HARFORD COUNTY PUBLIC SCHOOLS
MIDDLE SCHOOL ALGEBRA I CURRICULUM

Unit 1: Linear Equations and Inequalities

Primary Resource: *Algebra*, UCSMP, 3rd Edition.

Enduring Understandings

- For a given set of numbers there are relationships that are always true, and these are the rules that govern arithmetic and algebra.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.

Essential Questions

- How can linear equations and inequalities be used to solve real world problems?
- How can a graph be used to represent the solution set of an inequality?

Lesson Title	Lesson Overview	Standards
Algebraic Expressions and Equations	Students will translate real-world situations into algebraic expressions and equations.	
Solving $ax + b = c$	Students will write and solve equations of the form $ax + b = c$ in mathematical and real-world contexts.	7.EE.B.4a 8.EE.C.7b
Using the Distributive Property in Solving Equations	Students will write and solve multi-step linear equations that involve the Distributive Property in mathematical and real-world contexts.	7.EE.B.4a 8.EE.C.7b
Solving $ax + b < c$	Students will write and solve inequalities of the form $ax + b < c$ in mathematical and real-world contexts.	7.EE.B.4b

Using Tables and Graphs to Solve	Students will use tables and graphs to solve equations of the form $ax + b = cx + d$ in mathematical and real-world situations.	8.EE.C.7a 8.EE.C.7b
Solving $ax + b = cx + d$	Students will write and solve equations of the form $ax + b = cx + d$ in mathematical and real-world situations algebraically.	8.EE.C.7b A.REI.A.1
Solving $ax + b < cx + d$	Students will solve inequalities of the form $ax + b < cx + d$ in mathematical and real-world situations algebraically.	A.REI.B.3
Situations That Always or Never Happen	Students will solve equations that have one solution, no solutions, and infinitely many solutions. They will investigate the different cases numerically, graphically, and algebraically. And they will also discuss situations with inequalities that have no solutions or for which every value is a solution.	8.EE.C.7a
Equivalent Formulas	Students will use inverse operations to rearrange formulas and other equations to highlight a quantity of interest.	A.CED.A.4

Unit 2: Slopes and Lines

Primary Resource: *Algebra*, UCSMP, 3rd Edition.

Enduring Understandings

- If two quantities vary proportionally, that relationship can be represented as a linear function.
- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns members of one set to a unique member of another set.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.

Essential Questions

- How can one determine rate of change for a linear equation displayed algebraically, graphically, numerically in tables, or by verbal descriptions?
- When is it appropriate to describe a rate of change as slope?
- How can one determine the equation for a line displayed algebraically, graphically, numerically in tables, or by verbal descriptions?
- How can linear equations be written given numerical or graphical information that defines the line?
- How can real-world situations be modeled by linear equations to help solve problems?

Lesson Title	Lesson Overview	Standards
Exploring Slope	Students will explore the idea of steepness of line segments. This lesson serves as a prelude to formal conversations about slope.	
Rate of Change	Students will calculate rate of change using real-world data presented graphically or in a table.	8.F.A.2 8.F.B.4
The Slope of a Line	Students will find the slope of a line through two given points in mathematical and real-world situations.	8.EE.B.5 8.F.B.4
Properties of Slope	Students will use the definition and properties of slope. They will calculate rates of change from real data and interpret real-world meanings.	8.EE.B.5 8.F.B.4

Slope-Intercept Equations for Lines	Students will write an equation for a line in slope-intercept form to represent a mathematical or real-world context. They will convert a given linear equation to slope-intercept form using algebraic properties of equality.	8.EE.B.5 8.F.A.1 8.F.A.3 8.F.B.4
Proportional and Non-Proportional Relationships	Students will explore the relationships between proportional relationships and equations of lines by analyzing various relations.	7.RP.A.2a 7.RP.A.2b 7.RP.A.2c 7.RP.A.2d
Equations for Lines with a Given Point and Slope	Students will find an equation for a line given its slope and a point on it. They will use equations to describe real situations.	8.F.A.3 8.F.B.4 A.CED.A.2
Equations for Lines Through Two Points	Students will find an equation for a line through two given points for mathematical and real-world situations.	8.F.A.3 8.F.B.4 A.CED.A.2
Standard Form of the Equation of a Line	Students will write equations for lines in standard form to represent mathematical or real-world situations. From standard form, students will identify the intercepts of the line and then graph the line. .	A.CED.A.2 A.CED.A.4
Graphing Linear Inequalities	Students will graph linear inequalities on a coordinate plane that arise from mathematical or real-world situations.	A.CED.A.3 A.REI.D.10 A.REI.D.12

Unit 3: Linear Modeling

Primary Resources: *Algebra*, UCSMP, 3rd Edition, *Algebra* Carnegie Learning (2012), and Insert Lessons resources in Canvas

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns members of one set to a unique member of another set.

Essential Questions

- How can one describe the relationship between data that is displayed algebraically, graphically, numerically in tables, or by verbal descriptions?
- How can real-world situations be modeled by linear equations to help solve problems?

Lesson Title	Lesson Overview	Standards
Is There a Pattern Here? – Recognizing Patterns and Sequences	Students will be able to describe and continue patterns and write numeric sequences to represent patterns and situations.	F.LE.A.1a F.LE.A.1b F.LE.A.1c
The Password is Operations – Arithmetic and Geometric Sequences	Students will be able to continue arithmetic and geometric sequences and determine the common difference or common ratio. .	F.LE.A.1a F.LE.A.1b F.LE.A.1c
Formulas for Arithmetic Sequences	Students will write explicit formulas for arithmetic sequences using subscript notation. Given an explicit or recursive formula written in subscript notation, they will determine unknown terms of an arithmetic sequence.	F.IF.A.3 F.BF.A.1a F.LE.A.2

Fitting a Line to Data	Students will make a scatter plot, find the line of best fit, and interpret the slope and intercept in the context of the problem.	8.SP.A.1 8.SP.A.2 8.SP.A.3 S.ID.C.7 S.ID.C.8
Interpreting Data Using a Linear Model	Students will interpret the slope and the *y*-intercept of a linear model in the context of the data.	S.ID.B.6a S.ID.B.6b S.ID.C.7 S.ID.C.8 S.ID.C.9
Interpreting Linear Models; Plotting and Analyzing Residuals	Students will calculate an equation for the line of best fit for a set of real-world data and interpret the meaning of the slope and *y*-intercept in the context of the problem. They will create a residual plot and determine whether a linear model is a good fit for the data.	S.ID.B.6 S.ID.C.7 S.ID.C.8 S.ID.C.9

Unit 4: Systems of Equations and Inequalities

Primary Resource: *Algebra*, University of Chicago School Mathematics, 3rd Edition.

Enduring Understandings

- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found.

Essential Questions

- How can real-world situations be modeled by systems of equations or inequalities to help solve problems?
- What are the advantages and disadvantages of solving a system of linear equations graphically versus algebraically?
- What does the number of solutions (one, none or infinitely many) of a system of linear equations represent in the given context?

Lesson Title	Lesson Overview	Standards
Exploration Lesson	The students will develop a process to solve linear systems of equations in order to solve real world problems.	
An Introduction to Systems	Students will find solutions to systems of equations by graphing.	8.EE.C.8a A.CED.A.2
Solving Systems using Substitution	Students will solve systems using substitution. They will use systems of linear equations to solve real-world problems.	8.EE.C.7a 8.EE.C.7b 8.EE.C.8a 8.EE.C.8b 8.EE.C.8c A.REI.C.6

More Uses of Substitution	Students will solve real-world and mathematical problems leading to two linear equations in two variables. They will solve systems in which one of the equations in the system is in slope-intercept form or can be easily put into that form, but the other is not in that form. Students will solve these systems using substitution.	8.EE.C.7a 8.EE.C.7b 8.EE.C.8a 8.EE.C.8b 8.EE.C.8c A.REI.C.6
Solving Systems by Addition	Students will write and solve systems representing mathematical or real-world situations for which either addition or subtraction of the equations leads to an equation in one variable.	8.EE.C.7a 8.EE.C.7b 8.EE.C.8a 8.EE.C.8b 8.EE.C.8c A.REI.C.6
Solving Systems by Multiplication	Students will write and solve systems representing mathematical or real-world situations for which the elimination method requires multiplying one or both equations by a constant.	8.EE.C.7a 8.EE.C.7b 8.EE.C.8a 8.EE.C.8b 8.EE.C.8c A.REI.C.6
Systems and Parallel Lines	Students will recognize systems having no solutions or infinitely many solutions through graphical and algebraic techniques.	8.EE.C.8a 8.EE.C.8b
Systems of Inequalities	Students will solve systems of linear inequalities by graphing the solution set on a coordinate plane.	A.CED.A.3 A.REI.D.12

Unit 5: Analyzing Functions

Primary Resource: *Algebra*, UCSMP, 3rd Edition, *Algebra I*, Illustrative Mathematics, and Insert Lessons resources in Canvas

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns members of one set to a unique member of the other set.
- Objects in space can be transformed in an infinite number of ways, and those transformations can be described and analyzed mathematically.

Essential Questions

- How do functions and relations differ?
- How can function notation be used to represent relationships between quantities?
- What are the effects of a translation on a function in the coordinate plane?
- How can real-world situations be modeled by functions to help solve problems?

Lesson Title	Lesson Overview	Standards
To Be or Not to Be a Function? – Defining and Recognizing Functions	Students will determine whether a relation (represented as a mapping, set of ordered pairs, table, graph, equation, or context) is a function.	8.F.A.1
The Language of Functions	Students will use the language of functions, including identifying the domain and range of a function.	F.IF.A.1 F.IF.A.2 F.IF.B.5
Function Notation	Students will apply function notation in mathematical and real-world contexts.	F.IF.A.2 F.IF.A.3

Function Notation in Context	Students will interpret statements that use function notation in terms of a context, as well as relate the domain of a function to its graph and the relationship it describes. Include a step-function in instruction.	F.IF.A.2 F.IF.B.5
Non-Linear Functions	Students will graph a variety of functions as well as interpret key features of their graphs.	F.IF.B.4 F.IF.B.5
Piecewise Linear Functions	Students will: • Interpret a graph of a piecewise function or the rules given in function notation and explain the rules (orally and in writing) in terms of a situation. • Sketch a graph that represents the rules of a piecewise function, paying special attention to the endpoints of each interval. • Understand a piecewise function as a function defined by different rules for different intervals of the domain.	F.IF.B.4 F.IF.B.5 F.IF.C.7b
Absolute Value Functions (Part I)	Students will: • Analyze and describe (orally and in writing) features of a scatter plot that relates guesses and absolute errors. • Generalize (using words or equations) the relationship between guesses and absolute errors. • Given a set of numerical guesses and a target number, calculate absolute errors and create a scatter plot of the data.	F.IF.C.7b
Absolute Value Functions (Part II)	Students will: • Analyze and describe (orally and in writing) the effects of adding a constant term to an expression defining an absolute value function. • Define absolute value function in terms of the distance of the input from 0. • Interpret an absolute value function described in words or in function notation and create a table of values and a graph to represent the function.	F.BF.B.3 F.IF.B.4 F.IF.C.7b
Translating Functions	Students will translate functions vertically and horizontally. Given a function and a translation to be performed, students will write the equation for the translated function.	F.BF.B.3

Unit 6: Exponential Functions

Primary Resources: *Algebra*, UCSMP, 3rd Edition and Insert Lesson resources in Canvas

Enduring Understandings

- Mathematical rules (relations) can be used to assign members of one set to members of another set. A special rule (function) assigns members of one set to a unique member of the other set.

Essential Questions

- What is exponential growth and how does it differ from linear growth?
- How can one describe the relationship between data that is displayed algebraically, graphically, numerically in tables, or by verbal descriptions?
- How can real-world situations be modeled by exponential functions to help solve problems?

Lesson Title	Lesson Overview	Standards
Exploration Lesson	Students will explore the difference between linear growth and exponential growth.	
Compound Interest	Students will develop and apply the Compound Interest Formula to solve real-world problems.	F.LE.A.1c F.LE.A.2
Exponential Growth	Students will graph exponential growth relationships from mathematical or real-world situations and begin to write and apply exponential equations to represent those relationships.	F.LE.A.1c F.LE.A.2 F.LE.B.5
Exponential Decay	Students will graph exponential decay relationships from mathematical or real-world situations and write and apply exponential equations to represent those relationships.	F.LE.A.1c F.LE.A.2 F.LE.B.5

Modeling Exponential Growth and Decay	Students will model data from mathematical or real-world contexts using exponential equations.	A.SSE.B.3c F.LE.A.1a F.LE.A.1b F.LE.A.1c S.ID.B.6a
Formulas for Geometric Sequences	Students will write explicit formulas for geometric sequences using subscript notation as well as function notation. Given an explicit or recursive formula, written in subscript notation or function notation, they will determine unknown terms of a geometric sequence.	F.IF.A.3 F.BF.A.1a F.LE.A.2
Comparing Linear and Exponential Functions	Students will compare linear and exponential functions while focusing on average rate of change.	F.LE.A.2 F.LE.A.3

Unit 7: Powers and Roots

Primary Resource: *Algebra*, UCSMP, 3rd Edition, and Insert Lesson resources in Canvas

Enduring Understandings

- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- Basic facts and algorithms for operations with rational numbers use notions of equivalence to transform calculations into simpler ones.

Essential Questions

- How are the properties of integer exponents used to simplify numerical and algebraic expressions?
- What is the relationship between Pythagorean Theorem and the distance formula?
- How can real-world situations be modeled by powers to help solve problems?

Lesson Title	Lesson Overview	Standards
Exponent Properties, part 1	Students will apply the Product of Powers Property and the Power of a Power Property with integer exponents to generate equivalent numerical expressions.	8.EE.A.1
Exponent Properties, part 2	Students will apply the Quotient of Powers Property with integer exponents to generate equivalent numerical expressions. They will use quotient properties to develop an understanding of negative exponents and a zero exponent.	8.EE.A.1
Exponent Properties, part 3	Students will apply the Power of a Product Property and the Power of a Quotient Property with integer exponents to generate equivalent numerical expressions.	8.EE.A.1
Products and Powers of Powers	Students will develop and apply the Product of Powers and Power of a Power properties.	A.SSE.A.1 A.SSE.A.1a A.SSE.A.1b A.SSE.A.2

Square Roots and Cube Roots	Students will evaluate square roots and cube roots.	8.EE.A.2
Pythagorean Theorem	Students will apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in both two and three dimensions.	8.EE.A.2 8.G.B.6 8.G.B.7
Properties and Operations of Irrational and Rational Numbers	Students will apply operations with rational and irrational numbers based on their properties.	8.NS.A.1 8.NS.A.2 N.RN.B.3
Distance Formula	Students will apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	8.G.B.8

Unit 8: Introduction to Quadratic Functions

Primary Resource: *Algebra,* Carnegie Learning (2012).

Enduring Understandings

- Relationships can be described, and generalizations made for mathematical situations that have numbers of objects that repeat in predictable ways.
- Objects in space can be transformed in an infinite number of ways, and those transformations can be described and analyzed mathematically.

Essential Questions

- How can one determine the equation for a quadratic function displayed algebraically, graphically, numerically in a table, or by verbal descriptions?
- What are the effects of a dilation, translation, and/or reflection on a function in the coordinate plane?
- How can real-world situations be modeled by quadratic functions to help solve problems?

Lesson Title	Lesson Overview	Standards
Exploring Quadratic Functions	Students will create quadratic equations to represent real-world situations and analyze the key features of the graphs of those equations.	A.CED.A.1 A.CED.A.2 F.IF.B.4
Comparing Linear and Quadratic Functions	Students will identify linear and quadratic functions from multiple representations.	A.CED.A.1 A.CED.A.2 A.SSE.A.1a A.SSE.A.1b F.IF.B.4 F.IF.B.6 F.LE.A.1a

Domain, Range, Zeros, and Intercepts	Students will identify the key features of a quadratic function in a real-world context.	A.CED.A.1 A.CED.A.2 A.SSE.A.1a A.SSE.A.1b F.IF.B.4 F.IF.B.5 F.IF.C.7a
Factored Form of a Quadratic Function	Students will determine the *x*-intercepts from a quadratic function written in factored form and write the equation of a quadratic function in factored form, given the *x*-intercepts of its graph.	A.CED.A.1 A.CED.A.2 A.SSE.A.1a A.SSE.B.3a F.IF.B.4 F.IF.C.7a
Investigating the Vertex of a Quadratic Function	Students will investigate the vertex and symmetry of the graph of a quadratic function in mathematical and real-world contexts.	A.CED.A.4 A.SSE.A.1a F.IF.B.4 F.IF.C.7a
Vertex Form of a Quadratic Function	Students will identify and compare the key characteristics of a quadratic function written in standard form, factored form, and vertex form.	A.SSE.A.1a F.IF.B.4 F.IF.C.7a
Transformations of Quadratic Functions	Students will perform transformations of quadratic functions graphically and write equations of quadratic functions, given multiple transformations.	F.BF.3 F.IF.C.7a

Unit 9: Polynomials and Quadratics

Primary Resource: *Algebra,* Carnegie Learning (2012).

Enduring Understandings

- Relationships can be described, and generalizations made for mathematical situations that have numbers of objects that repeat in predictable ways.
- Any number, measure, numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.

Essential Questions

- How are the properties of algebraic expressions used to simplify polynomials?
- What do the factors of a quadratic equation reveal about its properties?
- When finding the roots of a quadratic equation, how does one decide between graphing, factoring, completing the square and quadratic formula?
- How can real-world situations be modeled by quadratic functions to help solve problems?

Lesson Title	Lesson Overview	Standards
Adding and Subtracting Polynomials	Students will add and subtract polynomial expressions by combining like terms. They will graph polynomial functions and make connections between the graph of the solution and the algebraic solution.	A.APR.A.1 A.CED.A.1 A.CED.A.2 A.SSE.A.1a F.BF.A.1b
Multiplying Polynomials	Students will use the Distributive Property to multiply polynomials.	A.APR.A.1
Factoring Polynomials	Students will factor polynomial expressions using the greatest common factor (GCF) technique. They will factor quadratic trinomials into the product of linear factors as well as quadratic and higher power polynomials that require first factoring out the GCF.	A.APR.A.1 A.SSE.B.3a

Solving Quadratics by Factoring	Students will solve quadratic equations by factoring to find the zeros. They will connect the zeros of the quadratic to the *x*-intercepts of the graph of the quadratic function.	A.REI.B.4b A.SSE.B.3a
Special Products	Students will factor polynomials involving special products.	A.SSE.A.2 A.SSE.B.3a
Approximating and Rewriting Radicals	Students will evaluate square roots and simplify radicals involving square root.	A.CED.A.1 A.REI.B.4b N.RN.A.2
Completing the Square	Students will determine the roots of a quadratic equation by completing the square.	A.REI.B.4b A.SSE.B.3b F.IF.C.8a
The Quadratic Formula	Students will solve quadratic equations using the Quadratic Formula.	A.CED.A.1 A.CED.A.2 A.REI.B.4a A.REI.B.4b

Unit 10: Synthesis of Modeling with Equations and Functions

Primary Resource: *Algebra I* Module 5, Topics A and B, EngageNY

Enduring Understandings

- Students synthesize what they have learned during the year about functions to select the correct function type in a series of modeling problems.
- Skills and knowledge from the year's work will support the work including writing, rewriting, comparing, and graphing functions and interpretation of the parameters of an equation.

Essential Questions

- How can functions describe real-world situations and be used to model predictions?
- How can we use data to model situations and solve problems?

Lesson Title	Lesson Overview	Standards
Analyzing a Graph	From a graphic representation, students recognize the function type and interpret key features of the graph for functions addressed in previous modules (linear, exponential, quadratic, cubic, square root, cube root, absolute value, and other piecewise functions).	A.CED.A.2 F.IF.B.4 N.Q.A.2
Analyzing a Data Set	Students recognize linear, quadratic, and exponential functions when presented as a data set or sequence, and formulate a model based on the data.	A.CED.A.1 F.IF.B.4 F.IF.B.5 F.LE.A.1b F.LE.A.1c F.LE.A.2

Analyzing a Verbal Description	Students make sense of a contextual situation that can be modeled with linear, quadratic, and exponential functions when presented as a word problem. They analyze a verbal description and create a model using equations, graphs, or tables.	A.CED.A.2 F.BF.A.1a F.BF.A.1b F.IF.B.4 F.IF.B.5 F.LE.A.1b F.LE.A.1c F.LE.A.2 N.Q.A.2
Modeling a Context from a Graph	Students create a two-variable equation that models the graph from a context. Function types include linear, quadratic, exponential, square root, cube root, and absolute value. Students interpret the graph and function and answer questions related to the model, choosing an appropriate level of precision in reporting their results.	A.CED.A.1 A.CED.A.2 F.BF.A.1a F.BF.A.1b F.IF.B.4 F.IF.B.5 F.IF.B.6 N.Q.A.2 N.Q.A.3
Modeling from a Sequence	Students recognize when a table of values represents an arithmetic or geometric sequence. Patterns are present in tables of values. Students choose and define the parameter values for a function that represents a sequence.	A.CED.A.1 A.CED.A.2 F.BF.A.1a F.LE.A.2
Modeling a Context from Data	Students write equations to model data from tables, which can be represented with linear, quadratic, or exponential functions, including several from Lessons 4 and 5. They recognize when a set of data can be modeled with a linear, exponential, or quadratic function and create the equation that models the data. Students interpret the function in terms of the context in which it is presented, make predictions based on the model, and use an appropriate level of precision for reporting results and solutions.	A.CED.A.1 A.CED.A.2 F.BF.A.1a F.BF.A.1b F.IF.B.4 F.IF.B.5 F.IF.B.6 F.LE.A.2 N.Q.A.2 N.Q.A.3

Modeling a Context from Data	Students use linear, quadratic, and exponential functions to model data from tables, and choose the regression most appropriate to a given context. They use the correlation coefficient to determine the accuracy of a regression model and then interpret the function in context. They then make predictions based on their model and use an appropriate level of precision for reporting results and solutions.	A.CED.A.1 A.CED.A.2 F.BF.A.1a F.BF.A.1b F.LE.A.2 N.Q.A.2 N.Q.A.3
Modeling a Context from a Verbal Description	Students model functions described verbally in a given context using graphs, tables, or algebraic representations.	A.CED.A.1 A.CED.A.2 F.BF.A.1a F.BF.A.1b F.LE.A.2 N.Q.A.2 N.Q.A.3
Modeling a Context from a Verbal Description	Students interpret the function and its graph and use them to answer questions related to the model, including calculating the rate of change over an interval, and always using an appropriate level of precision when reporting results. Students use graphs to interpret the function represented by the equation in terms of the context, and answer questions about the model using the appropriate level of precision in reporting results.	A.CED.A.1 A.CED.A.2 F.BF.A.1a F.BF.A.1b F.IF.B.4 F.IF.B.5 F.IF.B.6 F.LE.A.2 N.Q.A.2 N.Q.A.3

Unit 11 Interpreting Categorical and Quantitative Data

Primary Resource: *Algebra,* Carnegie Learning (2012).

Enduring Understandings

- Some questions can be answered by collecting and analyzing data and the question to be answered determines the data that needs to be collected and how best to collect it.
- Data can be represented visually using tables, charts, and graphs. The type of data determines the best choice of visual representation.
- There are special numerical measures that describe the center and spread of numerical data sets.

Essential Questions

- What questions should I be asking to best analyze this set of data and how I can best communicate the results of these questions?
- What are the measures of central tendency and the measures of spread for this data set and how can I display them in an effective and coherent manner?
- How can real-world data be represented and summarized to help solve problems?

Lesson Title	Lesson Overview	Standards
Summarize, Represent and Interpret Data on a Single Count	Students will construct dot plots, histograms, and box-and-whisker plots to summarize and interpret data sets.	S.ID.A.1 S.ID.A.2 S.ID.A.3
Could You Participate in Our Survey? – Interpreting Frequency Distributions	Students will be introduced to categorical data and will explore frequency distributions of data sets. Questions ask students to organize data from a table into a two-way frequency table. Students learn and interpret the meanings of frequency distribution and joint frequency. Students then represent data as a bar graph or a double bar graph.	S.ID.B.5

It's so Hot Outside! – Relative Frequency Distributions	Students will extend their understanding of two-way frequency tables to include relative frequency marginal distributions.	S.ID.B.5
She Blinded Me with Science – Relative Frequency Conditional Distribution	Students will complete relative frequency conditional distributions for given two-way tables and use a relative frequency conditional distribution to answer questions.	S.ID.B.5
Oh! Switch the Station! – Drawing Conclusions from Data	Students will organize data from a data table, represent the data graphically, draw conclusions, and make decisions based upon the data.	S.ID.B.5

Unit 12: Volume

Primary Resource: Grade 7 Module 6 (Topics C and E) and Grade 8 Module 5 (Topic B), EngageNY.

Enduring Understandings

- Two- and three-dimensional objects with or without curved surfaces can be described, classified, and analyzed by their attributes. Some attributes of objects are measurable and can be quantified using unit amounts.

Essential Questions

- How can the volume of three-dimensional objects be used to solve real world problems?

Lesson Title	Lesson Overview	Standards
Slicing a Right Rectangular Prism with a Plane	Students describe rectangular regions that result from slicing a right rectangular prism by a plane perpendicular to one of the faces.	7.G.A.3
Slicing a Right Rectangular Pyramid with a Plane	Students describe polygonal regions that result from slicing a right rectangular pyramid by a plane perpendicular to the base and by another plane parallel to the base.	7.G.A.3
Slicing on an Angle	Students describe polygonal regions that result from slicing a right rectangular prism or pyramid by a plane that is not necessarily parallel or perpendicular to the base.	7.G.A.3
Understanding Three-Dimensional Figures	Students describe three-dimensional figures built from cubes by looking at horizontal slicing planes.	7.G.A.3
Volume of Right Prisms	Students use the formula $V = Bh$ to determine the volume of a right prism. Students identify the base and compute the area of the base by decomposing it into pieces.	7.G.B.6
Volume of Composite Three-Dimensional Objects	Students compute volumes of three-dimensional objects composed of right prisms by using the fact that volume is additive.	7.G.B.6

Real-World Volume Problems	Students use the volume formula for a right prism ($V = Bh$) to solve volume problems involving rate of flow.	7.G.B.6
Examples of Functions from Geometry	Students write rules to express functions related to Geometry. Students review what they know about volume with respect to rectangular prisms and further develop their conceptual understanding of volume by comparing liquid contained within a solid to the volume of a standard rectangular prism (i.e., a prism with base area equal to one).	7.G.B.6
Volumes of Familiar Solids – Cones and Cylinders	Students know the volume formulas for cones and cylinders. Students apply the formulas for volume to real-world and mathematical problems.	8.G.C.9
Volumes of Spheres	Students know the volume formula for a sphere as it relates to a right circular cylinder with the same diameter and height. Students apply the formula for the volume of a sphere to real-world and mathematical problems.	8.G.C.9