Instructional Calendar 7th Grade Math

International Society for Technology in Education Standards	Grade Level Technology Targets
1. **Creativity and innovation:** Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology**.** 2. **Communication and collaboration**: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. 3. **Research and information fluency**: Students apply digital tools to gather, evaluate, and use information. 4. **Critical thinking, problem solving, and decision making**: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. 5. **Digital citizenship**: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. 6. **Technology Operations and Concepts:** Students demonstrate and sound understanding of technology concepts, systems and operations.	• **calculator**

Quarter 1

Standard 1 (Number Sense, Properties and Operations)	Standard 2 (Patterns, Functions, and Algebraic	Standard 3 (Data Analysis, Statistics, and Probability)	Standard 4 (Shape, Dimension, and Geometric Relationships)

International Society for Technology in Education Standards	Grade Level Technology Targets
1. **Creativity and innovation:** Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology**.** 2. **Communication and collaboration**: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.	• **Show Me Application** • **Book Creator**

3. **Research and information fluency**: Students apply digital tools to gather, evaluate, and use information. 4. **Critical thinking, problem solving, and decision making**: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. 5. **Digital citizenship**: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. 6. **Technology Operations and Concepts:** Students demonstrate and sound understanding of technology concepts, systems and operations.	• **Google Slides** • **Blend Space** • **ArchiTouch 3D**

Quarter 2

Standard 1 (Number Sense, Properties and Operations)	Standard 2 Patterns, Functions, and Algebraic Structures	Standard 3 (Data Analysis, Statistics, and Probability)	Standard 4 (Shape, Dimension, and Geometric Relationships

International Society for Technology in Education Standards	Grade Level Technology Targets

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Instructional Calendar Math/7th Grade

1. **Creativity and innovation:** Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology**.** 2. **Communication and collaboration**: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. 3. **Research and information fluency**: Students apply digital tools to gather, evaluate, and use information. 4. **Critical thinking, problem solving, and decision making**: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. 5. **Digital citizenship**: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. 6. **Technology Operations and Concepts:** Students demonstrate and sound understanding of technology concepts, systems and operations.	• • • • **Numbers Application** • **Desmos**

Quarter 3

Standard 1 (Number Sense, Properties and Operations)	Standard 2 Patterns, Functions, and Algebraic Structures	Standard 3 (Data Analysis, Statistics, and Probability)	Standard 4 (Shape, Dimension, and Geometric Relationships

International Society for Technology in Education Standards	Grade Level Technology Targets

1. **Creativity and innovation:** Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology**.** 2. **Communication and collaboration**: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. 3. **Research and information fluency**: Students apply digital tools to gather, evaluate, and use information. 4. **Critical thinking, problem solving, and decision making**: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. 5. **Digital citizenship**: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. 6. **Technology Operations and Concepts:** Students demonstrate and sound understanding of technology concepts, systems and operations.	● ● ● ●

Quarter 4

Standard 1 (Number Sense, Properties and Operations)	Standard 2 Patterns, Functions, and Algebraic Structures	Standard 3 (Data Analysis, Statistics, and Probability)	Standard 4 (Shape, Dimension, and Geometric Relationships

International Society for Technology in Education Standards	Grade Level Technology Targets
1. **Creativity and innovation:** Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology**.** 2. **Communication and collaboration**: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. 3. **Research and information fluency**: Students apply digital tools to gather, evaluate, and use information.	● ● ●

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Instructional Calendar Math/7th Grade

4. **Critical thinking, problem solving, and decision making**: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. 5. **Digital citizenship**: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. 6. **Technology Operations and Concepts:** Students demonstrate and sound understanding of technology concepts, systems and operations.	•

End of Year Expectations By Standard

Standard 1 (Number Sense, Properties and Operations)	Standard 2 Patterns, Functions, and Algebraic Structures	Standard 3 (Data Analysis, Statistics, and Probability)	Standard 4 (Shape, Dimension, and Geometric Relationships

[1] Computations with rational numbers extend the rules for manipulating fractions to complex fractions. (CCSS: 7.NS.3)

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Instructional Calendar Math/7th Grade

1.Number Sense, Properties, and Operations

Number sense provides students with a firm foundation in mathematics. Students build a deep understanding of quantity, ways of representing numbers, relationships among numbers, and number systems. Students learn that numbers are governed by properties, and understanding these properties leads to fluency with operations.

Prepared Graduates
The prepared graduate competencies are the preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

Prepared Graduate Competencies in the Number Sense, Properties, and Operations Standard are:

Ø Understand the structure and properties of our number system. At their most basic level numbers are abstract symbols that represent real-world quantities

Ø Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error

Ø Are fluent with basic numerical and symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency

Ø Make both relative (multiplicative) and absolute (arithmetic) comparisons between quantities. Multiplicative thinking underlies proportional reasoning

Ø Understand that equivalence is a foundation of mathematics represented in numbers, shapes, measures, expressions, and equations

Ø Apply transformation to numbers, shapes, functional representations, and data

Content Area: Mathematics
Standard: 1. Number Sense, Properties, and Operations
Prepared Graduates:

ø Make both relative (multiplicative) and absolute (arithmetic) comparisons between quantities. Multiplicative thinking underlies proportional reasoning

Grade Level Expectation: Seventh Grade

Concepts and skills students master:

1. Proportional reasoning involves comparisons and multiplicative relationships among ratios

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Analyze proportional relationships and use them to solve real-world and mathematical problems.(CCSS: 7.RP) b. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.[1] (CCSS: 7.RP.1) c. Identify and represent proportional relationships between quantities. (CCSS: 7.RP.2) i. Determine whether two quantities are in a proportional relationship.[2] (CCSS: 7.RP.2a) ii. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. (CCSS: 7.RP.2b) iii. Represent proportional relationships by equations.[3] (CCSS: 7.RP.2c) iv. 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. (CCSS: 7.RP.2d) d. Use proportional relationships to solve multistep ratio and percent problems.[4] (CCSS: 7.RP.3) i. Estimate and compute unit cost of consumables (to include unit conversions if necessary) sold in quantity to make purchase decisions based on cost and practicality (PFL) ii. Solve problems involving percent of a number, discounts, taxes, simple interest, percent increase, and percent decrease (PFL)	**Inquiry Questions:** 1. What information can be determined from a relative comparison that cannot be determined from an absolute comparison? 2. What comparisons can be made using ratios? 3. How do you know when a proportional relationship exists? 4. How can proportion be used to argue fairness? 5. When is it better to use an absolute comparison? 6. When is it better to use a relative comparison? **Relevance and Application:** 1. The use of ratios, rates, and proportions allows sound decision-making in daily life such as determining best values when shopping, mixing cement or paint, adjusting recipes, calculating car mileage, using speed to determine travel time, or enlarging or shrinking copies. 2. Proportional reasoning is used extensively in the workplace. For example, determine dosages for medicine; develop scale models and drawings; adjusting salaries and benefits; or prepare mixtures in laboratories. 3. Proportional reasoning is used extensively in geometry such as determining properties of similar figures, and comparing length, area, and volume of figures. **Nature of Mathematics:**

	1. Mathematicians look for relationships that can be described simply in mathematical language and applied to a myriad of situations. Proportions are a powerful mathematical tool because proportional relationships occur frequently in diverse settings. 2. Mathematicians reason abstractly and quantitatively. (MP) 3. Mathematicians construct viable arguments and critique the reasoning of others. (MP)	

Content Area: Mathematics

Standard: 1. Number Sense, Properties, and Operations

Prepared Graduates:
Ø Are fluent with basic numerical and symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency

Grade Level Expectation: Seventh Grade

Concepts and skills students master:

2. Formulate, represent, and use algorithms with rational numbers flexibly, accurately, and efficiently

Evidence Outcomes	**21st Century Skills and Readiness Competencies**	
Students can: a. Apply understandings of addition and subtraction to add and subtract rational numbers including integers. (CCSS: 7.NS.1) i. Represent addition and subtraction on a horizontal or vertical number line diagram. (CCSS: 7.NS.1) ii. Describe situations in which opposite quantities combine to make 0.[5] (CCSS: 7.NS.1a) iii. Demonstrate $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. (CCSS: 7.NS.1b) iv. Show that a number and its opposite have a sum of 0 (are additive inverses).	**Inquiry Questions:** 1. How do operations with rational numbers compare to operations with integers? 2. How do you know if a computational strategy is sensible? 3. Is equal to one? 4. How do you know whether a fraction can be represented as a repeating or terminating decimal? **Relevance and Application:** 1. The use and understanding algorithms help individuals spend money wisely. For example, compare discounts to determine best buys and compute sales tax. 2. Estimation with rational numbers enables individuals to make decisions quickly and flexibly in daily life such as estimating a total bill at a restaurant, the amount of money left on a gift card, and	

(CCSS: 7.NS.1b) v. Interpret sums of rational numbers by describing real-world contexts. (CCSS: 7.NS.1c) vi. Demonstrate subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. (CCSS: 7.NS.1c) vii. 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. (CCSS: 7.NS.1c) viii. Apply properties of operations as strategies to add and subtract rational numbers. (CCSS: 7.NS.1d) b. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers including integers. (CCSS: 7.NS.2) i. Apply properties of operations to multiplication of rational numbers.[6] (CCSS: 7.NS.2a) ii. Interpret products of rational numbers by describing real-world contexts. (CCSS: 7.NS.2a) iii. Apply properties of operations to divide integers.[7] (CCSS: 7.NS.2b) iv. Apply properties of operations as strategies to multiply and divide rational numbers. (CCSS: 7.NS.2c) v. Convert a rational number to a decimal using long division. (CCSS: 7.NS.2d) vi. Show that the decimal form of a rational number terminates in 0s or eventually repeats. (CCSS: 7.NS.2d) c. Solve real-world and mathematical problems involving the four operations with rational numbers.[8] (CCSS: 7.NS.3)	price markups and markdowns. 3. People use percentages to represent quantities in real-world situations such as amount and types of taxes paid, increases or decreases in population, and changes in company profits or worker wages). **Nature of Mathematics:** 1. Mathematicians see algorithms as familiar tools in a tool chest. They combine algorithms in different ways and use them flexibly to accomplish various tasks. 2. Mathematicians make sense of problems and persevere in solving them. (MP) 3. Mathematicians construct viable arguments and critique the reasoning of others. (MP) 4. Mathematicians look for and make use of structure. (MP)	

Standard: 1. Number Sense, Properties, and Operations
Seventh Grade

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Instructional Calendar Math/7th Grade

2. Patterns, Functions, and Algebraic Structures

Pattern sense gives students a lens with which to understand trends and commonalities. Being a student of mathematics involves recognizing and representing mathematical relationships and analyzing change. Students learn that the structures of algebra allow complex ideas to be expressed succinctly.

Prepared Graduates
The prepared graduate competencies are the preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must have to ensure success in a postsecondary and workforce setting.

Prepared Graduate Competencies in the 2. Patterns, Functions, and Algebraic Structures Standard are:

Ø Are fluent with basic numerical and symbolic facts and algorithms, and are able to select and use appropriate (mental math, paper and pencil, and technology) methods based on an understanding of their efficiency, precision, and transparency

Ø Understand that equivalence is a foundation of mathematics represented in numbers, shapes, measures, expressions, and equations

Ø Make sound predictions and generalizations based on patterns and relationships that arise from numbers, shapes, symbols, and data

Ø Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics

Ø Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

Content Area: Mathematics
Standard: 2. Patterns, Functions, and Algebraic Structures

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Instructional Calendar Math/7th Grade

Prepared Graduates:
Understand that equivalence is a foundation of mathematics represented in numbers, shapes, measures, expressions, and equations

Grade Level Expectation: Seventh Grade

Concepts and skills students master:

1. Properties of arithmetic can be used to generate equivalent expressions

Evidence Outcomes	21st Century Skills and Readiness Competencies	
Students can: a. Use properties of operations to generate equivalent expressions. (CCSS: 7.EE) i. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (CCSS: 7.EE.1) ii. Demonstrate 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.[9] (CCSS: 7.EE.2)	**Inquiry Questions:** 1. How do symbolic transformations affect an equation or expression? 2. How is it determined that two algebraic expressions are equivalent?	
	Relevance and Application: 1. The ability to recognize and find equivalent forms of an equation allows the transformation of equations into the most useful form such as adjusting the density formula to calculate for volume or mass.	
	Nature of Mathematics: 1. Mathematicians abstract a problem by representing it as an equation. They travel between the concrete problem and the abstraction to gain insights and find solutions. 2. Mathematicians reason abstractly and quantitatively. (MP) 3. Mathematicians look for and express regularity in repeated reasoning. (MP)	

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Instructional Calendar Math/7th Grade

Content Area: Mathematics

Standard: 2. Patterns, Functions, and Algebraic Structures

Prepared Graduates:
Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

Grade Level Expectation: Seventh Grade

Concepts and skills students master:

2. Equations and expressions model quantitative relationships and phenomena

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form,[10] using tools strategically. (CCSS: 7.EE.3) b. 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.[11] (CCSS: 7.EE.3) c. 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. (CCSS: 7.EE.4) i. Fluently 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. (CCSS: 7.EE.4a) ii. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.[12]	**Inquiry Questions:** 1. Do algebraic properties work with numbers or just symbols? Why? 2. Why are there different ways to solve equations? 3. How are properties applied in other fields of study? 4. Why might estimation be better than an exact answer? 5. When might an estimate be the only possible answer? **Relevance and Application:** 1. Procedural fluency with algebraic methods allows use of linear equations and inequalities to solve problems in fields such as banking, engineering, and insurance. For example, it helps to calculate the total value of assets or find the acceleration of an object moving at a linearly increasing speed. 2. Comprehension of the structure of equations allows one to use spreadsheets effectively to solve problems that matter such as showing how long it takes to pay off debt, or representing data collected from science experiments. 3. Estimation with rational numbers enables quick and flexible decision-making in

(CCSS: 7.EE.4a) iii. Solve word problems[13] leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. (CCSS: 7.EE.4b) iv. Graph the solution set of the inequality and interpret it in the context of the problem. (CCSS: 7.EE.4b)	daily life. For example, determining how many batches of a recipe can be made with given ingredients, how many floor tiles to buy with given dimensions, the amount of carpeting needed for a room, or fencing required for a backyard.	
	Nature of Mathematics: 1. Mathematicians model with mathematics. (MP)	

Standard: 2. Patterns, Functions, and Algebraic Structures
Seventh Grade

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Instructional Calendar Math/7th Grade

3. Data Analysis, Statistics, and Probability

Data and probability sense provides students with tools to understand information and uncertainty. Students ask questions and gather and use data to answer them. Students use a variety of data analysis and statistics strategies to analyze, develop and evaluate inferences based on data. Probability provides the foundation for collecting, describing, and interpreting data.

Prepared Graduates
The prepared graduate competencies are the preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

Prepared Graduate Competencies in the 3. Data Analysis, Statistics, and Probability Standard are:

Ø Recognize and make sense of the many ways that variability, chance, and randomness appear in a variety of contexts

Ø Solve problems and make decisions that depend on understanding, explaining, and quantifying the variability in data

Ø Communicate effective logical arguments using mathematical justification and proof. Mathematical argumentation involves making and testing conjectures, drawing valid conclusions, and justifying thinking

Ø Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

Content Area: Mathematics

Standard: 3. Data Analysis, Statistics, and Probability

Prepared Graduates:
ø Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

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Instructional Calendar Math/7th Grade

Grade Level Expectation: Seventh Grade

Concepts and skills students master:

1. Statistics can be used to gain information about populations by examining samples

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. Use random sampling to draw inferences about a population. (CCSS: 7.SP) i. Explain that generalizations about a population from a sample are valid only if the sample is representative of that population. (CCSS: 7.SP.1) ii. Explain that random sampling tends to produce representative samples and support valid inferences. (CCSS: 7.SP.1) iii. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. (CCSS: 7.SP.2) iv. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.[14] (CCSS: 7.SP.2) b. Draw informal comparative inferences about two populations. (CCSS: 7.SP) i. 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.[15] (CCSS: 7.SP.3) ii. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.[16] (CCSS: 7.SP.4)	**Inquiry Questions:** 1. How might the sample for a survey affect the results of the survey? 2. How do you distinguish between random and bias samples? 3. How can you declare a winner in an election before counting all the ballots? **Relevance and Application:** 1. The ability to recognize how data can be biased or misrepresented allows critical evaluation of claims and avoids being misled. For example, data can be used to evaluate products that promise effectiveness or show strong opinions. 2. Mathematical inferences allow us to make reliable predictions without accounting for every piece of data. **Nature of Mathematics:** 1. Mathematicians are informed consumers of information. They evaluate the quality of data before using it to make decisions. 2. Mathematicians use appropriate tools strategically. (MP)

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Instructional Calendar Math/7th Grade

Content Area: Mathematics

Standard: 3. Data Analysis, Statistics, and Probability

Prepared Graduates:
ø Recognize and make sense of the many ways that variability, chance, and randomness appear in a variety of contexts

Grade Level Expectation: Seventh Grade

Concepts and skills students master:

2. Mathematical models are used to determine probability

Evidence Outcomes	**21st Century Skills and Readiness Competencies**	
Students can: a. Explain that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.[17] (CCSS: 7.SP.5) b. 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.[18] (CCSS: 7.SP.6) c. Develop a probability model and use it to find probabilities of events. (CCSS: 7.SP.7) i. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (CCSS: 7.SP.7) ii. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.[19] (CCSS: 7.SP.7a) iii. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.[20] (CCSS: 7.SP.7b)	**Inquiry Questions:** 1. Why is it important to consider all of the possible outcomes of an event? 2. Is it possible to predict the future? How? 3. What are situations in which probability cannot be used?	
	Relevance and Application: 1. The ability to efficiently and accurately count outcomes allows systemic analysis of such situations as trying all possible combinations when you forgot the combination to your lock or deciding to find a different approach when there are too many combinations to try; or counting how many lottery tickets you would have to buy to play every possible combination of numbers. 2. The knowledge of theoretical probability allows the development of winning strategies in games involving chance such as knowing if your hand is likely to be the best hand or is likely to improve in a game of cards.	
	Nature of Mathematics:	

d. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (CCSS: 7.SP.8) i. Explain that the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. (CCSS: 7.SP.8a) ii. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. (CCSS: 7.SP.8b) iii. For an event[21] described in everyday language identify the outcomes in the sample space which compose the event. (CCSS: 7.SP.8b) iv. Design and use a simulation to generate frequencies for compound events.[22] (CCSS: 7.SP.8c)	1. Mathematicians approach problems systematically. When the number of possible outcomes is small, each outcome can be considered individually. When the number of outcomes is large, a mathematician will develop a strategy to consider the most important outcomes such as the most likely outcomes, or the most dangerous outcomes. 2. Mathematicians construct viable arguments and critique the reasoning of others. (MP) 3. Mathematicians model with mathematics. (MP)	

Standard: 3. Data Analysis, Statistics, and Probability
Seventh Grade

4. Shape, Dimension, and Geometric Relationships

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Instructional Calendar Math/7th Grade

Geometric sense allows students to comprehend space and shape. Students analyze the characteristics and relationships of shapes and structures, engage in logical reasoning, and use tools and techniques to determine measurement. Students learn that geometry and measurement are useful in representing and solving problems in the real world as well as in mathematics.

Prepared Graduates
The prepared graduate competencies are the preschool through twelfth-grade concepts and skills that all students who complete the Colorado education system must master to ensure their success in a postsecondary and workforce setting.

Prepared Graduate Competencies in the 4. Shape, Dimension, and Geometric Relationships standard are:

Ø Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error

Ø Make sound predictions and generalizations based on patterns and relationships that arise from numbers, shapes, symbols, and data

Ø Apply transformation to numbers, shapes, functional representations, and data

Ø Make claims about relationships among numbers, shapes, symbols, and data and defend those claims by relying on the properties that are the structure of mathematics

Ø Use critical thinking to recognize problematic aspects of situations, create mathematical models, and present and defend solutions

Content Area: Mathematics
Standard: 4. Shape, Dimension, and Geometric Relationships
Prepared Graduates: ø Apply transformation to numbers, shapes, functional representations, and data

Grade Level Expectation: Seventh Grade	
Concepts and skills students master:	

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Instructional Calendar Math/7th Grade

1. Modeling geometric figures and relationships leads to informal spatial reasoning and proof		
Evidence Outcomes	**21st Century Skills and Readiness Competencies**	
Students can: a. Draw construct, and describe geometrical figures and describe the relationships between them. (CCSS: 7.G) i. 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. (CCSS: 7.G.1) ii. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. (CCSS: 7.G.2) iii. Construct triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. (CCSS: 7.G.2) iv. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. (CCSS: 7.G.3)	**Inquiry Questions:** 1. Is there a geometric figure for any given set of attributes? 2. How does scale factor affect length, perimeter, angle measure, area and volume? 3. How do you know when a proportional relationship exists?	
	Relevance and Application: 1. The understanding of basic geometric relationships helps to use geometry to construct useful models of physical situations such as blueprints for construction, or maps for geography. 2. Proportional reasoning is used extensively in geometry such as determining properties of similar figures, and comparing length, area, and volume of figures.	
	Nature of Mathematics: 1. Mathematicians create visual representations of problems and ideas that reveal relationships and meaning. 2. The relationship between geometric figures can be modeled 3. Mathematicians look for relationships that can be described simply in mathematical language and applied to a myriad of situations. Proportions are a powerful mathematical tool because proportional relationships occur frequently in diverse settings. 4. Mathematicians use appropriate tools strategically. (MP) 5. Mathematicians attend to precision. (MP)	

Content Area: Mathematics
Standard: 4. Shape, Dimension, and Geometric Relationships

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Instructional Calendar Math/7th Grade

Prepared Graduates:
ø Understand quantity through estimation, precision, order of magnitude, and comparison. The reasonableness of answers relies on the ability to judge appropriateness, compare, estimate, and analyze error

Grade Level Expectation: Seventh Grade

Concepts and skills students master:

2. Linear measure, angle measure, area, and volume are fundamentally different and require different units of measure

Evidence Outcomes	21st Century Skills and Readiness Competencies
Students can: a. State the formulas for the area and circumference of a circle and use them to solve problems. (CCSS: 7.G.4) b. Give an informal derivation of the relationship between the circumference and area of a circle. (CCSS: 7.G.4) c. Use properties of supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. (CCSS: 7.G.5) d. 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. (CCSS: 7.G.6)	**Inquiry Questions:** 1. How can geometric relationships among lines and angles be generalized, described, and quantified? 2. How do line relationships affect angle relationships? 3. Can two shapes have the same volume but different surface areas? Why? 4. Can two shapes have the same surface area but different volumes? Why? 5. How are surface area and volume like and unlike each other? 6. What do surface area and volume tell about an object? 7. How are one-, two-, and three-dimensional units of measure related? 8. Why is pi an important number?
	Relevance and Application: 1. The ability to find volume and surface area helps to answer important questions such as how to minimize waste by redesigning packaging, or understanding how the shape of a room affects its energy use.
	Nature of Mathematics: 1. Geometric objects are abstracted and simplified versions of physical objects. 2. Geometers describe what is true about all cases by studying the most basic and essential aspects of objects and relationships between objects. 3. Mathematicians make sense of problems and persevere in solving them. (MP)

	4. Mathematicians construct viable arguments and critique the reasoning of others. (MP)	

[1] 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. (CCSS: 7.RP.1)
[2] 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. (CCSS: 7.RP.2a)
[3] 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. (CCSS: 7.RP.2c)
[4] Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. (CCSS: 7.RP.3)
[5] For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged. (CCSS: 7.NS.1a)
[6] 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. (CCSS: 7.NS.2a)
[7] 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 $-(p/q) = (-p)/q = p/(-q)$. (CCSS: 7.NS.2b)
Interpret quotients of rational numbers by describing real-world contexts. (CCSS: 7.NS.2b)
[8] Computations with rational numbers extend the rules for manipulating fractions to complex fractions. (CCSS: 7.NS.3)
[9] For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05." (CCSS: 7.EE.2)
[10] whole numbers, fractions, and decimals. (CCSS: 7.EE.3)
[11] 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. (CCSS: 7.EE.3)
[12] For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? (CCSS: 7.EE.4a)
[13] 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. (CCSS: 7.EE.4b)
[14] 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. (CCSS: 7.SP.2)
[15] 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. (CCSS: 7.SP.3)
[16] 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. (CCSS: 7.SP.4)

[17] 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. (CCSS: 7.SP.5)

[18] 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. (CCSS: 7.SP.6)

[19] 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. (CCSS: 7.SP.7a)

[20] 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? (CCSS: 7.SP.7b)

[21] e.g., "rolling double sixes" (CCSS: 7.SP.8b)

[22] 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? (CCSS: 7.SP.8c)