ROCHELLE PARK SCHOOL DISTRICT

EIGHTH GRADE MATHEMATICS CURRICULUM

Rochelle Park Mission Statement

We envision an educational community, which inspires and empowers all students to become self-sufficient and to thrive in a complex, global society.

Rochelle Park Vision Statement

- Establish and maintain a shared responsibility among home, school, and the greater community which fosters student learning, accountability, and citizenship.

- To provide curricula that enables all students to meet or exceed current national, state, and local standards.

- We will utilize a variety of formative and summative assessments in order to differentiate and guide instruction.

- The district, as a Professional Learning Community, will provide on-going professional development training and opportunities for collaboration among faculty and staff.

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PACING CHART

Topic	Time Frame
Multiply and Divide Fractions	14 days
Ch. 2: Represent and Interpret Data	10 days
Ch. 3: Understand Multiplication	10 days
Ch. 4: Multiplication Facts and Strategies	13 days
Ch. 5: Use Multiplication Facts	8 days
Ch. 6: Understand Division	13 days
Ch. 7: Division Facts and Strategies	14 days
Ch. 8: Understand Fractions	14 days
Ch. 9: Compare Fractions	12 days
Ch. 10: Time, Length, Liquid, Volume, and Mass	10 days
Ch. 11: Perimeter and Area	15 days
Ch. 12: Two-Dimensional Shapes	12 days

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Mathematic Domains

Operations and Algebraic Thinking

- Represent and solve problems involving addition and subtraction.
- Understand and apply properties of operations and the relationship between addition and subtraction.
- Add and subtract within 20.
- Work with addition and subtraction equations.

Number and Operations in Base Ten

- Extend the counting sequence.
- Understand place value.
- Use place value understanding and properties of operations to add and subtract.

Measurement and Data

- Measure lengths indirectly and by iterating length units.
- Tell and write time.
- Represent and interpret data.

Geometry

- Reason with shapes and their attributes.

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

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8.1 Educational Technology
All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

8.2 Technology Education, Engineering, Design, and Computational Thinking-Programming
All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Educational Technology

Indicators: 8.1.8.A.1, 8.1.8.A.4, 8.1.8.A.5, 8.1.8.F.1

- Demonstrate knowledge of a real world problem using digital tools.
- Graph and calculate data within a spreadsheet and present a summary of the results
- Create a database query, sort and create a report and describe the process, and explain the report results.
- Explore a local issue by using digital tools to collect and analyze data to identify a solution and make an informed decision.

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21st Century Life and Careers Skills

Indicators: 9.1.8.A.1, 9.1.8.B.2, 9.1.8.B.3, 9.1.8.B.4, 9.1.8.E.4, 9.1.8.E.6

- Explain the meaning and purpose of taxes and tax deductions and why fees for various benefits are taken out of play.
- Construct a simple personal savings and spending plan based on various sources of income.
- Justify the concept of "paying yourself first" as a financial savings strategy.
- Relate the concept of deferred gratification to (investment), meeting financial goals, and building wealth.
- Prioritize personal wants and needs when making purchases.
- Compare the value of goods or services from different sellers when purchasing large quantities and small quantities.

Career Ready Practices

Indicators: CRP1, CRP2, CRP4, CRP6, CRP7, CRP8, CRP9, CRP11, CRP12

- Act as responsible and contributing citizen and employee.
- Apply appropriate academic and technical skills.
- Communicate clearly and effectively and with reason.
- Demonstrate creativity and innovation.
- Employ valid and reliable research strategies.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Use technology to enhance productivity.
- Work productively in teams while using cultural global competence.

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Grade: Eighth		**Content:** Mathematics
Domain: The Number System	**Topic:** Real Numbers	**Time Frame:** 18 days
Standards: 8.NS.A.1 8.NS.A.2 8.EE.A.1 8.EE.A.2 8.EE.A.3 8.EE.A.4	**Focus Mathematical Practices:** MP.1, MP.3, MP.4, MP.5, MP.6, MP.7, MP.8	**PARCC Model Content Framework:** Major Content: EE.A.1, EE.A.2, EE.A.3, EE.A.4 Supporting Content: NS.A.1, NS.A.2 Additional Content: n/a

Essential Questions	Enduring Understandings
• How can you determine if a number is a rational number? • How can I write repeated multiplication using powers? • How can I use the properties of integer exponents to simplify algebraic and numeric expressions? • How does the Product of Powers law apply to finding the power of a power? • How are negative exponents and positive exponents related? • How is scientific notation useful in the real world? • How does scientific notation make it easier to perform computations with very large or very small numbers? • Why would I need to use square roots and cube roots? • How can I estimate the square root of a non-perfect square? • How are real numbers different from irrational numbers?	• Convert between scientific notation and standard form. • Perform operations using scientific notation. • Understand and apply the powers of exponents and calculate square and cube roots. • Compare and order rational numbers.

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Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Write fractions as decimals and decimals as fractions. • Write and evaluate expressions involving powers and exponents. • Simplify real number expressions by multiplying and dividing monomials. • Use the laws of Exponents to find powers of monomials. • Simplify expressions involving negative exponents. • Use scientific notation to write large and small numbers. • Compute with numbers written in scientific notation. • Find square roots and cube roots. • Estimate square and cube roots. • Compare mathematical expressions.	

Assessment/Project	Resources/Materials	Vocabulary
• Do now • Exit ticket • Teacher observations • Group work • Quizzes • Chapter test	• Tenmarks • Classroom Presentation component • Worksheets • UDL • Versatiles	• Base • Cube root • Exponent • Monomial • Perfect cube • Perfect square • Power • Radical sign • Rational number

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Differentiated Instruction		Interdisciplinary Connections
RTI/ELL	**Enrichment**	
• Anchor charts/ posters • Small group instruction • Reteach book • Online tutors	• H.O.T. problems • Enrichment book • Be a peer tutor	**Literature Connection**- read the graphic novel, Measuring Up. Then students will use the internet to describe how to convert one unit to another using the metric system. **Music Connection**- students will find the digital music sales from the recent year. Next they will write the number in both standard and scientific notation. Then compare their results to CD music sales for the same year and create a display to show their findings.

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Grade: Eighth		**Content:** Mathematics
Domain: Expressions and Equations	**Topic:** Equations in One Variable	**Time Frame:** 13 days
Standards: 8.EE.C.7 8.EE.C.7a 8.EE.C.7b	**Focus Mathematical Practices:** MP.1, MP.2, MP.3, MP.4, MP.5, MP.7	**PARCC Model Content Framework:** Major Content: EE.C.7 Supporting Content: n/a Additional Content: n/a

Essential Questions	Enduring Understandings
• How is the multiplicative inverse used to solve an equation that has a rational coefficient? • How can you use the *work backward* problem-solving strategy to solve a two-step equation? • Why is it important to define a variable before writing an equation? • How is solving an equation with the variable on each side similar to solving a two-step equation? • How many possible solutions are there to a linear equation in one variable?	• Properly solve multi-step equations using the equality properties. • Use inverse operations to solve equations. • Write and solve equations that represent real-world situations.

Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Solve equations with rational coefficients. • Solve two-step equations. • Write two-step equations that represent situations. • Solve equations with variables on each side. • Solve multi-step equations.	

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<tr><th>Assessment/Project</th><th>Resources/Materials</th><th>Vocabulary</th></tr>
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• Quizzes
• Chapter test</td><td>• Tenmarks
• Classroom Presentation component
• Worksheets
• UDL
• Versatiles</td><td>• Coefficient
• Identity
• Multiplicative inverse
• Null set
• Properties
• Reciprocal
• Variable</td></tr>
<tr><th colspan="2">Differentiated Instruction</th><th rowspan="2">Interdisciplinary Connections</th></tr>
<tr><th>RTI/ELL</th><th>Enrichment</th></tr>
<tr><td>• Anchor charts/ posters
• Small group instruction
• Reteach book
• Online tutors</td><td>• H.O.T. problems
• Enrichment book
• Be a peer tutor</td><td>Literature Connection- read the graphic novel, Testing, testing, 1, 2, 3. Next students will research different texting plans then compare and contrast them.

Technology Connection- students will research the cost of taking a Web design class. Then they will write an equation for how long it will take to save enough money and explain.</td></tr>
</table>

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Grade: Eighth		**Content:** Mathematics
Domain: Expressions and Equations	**Topic:** Equations in Two Variables	**Time Frame:** 20 days
Standards: 8.EE.B.5 8.EE.B.6 8.EE.C.8, 8a, 8b, 8c 8.F.A.2 8.F.A.3 8.F.B.4 8.F.B.5	**Focus Mathematical Practices:** MP.1, MP.2, MP.3, MP.4, MP.5, MP.7	**PARCC Model Content Framework:** Major Content: EE.B.5, EE.B.6, EE.C.8, F.A.2, F.A.3, F.B.4, F.B.5 Supporting Content: n/a Additional Content: n/a

Essential Questions	Enduring Understandings
• How can you use a table to determine if there is a proportional relationship between two quantities? • In any linear relationship, explain why the slope is always the same. • What is the relationship among the unit rate, slope, and constant rate of change of a proportional linear relationship? • How does the y-intercept appear in these three representations: table, equation, and graph? • How can the x-intercept and y-intercept be used to graph a linear equation? • How does using the point-slope form of a linear equation make it easier to write the equation of a line? • How can you use a graph to solve a system of equations? • How can you solve a system of equations?	• Calculate constant rate of change/slope. • Write linear equations using point-slope form, slope/y-intercept form, from a graph, from two points, and from a table. • Solve systems of equations by graphing or algebraically.

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Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Identify proportional and non-proportional linear relationships by finding a constant rate of change. • Use tables and graphs to find the slope of a line. • Use direct variation to solve problems. • Graph linear equations using the slope and y-intercept. • Graph an equation using the x- and y-intercepts. • Write an equation of a line. • Solve systems of linear equations by graphing. • Solve systems of equations algebraically.	

Assessment/Project	Resources/Materials	Vocabulary
• Do now • Exit ticket • Teacher observations • Group work • Quizzes • Chapter test	• Tenmarks • Classroom Presentation component • Worksheets • UDL • Versatiles	• Direct variation • Rise • Run • Slope • Standard form • Substitution • X-intercept • Y-intercept

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Differentiated Instruction		Interdisciplinary Connections
RTI/ELL	**Enrichment**	
• Anchor charts/ posters • Small group instruction • Reteach book • Online tutors	• H.O.T. problems • Enrichment book • Be a peer tutor	**Literature Connection**- read the graphic novel, A Fair Deal. Next students will research the cost of ride tickets and a ride wrist band for a state fair and decide which one is a better deal. **Science Connection-** Graph and analyze how your heart rate changes through a warm up, workout, and cool down.

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Grade: Eighth		**Content:** Mathematics
Domain: Functions	**Topic:** Functions	**Time Frame:** 19 days
Standards: 8.F.A.1 8.F.A.2 8.F.A.3 8.F.B.4 8.F.B.5	**Focus Mathematical Practices:** MP.1, MP.2, MP.3, MP.4, MP.5, MP.7	**PARCC Model Content Framework:** Major Content: F.A.1, F.A.2, F.A.3, F.B.4, F.B.5 Supporting Content: n/a Additional Content: n/a

Essential Questions	Enduring Understandings
• How can you use a graph to write an equation? • How do tables and graphs represent relations? • How does the domain affect the range in a function? • How can functions be used to solve real-world situations? • What are the advantages and disadvantages to representing a function as an equation instead of a graph? • How is the initial value of a function represented in a table and in a graph? • How can you use a table or a graph to determine if a function is linear or nonlinear? • When does the graph of a quadratic function open upward or downward? • What are some advantages of displaying the relationship between two quantities using a qualitative graph?	• Understand and construct functions. • Identify domain, range, and independent/dependent variables. • Determine if a relation is a function and if it is linear or nonlinear.

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Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Translate tables and graphs into linear equations. • Represent relations using tables and graphs. • Find function values and complete function tables. • Represent linear functions using table and graphs. • Compare properties of functions represented in different ways. • Find and interpret the rate of change and initial value of a function. • Determine whether a function is linear or nonlinear. • Graph quadratic functions. • Sketch and describe qualitative graphs.	

Assessment/Project	Resources/Materials	Vocabulary
• Do now • Exit ticket • Teacher observations • Group work • Quizzes • Chapter test	• Tenmarks • Classroom Presentation component • Worksheets • UDL • Versatiles	• Continuous data • Dependent variable • Function • Independent variable • Quadratic function • Qualitative graph • Relation

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Differentiated Instruction		Interdisciplinary Connections
RTI/ELL	**Enrichment**	
• Anchor charts/ posters • Small group instruction • Reteach book • Online tutors	• H.O.T. problems • Enrichment book • Be a peer tutor	**Literature Connection**- read the graphic novel, Picture This. After reading, look up the cost of printing and shipping photos from two different printing services. Then choose which has the better deal. **Science Connection**- Students will select a vegetable and research the average temperatures in the area for growing season. Then they will sketch a qualitative graph that shows the change in temperature over the season.

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Grade: Eighth		**Content:** Mathematics
Domain: Geometry	**Topic:** Triangles and the Pythagorean Theorem	**Time Frame:** 19 days
Standards: 8.G.A.5 8.G.B.6 8.G.B.7 8.G.B.8 8.EE.A.2	**Focus Mathematical Practices:** MP.1, MP.2, MP.3, MP.4, MP.5, MP.7, MP.8	**PARCC Model Content Framework:** Major Content: G.A.5, G.B.6, G.B.6, G.B.8, EE.A.2 Supporting Content: n/a Additional Content: n/a

Essential Questions	Enduring Understandings
• How are the measures of angles related when parallel lines are cut by a transversal? • How is deductive reasoning used in algebra and geometry proofs? • How can you find the missing measure of an angle in a triangle if you know the measure of two of the interior angles? • How can I find the sum of the interior angle measures of a polygon? • What is the relationship among the legs and the hypotenuse of a right triangle? • How do you solve a right triangle? • How can you use the Pythagorean Theorem to find the distance between two points on the coordinate plane?	• Find and calculate the measures of angles cut by a transversal. • Find the interior angle sum of a polygon. • Use the Pythagorean Theorem to find the missing side.

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Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Identify relationships of angles formed by two parallel lines cut by a transversal. • Write geometric proofs. • Find missing angle measures in triangles. • Find the sum of the angle measures of a polygon and the one interior angle of a regular polygon. • Use the Pythagorean Theorem. • Solve problems using the Pythagorean Theorem. • Find the distance between two points on the coordinate plane.	

Assessment/Project	Resources/Materials	Vocabulary
• Do now • Exit ticket • Teacher observations • Group work • Quizzes • Chapter test	• Tenmarks • Classroom Presentation component • Worksheets • UDL • Versatiles	• Alternate interior angles • Corresponding angles • Deductive reasoning • Hypotenuse • Inductive reasoning • Parallel lines • Pythagorean Theorem • Regular polygon • Theorem • Transversal

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Differentiated Instruction		Interdisciplinary Connections
RTI/ELL	**Enrichment**	
• Anchor charts/ posters • Small group instruction • Reteach book • Online tutors	• H.O.T. problems • Enrichment book • Be a peer tutor	**Literature Connection**- read the graphic novel, Ramping Up. Then students will design a bicycle ramp including measurements for the lengths of the side of the ramp. **Science Connection**- Students will create the dimensions for enclosures based on the amount of area needed for various animals at the zoo where they live.

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Grade: Eighth		**Content:** Mathematics
Domain: Geometry	**Topic:** Transformations	**Time Frame:** 13 days
Standards: 8.G.A.1, 1a, 1b, 1c 8.G.A.3	**Focus Mathematical Practices:** MP.1, MP.2, MP.3, MP.4, MP.5, MP.7, MP.8	**PARCC Model Content Framework:** Major Content: G.A.1, G.A.3 Supporting Content: n/a Additional Content: n/a

Essential Questions	Enduring Understandings
• How are figures translated on the coordinate plane? • How can you determine the coordinates of a figure after a reflection over either axis? • What is the difference between rotating a figure about a given point that is a vertex and rotating the same figure about the origin if the rotation is less than 360 degrees? • How are dilations similar to scale drawings?	• Use transformations and dilations to find an image or pre-image.

Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Graph translations on the coordinate plane. • Graph reflections on the coordinate plane. • Graph rotations on the coordinate plane. • Use scale factors to graph dilations.	

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<tr><td>• Anchor charts/ posters
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• Reteach book
• Online tutors</td><td>• H.O.T. problems
• Enrichment book
• Be a peer tutor</td><td>Literature Connection- read the graphic novel, Dance Steps. Then students will research another type of dance and describe how to learn it and how easy it is to learn.

Art Connection- Use tracing paper and/or graph paper and color pencils to reflect points and lines. Create images on the coordinate plane, identify the coordinates and create a variety of transformations for the image(s).</td></tr>
</table>

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Grade: Eighth		**Content:** Mathematics
Domain: Geometry	**Topic:** Congruence and Similarity	**Time Frame:** 17 days
Standards: 8.G.A.1, 1a, 1b 8.G.A.2 8.G.A.4 8.G.B.5 8.EE.B.6	**Focus Mathematical Practices:** MP.1, MP.2, MP.3, MP.4, MP.5, MP.7	**PARCC Model Content Framework:** Major Content: G.A.1, G.A.2, G.A.4, G.A.5 Supporting Content: n/a Additional Content: n/a

Essential Questions	Enduring Understandings
• Why do translations, reflections, and rotations create congruent images? • How can the coordinate plane help you determine that corresponding sides are congruent? • What is the difference between using transformations to create similar figures versus using transformations to create congruent figures? • How does the scale factor of a dilation relate to the ratio of two of the corresponding sides of the preimage and the image? • How do similar triangles make it easier to measure very tall objects? • How is the slope of a line related to the similar slope right triangles formed by the line? • If you know two figures are similar and you are given the area of both figures, how can you determine the scale factor of the similarity?	• Determine if two figures are congruent or similar using transformations and/or dilations. • Find the new area and/or perimeter if a similar figure using scale factor.

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Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Use a series of transformations to create congruent figures. • Write congruence statements for congruent figures. • Use transformations to create similar figures. • Identify similar polygons and find missing measures of similar polygons. • Solve problems involving similar triangles. • Relate the slope of a line to similar triangles. • Find the relationship between perimeters and areas of similar figures.	

Assessment/Project	Resources/Materials	Vocabulary
• Do now • Exit ticket • Teacher observations • Group work • Quizzes • Chapter test	• Tenmarks • Classroom Presentation component • Worksheets • UDL • Versatiles	• Composition of transformations • Congruent • Corresponding parts • Indirect measurement • Similar • Similar polygons
Differentiated Instruction		**Interdisciplinary Connections**
RTI/ELL	**Enrichment**	
• Anchor charts/ posters • Small group instruction • Reteach book • Online tutors	• H.O.T. problems • Enrichment book • Be a peer tutor	**Literature Connection**- read the graphic novel, Up, Up, and Away. Students will create text and graphics for a presentation on congruency and/or similarity. Presentations must include definitions and examples needed to teach their topic. **College & Career Connection**- Students will use transformations to design a car and then describe its features.

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Grade: Eighth		**Content:** Mathematics
Domain: Geometry	**Topic:** Volume and Surface Area	**Time Frame:** 15 days
Standards: 8.G.C.9	**Focus Mathematical Practices:** MP.1, MP.2, MP.3, MP.4, MP.6, MP.7	**PARCC Model Content Framework:** Major Content: n/a Supporting Content: n/a Additional Content: G.C.9

Essential Questions	Enduring Understandings
• How is the formula for the volume of a cylinder similar to the formula for the volume of a rectangular prism? • What would have a greater effect on the volume of a cone: doubling its radius or doubling its height? • How are the volume of a sphere and the volume of a cylinder with the same radius and height of 2r related? • How is a calculation affected if you round to 3.14 or use the pi key on your calculator? • How does the volume of a three-dimensional figure differ from its surface area? • How is the volume of a prism affected when its dimensions are tripled?	• Find the volume and surface area of three-dimensional figures. • Calculate the surface area and volume of similar solids.

Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Find the volume of cylinders. • Find the volume of cones. • Find the volume of spheres. • Find the surface area of cylinders. • Find the surface area of cones. • Solve problems involving similar solids.	

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• Similar solids</td></tr>
<tr><th colspan="2">Differentiated Instruction</th><th rowspan="2">Interdisciplinary Connections</th></tr>
<tr><th>RTI/ELL</th><th>Enrichment</th></tr>
<tr><td>• Anchor charts/ posters
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• Reteach book
• Online tutors</td><td>• H.O.T. problems
• Enrichment book
• Be a peer tutor</td><td>Literature Connection- read the graphic novel, Material Mayhem. Then if Adrienne's mom made soup in a large pot and wanted to pour it into quart jars, how could she estimate how many jars she would need? Students will brainstorm this task and choose an estimation method.

Social Studies Connection- Find the area of a "region of a region" for simple composite figures and the area of cross sections of regular geometric solids.</td></tr>
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Grade: Eighth		**Content:** Mathematics
Domain: Statistics and Probability	**Topic:** Scatter Plots and Data Analysis	**Time Frame:** 18 days
Standards: 8.SP.A.1 8.SP.A.2 8.SP.A.3 8.SP.A.4	**Focus Mathematical Practices:** MP.1, MP.2, MP.3, MP.4, MP.5, MP.7	**PARCC Model Content Framework:** Major Content: n/a Supporting Content: SP.A.1, SP.A.2, SP.A.3, SP.A.4 Additional Content: n/a

Essential Questions	Enduring Understandings
• What are the inferences that can be drawn from sets of data points having a positive association and a negative association? • Why do we estimate a line of best fit for a scatter plot? • How is a two-way table used when determining possible associations between two different categories from the same sample group? • What does the length of the whiskers in a box plot say about the data? • How does the mean absolute deviation describe the variation of a set of data? • Why is the median used to describe the center of a non-symmetric distribution instead of the mean?	• Use scatter-plots to determine the type of association. • Understand the relevance of the line of best fit. • Determine the measures of center and variability using the 5-number summary.

Skills	NJDOE Model Curriculum (Student Learning Objectives)
Students will be able to: • Construct and make conjectures about scatter plots. • Draw lines of best fit and use them to make predictions about data. • Construct and interpret two-way tables. • Find the measures of center and variation. • Find and interpret the mean absolute deviation for a set of data. • Analyze data distributions.	

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<td>• Bivariate data
• Distribution
• Five-number summary
• Line of best fit
• Mean absolute deviation
• Qualitative data
• Quantitative data
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• Symmetric
• Two-way table
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<td>• H.O.T. problems
• Enrichment book
• Be a peer tutor</td>
<td>Literature Connection- read the graphic novel, Movie Mania. Then students will research the price of a movie ticket and 3D movie ticket from multiple theaters and compare the best price for each ticket.

Science Connection- Students will take their own pulse and record how many times their heart beats in a minute. Then use that information and put it into a table and graph it to draw conclusions.</td>
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</table>