

Verona Public School District Curriculum Overview

7th Grade Math

**Curriculum Committee Members:**

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Verona Public Schools Mission Statement:

The mission of the Verona Public Schools, the center of an engaged and supportive community, is to empower students to achieve their potential as active learners and productive citizens through rigorous curricula and meaningful, enriching experiences.

Course Description:

At the 7th grade level, students generally extend understanding of previous concepts in the 6th grade rather than learn new concepts. They use their understanding of ratio to work with equivalent ratios and analyze proportional relationships to solve real world problems. Students take their initial work with solving simple expressions to generate and compare equivalent expressions and solve real world problems using numeric and algebraic expressions. They expand their understanding of fractions to include all rational numbers and continue using all four operations with fractions.

Prerequisite(s):

6th Grade Math

Standard 8: Technology Standards

8.1: Educational Technology: <i>All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</i>	8.2: Technology Education, Engineering, Design, and Computational Thinking - Programming: <i>All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.</i>
A. Technology Operations and Concepts B. Creativity and Innovation X C. Communication and Collaboration D. Digital Citizenship E. Research and Information Fluency X F. Critical thinking, problem solving, and decision making	A. The Nature of Technology: Creativity and Innovation B. Technology and Society C. Design D. Abilities for a Technological World X E. Computational Thinking: Programming

SEL Competencies and Career Ready Practices

Social and Emotional Learning Core Competencies: <i>These competencies are identified as five interrelated sets of cognitive, affective, and behavioral capabilities</i>	Career Ready Practices: <i>These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.</i>
Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.	X CRP2. Apply appropriate academic and technical skills. CRP9. Model integrity, ethical leadership, and effective management. CRP10. Plan education and career paths aligned to personal goals.
Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.	CRP3. Attend to personal health and financial well-being. CRP6. Demonstrate creativity and innovation. X CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.
Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.	X CRP1. Act as a responsible and contributing citizen and employee. CRP9. Model integrity, ethical leadership, and effective management.
Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.	X CRP4. Communicate clearly and effectively and with reason. CRP9. Model integrity, ethical leadership, and effective management. CRP12. Work productively in teams while using cultural global competence.
Responsible decision making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.	CRP5. Consider the environmental, social, and economic impact of decisions. CRP7. Employ valid and reliable research strategies. X CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership, and effective management.

Standard 9: 21st Century Life and Careers

9.1: Personal Financial Literacy: <i>This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.</i>	9.2: Career Awareness, Exploration & Preparation: <i>This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.</i>	9.3: Career and Technical Education: <i>This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.</i>
X A. Income and Careers B. Money Management C. Credit and Debt Management D. Planning, Saving, and Investing X E. Becoming a Critical Consumer F. Civic Financial Responsibility G. Insuring and Protecting	X A. Career Awareness (K-4) B. Career Exploration (5-8) C. Career Preparation (9-12)	A. Agriculture, Food & Natural Res. B. Architecture & Construction C. Arts, AV Technology & Comm. D. Business Management & Admin. E. Education & Training F. Finance G. Government & Public Admin. H. Health Science I. Hospital & Tourism J. Human Services K. Information Technology L. Law, Public, Safety, Corrections & Security M. Manufacturing N. Marketing X O. Science, Technology, Engineering & Math P. Transportation, Distribution & Log.

Course Materials

Core Instructional Materials: <i>These are the board adopted and approved materials to support the curriculum, instruction, and assessment of this course.</i>	Differentiated Resources: <i>These are teacher and department found materials, and also approved support materials that facilitate differentiation of curriculum, instruction, and assessment of this course.</i>
<ul style="list-style-type: none"> Big Ideas Math 8th Grade 	<ul style="list-style-type: none"> Common Core State Standards http://www.corestandards.org/Math/Content/4/introduction/ Howard County MD Mathematics 8 https://hcpss.instructure.com/courses/161 Khan Academy 8th Grade Math https://www.khanacademy.org/math/cc-eighth-grade-math Math Assessment Project Resources http://map.mathshell.org/ Promoting Inquiry in Mathematics and Science Education Across Europe http://www.primas-project.eu/en/index.do



Unit Title / Topic: The Number System	Unit Duration: 27 days
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Stage 1: Desired Results

Established Goals:
 CCSS.MATH.CONTENT
 7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
 7.NS.A.1.A Describe situations in which opposite quantities combine to make 0. For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.
 7.NS.A.1.B Understand $p + q$ as the number located a distance $|q|$ from p , in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
 7.NS.A.1.C Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
 7.NS.A.1.D Apply properties of operations as strategies to add and subtract rational numbers.
 7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
 7.NS.A.2.A Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
 7.NS.A.2.B Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
 7.NS.A.2.C Apply properties of operations as strategies to multiply and divide rational numbers.
 7.NS.A.2.D Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
 7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers

Transfer Goal:
 Students will be able to independently use their learning to... make responsible decisions in their daily lives in regards to managing personal finance.

Students will understand that:

- there is classification of the real number system
- all numbers exist as a point on a number line.
- a number line is a tool that enables visualization of the distance between any two numbers on the line.
- the further you move a point to the right on a number line, the greater the number that the point represents. Likewise, the further you move a point to the left, on a number line, the lesser the number that the point represents.
- "subtraction makes number smaller" does not always apply when negative numbers are involved. Subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$.
- rational numbers can be negative and are used in everyday life such as sports, temperature, money, elevation, etc...

Essential Questions:

- How is it helpful to understand the difference between negative and positive numbers?
- Is the sum, difference, product or quotient positive, negative, or zero? How can you tell?
- Why can't you divide by zero?
- How can mathematical operations with rational numbers help us make real-life decisions?
- How can number lines and diagrams be used to visualize mathematical operations with rational numbers?

Students will know:

- absolute value of a number is the number's distance from zero on a number line.
- difference between rational and irrational numbers
- to calculate sum of two numbers with the same signs, add the absolute value of the numbers and keep the sign
- to calculate sum of two numbers with different signs, subtract the absolute value of the numbers and keep the sign on the greater number
- subtraction problems can be solved by adding the opposite
- products and quotients of rational numbers with the same signs are positive
- products and quotients of rational numbers with different signs are negative
- vocabulary: integer, absolute value, opposites, additive inverse, rational number, terminating decimal, repeating decimal

Students will be able to:

- calculate absolute value of numbers
- compare, order, and graph rational numbers
- represent addition and subtraction using number lines and integer chips
- add rational numbers without the use of a visual or concrete model.
- compute subtraction problems using the idea that it can be rewritten as an addition problem.
- find products and quotient of rational numbers with the same sign
- find products and quotient of rational numbers with different signs.
- write, solve, and interpret real life situations involving with rational numbers.

Stage 2: Acceptable Evidence

Transfer Task
 Department Developed Performance Task and Unit Assessment

Reference Materials

Big Ideas Math Support Materials
 Common Core State Standards <http://www.corestandards.org/Math/Content/4/introduction/>
 Howard County MD Mathematics 7 <https://hcpss.instructure.com/courses/127>
 Khan Academy 7th Grade Math <https://www.khanacademy.org/math/cc-seventh-grade-math>
 Math Assessment Project Resources <http://map.mathshell.org/>



Unit Title / Topic: Expression, Equations, and Inequalities

Unit Duration: 30 days

Stage 1: Desired Results

Established Goals:

CCSS.MATH.CONTENT

7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.A.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

7.EE.B.4.A Solve word problems leading to equations of the form px + q = r and p(x + q) = r, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

7.EE.B.4.B Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.

Transfer Goal:

Students will be able to independently use their learning to...write and solve equations that model real world linear relationships.

Students will understand that:

- Equations and inequalities can be used to solve real life application problems.
• The symbolic language of algebra is used to communicate and generalize the patterns and relationships in the real world.
• Algebra often uses number properties to create an equivalent expression or equation in order to solve a problem
• The equal sign means two expressions represent the same value.
• The inequality signs means that there might be more than one number that satisfies the two expressions.

Essential Questions:

- How can solving equations be useful in real life?
• How is thinking algebraically differ from thinking arithmetically?
• What is meant by equality?
• When is it legitimate for you to break apart a task to make it easier to complete?
• What happens when two sides of an equation are not equal?

Students will know:

- like terms have the same variables and powers.
• inverse operations undo each other.
• properties of equalities (addition, subtraction, multiplication, and division)
• difference between equation and inequality
• open circle is used to graph inequalities with <, >, while closed circle is used to graph inequalities with ≤, ≥
• which direction to shade for inequality
• properties of inequalities (addition, subtraction, multiplication, and division)
• vocabulary: like terms, simplest form, linear expression, factoring an expression, equivalent equations, inequality, solution of an inequality, solution set, graph of an inequality.

Students will be able to:

- simplify expressions by combining like terms.
• use commutative, associative, and distributive properties to solve equations.
• factor linear expressions.
• model equations using algebra tiles.
• solve equations using the Addition and Subtraction Properties of Equality.
• solve equations using the Multiplication and Division Properties of Equality.
• solve two-step equations.
• solve multi-step equations involving different techniques.
• decode real life situations into equations
• translate inequalities from words to symbols and check to see whether a value is a solution of the inequality.
• use Properties of Inequality to solve addition, subtraction, multiplication, and division inequalities.
• solve and graph two-step inequalities.

Stage 2: Acceptable Evidence

Transfer Task

Department Developed Performance Task and Unit Assessment

Reference Materials

- Big Ideas Math Support Materials
Common Core State Standards http://www.corestandards.org/Math/Content/4/introduction/
Howard County MD Mathematics 7 https://hcpss.instructure.com/courses/127
Khan Academy 7th Grade Math https://www.khanacademy.org/math/cc-seventh-grade-math
Math Assessment Project Resources http://map.mathshell.org/



Unit Title / Topic: Ratio, Proportions, and Percents

Unit Duration: 45 days

Stage 1: Desired Results

Established Goals:

CCSS.MATH.CONTENT

- 7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 ÷ 1/4 miles per hour, equivalently 2 miles per hour.*
- 7.RP.A.2 Recognize and represent proportional relationships between quantities.
 - 7.RP.A.2.A Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
 - 7.RP.A.2.B Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
 - 7.RP.A.2.C Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t = pn$.*
 - 7.RP.A.2.D Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.
- 7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

Transfer Goal:

Students will be able to independently use their learning to...

- make optimal financial decisions.
- analyze, model, and show relationships between related variables in the world.

Students will understand that:

- Proportional relationships express how quantities change in relationship to each other.
- Parts of a whole can be represented with different mathematical forms, such as fractions, percents, decimals and ratios. Therefore fractions, percent, decimals, and ratios are real just different versions of each other.
- Proportions are two ratios that are equal in value.
- Percents are used in the real world for a variety of situations, including discount, sales tax, tip, and markup.
- Understanding percents is essential for financial decision making and financial survival.

Essential Questions:

- When and why do I use proportional comparisons?
- How does comparing quantities describe the relationship between them?
- Why do we use different mathematical forms to represent the same thing?
- What correlation do you look for between the principal, rate, and length of time when borrowing money versus saving money in a banking institution?
- How can you use estimation to mentally make financial decisions?

Students will know:

- ratio is a comparison of two quantities using division
- rate is a ratio of two quantities with different units, while unit rate is a rate with denominator of 1
- a proportion is an equation stating two ratios are equivalent
- simplifying ratios and cross product property can be used to determine if two ratios are proportional
- graphs of proportional relationships pass the origin
- tables, rows, and columns can be used to write proportions
- proportions can be solved using mental math, multiplication property of equality, and cross product property
- slope is the rate of change between two points and can be found by $\frac{\text{change in } y}{\text{change in } x}$
- direct variation can be modeled by $y = kx$, where k is the constant of proportionality
- to convert percent to decimal, divide by a 100, and to convert decimal to percent, multiply by 100
- to convert fraction to percent, make it an equivalent fraction with a denominator of a 100
- percent proportion and percent equation can be used to solve for part, whole, and percent
- percent of change is the percent that a quantity changes from original amount
- discount is a decrease from the original and markup is an increase from original price
- simple interest problems can be solved using the formula $I = PRT$
- vocabulary: ratio, rate, unit rate, complex fraction, proportion, proportional, cross products, slope, direct variation, constant of proportionality, percent of change, percent of increase, percent of decrease, percent error, discount, markup, interest, principal, simple interest

Students will be able to:

- determine rates given words, tables, and graph. Additionally verbally explain the process of determining rates to someone else
- use multiplication and division, and the Cross Products Property to decide if two ratios are equal.
- graph proportional relationships.
- write and solve a proportion using mental math, cross products property, and multiplication and division.
- determine the slope of a line from its graph.
- apply a formal definition of direct variation to determine if a relationship varies directly.
- convert between percents and decimals.
- compare and order less common percents, decimals, and fractions.
- find whole, part, and percent using percent proportions and percent equation.
- use a percent of change formula to solve problems.
- find discounts and markups of items.
- use the simple interest formula and knowledge of equation solving to solve for different variables in the formula.
- apply knowledge of ratios, proportions, and percents to solve real life application problems

Stage 2: Acceptable Evidence

Transfer Task

Department Developed Performance Task and Unit Assessment

Reference Materials

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Unit Title / Topic: Geometry

Unit Duration: 40 days

Stage 1: Desired Results

Established Goals:

CCSS.MATH.CONTENT

- 7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
- 7.G.A.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
- 7.G.A.3 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.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
- 7.G.B.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
- 7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Transfer Goal:

Students will be able to independently use their learning to...

- accurately describe and model geometric shapes.
- find the capacity of three dimensional-figure to make financial/ business decisions

Students will understand that:

- Geometry and spatial sense offer ways to interpret and reflect on our physical environment.
- Angles make up geometric figures as well as appear in our environment in real life objects
- As a geometric figure is dilated the area will change more than the perimeter.
- Surface area and volume provide important real world measurements of 3-D figures such as home improvement projects, video game designs, and packing.

Essential Questions:

- How do geometric models describe spatial relationships?
- Why are angles a fundamental building block?
- How does what we measure influence how we measure?
- How does volume and surface area relate to profitability?

Students will know:

- adjacent angles share a common ray
- vertical angles are opposite angles formed by intersection of two line and are always congruent.
- complementary angles add up to 90 degrees, while supplementary angles add up to 180 degrees
- triangles can be classified using side lengths and angle measures
- angles in a triangle add up to 180 degrees
- quadrilaterals can be classified by angles and side lengths(trapezoid, parallelogram, kite, rectangle, square, rhombus)
- angles in a quadrilateral add up to 360 degrees
- diameter is twice the radius of a given circle
- circumference can be found using $C = 2\pi r$ or $C = \pi d$
- perimeter of a composite figure can be found by adding all the sides and arcs together
- area of a circle can be found using the formula $A = \pi r^2$
- area of composite figures can be found by finding areas of separate figures and adding them altogether
- surface areas of prism, pyramids and cylinders can be found by adding all the individual faces
- volume of prisms can be found using $V = Bh$, where B is the area of the base and h is height
- volume of pyramid can be found using $V = \frac{1}{3}Bh$, where B is the area of the base and h is height
- vocabulary: lateral surface area, regular pyramid, slant height, cross section

Students will be able to:

- will identify adjacent or vertical angles.
- classify several pairs of angles as complementary or supplementary.
- classify triangles by side lengths and angle measures
- find the missing angle measure of a triangle
- classify quadrilaterals by the attributes they possess.
- use a scale drawing to find a missing measure.
- use the formula for circumference to solve real-life problems.
- use formulas to find the perimeter of composite figures.
- use the formula for area of a circle to solve real-life problems.
- divide composite figures into familiar geometric shapes and use known area formulas to find the total area.
- compute surface area of prism, pyramids, and cylinders using formulas as well as nets
- compute volume of prisms and pyramids to solve problems
- describe cross sections of three-dimensional figures.
- apply geometric knowledge to real life application problems.

Stage 2: Acceptable Evidence

Transfer Task

Department Developed Performance Task and Unit Assessment

Reference Materials

Big Ideas Math Support Materials
 Common Core State Standards <http://www.corestandards.org/Math/Content/4/introduction/>
 Howard County MD Mathematics 7 <https://hcpss.instructure.com/courses/127>
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Unit Title / Topic: Probability and Statistics

Unit Duration: 27 days

Stage 1: Desired Results

Established Goals:

- 7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
- 7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*
- 7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*
- 7.SP.B.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*
- 7.SP.C.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
- 7.SP.C.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*
- 7.SP.C.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
- 7.SP.C.7.A Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.*
- 7.SP.C.7.B Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*
- 7.SP.C.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
- 7.SP.C.8.A Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
- 7.SP.C.8.B Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
- 7.SP.C.8.C Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*

Transfer Goal:

Students will be able to independently use their learning to...make predictions and decisions on real world events based on sampling, statistics, and probability.

Students will understand that:

- different ways data is collected, organized and displayed influences interpretation.
- results of a statistical investigation can be used to refute or support an argument.
- statistics and probabilities are used in everyday life including sports, forecasting weather, predicting diseases, political campaigns, etc....

Essential Questions:

- Why is data collected and analyzed?
- How do people use data to influence others?
- What is the difference between predicted outcomes and observed outcomes?

Students will know:

- probabilities are between 0 and 1, including 0 and 1.
- relative frequency can be found using the formula $\frac{\text{number of times the event occurs}}{\text{total number of times you conduct the experiment}}$
- experimental probability can be found using the formula $\frac{\text{number of times the event occurs}}{\text{total number of trials}}$
- theoretical probability can be found using the formula $\frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$
- possible outcomes of two or more events can be found using fundamental counting principle
- probability of a compound even can be found using tree diagrams and fundamental counting principle
- probability of independent events can be found by multiplying the probabilities of individual events together
- probability of two dependent events A and B is the probability of A times the probability of B after A occurs.
- simulations allow you to study situations that are impractical to create in real life.
- samples can be used to make inferences about a population. Unbiased samples help make more accurate inferences.
- to compare two populations with symmetric distribution, use mean and mean absolute deviation
- to compare two populations with asymmetric distribution, use inter quartile range and median
- vocabulary: experiment, outcomes, event, favorable outcomes, probability, relative frequency, experimental probability, theoretical probability, sample space, Fundamental Counting Principle, compound event, independent events, dependent events, simulation, population, sample, unbiased sample, biased sample

Students will be able to:

- describe the outcomes of an experiment.
- compute the probability of an event.
- compute the experimental probability of an event and the theoretical probability of an event.
- find the number of outcomes of compound events.
- compute theoretical probabilities of independent and dependent events.
- perform simulations to find probabilities of compound events.
- identify biased and unbiased samples and determine whether a sample can be used to draw conclusions and make predictions about a population.
- generate multiple samples of data and draw inferences about a population.
- compare two populations using measures of center, measures of variation, and overlap.

Stage 2: Acceptable Evidence

Transfer Task

Department Developed Performance Task and Unit Assessment

Reference Materials

- Big Ideas Math Support Materials
- Common Core State Standards <http://www.corestandards.org/Math/Content/4/introduction/>
- Howard County MD Mathematics 7 <https://hcpss.instructure.com/courses/127>
- Khan Academy 7th Grade Math <https://www.khanacademy.org/math/cc-seventh-grade-math>
- Math Assessment Project Resources <http://map.mathshell.org/>