# 7<sup>th</sup> Grade Mathematics

| COURSE OUTLINE | | |
|---|---|---|
| **Unit One** | *Integers and Rational Numbers* | *17-19 days* |
| **Unit Two** | *Analyze and Use Proportional Relationships* | *11-13 days* |
| **Unit Three** | *Analyze and Solve Percent Problems* | *11-13 days* |
| **Unit Four** | *Generate Equivalent Expressions* | *14-16 days* |
| **Unit Five** | *Solve Problems Using Equation and Inequalities* | *13-15 days* |
| **Unit Six** | *Use Sampling to Draw Inferences About Populations* | *8-10 days* |
| **Unit Seven** | *Probability* | *14-16 days* |
| **Unit Eight** | *Solve Problems Involving Geometry* | *16-18 days* |

| *School-wide Academic Expectations Taught In This Course* |
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- o Communication
- o Collaboration
- o Analysis
- o Literacy

| *School-wide Social and Civic Expectations Taught in This Course* |
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- o Demonstrate Resiliency
- o Demonstrate Responsibility
- o Demonstrate Respect

| *Content Standards Taught in This Course* | |
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| 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.* |
| CCSS.MATH.CONTENT.7.RP.A.2 | Recognize and represent proportional relationships between quantities. CCSS.MATH.CONTENT.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. CCSS.MATH.CONTENT.7.RP.A.2.B Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. |

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| | CCSS.MATH.CONTENT.7.RP.A.2.C<br>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.*<br>CCSS.MATH.CONTENT.7.RP.A.2.D<br>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.MATH.CONTENT.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. |
| 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.<br>CCSS.MATH.CONTENT.7.NS.A.1.A<br>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.*<br>CCSS.MATH.CONTENT.7.NS.A.1.B<br>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.<br>CCSS.MATH.CONTENT.7.NS.A.1.C<br>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.<br>CCSS.MATH.CONTENT.7.NS.A.1.D<br>Apply properties of operations as strategies to add and subtract rational numbers. |
| CCSS.MATH.CONTENT.7.NS.A.2 | Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.<br>CCSS.MATH.CONTENT.7.NS.A.2.A<br>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.<br>CCSS.MATH.CONTENT.7.NS.A.2.B<br>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. |

| | CCSS.MATH.CONTENT.7.NS.A.2.C<br>Apply properties of operations as strategies to multiply and divide rational numbers.<br>CCSS.MATH.CONTENT.7.NS.A.2.D<br>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. |
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| CCSS.MATH.CONTENT.7.NS.A.3 | Solve real-world and mathematical problems involving the four operations with rational numbers.[1] |
| CCSS.MATH.CONTENT.7.EE.A.1 | Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. |
| CCSS.MATH.CONTENT.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."* |
| CCSS.MATH.CONTENT.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.* |
| CCSS.MATH.CONTENT.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.<br>CCSS.MATH.CONTENT.7.EE.B.4.A<br>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?*<br>CCSS.MATH.CONTENT.7.EE.B.4.B<br>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.* |
| 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. |

| CCSS.MATH.CONTENT.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. |
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| CCSS.MATH.CONTENT.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. |
| CCSS.MATH.CONTENT.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. |
| CCSS.MATH.CONTENT.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. |
| CCSS.MATH.CONTENT.7.G.B.6 | 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. |
| CCSS.MATH.CONTENT.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. |
| CCSS.MATH.CONTENT.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.* |
| CCSS.MATH.CONTENT.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.* |
| CCSS.MATH.CONTENT.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.* |
| CCSS.MATH.CONTENT.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. |

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| CCSS.MATH.CONTENT.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.* |
| CCSS.MATH.CONTENT.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.<br>CCSS.MATH.CONTENT.7.SP.C.7.A<br>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.*<br>CCSS.MATH.CONTENT.7.SP.C.7.B<br>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?* |
| CCSS.MATH.CONTENT.7.SP.C.8 | Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.<br>CCSS.MATH.CONTENT.7.SP.C.8.A<br>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.<br>CCSS.MATH.CONTENT.7.SP.C.8.B<br>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.<br>CCSS.MATH.CONTENT.7.SP.C.8.C<br>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?* |

# Unit 1: Integers and Rational Numbers

**Introduction and Established Goals:** Throughout Topic 1, students apply their knowledge of rational number operations to solve problems in a real-world context. They determine the correct arithmetic operation, set up the problem by writing an equation, solve the equation, and check their solution for reasonableness.

**Desired Outcome(s):**
- Understand the relationship between integers and their opposites;
- Write rational numbers in decimal form;
- Add positive and negative integers;
- Understand subtraction of integers as adding the additive inverse; use properties of operations to add and subtract rational numbers;
- Multiply positive and negative integers;
- Find the product of rational numbers;
- Understand division of integers;
- Apply skills to problem solving situations.

**CT State Standards / Common Core Standard(s):**
- o  7.NS.A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
- o  Apply and extend previous understandings of addition and subtraction to add and subtract integers and other rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
- o  Describe situations in which opposite quantities combine to make zero. For example: A hydrogen atom has zero charge because its two constituents are oppositely charged; If you open a new bank account with a deposit of $30 and then withdraw $30, you are left with a $0 balance. 2
- o  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.
- o  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.
- o  Apply properties of operations as strategies to add and subtract rational numbers.
- o  Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers.
- o  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.
- o  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.
- o  Apply properties of operations as strategies to multiply and divide rational numbers.
- o  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.
- o  Solve real-world and mathematical problems involving the four operations with integers and other rational numbers.

**Essential Question(s):**
- How do operations with integers relate to the same operations with rational numbers?
- How can you determine the correct operation to use to solve problems?

**Key Terms/Concepts:**
- Repeating decimal
- Terminating decimal
- Complex fraction
- Multiplicative inverse
- Whole numbers
- Rational numbers
- Integers
- Additive inverse
- Absolute value

# LEARNING PLAN

| STANDARD | LEARNING OBJECTIVES (Content and Skill) | INSTRUCTIONAL STRATEGIES | ASSESMENT EVIDENCE |
|---|---|---|---|
| 7.SP.A.1, 7.SP.A.2, 7.SP.B.3, MS-ESS3-2, MS-ETS1-2, MS-ETS1-3 | 1. STEM Project: How Cold is Too Cold? | o Topic 1 STEM Video<br>o Group discussion<br>o Pair work for project | STEM Project document |
| 7.NS.A.1a | 2. Relate Integers and Their Opposites | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Topic Readiness Assessment Exit Ticket (3 key problems) |
| 7.NS.A.1d | 3. Understand Rational Numbers | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| 7.NS.A.1b, 7.NS.A.1d | 4. Add Integers | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| 7.NS.A.1c, 7.NS.A.1d | 5. Subtract Integers | o Solve & Discuss It! Individual work and group discussion | Exit Ticket (3 key problems) |

| | | o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | |
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| **7.NS.A.1b, 7.NS.A.1c, 7.NS.A.1d** | 6. Add and Subtract Rational | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Mid Topic Assessment |
| **7.NS.A.2a, 7.NS.A.2c** | 7. Multiply Integers | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.NS.A.2a, 7.NS.A.2c** | 8. Multiply Rational Numbers | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.NS.A.2b, 7.NS.A.2c** | 9. Divide Integers | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.NS.A.2b,7.NS.A.2c** | 10. Divide Rational Numbers | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.NS.A.3, 7.EE.B.3** | 11. Solve Problems with Rational Numbers | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Topic Assessment Topic Performance Assessment |

| 7.NS.A.1, 7.NS.A.3 | 12. 3-Act Mathematical Modeling: Win Some, Lose Some | o Act 1, 2 and 3 Videos<br>o 3-Act Hook, Model and the Solution and Sequel | 3-Act Modeling Activity |
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**Suggested Resources and Texts:**

Student's Edition Pearson enVision Book

Additional Practice Workbook

Teaching Resources

- Reteach to Build Understanding
- Additional Vocabulary Support
- Build Mathematical Literacy
- Enrichment
- Listen and Look for PD Video

**Suggested Technology:**

Digital projector to show daily videos and group problems

# Unit 2: Analyze and Use Proportional Relationships

**Introduction and Established Goals:**
Throughout topic 2, students encounter many different types of situations involving ratios. They use ratio reasoning to solve real-world problems. They compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in different units. They also use proportional relationships and reasoning to solve multi-step problems.

**Desired Outcome(s):**
- Be able to use ratios and rates to describe the relationship between two quantities;
- Find equivalent rations; use unit rate to solve multi-step problems;
- Find unit rates with ratios of fractions; determine whether quantities are proportional by testing for equivalent ratios;
- Use the constant of proportionality to write equations that represent proportional relationships;
- Use mathematical modeling to represent a problem situation use a graph to recognize proportionality.

**CT State / Common Core Standard(s):**
- 7.NS  Analyze proportional relationships and use them to solve real-world and mathematical problems.
- 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 ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½ ⁄¼ miles per hour, equivalently 2 miles per hour.
- Recognize and represent proportional relationships between quantities.
- 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.
- Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- 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.
- 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.
- Use proportional relationships to solve multi-step ratio, rate, and percent problems. For example: simple interest, tax, price increases and discounts, gratuities and commissions, fees, percent increase and decrease, percent error.

**Essential Question(s):**
- Do proportional relationships have common features?
- If so what are they and how are they displayed in different representations?
- What strategies could you use to find the missing value in a proportion?
- How are your strategies related?
- How can you apply ratios and proportional reasoning to real-world situations?
- How can you extend this to scale drawings?
- How could you prove a real life situation is proportional?
- Why is unit rate important for analyzing a proportional relationship?

**Key Terms/Concepts:**
- Proportional relationships
- Proportionality
- Ratio Rate
- Constant of proportionality
- Ratio reasoning
- Rates

# LEARNING PLAN

| STANDARD | LEARNING OBJECTIVES (Content and Skill) | INSTRUCTIONAL STRATEGIES | ASSESMENT EVIDENCE |
|---|---|---|---|
| **7.RP.A.1, 7.RP.A.2** | 1. STEM Project: An Essential Resource | o Topic 2 STEM Video<br>o Group discussion<br>o Pair work for project | STEM Project document |
| **7.RP.A.1, 7.RP.A.3** | 2. Connect Ratios, Rates, and Unit Rates | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Topic Readiness Assessment<br>Exit Ticket (3 key problems) |
| **7.RP.A.1, 7.RP.A.3** | 3. Determine Unit Rates with Ratios of Fractions | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.RP.A.2a** | 4. Understand Proportional Relationships: Equivalent Ratios | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Mid Topic Assessment |
| **7.RP.A.2b, 7.RP.A.2c** | 5. Describe Proportional Relationships: Constant of Proportional | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.RP.A.2a, 7.RP.A.2b, 7.RP.A.2d** | 6. Graph Proportional Relationships | o Solve & Discuss It! Individual work and group discussion | Exit Ticket (3 key problems) |

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| | | o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | |
| **7.RP.A.2, 7.RP.A.3** | 7. Apply Proportional Reasoning to Solve Problems | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems)<br>Topic Assessment<br>Topic Performance Assessment |
| **7.RP.A.1, 7.RP.A.2a** | 3-Act Mathematical Modeling: Mixin' It Up | o Act 1, 2 and 3 Videos<br>o 3-Act Hook, Model and the Solution and Sequel | 3-Act Modeling Activity |

**Suggested Resources and Texts:**

Student's Edition Pearson enVision Book

Additional Practice Workbook

Teaching Resources

- Reteach to Build Understanding
- Additional Vocabulary Support
- Build Mathematical Literacy
- Enrichment
- Listen and Look for PD Video

**Suggested Technology:**

Digital projector to show daily videos and group problems

## Unit 3: Analyze and Solve Percent Problems

**Introduction and Established Goals:** Throughout topic 3, students encounter many different situations involving percent. Students use proportional relationships and reasoning to create a percent equation. They use percent equations to interpret and solve real-life scenarios related to percent change, percent error, markup, markdown, sales tax, and simple interest.

**Desired Outcome(s):**
- Understand that equivalent rates can be used to find percent;
- Construct a percent proportion;
- Use a percent proportion to find an unknown part, whole, or percent;
- Understand the relationship between proportional reasoning and percent;
- Solve problems with percent change and percent error;
- Understand and calculate markups and markdowns;
- Identify the parts of interest problems and how the values are related;
- Understand simple interest

**CT State / Common Core Standard(s):**
- 7.RP.3 Use proportional relationships to solve multi-step ratio, rate, and percent problems. For example: simple interest, tax, price increases and discounts, gratuities and commissions, fees, percent increase and decrease, percent error.

**Essential Question(s):**
- How can percent show proportional relationships between quantities and be used to solve problems?

**Key Terms/Concepts:**
- Percent equation
- Percent change
- Percent error
- Markup
- Markdown
- Interest rate
- Principal
- Simple interest

# LEARNING PLAN

| STANDARD | LEARNING OBJECTIVES (Content and Skill) | INSTRUCTIONAL STRATEGIES | ASSESMENT EVIDENCE |
|---|---|---|---|
| 7.RP.A.3 | 1. STEM Project: Analyze Activity Tracker Data | o Topic 3 STEM Video<br>o Group discussion<br>o Pair work for project | STEM Project document |
| 7.RP.A.2c, 7.RP.A.3 | 2. Analyze Percent of Numbers | o Solve & Discuss It! Individual work and group discussion | Topic Readiness Assessment |

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| | | o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.RP.A.2c, 7.RP.A.3** | 3. Connect Percent and Proportion | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.RP.A.3** | 4. Represent and Use the Percent Equation | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Mid Topic Assessment |
| **7.NS.A.3** | 5. Solve Percent Change and Percent Error Problems | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.RP.A.3** | 6. Solve Markup and Markdown Problems | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.RP.A.3** | 7. Solve Simple Interest Problems | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) Topic Assessment Topic Performance Assessment |
| **7.RP.A.1, 7.RP.A.2a** | 3-Act Mathematical Modeling: The Smart Shopper | o Act 1, 2 and 3 Videos<br>o 3-Act Hook, Model and the Solution and Sequel | 3-Act Modeling Activity |

**Suggested Resources and Texts:**

Student's Edition Pearson enVision Book

Additional Practice Workbook

Teaching Resources

- Reteach to Build Understanding
- Additional Vocabulary Support
- Build Mathematical Literacy
- Enrichment

- Listen and Look for PD Video

**Suggested Technology:**
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# Unit 4: Generate Equivalent Expressions

**Introduction and Established Goals:**
Throughout topic 4, students apply properties of operations to expressions in order to solve real world problems. Students will utilize a combination of the additive inverse, Commutative Property, Associative Property, and Distributive Property to identify and generate equivalent expressions to look at real-world problems in a new way.

**Desired Outcome(s):**
- Understand how variables are used to represent unknown values;
- Recognize when two expressions are equivalent;
- Combine like integer and rational terms;
- Use the Distributive Property to expand expressions;
- Identify the GCF of algebraic terms in expressions;
- Use properties of operations to add and subtract expressions

**CT State / Common Core Standard(s):**
- Use properties of operations to generate equivalent expressions.
- Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. For
- example, $4x + 2 = 2(2x + 1)$ and $-3(x - 5/3) = -3x + 5$.
- 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."
- A shirt at a clothing store is on sale for 20% off the regular price, "p". The discount can be expressed as $0.2p$. The new price for the shirt can be expressed as $p - 0.2p$ or $0.8p$.

**Essential Question(s):**
- How can properties of operations help to generate equivalent expressions that can be used in solving problems?

**Key Terms/Concepts:**
- Constants
- Variable
- Simplify
- Like/unlike terms
- Equivalent expression
- Coefficient

# LEARNING PLAN

| STANDARD | LEARNING OBJECTIVES (Content and Skill) | INSTRUCTIONAL STRATEGIES | ASSESMENT EVIDENCE |
|---|---|---|---|
| **7.EE.A.1, 7.EE.A.2** | 1. STEM Project: Analyze Activity Tracker Data | o Topic 4 STEM Video<br>o Group discussion<br>o Pair work for project | STEM Project document |
| **7.EE.B.4** | 2. Write and Evaluate Algebraic Expressions | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.A.1** | 3. Generate Equivalent Expressions | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.A.1, 7.EE.A.2** | 4. Simplify Expression | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.A.1, 7.EE.A.2** | 6. Expand Expressions | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.A.1, 7.EE.A.2** | 7. Factors & Expressions | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Mid Topic Assessment |
| **7.EE.A.1, 7.EE.A.2** | Add Expressions | o Act 1, 2 and 3 Videos<br>o 3-Act Hook, Model and the Solution and Sequel | Exit Ticket (3 key problems) |
| **7.EE.A.1, 7.EE.A.2** | Subtract Expressions | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.A.2** | Analyze Equivalent Expressions | o Solve & Discuss It! Individual work and group discussion | Topic Assessment |

| | | o Interactive videos, Try It! Problems individually <br> o Do you Understand / Do You Know How? <br> o Practice & Problem Solving | Topic Performance Assessment |
|---|---|---|---|
| **7.EE.A.1, 7.EE.A.2** | 3-Act Mathematical Modeling: I've Got You Covered | o Act 1, 2 and 3 Videos <br> o 3-Act Hook, Model and the Solution and Sequel | 3-Act Modeling Activity |

**Suggested Resources and Texts:**

Student's Edition Pearson enVision Book

Additional Practice Workbook

Teaching Resources

- Reteach to Build Understanding
- Additional Vocabulary Support
- Build Mathematical Literacy
- Enrichment
- Listen and Look for PD Video

**Suggested Technology:**

Digital projector to show daily videos and group problems

# Unit 5: Solve Problems Using Equations and Inequalities

**Introduction and Established Goals:** Throughout Topic 5, students encounter a variety of real-world problems they interpret and solve. Scenarios that represent equations will have one solution, and scenarios that represent inequalities will have more than one solution and possibly infinitely many.

**Desired Outcome(s):**
- Analyze word problems to write two-step equations; understand the relationship between the terms of the equation and the values they represent;
- Use models to solve two-step equations;
- Compare algebraic and arithmetic solutions;
- Solve equations using the Distributive Property;
- Graph the solution of inequalities on a number line;
- Solve inequalities using the Addition and Subtraction Properties of Inequality;
- Write inequalities and solve them using Multiplication and Division Properties of Inequality;
- Grade the solutions of an inequality on a number line;
- Use mathematical modeling to represent a problem situation;
- Write and solve two-step inequalities;
- Solve an inequality by multiplying or dividing by a negative rational number;
- Explore the relationship between two-step inequalities and multi-step inequalities

**CT State / Common Core Standard(s):**
- Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
- 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 10 her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9¾ inches long in the center of a door that is 27½ 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.
- 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.
- Solve word problems leading to equations of the form $px + q = r$ and $p(x \div q) = r$, 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?
- 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.

o Extend analysis of patterns to include analyzing, extending, and determining an expression for simple arithmetic and geometric sequences (e.g., compounding, increasing area), using tables, graphs, words, and expressions.

**Essential Question(s):**
- How can you solve real-world and mathematical problems with numerical and algebraic equations and inequalities?

**Key Terms/Concepts:**
- Isolate the variable
- Substitute
- Constant
- Coefficient
- Inverse
- Variable
- Reciprocal

# LEARNING PLAN

| STANDARD | LEARNING OBJECTIVES (Content and Skill) | INSTRUCTIONAL STRATEGIES | ASSESMENT EVIDENCE |
|---|---|---|---|
| **7.EE.B.3, 7.EE.B.4** | 1. STEM Project: Analyze Water is Life! | o Topic 5 STEM Video<br>o Group discussion<br>o Pair work for project | STEM Project document |
| **7.EE.B.4** | 2. Write Two-Step Equations | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.B.3, 7.EE.B.4a** | 3. Solve Two-Step Equations | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.B.3, 7.EE.B.4a** | 4. Solve Equations Using the Distributive Property | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.B.4b** | 6. Solve Inequalities Using Addition or Subtraction | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.EE.B.4b** | 7. Solve Inequalities Using Multiplication or Division | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Mid Topic Assessment |
| **7.EE.B.3, 7.EE.B.4** | 3-Act Modeling: Digital Downloads | o Act 1, 2 and 3 Videos<br>o 3-Act Hook, Model and the Solution and Sequel | 3-Act Modeling Activity |
| **7.EE.B.4b** | Solve Two-Step Inequalities | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |

| 7.EE.B.4b | Solve Multi-Step Inequalities | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Topic Assessment<br>Topic Performance Assessment |
|---|---|---|---|

**Suggested Resources and Texts:**

Student's Edition Pearson enVision Book

Additional Practice Workbook

Teaching Resources

- Reteach to Build Understanding
- Additional Vocabulary Support
- Build Mathematical Literacy
- Enrichment
- Listen and Look for PD Video

**Suggested Technology:**

Digital projector to show daily videos and group problems

# Unit 6: Use Sampling to Draw Inferences about Populations

**Introduction and Established Goals:** In Topic 6, students apply their understanding of random samples to determine if a sample is representative and they learn how to generate a random sample. Students will apply their knowledge of samples and proportional relationships to make inferences about populations, and determine if their inferences are valid. Using statistical measures, students apply knowledge about mean, mode, range, MAD and data displays to compare two representative, random populations.

**Desired Outcome(s):**
- Distinguish between a population and a sample;
- Establish wither a sample is representative of a population;
- Generate random samples;
- Make qualitative inferences from a data set;
- Make quantitative inferences from a data set;
- Make estimates about a population based on a data set;
- Use box plots to compare and make inferences about populations;
- Use the median and inter-quartile range to data sets to compare and make inferences about populations;
- Use mode, range, mean, and mean absolute deviation to compare populations.

**CT State / Common Core Standard(s):**
- Use random sampling to draw inferences about a population.
- 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.
- 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.
- Draw informal comparative inferences about two populations.
- 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 and both distributions have similar variability (mean absolute deviation) of about 5 cm. The difference between the mean heights of the two teams (10 cm) is about twice the variability (5 cm) on either team. On a dot plot, the separation between the two distributions of heights is noticeable.
- 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.

**Essential Question(s):**
- How can sampling be used to draw inferences about one more populations?

**Key Terms/Concepts:**
- Random sample
- Representative sample
- Valid inference
- Interquartile range
- Mean absolute deviation

# LEARNING PLAN

| STANDARD | LEARNING OBJECTIVES (Content and Skill) | INSTRUCTIONAL STRATEGIES | ASSESMENT EVIDENCE |
|---|---|---|---|
| **7.SP.A.1, 7.SP.A.2, 7.SP.A.3, 7.SP.A.4, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETC1-4** | 1. STEM Project: Analyze Golden Path | o Topic 6 STEM Video<br>o Group discussion<br>o Pair work for project | STEM Project document |
| **7.SP.A.1** | 2. Populations and Samples | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.SP.A.1, 7.SP.A.2, 7.RP.A.2c, 7.EE.B.3** | 3. Draw Inferences from Data | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.SP.B.3, 7.SP.B.4** | 4. Make Comparative Inferences about Populations | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.SP.B.3, 7.SP.B.4** | 6. Make More Comparative Inferences About Populations | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) Topic Assessment Topic Performance Assessment |

| 7.SP.A.1, 7.SP.A.2, 7.RP.A.3 | 3-Act Modeling: Raising Money | o Act 1, 2 and 3 Videos<br>o 3-Act Hook, Model and the Solution and Sequel | 3-Act Modeling Activity |
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**Suggested Resources and Texts:**

Student's Edition Pearson enVision Book

Additional Practice Workbook

Teaching Resources

- Reteach to Build Understanding
- Additional Vocabulary Support
- Build Mathematical Literacy
- Enrichment
- Listen and Look for PD Video

**Suggested Technology:**

Digital projector to show daily videos and group problems

# Unit 7: Probability

**Introduction and Established Goals:** Throughout Topic 7, students apply what they know about sample spaces, outcomes and probability models to find probabilities of single or compound events and use the probabilities to make decisions, predictions, and inferences.

**Desired Outcome(s):**
- Use probability to describe the likelihood that an event will occur;
- Understand theoretical probability;
- Compare theoretical and experimental probability;
- Use experimental probability to make predictions; develop a probability model to evaluate a situation;
- Use a tree diagram, a table, or an organized list to represent the sample space for a compound event;
- Use different tools to simulate a compound event.

**CT State / Common Core Standard(s):**
- Investigate chance processes and develop, use, and evaluate probability models.
- 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 ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
- 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.
- 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.
- 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.
- 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?
- Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
- 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.

- 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.
- 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 four donors to find one with type A blood?

**Essential Question(s):**
- How can you investigate chance processes and develop, use, and evaluate probability models?

**Key Terms/Concepts:**
- Outcomes
- Probability
- Event
- Theoretical probability
- Experimental probability
- Relative frequency
- Sample space
- Probability model
- Compound event
- Simulation

# LEARNING PLAN

| STANDARD | LEARNING OBJECTIVES (Content and Skill) | INSTRUCTIONAL STRATEGIES | ASSESMENT EVIDENCE |
|---|---|---|---|
| **7.SP.C.5, 7.SP.C.6, 7.SP.C.7, MS-LS2-1, MS-LS2-4, MS-ESS3-4** | 1. STEM Project: International Trending | o Topic 7 STEM Video<br>o Group discussion<br>o Pair work for project | STEM Project document |
| **7.SP.C.5, 7.EE.B.3** | 2. Understand Likelihood and Probability | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.SP.C.6, 7.RP.A.2c** | 3. Understand Theoretical Probability | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.SP.C.6, 7.SP.C.7** | 4. Understand Experimental Probability | o Solve & Discuss It! Individual work and group discussion | Exit Ticket (3 key problems) |

| | | | |
|---|---|---|---|
| | | o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | |
| **7.SP.C.7a, 7.SP.C.7b, 7.EE.B.3** | 6. Use Probability Models | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) Mid-Topic Assessment |
| **7.SP.C.5, 7.SP.C.6, 7.SP.C.7** | 3-Act Modeling: Photo Finish | o Act 1, 2 and 3 Videos<br>o 3-Act Hook, Model and the Solution and Sequel | 3-Act Modeling Activity |
| **7.SP.C.8b** | Determine Outcomes of Compound Events | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.SP.8a** | Find Probabilities of Compound Events | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.SP.C.8c** | Simulate Compound Events | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) Topic Assessment Topic Performance Assessment |

**Suggested Resources and Texts:**

Student's Edition Pearson enVision Book

Additional Practice Workbook

Teaching Resources

- Reteach to Build Understanding
- Additional Vocabulary Support
- Build Mathematical Literacy
- Enrichment
- Listen and Look for PD Video

**Suggested Technology:**

Digital projector to show daily videos and group problems

# Unit 8: Solve Problems Involving Geometry

**Introduction and Established Goals:** In Topic 8, students apply proportional reasoning to solve problems involving scales to construct scale drawings. They also use scale factors to find actual lengths and areas of real-world figures. Students will also use the formulas for the circumference and area for a circle to solve problems in real-world situations. Students find the sum of the areas of shapes to find the area of a composite figure, and the sum of the areas of multiple surfaces to find the surface area of a three-dimensional figure. Students also apply the formula for volume of a prism, which is the area of the base multiplied by the height, to solve real-world and mathematical problems.

**Desired Outcome(s):**
- Use a scale drawing as a representation of actual lengths and area;
- Sketch quadrilaterals with given conditions;
- Name and classify quadrilaterals;
- Construct triangles with given conditions;
- Calculate the measure of angles by using angle relationships;
- Calculate the circumference, radius, or diameter of a circle;
- Find the area of a circle; use the area to find the radius and diameter;
- Describe cross sections of right rectangular prisms and pyramids;
- Find the surface area of two- and three-dimensional composite shapes;
- Calculate the volume of various three-dimensional figures.

**CT State / Common Core Standard(s):**
- Draw, construct, and describe geometrical figures and describe the relationships between them.
- Solve problems involving scale drawings of geometric figures, such as computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
- Draw (freehand, with ruler and protractor, and with technology) two-dimensional 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.
- Describe the shape of the two-dimensional face of the figure that results from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
- Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
- Circles and measurement: Know that a circle is a two-dimensional shape created by connecting all of the points equidistant from a fixed point called the center of the circle.
- Understand and describe the relationships among the radius, diameter, circumference and circumference of a circle.
- Understand and describe the relationship among the radius, diameter, and area of a circle.
- 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.
- Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write simple equations and use them to solve for an unknown angle in a figure.

- 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.

**Essential Question(s):**

- How can geometry be used to solve problems?

**Key Terms/Concepts:**
- Scale drawing
- Adjacent angles
- Complementary angles
- Supplementary angles
- Vertical angle
- Circumference
- Cross section
- Composite figure
- Diameter
- Radius
- Pi

# LEARNING PLAN

| STANDARD | LEARNING OBJECTIVES (Content and Skill) | INSTRUCTIONAL STRATEGIES | ASSESMENT EVIDENCE |
|---|---|---|---|
| **7.G.A.1, 7.G.A.2** | 1. STEM Project: Upscale Design | o Topic 8 STEM Video<br>o Group discussion<br>o Pair work for project | STEM Project document |
| **7.G.A.1** | 2. Solve Problems Involving Scale Drawings | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.G.A.2** | 3. Draw Geometric Figures | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.G.A.2** | 4. Draw Triangles with Given Conditions | o Solve & Discuss It! Individual work and group discussion<br>o Interactive videos, Try It! Problems individually<br>o Do you Understand / Do You Know How?<br>o Practice & Problem Solving | Exit Ticket (3 key problems) |

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|---|---|---|---|
| **7.G.A.5** | 5. Solve Problems Using Angle Relationships | ○ Solve & Discuss It! Individual work and group discussion<br>○ Interactive videos, Try It! Problems individually<br>○ Do you Understand / Do You Know How?<br>○ Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.G.A.4, 7.EE.B.4a** | 6. Solve Problems Involving Circumference of a Circle | ○ Solve & Discuss It! Individual work and group discussion<br>○ Interactive videos, Try It! Problems individually<br>○ Do you Understand / Do You Know How?<br>○ Practice & Problem Solving | Exit Ticket (3 key problems)<br>Mid-Topic Assessment |
| **7.G.A.4, 7.EE.B.3, 7.EE.B.4a** | 7. Solve Problems Involving Area of a Circle | ○ Solve & Discuss It! Individual work and group discussion<br>○ Interactive videos, Try It! Problems individually<br>○ Do you Understand / Do You Know How?<br>○ Practice & Problem Solving | Exit Ticket (3 key problems) |
| **7.G.B.4** | 8. 3-Act Modeling: Whole Lotta Dough | ○ Act 1, 2 and 3 Videos<br>○ 3-Act Hook, Model and the Solution and Sequel | 3-Act Modeling Activity |
| **7.G.A.3** | 9. Describe Cross Sections | ○ Solve & Discuss It! Individual work and group discussion<br>○ Interactive videos, Try It! Problems individually<br>○ Do you Understand / Do You Know How?<br>○ Practice & Problem Solving | Exit Ticket (3 key problems)<br>Topic Assessment<br>Topic Performance Assessment |
| **7.G.B.6, 7.NS.A.3, 7.EE.B.3, 7.EE.B4a** | 10. Solve Problems Involving Surface Area | ○ Solve & Discuss It! Individual work and group discussion<br>○ Interactive videos, Try It! Problems individually<br>○ Do you Understand / Do You Know How?<br>○ Practice & Problem Solving | |
| **7.G.B6, 7.NS.A.3, 7.EE.B.3, 7.EE.B.4a** | 11. Solve Problems Involving Volume | ○ Solve & Discuss It! Individual work and group discussion<br>○ Interactive videos, Try It! Problems individually<br>○ Do you Understand / Do You Know How?<br>○ Practice & Problem Solving | Topic Assessment<br>Topic Performance Assessment |

**Suggested Resources and Texts:**

Student's Edition Pearson enVision Book

Additional Practice Workbook

Teaching Resources

- Reteach to Build Understanding
- Additional Vocabulary Support
- Build Mathematical Literacy

- Enrichment
- Listen and Look for PD Video

**Suggested Technology:**
Digital projector to show daily videos and group problems