Belvidere Cluster Wide
Mathematics Curriculum
8th grade
Updated Fall 2018

All Belvidere Cluster curriculum and instruction areas are aligned to the New Jersey Student Learning Standards (NJSLS) in accordance with the NJ Department of Education's curriculum implementation requirements.

Interdisciplinary Connections

- English Language Arts
- Science and Scientific Inquiry (Next Generation)
- Social Studies, including American History, World History, Geography, Government and Civics, and Economics
- Technology
- Visual and Performing Arts
- World languages

Technology Standards and Integration
Chromebooks
iXL.com
Holt/Textbook online resources
Interactive SmartBoard activities

NJSLA Technology
8.1.2.A.2
Create a document using a word processing application.
8.1.2.A.4
Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
8.1.P.B.1
Create a story about a picture taken by the student on a digital camera or mobile device.
8.1.P.C.1
Collaborate with peers by participating in interactive digital games or activities.
8.1.2.E.1
Use digital tools and online resources to explore a problem or issue.

CAREER EDUCATION (NJDOE CTE Clusters)

- Agriculture, Food & Natural Resources
- Architecture & Construction
- Arts, A/V Technology & Communications
- Business Management & Administration
- Education & Training
- Finance
- Government & Public Administration

– Health Science
– Hospitality & Tourism
– Human Services
– Information Technology
– Law, Public Safety, Corrections & Security
– Manufacturing
– Marketing
– Science, Technology, Engineering & Mathematics (STEM)
– Transportation, Distribution & Logistics

21st Century Skills/ Themes

– Financial, Economic, Business and Entrepreneurial Literacy
– Creativity and Innovation
– Critical Thinking
– Problem Solving
– Communication
– Collaboration
– Information Literacy

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence

Accommodations

Special Education

– Printed copy of board work/notes provided
– Additional time for skill mastery
– Assistive technology
– Behavior management plan
– Center-Based Instruction
– Check work frequently for understanding
– Computer or electronic device utilization
– Extended time on tests/ quizzes
– Have student repeat directions to check for understanding
– Highlighted text visual presentation
– Modified assignment format
– Modified test content
– Modified test format
– Modified test length
– Multiple test sessions
– Multi-sensory presentation
– Preferential seating
– Preview of content, concepts, and vocabulary
– Reduced/shortened written assignments

– Secure attention before giving instruction/directions
– Shortened assignments
– Student working with an assigned partner
– Teacher initiated weekly assignment sheet
– Use open book, study guides, test prototypes
– Choice of activities
– Cubing activities
– Exploration by interest
– Flexible grouping
– Goal setting with students
– Jigsaw
– Mini workshops to re-teach or extend skills Open-ended activities
– Think-Pair-Share
– Varied supplemental materials

ELL
– Allowing students to correct errors (looking for understanding)
– Teaching key aspects of a topic Eliminate nonessential information Using videos, illustrations, pictures, and drawings to explain or clarify
– allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slideshows, videos, etc.) to demonstrate student's learning
– Allowing students to correct errors (looking for understanding)
– Allowing the use of note cards or open-book during testing
– Decreasing the amount of work presented or required
– Having peers take notes or providing a copy of the teacher's notes
– Modifying tests to reflect selected objectives
– Providing study guide
– Reducing the number of answer choices on a multiple choice test
– Tutoring by peers
– Using true/false, matching, or fill in the blank tests in lieu of essay tests

At Risk
– Allowing students to correct errors (looking for understanding)
– Teaching key aspects of a topic Eliminate nonessential information allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slideshows, videos, etc.) to demonstrate student's learning
– Allowing students to select from given choices .
– Allowing the use of note cards or open-book during testing
– Collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test
– decreasing the amount of work presented or required .
– Having peers take notes or providing a copy of the teacher's notes
– Marking students' correct and acceptable work, not the mistakes
– Modifying tests to reflect selected objectives
– Providing study guides
– Reducing or omitting lengthy Outside reading assignments
– Reducing the number of answer choices on a multiple choice test
– Tutoring by peers
– Using authentic assessments with real-life problem-solving
– Using true/false, matching, or fill in the blank tests in lieu of essay tests
– using videos, illustrations, pictures, and drawings to explain or clarify

– Cubing activities
– Flexible grouping
– Goal setting with students
– Jigsaw
– Mini workshops to re-teach or extend skills Open-ended activities
– Think-Pair-Share
– Varied supplemental materials

Gifted and Talented
– Alternative formative and summative assessments
– Choice boards
– Games and tournaments
– Group investigations
– Guided Reading
– Independent research and projects Interest groups
– Learning contracts
– Leveled rubrics
– Multiple intelligence options
– Multiple texts
– Personal agendas
– Project-based learning
– Problem-based learning
– Stations/centers
– Think-Tac-Toes
– Tiered activities/assignments
– Tiered products
– Varying organizers for instructions

504
– Printed copy of board work/notes provided
– Additional time for skill mastery
– Assistive technology
– Behavior management plan
– Center-Based Instruction
– Check work frequently for understanding
– Computer or electronic device utilization
– Extended time on tests/ quizzes
– Have student repeat directions to check for understanding
– Highlighted text visual presentation
– Modified assignment format
– Modified test content
– Modified test format
– Modified test length
– Multiple test sessions
– Multi-sensory presentation
– Preferential seating
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– Reduced/shortened written assignments
– Secure attention before giving instruction/directions
– Shortened assignments
– Student working with an assigned partner
– Seacher initiated weekly assignment sheet
– Use open book, study guides, test prototypes

– Choice of activities
– Cubing activities
– Exploration by interest
– Flexible grouping
– Goal setting with students
– Jigsaw
– Mini workshops to re-teach or extend skills Open-ended activities
– Think-Pair-Share
– Varied supplemental materials

Belvidere Cluster Wide Mathematics Curriculum Grade 8 Unit Plan #1	
Title: Numbers and Operations	
Grade Level: 8	**Approximate Length of Time: 3 weeks**
Chapter Summary: This chapter starts off reviewing skills learned in 7th grade/ This unit will then allow students to evaluate squares and radicals. They will explore how to simplify and approximate square roots to help solve expressions. The chapter will also introduce different properties of exponents and solving equations using them. These skills will be necessary when solving problems involving Pythagorean Theorem or exponential notations.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ● Additional Clusters	
Domain: The Number System	
Cluster: Know that there are numbers that are not rational, and approximate them by rational numbers.	
Standard #s:	**Standards:**
8.NS.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.
8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).
Domain: Expressions and Equations	
Cluster: Expressions and Equations work with radicals and integer exponents.	
Standard #s:	**Standards:**
8.EE.1	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.
8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.
Domain: Standards for Math Practice	
Standard#:	**Standard:**

MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Chapter Essential Question:	**Chapter Enduring Understanding:**
● What is the difference between rational and irrational numbers?	● Squares and Radicals can help solve real world problems. ● Squares and Radicals affect the numbers that are being used within an operation.

Chapter Objectives:

- *Students will be able to find the squares and square roots of both rational and irrational numbers.*
- *Students will know the perfect squares. They will also be able to simplify perfect square radical expressions as well as non-perfect square radicands.*
- *Students will use the perfect squares to approximate square roots.*
- *Students will understand the properties of exponents and will use them to solve equations with perfect square and cube roots.*

Evidence of Learning

Possible Formative Assessments:

- SMART Response questions used throughout the chapter.
- Quizzes
- Homework/Classwork
- Q and A
- Labs/Projects
- IXL.com
- First in Math
- TenMarks Education

Summative Assessment:

- Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans

Topics	Approximate Timeframe
Presentation Part 1	
Topic #1: Addition, Natural Numbers & Whole Numbers	0.5 day
Topic #2: Addition, Subtraction and Integers	0.5 day
Topic #3: Multiplication and Division of Integers	0.5 day

Topic #4: Operations with Rational Numbers	0.5 day
Topic #5: Converting Repeating Decimals to Fractions	1.5 days
Topic #6: Exponents, Squares, Square Roots and Perfect Squares *Activity: A Penny for Your Thoughts*	1.5 days
Presentation Part 2	
Topic #7: Squares of Numbers Greater than 20	1 day
Topic #8: Simplifying Perfect Square Radical Expressions	1.5 days
Topic #9: Approximating Square Roots *Activity: Root Race*	1.5 days
Topic #10: Rational & Irrational Numbers	1.5 days
Topic #11: Real Numbers	0.5 day
Topic #12: Properties of Exponents *Activity: Laws of Exponents*	2 days
Review and Chapter Test	2 days
Materials and Curriculum Resources: ● http://njctl.org/courses/math/8th-grade-math/ ● http://www.kahnacademy.org ● District Approved Textbooks	
Lesson Components	
21st Century Skills ● Financial, Economic, Business, and Entrepreneurial Literacy **21st Century Themes** ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills	

Belvidere Cluster Wide
Mathematics Curriculum
Grade 8
Unit Plan

Title: 2D Geometry

Grade Level: 8 | **Approximate Length of Time:** 5 weeks

Chapter Summary: Students will be able to use models to show their understanding of congruent and similar one and two-dimensional figures.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ● Additional Clusters

Domain: Geometry

Cluster: Understand congruence and similarity using physical models, transparencies, or geometry software.

Standard #s:	**Standards:**
8.G.1	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines.
8.G.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.
8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
8.G.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.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. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*

Domain: Standards for Math Practice

Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Chapter Essential Questions:	**Chapter Enduring Understandings:**
● How can you use models of one and two-dimensional figures to show congruent figures?	● Congruent figures can be formed by a series of transformations.

● How can you use models of one and two-dimensional figures to show similar figures?	● Similar figures can be formed by a series of transformations. ● Understand angle relationships in one and two-dimensional figures.

Chapter Objectives:

- *Students will be able to transform figures on a coordinate plane.*
- *Students will be able to use their understanding of angle relationships to find unknown angles.*
- *Students will be able to describe a sequence of transformations that will result in congruent figures.*
- *Students will be able to describe a sequence of transformations and dilations that will result in similar figures.*

Evidence of Learning

Possible Formative Assessments:

- SMART Response questions used throughout the chapter.
- Quizzes
- Homework/Classwork
- Q and A
- Labs/Projects
- IXL.com
- First in Math
- TenMarks Education

Summative Assessment:

- Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans

Topics	Approximate Timeframes
Topic #1: Translations Lab: Translations	3.5 days
Topic #2: Rotations	3 days
Topic #3: Reflections	2.5 days
Topic #4: Dilations Lab: Dilations	3 days
Topic #5: Symmetry	2 days
Topic #6: Congruence & Similarity	3.5 days
Topic #7: Special Pairs of Angles	3.5 days
Topic #8: Remote Exterior Angles	2 days
Review & Chapter Test	2 days

Materials and Curriculum Resources:

- https://njctl.org/courses/math/8th-grade-math/
- https://www.engageny.org/resource/grade-8-mathematics-module-2-topic-overview
- http://www.kahnacademy.org
- District Approved Textbooks

Lesson Components
21st Century Skills ● Financial, Economic, Business, and Entrepreneurial Literacy **21st Century Themes** ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills

Belvidere Cluster Wide
Mathematics Curriculum
Grade 8
Unit Plan

Title: 3D Geometry

Grade Level: 8	**Approximate Length of Time:** 2 weeks

Chapter Summary: This chapter will allow students to learn about 3-dimensional solids and how to calculate their volume. They will also use these formulas to solve real world problems.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters

Domain: Geometry

Cluster: Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

Standard #:	**Standard:**
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Domain: Standards for Math Practice

Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Chapter Essential Question:

- What is a 3-dimensional figure?
- How can I find the volume of a 3-dimensional figure?
- How can the volume of a 3-dimensional figure help me solve real world problems?

Chapter Enduring Understanding:

- There are different formulas that can be used when solving for the volume of a 3-dimensional figure.

Chapter Objectives:

- *Students will identify what a 3-dimensional figure is.*
- *Students will use a formula to find the volume of a prism and cylinder.*
- *Students will use a formula to find the volume of pyramids, cones & spheres.*

Evidence of Learning

Possible Formative Assessments:

- SMART Response questions used throughout the chapter.
- Quizzes
- Homework/Classwork
- Q and A
- Labs/Projects
- IXL.com
- First in Math
- TenMarks Education

Summative Assessment:

- Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans	
Topics	**Approximate Timeframes**
Topic #1: 3-Dimensional Solids	3 days
Lab #1: Volume Activity Topic #2: Volume-Prisms and Cylinders	2 days
Topic #3: Volume-Pyramids, Cones & Spheres Lab: RAFT – Volume Verification	3 days
Review and Chapter Test	2 days

Materials and Curriculum Resources:

- https://njctl.org/courses/math/8th-grade-math/
- http://www.njctl.org/courses/math/8th-grade-math/3d-geometry/volume-activity/
- http://www.raftbayarea.org/ideas/Volume%20Verification.pdf
- http://kahnacademy.org
- District Approved Textbooks

Lesson Components

21st Century Skills

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

Belvidere Cluster Wide Mathematics Curriculum Grade 8 Unit Plan	
Title: Data	
Grade Level: 8	Approximate Length of Time: 3 weeks
Chapter Summary: This chapter will allow students to examine scatter plots and interpret data into a graph. They will be able to understand different patterns and lines of best fit within graphs. They will use linear models and two variable data to explain real life situations. They also will examine frequencies and bivariate data.	
Learning Targets	
PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters	
Domain: Statistics & Probability	
Cluster: Investigate patterns of association in bivariate data.	
Standard #s:	Standards:
8.SP.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association
8.SP.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
8.SP.3	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.
8.SP.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?

Domain: Standards for Math Practice	
Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Chapter Essential Questions:	Chapter Enduring Understandings:
● How can information from a problem be represented in a way to see a pattern or a frequency? ● What is a line of best fit and how can it simply a conclusion? ● Are interpretation and prediction an accurate conclusion for a problem?	● Scatter plots, line of best fit, and frequencies all help interpret data within a problem. ● Patterns can be modeled using different graphs. ● Straight lines are widely used to model relationships.

Chapter Objectives:

- Student will be able to graph scatter plots.
- Students will interpret and examine data to come to a conclusion.
- Students will know about line of best fit and two variable data relationships.
- Students will understand patterns of association in bivariate categorical data.
- Students will use frequency to solve real life problems and make predictions for future ones.

Evidence of Learning

Possible Formative Assessments:

- SMART Response questions used throughout the chapter.
- Quizzes
- Homework/Classwork
- Q and A
- Labs/Projects
- IXL.com
- First in Math
- TenMarks Education

Summative Assessment:

- Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans	
Topics	Approximate Timeframes
Topic #1: Two Variable Data Lab: RAFT – Stars on the HR Diagram	3 days
Topic #2: Line of Best Fit Lab: Illustrative Mathematics – Bird Eggs	3 days
Topic #3: Determining the Prediction Equation	4 days
Topic #4: Two Way Table	3 days
Review and Chapter Test	2 days

Materials and Curriculum Resources:

- https://njctl.org/courses/math/8th-grade-math/
- http://www.raftbayarea.org/ideas/Stars%20on%20the%20HR%20Diagram.pdf
- http://www.illustrativemathematics.org/illustrations/41

- http://www.kahnacademy.org
- District Approved Textbooks

Lesson Components
21st Century Skills ● Financial, Economic, Business, and Entrepreneurial Literacy **21st Century Themes** ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills

Belvidere Cluster Wide
Mathematics Curriculum
Grade 8
Unit Plan

Title: Equations with Roots and Radicals

Grade Level: 8	**Approximate Length of Time: 2 weeks**

Chapter Summary: This chapter will allow students to evaluate squares and radicals in equations. They will explore how to simplify and approximate square roots to help solve expressions.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ● Additional Clusters

Domain: Expressions and Equations

Cluster: Expressions and Equations work with radicals and integer exponents.

Standard #s:	**Standards:**
8.EE.2	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

Domain: Standards for Math Practice

Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Chapter Essential Questions:	**Chapter Enduring Understanding:**
● How do radicals and squares help solve real world problems? ● How are radicals and squares useful for solving equations and manipulating numbers?	● Squares and Radicals can help solve real world problems. ● Squares and Radicals affect the numbers that are being used within an operation. ● The rules for radicals can be applied to variable expressions.

Chapter Objectives:
- *Students will be able to use their understanding of square roots to simplify roots of variables.*
- *Students will evaluate square and cube roots of perfect square and cubes to solve equations.*

Evidence of Learning

Possible Formative Assessments:
- SMART Response questions used throughout the chapter.
- Quizzes
- Homework/Classwork
- Q and A
- Labs/Projects
- IXL.com
- First in Math
- TenMarks Education

Summative Assessment:

- Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans

Topics	Approximate Timeframes
Topic #1: Radical Expressions Containing Variables	1 days
Topic #2: Simplifying Non-Perfect Square Radicands	1.5 days
Topic #3: Simplifying Roots of Variables *Activity: Radical Makeover*	1.5 days
Topic #4: Solving Equations with Perfect Square & Cube Roots	1.5 days
Review and Chapter Test	2 days

Materials and Curriculum Resources:

- http://njctl.org/courses/math/8th-grade-math/
- http://www.kahnacademy.org
- District Approved Textbooks

Lesson Components

21st Century Skills

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

Belvidere Cluster Wide
Mathematics Curriculum
Grade 8
Unit Plan

Title: Functions

Grade Level: 8	Approximate Length of Time: 2.5 weeks

Unit Summary: This chapter will allow students to understand how functions operate and relates to a graph. They will compare properties of two functions and represent functions in multiple ways. They will be introduced to slope-intercept form and recognize that the graph will be a straight line.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters

Domain: Functions

Cluster: Define, evaluate, and compare functions.

Standard #s:	Standards:
8.F.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
8.F.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

Cluster: Use functions to model relationships between quantities

Standard #s:	Standards:
8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Domain: Standards for Math Practice

Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Unit Essential Question:	Unit Enduring Understanding:
• What is a function? • How are functions represented? • What can a relationship between numbers tell about a problem?	• Properties of functions and their graphs are similar but not identical. • Slope-intercept form is an easy way of graphing functions.

Unit Objectives:

- Students will understand what a function is and its corresponding graph.
- Students will compare properties of different functions and relate the information to real world situations.
- Students will graph slope-intercept form of a line.

Evidence of Learning

Possible Formative Assessments:

- SMART Response questions used throughout the chapter.
- Quizzes
- Homework/Classwork
- Q and A
- Labs/Projects
- IXL.com
- First in Math
- TenMarks Education

Summative Assessment:

- Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans

Topics	Approximate Timeframe
Topic #1: Relationships and Functions Lab – Intro to Functions (either group or individual)	2 days
Topic #2: Domain and Range	3 days
Topic #3: Vertical Line Test	3 days
Topic #4: Linear Vs. Non-Linear Functions	3 days
Review and Chapter Test	2 days

Materials and Curriculum Resources:

- https://njctl.org/courses/math/8th-grade-math/
- http://www.kahnacademy.org
- District Approved Textbooks

Lesson Components

21st Century Skills

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

Belvidere Cluster Wide
Mathematics Curriculum
Grade 8
Unit Plan

Title: Modeling Relationships

Grade Level: 8	Approximate Length of Time: 2 weeks

Unit Summary: This chapter will allow students to interpret functions. They will also construct graphs from two quantities that form a linear relationship and describe the relationship using that graph.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ○ Additional Clusters

Domain: Functions

Cluster: Define, evaluate, and compare functions.

Standard #s:	Standards:
8.F.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

Cluster: Use functions to model relationships between quantities.

8.F.4	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
8.F.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally

Domain: Standards for Math Practice

Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Unit Essential Question:	Unit Enduring Understanding:
● What is a function? ● Are properties of functions and graphs the same for all functions?	● The definition of a function and what it's graph represents. ● The ability to graph a function and write a function from a graph.

Unit Objectives:

- Students will construct a function and determine the rate of change and initial value.
- Students will describe a functional relationship by examining a graph.

Evidence of Learning

Possible Formative Assessments:

- SMART Response questions used throughout the chapter.
- Quizzes
- Homework/Classwork
- Q and A
- Labs/Projects
- IXL.com
- First in Math
- TenMarks Education

Summative Assessment:

- Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans	
Topics	Approximate Timeframes
Topic #1: Interpreting with Functions	3 days
Topic #2: Analyzing a Graph	3 days
Topic #3: Comparing Different Representations of Functions	3 days
Review and Chapter Test	2 days

Materials and Curriculum Resources:

- https://njctl.org/courses/math/8th-grade-math/
- http://www.kahnacademy.org
- District approved textbooks

Lesson Components

21st Century Skills

- Financial, Economic, Business, and Entrepreneurial Literacy

21st Century Themes

- Critical Thinking and Problem Solving
- Communication and Collaboration
- Life and Career Skills

Belvidere Cluster Wide
Mathematics Curriculum
Grade 8
Unit Plan

Title: Scientific Notation

Grade Level: 8	**Approximate Length of Time: 2 weeks**

Chapter Summary: This chapter will introduce the concept of scientific notation to students. It will demonstrate the purpose of scientific notation and how to write numbers using this form. They will be able to convert numbers between scientific notation and standard form, as well as perform different operations within equations.

Learning Targets

PARCC ■ Major Clusters; ◘ Supporting Clusters; ○ Additional Clusters

Domain: Expressions & Equations

Cluster: Expressions and equations work with radicals and integer exponents.

Standard #s:	Standards:
8.EE.3	Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
8.EE.4	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Domain: Standards for Math Practice

Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Chapter Essential Question:	Chapter Enduring Understanding:
● How will scientific notation help when writing numbers and equations? ● How is scientific notation used in real world application problems? ● How numbers are compared and manipulated using scientific notation?	● Scientific notation will help demonstrate very large and very small numbers when solving real world application problems. ● Numbers can be represented in scientific notation and still be manipulated using operations such as addition, subtraction, multiplication, and division.

Chapter Objectives:

- Students will express numbers using scientific notation.
- Students will recognize the difference between scientific notation and standard form.
- Students will distinguish the difference between different numbers written in scientific notation.
- Students will solve equations with addition, subtraction, multiplication, and division using numbers in scientific notation.
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Evidence of Learning
Possible Formative Assessments: ● SMART Response questions used throughout the chapter. ● Quizzes ● Homework/Classwork ● Q and A ● Labs/Projects ● IXL.com ● First in Math ● TenMarks Education
Summative Assessment: ● Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plan	
Topics	**Approximate Timeframes**
Topic #1: Purpose of Scientific Notation Lab: RAFT – One in a Million	1.5 days
Topic #2: How to Write Numbers in Scientific Notation	0.5 day
Topic #3: How to convert between Scientific Notation and Standard Form	1.5 days
Topic #4: Magnitude	1 day
Topic #5: Comparing Numbers in Scientific Notation	1.5 days
Topic #6: Multiply and Divide with Scientific Notation	0.5 day
Topic #7: Addition and Subtraction with Scientific Notation	1.5 days
Review and Chapter Test	2 days

Materials and Curriculum Resources:

- https://njctl.org/courses/math/8th-grade-math/
- http://www.raftbayarea.org/ideas/One%20in%20a%20Million.pdf
- http://www.kahnacademy.org
- District Approved Textbooks

Lesson Components
21st Century Skills ● Financial, Economic, Business, and Entrepreneurial Literacy **21st Century Themes** ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills

Belvidere Cluster Wide
Mathematics Curriculum
Grade 8
Unit Plan

Title: Solving Equations

Grade Level: 8	Approximate Length of Time: 4 weeks

Chapter Summary: This chapter explores linear equations. Students learn to solve equations starting with a review of inverse operations and two-step equations and progressing to more complex equations. The chapter concludes with using the skills to solve word problems and transforming formulas.

Learning Targets

PARCC ■ Major Clusters; ■ Supporting Clusters; ● Additional Clusters + Additional Standard

Domain: Expressions & Equations

Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations.

Standard #s:	Standards:
8.EE.7	Solve linear equations in one variable. a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Domain: Standards for Math Practice

Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Chapter Essential Question:	Chapter Enduring Understanding:
● How can the value of an unknown variable be found?	● How to solve an equation in one variable for that variable. · How to translate word problems into an equation.

Chapter Objectives:

- *Students will be able to solve two-step equations.*
- *Students will be able to solve multiple-step equations.*
- *Students will be able to solve equations that contain fractions.*
- *Students will be able to solve equations that contain the same variable on both sides of the equation.*
- *Students will be able to simplify and compare algebraic expressions that contain the same variable.*
- *Students will be able to and translate word problems into equations and solve them.*

Evidence of Learning
Possible Formative Assessments: ● SMART Response questions used throughout the chapter. ● Quizzes ● Homework/Classwork ● Q and A ● Labs/Projects ● IXL.com ● First in Math ● TenMarks Education
Summative Assessment: ● Chapter Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans	
Topics	Approximate Timeframe
Topic 1: Review of Two-Step Equations	1 day
Topic 2: Multi-step Equations	2 days
Topic 3: Solving Equations that Contain Fractions	2 days
Topic 4: Equations with the Same Variable on Both Sides	2 days
Topic 5: Comparing Expressions with the Same Variable	1 day
Topic 6: Writing & Solving Algebraic Equations	2 days
Topic 7: Translating and Solving Consecutive Integer Problems	2 days
Suggested Lab: RAFT – Occasions for an Equation	2 days
Topic 8: Transforming Formulas	2 days
Review and Chapter Test	2 days

Materials and Curriculum Resources:

- https://njctl.org/courses/math/8th-grade-math/
- http://www.raftbayarea.org/ideas/Occasions%20for%20an%20Equation.pdf
- http://www.kahnacademy.org
- district approved textbook

Lesson Components
21st Century Skills ● Financial, Economic, Business, and Entrepreneurial Literacy 21st Century Themes ● Critical Thinking and Problem Solving ● Communication and Collaboration ● Life and Career Skills

Belvidere Cluster Wide
Mathematics Curriculum
Grade 8
Unit Plan

Title: Systems of Equations

Grade Level: 8	**Approximate Length of Time:** 2.5 weeks

Unit Summary: The unit uses graphing, elimination, and substitution to solve systems of equations. Situations will be modeled with systems and solved.

Learning Targets

PARCC Major Clusters; Supporting Clusters; Additional Clusters + Additional Standard

Conceptual Category: Grade 8: Expressions & Equations

Cluster: Analyze and solve linear equations and pairs of simultaneous linear equations

Standard#:	**Standard:**
8.EE.8	Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6. c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair

Domain: Standards for Math Practice

Standard#:	**Standard:**
MP1	Making sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

Unit Essential Question:	**Unit Enduring Understandings:**
● How can real world situations be modeled by systems? How can solutions be found to a system?	● The point at which lines intersect is the solution to the system with those lines.

Unit Objectives:

- *Students will be able to graph systems of linear equations to find a solution.*
- *Students will be able to solve a system of equations by using substitution and elimination.*
- *Students will be able to translate real world problem into a system.*

Evidence of Learning

Possible Formative Assessments:

- SMART Response questions used throughout the unit.

- Quizzes
- Homework/Classwork
- Labs/Projects
- Q and A
- IXL.com
- firstinmath.com
- tenmarks.com

Summative Assessment:

- Unit Test

Benchmark Assessments:

Mid and end of unit teacher-created checkpoints

Textbook unit test

Possible Alternative Assessments:

- Choice boards - projects
- Skit
- Demonstration
- Journaling
- Conferencing

Suggested Lesson Plans

Topics	Approximate Timeframes
PhET Lab: Exploring Systems of Linear Equations Topic #1: Solving Systems by Graphing	3 days
Topic #2: Solving Systems by Substitution	2 days
Topic #3: Solving Systems by Elimination	2 days
Topic #4: Choosing a Strategy	1 day
Topic #5: Writing Systems to Model Situations	1 day
Topic #6: Review and Chapter Test	2 days

Materials and Curriculum Resources:

- https://njctl.org/courses/math/8th-grade-math/
- https://phet.colorado.edu/en/contributions/view/4072
- https://phet.colorado.edu/en/simulation/graphing-slope-intercept
- http://kahnacademy.org
- District Approved Textbooks

Lesson Components

21st Century Skills

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21st Century Themes

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