HARFORD COUNTY PUBLIC SCHOOLS
INTEGRATED MATH 7 CURRICULUM

CLICK HERE for the Maryland College and Career Ready Standards for Grade 7 Mathematics.

CLICK HERE for the Maryland College and Career Ready Standards for Grade 8 Mathematics.

Unit 1: Number Systems and Integer Operations

Primary Resource: *enVisionmath2.0 Grade 7*, Savvas 2017 and HCPS Insert Lessons provided in Canvas.

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.

Essential Questions

- How do you use absolute value to add and subtract integers?
- How is adding and subtracting integers related to adding and subtracting rational numbers?
- How do the signs of the factors affect the product?
- How does dividing integers relate to multiplying integers?
- How is multiplying or dividing rational numbers like multiplying or dividing integers?
- How can real-world situations be modeled with rational numbers to help solve problems?

Lesson Title	Lesson Overview	Standards
Sets of Numbers	Students will develop an understanding of the different sets of real numbers.	8.NS.A.1
Review of Adding, Subtracting, Multiplying, Dividing Fractions	Before introducing negative numbers, students can benefit from a review on adding, subtracting, multiplying, and dividing fractions.	7.NS.A.1
Adding and Subtracting Integers	Students will add and subtract integers in mathematical and real-world situations.	7.NS.A.1a 7.NS.A.1b 7.NS.A.1c 7.NS.A.1d

Adding and Subtracting Rational Numbers	Students will add and subtract rational numbers in mathematical and real-world situations. They will use number lines to model addition and subtraction as a movement or distance between rational numbers.	7.NS.A.1b 7.NS.A.1c 7.NS.A.1d
Adding and Subtracting Integers and Rational Numbers	Students will practice adding and subtracting integers and rational numbers.	7.NS.A.1a 7.NS.A.1b 7.NS.A.1c 7.NS.A.1d
Multiplying and Dividing Integers	Students will multiply and divide integers in mathematical and real-world situations.	7.NS.A.2a 7.NS.A.2b 7.NS.A.2c 7.NS.A.2d
Multiplying and Dividing Rational Numbers	Students will multiply and divide rational numbers in mathematical and real-world situations.	7.NS.A.2a 7.NS.A.2b 7.NS.A.2c 7.NS.A.2d
Multiplying and Dividing Integers and Rational Numbers	Students will practice multiplying and dividing integers and rational numbers.	7.NS.A.2a 7.NS.A.2b 7.NS.A.2c 7.NS.A.2d

Unit 2: Equations and Inequalities

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

Enduring Understandings

- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, graphical representations, 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
The Distributive Property and Removing Parentheses	Students will use the Distributive Property of Multiplication over Addition and Subtraction to simplify expressions.	7.EE.A.1
The Distributive Property and Adding Like Terms	Students will use the Distributive Property to expand and combine like terms in mathematical and real-world situations. The focus of this lesson is to provide students with opportunities to apply operations as strategies to add, subtract, and expand linear expressions with rational coefficients (7.EE.A.1) as preparation for solving linear equations that require simplification.	7.EE.A.1
Opposites	Students will use the equivalence between multiplying by –1 and taking the opposite of a number to simplify algebraic expressions.	7.EE.A.1
Solving Equations by Creating Equivalent Equations	Students will explore solving equations of the form $ax + b = c$ through algebra tiles and a balance illustration.	7.EE.B.4a
Solving $ax + b = c$	Students will solve equations of the form $ax + b = c$ in mathematical and real-world contexts. Algebraic representation of equations must involve rational numbers as well as integers.	7.EE.B.4a 8.EE.C.7b

Using the Distributive Property in Solving Equations	Students will use the Distributive Property to solve multi-step linear equations in mathematical and real-world contexts.	7.EE.B.4a 8.EE.C.7b
Inequalities and Multiplication	Students will review the vocabulary and basic properties of inequalities and apply them to the solution of inequalities of the form $ax < b$.	7.EE.B.4b
Solving $ax + b < c$	Students will solve inequalities of the form $ax + b < c$ in mathematical and real-world contexts. Require students to graph the solution on a number line.	7.EE.B.4b 8.EE.C.7b

Unit 3: Ratios and Proportional Relationships

Primary Resource: HCPS Insert Lessons provided in Canvas.

Enduring Understandings

- Understand a proportional relationship when graphed is a straight line through the origin.
- Realize that a specific point (x, y) on a linearly proportional graph represents a rate.
- Understand that the point (1, r) on a linearly proportional graph represents the unit rate.
- Recognize that relationships may be represented using tables, graphs, equations, and verbal descriptions.
- Scale Factor influences similarity between figures in that if their corresponding sides are not proportional, they cannot be similar.

Essential Questions

- What is a ratio, unit rate, and constant of proportionality?
- How can you determine a proportional relationship, or non-proportional relationship?
- How can rate of change be found in various representations of linear data?
- How can scale factor be used to interpret real-world dimensions?
- How can real-world situations be modeled by proportions to help solve problems?

Lesson Title	Lesson Overview	Standards
Unit Rates and Ratio Problems	Students will use ratios and unit rates to solve multi-step problems. They will use equivalent ratios (not cross-products) to make comparisons.	7.RP.A.1 7.RP.A.3
Unit Rates with Ratios of Fractions	Students will calculate unit rates with ratios that contain fractions. They will use tape diagrams, tables, and equivalent ratios.	7.RP.A.1 7.RP.A.3
Equivalent Ratios and Proportional Relationships	Students will use equivalent ratios to determine whether quantities are proportional. Proportions will be solved using inverse operations or equivalent ratios, not cross-products, so that conceptual understanding can be developed.	7.RP.A.2a
Constant of Proportionality	Students will calculate the constant of proportionality and use it to write equations for proportional relationships. They will use equations to solve problems involving proportional relationships.	7.RP.A.2b 7.RP.A.2c

Graph Proportional Relationships	Students will recognize the graph of a proportional relationship as a straight line that passes through the origin. From the graph of a proportional relationship, students will identify the constant of proportionality and interpret the meaning of any given point on that graph.	7.RP.A.2a 7.RP.A.2b 7.RP.A.2d
Applying Proportional Reasoning	Students will recognize and explain whether a situation represents a proportional relationship. They will choose and apply an appropriate problem-solving strategy based on their knowledge of additive and multiplicative relationships.	7.RP.A.2 7.RP.A.3
Scale Drawings	Students will solve multi-step problems about scale drawings using ratios and proportional reasoning. They will use double number lines and proportions. Proportions should be solved using inverse operations, not cross-products.	7.G.A.1

Unit 4: Solving Problems Involving Percent

Primary Resource: Insert Lessons provided in Canvas.

Enduring Understandings

- Extend the topic of ratios and proportions from grade 6 to learning that a percent is a specific type of ratio or proportion that represents a part out of the whole, where the whole is measured in hundredths.

Essential Questions

- How can percents show proportional relationships between quantities and be used to solve problems?
- How can real-world situations be modeled by percentages to help solve problems?

Lesson Title	Lesson Overview	Standards
Analyzing Percent of a Number	Students will use tape diagrams and equivalent ratios to determine the percent of a number. For this lesson, students will be given the percent and the whole and will need to find the part.	7.RP.A.3
More Work with Percents	Students will use percent proportions to solve percent problems. Students may continue to use tape diagrams to model the problems but should transition to solving proportions using inverse operations.	7.RP.A.3
Using the Percent Equation	Students will use the percent equation to solve problems. Students should derive the formula using the proportions they focused on during lessons A and B.	7.RP.A.3
Solve Percent Change and Percent Error Problems	Students will solve problems that involve percent increase and decrease. They will calculate percent error for real-world situations.	7.RP.A.3
Price Changes	Students will use their knowledge of percents to determine percent markups and markdowns.	7.RP.A.3
Simple Interest	Students will solve problems involving simple interest. They will calculate simple interest earned or owed over a given period of time.	7.RP.A.3

Unit 5: Rate of Change and Slope

Primary Resource: *Algebra*, University of Chicago School Mathematics Project, 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.

Essential Questions

- How do functions and relations differ?
- How can one determine rate of change for a linear function displayed algebraically, graphically, numerically in tables, or by verbal descriptions?
- When is it appropriate to describe a rate of change as slope?
- How can real-world situations be modeled by linear functions to help solve problems?

Lesson Title	Lesson Overview	Standards
Graph Stories	Students will describe qualitatively a functional relationship between two quantities by analyzing and/or creating graphs, verbal situations, and tables.	8.F.A.1 8.F.A.2
Graphing on a Coordinate Plane Review	Students will be able to plot coordinates on the coordinate plane.	6.NS.C.8
Functions	Students will interpret tables, maps and graphs to differentiate between functions and non-functions. Students will also determine appropriate domains and ranges.	8.F.A.2 8.F.B.4
Understanding Slope through Proportional Relationships	Students will compare proportional relationships to develop a conceptual understanding of slope and solve a real-world problem.	8.EE.B.5

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 their real-world meanings.	8.EE.B.5 8.F.B.4
Equations of Lines using Multiple Representations	Students will determine the *y*-intercept of the graph of a linear function from a context, a table, a graph, and an equation.	8.F.B.4

Unit 6: Slopes and Lines

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

Enduring Understandings

- If two quantities vary proportionally, that relationship can be represented as a linear function.
- 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 the equation for a linear function 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 functions to help solve problems?

Lesson Title	Lesson Overview	Standards
Modeling Linear Relationships	Students will compare linear functions given different representations.	
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
Equations for Lines 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
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

Mixed Practice Writing & Graphing Equations	Students will find an equation for a line given slope, table, one or two points. Students will also be able to graph a line from slope-intercept form.	8.F.A.3 8.F.B.4
Fitting a Line to Data	Students will construct and interpret scatter plots for bivariate data and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. Students will also informally assess the model fit by judging the closeness of the data points to the line.	8.SP.A.1 8.SP.A.2 8.SP.A.3
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 graph the line. They will move fluently between slope-intercept form and standard form by applying algebraic properties of equality.	8.F.A.3 8.F.B.4

Unit 7: More Linear Equations and Inequalities

Primary Resource: *Algebra*, University of Chicago School Mathematics Project, 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, graphical representations, 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
Using Tables and Graphs to Solve	Students will use tables and graphs to solve real-world problems involving linear situations.	8.EE.C.7
Solving $ax + b = cx + d$	Students will solve and check equations of the form $ax + b = cx + d$. They will apply and recognize Addition and Multiplication Properties of Equality when solving linear equations. They will solve real-world problems using equations of this form.	8.EE.C.7b
Solving $ax + b < cx + d$	Students will solve and check $ax + b < cx + d$. They will apply and recognize Addition and Multiplication Properties of Inequality when solving linear inequalities. They will solve real-world problems using inequalities of this form.	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.	8.EE.C.7a

Unit 8: Linear Systems

Primary Resource: *Algebra*, University of Chicago School Mathematics Project, 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 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
Making and Selling Markers	Students will analyze cost and income equations, graph the cost and income equations on the same grid, and find the break-even point graphically.	
Introduction to Systems	Students will find solutions to systems of equations by graphing.	8.EE.C.8a 8.EE.C.8b 8.EE.C.8c
Making and Selling T-Shirts	Students will analyze cost and income equations. Graph the cost and income equations on the same grid. Find the break-even point graphically.	
Solving Systems Using Substitution	Students will solve systems using substitution. They will use systems of linear equations to solve real-world problems. Students may need extra practice with solving systems using substitution.	8.EE.C.8a 8.EE.C.8b 8.EE.C.8c

Making Trail Mix	Given a scenario about making trail mix, students will construct a system of linear equations consisting of one equation in standard form and one in slope-intercept form. Students will use substitution to solve systems of linear equations.	8.EE.C.8a 8.EE.C.8b 8.EE.C.8c
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.8a 8.EE.C.8b 8.EE.C.8c
Solutions to Systems	Students will recognize systems having no solutions or infinitely many solutions through graphical and algebraic techniques.	8.EE.C.8a 8.EE.C.8b 8.EE.C.8c

Unit 9: Statistics and Probability

Primary Resources: *Algebra*, UCSMP, 3rd Edition and *Transition Mathematics*, UCSMP.

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

- How reliable is a statistic?
- How can real-world data be represented and summarized to help solve problems?

Lesson Title	Lesson Overview	Standards
Box Plots	Students will be able to create and interpret data displayed through a box-and-whisker plot.	
Data and Spread	Students will compare two populations and make inferences for them based on their measures of center and variability.	7.SP.B.3 7.SP.B.4
Probability	Students will recognize the relationship between the probability of an event and the relative frequency of the event in repeated experiments. Students have prior experience with probability.	7.SP.C.5
Addition and Probability	Students will calculate the probability of the event (*A* or *B*) when *A* and *B* are mutually exclusive, or when the overlap of *A* and *B* is known and calculate the probability of the complement of *A* from the probability of *A*.	7.SP.C.5 7.SP.C.8a 7.SP.C.8b 7.SP.C.8c

Multiplying Probabilities	Students will find the probability that a set of independent events occurs by multiplying the probabilities of the individual events.	7.SP.C.5 7.SP.C.8a 7.SP.C.8b 7.SP.C.8c
Probability Models	Students will develop a probability model, compare probabilities, and find probabilities of compound events.	7.SP.C.6 7.SP.C.7a 7.SP.C.7b 7.SP.C.8a 7.SP.C.8b 7.SP.C.8c
Associations of Bivariate Categorical Data	Students will use a frequency table that summarizes categorical data to analyze and interpret data.	8.SP.A.4

Unit 10: Geometry

Primary Resource: *Transitions Mathematics*, University of Chicago School Mathematics Project.

Enduring Understandings

- Two-and three-dimensional objects with or without curved surfaces can be described, classified, and analyzed by their attributes.
- Objects in space can be oriented in an infinite number of ways, and an object's location in space can be described quantitatively.

Essential Questions

- How do 2-D and 3-D shapes compare?
- How do Geometry and Algebra relate?
- How can real-world situations be modeled by geometric figures to help solve problems?

Lesson Title	Lesson Overview	Standards
Area and Perimeter	Students will identify the relationship between area and perimeter of rectangles.	
Circles	Students will find the area and circumference of a circle in mathematical and real-world situations.	7.G.B.4
Draw Triangles with Given Conditions	Students will draw triangles when given information about their side lengths and angle measures.	7.G.A.2
Plane-Sections of 3-D Figures	Students will describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	7.G.A.3
The Surface Area and Volume of a Box	Students will solve real-world and mathematical problems involving volume and surface area of a cube.	7.G.B.6
Surface Area of Prisms and Volume of Prisms	Students will solve real-world and mathematical problems involving surface area and volume of prisms.	7.G.B.6 8.G.C.9
Spheres **Volume of Cones**	Students will solve real-world and mathematical problems involving volume of spheres and cones.	8.G.C.9

Angles and Lines **Angles and Parallel Lines**	Students will learn about angles created by intersecting lines as well as angles created by parallel lines cut by a transversal. They will use properties of lines and angles to determine angle measures in mathematical and real-world situations.	7.G.B.5 8.G.A.5

Unit 11: Rigid Motion Transformations

Primary Resource: *Course 3*, Carnegie Learning, 2011.

Enduring Understandings

- Any numerical expression, algebraic expression, or equation can be represented in an infinite number of ways that have the same value.
- Mathematical situations and structures can be translated and represented abstractly using variables, expressions, and equations.
- Objects in space can be oriented in an infinite number of ways, and an object's location in space can be described quantitatively.

Essential Questions

- What mathematical models can be created to represent linear relationships?
- How can operations and properties be applied to simplify numeric and algebraic expressions?
- How does transforming a shape alter its characteristics?
- How can real-world situations be modeled by geometric figures to help solve problems?

Lesson Title	Lesson Overview	Standards
Translations Using Geometric Figures	Students will translate geometric figures horizontally and vertically and understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of translations.	8.G.A.1a 8.G.A.2 8.G.A.3
Translations of Linear Functions	Students will translate figures horizontally and vertically and use multiple representations such as tables, graphs, and equations to represent linear functions and the translations of linear functions.	8.G.A.1a
Rotations of Geometric Figures on the Coordinate Plane	Students will rotate geometric figures on the coordinate plane.	8.G.A.1a 8.G.A.1b 8.G.A.2 8.G.A.3

Reflections of Geometric Figures on the Coordinate Plane	Students will reflect geometric figures over the axes on the coordinate plane and over other horizontal and vertical lines on the coordinate plane.	8.G.A.1a 8.G.A.1b 8.G.A.2 8.G.A.3
Translations, Rotations and Reflections of Triangles	Students will translate, rotate, and reflect triangles in a coordinate plane. This lesson explores translations, rotations, and reflections of triangles using coordinates.	8.G.A.3

Unit 12: Powers and Roots

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

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?
- How is scientific notation used to describe very large or very small quantities and the relationship between quantities?
- How can real-world situations be modeled with the Pythagorean Theorem to help solve problems?
- How can real-world situations be modeled by powers and roots to help solve problems?

Lesson Title	Lesson Overview	Standards
Properties of Exponents	Students will explore the properties of integer exponents to generate equivalent numerical expressions.	8.EE.A.1 8.EE.A.2 8.EE.A.3 8.EE.A.4
Products and Powers of Powers	Students will develop and apply the Product of Powers and Power of a Power properties.	8.EE.A.1 A-SSE.A.1a A-SSE.A.1b A-SSE.A.2
Quotient of Powers	Students will develop and apply the Quotient of Powers property.	8.EE.A.1 A-SSE.A.1a A-SSE.A.1b A-SSE.A.2

Negative Exponents	Students will develop the meaning of powers with negative exponents by extending the properties of powers previously presented.	8.EE.A.1 A-SSE.A.1a A-SSE.A.1b A-SSE.A.2
Powers of Products and Quotients	Students will develop and apply the Power of a Product and Power of a Quotient properties.	8.EE.A.1 A-SSE.A.1a A-SSE.A.1b A-SSE.A.2
Introduction to Scientific Notation	Students will express numbers in the form of a single digit times an integer power of 10 to estimate very large or very small quantities.	8.EE.A.3 8.EE.A.4
Products and Quotients in Scientific Notation	Students will perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.	8.EE.A.3 8.EE.A.4
Square Roots and Cube Roots	Students will evaluate square roots and cube roots. Students will define irrational numbers. They will evaluate small perfect cube roots or small perfect cubes. Students will discuss primary and positive roots as having the same meaning; these terms will be used in later units. They will address positive and negative square root possibilities.	8.EE.A.2 8.NS.A.1
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
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