

The study of High School geometry involves the study of Euclidean geometry. Students study congruence in terms of rigid motions. Experiment with transformations of shapes in the plane. Prove geometric theorems and make geometric conjectures. Students are required to understand similarity in terms of transformations. Prove theorems involving similarity. Define trigonometric ratios and solve problems using right triangles. They then use this understanding to apply trigonometry to general triangles.

Study continues with circles and the understanding and application of theorems about circles. Students explore arc lengths and areas of sectors. The course continues with translations between geometric descriptions and questions of conic sections. Coordinates are used to prove simple geometric theorems algebraically. Volume formulas are explored and explained. Two-dimensional and three-dimensional visualizations are explored. All geometric concepts are used to model situations and real-life events.

### Overview of Units:

1. **Congruence and Constructions**
2. **Congruence, Similarity & Proof**
3. **Trigonometric Ratios & Geometric Equations**
4. **Spatial Reasoning: Polygons, Solids, Area and Volume**



Mathematics: Geometry

Unit 4 - Geometry

Unit Name: Spatial Reasoning: Polygons, Solids, Area and Volume

Primary Resource: Big Ideas Math Geometry by Ron Larson, 2015

Duration: Approximately 10 weeks

WEEK 31

Essential Question: How can you find the area of a regular polygon? How can you find the area of trapezoids, rhombi, and kites? How can you find the area of composite figures?

11.3

NJSL Standards	Concepts <i>What student will know.</i>	Skills <i>What students will be able to do.</i>	Activities	Assessments and Checks for Understanding
<b>G.MG.A.3:</b> 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)	<p><b>Lesson Vocabulary:</b></p> <p>Center of a regular polygon, apothem of a regular polygon, central angle of a regular polygon</p> <p><b>Learning Goals:</b></p> <ol style="list-style-type: none"> <li>Finding the area of a rhombus or kite</li> <li>Finding the area of trapezoids</li> </ol>	<ul style="list-style-type: none"> <li>Use and apply vocabulary terms in context.</li> <li>solve real-life problems</li> <li>Find areas of rhombuses and kites</li> <li>Find angle measures in regular polygons</li> <li>Find areas of regular polygons</li> <li>Find the area of any regular n-gon</li> </ul>	<ul style="list-style-type: none"> <li>Exploration 1 (p.609): Use dynamic geometry software to construct each regular polygon with side lengths of 4. Find the apothem and use it to find the area of the polygon. Describe the steps that you used.</li> <li>Exploration 2: Work with a partner.</li> </ul>	<p><b>Formative:</b></p> <p>Analyzing Student classwork Strategic Questioning Error Analysis Think-Pair-Share Exit Slips Do Nows Graphic Organizers Homework Quizzes</p> <p><b>Summative:</b></p> <p>Topic Tests Projects</p>



	<p>3. Finding the Area of a Regular Polygon</p> <p>4. Finding the area of shaded regions</p>	<p>by dividing into congruent triangles.</p> <ul style="list-style-type: none"> <li>• Read diagrams</li> <li>• Reason Abstractly: Know and flexibly use different properties of operations and objects.</li> </ul>	<p>Generalize the steps from Exploration 1 to develop a formula for the area of a regular polygon.</p> <ul style="list-style-type: none"> <li>• Discuss vocabulary</li> <li>• Use word problems to illustrate real life examples</li> <li>• P. 615 Error Analysis: Describe and correct the error in finding the area of regular hexagon.</li> <li>• Critical Thinking: Tell whether the statement is true or false. Explain your reasoning.</li> <li>• Reasoning: Predict which figure has the greatest area and which has the least area. Explain your reasoning. Check by finding the area of each figure.</li> </ul>	<p><b>Benchmark Assessments:</b> Every 5-6 weeks.</p> <p><b>Alternative:</b></p> <ul style="list-style-type: none"> <li>• Have students describe the solution set of a problem</li> <li>• Have students use technology to create a visual and explain the solution of a problem.</li> </ul>
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**Possible Resources:**

[Khan Academy](#), [www.ixl.com](http://www.ixl.com)



Real world problem - [Illustrative Math](#)

**WEEK 32**

**Essential Question:** How can you find the surface area of prisms, cylinders, cones, pyramids, and composite solids? 11.7

NJSL Standards	Concepts <i>What student will know.</i>	Skills <i>What students will be able to do.</i>	Activities	Assessments and Checks for Understanding
<p><b>G.GMD.A.1:</b> Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. <i>Use dissection arguments Cavalieri's principle, and informal limit arguments.</i></p> <p><b>G.MG.A.3:</b> 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).</p> <p><b>MP.1</b> Make sense of problems and persevere in solving them.</p>	<p><b>Lesson Vocabulary:</b></p> <p>Surface area, prism, cylinder, cone, pyramid, composite figure, base, height, radius, circumference,</p> <p><b>Learning Goals:</b></p> <p>1.</p>	<ul style="list-style-type: none"> <li>● Find the surface area a cone</li> <li>● Find surface areas of right cones</li> <li>● Find the surface area prisms, pyramids</li> <li>● Find the surface area composite solids.</li> </ul>	<ul style="list-style-type: none"> <li>● Exploration 1 (p.641): Construct a circle with a radius of 3 inches. Mark the circumference of the circle into six equal parts, and label the length of each part. Then cut out one sector of the circle and make a cone.             <ul style="list-style-type: none"> <li>a) Explain why the base of the cone is a circle. What are the circumference and radius of the base?</li> <li>b) What is the area of the original circle? What is the area with one sector missing?</li> <li>c) Describe the surface area of the</li> </ul> </li> </ul>	<p><b>Formative:</b></p> <p>Analyzing Student classwork Strategic Questioning Error Analysis, Thumbs up, Thumbs down Exit Slips Do Nows Graphic Organizers, to diagram the Core concepts. Homework Quiz</p> <p><b>Summative:</b></p> <p>Topic Tests Projects</p> <p><b>Benchmark Assessments:</b> Every 5-6 weeks.</p>



<p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>MP.3</b> Construct viable arguments &amp; critique the reasoning of others.</p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.5</b> Use appropriate tools strategically.</p> <p><b>MP.6</b> Attend to precision.</p> <p><b>MP.7</b> Look for and make use of structure.</p> <p><b>MP.8</b> Look for and express regularity in repeated reasoning.</p>			<p>cone, including the base. Use your description to find the surface area.</p>	
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**Possible Resources:**

Solving equations - [Khan Academy](https://www.khanacademy.org), <https://www.ixl.com/signin/cliffsidepark>

Real world problem - [Illustrative Math](https://www.illustrativemathematics.org)

**Additional Resources:**

[www.desmos.com](https://www.desmos.com)

[www.GeoGebra.com](https://www.geogebra.com)



<b>WEEK 33</b>				
<b>Essential Question(s):</b> How can you find the volume of a prism or cylinder that is not a right prism or right cylinder? How can you find the surface area of prisms, cylinders, cones, pyramids, and composite solids? 11.5				
<b>NJSLS Standards</b>	<b>Concepts</b> <i>What student will know.</i>	<b>Skills</b> <i>What students will be able to do.</i>	<b>Activities</b>	<b>Assessments and Checks for Understanding</b>
<p><b>G.GMD.A.1</b> Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. <i>Use dissection arguments, Cavalieri’s principle, and informal limit arguments.</i></p> <p><b>G.GMD.A.2</b> (+) Give an informal argument using Cavalieri’s principle for the formulas for the volume of a sphere and other solid figures.</p> <p><b>G.GMD.A.3</b> Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*</p> <p><b>G.MG.A.1</b> Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★</p> <p><b>G.MG.A.2</b> Apply concepts of density based on area and volume in modeling</p>	<p><b>Lesson Vocabulary:</b></p> <p><b>Lesson Concepts:</b></p> <ul style="list-style-type: none"> <li>Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems</li> <li>Find missing dimension of a prism or cylinder given the volume.</li> </ul>	<ul style="list-style-type: none"> <li>Use and apply vocabulary terms in context.</li> <li>Find the volumes of prisms and cylinders, solids that structurally are the same.</li> <li>Work with the density formula of a solid.</li> <li>Find the volume of a similar solid .</li> <li>Find the missing dimensions of a figure given its volume.</li> <li>Analyze relationships and explain how volume is affected by changing radius, lengths, or heights.</li> </ul>	<ul style="list-style-type: none"> <li>Exploration 1: Finding Volume of a stack of square papers that is in the form of a right prism. When you twist the stack of papers, do you change the volume? P. 625</li> <li>Exploration 2: Use the conjecture from exploration 1 to find the volume of a cylinder. P. 625</li> <li>Leaning Tower of Pisa - find the volume of main cylinder and the upper cylinder (bell tower).</li> <li>Ask whether anyone has visited the famed Louvre Museum in Paris. It is a large glass and metal pyramid, surrounded by smaller pyramids. Students will</li> </ul>	<p><b>Formative:</b></p> <p>Analyzing Student classwork Strategic Questioning Error Analysis Think-pair-share Turn and Talk: Auditory exercise Exit Slips Do Nows Mini assessment TE Quiz</p> <p><b>Summative:</b></p> <p>Topic Tests Projects</p> <p><b>Benchmark Assessments:</b> Every 5-6 weeks.</p> <p><b>Alternative:</b> illustrations, computer projects, oral response, creative presentations or demonstration, etc</p>



<p>situations (e.g., persons per square mile, BTUs per cubic foot).★</p> <p><b>G.MG.A.3</b> 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).</p> <p><b>MP.1</b> Make sense of problems and persevere in solving them.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>MP.3</b> Construct viable arguments &amp; critique the reasoning of others.</p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.5</b> Use appropriate tools strategically.</p> <p><b>MP.6</b> Attend to precision.</p> <p><b>MP.7</b> Look for and make use of structure.</p> <p><b>MP.8</b> Look for and express regularity in repeated reasoning.</p>			<p>find the volume of the glass pyramid at the end of the lesson.</p> <p><a href="https://www.youvisit.com/tour/louvremuseum">https://www.youvisit.com/tour/louvremuseum</a></p> <ul style="list-style-type: none"> <li>Use the formula from Exploration 1 to find the volume of the hexagonal pyramid.</li> </ul> <p>(Serves as a good review of Section 11.3, where students found the areas of regular polygons.)</p> <p>Students will discover that the relationship between cones and cylinders is the same as the relationship between pyramids and prisms.</p>	<p>p.633 . problems 41, 42</p> <p>Use dynamic assessment and investigations on online platform.</p>
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**Additional Resources:**



KhanAcademy.org, IXLmath.com

Real World Problems - Illustrative Math

WEEK 34 Geometric Probability

Essential Questions: How can you list the possible outcomes in the sample space of an experiment? How can you determine whether two events are independent or dependent? 12.1

NJSLS Standards	Concepts <i>What student will know.</i>	Skills <i>What students will be able to do.</i>	Activities	Assessments and Checks for Understanding
<p><b>S.CP.A.1</b> Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).</p> <p>E.g. product testing, medical testing, pulling a hockey goalie at the end of a game.</p> <p><b>MP.1</b> Make sense of problems and persevere in solving them.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>MP.3</b> Construct viable arguments &amp; critique the reasoning of others.</p> <p><b>MP.4</b> Model with</p>	<p><b>Lesson Vocabulary:</b></p> <p>Probability experiment, Sample space, outcomes, event, sample space, complement of an event, geometric probabilities, experimental probabilities, independent events, dependent events, conditional probabilities,</p> <p><b>Learning Goals:</b></p>	<ul style="list-style-type: none"> <li>• Use and apply vocabulary terms in context.</li> <li>• Find sample spaces</li> <li>• Find theoretical probabilities</li> <li>• Find experimental probabilities</li> <li>• Find Probability of Independent Events</li> <li>• Find Probability of Dependent Events</li> <li>• Find Conditional Probabilities</li> </ul>	<p>Exploration 1: In a experiment, three coins are flipped. List the possible outcomes in the sample space of the experiment.</p> <p>Exploration 2: List the possible outcomes in the sample space of the experiment.</p> <p>Exploration 3: In a experiment, a spinner is spun. How many ways can you spin a 1? 2? 3? 4? 5? List the sample space. What is the number of outcomes? P. 667</p> <p>Exploration 4: In an experiment, a bag contains 2 blue marbles and 5 red</p>	<p><b>Formative:</b></p> <p>Analyzing Student classwork Strategic Questioning Error Analysis, p. 81 Calculator activities Dynamic Investigations Student discussion Exit Slips Do Nows</p> <p><b>Summative:</b></p> <p>Dynamic Assessment Tool Topic Tests Projects</p> <p><b>Benchmark Assessments:</b></p> <p>Every 5-6 weeks.</p> <p><b>Alternative:</b></p> <p>Questioning</p>



<p>mathematics.  <b>MP.5</b> Use appropriate tools strategically.  <b>MP.6</b> Attend to precision.  <b>MP.7</b> Look for and make use of structure.  <b>MP.8</b> Look for and express regularity in repeated reasoning.</p>	<ul style="list-style-type: none"> <li>• Finding the Probability of an Event</li> <li>• Finding a Sample Space</li> <li>• Finding a Theoretical Probability</li> <li>• Using Area to Find Probability</li> <li>• Finding an experimental probability</li> <li>• Use Probability to Make Decisions</li> <li>• Use Probability to Evaluate Outcomes of Decisions</li> </ul>		<p>marbles. Two marbles are drawn from the bag. How many ways can you choose two blue? A red then blue? A blue then red? Two red?</p> <p>Communicate Your Answer: How can you list the possible outcomes in the sample space of an experiment?</p>	<p>Journal responses  illustrations, computer projects, oral response, creative presentations or demonstration, etc</p>
<p><b>Additional Resources:</b></p> <p><b>KhanAcademy.org</b>  <b>IXL</b></p>				
<p><b>WEEK 35 Geometric Probability</b>  <b>Essential Questions:</b> How can you determine whether two events are independent or dependent?  12.2</p>				



NJSL Standards	Concepts <i>What student will know.</i>	Skills <i>What students will be able to do.</i>	Activities	Assessments and Checks for Understanding
<p><b>S.CP.A.1</b> Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).</p> <p><b>S.CP.A.2</b> Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.</p> <p><b>S.CP.A.3</b> Understand the conditional probability of A given B as <math>P(A \text{ and } B)/P(B)</math>, and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.</p> <p><b>S.CP.A.5</b> Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. <i>For example, compare the chance of having lung cancer if you are a smoker</i></p>	<p><b>Lesson Vocabulary:</b></p> <p>Independent events, dependent events, conditional probability</p> <p><b>Learning Goals:</b></p> <ul style="list-style-type: none"> <li>● Finding the Probability of an Event</li> <li>● Finding a Sample Space</li> <li>● Finding a Theoretical Probability</li> <li>● Using Area to Find Probability</li> <li>● Finding an experimental probability</li> </ul>	<ul style="list-style-type: none"> <li>● Use and apply vocabulary terms in context.</li> <li>● Find sample spaces</li> <li>● Find theoretical probabilities</li> <li>● Find experimental probabilities</li> <li>● Find Probability of Independent Events</li> <li>● Find Probability of Dependent Events</li> <li>● Find Conditional Probabilities</li> </ul>	<p>Exploration 1: identify independent and dependent events p. 675.</p> <p>Exploration 2: Find experimental probabilities P. 675</p> <p>Exploration 3: Find Theoretical probability p. 675</p> <p>Core Concept:</p> <ul style="list-style-type: none"> <li>● Probability of independent Events p. 676</li> <li>● Probability of dependent events p. 677</li> <li>● Find COnditional probabilities</li> </ul>	<p><b>Formative:</b></p> <p>Analyzing Student classwork Strategic Questioning Error Analysis, p. 681 Calculator activities Dynamic Investigations Student discussion Exit Slips Do Nows</p> <p><b>Summative:</b></p> <p>Dynamic Assessment Tool Topic Tests Projects</p> <p><b>Benchmark Assessments:</b> Every 5-6 weeks.</p> <p><b>Alternative:</b> Questioning Journal responses illustrations, computer projects, oral response, creative presentations or demonstration, etc</p>



<p><i>with the chance of being a smoker if you have lung cancer.</i></p> <p><b>S.CP.B.6</b> . Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.</p> <p><b>S.CP.B.8</b> (+) Apply the general Multiplication Rule in a uniform probability model, <math>P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)</math>, and interpret the answer in terms of the model.</p> <p><b>MP.1</b> Make sense of problems and persevere in solving them.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>MP.3</b> Construct viable arguments &amp; critique the reasoning of others.</p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.5</b> Use appropriate tools strategically.</p> <p><b>MP.6</b> Attend to precision.</p> <p><b>MP.7</b> Look for and make use of structure.</p> <p><b>MP.8</b> Look for and express regularity in repeated reasoning.</p>	<ul style="list-style-type: none"> <li>• Use Probability to Make Decisions</li> <li>• Use Probability to Evaluate Outcomes of Decisions</li> </ul>			
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Additional Resources:

KhanAcademy.org  
IXL

Week 36

Essential Question: How can you construct and interpret a two-way table? 12.3

NJSL Standards	Concepts <i>What student will know.</i>	Skills <i>What students will be able to do.</i>	Activities	Assessments and Checks for Understanding
<p><b>S.CP.A.4</b> Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.</p> <p><b>S.CP.A.5</b> Recognize and explain the concepts of conditional probability and independence in everyday language and everyday</p>	<p><b>Lesson Vocabulary:</b></p> <p>Two-way Table, joint frequency, marginal frequency, joint relative frequency, marginal relative frequency</p> <p><b>Learning Goals:</b></p> <ul style="list-style-type: none"> <li>• Make two-way table</li> <li>• Find relative and conditional relative frequencies.</li> <li>• Use conditional relative frequencies to find conditional probabilities.</li> </ul>	<ul style="list-style-type: none"> <li>• Use and apply vocabulary terms in context.</li> <li>• Make a two-way table</li> <li>• Find relative and conditional relative frequencies</li> </ul>	<p>Exploration 1: Complete and use a two-way table p. 683</p> <p>Exploration 2: Find the two-way tables and probabilities</p> <p>Exploration 3: Conduct a Survey p. 683</p> <p>Core Concept: Relative and conditional relative frequencies p. 685</p> <p>Communicate Your Answers</p>	<p><b>Formative:</b></p> <p>Analyzing Student classwork Strategic Questioning Error Analysis, p. 689 Calculator activities Dynamic Investigations Student discussion Exit Slips Do Nows</p> <p><b>Summative:</b></p> <p>Dynamic Assessment Tool Topic Tests Projects</p> <p><b>Benchmark Assessments:</b></p> <p>Every 5-6 weeks.</p> <p><b>Alternative:</b></p> <p>Questioning Journal responses</p>



<p>situations. <i>For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.</i></p> <p>E.g. product testing, medical testing, pulling a hockey goalie at the end of a game.</p> <p><b>MP.1</b> Make sense of problems and persevere in solving them.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>MP.3</b> Construct viable arguments &amp; critique the reasoning of others.</p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.5</b> Use appropriate tools strategically.</p> <p><b>MP.6</b> Attend to precision.</p> <p><b>MP.7</b> Look for and make use of structure.</p> <p><b>MP.8</b> Look for and express regularity in repeated reasoning.</p>				<p>illustrations, computer projects, oral response, creative presentations or demonstration, etc</p>
<p><b>Additional Resources:</b></p> <p><b>KhanAcademy.org</b></p> <p><b>IXL</b></p>				



<b>Week 37</b> <b>Essential Question:</b> How can you find the probability of disjoint and overlapping events?12.4				
<b>NJSLS Standards</b>	<b>Concepts</b> <i>What student will know.</i>	<b>Skills</b> <i>What students will be able to do.</i>	<b>Activities</b>	<b>Assessments and Checks for Understanding</b>
<p><b>S.CP.A.1</b> Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).</p> <p><b>S.CP.B.7</b> Apply the Addition Rule, <math>P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)</math>, and interpret the answer in terms of the model.</p> <p><b>MMP.1</b> Make sense of problems and persevere in solving them.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>MP.3</b> Construct viable arguments &amp; critique the reasoning of others.</p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.5</b> Use appropriate tools strategically.</p>	<p><b>Lesson Vocabulary:</b></p> <p>Compound events, overlapping events, disjoint or mutually exclusive events</p> <p><b>Learning Goals:</b></p> <ul style="list-style-type: none"> <li>• Find probabilities of compound events</li> <li>• Use more than one probability rule to solve real-life problems</li> </ul>	<ul style="list-style-type: none"> <li>• Use and apply vocabulary terms in context.</li> <li>• Make a two-way table</li> <li>• Find relative and conditional relative frequencies</li> </ul>	<p>Exploration 1: Disjoint and overlapping events p. 693</p> <p>Exploration 2: Find the probability that two events occur p. 683</p> <p>Exploration 3: Discovering probability formulas p 693</p> <p>Core Concept: Probability of compound events p. 694</p>	<p><b>Formative:</b></p> <p>Analyzing Student classwork Strategic Questioning Error Analysis, p. 697 Calculator activities Dynamic Investigations Student discussion Exit Slips Do Nows</p> <p><b>Summative:</b></p> <p>Dynamic Assessment Tool Topic Tests Projects</p> <p><b>Benchmark Assessments:</b></p> <p>Every 5-6 weeks.</p> <p><b>Alternative:</b></p> <p>Questioning Journal responses illustrations, computer projects, oral response, creative presentations or demonstration, etc</p>



<p><b>MP.6</b> Attend to precision.</p> <p><b>MP.7</b> Look for and make use of structure.</p> <p><b>MP.8</b> Look for and express regularity in repeated reasoning.</p>				
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**Additional Resources:**

**KhanAcademy.org**  
**IXL**

**Week 38**  
**Essential Question:** How can a tree diagram help you visualize the number of ways in which two or more events can occur? How can you determine the frequency of each outcome of an event? 12.5 12. 6

<b>NJSLS Standards</b>	<b>Concepts</b> <i>What student will know.</i>	<b>Skills</b> <i>What students will be able to do.</i>	<b>Activities</b>	<b>Assessments and Checks for Understanding</b>
<p><b>A.APR.C.5</b> (+) Know and apply the Binomial Theorem for the expansion of <math>(x + y)^n</math> in powers of <math>x</math> and <math>y</math> for a positive integer <math>n</math>, where <math>x</math> and <math>y</math> are any numbers, with coefficients determined for example by Pascal's Triangle.<sup>1</sup></p> <p><small><sup>1</sup> The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.</small></p> <p><b>S.CP.B.9</b> (+) Use permutations and</p>	<p><b>Lesson Vocabulary:</b></p> <p>Permutation, <math>n</math> factorial, combination, random variable, probability distribution, binomial distribution, binomial experiment</p> <p><b>Learning Goals:</b></p>	<ul style="list-style-type: none"> <li>• Use and apply vocabulary terms in context.</li> <li>• Count permutations</li> <li>• Find probability using permutations</li> <li>• Count combinations</li> <li>• Find probability using combinations</li> <li>• Construct a probability distribution</li> </ul>	<p>Exploration 1, 2: Reading Tree diagrams p. 699</p> <p>Exploration 3: Writing a conjecture p. 699</p> <p>Exploration 3: Conduct a Survey p. 683</p> <p>Core Concept: Permutations p. 701</p> <p>Combinations p.702</p> <p>Probability Distributions p. 708</p> <p>Binomial Experiments p.</p>	<p><b>Formative:</b></p> <p>Analyzing Student classwork</p> <p>Strategic Questioning</p> <p>Error Analysis, p. 705</p> <p>Calculator activities</p> <p>Dynamic Investigations</p> <p>Student discussion</p> <p>Exit Slips</p> <p>Do Nows</p> <p><b>Summative:</b></p> <p>Dynamic Assessment Tool</p>



<p>combinations to compute probabilities of compound events and solve problems.</p> <p><b>MP.1</b> Make sense of problems and persevere in solving them.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>MP.3</b> Construct viable arguments &amp; critique the reasoning of others.</p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.5</b> Use appropriate tools strategically.</p> <p><b>MP.6</b> Attend to precision.</p> <p><b>MP.7</b> Look for and make use of structure.</p> <p><b>MP.8</b> Look for and express regularity in repeated reasoning.</p>	<ul style="list-style-type: none"> <li>● Use a formula to find the number of permutations</li> <li>● Use a formula to find the number of combinations</li> <li>● Construct and interpret probability distributions</li> <li>● Construct and interpret a binomial distribution</li> </ul>	<ul style="list-style-type: none"> <li>● Interpret a probability distribution</li> <li>● CONstruct a Binomial distribution</li> <li>● Interpret a binomial distribution</li> </ul>	<p>709</p> <p>Exploration 1: Analyzing histograms p. 707</p> <p>Communicate Your Answers</p>	<p>Topic Tests Projects</p> <p><b>Benchmark Assessments:</b> Every 5-6 weeks.</p> <p><b>Alternative:</b> Questioning Journal responses illustrations, computer projects, oral response, creative presentations or demonstration, etc</p>
<p><b>Additional Resources:</b></p> <p><b>KhanAcademy.org</b> <b>IXL</b></p>				



**Interdisciplinary Connections:**

**NJSLS-ELA**

**RST.11-12.3** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

**RST.11-12.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

**RST.11-12.9** Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

**RST.11-12.10** By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.

**W.11-12.1** Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

**W.11-12.2.D** Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

**NJSLS-S: Physics**

**HS-PS3-2** Energy Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects)

**HS-PS3-5.5** Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction

**HS-PS2-4** : Forces and Motions Use mathematical representations of Newton’s Law of Gravitation and Coulomb’s Law to describe and predict the gravitational and electrostatic forces between objects

**NGSS Practices:**

*Analyzing and Interpreting Data:* Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

*Developing and Using Models:* Develop or use a model based on evidence to illustrate the relationships between systems or between components of a system.

*Engaging in Argument from Evidence:* Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.



**NJSLS- Biology**

**HS-LS3** Heredity: Inheritance and Variation of Traits

**HS-LS3-2.** Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

**NJSLS-Technology:**

Students will use Desmos, GeoGebra or the TI-84 calculator to assist in graphing and analyzing these equations. They will discuss their findings with the instructor and their classmates. Students will participate in activities on Google Classroom and other online resources, Desmos, GeoGebra, IXL

**8.1.12.A.3** Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.

**8.1.12.A.4** Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all the worksheets to convey the results.

**Career Ready Practices:**

**CRP2.** Apply appropriate academic and technical skills.

**CRP4.** Communicate clearly and effectively and with reason

**CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.

**CRP11.** Use technology to enhance productivity

**21st Century Life and Career:**

**9.1.12.B.6** Design and utilize a simulated budget to monitor progress of financial needs.

**9.1.12.C.2** Compare and compute interest and compound interest and develop an amortization table using business tools.

**9.1.12.C.3** Compute and assess the accumulating effect of interest paid over time when using a variety of sources of credit.



Integrated Differentiation/Accommodations/Modifications for **Geometry Unit 4**  
(Alternate Modes of Instruction and Support)

Modifications to Support Gifted and Talented Students	Modifications to Support English Language Learners	Modifications to Support Our Learners (Students with IEPs/504s and At-Risk Learners)
<p>See specific modifications in each lesson.</p> <p>Integrate Higher Order Thinking Skills (HOTS) through questioning and extension projects specific to linear equations, inequalities and functions</p> <p>Provide menu of challenge activities for when the child finishes the lesson early (integrate technology when possible).</p> <p>College/Career Readiness skill enhancement - G &amp; T students can research professions related to the Algebra.</p> <p>Have the student teach the lesson - peer tutoring (research-based strategy) Accelerate pace for students who are advanced in concepts.</p> <p>Use inquiry-based, discovery learning approaches that emphasize open-ended problems with multiple solutions or multiple paths to solutions.</p> <p>Allow students to design their own ways to find the answers to complex questions.</p>	<p>See specific modifications in each lesson.</p> <p><b>Concept/Idea Map</b> - teacher models note-taking on Circumference, arc lengths, surface areas and volumes of spheres, volumes of prisms and cylinders, sample spaces, two way tables, disjoint and overlapping events, permutations and combinations, binomial distribution and probability.</p> <p><b>Contextualize language</b> See each lesson for specific vocabulary</p> <p><b>Visuals and illustrations</b> to be used for Circumference, arc lengths, surface areas and volumes of spheres, volumes of prisms and cylinders, sample spaces, two way tables, disjoint and overlapping events, permutations and combinations, binomial distribution and probability. and other concrete terms.</p> <p><b>Word/picture bank</b> available for students' reference in classroom, online and in their textbooks.</p> <p><b>Wait Time Two</b> - extend basic "Wait Time" - after the 1st student responds to a question, the teacher waits an additional 5 - 7 seconds before calling on another student to ask a question about unit 3.</p>	<p>See specific modifications in each lesson.</p> <p>Review student individual educational plan and/or 504 plan for instructional, assessment, and environmental supports.</p> <p>Allow student to use calculator to solve &lt;enter text here&gt;.</p> <p>Teach students how to check the accuracy of the solution that was derived from use of the graphing calculator.</p> <p>Utilize manipulatives and/or visuals within instructional presentation of Circumference, arc lengths, surface areas and volumes of spheres, volumes of prisms and cylinders, sample spaces, two way tables, disjoint and overlapping events, permutations and combinations, binomial distribution and probability.</p> <p>Teach students how to check the accuracy of the solution that was derived from use of the calculator or other method.</p> <p>Utilize graphic organizer or partially completed template for students to solve word problems and other complex problems in the unit.</p> <p>Provide study guides that are partially completed by teacher, allowing the student to fill in missing information during instruction in order to aid in obtaining information pertaining to modeling Circumference, arc lengths, surface areas and volumes of spheres, volumes of prisms and cylinders, sample spaces, two way tables, disjoint and</p>



	<p><b>Native Language Supports</b> (peer, online assistive technology, translation device, bilingual dictionary)</p> <p>Teach the text backward - <b>frontload</b> the concepts and vocabulary needed for learning the material and activating prior knowledge vocabulary, see specific lesson for vocabulary list.</p> <p>Use a <b>word square</b> to teach target academic vocabulary for this unit.</p>	<p>overlapping events, permutations and combinations, binomial distribution and probability.</p> <p>Utilize visual aids such as charts or graphs connected to Circumference, arc lengths, surface areas and volumes of spheres, volumes of prisms and cylinders, sample spaces, two way tables, disjoint and overlapping events, permutations and combinations, binomial distribution and probability and provide explicit instruction in how to analyze or use the data or information.</p> <p>By utilizing individual student assessment results, the teacher will provide small group or remedial instruction to review essential questions/big ideas, key concepts and provide additional explanations, more examples, and to model procedures in finding the solutions to particular problems.</p> <p>Provide wait time to allow students to process orally presented information and questions relating to the unit.</p> <p>Access to word/picture banks to develop an understanding and use content-specific vocabulary.</p> <p>Allow for Student Choice: Students should be permitted to demonstrate understanding of content through illustrations, computer projects, oral response, creative presentations or demonstration, etc.</p> <p>Support comprehension of unknown vocabulary, by providing examples of Note-taking, highlighting, underlining, etc. Students should be allowed given copies of grade level material or text so they can highlight or underline pertinent information.</p> <p>Text to speech/Oral reading if necessary</p> <p>Provide students with flexible seating options while working independently, depending on need or preference.</p>
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		<p>Math-specific vocabulary and literary terms should be pre-taught before teaching relevant concepts.</p> <p>Allow extra time to complete in class written assignments.</p> <p>Provide students with a sample problem or list of steps or procedures for multi-step solutions to problems. Allow student to reference these procedures when solving independently.</p> <p>Reduce the number of assigned problems within a unit.</p> <p>Provide models or templates to teach the structure of how to solve problems systematically.</p> <p>If necessary, provide additional set of materials or online access so that students can utilize resources at school and home.</p> <p>Provide study guide for students to review before Unit quizzes or tests.</p> <p>Review essential questions/big ideas of &lt;enter text here&gt; to provide additional explanations, more examples, and to model procedures in finding the solutions to particular problems.</p> <p>Provide wait time to allow students to process orally presented information and questions relating to the unit.</p> <p>Access to word/picture banks to develop an understanding and use content-specific vocabulary, such as those listed in each lesson.</p> <p>Modify tests to address big ideas/essential questions of the unit.</p>
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