



# Washington Township School District



*The mission of the Washington Township Public Schools is to provide a safe, positive, and progressive educational environment that provides opportunity for all students to attain the knowledge and skills specified in the NJ Learning Standards at all grade levels, so as to ensure their full participation in an ever-changing world as responsible, self-directed, and civic-minded citizens.*

<b>Course Title:</b>		<b>Advanced Mathematics 7</b>			
<b>Grade Level(s):</b>		<b>7<sup>th</sup> Grade</b>			
<b>Duration:</b>		<i>Full Year:</i>	✓	<i>Semester:</i>	<i>Marking Period:</i>
<b>Course Description:</b>		<p>The Accelerated Grade 7 mathematics curriculum will be an integrated curriculum of both 7<sup>th</sup> grade standards and 8<sup>th</sup> grade algebraic concepts. The goal is to help students develop mathematical reasoning, as well as an understanding of the 7<sup>th</sup> grade concepts, skills, and procedures in respect to the following areas:</p> <ul style="list-style-type: none"><li>• Developing understanding of and applying proportional relationships.</li><li>• Developing understanding of operations with rational numbers.</li><li>• Working with expressions and linear equations.</li><li>• Solving problems involving scale drawings and informal geometric constructions.</li><li>• Working with two- and three- dimensional shapes to solve problems involving area, surface area, and volume.</li><li>• Drawing inferences about populations based on samples.</li></ul> <p>With a focus on the following 8<sup>th</sup> grade algebraic concepts and skills:</p> <ul style="list-style-type: none"><li>• Formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation.</li><li>• Solving linear equations and systems of linear equations.</li><li>• Grasping the concept of a function and using functions to describe quantitative relationships.</li><li>• Analyzing two- and three- dimensional space and figures using distance, angle, similarity, congruence and understanding and applying the Pythagorean Theorem.</li></ul> <p>Subsequently, an awareness of and appreciation for the rich connections among mathematical strands as well as other disciplines will be developed. The seventh-grade mathematics curriculum development has been guided by the mathematical practice standards: All students should be able to make sense of problems and persevere in solving them, reason abstractly and quantitatively, construct viable arguments and critique the reasoning of others, model with mathematics, use appropriate tools strategically, attend to precision, look for and</p>			

	<p>make use of structure, look for and express regularity in repeated reasoning. Students should also have knowledge of and skill in the use of the vocabulary, forms of representation, materials, tools, techniques, and intellectual methods of the discipline of mathematics, including the ability to define and solve real-world problems with reason, insight, inventiveness, and technical proficiency.</p>										
<b>Grading Procedures:</b>	<p>Each semester will be a composite of quiz scores, test scores, homework, and participation reflecting a student's mastery of the areas outlined above. The student can pass the course with an overall average of 60%. The individual teacher will explain the grading system to the student.</p> <p><b><u>Grading Scale</u></b></p> <table> <tr> <td><b>A</b></td><td>90 - 100</td></tr> <tr> <td><b>B</b></td><td>80 - 89</td></tr> <tr> <td><b>C</b></td><td>70 - 79</td></tr> <tr> <td><b>D</b></td><td>60 - 69</td></tr> <tr> <td><b>F</b></td><td>0 - 59</td></tr> </table> <p><b><u>Grading Categories</u></b></p> <p><b>Major Assessments                      50%</b></p> <ul style="list-style-type: none"> <li>Summative assessments to measure proficiency of target skills</li> <li>Provides evidence of knowledge and need for recovery of learning</li> </ul> <p><i>Examples: Tests, Common Assessments</i></p> <p><b>Minor Assessments                      35%</b></p> <ul style="list-style-type: none"> <li>Formative assessments to measure proficiency of target skills</li> <li>Provides evidence of knowledge and need for recovery of learning</li> </ul> <p><i>Examples: Quizzes, Projects</i></p> <p><b>Supportive Assessments              15%</b></p> <ul style="list-style-type: none"> <li>Daily learning activities to practice / make progress towards skill proficiency</li> <li>Focuses on feedback</li> </ul> <p><i>Examples: Classwork, Homework</i></p>	<b>A</b>	90 - 100	<b>B</b>	80 - 89	<b>C</b>	70 - 79	<b>D</b>	60 - 69	<b>F</b>	0 - 59
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<b>Primary Resources:</b>	<p><a href="#">2023 New Jersey Student Learning Standards</a></p> <p><b>McGraw Hill Reveal Math Accelerated</b></p>										

# Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21st century skills for College and Career Readiness in a global society

**Designed by:**

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**Under the Direction of:**

Dr. Carole English (2022) & Allison Krzyminski (2024)

**Written:** July 2022

**Revised:** July 2024

**BOE Approval:** August 2024

**Unit Title:**

## Module 1

# Proportional Relationships

### Unit Description:

In this module, students will draw on their knowledge of ratios and rates to develop understanding of proportional relationships. They will use this understanding to build fluency with proportional relationships by representing them with tables, graphs, and equations, and finding the constant of proportionality.

**Unit Duration:** 14 days

### Desired Results

#### Standard(s):

##### 7.RP.A

*Analyze proportional relationships and use them to solve real-world and mathematical problems.*

#### Indicators:

##### 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.*

##### 7.RP.A.2

*Recognize and represent proportional relationships between quantities.*

##### 7.RP.A.3

*Use proportional relationships to solve multi-step ratio and percent problems.*

#### Understandings:

*Students will understand that...*

- Unit rates can be found when one or both quantities are fractions.
- Use of models and ratio reasoning can help you understand how a proportional relationship can exist between quantities.
- You can determine proportionality by analyzing the relationship between two quantities represented in tables.
- You can determine proportionality by analyzing the relationship between two quantities graphed on a coordinate plane.

#### Essential Questions:

*What does it mean for two quantities to be in a proportional relationship?*

*How can you find a unit rate in which one or both quantities are fractions?*

*How can organizing information in a table help you determine if the ratios between two quantities are equivalent?*

*How are the graphs of proportional and nonproportional linear relationships alike? How are they different?*

*How are equations of proportional relationships different from those of nonproportional relationships?*

<ul style="list-style-type: none"> <li>• An equation can be written to represent a proportional relationship.</li> <li>• Real world problems can be solved by applying their knowledge of proportional relationships.</li> </ul>	
Assessment Evidence	
<b>Performance Tasks:</b> <ul style="list-style-type: none"> <li>• Warm-ups</li> <li>• Exit Tickets</li> <li>• Reveal Practice Assignments</li> <li>• Formative Assessment Math Probe</li> <li>• GoFormative Assignments</li> </ul>	<b>Other Evidence:</b> <ul style="list-style-type: none"> <li>• Independent Work</li> <li>• Class Discussions</li> <li>• Online Activities</li> <li>• Practice</li> <li>• Homework</li> </ul>
<b>Benchmarks:</b> Departmental assessment for Module 1 will be developed from the following resources:  <b>On-Level Assessments (Form A)</b> <i>Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.</i>  <b>Differentiated Assessments (Form B and C)</b> <i>Form B represents the approaching-level (AL) assessment.</i> <i>Form C represents the beyond-level (BL) assessment.</i>	
Learning Plan	
<b>Learning Activities:</b>	
<b><u>Module 1-1: Unit Rates Involving Ratios of Fractions</u></b> <ul style="list-style-type: none"> <li>• <b>LAUNCH</b>  <i>Students will participate in a real-world discussion about the rate at which passenger trains can travel in Japan.</i> </li> <li>• <b>EXPLORE &amp; DEVELOP</b> <ul style="list-style-type: none"> <li>○ <b>Explore:</b> Find Unit Rates with Fractions  <i>Students will use bar diagrams to explore how to find a unit rate when one or both quantities of a given rate are fractions.</i> </li> <li>○ <b>Learn:</b> Unit Rates Involving Ratios of Fractions  <i>Students will learn how to find a unit rate that involves ratios of fractions.</i> <ul style="list-style-type: none"> <li>▪ <b>Example 1:</b> Find Unit Rates  <i>Students will find a unit rate in which one of the given quantities is a fraction.</i> </li> <li>▪ <b>Example 2:</b> Find Unit Rates  <i>Students will find a unit rate in which both of the given quantities are fractions.</i> </li> </ul> </li> <li>○ <b>Apply:</b> Kayaking  <i>Students will come up with their own strategy to solve an application problem involving kayaking.</i> </li> </ul> </li> </ul>	

- **REFLECT & PRACTICE**

- **Exit Ticket**

- Students will determine the train's average unit rate in miles per hour.*

- **Practice (SE p. 11 – 12)**

- Find unit rates that involve ratios of fractions where one quantity is a fraction (1-5)*

- Find unit rates that involve ratios of fractions where both quantities are fractions. (6-7)*

- Extend concepts learned in class to apply them in new contexts. (8)*

- Solve application problems involving unit rates. (9-10)*

- Use higher-order and critical thinking skills. (11-14)*

## **Module 1-2: Understand Proportional Relationships**

- **LAUNCH**

- Students will participate in a real-world discussion about proportional relationships between the ratio of blue paint to yellow paint to create a specific color green.*

- **EXPLORE & DEVELOP**

- **Learn: Proportional Relationships**

- Students will understand what makes a relationship between two quantities a proportional relationship.*

- **Example 1: Identify Proportional Relationships**

- Students will identify whether a relationship is proportional by determining if the ratio between the two quantities is maintained.*

- **Example 2: Identify Proportional Relationships**

- Students will identify whether a relationship is proportional by determining if the ratio between the two quantities is maintained.*

- **Apply: Construction**

- Students will come up with their own strategy to solve an application problem involving constructing a deck.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

- Students will determine if the ratios of blue paint to yellow paint form a proportional relationship.*

- **Practice (SE p. 19 – 20)**

- Determine if each situation represents a proportional relationship. (1-6)*

- Extend concepts learned in class to apply them to new contexts. (7)*

- Solve application problems involving proportional relationships. (8-9)*

## **Module 1-3: Tables of Proportional Relationships**

- **LAUNCH**

*Students will participate in a real-world discussion about proportional relationships between two car rental companies.*

- **EXPLORE & DEVELOP**

- **Explore:** Ratios in Tables

*Students will use a table to explore how to determine if the ratios between two quantities are equivalent.*

- **Learn:** Proportional Relationships and Tables

*Students will learn how to identify a proportional relationship from a table.*

- **Example 1:** Identify Proportional Relationships and Tables

*Students will identify a proportional relationship from a table.*

- **Example 2:** Identify Proportional Relationships and Tables

*Students will identify a nonproportional relationship from a table.*

- **Learn:** Identify the Constant of Proportionality

*Students will learn how to find the constant of proportionality from a table or verbal description.*

- **Example 3:** Identify the Constant of Proportionality

*Students will find the constant of proportionality from a verbal description.*

- **Example 4:** Identify the Constant of Proportionality

*Students will find the constant of proportionality from a table.*

- **Apply:** Sales Tax

*Students will come up with their own strategy to solve an application problem involving sales tax.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain how to determine which relationship is proportional.*

- **Practice (SE p. 29 – 30)**

*Identify a proportional relationship from a table. (1-2)*

*Identify a nonproportional relationship from a table. (3-4)*

*Find the constant of proportionality from a verbal description. (5-6)*

*Find the constant of proportionality from a table. (7)*

*Extend concepts learned in class to apply them in new contexts. (8)*

*Solve application problems involving proportional relationships and tables. (9-10)*

*Use higher-order and critical thinking skills. (11-14)*

## **Module 1-4: Graphs of Proportional Relationships**

- **LAUNCH**

*Students will participate in a real-world discussion about a proportional relationship between job pay and hours worked.*

- **EXPLORE & DEVELOP**

- **Explore:** Proportional Relationships, Tables and Graphs

*Students will use Web Sketchpad to explore the graphs of proportional and nonproportional linear relationships.*

- **Learn:** Proportional Relationships and Graphs

*Students will learn how to identify a proportional relationship from a graph.*

- **Example 1:** Proportional Relationships and Graphs

*Students will graph and identify a proportional relationship on the coordinate plane.*

- **Example 2:** Proportional Relationships and Graphs

*Students will graph and identify a nonproportional relationship on the coordinate plane.*

- **Learn:** Find the Constant of Proportionality from Graphs

*Students will learn how to identify the constant of proportionality from a graph.*

- **Example 3:** Find the Constant of Proportionality from Graphs

*Students will find the constant of proportionality from a graph.*

- **Explore:** Analyze Points

*Students will use Web Sketchpad to explore and analyze the points  $(0,0)$  and  $(1,r)$  on a graph of a proportional relationship.*

- **Learn:** Analyze Points on a Graph

*Students will understand the significance of the points  $(0,0)$  and  $(1,r)$  on a graph of a proportional relationship.*

- **Example 4:** Analyze Points on a Graph

*Students will identify and describe the significance of the points  $(0,0)$  and  $(1,r)$  on the graph of a proportional relationship.*

- **Apply:** Fundraising

*Students will come up with their own strategy to solve an application problem involving fundraising.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain how to determine the constant of proportionality from a graph.*



- o **Practice (SE p. 39 – 40)**

*Graph and identify a proportional relationship on the coordinate plane. (1)*

*Graph and identify a nonproportional relationship on the coordinate plane. (2)*

*Find the constant of proportionality from a graph. (3)*

*Identify and describe the significance of the points  $(0,0)$  and  $(1,r)$  on the graph of a proportional relationship. (4)*

*Solve application problems involving proportional relationships and graphs. (5)*

*Use high-order and critical thinking skills. (6-9)*

## **Module 1-5: Equations of Proportional Relationships**

- **LAUNCH**

*Students will participate in a real-world discussion about the proportional relationship of one of the fastest elevators in the world.*

- **EXPLORE & DEVELOP**

- o **Explore:** Proportional Relationships and Equations

*Students will use Web Sketchpad to explore the equations of proportional relationships.*

- o **Learn:** Identify the Constant of Proportionality in Equations

*Students will learn how to identify the constant of proportionality in equations.*

- **Example 1:** Identify the Constant of Proportionality in Equations

*Students will identify the constant of proportionality in equations.*

- o **Learn:** Proportional Relationships and Equations

*Students will learn how to write equations to represent proportional relationships.*

- **Example 2:** Proportional Relationships and Equations

*Students will write equations to represent proportional relationships.*

- **Example 3:** Proportional Relationships and Equations

*Students will write equations for proportional relationships to find a missing value.*

- o **Apply:** Running

*Students will come up with their own strategy to solve an application problem involving running.*

- **REFLECT & PRACTICE**

- o **Exit Ticket**

*Students will explain the meaning of the constant of proportionality.*

- o **Practice (SE p. 47 – 48)**

*Identify the constant of proportionality in equations. (1-2)*

*Write equations to represent the proportional relationships. (3-4)*

*Write equations for proportional relationships to find a missing value. (5-6)*

*Extend concepts learned in class to apply them in new contexts. (7)*

*Solve application problems involving proportional relationships and equations. (8-9)*

*Use higher-order and critical thinking skills. (10-13)*

o **Formative Assessment Math Probe**

*Students will determine which item(s) in each set show a proportional relationship and explain their choices.*

## **Module 1-6: Solve Problems Involving Proportional Relationships**

- **LAUNCH**

*Students will participate in a real-world discussion about using information from an infographic on the Golden Ratio to find forearm length.*

- **EXPLORE & DEVELOP**

- o **Learn: Proportions**

*Students will understand how to make a table, use a graph, or write an equation to solve problems involving proportional relationships.*

- **Example 1: Solve Problems Involving Proportional Relationships**

*Students will solve problems involving proportional relationships using a table, graph, or an equation.*

- **Example 2: Solve Problems Involving Proportional Relationships**

*Students will choose a strategy for solving a problem involving a proportional relationship, such as writing an equation.*

- o **Apply: Blood Drives**

*Students will come up with their own strategy to solve an application problem involving blood drives.*

- **REFLECT & PRACTICE**

- o **Exit Ticket**

*Students explain how to determine the length of a woman's hand if her forearm is 17 cm long.*

- o **Practice (SE p. 55 – 56)**

*Solve problems involving proportional relationships using any strategy. (1-4)*

*Extend concepts learned in class to apply them in new contexts. (5-6)*

*Solve application problems involving proportional relationships. (7-8)*

*Use higher-order and critical thinking skills. (9-12)*








## Module 1 Review

### Module 1 Assessment

#### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

### Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<div> Refer to green <b>BL</b> (<i>Beyond Level</i>) indicators in Teacher Edition and assign corresponding activities:<ul style="list-style-type: none"><li>• Beyond Level Differentiated Activities</li><li>• Extension Activities</li></ul></div> <div> Use IXL and iReady to enhance targeted skills.</div>
<b>Struggling Learners</b>	<div> Refer to orange <b>AL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:<ul style="list-style-type: none"><li>• Remediation Activities</li><li>• Extra Examples</li><li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li></ul></div> <div> Use IXL and iReady to enhance targeted skills.</div>
<b>English Language Learners</b>	<div> Refer to purple <b>ELL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:<ul style="list-style-type: none"><li>• Spanish Interactive Student Edition</li><li>• Spanish Personal Tutors</li><li>• Math Language – Building Activities</li><li>• Language Scaffolds</li><li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li><li>• Multilingual Glossary</li><li>• Audio</li><li>• Graphic Organizers</li><li>• Web Sketchpad, Desmos and eTools</li></ul></div>
<b>Special Needs Learners</b>	Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:

	<ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.

## Interdisciplinary Connections

### Indicators:

#### Health and Physical Education (Grades 6-8)

##### **2.1.8.PGD.4**

*Analyze the relationship between healthy behaviors and personal health.*

##### **2.1.8.EH.2**

*Analyze how personal attributes, resiliency and protective factors support mental and emotional health.*

#### Social Studies (Grades 6-8)

##### **6.2.8.HistoryCC.1.a**

*Describe the influence of the agricultural revolution on population growth and the subsequent development of civilizations (e.g., the impact of food surplus from farming).*

##### **6.2.8.HistoryCA.2.a**

*Analyze the factors that led to the rise and fall of various early river valley civilizations and determine whether there was a common pattern of growth and decline.*

##### **6.2.8.GeoPP.3.b**

*Explain how geography and the availability of natural resources led to both the development of classical civilizations and to their decline.*

##### **6.2.8.HistoryCC.4.b**

*Explain how and why the interrelationships among improved agricultural production, population growth, urbanization, and commercialization led to the rise of power states and kingdoms (I.e., Europe, Asia, Americas)*

##### **6.2.8.History.CC.4.c**

*Assess the demographic, economic and religious impact of the plague on Europe.*

## Science (Grades 6-8)

### **MS-PS3-1**

*Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.*

### **MS-LS2-1**

*Analyze and interpret data to provide evidence for the effects of resources availability an organism and populations of organisms in an ecosystem.*

### **MS-LS4-3**

*Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.*

### **MS-ESS3-4**

*Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's system.*

## **Integration of 21<sup>st</sup> Century Skills**

### **Indicators:**

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration and communication.*

### **Personal Financial Literacy:**

#### **9.1.8.CP.1**

*Compare prices for the same goods or services.*

### **Career & Technical Education:**

#### **9.3.12.AG.1**

*Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster.*

#### **9.3.12.AG-ANI.1**

*Analyze historic and current trends impacting the animal systems industry.*

#### **9.3.12.AG-NR.2**

*Analyze the interrelationships between natural resources and humans.*

#### **9.3.12.AC.5**

*Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.*

#### **9.3.HL-BRD.5**

*Determine processes for product design and production and how that work contributes to an understanding of the biotechnology product development process.*

#### **9.3.HT-LOD.9**

*Explain how room access policies and procedures ensure guest safety and minimize risks to the lodging facility.*

**9.3.HT-REC.10**

*Analyze the merchandising, program and product potential for different recreation, amusement and attraction venues.*

**9.3.HT-RFB.5**

*Research costs, pricing, market demands and marketing strategies to manage profitability in food and beverage service facilities.*

**9.3.HT-TT.2**

*Apply unit and time conversion skills to develop travel schedules and compute costs, distance and time (including travel time) factors.*

**9.3.HT-TT.8**

*Compare and contrast services and products from related industries to understand and evaluate how they impact the delivery of travel and tourism products and services to customers.*

**9.3.HT-TT.12**

*Select the most effective communication technique and media venue to convey travel marketing information to a target audience.*

**9.3.HU-CSM.2**

*Communicate product or equipment features that meet the needs of clients and consumers.*

**9.3.HU-CSM.3**

*Make consumer services recommendations meeting the needs of clients or customers.*

**9.3.HU-CSM.4**

*Analyze financial/economic situations when making recommendations about consumer services.*

**9.3.HU-CMH.3**

*Evaluate client motivation, strengths and weaknesses to develop a client treatment program.*

**9.3.HU-CMH.6**

*Choose appropriate counseling and therapy techniques to serve identified needs.*

**9.3.HU-ED.5**

*Evaluate safety and sanitation procedures associated with the early childhood education environment to assure compliance and prevent potential hazards.*

**9.3.HU-PC.2**

*Evaluate an individualized personal care plan that reflects client preferences, needs and interests for a course of treatment/action.*

**9.3.IT.1**

*Demonstrate effective professional communication skills and practices that enable positive customer relationships.*

**9.3.IT-WD.4**

*Demonstrate effective use of tools for digital communication production, development and project management.*

**9.3.LW.3**

*Assess and implement measures to maintain safe and healthy working conditions in a law, public safety, corrections and/or security environment.*

**9.3.LW-ENF.14**

*Describe the behavioral symptoms of drug use and the inherent dangers associated with handling dangerous drugs.*

**9.3.LW-SEC.10**

*Explain the application of risk management principles to the protection of assets in various settings.*

**9.3.MN.2**

*Analyze and summarize how manufacturing businesses improve performance.*

**9.3.MK-COM.5**

*Communicate information about products, services, images and/or ideas to achieve a desired outcome.*

**9.3.ST-SM.1**

*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

**9.3.ST-SM.3**

*Analyze the impact that science and mathematics has on society.*

**Life Literacies and Key Skills:**

**9.4.8.TL.1**

*Construct a spreadsheet in order to analyze multiple data sets, identify relationships and facilitate data-based decision-making.*

**9.4.8.TL.3**

*Select appropriate tools to organize and present information digitally.*

Unit Title:

## Module 2

# Solve Percent Problems

### Unit Description:

In this module, students will draw on their understanding of proportional relationships to build fluency with using ratio reasoning and properties of operations to solve algebraic equations involving percents. They apply their fluency to solve multi-step ratio and percent problems.

Unit Duration: 11 days

### Desired Results

#### Standard(s):

##### 7.RP.A

*Analyze proportional relationships and use them to solve real-world and mathematical problems.*

##### 7.EE.A

*Use properties of operations to generate equivalent expressions.*

##### 7.EE.B

*Solve real-life and mathematical problems using numerical and algebraic expressions and equations.*

#### Indicators:

##### 7.RP.A.3

*Use proportional relationships to solve multi-step ratio and percent problems.*

##### 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.*

##### 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.*

#### Climate Change Example:

*Students may solve multi-step real-life problems posed with positive and negative rational numbers in any form related to the relationship between altitude and the temperature above sea level.*



<p><b>Understandings:</b>  <i>Students will understand that...</i></p> <ul style="list-style-type: none"> <li>• You can solve problems involving percent of increase and percent of decrease.</li> <li>• You can solve multi-step ratio and percent problems involving taxes.</li> <li>• You can solve multi-step ratio and percent problems involving tips and markups.</li> <li>• You can solve multi-step ratio and percent problems involving discounts.</li> <li>• You can solve problems involving simple interest.</li> <li>• You can solve problems involving commission and fees.</li> <li>• You can solve problems involving percent error.</li> </ul>	<p><b>Essential Questions:</b></p> <p><i>What does it mean for two quantities to be in a proportional relationship?</i></p> <p><i>How can you find a unit rate in which one or both quantities are fractions?</i></p> <p><i>How can organizing information in a table help you determine if the ratios between two quantities are equivalent?</i></p> <p><i>How are the graphs of proportional and nonproportional linear relationships alike? How are they different?</i></p> <p><i>How are equations of proportional relationships different from those of nonproportional relationships?</i></p>
<p><b>Assessment Evidence</b></p>	
<p><b>Performance Tasks:</b></p> <ul style="list-style-type: none"> <li>• Warm-ups</li> <li>• Exit Tickets</li> <li>• Reveal Practice Assignments</li> <li>• Formative Assessment Math Probe</li> <li>• GoFormative Assignments</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>• Independent Work</li> <li>• Class Discussions</li> <li>• Online Activities</li> <li>• Practice</li> <li>• Homework</li> </ul>
<p><b>Benchmarks:</b>  Departmental assessment for Module 2 will be developed from the following resources:</p> <p><b>On-Level Assessments (Form A)</b>  <i>Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.</i></p> <p><b>Differentiated Assessments (Form B and C)</b>  <i>Form B represents the approaching-level (AL) assessment.</i>  <i>Form C represents the beyond-level (BL) assessment.</i></p>	
<p><b>Learning Plan</b></p>	
<p><b>Learning Activities:</b></p> <p><b>Formative Assessment Math Probe</b> <i>(Use in Beginning, Middle or End of Module)</i>  <i>Students will determine the best choice for an estimate for each item (without calculating) and explain their choices.</i></p>	

## **Module 2-1: Percent of Change**

- **LAUNCH**

*Students will participate in a real-world discussion about inflation of ticket prices as a percent of change.*

- **EXPLORE & DEVELOP**

- **Explore:** Percent of Change

*Students will use bar diagrams to explore percent of change.*

- **Learn:** Percent of Increase

*Students will understand how percent of change (increase) compares the change in quantity to the original amount.*

- **Example 1:** Percent of Increase

*Students will find the percent of increase in a real-world context (student enrollment).*

- **Example 2:** Percent of Increase

*Students will find the percent of increase in a real-world context (cost of gas).*

- **Learn:** Percent Decrease

*Students will understand how percent of change (decrease) compares the change in quantity to the original amount.*

- **Example 3:** Percent of Decrease

*Students will find the percent of decrease in a real-world context (volume of liquid).*

- **Apply:** Movies

*Students will come up with their own strategy to solve an application problem involving the change in the length of movies over time.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine if the percent of change in movie ticket prices between 1985 and 2000 will be the same as the percent change in movie ticket prices between 2000 and 2015.*

- **Practice (SE p. 71 – 72)**

*Find the percent of change. (1-3)*

*Find the percent of increase. (4-7)*

*Find the percent of decrease. (8-9)*

*Extend concepts learned in class to apply them in new contexts. (10)*

*Solve application problems involving the percent of change. (11-12)*

*Use higher-order and critical thinking skills. (13-16)*

## **Module 2-2: Tax**

- **LAUNCH**

*Students will participate in a real-world discussion about taxes and how they are related to percents.*

- **EXPLORE & DEVELOP**

- **Explore: Sales Tax**

*Students will use Web Sketchpad to explore how sales tax affects the total cost of an item.*

- **Learn: Sales Tax**

*Students will learn how to find sales tax.*

- **Example 1: Sales Tax**

*Students will find the total cost for an item given the item's cost and the percent of sales tax.*

- **Example 2: Hotel Tax**

*Students will find the total cost of a hotel room given the cost of the room and the percent of tax.*

- **Example 3: Sale Tax**

*Students will find the total cost of an item given the item's cost and the percent of sales tax.*

- **Apply: Shopping**

*Students will come up with their own strategy to solve an application problem involving the total cost of a purchase at a grocery store.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine the total cost of all items (school supplies and lunch meat) including sales tax.*

- **Practice (SE p. 81 – 82)**

*Find the total cost for an item given the item's cost and percent of sales tax. (1-3)*

*Find the total cost for an item given the item's cost and the percent of sales tax. (4-5, 8-9)*

*Find the total cost of a hotel room with the hotel room tax. (6-7)*

*Solve application problems involving tax. (10-11)*

*Use higher-order and critical thinking skills. (12-15)*

## **Module 2-3: Tips and Markups**

- **LAUNCH**

*Students will participate in a real-world discussion about tips for services in everyday life.*

- **EXPLORE & DEVELOP**

- **Learn: Tips**

- Students will understand that tips are usually based on a percent of the service provided.*

- **Example 1: Tips**

- Students will find the total cost of a services including a percent tip.*

- **Learn: Markup**

- Students will understand that the selling price of an item is equal to the item's wholesale cost plus the percent markup.*

- **Example 2: Markup**

- Students will find the selling price of an item given the wholesale cost of an item and percent markup.*

- **Example 3: Markup**

- Students will find the percent of markup of an item given the selling price and the wholesale cost.*

- **Apply: Dining Out**

- Students will come up with their own strategy to solve an application problem involving tips.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

- Students will find the total amount needed to pay for lunch.*

- **Practice (SE p. 29 – 30)**

- Find the total cost including a tip or markup based on a percent. (1-3)*

- Find the total cost of a service including a tip based on a percent. (4-5)*

- Find the selling price of an item given the wholesale cost of an item and a markup based on a percent. (6-7)*

- Find the percent of markup on an item given the selling price of an item and the wholesale cost. (8-9)*

- Extend concepts learned in class to apply them in new contexts. (10)*

- Solve application problems involving tips or markups. (11-12)*

- Use higher-order and critical thinking skills. (13-16)*

## **Module 2-4: Discounts**

- **LAUNCH**

- Students will participate in a real-world discussion about discounts.*

- **EXPLORE & DEVELOP**

- o **Learn: Discounts**

*Students will understand that a discount is an amount by which the price of an item is decreased and is often represented as a percent of the original price.*

- **Example 1: Discounts**

*Students will find the sale price of an item given the original cost and a percent discount.*

- **Example 2: Combined Discounts**

*Students will find the sale price of an item given the original cost and more than one discount applied.*

- **Example 3: Find the Original Price**

*Students will find the original price given the percent discount and the sale price.*

- o **Apply: Shopping**

*Students will come up with their own strategy to solve an application problem that involves comparing prices after a discount.*

- **REFLECT & PRACTICE**

- o **Exit Ticket**

*Students will explain how to determine if they have enough money to buy a T-shirt before tax.*

- o **Practice (SE p. 97 – 98)**

*Find the sale price of an item given the original cost and a discount based on a percent. (1-5)*

*Find the sale price of an item given the original cost and more than one discount based on a percent. (6-7)*

*Find the original price given the percent discount and the sale price. (8-9)*

*Extend concepts learned in class to apply them in new contexts. (10)*

*Solve application problems involving discounts. (11-12)*

*Use high-order and critical thinking skills. (13-16)*

## **Module 2-5: Interest**

- **LAUNCH**

*Students will participate in a real-world discussion about interest.*

- **EXPLORE & DEVELOP**

- o **Explore: Interest**

*Students will use Web Sketchpad to explore the simple interest formula.*

- o **Learn: Simple Interest**

*Students will understand what simple interest is and learn how to use the simple interest formula.*

- **Example 1: Find Simple Interest**

*Students will use an annual simple interest rate to find the amount of simple interest*

*owed when the time is written as a whole number.*

- **Example 2:** Find Simple Interest

*Students will use an annual simple interest rate to find the amount of simple interest owed when the time is written as a fraction.*

- **Example 3:** Find Simple Interest

*Students will use an annual simple interest rate to find the amount of simple interest owed when the rate is written as a fraction.*

- **Apply:** Car Shopping

*Students will come up with their own strategy to solve an application problem that involves purchasing a car.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine which account will pay more to deposit over the course of a year.*

- **Practice (SE p. 105 – 106)**

*Use an annual simple interest rate to find the amount of simple interest owed when time is written as a whole number. (1-5)*

*Use an annual simple interest rate to find the amount of simple interest owed when time is written as a fraction. (6-7)*

*Use an annual simple interest rate to find the amount of simple interest owed when the rate is written as a fraction. (8-9)*

*Extend concepts learned in class to apply them in new contexts. (10)*

*Solve application problems involving simple interest. (11-12)*

*Use higher-order and critical thinking skills. (13-16)*

## **Module 2-6: Commission and Fees**

- **LAUNCH**

*Students will participate in a real-world discussion about wages paid as commission.*

- **EXPLORE & DEVELOP**

- **Learn:** Commission and Fees

*Students will understand what commission and fees are, and how they are often calculated using percents.*

- **Example 1:** Find Commission

*Students will find the amount of commission, given the total sales and percent of commission.*

- **Example 2:** Find the Amount of Sales

*Students will find the total amount of sale, given the amount of commission and the*

*percent of commission.*

- **Example 3: Fees**

*Students will find the amount of a fee, given the conditions on which the fee is based and the percent of the fee.*

- **Apply: Personal Finance**

*Students will come up with their own strategy to solve an application problem that involves commission rates.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine weekly pay given a base salary plus commission of sale per week.*

- **Practice (SE p. 105 – 106)**

*Find the amount of commission given total sales and the percent commission. (1-2)*

*Find the total amount of sales given the amount of commission and the percent commission. (3-5)*

*Find the amount of a fee given the amount on which the fee is based and the percent of the fee. (6-8)*

*Solve application problems involving commission or fees. (9-10)*

*Use higher-order and critical thinking skills. (11-14)*

## **Module 2-7: Percent Error**

- **LAUNCH**

*Students will participate in a real-world discussion about using a percent to compare an estimate to an actual value in everyday life situations.*

- **EXPLORE & DEVELOP**

- **Explore: Percent Error**

*Students will use Web Sketchpad to explore percent error.*

- **Learn: Percent Error**

*Students will understand that percent error can help them compare the inaccuracy of an estimate, or amount of error, to the actual amount.*

- **Example 1: Percent Error**

*Students will find the percent error given the estimated value and the actual amount.*

- **Apply: Sports**

*Students will come up with their own strategy to solve an application problem involving percent error of estimating the number of wins a sports team will have in a season.*

- **REFLECT & PRACTICE**








- o **Exit Ticket**  
*Students explain how to determine the percent error from an estimated number of jellybeans in a jar.*
- o **Practice (SE p. 119 – 120)**  
*Find the percent error given the estimated value and the actual amount. (1-7)*  
  
*Extend concepts learned in class to apply them in new contexts. (8)*  
  
*Solve application problems involving percent error. (9-10)*  
  
*Use higher-order and critical thinking skills. (11-14)*

## Module 2 Review

## Module 2 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

Unit Modifications for Special Population Students	
<b>Advanced Learners</b>	 Refer to green <b>BL</b> ( <i>Beyond Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Beyond Level Differentiated Activities</li> <li>• Extension Activities</li> </ul>   Use IXL and iReady to enhance targeted skills.
<b>Struggling Learners</b>	 Refer to orange <b>AL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Remediation Activities</li> <li>• Extra Examples</li> <li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li> </ul>   Use IXL and iReady to enhance targeted skills.
<b>English Language Learners</b>	 Refer to purple <b>ELL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> </ul>



	<ul style="list-style-type: none"> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	<p>Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.</p>

### Interdisciplinary Connections

#### Indicators:

#### Social Studies (Grades 6-8):

##### **6.1.8.EconET.4.a**

*Analyze the debates involving the National Bank, uniform currency and tariffs and determine the extent to which each of these economic tools met the economic challenges facing the new nation.*

### Integration of 21<sup>st</sup> Century Skills

#### Indicators:

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and critical thinking.*

#### Personal Financial Literacy:

**9.1.8.CDM.1**

*Compare and contrast the use of credit cards and debit cards for specific purchases and the advantages and disadvantages of using each.*

**9.1.8.CDM.2**

*Demonstrate an understanding of the terminology associated with different types of credit (e.g. credit cards, installment loans, mortgages, lines of credit, etc.) and compare and calculate the interest rates associated with each.*

**9.1.8.CDM.3**

*Compare and contrast loan management strategies, including interest charges and total principal repayment costs.*

**9.1.8.CDM.4**

*Evaluate the application process for different types of loans (e.g. credit card, mortgage, student loans, etc.).*

**9.1.8.CP.2**

*Analyze how spending habits affect one's ability to save.*

**9.1.8.CP.5**

*Compare the financial products and services available to borrowers relative to their credit worthiness.*

**9.1.8.EG.1**

*Explain how taxes affect disposable income and the difference between net and gross income.*

**9.1.8.EG.2**

*Explain why various sources of income are taxed differently.*

**9.1.8.FI.1**

*Identify the factors to consider when selecting various financial service providers.*

**9.1.8.FI.3**

*Evaluate the most appropriate financial institutions to assist with meeting various personal financial needs and goals.*

**9.1.8.FI.4**

*Analyze the interest rates and fees associated with financial products.*

**9.1.8.FP.5**

*Determine how spending, investing, and using credit wisely contributes to financial well being.*

**9.1.8.FP.7**

*Identify the techniques and effects of deceptive advertising.*

**9.1.8.PB.3**

*Explain how to create a budget that aligns with financial goals.*

**9.1.8.PB.4**

*Construct a simple personal savings and spending plan based on various sources of income and different stages of life (e.g. teenager, young adult, family, etc.)*

**9.1.8.PB.5**

*Identify factors that affect one's goals, including peers, culture, location, and past experiences.*

**9.1.8.PB.6**

*Construct a budget to save for short-term, long term and charitable goals.*

**9.1.8.PB.7**

*Brainstorm techniques that will help decrease expenses including comparison shopping, negotiating, and day-to-day expense management.*

**Career Awareness, Exploration, Preparation, and Training:**

**9.2.8.CAP.20**

*Identify the items to consider when estimating the cost of funding a business.*

**Career & Technical Education:**

**9.3.12.AG-BIZ.3**

*Manage cash budgets, credit budgets and credit for an AFNR business usually generally accepted accounting principles.*

**9.3.12.FN-BNK.3**

*Manage the use of financial resources to enhance banking performance.*

**9.3.12.FN-BF.4**

*Employ risk-management strategies and techniques in corporate finance to minimize business loss.*

**9.3.12.FN-INS.5**

*Determine client needs and wants and respond through planned, personalized communication to guide purchase decisions and enhance future insurance business opportunities.*

**9.3.12.FN-SEC.5**

*Determine client needs and wants and respond through planned, personalized communication to guide purchase decisions and enhance future securities and investments opportunities.*

**9.3.HT-REC.7**

*Compare different ticket sales options to maximize revenue for recreation, amusement and attraction venues.*

**9.3.HT-RFB.5**

*Research costs, pricing, market demands and marketing strategies to manage profitability in food and beverage service facilities.*

**Unit Title:**

## Module 3

# Operations with Integers and Rational Numbers

### Unit Description:

In this module, students will draw on their knowledge of rational numbers (gained in Grade 6) to develop *understanding* of operations with integers and rational numbers. They use this understanding to build *fluency* with rational number operations and the order of operations. They will *apply* their fluency to solve multi-step problems involving integers and rational numbers.

**Unit Duration:** 14 days

### Desired Results

#### Standard(s):

##### 7.NS.A

*Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.*

##### 7.EE.B

*Solve real-life and mathematical problems using numerical and algebraic expressions and equations.*

#### Indicators:

##### 7.NS.A.1

*Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.*

##### 7.NS.A.2

*Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.*

##### 7.NS.A.3

*Solve real-world and mathematical problems involving the four operations with rational numbers.*

*(Clarification: Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)*

#### Climate Change Example:

*Students may solve real-world problems involving the four operations with rational numbers related to the relationship between altitude and the temperature above sea level.*

##### 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 computation and estimation strategies.*

**For example:** If a woman making \$25 an hour gets a 10% raise, she will make an additional  $\frac{1}{10}$  of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar  $9\frac{3}{4}$  inches long in the center of a door that is  $27\frac{1}{2}$  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.

**🌱 Climate Change Example:**

*Students may solve multi-step real-life problems posed with positive and negative rational numbers in any form related to the relationship between altitude and the temperature above sea level.*

**Understandings:**

*Students will...*

- Solve problems adding integers.
- Solve problems subtracting integers.
- Solve problems multiplying integers.
- Solve problems dividing integers.
- Solve problems by applying all operations to integers.
- Identify terminating and repeating decimals and use long division to convert rational numbers to decimals.
- Demonstrate application of the additive inverse and an understanding of addition and subtraction of rational numbers.
- Apply understanding of multiplication and division to rational numbers and use the order of operations to solve real-world problems.
- Apply understanding of the four operations with rational numbers to evaluate mathematical expressions.

**Essential Questions:**

*How are operations with rational numbers related to operations with integers?*

*How can algebra tiles be used to model integer addition?*

*How can you use algebra tiles to model integer subtraction?*

*How can you use algebra tiles to model integer division?*

*How can you determine the sign of the product of two integers?*

*What are the patterns in the decimal form of a rational number?*

*How can you extend concepts learned in class to apply them in new contexts?*

**Assessment Evidence**

**Performance Tasks:**

- Warm-ups
- Exit Tickets
- Reveal Practice Assignments
- Formative Assessment Math Probe
- GoFormative Assignments

**Other Evidence:**

- Independent Work
- Class Discussions
- Online Activities
- Practice
- Homework

**Benchmarks:**

Departmental assessment for Module 3 will be developed from the following resources:

**On-Level Assessments (Form A)**

*Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.*

**Differentiated Assessments (Form B and C)**

*Form B represents the approaching-level (AL) assessment.*

*Form C represents the beyond-level (BL) assessment.*

## Learning Plan

**Learning Activities:****Module 3-1: Add Integers**

- **LAUNCH**

*Students will participate in a real-world discussion about integers as they relate to football.*

- **EXPLORE & DEVELOP**

- **Explore:** Use Algebra Tiles to Add Integers

*Students will use algebra tiles to explore how to add integers.*

- **Learn:** Add Integers with the Same Sign

*Students will understand that they can use a number line to add integers with the same sign.*

- **Example 1:** Add Integers with the Same Sign

*Students will add integers with the same sign.*

- **Example 2:** Add Integers with the Same Sign.

*Students will add integers with the same sign to solve a real-world problem.*

- **Learn:** Find Additive Inverses

*Students will understand that an integer and its opposite are called additive inverses, and their sum is zero.*

- **Example 3:** Find Additive Inverses

*Students will find the additive Inverse of an integer in a real-world context.*

- **Learn:** Add Integers with Different Signs

*Students will understand that they can use a number line to add integers with different signs.*

- **Example 4:** Add Integers with Different Signs

*Students will add integers with different signs.*

- **Example 5:** Add Integers with Different Signs

*Students will add integers with different signs to solve a real-world problem.*

- **Example 6:** Add Three or More Integers

*Students will add three or more integers.*

- **Example 7:** Add Three or More Integers  
*Students will add three or more integers to solve a real-world problem.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will determine the number of yards a team has moved the ball on two plays.*
- **Practice (SE p. 137 – 138)**  
*Add integers with the same sign. (1-2)*  
  
*Add integers with different signs. (3-4)*  
  
*Add three or more integers. (5-6)*  
  
*Add integers with the same sign to solve a real-world problem. (7-8)*  
  
*Find the additive inverse of an integer in a real-world context. (9-10)*  
  
*Practice adding integers with different signs to solve a real-world problem. (11-12)*  
  
*Add three or more integers to solve a real-world problem. (13)*  
  
*Extend concepts learned in class to apply them in new contexts. (14)*  
  
*Solve application problems involving adding integers. (15-16)*  
  
*Use higher-order and critical thinking skills. (17-20)*

## **Module 3-2: Subtract Integers**

- **LAUNCH**  
*Students will participate in a real-world discussion about integers using an infographic.*
- **EXPLORE & DEVELOP**
  - **Explore:** Use Algebra Tiles to Subtract Integers  
*Students will use algebra tiles to explore how to subtract integers.*
  - **Learn:** Subtract Integers  
*Students will understand that they can use a number line to subtract integers.*
    - **Example 1:** Subtract Integers  
*Students will subtract a negative integer from a positive integer.*
    - **Example 2:** Subtract Integers  
*Students will subtract a negative integer from a negative integer.*
    - **Example 3:** Subtract Expressions  
*Students will evaluate an algebraic expression that involves subtracting integers.*

- **Explore:** Find Distance on a Number Line  
*Students will explore how the distance between integers on a number line is related to their difference.*
- **Learn:** Find the Distance Between Integers  
*Students will learn how to find the distance between two integers on a number line.*
  - **Example 4:** Find the Distance Between Integers  
*Students will find the distance between two integers on a number line.*
  - **Example 5:** Find the Distance Between Integers  
*Students will find the distance between two integers to solve a real-world problem.*
- **Apply:** The Solar System  
*Students will come up with their own strategy to solve an application problem involving temperature of celestial objects.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will explain how to find the distance between the elevations above sea level in New Orleans and Britton Hill.*
- **Practice (SE p. 147 – 148)**  
*Subtract integers. (1-9)*  
  
*Evaluate algebraic expressions involving subtraction. (10-11)*  
  
*Find the distance between two integers on a number line. (12-13)*  
  
*Find the distance between two integers to solve a real-world problem. (14)*  
  
*Extend concepts learned in class to apply them to new contexts. (15)*  
  
*Solve application problems that involve subtracting integers. (16-17)*  
  
*Use higher-order and critical thinking skills. (18-21)*

## Module 3-3: Multiply Integers

- **LAUNCH**  
*Students will participate in a real-world discussion about hair growth and hair loss.*
- **EXPLORE & DEVELOP**
  - **Explore:** Use Algebra Tiles to Multiply Integers  
*Students will use algebra tiles to explore how to multiply integers.*
  - **Learn:** Multiply Integers with Different Signs  
*Students will understand how a number line and repeated addition can be used to multiply integers with different signs.*



- **Example 1:** Multiply Integers with Different Signs  
*Students will multiply integers with different signs.*
- **Example 2:** Multiply Integers with Different Signs  
*Students will multiply integers with different signs to solve a real-world problem.*
- **Learn:** Multiply Integers with the Same Sign  
*Students will use patterns to understand that the product of two integers with the same sign is positive.*
  - **Example 3:** Multiply Integers with the Same Sign  
*Students will multiply integers with the same sign.*
  - **Example 4:** Multiply Integers with the Same Sign  
*Students will evaluate an algebraic expression that involves multiplying integers.*
  - **Example 5:** Multiply Three or More Integers  
*Students will multiply three or more integers.*
  - **Example 6:** Multiply Three or More Integers  
*Students will evaluate an algebraic expression that involves multiplying three or more integers.*
- **Learn:** Use Properties to Multiply Integers  
*Students will understand how the properties of operations can be applied to multiply integers.*
- **Apply:** Agriculture  
*Students will come up with their own strategy to solve an application problem involving revenue, expenses, and savings for a farm.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will explain how to determine what integer represents the change in amount of dog hair loss per week.*
- **Practice (SE p. 157 – 158)**  
*Multiply integers. (1-9)*  
  
*Evaluate algebraic expressions involving multiplication of two integers. (10-11)*  
  
*Evaluate algebraic expressions involving multiplication of three or more integers. (12-13)*  
  
*Multiply integers with different signs to solve a real-world problem. (14)*  
  
*Extend concepts learned in class to apply them in new contexts. (15)*  
  
*Solve application problems involving multiplying integers. (16-17)*  
  
*Use higher-order and critical thinking skills. (18-21)*

## **Module 3-4: Divide Integers**

- **LAUNCH**

*Students will participate in a real-world discussion about changes in temperatures as related to integers.*

- **EXPLORE & DEVELOP**

- **Explore:** Use Algebra Tiles to Divide

*Students will use algebra tiles to explore how to divide integers.*

- **Learn:** Divide Integers with Different Signs

*Students will understand how they can use related multiplication sentences to determine how to divide integers with different signs.*

- **Example 1:** Divide Integers with Different Signs

*Students will divide integers with different signs.*

- **Example 2:** Divide Integers with Different Signs

*Students will divide integers with different signs to solve a real-world problem.*

- **Learn:** Divide Integers with the Same Sign

*Students will understand how they can use related multiplication sentences to determine how to divide integers with the same sign.*

- **Example 3:** Divide Integers with the Same Sign

*Students will divide integers with the same sign.*

- **Example 4:** Divide Integers with the Same Sign

*Students will evaluate an algebraic expression involving division of integers.*

- **Apply:** Persona Finance

*Students will come up with their own strategy to solve an application problem involving managing a bank account.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain how to determine the average change in temperature per hour.*

- **Practice (SE p. 165 – 166)**

*Divide integers with different signs. (1-3)*

*Divide integers with the same sign. (4-6)*

*Evaluate algebraic expressions involving division of integers. (7-12)*

*Divide integers with different signs to solve real-world problems. (13)*

*Extend concepts learned in class to apply them in new contexts. (14)*

*Solve application problems involving dividing integers. (15-16)*

*Use high-order and critical thinking skills. (17-20)*

- **Formative Assessment Math Probe**

*Students will determine whether each simplified expression is positive or not, without actually calculating.*

## **Module 3-5: Apply Integer Operations**

- **LAUNCH**

*Students will participate in a real-world discussion about using the order of integer operations with temperature change.*

- **EXPLORE & DEVELOP**

- **Example 1: Order of Integer Operations**

*Students will apply the order of operations to evaluate a numerical expression involving integers.*

- **Example 2: Order of Integer Operations**

*Students will apply the order of operations to evaluate a numerical expression involving integers.*

- **Example 3: Order of Integer Operations**

*Students will evaluate an algebraic expression involving the four operations with integers.*

- **Example 4: Order of Integer Operations**

*Students will solve a real-world problem involving operations with integers.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain the meaning of the constant of proportionality.*

- **Practice (SE p. 169 – 170)**

*Apply the order of operations to evaluate numerical expressions involving integers. (1-6)*

*Evaluate algebraic expressions involving the four operations with integers. (7-12)*

*Solve real-world problems involving operations with integers. (13-14)*

*Solve application problems that involve applying integer operations. (15-16)*

*Use higher-order and critical thinking skills. (17-20)*

## **Module 3-6: Rational Numbers**

- **LAUNCH**

*Students will participate in a real-world discussion about finding the batting average as a decimal.*

- **EXPLORE & DEVELOP**

- **Explore:** Rational Numbers Written as Decimals  
*Students will use Web Sketchpad to explore how to convert a rational number to a decimal.*
- **Learn:** Rational Numbers  
*Students will learn how to identify rational numbers.*
- **Learn:** Rational Numbers Written as Decimals  
*Students will understand that the decimal form of a rational number either terminates in 0s or eventually repeats.*
  - **Example 1:** Write Fractions as Decimals  
*Students will use long division to convert a fraction to a decimal and determine if the decimal is terminating.*
  - **Example 2:** Write Fractions as Decimals  
*Students will use long division to convert a fraction to a decimal and determine if the decimal is terminating.*
- **Learn:** Write Repeating Decimals as Fractions  
*Students will learn how to convert repeating, non-terminating decimals into fractions.*
  - **Example 3:** Write Repeating Decimals as Fractions  
*Students will write repeating, non-terminating decimals as fractions in simplest form.*
  - **Example 4:** Write Repeating Decimals as Mixed Numbers  
*Students will write repeating, non-terminating decimals as mixed numbers in simplest form.*
- **Apply:** Crafting  
*Students will come up with their own strategy to solve an application problem involving the sizes of different signs at a craft show.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will determine a baseball player's batting average given  $a$  hits and  $b$  at-bats.*
- **Practice (SE p. 179 – 180)**  
*Use long division to convert a fraction to a decimal and determine if the decimal is terminating. (1-6)*  
  
*Write repeating decimals as fractions and mixed numbers. (7-10)*  
  
*Extend concepts learned in class to apply them in new contexts. (11)*  
  
*Solve application problems involving rational numbers. (12-13)*  
  
*Use higher-order and critical thinking skills. (14-17)*

## **Module 3-7: Add and Subtract Rational Numbers**

- **LAUNCH**

*Students will participate in a real-world discussion about finding changes in temperature.*

- **EXPLORE & DEVELOP**

- **Learn:** Rational Numbers and Additive Inverses

*Students will learn how to find the additive inverse of a rational number.*

- **Example 1:** Find Additive Inverses

*Students will find the additive inverse of rational numbers.*

- **Example 2:** Find Additive Inverses

*Students will find the additive inverse of rational numbers.*

- **Learn:** Add Rational Numbers

*Students will understand that they can apply what they know about adding fractions, decimals, and integers to the set of rational numbers.*

- **Example 3:** Add Rational Numbers

*Students will add rational numbers written as like fractions and mixed numbers.*

- **Example 4:** Add Rational Numbers

*Students will add rational numbers written in different forms.*

- **Example 5:** Add Rational Numbers

*Students will add four rational numbers written in different forms to solve a real-world problem.*

- **Learn:** Subtract Rational Numbers

*Students will learn how to subtract rational numbers.*

- **Example 6:** Subtract Rational Numbers

*Students will subtract rational numbers written as decimals.*

- **Example 7:** Subtract Rational Numbers

*Students will subtract rational numbers written as unlike fractions and mixed numbers.*

- **Example 8:** Evaluate Expressions

*Students will evaluate an algebraic expression involving subtraction of rational numbers.*

- **Apply:** Animal Care

*Students will come up with their own strategy to solve an application problem involving the change in weight of a cat.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain how to determine how to find the change in temperature.*

- o **Practice (SE p. 193 – 194)**

*Find the additive inverse of rational numbers. (1-5)*

*Add rational numbers. (6-10)*

*Subtract rational numbers written as decimals. (11-14)*

*Solve a real-world problem involving addition of rational numbers (15)*

*Extend concepts learned in class to apply them in new contexts. (16)*

*Solve application problems involving adding and subtracting rational numbers. (17-18)*

*Use higher-order and critical thinking skills. (19-22)*

## **Module 3-8: Multiply and Divide Rational Numbers**

- **LAUNCH**

*Students will participate in a real-world discussion about multiplying quantities in a recipe to serve more people.*

- **EXPLORE & DEVELOP**

- o **Learn: Multiply Rational Numbers**

*Students will understand that they can apply what they know about multiplying fractions, decimals, and integers to the set of rational numbers.*

- **Example 1: Multiply Rational Numbers**

*Students will multiply rational numbers written as fractions.*

- **Example 2: Multiply Rational Numbers**

*Students will multiply rational numbers written as mixed numbers.*

- o **Learn: Multiply Rational Numbers**

*Students will understand when it is more efficient to write numbers as fractions or decimals when multiplying rational numbers written in different forms.*

- **Example 3: Multiply Rational Numbers**

*Students will multiply rational numbers written in different forms.*

- **Example 4: Multiply Rational Numbers**

*Students will evaluate an algebraic expression involving multiplication of rational numbers.*

- **Example 5: Multiply Rational Numbers**

*Students will evaluate an algebraic expression involving different forms of rational numbers.*

- o **Learn: Divide Rational Numbers**

*Students will understand that they can apply what they know about dividing fractions,*

*decimals, and integers to the set of rational numbers.*

- **Example 6:** Divide Rational Numbers  
*Students will divide rational numbers written as fractions.*

- **Example 7:** Divide Rational Numbers  
*Students will divide rational numbers written as mixed numbers.*

- **Learn:** Divide Rational Numbers  
*Students will understand when it is more efficient to write numbers as fractions or decimals when dividing rational numbers written in different forms.*
- **Example 8:** Divide Rational Numbers  
*Students will evaluate an algebraic expression involving division of rational numbers.*
- **Apply:** Temperature  
*Students will come up with their own strategy to solve an application problem involving a city's change in temperature overnight.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will explain how to determine the amount of cooked pasta you will need if you triple the recipe.*
- **Practice (SE p. 207 – 208)**  
*Multiply rational numbers. (1-4)*  
  
*Divide rational numbers (5-9)*  
  
*Evaluate algebraic expressions involving multiplication of rational numbers. (10-12)*  
  
*Evaluate algebraic expressions involving division of rational numbers. (13-14)*  
  
*Extend concepts learned in class to apply them in new contexts. (15)*  
  
*Solve application problems involving multiplying rational numbers. (16-17)*  
  
*Use high-order and critical thinking skills. (17-20)*

## **Module 3-9: Apply Rational Number Operations**

- **LAUNCH**  
*Students will participate in a real-world discussion about using rational number operations to find differences in extreme temperatures.*
- **EXPLORE & DEVELOP**
  - **Learn:** Apply Rational Number Operations  
*Students will understand how to apply the properties of operations to evaluate expressions involving rational numbers.*

- **Example 1:** Apply Rational Number Operations  
*Students will use the properties of operations to evaluate expressions involving different forms of rational numbers.*
- **Example 2:** Apply Rational Number Operations  
*Students will use the properties of operations to evaluate expressions involving different forms of rational numbers.*

- **Apply: Food**  
*Students will come up with their own strategy to solve an application problem that involves changing amounts in a recipe.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students explain how to determine the difference between two temperatures using the formula  $F = \frac{9}{5}C + 32$  to convert Celsius temperatures to Fahrenheit.*

- **Practice (SE p. 213 – 214)**  
*Use the properties of operations to evaluate expressions involving rational numbers. (1-6)*

*Use the properties of operations to evaluate expressions involving different forms of rational numbers. (7-12)*

*Extend concepts learned in class to apply them in new contexts. (13)*

*Solve application problems that involve applying rational number operations. (14-15)*

*Use higher-order and critical thinking skills. (16-19)*

## Module 3 Review

## Module 3 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

## Unit Modifications for Special Population Students

### Advanced Learners







Refer to green **BL** (*Beyond Level*) indicators in Teacher Edition and assign corresponding activities:

- Beyond Level Differentiated Activities
- Extension Activities



Use IXL and iReady to enhance targeted skills.



<b>Struggling Learners</b>	 Refer to orange <b>AL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Remediation Activities</li> <li>• Extra Examples</li> <li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li> </ul>   Use IXL and iReady to enhance targeted skills.
<b>English Language Learners</b>	 Refer to purple <b>ELL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	<p>Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.</p>

## Interdisciplinary Connections

### Indicators:

#### Health and Physical Education (Grades 6-8):

##### **2.3.8.ATD.5**

*Analyze how the influence of peers and different social outcomes (e.g., home, school, party) can result in positive and/or negative outcomes.*

#### Social Studies (Grades 6-8):

##### **6.1.8.EconET.3.a**

*Identify the effect of inflation and debt on the American people and evaluate the policies of state and national governments during this time.*

#### Science (Grades 6-8):

##### **MS-PS2-2**

*Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.*

## Integration of 21<sup>st</sup> Century Skills

### Indicators:

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration and communication.*

#### Career Awareness, Exploration, Preparation, and Training:

##### **9.2.8.CAP.20**

*Identify the items to consider when estimating the cost of funding a business.*

#### Career & Technical Education:

##### **9.3.12.AG-BIZ.2**

*Use record keeping to accomplish AFNR business objectives, manage budgets and comply with laws and regulations.*

##### **9.3.12.AG-BIZ.3**

*Manage cash budgets, credit budgets and credit for an AFNR business usually generally accepted accounting principles.*

##### **9.3.12.AR-PRT.1**

*Manage the printing process, including customer service and sales, scheduling, production and quality control.*

##### **9.3.12.BM-BIM.2**

*Plan, monitor, manage and maintain the use of financial resources to ensure a business's financial wellbeing.*

**9.3.12.BM-MGT.5**

*Plan, monitor, manage, and maintain the use of financial resources to ensure a business's financial wellbeing.*

**9.3.12.BM-MGT.8**

*Create strategic plans used to manage business growth, profit and goals.*

**9.3.12.BM-HR.4**

*Plan, monitor and manage the use of financial and human resources to ensure a business's financial wellbeing.*

**9.3.12.FN-INS.5**

*Determine client needs and wants and respond through planned, personalized communication to guide purchase decisions and enhance future insurance business opportunities.*

**9.3.12.FN-SEC.3**

*Plan, monitor and manage day-to-day securities and investments operations.*

**9.3.12.FN-SEC.4**

*Utilize career-planning concepts, tools and strategies to explore, obtain and/or develop in a securities and investments career.*

**9.3.12.FN-SEC.5**

*Determine client needs and wants and respond through planned, personalized communication to guide purchase decisions and enhance future securities and investments opportunities.*

**9.3.GV-MGT.3**

*Utilize fiscal management skills to manage budget and allocation processes to ensure that resources are applied in a manner consistent with the department or agency's vision, mission and goals.*

**9.3.HT-LOD.10**

*Explain how cash control procedures are used in the lodging industry.*

**9.3.HT-REC.7**

*Compare different ticket sales options to maximize revenue for recreation, amusement and attraction venues.*

**9.3.HT-RFB.5**

*Research costs, pricing, market demands and marketing strategies to manage profitability in food and beverage service facilities.*

**9.3.MK.7**

*Determine and adjust prices to maximize return while maintaining customer perception of value.*

**9.3.MK-MGT.5**

*Determine and adjust prices to maximize return and meet customers' perceptions of value.*

**9.3.MK-MER.5**

*Determine and adjust prices to maximize return and meet customers' perceptions of value.*

**9.3.12.TD-SAL.2**

*Demonstrate the use of sales and ongoing service of products and services that are transportation related to promote development of existing and future clients and customers.*

**Unit Title:**

## Module 6

# Algebraic Expressions

**Unit Description:**

In this module, students draw on their knowledge of operations with algebraic expressions, greatest common factors, and the distributive property (all gain in grade 6) to gain an *understanding* of simplifying algebraic expressions which includes distributing integers across algebraic expressions, adding, and subtracting algebraic expressions, combining like terms, and factoring algebraic expressions.

**Unit Duration:** 8.5 days

### Desired Results

**Standard(s):**

**7.EE.A**

*Use properties of operations to generate equivalent expressions.*

**Indicators:**

**7.EE.A.1**

*Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.*

**7.EE.A.2**

*Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.*

**Understandings:**

*Students will...*

- Simplify algebraic expressions by combining like terms and using the Distributive Property.
- Add linear expressions and express the sum in simplest form.
- Subtract linear expressions and express the difference in simplest form.
- Find the GCF of monomials and factor algebraic expressions.

**Essential Questions:**

*Why is it beneficial to rewrite expressions in different forms?*

*How can algebra tiles be used to simplify an expression?*

*How can you use a Magic Square puzzle to add expressions?*

*How can algebra tiles help you factor linear expressions?*

<ul style="list-style-type: none"> <li>Combine operations to simplify linear expressions.</li> </ul>	
Assessment Evidence	
<b>Performance Tasks:</b> <ul style="list-style-type: none"> <li>Warm-ups</li> <li>Exit Tickets</li> <li>Reveal Practice Assignments</li> <li>Formative Assessment Math Probe</li> <li>GoFormative Assignments</li> </ul>	<b>Other Evidence:</b> <ul style="list-style-type: none"> <li>Independent Work</li> <li>Class Discussions</li> <li>Online Activities</li> <li>Practice</li> <li>Homework</li> </ul>
<b>Benchmarks:</b> Departmental assessment for Module 6 will be developed from the following resources:  <b>On-Level Assessments (Form A)</b> <i>Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.</i>  <b>Differentiated Assessments (Form B and C)</b> <i>Form B represents the approaching-level (AL) assessment.</i> <i>Form C represents the beyond-level (BL) assessment.</i>	
Learning Plan	
<b>Learning Activities:</b>	
<b><u>Module 6-1: Simplify Algebraic Expressions</u></b>	
<ul style="list-style-type: none"> <li><b>LAUNCH</b> Students will participate in a real-world discussion about using an expression to represent a youth organization's cookie sales.</li> <li><b>EXPLORE &amp; DEVELOP</b> <ul style="list-style-type: none"> <li><b>Explore:</b> Simplify Algebraic Expressions Students will use algebra tiles to explore how to simplify algebraic expressions.</li> <li><b>Learn:</b> Like Terms Students will understand what a term is and how to identify like terms.</li> <li><b>Learn:</b> Combine Like Terms Students will learn how to combine like terms.               <ul style="list-style-type: none"> <li><b>Example 1:</b> Combine Like Terms Students will combine like terms to simplify an expression representing a real-world scenario.</li> <li><b>Example 2:</b> Combine Like Terms Students will combine like terms with integer coefficients and constants.</li> </ul> </li> </ul> </li> </ul>	

- **Example 3:** Combine Like Terms  
*Students will combine like terms with rational coefficients and constants.*
- **Learn:** Expand Linear Expressions  
*Students will understand how to expand linear expressions using the Distributive Property.*
  - **Example 4:** Distribute Over Addition  
*Students will expand linear expressions by distributing over addition.*
  - **Example 5:** Distribute Over Subtraction  
*Students will expand linear expressions by distributing over subtraction.*
  - **Example 6:** Distribute Negative Numbers  
*Students will expand linear expressions by distributing a negative number.*
- **Apply:** Geometry  
*Students will come up with their own strategy to solve an application problem involving side lengths of triangles.*
- **REFLECT & PRACTICE**
  - **Exit Ticket**  
*Students will write an expression that represents the cookies sales for two girls.*
  - **Practice (SE p. 345 – 346)**  
*Combine like terms in a real-world scenario. (1-2)*  
  
*Combine like terms with integer and rational coefficients and constants. (3-8)*  
  
*Expand linear expressions by distributing. (9-14)*  
  
*Extend concepts learned in class to apply them in new contexts. (15)*  
  
*Solve application problems involving simplifying algebraic expressions. (16-17)*  
  
*Use higher-order and critical thinking skills. (18-20)*

## **Module 6-2: Add Linear Expressions**

- **LAUNCH**  
*Students will participate in a real-world discussion about using expressions to find total numbers of new species discovered in the rain forest.*
- **EXPLORE & DEVELOP**
  - **Explore:** Add Expressions  
*Students will use Web Sketchpad to explore how to add linear expressions.*
  - **Learn:** Add Linear Expressions  
*Students will understand what a linear expression is and how to add linear expressions.*

- **Example 1:** Add Linear Expressions  
*Students will add linear expressions with integer coefficients and constants.*
- **Example 2:** Add Linear Expressions  
*Students will add linear expressions with rational coefficients and constants.*

- **Apply:** Theater  
*Students will come up with their own strategy to solve an application problem involving ticket sales and donations.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will write and simplify an expression that represents the total number of species that were discovered over a span of just a few years.*
- **Practice (SE p. 353 – 354)**  
*Add linear expressions. (1-12)*  
  
*Extend concepts learned in class to apply them to new contexts. (13)*  
  
*Solve application problems involving adding linear expressions. (14-15)*  
  
*Use higher-order and critical thinking skills. (16-19)*

## Module 6-3: Subtract Linear Expressions

- **LAUNCH**  
*Students will participate in a real-world discussion about using expressions to determine the difference between two countries' shots on goal in soccer.*

## • EXPLORE & DEVELOP

- **Learn:** Additive Inverses of Expressions  
*Students will understand that when two expressions are additive inverses, their sum is zero.*
  - **Example 1:** Find the Additive Inverse of Expressions  
*Students will find the additive inverse of linear expressions.*
- **Learn:** Subtract Linear Expressions  
*Students will learn how to subtract linear expressions using the additive inverse.*
  - **Example 2:** Subtract Linear Expressions  
*Students will subtract linear expressions with integer coefficients and constants.*
  - **Example 3:** Subtract Linear Expressions  
*Students will subtract linear expressions with rational coefficients and constants.*
- **Apply:** Sales  
*Students will come up with their own strategy to solve an application problem involving sales of T-shirts.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

- Students will write and simplify an expression that represents how many more shots on goal Japan had than the United States.*

- **Practice (SE p. 361 – 362)**

- Find the additive inverse of linear expressions. (1-3)*

- Subtract linear expressions. (4-12)*

- Extend concepts learned in class to apply them in new contexts. (13)*

- Solve application problems involving subtracting linear expressions. (14-15)*

- Use higher-order and critical thinking skills. (16-19)*

## **Module 6-4: Factor Linear Expressions**

- **LAUNCH**

- Students will participate in a real-world discussion about using an expression to find the cost of a group of friends attending a concert.*

- **EXPLORE & DEVELOP**

- **Learn: Greatest Common Factor of Monomials**

- Students will find the greatest common factor of two monomials.*

- **Example 1:** Find the GCF of Monomials

- Students will find the greatest common factor of monomials by identifying the GCF of the coefficients and the variables.*

- **Example 2:** Find the GCF of Monomials

- Students will find the greatest common factor of monomials using prime factorization.*

- **Explore: Factor Linear Expressions**

- Students will use algebra tiles to explore how to factor linear expressions.*

- **Learn: Factor Linear Expressions**

- Students will use the Distributive Property to factor a linear expression.*

- **Example 3:** Factor Linear Expressions

- Students will factor linear expressions.*

- **Example 4:** Expressions with No Common Factors

- Students will determine that linear expressions with no common factors cannot be factored.*

- **Example 5:** Factor Linear Expressions

- Students will factor linear expressions with rational numbers written as fractions.*



- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will rewrite the expression  $4x + 8$  using a common factor that represents the total cost and the cost for each friend going to a concert.*

- **Practice (SE p. 369 – 370)**

*Find the greatest common factor of monomials by identifying the GCF of the coefficients and the variables. (1-6)*

*Factor linear expressions. (7-15)*

*Extend concepts learned in class to apply them in new context. (16)*

*Solve application problems involving factoring linear expressions. (17-18)*

*Use high-order and critical thinking skills. (19-22)*

## **Module 6-5: Combine Operations with Linear Expressions**

- **LAUNCH**

*Students will participate in a real-world discussion about using an expression to find the number of leftover decorations from classroom parties.*

- **EXPLORE & DEVELOP**

- **Example 1:** Combine Operations to Simplify Expressions

*Students will simplify linear expressions by using the Distributive Property, combining like terms, and writing the answer in factored form.*

- **Example 2:** Combine Operations to Simplify Expressions

*Students will simplify expressions with rational numbers by using the Distributive Property and combining like terms.*

- **Example 3:** Combine Operations to Simplify Expressions

*Students will simplify linear expressions by using the Distributive Property, adding, or subtracting, and writing the answer in factored form.*

- **Apply: Gardening**

*Students will come up with their own strategy to solve an application problem involving the area of a flower border of a garden.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will find the simplified expression that represents the number of decorations and streamers that were given to each of the three neighboring classrooms.*

- **Practice (SE p. 375 – 376)**

*Simplify linear expressions by using the Distributive Property, combining like terms, and adding or subtracting. (1-12)*

*Extend concepts learned in class to apply them in new contexts. (13)*

*Solve application problems involving combining operations with linear expressions. (14-15)*

*Use higher-order and critical thinking skills. (16-19)*

o **Formative Assessment Math Probe**

*Students will determine if each pair of expressions is equivalent by using strategies such as: combining like terms, factoring, and distribution.*








## Module 6 Review

## Module 6 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

## Unit Modifications for Special Population Students

<b>Advanced Learners</b>	 Refer to green <b>BL</b> ( <i>Beyond Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"><li>• Beyond Level Differentiated Activities</li><li>• Extension Activities</li></ul>   Use IXL and iReady to enhance targeted skills.
<b>Struggling Learners</b>	 Refer to orange <b>AL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"><li>• Remediation Activities</li><li>• Extra Examples</li><li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li></ul>   Use IXL and iReady to enhance targeted skills.
<b>English Language Learners</b>	 Refer to purple <b>ELL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"><li>• Spanish Interactive Student Edition</li><li>• Spanish Personal Tutors</li><li>• Math Language – Building Activities</li><li>• Language Scaffolds</li><li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li></ul>

	<ul style="list-style-type: none"> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	<p>Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.</p>

### Interdisciplinary Connections

#### Indicators:

#### Science (Grades 6-8):

##### **MS-PS4-1**

*Use mathematical representations to describe a simple model for waves that include how the amplitude of a wave is related to the energy in a wave.*

### Integration of 21<sup>st</sup> Century Skills

#### Indicators:

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and critical thinking.*

#### Career Awareness, Exploration, Preparation, and Training:

##### **9.2.8.CAP.20**

*Identify the items to consider when estimating the cost of funding a business.*

**Career & Technical Education:**

**9.3.12.BM-BIM.2**

*Plan, monitor, manage and maintain the use of financial resources to ensure a business's financial wellbeing.*

**9.3.12.BM-MGT.5**

*Plan, monitor, manage, and maintain the use of financial resources to ensure a business's financial wellbeing.*

**9.3.12.BM-MGT.8**

*Create strategic plans used to manage business growth, profit and goals.*

**9.3.12.BM-HR.4**

*Plan, monitor and manage the use of financial and human resources to ensure a business's financial wellbeing.*

Unit Title:

## Module 7

# Equations and Inequalities

### Unit Description:

In this module, students will draw on their knowledge of solving one-step equations (gained in Grade 6) to develop and *understanding* of solving equations and inequalities. They will use this understanding to gain *fluency* in writing and solving equations and inequalities. They will *apply* their understanding to solve real-world problems.

Unit Duration: 18 days

### Desired Results

#### Standard(s):

##### 7.NS.A

*Apply and extend previous understandings of operations with fractions to add, subtract, multiply and divide rational numbers.*

##### 7.EE.B

*Solve real-life and mathematical problems using numerical and algebraic expressions and equations.*

##### 8.EE.C

*Analyze and solve linear equations and pairs of simultaneous linear equations.*

#### Indicators:

##### 7.NS.A.3

*Solve real-world and mathematical problems involving the four operations with rational numbers.*

*(Clarification: Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)*

#### Climate Change Example:

*Students may solve real-world problems involving the four operations with rational numbers related to the relationship between altitude and the temperature above sea level.*

##### 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.*

##### 8.EE.C.7

*Solve linear equations in one variable.*

<p><b>Understandings:</b> <i>Students will...</i></p> <ul style="list-style-type: none"> <li>• Write and solve two-step equations of the form <math>px + q = r</math>.</li> <li>• Write and solve two-step equations of the form <math>p(x + q) = r</math>.</li> <li>• Write and solve equations with variables on each side.</li> <li>• Write and solve multi-step equation with variables on each side.</li> <li>• Determine the number of solutions to an equation.</li> <li>• Write and solve one-step addition and subtraction inequalities.</li> <li>• Write and solve one-step multiplication and division inequalities.</li> <li>• Write and solve two-step inequalities.</li> </ul>	<p><b>Essential Questions:</b></p> <p><i>How can equations be used to solve everyday problems?</i></p> <p><i>How can algebra tiles help you solve equations that involve two operations?</i></p> <p><i>How can a bar diagram help you solve problems involving two-step equations?</i></p> <p><i>How can algebra tiles help you solve two-step equations containing parentheses?</i></p> <p><i>How can a bar diagram help you solve problems involving two-step equations that contain parentheses?</i></p> <p><i>How can you solve an equation with variables on each side of the equals sign?</i></p> <p><i>Why is writing an equation a useful way to solve a real-world problem?</i></p> <p><i>How can you translate a real-world problem into a multi-step equation?</i></p> <p><i>How many solutions can an equation have?</i></p> <p><i>How does adding or subtracting the same number from each side of an inequality affect the inequality?</i></p> <p><i>How does multiplying or dividing each side of an inequality by the same positive number affect the inequality?</i></p> <p><i>How does multiplying or dividing each side of an inequality by the same negative number affect the inequality?</i></p>
<p><b>Assessment Evidence</b></p>	
<p><b>Performance Tasks:</b></p> <ul style="list-style-type: none"> <li>• Warm-ups</li> <li>• Exit Tickets</li> <li>• Reveal Practice Assignments</li> <li>• Formative Assessment Math Probe</li> <li>• GoFormative Assignments</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>• Independent Work</li> <li>• Class Discussions</li> <li>• Online Activities</li> <li>• Practice</li> <li>• Homework</li> </ul>

**Benchmarks:**

Departmental assessment for Module 7 will be developed from the following resources:

**On-Level Assessments (Form A)**

*Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.*

**Differentiated Assessments (Form B and C)**

*Form B represents the approaching-level (AL) assessment.*

*Form C represents the beyond-level (BL) assessment.*

## Learning Plan

**Learning Activities:****Module 7-1: Write and Solve Two-Step Equations:  $px + q = r$** 

- **LAUNCH**

*Students will participate in a real-world discussion about using an equation to determine the specifics of joining the ski club.*

- **EXPLORE & DEVELOP**

- **Explore:** Solve Two-Step Equations with Parentheses Using Algebra Tiles

*Students will use algebra tiles to explore how to model and solve two-step equations.*

- **Learn:** Two-Step Equations

*Students will learn how to solve two-step equations.*

- **Learn:** Properties of Equality

*Students will learn about the properties of equality.*

- **Example 1:** Solve Two-Step Equations

*Students will solve two-step equations of the form  $px - q = r$  with integers.*

- **Example 2:** Solve Two-Step Equations

*Students will solve two-step equations with fractional coefficients.*

- **Learn:** Two-Step Equations: Arithmetic Method and Algebraic Method

*Students will understand how the arithmetic method and algebraic method of solving a two-step equation compare.*

- **Explore:** Write Two-Step Equations

*Students will use bar diagrams to explore how to write two-step equations.*

- **Learn:** Write Two-Step Equations

*Students will learn how to model a real-world problem with a two-step equation of the form  $px + q = r$ .*

- **Example 3:** Write and Solve Two-Step Equations

*Students will write and solve two-step equations of the form  $px + q = r$ .*

- **Example 4: Write and Solve Two-Step Equations**  
*Students will write and solve two-step equations of the form  $px + q = r$  with negative coefficients.*

- **Apply: Budgets**  
*Students will come up with their own strategy to solve an application problem involving the cost to rent a moon bounce.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will solve the equation  $95.5 + 20w = 270$ , where  $w$  is the number of weeks you will need to save and interpret the solution within the context of the problem.*

- **Practice (SE p. 393 – 394)**  
*Solve two-step equations of the form  $px + q = r$ . (1-6)*

*Write and solve two step equations of the form  $px + q = r$ . (7-10)*

*Extend concepts learned in class to apply them to new contexts. (11)*

*Solve application problems involving solving two-step equations of the form  $px + q = r$ . (12-13)*

*Use higher-order and critical thinking skills. (14-17)*

## **Module 7-2: Write and Solve Two-Step Equations: $p(x + q) = r$**

- **LAUNCH**  
*Students will participate in a real-world discussion about using an equation to find the cost per game of bowling.*

## • EXPLORE & DEVELOP

- **Explore: Solve Two-Step Equations Using Algebra Tiles**  
*Students will use algebra tiles to explore how to model and solve two-step equations with parentheses.*
- **Learn: Two-Step Equations**  
*Students will learn how to solve two-step equations of the form  $p(x + q) = r$ .*
  - **Example 1: Solve Two-Step Equations**  
*Students will solve two-step equations of the form  $p(x + q) = r$  with integers.*
  - **Example 2: Solve Two-Step Equations**  
*Students will solve two-step equations of the form  $p(x + q) = r$  with integers.*
  - **Example 3: Solve Two-Step Equations**  
*Students will solve two-step equations of the form  $p(x + q) = r$  with rational numbers written as fractions.*



- **Learn:** Two-Step Equations: Arithmetic Method and Algebraic Method  
*Students will understand how the arithmetic method and algebraic method of solving a two-step equation with parentheses compare.*
- **Learn:** Write Two-Step Equations  
*Students will learn how to model a real-world problem with a two-step equation of the form  $p(x + q) = r$ .*
- **Explore:** Write Two-Step Equations  
*Students will explore how to write two-step equations with parentheses.*
  - **Example 4:** Write and Solve Two-Step Equations  
*Students will write and solve two-step equations of the form  $p(x + q) = r$ .*
  - **Example 5:** Write and Solve Two-Step Equations  
*Students will write and solve two-step equations of the form  $p(x - q) = r$ .*
- **Apply:** Perimeter  
*Students will come up with their own strategy to solve an application problem involving perimeter.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will explain how to write an equation that can be used to find the cost of a game of bowling.*
- **Practice (SE p. 405 – 406)**  
*Solve two-step equations of the form  $p(x + q) = r$ . (1-6)*  
  
*Write and solve two-step equations of the form  $p(x + q) = r$ . (7-10)*  
  
*Extend concepts learned in class to apply them in new contexts. (11)*  
  
*Solve application problems involving solving two-step equations of the form  $p(x + q) = r$ . (12-13)*  
  
*Use high-order and critical thinking skills. (14-17)*
- **Formative Assessment Math Probe**  
*Students will understand the mathematical meaning of words used to describe relationships between quantities in real-life situations and recognize different ways to write algebraic equations that represent the same mathematical relationships. They will determine which equations can be used to represent each situation and explain their choices.*

## Module 7-3: Write and Solve Equations with Variables on Each Side

- **LAUNCH**  
*Students will participate in a real-world discussion about using an equation to find which form of public transportation is the best option.*

- **EXPLORE & DEVELOP**

- **Explore:** Equations with Variables on Each Side  
*Students will use Web Sketchpad to explore how to use a balance to solve equations with variables on each side.*
- **Learn:** Equations with Variables on Each Side  
*Students learn how to solve equations with variables on each side.*
  - **Example 1:** Solve Equations with Variables on Each Side  
*Students will solve equations with variables on each side that have integer coefficients.*
  - **Example 2:** Solve Equations with Rational Coefficients  
*Students will solve equations with variables on each side that have rational coefficients written as fractions.*
- **Explore:** Write and Solve Equations with Variables on Each Side  
*Students will explore how to write an equation with variables on each side to solve a real-world problem.*
- **Learn:** Write and Solve Equations with Variables on Each Side  
*Students learn understand that they can model a real-world problem with an equation that has variables on each side.*
  - **Example 3:** Write and Solve Equations with Variables on Each Side  
*Students will write and solve equations with variables on each side that have integer coefficients.*
  - **Example 4:** Write and Solve Equations with Variables on Each Side  
*Students will write and solve equations with variables on each side that have rational coefficients.*
- **Apply:** Home Improvement  
*Students will come up with their own strategy to solve an application problem that involves calculating the total cost of carpeting a living room.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will explain and determine what number of rides per month do the two transportation options have the same cost.*

**Practice (SE p. 323 – 324)**

*Solve equations with variables on each side. (1-4)*

*Write and solve equations with variables on each side that have rational coefficients. (5-6)*

*Extend concepts learned in class to apply them in new contexts. (7)*

*Solve application problems that involve solving equations with variables on each side. (8-9)*

*Use higher-order and critical thinking skills. (10-12)*

## **Module 7-4: Write and Solve Multi-Step Equations**

- **LAUNCH**

*Students will participate in a real-world discussion about the cost of buying and shipping trading cards, using a multi-step equation.*

- **EXPLORE & DEVELOP**

- **Learn:** Solve Multi-Step Equations

*Students will learn how to solve multi-step equations with variables on each side and grouping symbols on one or both sides.*

- **Example 1:** Solve Multi-Step Equations

*Students will solve multi-step equations with variables on each side that have integer coefficients.*

- **Example 2:** Solve Multi-Step Equations

*Students will solve multi-step equations with variables on each side that have rational coefficients written as decimals.*

- **Example 3:** Solve Multi-Step Equations

*Students will solve multi-step equations with variables on each side that have rational coefficients written as fractions.*

- **Explore:** Translate Problems into Equations

*Students will explore how to model a real-world problem with a multi-step equation with variables on both sides.*

- **Learn:** Write and Solve Multi-Step Equations

*Students will understand that they can model and solve a real-world problem by using a multi-step equation that has variables on each side.*

- **Example 4:** Write and Solve Multi-Step Equations

*Students will model and solve a real-world problem by using a multi-step equation with integer coefficients, variables on both sides and group symbols.*

- **Example 5:** Write and Solve Multi-Step Equations

- *Students will model and solve a real-world problem by using a multi-step equation with rational coefficients, variables on both sides and grouping symbols.*

- **Apply:** Business Finance

*Students will come up with their own strategy to solve an application problem that involves finding the total payroll of a coffee shop.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain and determine how much the cost of domestic shipping is by defining a variable, writing an equation, and solving the problem.*

- **Practice (SE p. 429 – 430)**

*Solve multi-step equations. (1-4)*

*Model and solve real-world problems by using a multi-step equation with rational coefficients, variables on both sides and grouping symbols. (5-6)*

*Extend concepts learned in class to apply them in new contexts. (7)*

*Solve application problems that involve writing and solving multi-step equations. (8-9)*

*Use higher-order and critical thinking skills. (10-12)*

## **Module 7-5: Determine the Number of Solutions**

- **LAUNCH**

*Students will participate in a real-world discussion about the cost of a birthday party using an equation.*

- **EXPLORE & DEVELOP**

- **Explore:** Number of Solutions

*Students will use Web Sketchpad to explore equations with one solution, no solution and infinitely many solutions.*

- **Learn:** Number of Solutions

*Students will understand that an equation can have one solution, no solution, or infinitely many solutions.*

- **Example 1:** Equations with Infinitely Many Solutions

*Students will determine algebraically that an equation has an infinite number of solutions.*

- **Example 2:** Equations with No Solution

*Students will determine algebraically that an equation has no solution.*

- **Learn:** Analyze Equations to Determine the Number of Solutions

*Students will understand how the structure of an equation indicates whether it has one solution, no solution or infinitely many solutions.*

- **Example 3:** Create Equations with Infinitely Many Solutions

*Students will construct an equation that has infinitely many solutions.*

- **Example 4:** Create Equations with No Solution

*Students will construct an equation that has no solution.*

- **Apply:** School

*Students will come up with their own strategy to solve an application problem that involves analyzing expressions.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain and determine how much was spent on food per person for a party by*

*writing an equation to represent the situation.*

- o **Practice (SE p. 439 – 440)**

*Determine algebraically that an equation has an infinite number of solutions. (2-3)*

*Determine algebraically that an equation has no solution. (1, 4)*

*Construct equations that have infinitely many solutions. (5-6)*

*Construct equations that have no solution. (7-8)*

*Extend concepts learned in class to apply them in new contexts. (9)*

*Solve application problems that involve equations with one solution, no solution or infinitely many solutions. (10-11)*

*Use higher-order and critical thinking skills. (12-15)*

## **Module 7-6: Write and Solve One-Step Addition and Subtraction Inequalities**

- **LAUNCH**

*Students will participate in a real-world discussion about inequalities, using an infographic.*

- **EXPLORE & DEVELOP**

- o **Explore:** Addition and Subtraction Properties of Inequality

*Students will use Web Sketchpad to explore how inequalities behave when adding or subtracting the same number from each side.*

- o **Learn:** Inequalities

*Students will understand the definition of inequality and the different meanings of the inequality symbols.*

- o **Learn:** Graph Inequalities

*Students will understand how to graph an inequality on a number line.*

- o **Learn:** Subtraction and Addition Properties of Inequality

*Students will understand Subtraction and Addition Properties of Inequality.*

- **Example 1:** Solve and Graph Addition Inequalities

*Students will solve and graph one-step addition inequalities with rational numbers.*

- **Example 2:** Solve and Graph Subtraction Inequalities

*Students will solve and graph one-step subtraction inequalities with rational numbers.*

- o **Learn:** Write Inequalities

*Students will understand how to write inequalities from a real-world problem.*

- **Example 3:** Write and Solve One-Step Addition Inequalities

*Students will write one-step addition inequalities from real-world problems and interpret the solution.*

- **Example 4: Write and Solve One-Step Subtraction Inequalities**  
*Students will write one-step subtraction inequalities from real-world problems and interpret the solution.*

- **Apply: Elevators**  
*Students will come up with their own strategy to solve an application problem involving the weight capacity of an elevator.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will determine the inequality that can be used to find the number of inches a girl needs to grow so that she is at least 36 inches tall.*

- **Practice (SE p. 451 – 452)**  
*Solve and graph one-step addition and subtraction inequalities. (1-6)*

*Write and solve one-step addition inequalities from real-world problems and interpret the solution. (7)*

*Write and solve one-step subtraction inequalities from real-world problems and interpret the solution. (8-9)*

*Extend concepts learned in class to apply them to new contexts. (10)*

*Solve application problems involving writing and solving one-step addition and subtraction inequalities. (11-12)*

*Use higher-order and critical thinking skills. (13-16)*

## Module 7-7: Solve One-Step Multiplication and Division Inequalities

- **LAUNCH**  
*Students will participate in a real-world discussion about the flying speeds of peregrine falcons.*

## • EXPLORE & DEVELOP

- **Explore: Multiplication and Division Properties of Inequality**  
*Students will explore how multiplying and dividing each side of an inequality by the same positive number affects the inequality.*
- **Learn: Division and Multiplication Properties of Inequalities**  
*Students will understand Division of Multiplication Properties of Inequality when coefficients are positive.*
  - **Example 1: Solve and Graph Multiplication Inequalities**  
*Students will solve and graph one-step multiplication inequalities with positive coefficients.*
  - **Example 2: Solve and Graph Division Inequalities**  
*Students will solve and graph one-step division inequalities with positive coefficients.*

- **Explore:** Multiply and Divide Inequalities by Negative Numbers  
*Students will use Web Sketchpad to explore how multiplying and dividing each side of an inequality by the same negative number affects the inequality.*
- **Learn:** Division and Multiplication Properties of Inequality  
*Students will understand the Division and Multiplication Properties of Inequality when coefficients are negative.*
  - **Example 3:** Multiplication Inequalities with Negative Coefficients  
*Students will solve and graph one-step multiplication inequalities with negative coefficients.*
  - **Example 4:** Division Inequalities with Negative Coefficients  
*Students will solve and graph one-step division inequalities with negative coefficients.*
  - **Example 5:** Write and Solve One-Step Multiplication Inequalities  
*Students will write one-step multiplication inequalities from real-world problems and interpret the solution.*
  - **Example 6:** Write and solve One-Step Division Inequalities  
*Students will write one-step division inequalities from real-world problems and interpret the solution.*
- **Apply:** Fundraising  
*Students will come up with their own strategy to solve an application problem involving fundraising for buses.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will write an inequality that can be used to determine how long it would take a peregrine falcon to travel at most 220 miles.*
- **Practice (SE p. 465 – 466)**  
*Solve one-step multiplication and division inequalities with positive coefficients. (1-3)*  
  
*Solve one-step multiplication and division inequalities with negative coefficients. (4-6)*  
  
*Write and solve one-step multiplication inequalities from real-world problems and interpret the solution. (7-8)*  
  
*Write and solve one-step division inequalities from real-world problems and interpret the solution. (9)*  
  
*Extend concepts learned in class to apply them in new contexts. (10)*  
  
*Solve application problems involving writing and solving one-step multiplication and division inequalities. (11-12)*  
  
*Use higher-order and critical thinking skills. (13-16)*



## **Module 7-8: Write and Solve Two-Step Inequalities**

- **LAUNCH**

*Students will participate in a real-world discussion about renting bicycles to travel around Mackinac Island in Michigan.*

- **EXPLORE & DEVELOP**

- **Learn: Solve Two-Step Inequalities**

*Students will understand how to solve two-step inequalities.*

- **Example 1: Solve Two-Step Inequalities**

*Students will solve and graph two-step inequalities involving integers.*

- **Example 2: Solve Two-Step Inequalities**

*Students will solve and graph two-step inequalities involving decimals.*

- **Example 3: Solve Two-Step Inequalities**

*Students will solve and graph two-step inequalities involving fractions.*

- **Example 4: Write and Solve Two-Step Inequalities**

*Students will write two-step inequalities from real-world problems and interpret the solution.*

- **Example 5: Write and Solve Two-Step Inequalities**

*Students will write two-step inequalities with negative coefficients from real-world problems and interpret the solution.*

- **Apply: School**

*Students will come up with their own strategy to solve an application problem involving the average score needed in a class.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will write and solve an inequality that can be used to determine the number of hours for which they can rent the bikes and interpret the solution within the context of the problem.*

- **Practice (SE p. 477 – 478)**

*Solve and graph two-step inequalities with rational numbers. (1-6)*

*Write and solve two-step inequalities from real-world problems and interpret the solution. (7-8)*

*Write and solve two-step inequalities with negative coefficients from real-world problems and interpret the solution. (9)*

*Extend concepts learned in class to apply them in new contexts. (10)*

*Solve application problems involving writing and solving two-step inequalities. (11-12)*

*Use higher-order and critical thinking skills. (13-16)*










## Module 7 Review

## Module 7 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

### Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<div data-bbox="532 611 602 684"></div> <p>Refer to green <b>BL</b> (<i>Beyond Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Beyond Level Differentiated Activities</li> <li>• Extension Activities</li> </ul> <div data-bbox="532 810 602 884"></div> <div data-bbox="618 810 688 884"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>Struggling Learners</b>	<div data-bbox="532 947 602 1020"></div> <p>Refer to orange <b>AL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Remediation Activities</li> <li>• Extra Examples</li> <li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li> </ul> <div data-bbox="532 1188 602 1262"></div> <div data-bbox="618 1188 688 1262"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>English Language Learners</b>	<div data-bbox="532 1325 602 1398"></div> <p>Refer to purple <b>ELL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p>

	<ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.

## Interdisciplinary Connections

### Indicators:

#### Science:

##### **MS-PS4-1**

*Use mathematical representations to describe a simple model for waves that include how the amplitude of a wave is related to the energy in a wave.*

#### Social Studies:

##### **6.1.12.EconNE.3.a**

*Analyze the impact of money, investment, credit, savings, debt, and financial institutions on the development of the nation and the lives of individuals.*

#### Computer Science and Design Thinking:

##### **8.1.8.DA.1**

*Organize and transform data collected using computational tools to make it usable for a specific purpose.*

#### Technology Education:

##### **9.3.ST-ET.5**

*Apply the knowledge learned in STEM to solve problems.*

##### **9.4.12.O.11**

*Apply active listening skills to obtain and clarify information.*

## Integration of 21<sup>st</sup> Century Skills

### Indicators:

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and critical thinking.*

### Career Awareness, Exploration, Preparation, and Training:

#### **9.2.8.CAP.20**

*Identify the items to consider when estimating the cost of funding a business.*

### Career & Technical Education:

#### **9.3.12.AG-BIZ.2**

*Use record keeping to accomplish AFNR business objectives, manage budgets and comply with laws and regulations.*

#### **9.3.12.AG-BIZ.3**

*Manage cash budgets, credit budgets and credit for an AFNR business usually generally accepted accounting principles.*

#### **9.3.12.AG-PL.1**

*Develop and implement a crop management plan for a given production goal that accounts for environmental factors.*

#### **9.3.12.AC.1**

*Use vocabulary, symbols and formulas common to architecture and construction.*

#### **9.3.12.BM-BIM.2**

*Plan, monitor, manage and maintain the use of financial resources to ensure a business's financial wellbeing.*

#### **9.3.12.BM-MGT.5**

*Plan, monitor, manage, and maintain the use of financial resources to ensure a business's financial wellbeing.*

#### **9.3.12.BM-MGT.8**

*Create strategic plans used to manage business growth, profit and goals.*

#### **9.3.12.BM-HR.4**

*Plan, monitor and manage the use of financial and human resources to ensure a business's financial wellbeing.*

#### **9.3.GV-MGT.3**

*Utilize fiscal management skills to manage budget and allocation processes to ensure that resources are applied in a manner consistent with the department or agency's vision, mission and goals.*

#### **9.3.HT-REC.7**

*Compare different ticket sales options to maximize revenue for recreation, amusement and attraction venues.*

#### **9.3.HT-RFB.5**

*Research costs, pricing, market demands and marketing strategies to manage profitability in food and beverage service facilities.*

**9.3.ST-SM.1**

*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

Unit Title:

## Module 8

# Linear Relationships and Slope

### Unit Description:

In this module, students draw on their knowledge of proportional relationships to develop *understanding* of the concept of slope. They use this understanding to build *fluency* with finding the slope of a line and writing and graphing linear equations. They *apply* their fluency to solve multi-step real-world problems.

Unit Duration: 15 days

### Desired Results

#### Standard(s):

##### 8.EE.B

*Understand the connections between proportional relationships, lines, and linear equations.*

#### Indicators:

##### 8.EE.B.5

*Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.*

##### 8.EE.B.6

*Use similar triangles to explain why the slope  $m$  is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation  $y = mx + b$  for a line intercepting the vertical axis at  $b$ .*

#### Understandings:

*Students will...*

- Graph and compare proportional relationships, interpreting the unit rate as the slope of the line.
- Students will find the slope of a line from a graph, table and using the formula.
- Relate the slope of a line to similar triangles.
- Derive the equation  $y = mx$  from graphs, tables, and verbal descriptions of proportional relationships.
- Write equations to represent linear relationships in the form  $y = mx + b$ .

#### Essential Questions:

*How are linear relationships related to proportional relationships?*

*How can you describe how one quantity changes in relation to another quantity?*

*How can you demonstrate the concept of slope as you travel from one point to another on a coordinate plane?*

*How can you determine the slope of a horizontal or vertical line?*

*How does the slope compare between any two pairs of points on a line?*

<ul style="list-style-type: none"> <li>Graph lines in slope-intercept form, vertical lines, and horizontal lines.</li> </ul>	<p><i>How can you use the slope formula to derive the equation of a proportional linear relationship?</i></p> <p><i>How can you use the slope formula to derive the equation of a nonproportional linear relationship?</i></p>
Assessment Evidence	
<b>Performance Tasks:</b> <ul style="list-style-type: none"> <li>Warm-ups</li> <li>Exit Tickets</li> <li>Reveal Practice Assignments</li> <li>Formative Assessment Math Probe</li> <li>GoFormative Assignments</li> </ul>	<b>Other Evidence:</b> <ul style="list-style-type: none"> <li>Independent Work</li> <li>Class Discussions</li> <li>Online Activities</li> <li>Practice</li> <li>Homework</li> </ul>
<b>Benchmarks:</b> Departmental assessment for Module 8 will be developed from the following resources: <p><b>On-Level Assessments (Form A)</b>  <i>Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.</i></p> <p><b>Differentiated Assessments (Form B and C)</b>  <i>Form B represents the approaching-level (AL) assessment.</i>  <i>Form C represents the beyond-level (BL) assessment.</i></p>	
Learning Plan	
<b>Learning Activities:</b>	
<b><u>Module 8-1: Unit Rates Involving Ratios of Fractions</u></b>	
<ul style="list-style-type: none"> <li><b>LAUNCH</b>  <i>Students will participate in a real-world discussion about using an equation to find the cost of entrance fees to two different national parks.</i></li> <li><b>EXPLORE &amp; DEVELOP</b> <ul style="list-style-type: none"> <li><b>Explore:</b> Rate of Change  <i>Students will explore how quantity changes in relation to another quantity.</i></li> <li><b>Learn:</b> Proportional Relationships  <i>Students will understand how proportional relationships are related to linear relationships.</i> <ul style="list-style-type: none"> <li><b>Example 1:</b> Proportional Relationships and Slope  <i>Students will find and interpret the slope of a graph of a proportional relationship and compare it to the unit rate.</i></li> <li><b>Example 2:</b> Graph Proportional Relationships  <i>Students will graph the equation of a proportional relationship and interpret the slope.</i></li> <li><b>Example 3:</b> Graph Proportional Relationships  <i>Students will graph a proportional relationship from a verbal description and interpret</i></li> </ul> </li> </ul> </li> </ul>	

*the slope.*

- **Example 4:** Compare Proportional Relationships  
*Students will compare two different proportional relationships represented in different ways.*
- **Example 5:** Compare Proportional Relationships  
*Students will compare two different proportional relationships represented in different ways.*

- **Apply: Utilities**

*Students will come up with their own strategy to solve an application problem that involves comparing utility prices.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine which park has the greater cost per vehicle.*

- **Practice (SE p. 499 – 500)**

*Find and interpret the slope of a graph of a proportional relationship and compare it to the unit rate. (1)*

*Graph the equation of a proportional relationship and interpret the slope. (2)*

*Graph verbal descriptions of proportional relationships and interpret the slope. (3)*

*Compare two different proportional relationships represented in different ways. (4)*

*Extend concepts learned in class to apply them in new contexts. (5)*

*Solve application problems involving proportional relationships and slope. (6)*

*Use higher-order and critical thinking skills. (7-10)*

## **Module 8-2: Understand Proportional Relationships**

- **LAUNCH**

*Students will participate in a real-world discussion about the steepness of a roller coaster as related to rise and run.*

- **EXPLORE & DEVELOP**

- **Explore:** Develop Concepts of Slope

*Students will use Web Sketchpad to explore how horizontal and vertical steps are used to travel between points on a coordinate plane.*

- **Learn:** Slope of a Line

*Students will define slope as the ratio of the vertical change (rise) to the horizontal change (run) of a line.*

- **Learn:** Find Slope from a Graph  
*Students will learn how to find the slope of a line from a graph.*
  - **Example 1:** Find Slope from a Graph  
*Students will find the positive slope of a line from a graph.*
  - **Example 2:** Find Slope from a Graph  
*Students will find the negative slope of a line from a graph.*
- **Learn:** Find Slope from a Table  
*Students will learn how to find the slope of a line from a table.*
  - **Example 3:** Find Slope from a Table  
*Students will find the slope of a line from a table.*
- **Learn:** Find Slope Using the Slope Formula  
*Students will learn how to find slope of a line from two points on that line by using the slope formula.*
  - **Example 4:** Find Slope Using the Slope Formula  
*Students will find the slope of a line from two points on the line, by using the slope formula.*
- **Explore:** Slope of Horizontal and Vertical Lines  
*Students will use Web Sketchpad to explore the slopes of horizontal and vertical lines.*
- **Learn:** Zero and Undefined Slope  
*Students will understand that the slope of a horizontal line is zero and the slope of a vertical line is undefined.*
  - **Example 5:** Zero Slope  
*Students will find the slope of a horizontal line by using the slope formula.*
  - **Example 6:** Undefined Slope  
*Students will show that the slope of a vertical line is undefined by using the slope formula.*
- **Apply:** Income  
*Students will come up with their own strategy to solve an application problem that involves comparing income.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will determine what the slope is of a ride at an amusement park that rise 8 feet for every horizontal change of 2 feet.*
- **Practice (SE p. 19 – 20)**  
*Find the positive slope of a line from a graph. (1)*  
  
*Find the negative slope of a line from a graph. (2)*



*Find the slope of a line from a table. (3)*

*Find the slope of a line from two points on the line, by using the slope formula. (4)*

*Find the slope of a horizontal line by using the slope formulas. (5)*

*Show the slope of a vertical line is undefined by using the slope formula. (6)*

*Extend concepts learned in class to apply them to new contexts. (7)*

*Solve application problems involving slope of a line. (8)*

*Use higher-order and critical thinking skills. (9-12)*

### **Module 8-3: Similar Triangles and Slope**

- **LAUNCH**

*Students will participate in a real-world discussion about the slope of a wheelchair ramp.*

- **EXPLORE & DEVELOP**

- **Explore:** Right Triangles and Slope

*Students will use Web Sketchpad to explore why the slope of a line is the same between any two points on the line.*

- **Learn:** Similar Triangles

*Students will understand the relationship between corresponding angles and sides of similar figures.*

- **Learn:** Similar Triangles and Slope

*Students will understand the relationship between slopes of similar slope triangles and the slope of a line.*

- **Example 1:** Compare Slopes of Similar Triangles

*Students will use similar slope triangles that correspond to the same line, to compare their slopes.*

- **Example 2:** Verify Slopes Using Slope Triangles

*Students will graph slope triangles on the coordinate plane to show that the slope of a line is the same between any two points on a line.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine what the horizontal length of a ramp should be for a set of stairs that have a height of 4 feet.*

- **Practice (SE p. 521 – 522)**

*Use similar slope triangles that correspond to the same line, to compare their slopes. (1)*

*Graph slope triangles on the coordinate plane to show that the slope of a line is the same between any two points on a line. (2)*

*Extend concepts learned in class to apply them in new contexts. (3-7)*

*Use higher-order and critical thinking skills. (8-11)*

## **Module 8-4: Direct Variation**

- **LAUNCH**

*Students will participate in a real-world discussion about the number of hours a koala sleeps, as a unit rate.*

- **EXPLORE & DEVELOP**

- **Explore:** Derive the Equation  $y = mx$

*Students will explore how to use the slope formula to derive the equation  $y = mx$ .*

- **Learn:** Direct Variation

*Students will understand that a direct variation is a proportional relationship, and how to derive the direct variation equation,  $y = mx$ .*

- **Example 1:** Write Direct Variation Equations from Graphs

*Students will write direct variation equations from graphs and interpret the constant of variation.*

- **Example 2:** Write Direct Variation Equations from Words

*Students will write a direct variation equation from a verbal description and interpret the constant of variation.*

- **Example 3:** Write Direct Variation Equations from Tables

*Students will write a direct variation equation from a table and interpret the constant of variation.*

- **Apply:** Animal Care

*Students will come up with their own strategy to solve an application problem involving heart rates.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will write an equation that models the relationship between the total number of hours,  $y$ , a koala spends asleep for any number of days,  $x$  and determine how many hours you can expect a koala to sleep over an 8-day period.*

- **Practice (SE p. 533 – 534)**

*Write a direct variation equation from a graph and interpret the constant of variation. (1-2)*

*Write a direct variation equation from a verbal description and interpret the constant variation. (3-4)*

*Write a direct variation equation from a table and interpret the constant of variation. (5)*

*Solve application problems involving direct variation. (6-7)*

*Use high-order and critical thinking skills. (8-11)*

## **Module 8-5: Slope-Intercept Form**

- **LAUNCH**

*Students will participate in a real-world discussion about sightseeing in Washington, D.C., and the cost of a tour in relation to time.*

- **EXPLORE & DEVELOP**

- **Explore:** Derive the Equation  $y = mx + b$

*Students will explore how to use the slope formula to derive the equation  $y = mx + b$ .*

- **Learn:** Slope-Intercept Form of a Line

*Students will understand how to derive the slope-intercept form of a linear equation,  $y = mx + b$ .*

- **Example 1:** Identify Slopes and y-intercepts

*Students identify the slope and y-intercept of a line from the equation in slope-intercept form.*

- **Example 2:** Write Equations in Slope-Intercept Form

*Students will write an equation in slope-intercept form given the slope and y-intercept.*

- **Learn:** Write Equations in Slope-Intercept Form from Graphs

*Students will learn how to write an equation in slope-intercept form given the graph of a nonproportional linear relationship.*

- **Example 3:** Write Equations in Slope-Intercept Form

*Students will write an equation in slope-intercept form given the graph of a nonproportional linear relationship.*

- **Learn:** Write Equations in Slope-Intercept Form from Verbal Descriptions

*Students will learn how to write equations in slope-intercept form given a verbal description.*

- **Example 4:** Write Equations in Slope-Intercept Form

*Students will write an equation in slope-intercept form given a verbal description that represents a linear relationship.*

- **Learn:** Write Equations in Slope-Intercept Form from Tables

*Students will learn how to write an equation in slope-intercept form given a table of values that represents a linear relationship.*

- **Example 5:** Write Equations in Slope-Intercept Form

*Students will write an equation in slope-intercept form to represent a linear relationship expressed in a table.*

- **Apply:** Consumer Science

*Students will come up with their own strategy to solve an application problem that involves*

comparing shipping companies.

- **REFLECT & PRACTICE**

- o **Exit Ticket**

*Students will write an equation that represents the total cost,  $y$ , of renting the scooter in relation to the number of hours,  $x$ .*

- o **Practice (SE p. 545 – 546)**

*Identify the slope and y-intercept of a line given an equation in slope-intercept form. (1-2)*

*Write an equation in slope-intercept form given the slope and y-intercept. (3-6)*

*Write an equation in slope-intercept form given the graph of a nonproportional linear relationship. (7)*

*Write an equation in slope-intercept form given a verbal description that represents a linear relationship. (8)*

*Write an equation in slope-intercept form given a table of values that represents a linear relationship. (9)*

*Extend concepts learned in class to apply them in new contexts. (10)*

*Solve application problems involving slope-intercept form. (11-12)*

*Use higher-order and critical thinking skills. (13-16)*

## **Module 8-6: Graph Linear Equations**

- **LAUNCH**

*Students will participate in a real-world discussion about graphing the equation that represents the cost to attend a week-long space camp.*

- **EXPLORE & DEVELOP**

- o **Learn: Graph Equations in Slope-Intercept Form**

*Students will learn how to graph an equation in slope-intercept form by using the slope and y-intercept.*

- **Example 1: Graph Lines Using Slope-Intercept Form**

*Students will graph an equation in slope-intercept form by using the slope and y-intercept.*

- **Example 2: Graph Lines Using Slope Intercept Form**

*Students will graph an equation in slope-intercept form by using the slope and y-intercept.*

- o **Learn: Graphs of Horizontal Lines**

*Students will understand how the graph of a horizontal line is related to its equation.*

- **Example 3: Graph Horizontal Lines**  
*Students will graph a horizontal line given an equation.*

- **Learn: Graphs of Vertical Lines**  
*Students will understand how the graph of a vertical line is related to its equation.*

- **Example 4: Graph Vertical Lines**  
*Students will graph a vertical line given an equation.*

- **Apply: Travel**  
*Students will come up with their own strategy to solve an application problem involving travel times and distances.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students graph the equation  $y = 100x + 400$  representing a week-long space camp cost.*

- **Practice (SE p. 555 – 556)**  
*Graph equations in slope-intercept form by using the slope and y-intercept. (1-4)*

*Graph a horizontal line given an equation. (5)*

*Graph a vertical line given an equation. (6)*

*Extend concepts learned in class to apply them in new contexts. (7)*

*Solve application problems that involve graphing equations in slope-intercept form. (8)*

*Use higher-order and critical thinking skills. (9-12)*

- **Formative Assessment Math Probe**  
*Students will understand how the slope and y-intercept in an equation can give you information about the general shape of the graph and determine which graphs can represent each equation and explain their choice.*








## Module 8 Review

## Module 8 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

## Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<div data-bbox="532 195 602 268"></div> <p>Refer to green <b>BL</b> (<i>Beyond Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Beyond Level Differentiated Activities</li> <li>• Extension Activities</li> </ul> <div data-bbox="532 394 602 468"></div> <div data-bbox="618 394 688 468"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>Struggling Learners</b>	<div data-bbox="532 537 602 611"></div> <p>Refer to orange <b>AL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Remediation Activities</li> <li>• Extra Examples</li> <li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li> </ul> <div data-bbox="532 768 602 842"></div> <div data-bbox="618 768 688 842"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>English Language Learners</b>	<div data-bbox="532 911 602 984"></div> <p>Refer to purple <b>ELL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>

<b>Learners with a 504</b>	Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.
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## Interdisciplinary Connections

### Indicators:

#### Social Studies (Grades 6-8):

##### **6.2.8.HistoryCA.2.a**

*Analyze the factors that led to the rise and fall of various early river valley civilizations and determine whether there was a common pattern of growth and decline.*

#### Science (Grades 6-8):

##### **MS-PS3-1**

*Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.*

## Integration of 21<sup>st</sup> Century Skills

### Indicators:

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and critical thinking.*

#### Career Awareness, Exploration, Preparation, and Training:

##### **9.2.8.CAP.20**

*Identify the items to consider when estimating the cost of funding a business.*

#### Career & Technical Education:

##### **9.3.12.AG-ANI.1**

*Analyze historic and current trends impacting the animal systems industry.*

##### **9.3.12.AG-NR.2**

*Analyze the interrelationships between natural resources and humans.*

##### **9.3.12.AC.5**

*Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.*

##### **9.3.HL-BRD.5**

*Determine processes for product design and production and how that work contributes to an understanding of the biotechnology product development process.*

##### **9.3.HT-LOD.9**

*Explain how room access policies and procedures ensure guest safety and minimize risks to the lodging facility.*

**9.3.HT-REC.10**

*Analyze the merchandising, program and product potential for different recreation, amusement and attraction venues.*

**9.3.HT-RFB.5**

*Research costs, pricing, market demands and marketing strategies to manage profitability in food and beverage service facilities.*

**9.3.HT-TT.2**

*Apply unit and time conversion skills to develop travel schedules and compute costs, distance and time (including travel time) factors.*

**9.3.HT-TT.8**

*Compare and contrast services and products from related industries to understand and evaluate how they impact the delivery of travel and tourism products and services to customers.*

**9.3.HT-TT.12**

*Select the most effective communication technique and media venue to convey travel marketing information to a target audience.*

**9.3.HU-CSM.2**

*Communicate product or equipment features that meet the needs of clients and consumers.*

**9.3.HU-CSM.3**

*Make consumer services recommendations meeting the needs of clients or customers.*

**9.3.HU-CSM.4**

*Analyze financial/economic situations when making recommendations about consumer services.*

**9.3.HU-CMH.3**

*Evaluate client motivation, strengths and weaknesses to develop a client treatment program.*

**9.3.HU-CMH.6**

*Choose appropriate counseling and therapy techniques to serve identified needs.*

**9.3.HU-ED.5**

*Evaluate safety and sanitation procedures associated with the early childhood education environment to assure compliance and prevent potential hazards.*

**9.3.HU-PC.2**

*Evaluate an individualized personal care plan that reflects client preferences, needs and interests for a course of treatment/action.*

**9.3.IT.1**

*Demonstrate effective professional communication skills and practices that enable positive customer relationships.*

**9.3.IT-WD.4**

*Demonstrate effective use of tools for digital communication production, development and project management.*

**9.3.LW.3**

*Assess and implement measures to maintain safe and healthy working conditions in a law, public safety, corrections and/or security environment.*

**9.3.LW-ENF.14**



*Describe the behavioral symptoms of drug use and the inherent dangers associated with handling dangerous drugs.*

**9.3.LW-SEC.10**

*Explain the application of risk management principles to the protection of assets in various settings.*

**9.3.MN.2**

*Analyze and summarize how manufacturing businesses improve performance.*

**9.3.MK-COM.5**

*Communicate information about products, services, images and/or ideas to achieve a desired outcome.*

**9.3.ST-SM.1**

*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

**9.3.ST-SM.3**

*Analyze the impact that science and mathematics has on society.*

**Life Literacies and Key Skills:**

**9.4.8.TL.1**

*Construct a spreadsheet in order to analyze multiple data sets, identify relationships and facilitate data-based decision-making.*

**9.4.8.TL.3**

*Select appropriate tools to organize and present information digitally.*

**Unit Title:**

## Module 9

# Probability

**Unit Description:**

In this module, students will develop an *understanding* of probability of simple and compound events. They will use this understanding to develop *fluency* in finding likelihoods, relative frequencies, and determining the sample space for compound events. They will also compare probabilities, design simulation, and *apply* their understanding of probability to solve real-world problems.

**Unit Duration:** 11 days

### Desired Results

**Standard(s):**

**7.SP.C**

*Investigate chance processes and develop, use, and evaluate probability models.*

**Indicators:**

**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.*

**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  $\frac{1}{2}$  indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.*

**7.SP.C.6**

*Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency and predict the approximate relative frequency given the probability.*

**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 discrepancy.*

**7.SP.C.8**

*Find probabilities of compound events using organized lists, tables, tree diagrams and simulation.*

**Understandings:**

*Students will...*

- Solve problems that classify the likelihood of simple events.

**Essential Questions:**

*How can probability be used to predict future events?*

*How can words be used to describe the chance of an event happening?*

<ul style="list-style-type: none"> <li>Find the relative frequency of simple events and compare relative frequency to experimental probability.</li> <li>Solve problems involving theoretical probability of simple events and their complements.</li> <li>Solve problems that compare probabilities and relative frequencies of simple events.</li> <li>Solve problems involving the probability of compound events.</li> <li>Solve problems by simulating compound probability events.</li> </ul>	<p><i>How does running an experiment help you find the likelihood of an event occurring?</i></p> <p><i>How can you predict relative frequency without performing an experiment?</i></p> <p><i>How can you use a table or organized list to represent all possible outcomes from repeated simple events?</i></p> <p><i>How can you use a random number generator to model a probability experiment?</i></p>
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### Assessment Evidence

<b>Performance Tasks:</b> <ul style="list-style-type: none"> <li>Warm-ups</li> <li>Exit Tickets</li> <li>Reveal Practice Assignments</li> <li>Formative Assessment Math Probe</li> <li>GoFormative Assignments</li> </ul>	<b>Other Evidence:</b> <ul style="list-style-type: none"> <li>Independent Work</li> <li>Class Discussions</li> <li>Online Activities</li> <li>Practice</li> <li>Homework</li> </ul>
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#### Benchmarks:

Departmental assessment for Module 9 will be developed from the following resources:

#### On-Level Assessments (Form A)

*Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.*

#### Differentiated Assessments (Form B and C)

*Form B represents the approaching-level (AL) assessment.*

*Form C represents the beyond-level (BL) assessment.*

### Learning Plan

#### Learning Activities:

#### Module 9-1: Find Likelihoods

- LAUNCH**

*Students will participate in a real-world discussion about the likelihood of winning a coin toss at the beginning of a football game.*

- EXPLORE & DEVELOP**

- Explore:** Chance Events

*Students will use Web Sketchpad to explore how to describe the likelihood of events.*

- Learn:** Likelihood of Events

*Students will understand how to describe the likelihood of events using precise vocabulary.*

- **Example 1: Classify Likelihoods**  
*Students will classify the likelihood of simple events.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will classify an event as impossible, unlikely, equally likely, likely, or certain and defend their solution.*

- **Practice (SE p. 565 – 566)**  
*Classify the likelihood of simple events. (1-6)*

*Extend concepts learned in class to apply them in new contexts. (7-8)*

*Solve application problems involving finding likelihood. (9-10)*

*Use higher-order and critical thinking skills. (11-14)*

## **Module 9-2: Relative Frequency of Simple Events**

- **LAUNCH**

*Students will participate in a real-world discussion about expected free throw shots made by basketball players.*

- **EXPLORE & DEVELOP**

- **Explore: Experiments and Likelihood**  
*Students will use Web Sketchpad to explore how running an experiment helps to classify the likelihood of an event.*

- **Learn: Relative Frequency**  
*Students will understand what relative frequency means and how to find the relative frequency of an event.*

- **Example 1: Find Relative Frequencies**  
*Students will find relative frequencies from a verbal situation.*

- **Example 2: Find Relative Frequencies from Tables**  
*Students will find relative frequencies from data in frequency tables.*

- **Example 3: Find Relative Frequencies from Graphs**  
*Students will find relative frequencies from frequency bar graphs.*

- **Learn: Relative Frequency Tables and Bar Graphs**  
*Students will understand how to create relative frequency tables and bar graphs from a set of data.*

- **Learn: Experimental Probability from Relative Frequency**  
*Students will understand how experimental probability is related to relative frequency.*

- **Example 4: Find Experimental Probabilities**  
*Students will find the experimental probability of an event from a relative frequency bar*

graph.

- **Example 5:** Estimate to Make Predictions

*Students will make predictions using relative frequency and proportional reasoning.*

- **Apply:** Sales

*Students will come up with their own strategy to solve an application problem involving DVD sales.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine the number of free throws that you would expect a basketball player to make, out of 300 attempts and defend their solution.*

- **Practice (SE p. 579 – 580)**

*Find relative frequencies from the word problems. (1)*

*Find relative frequencies from data in frequency tables. (2)*

*Find relative frequencies from frequency bar graphs. (3)*

*Find the experimental probability of an event from a relative frequency bar graph. (4)*

*Extend concepts learned in class to apply them to new contexts. (5)*

*Solve application problems involving relative frequency of simple events. (6-7)*

*Use higher-order and critical thinking skills. (8-11)*

## **Module 9-3: Theoretical Probability of Simple Events**

- **LAUNCH**

*Students will participate in a real-world discussion about games of skill and chance at a carnival.*

- **EXPLORE & DEVELOP**

- **Explore:** Long-Run Relative Frequencies

*Students will use Web Sketchpad to explore the relationship between long-run relative frequency and theoretical probability.*

- **Learn:** Sample Space of Simple Events

*Students will understand how to find the sample space of simple events.*

- **Example 1:** Find Sample Space of Simple Events

*Students will find the sample space of simple events.*

- **Learn:** Theoretical Probability of Simple Events

*Students will understand how to find the theoretical probability of simple events.*

- **Example 2:** Find Theoretical Probabilities of Simple Events  
*Students will find the theoretical probability of simple events.*
- **Learn:** Complements of Simple Events  
*Students will understand how to find the complements of simple events.*
  - **Example 3:** Find Complements of Simple Events  
*Students will find complements of simple events.*
- **Apply:** Probability  
*Students will come up with their own strategy to solve an application problem involving probability.*
- **REFLECT & PRACTICE**
  - **Exit Ticket**  
*Students will explain how to find the chance of winning before playing using a spinner.*
  - **Practice (SE p. 589 – 590)**  
*Find the sample space of simple events. (1-2)*  
  
*Find the theoretical probability of simple events. (3-4)*  
  
*Find the complements of simple events. (5-6)*  
  
*Extend concepts learned in class to apply them in new contexts. (7)*  
  
*Solve application problems involving theoretical probability of simple events. (8-9)*  
  
*Use higher-order and critical thinking skills. (10-13)*

## **Module 9-4: Compare Probabilities of Simple Events**

- **LAUNCH**  
*Students will participate in a real-world discussion about words used to describe the likelihood of an event.*
- **EXPLORE & DEVELOP**
  - **Learn:** Compare Relative Frequency to Theoretical Probability  
*Students will understand how to compare relative frequency to theoretical probability.*
    - **Example 1:** Compare Relative Frequencies to Probabilities  
*Students will compare relative frequency to the theoretical probability of a simple event.*
  - **Apply:** Experiments  
*Students will come up with their own strategy to solve an application problem involving probability experiments.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain when the relative frequency of an experiment might be different from its theoretical probability and also explain when the relative frequency of an experiment might be close to its theoretical probability.*

- **Practice (SE p. 597 – 598)**

*Compare relative frequency to the theoretical probability of a simple event. (1)*

*Extend concepts learned in class to apply them in new contexts. (2)*

*Solve application problems involving comparing relative frequency to the theoretical probability of simple events. (3)*

*Use high-order and critical thinking skills. (4-7)*

## **Module 9-5: Probability of Compound Events**

- **LAUNCH**

*Students will participate in a real-world discussion about possible outcomes of a multiple-choice quiz.*

- **EXPLORE & DEVELOP**

- **Explore:** Sample Space of Repeated Simple Events

*Students will use Web Sketchpad to explore how to find the sample space of repeated simple events.*

- **Learn:** Sample Space of Compound Events

*Students will understand how to find the sample space of compound events.*

- **Example 1:** Find Sample Space of Compound Events

*Students will find the sample space of compound events using a table or a tree diagram.*

- **Example 2:** Find Sample Space of Compound Events

*Students will find the sample space of compound events using an organized list or a tree diagram.*

- **Learn:** Theoretical Probability of Compound Events

*Students will understand how to find the theoretical probability of compound events.*

- **Example 3:** Find Probabilities of Compound Events

*Students will find the theoretical probability of compound events using a table or list.*

- **Example 4:** Find Probabilities of Compound Events

*Students will find the theoretical probability of compound events using a tree diagram.*

- **Apply:** Outcomes

*Students will come up with their own strategy to solve an application problem involving the outcomes of rolling two number cubes.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain how to find the probability of guessing the correct answer to both multiple-choice questions, each with answer choices A, B, C, D and E.*

- **Practice (SE p. 609 – 610)**

*Find the sample space of compound events using a table or list. (1)*

*Find the sample space of compound events using a tree diagram. (2)*

*Find the theoretical probability of compound events using a table or list. (3)*

*Find the theoretical probability of compound events. (4-5)*

*Solve application problems involving probability of compound events. (6-7)*

*Use higher-order and critical thinking skills. (8-11)*

- **Formative Assessment Math Probe**

*Students will understand the relationship between theoretical and experimental probability and determine the probability by noticing the number of possible occurrences of the wanted outcome divided by the number of all possible outcomes.*

## **Module 9-6: Simulate Chance Events**

- **LAUNCH**

*Students will participate in a real-world discussion about possible ways to run a simulation of an event.*

- **EXPLORE & DEVELOP**

- **Explore:** Simulations

*Students will use Web Sketchpad to explore simulating events.*

- **Learn:** Simulate Simple Events

*Students will understand how to simulate simple events.*

- **Learn:** Simulate Compound Events

*Students will learn about simulating compound events.*

- **Example 1:** Simulate Compound Events

*Students will design a simulation of a compound event and analyze the results.*

- **Example 2:** Interpret Simulations of Compound Events

*Students will interpret a relative frequency bar graph that shows the results of a simulated compound event.*

- **REFLECT & PRACTICE**



- o **Exit Ticket**  
*Students will give an example of where a coin can be used to simulate the probability of an even occurring.*
- o **Practice (SE p. 619 – 620)**  
*Design simulation of a compound event and analyze the results. (1)*  
  
*Interpret a relative frequency bar graph that shows the results of a simulated compound event. (2)*  
  
*Extend concepts learned in class to apply them in new contexts. (3-4)*  
  
*Use higher-order and critical thinking skills. (5-8)*








## Module 9 Review

## Module 9 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

## Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<div data-bbox="532 1092 604 1163"></div> <p>Refer to green <b>BL</b> (<i>Beyond Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Beyond Level Differentiated Activities</li> <li>• Extension Activities</li> </ul> <div data-bbox="532 1289 604 1360"></div> <div data-bbox="620 1289 691 1360"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>Struggling Learners</b>	<div data-bbox="532 1428 604 1499"></div> <p>Refer to orange <b>AL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Remediation Activities</li> <li>• Extra Examples</li> <li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li> </ul> <div data-bbox="532 1667 604 1738"></div> <div data-bbox="620 1667 691 1738"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>English Language Learners</b>	<div data-bbox="532 1806 604 1877"></div> <p>Refer to purple <b>ELL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> </ul>

	<ul style="list-style-type: none"> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	<p>Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.</p>

## Interdisciplinary Connections

### Indicators:

#### Health and Physical Education (Grades 6-8):

##### **2.2.8.PF.4**

*Implement and assess the effectiveness of a fitness plan based on health data, the assessment of one's personal fitness levels and monitor healthy/fitness indicators before, during and after the workout program.*

#### Social Studies (Grades 6-8):

##### **6.1.8.CivicsPI.3.d**

*Use data and other evidence to determine the extent to which demographics influenced the debate on representation in Congress and federalism by examining the New Jersey and Virginia plans.*

#### Science (Grades 6-8):

##### **MS-LS1-4**

*Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.*

**MS-ESS2-5**

*Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.*

**Integration of 21<sup>st</sup> Century Skills****Indicators:**

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration and communication.*

**Career & Technical Education:****9.3.12.AG.1**

*Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster.*

**9.3.12.AC-DES.1**

*Justify design solutions through the use of research documentation and analysis of data.*

**9.3.12.ED.4**

*Evaluate and manage risks to safety, health and the environment in education and training settings.*

**9.3.12.FN.14**

*Employ financial risk-management strategies and techniques used to minimize business loss.*

**9.3.12.FN-BF.4**

*Employ risk-management strategies and techniques in corporate finance to minimize business loss.*

**9.3.12.FN-INS.4**

*Demonstrate underwriting techniques and strategies to evaluate the risk posed by potential insurance clients.*

**9.3.GV-SEC.4**

*Collect and analyze information from within and outside the United States to assess threats and opportunities regarding national security.*

**9.3.GV-SEC.5**

*Develop strategies to defend against and respond to the effects of chemical, biological, radiological, nuclear (CBRN) or other emergent events.*

**9.3.HL.3**

*Identify existing and potential hazards to clients, coworkers, visitors and self in the healthcare workplace.*

**9.3.HT-LOD.9**

*Explain how room access policies and procedures ensure guest safety and minimize risks to the lodging facility.*

**9.3.HT-REC.10**

*Analyze the merchandising, program and product potential for different recreation, amusement and attraction venues.*

**9.3.HT-TT.4**

*Assess the potential (real and perceived) hazards related to multiple environments, and recommend appropriate safety, health and security measures for travelers.*

**9.3.HT-TT.8**

*Compare and contrast services and products from related industries to understand and evaluate how they impact the delivery of travel and tourism products and services to customers.*

**9.3.HU-ED.5**

*Evaluate safety and sanitation procedures associated with the early childhood education environment to assure compliance and prevent potential hazards.*

**9.3.LW-COR.1**

*Evaluate the correctional environment for signs of potential problems and/or danger.*

**9.3.LW-COR.8**

*Analyze the techniques used to manage crisis situations and resolve conflicts in correctional environments.*

**9.3.LW-SEC.10**

*Explain the application of risk management principles to the protection of assets in various settings.*

**9.3.MK-COM.5**

*Communicate information about products, services, images and/or ideas to achieve a desired outcome.*

**9.3.ST-SM.1**

*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

**9.3.12.TD-OPS.2**

*Analyze performance of transportation operations in order to improve quality and service levels and increase efficiency.*

**Life Literacies and Key Skills:**

**9.4.8.CT.1**

*Evaluate diverse solutions proposed by a variety of individuals, organizations and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective.*

**9.4.8.CT.2**

*Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option.*

**9.4.8.DC.8**

*Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g. smart cities).*

**9.4.8.IML.3**

*Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement and spatial grouping.*

**9.4.8.IML.4**

*Ask insightful questions to organize different types of data and create meaningful visualizations.*

**9.4.8.IML.5**

*Analyze and interpret local or public data sets to summarize and effectively communicate the data.*

**9.4.8.IML.11**

*Predict the personal and community impact of online and social media activities.*

**9.4.8.TL.1**

*Construct a spreadsheet in order to analyze multiple data sets, identify relationships and facilitate data-based decision-making.*

**9.4.8.TL.3**

*Select appropriate tools to organize and present information digitally.*

**Unit Title:**

## Module 10

# Sampling and Statistics

### Unit Description:

In this module, students draw upon their knowledge of measures of center, measures of variation, and ratios to develop *understanding* about statistical sampling and making inferences and predictions. Students come to *understand* that taking multiple samples can help them gauge the variation in their predictions. Students build *fluency* in using ratio reasoning to make predictions. Students build *fluency* in using ratio reasoning to make predictions about a population and in using measures of center and variation to compare two sample distributions. They *apply* their understanding of the mean and mean absolute deviation to informally assess the degree of visual overlap between two distributions to infer how close the population means might be.

**Unit Duration:** 10.5 days

### Desired Results

#### Standard(s):

##### **7.SP.A**

*Use random sampling to draw inferences about a population.*

##### **7.SP.B**

*Draw informal comparative inferences about two populations.*

##### **7.RP.A**

*Analyze proportional relationships and use them to solve real-world and mathematical problems.*

#### Indicators:

##### **7.SP.A.1**

*Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.*

##### **7.SP.A.2**

*Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.*

##### **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 measure of variability.*

##### **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.*

**7.RP.A.2**

*Recognize and represent proportional relationships between quantities.*

**7.RP.A.3**

*Use proportional relationships to solve multistep ratio and percent problems.*

**Understandings:**

*Students will...*

- Identify samples as biased or unbiased and determine whether inferences from the samples are valid.
- Make predictions based on data gathered using a valid sampling method.
- Understand that taking multiple samples can help them gauge the variation in their predictions.
- Make comparative inferences about two populations based on the data from random samples.
- Informally assess the degree of visual overlap between two distributions.

**Essential Questions:**

*How can you use a sample to gain information about a population?*

*How can taking multiple samples help you when making inferences about a population?*

*How does increasing the sample size allow you to make more accurate predictions?*

*How can you determine if two samples are drawn from populations with similar means?*

### Assessment Evidence

**Performance Tasks:**

- Warm-ups
- Exit Tickets
- Reveal Practice Assignments
- Formative Assessment Math Probe
- GoFormative Assignments

**Other Evidence:**

- Independent Work
- Class Discussions
- Online Activities
- Practice
- Homework

**Benchmarks:**

Departmental assessment for Module 10 will be developed from the following resources:

**On-Level Assessments (Form A)**

*Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.*

**Differentiated Assessments (Form B and C)**

*Form B represents the approaching-level (AL) assessment.*

*Form C represents the beyond-level (BL) assessment.*

### Learning Activities:

### Module 10-1: Biased and Unbiased Samples

- **LAUNCH**

*Students will participate in a real-world discussion about sampling using an infographic.*

- **EXPLORE & DEVELOP**

- **Learn: Populations and Samples**

*Students will learn about populations and samples.*

- **Learn: Valid Sampling Methods**

*Students will learn about valid sampling methods.*

- **Example 1: Identify Valid Sampling Methods**

*Students will identify sampling methods that best represent survey descriptions.*

- **Learn: Biased Samples**

*Students will learn about biased sampling methods.*

- **Example 2: Identify Biased Sampling Methods**

*Students will classify biased samples by type.*

- **Learn: Valid Inferences**

*Students will learn about the differences between valid and invalid inferences.*

- **Example 3: Identify Valid Inferences**

*Students will identify the sampling method used in order to determine that an invalid inference was made.*

- **Example 4: Identify Valid Inferences**

*Students will identify the sampling method used in order to determine that a valid inference was made.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine the number of students in the entire school who prefer having a certain type of pet (cat, dog or other) and design an unbiased sampling method that can be used and explain why the sampling method is unbiased.*

- **Practice (SE p. 635 – 636)**

*Classify valid sampling methods from a situation. (1)*

*Classify biased samples by type. (2)*

*Interpret valid and invalid inferences made from a sample. (3-4)*

*Extend concepts learned in class to apply them in new contexts. (5)*



*Solve application problems involving biased and unbiased samples. (6-7)*

*Use higher-order and critical thinking skills. (8-11)*

## **Module 10-2: Make Predictions**

- **LAUNCH**

*Students will participate in a real-world discussion about making predictions about television program viewing.*

- **EXPLORE & DEVELOP**

- **Learn: Make Predictions**

*Students will understand that they can make predictions about a population by using information from a survey, provided the survey used an unbiased sample.*

- **Example 1: Make Predictions**

*Students will use proportional reasoning to make a prediction about a population from a valid sample.*

- **Example 2: Make Predictions**

*Students will use proportional reasoning to make a prediction about a population from a valid sample.*

- **Apply: Profit**

*Students will come up with their own strategy to solve an application problem involving using surveys to predict profit.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine how many people can be expected to watch the same television program at least once.*

- **Practice (SE p. 643 – 644)**

*Use proportional reasoning to make predictions about a population from a valid sample. (1-5)*

*Extend concepts learned in class to apply them to new contexts. (6)*

*Solve application problems involving making predictions. (7-8)*

*Use higher-order and critical thinking skills. (9-12)*

## **Module 10-3: Generate Multiple Samples**

- **LAUNCH**

*Students will participate in a real-world discussion about the percentage of online gamers who pay to play the games.*

- **EXPLORE & DEVELOP**

- **Explore:** Generate Multiple Samples  
*Students will explore how taking multiple samples can help them when making inferences about a population.*
- **Learn:** Analyze Means of Multiple Samples  
*Students will understand that, by analyzing the means of multiple samples, they can gain more insight into the true mean of the population.*
  - **Example 1:** Analyze Means of Multiple Samples  
*Students will analyze the means of multiple samples of data to predict the population mean and describe the variability of the distribution.*
- **Explore:** Sample Size in Multiple Samples  
*Students will use Web Sketchpad to explore how increasing the sample size allows you to make more accurate predictions.*
- **Apply:** Animal Science  
*Students will come up with their own strategy to solve an application problem involving how to infer manatee weights given data.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will describe at least one reason that might explain why the percents from a survey are different, which percent might be more trustworthy and defend the solution.*
- **Practice (SE p. 653 – 654)**  
*Analyze multiple samples of data involving means of samples to gauge variation and make predictions. (1)*  
  
*Extend concepts learned in class to apply them in new contexts. (2)*  
  
*Solve application problems involving generating multiple samples. (3)*  
  
*Use higher-order and critical thinking skills. (4-5)*

## **Module 10-4: Compare Two Populations**

- **LAUNCH**

*Students will participate in a real-world discussion about comparing two samples of movie running times.*

- **EXPLORE & DEVELOP**

- **Learn:** Shape of Data Distributions  
*Students will understand which measures of center and variability best represent asymmetric and symmetric distributions of data.*
- **Learn:** Compare Two Populations  
*Students will understand that they can make comparative inferences about two populations*

*by comparing their centers and variations.*

- **Example 1:** Compare Two Populations  
*Students will make informal comparative inferences about two populations using a double dot plot with symmetric distributions.*
- **Example 2:** Compare Two Populations  
*Students will make informal comparative inferences about two populations using a double box plot with asymmetric distributions.*
- **Explore:** Compare Means of Two Populations  
*Students will use Web Sketchpad to explore whether samples drawn from different populations have similar means.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will sketch a double box plot of data for each movie genre, compare the two populations of movie running times and determine what inferences can be made based on the double box plot?*

- **Practice (SE p. 663 – 664)**

*Make informal inferences about two populations using a double dot plot with symmetric distributions. (1)*

*Make informal inferences about two populations using a double box plot with asymmetric distributions. (2)*

*Extend concepts learned in class to apply them in new contexts. (3)*

*Solve application problems involving comparing populations. (4-5)*

*Use high-order and critical thinking skills. (6-8)*

- **Formative Assessment Math Probe**

*Students will understand that sets of data summarized as box plots can be analyzed and compared (minimum, lower quartile, median, upper quartile, maximum) even without a specific scale to determine if each statement is true or false and explain their choices.*

## **Module 10-5: Assess Visual Overlap**

- **LAUNCH**

*Students will participate in a real-world discussion about comparing two samples of heights of Olympic athletes.*

- **EXPLORE & DEVELOP**

- **Learn:** Interpret Visual Overlap

*Students will learn how they can use a ratio to assess the degree of visual overlap between two samples in order to make an inference as to how likely the population means are similar or different.*

- **Example 1: Measure Variability Between Populations**  
*Students will find the number of measures of variability that separate the means of two samples with similar variability and make an inference about the population means.*

## • REFLECT & PRACTICE

### o Exit Ticket

*Students will sketch a double plot that might show significant visual overlap between two samples, explain what this might indicate about the two populations, sketch a double dot plot that might show little, or no, overlap between the two samples, and explain what this might indicate about the two populations.*

### o Practice (SE p. 669 – 670)

*Make informal inferences about two populations based on their visual overlap. (1)*

*Extend concepts learned in class to apply them in new contexts. (2)*

*Solve application problems involving visual overlap. (3-4)*

*Use higher-order and critical thinking skills. (5-7)*

## Module 10 Review

## Module 10 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

## Unit Modifications for Special Population Students

### Advanced Learners



Refer to green **BL** (*Beyond Level*) indicators in Teacher Edition and assign corresponding activities:

- Beyond Level Differentiated Activities
- Extension Activities






Use IXL and iReady to enhance targeted skills.

### Struggling Learners



Refer to orange **AL** (*Approaching Level*) indicators in Teacher Edition and assign corresponding activities:

- Remediation Activities
- Extra Examples
- *Arrive Math* Take Another Look Mini Lessons

	  Use IXL and iReady to enhance targeted skills.
<b>English Language Learners</b>	 Refer to purple <b>ELL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.

<b>Interdisciplinary Connections</b>	
<b>Indicators:</b>  <b><u>Health and Physical Education (Grades 6-8):</u></b>  <b>2.2.8.PF.4</b> <i>Implement and assess the effectiveness of a fitness plan based on health data, the assessment of one's personal fitness levels and monitor healthy/fitness indicators before, during and after the workout program.</i>	

### Social Studies (Grades 6-8):

#### **6.1.8.CivicsPI.3.d**

*Use data and other evidence to determine the extent to which demographics influenced the debate on representation in Congress and federalism by examining the New Jersey and Virginia plans.*

#### **6.3.8.CivicsPR.4**

*Use evidence and quantitative data to propose or defend a public policy related to climate change.*

#### **6.3.8.EconET.1**

*Using quantitative data, evaluate the opportunity cost of a proposed economic action, and take a position and support it (e.g., healthcare, education, transportation).*

### Science (Grades 6-8):

#### **MS-LS4-1**

*Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.*

#### **MS-LS4-6**

*Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.*

#### **MS-ESS2-3**

*Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.*

## **Integration of 21<sup>st</sup> Century Skills**

### **Indicators:**

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration and communication.*

### Career Awareness, Exploration, Preparation, and Training:

#### **9.2.8.CAP.11**

*Analyze potential career opportunities by considering different types of resources, including occupation databases and state and national labor market statistics.*

### Career & Technical Education:

#### **9.3.12.AG.1**

*Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster.*

#### **9.3.12.AG-ANI.1**

*Analyze historic and current trends impacting the animal systems industry.*

#### **9.3.12.AC-DES.1**

*Justify design solutions through the use of research documentation and analysis of data.*

**9.3.12.ED-TT.9**

*Utilize assessment and evaluation tools and data to advance learner achievement and adjust instructional plans.*

**9.3.12.FN-INS.4**

*Demonstrate underwriting techniques and strategies to evaluate the risk posed by potential insurance clients.*

**9.3.GV-GOV.1**

*Employ research skills to gather and document factual information analyze data and interpret statistics applicable to matters of public policy.*

**9.3.GV-SEC.4**

*Collect and analyze information from within and outside the United States to assess threats and opportunities regarding national security.*

**9.3.GV-REV.3**

*Design, develop, operate and review data analysis systems and procedures to minimize and eliminate revenue-related financial problems.*

**9.3.HL.3**

*Identify existing and potential hazards to clients, coworkers, visitors and self in the healthcare workplace.*

**9.3.HL-BRD.2**

*Apply the fundamentals of biochemistry, cell biology, genetics, mathematical concepts, microbiology, molecular biology, organic chemistry and statistics to conduct effective biotechnology research and development products.*

**9.3.HT-LOD.9**

*Explain how room access policies and procedures ensure guest safety and minimize risks to the lodging facility.*

**9.3.HT-REC.10**

*Analyze the merchandising, program and product potential for different recreation, amusement and attraction venues.*

**9.3.HT-TT.8**

*Compare and contrast services and products from related industries to understand and evaluate how they impact the delivery of travel and tourism products and services to customers.*

**9.3.HT-TT.12**

*Select the most effective communication technique and media venue to convey travel marketing information to a target audience.*

**9.3.HU-CMH.3**

*Evaluate client motivation, strengths and weaknesses to develop a client treatment program.*

**9.3.HU-CMH.6**

*Choose appropriate counseling and therapy techniques to serve identified needs.*

**9.3.HU-ED.5**

*Evaluate safety and sanitation procedures associated with the early childhood education environment to assure compliance and prevent potential hazards.*

**9.3.HU-PC.1**

*Analyze basic principles of biology, chemistry and human anatomy for safe and effective utilization and selection of personal care products and services.*

**9.3.HU-PC.2**

*Evaluate an individualized personal care plan that reflects client preferences, needs and interests for a course of treatment/action.*

**9.3.IT.10**

*Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.*

**9.3.IT-SUP.6**

*Evaluate the effectiveness of an information system.*

**9.3.IT-PRG.1**

*Analyze customer software needs and requirements.*

**9.3.IT-WD.4**

*Demonstrate effective use of tools for digital communication production, development and project management.*

**9.3.LW.3**

*Assess and implement measures to maintain safe and healthy working conditions in a law, public safety, corrections and/or security environment.*

**9.3.LW-COR.8**

*Analyze the techniques used to manage crisis situations and resolve conflicts in correctional environments.*

**9.3.LW-SEC.10**

*Explain the application of risk management principles to the protection of assets in various settings.*

**9.3.MN.2**

*Analyze and summarize how manufacturing businesses improve performance.*

**9.3.MN-MIR.4**

*Investigate and employ techniques to maximize manufacturing equipment performance.*

**9.3.MN-PPD.2**

*Research, design and implement alternative manufacturing processes to manage production of new and/or improved products.*

**9.3.MN-QA.4**

*Employ project management processes using data and tools to deliver quality, value-added products.*

**9.3.MK-COM.5**

*Communicate information about products, services, images and/or ideas to achieve a desired outcome.*

**9.3.MK-RES.3**

*Use information systems and tools to make marketing research decisions.*

**9.3.ST.2**

*Use technology to acquire, manipulate, analyze and report data.*

**9.3.ST-SM.1**



*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

**9.3.ST-SM.3**

*Analyze the impact that science and mathematics has on society.*

**9.3.ST-SM.4**

*Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.*

**Life Literacies and Key Skills:**

**9.4.8.CI.1**

*Assess data gathered on varying perspectives on causes of climate change (e.g. cross-cultural, gender-specific, generationally, etc.) and determine how the data can best be used to design multiple potential solutions.*

**9.4.8.CT.3**

*Compare past problem-solving solutions to local, national or global issues and analyze the factors that led to a positive or negative outcome.*

**9.4.8.DC.7**

*Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.*

**9.4.8.DC.8**

*Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g. smart cities).*

**9.4.8.IML.1**

*Critically curate multiple resources to assess the credibility of sources when searching for information.*

**9.4.8.IML.2**

*Identify specific examples of distortion, exaggeration or misrepresentation of information.*

**9.4.8.IML.3**

*Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement and spatial grouping.*

**9.4.8.IML.4**

*Ask insightful questions to organize different types of data and create meaningful visualizations.*

**9.4.8.IML.5**

*Analyze and interpret local or public data sets to summarize and effectively communicate the data.*

**9.4.8.TL.1**

*Construct a spreadsheet in order to analyze multiple data sets, identify relationships and facilitate data-based decision-making.*

**9.4.8.TL.2**

*Gather data and digitally represent information to communicate a real-world problem.*

**9.4.8.TL.3**

*Select appropriate tools to organize and present information digitally.*

**Unit Title:**

## Module 11

# Geometric Figures

### Unit Description:

In this module, students will draw on their knowledge of lines and angles, equivalent ratios, and three-dimensional figures to gain *understanding* of angles, parallel lines, triangles, and scale drawings. They will use this understanding to develop *fluency* with vertical, adjacent, complementary, and supplementary angles, angle relationships and triangles, classifying and drawing triangles, scale drawings and three-dimensional figures. They will *apply* their fluency to solve real-world problems.

**Unit Duration:** 14 days

### Desired Results

#### Standard(s):

##### 7.G.A

*Draw, construct and describe geometrical figures and describe the relationships between them.*

##### 7.G.B

*Solve real-life and mathematical problems involving angle measure, area, surface area and volume.*

##### 8.G.A

*Understand congruence and similarity using physical models, transparencies, or geometry software.*

#### Indicators:

##### 7.G.A.1

*Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing, and reproducing a scale drawing at a different scale.*

##### 7.G.A.2

*Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.*

##### 7.G.A.3

*Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.*

##### 7.G.B.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.*

##### 8.G.A.5

*Use informal arguments to establish facts about the angle sum and exterior angle of triangles and the angles created when parallel lines are cut by a transversal and the angle-angle criterion for similarity of triangles.*

<p><b>Understandings:</b> <i>Students will...</i></p> <ul style="list-style-type: none"> <li>• Identify vertical and adjacent angles and use what they know to find missing values.</li> <li>• Identify complementary and supplementary angles and use what they know to find missing values.</li> <li>• Examine relationships of angles formed by parallel lines cut by a transversal.</li> <li>• Draw triangles with and without tools.</li> <li>• Examine relationships among the angles in a triangle.</li> <li>• Solve problems involving scale drawings.</li> <li>• Analyze three-dimensional figures.</li> </ul>	<p><b>Essential Questions:</b></p> <p><i>How does geometry help to describe objects?</i></p> <p><i>What are some relationships between pairs of angles created by two intersecting lines?</i></p> <p><i>What does it mean for angle pairs to be complementary or supplementary?</i></p> <p><i>What are the angle relationships formed when a line intersects two parallel lines?</i></p> <p><i>How do you know whether or not it is possible to create a triangle given any three side lengths or any three angle measures?</i></p> <p><i>What is the relationship among the measures of a triangle?</i></p> <p><i>How is the measure of a triangle's exterior angle related to the measures of its remote interior angles?</i></p> <p><i>How can I use the scale to create a scale drawing?</i></p>
<p><b>Assessment Evidence</b></p>	
<p><b>Performance Tasks:</b></p> <ul style="list-style-type: none"> <li>• Warm-ups</li> <li>• Exit Tickets</li> <li>• Reveal Practice Assignments</li> <li>• Formative Assessment Math Probe</li> <li>• GoFormative Assignments</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>• Independent Work</li> <li>• Class Discussions</li> <li>• Online Activities</li> <li>• Practice</li> <li>• Homework</li> </ul>
<p><b>Benchmarks:</b> Departmental assessment for Module 11 will be developed from the following resources:</p> <p><b>On-Level Assessments (Form A)</b> <i>Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.</i></p> <p><b>Differentiated Assessments (Form B and C)</b> <i>Form B represents the approaching-level (AL) assessment.</i> <i>Form C represents the beyond-level (BL) assessment.</i></p>	
<p><b>Learning Plan</b></p>	
<p><b>Learning Activities:</b></p> <p><b><u>Module 11-1: Vertical and Adjacent Angles</u></b></p> <ul style="list-style-type: none"> <li>• <b>LAUNCH</b> <i>Students will participate in a real-world discussion about engineers using different combinations of</i></li> </ul>	

*vertical and adjacent angles to ensure the safety of roller coasters.*

- **EXPLORE & DEVELOP**

- **Learn: Angles**  
*Students will understand how to classify angles by their measures.*
- **Learn: Name Angles**  
*Students will understand the different ways in which to name angles.*
  - **Example 1: Name Angles**  
*Students will name angles using different notations.*
- **Explore: Vertical and Adjacent Angle Pairs**  
*Students will use Web Sketchpad to explore attributes of vertical and adjacent angle pairs.*
- **Learn: Identify Vertical Angles**  
*Students will understand the relationship between vertical angles*
  - **Example 2: Identify Vertical Angles**  
*Students will identify vertical angle pairs.*
- **Learn: Use Vertical Angles to Find Missing Values**  
*Students will understand how to use the properties of vertical angles to find missing values.*
  - **Example 3: Use Vertical Angles to Find Missing Values**  
*Students will use the properties of vertical angles to find missing values.*
- **Learn: Identify Adjacent Angles**  
*Students will understand the relationship between adjacent angles.*
  - **Example 4: Identify Adjacent Angles**  
*Students will identify adjacent angle pairs.*
- **Learn: Use Adjacent Angles to Find Missing Values**  
*Students will understand how to use the properties of adjacent angles to find missing values.*
  - **Example 5: Use Adjacent Angles to Find Missing Values**  
*Students will use the properties of adjacent angles to find missing values.*
- **Apply: Art**  
*Students will come up with their own strategy to solve an application problem involving vertical and adjacent angles.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will explain the difference between vertical angles and adjacent angles.*
- **Practice (SE p. 687 – 688)**  
*Name angles. (1-2)*

*Identify vertical and adjacent angle pairs. (3-4)*

*Use vertical angles to find missing values. (5-6)*

*Use adjacent angles to find missing values. (7)*

*Extend concepts learned in class to apply them in new contexts. (8)*

*Solve application problems involving adjacent angles. (9-10)*

*Use higher-order and critical thinking skills. (11-14)*

## **Module 11-2: Complementary and Supplementary Angles**

- **LAUNCH**

*Students will participate in a real-world discussion about different angle measures used in the construction of a bridge, affecting the load that a bridge can support.*

- **EXPLORE & DEVELOP**

- **Explore:** Complementary and Supplementary Angle Pairs

*Students will use Web Sketchpad to explore the properties of complementary and supplementary angle pairs.*

- **Learn:** Identify Complementary Angles

*Students will understand the properties of complementary angles.*

- **Example 1:** Identify Complementary Angles

*Students will identify complementary angle pairs.*

- **Learn:** Use Complementary angles to Find Missing Values

*Students will understand how to use the properties of complementary angles to find missing values.*

- **Example 2:** Use Complementary Angles to find Missing Values

*Students will use the properties of complementary angles to find missing values.*

- **Learn:** Identify Supplementary Angles

*Students will understand the properties of supplementary angles.*

- **Example 3:** Identify Supplementary Angles

*Students will identify supplementary angle pairs.*

- **Learn:** Use Supplementary Angles to Find Missing Values

*Students will understand how to use the properties of supplementary angles to find missing values.*

- **Example 4:** Use Supplementary Angles to Find Missing Values

*Students will use the properties of supplementary angles to find missing values.*

- **Apply:** Engineering

*Students will come up with their own strategy to solve an application problem involving the engineering of a space shuttle scaffold.*

## • REFLECT & PRACTICE

- **Exit Ticket**

*Students will determine the measure of the other angle on a straight angle truss formed by two angles, given the measure of one angle is  $45^\circ$ .*

- **Practice (SE p. 697 – 698)**

*Identify the complement of angles. (1-3)*

*Identify supplementary angles. (4-6)*

*Use complementary and supplementary angles to find missing values. (7-12)*

*Solve application problems involving complementary and supplementary angles. (13-14)*

*Use higher-order and critical thinking skills. (15-18)*

- **Formative Assessment Math Probe**

*Students will understand the terms complementary, supplementary, vertical, congruent, and adjacent and use reasoning about angles to analyze relationships to classify pairs of angles.*

## Module 11-3: Angle Relationships and Parallel Lines

### • LAUNCH

*Students will participate in a real-world discussion about the gymnastics events involving parallel bars.*

### • EXPLORE & DEVELOP

- **Explore:** Parallel Lines and Transversals

*Students will use Web Sketchpad to explore the relationships between angles created by parallel lines and transversals.*

- **Learn:** Lines, Angles and Transversals

*Students will learn about perpendicular lines, parallel lines and the angles formed when parallel lines are cut by a transversal.*

- **Example 1:** Classify Angle Pairs

*Students will classify angle pairs created when parallel lines are cut by a transversal.*

- **Example 2:** Classify Angle Pairs

*Students will classify angle pairs created when parallel lines are cut by a transversal.*

- **Learn:** Find Missing Angle Measures  
*Students will understand that they can use angle relationships to find missing angle measures, when two parallel lines are cut by transversals.*
  - **Example 3:** Find Missing Angle Measures  
*Students will find missing angle measures when two parallel lines are cut by a transversal.*
  - **Example 4:** Find Missing Angle Measures  
*Students will find missing angle measures when two parallel lines are cut by more than one transversal.*
- **Apply:** Construction  
*Students will come up with their own strategy to solve an application problem involving come up with their own strategy to solve an application problem involving angles found in bridge construction.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will determine what the measure of the other angle, label  $x$ , that the gymnast's arms form with the bars.*
- **Practice (SE p. 709 – 710)**  
*Classify angle pairs created when parallel lines are cut by a transversal. (1-4)*  
  
*Find missing angle measures when two parallel lines are cut by a transversal. (5)*  
  
*Find missing angle measures when two parallel lines are cut by more than one transversal. (6)*  
  
*Extend concepts learned in class to apply them in new contexts. (7-8)*  
  
*Solve application problems that involve finding missing angle measures formed by parallel lines and transversals. (9-10)*  
  
*Use higher-order and critical thinking skills. (11-14)*

## Module 11-4: Triangles

- **LAUNCH**  
*Students will participate in a real-world discussion about the use of triangular sails on sailboats.*
- **EXPLORE & DEVELOP**
  - **Explore:** Create Triangles  
*Students will use Web Sketchpad to explore the relationship among the side lengths of angle measures in a triangle.*
  - **Learn:** Classify Triangles  
*Students will understand how to classify triangles by angle measures and by side lengths.*

- **Learn: Draw Triangles Freehand**  
*Students will understand how to draw triangles without tools.*
  - **Example 1: Draw Triangles Freehand**  
*Students will draw triangles without tools, classify the triangles by their sides and angles, and determine if the triangles are unique.*
- **Learn: Draw Triangles Using Tools**  
*Students will understand how to draw triangles using a ruler and protractor.*
  - **Example 2: Draw Triangles Using Tools**  
*Students will draw triangles (given three angles) using a ruler and protractor.*
  - **Example 3: Draw Triangles Using Tools**  
*Students will draw triangles (given two angles and the side length of the included side) using a ruler and protractor.*
- **Learn: Draw Triangles with Technology**  
*Students will understand how to draw triangles using technology.*
  - **Example 4: Draw Triangles with Technology**  
*Students will draw triangles (given three sides) using technology.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will determine if you have all the information needed to buy the correct size sail for a sailboat.*
- **Practice (SE p. 719 – 720)**  
*Draw triangles without tools, classify the triangle by its sides and angles, and determine if it has the given characteristics. (1-2)*  
  
*Draw triangles using a ruler and protractor. (3-6)*  
  
*Draw triangles using technology. (7)*  
  
*Extend concepts learned in class to apply them in new contexts. (8)*  
  
*Solve application problems involving triangles. (9-10)*  
  
*Use high-order and critical thinking skills. (11-14)*

## Module 11-5: Angle Relationships and Triangles

- **LAUNCH**  
*Students will participate in a real-world discussion about the use of triangles in the design of many structures.*
- **EXPLORE & DEVELOP**



- **Learn: Triangles**  
*Students will understand the parts of a triangle (sides, vertices, and angles) and how to name them.*
- **Explore: Angles of Triangles**  
*Students will use Web Sketchpad to explore the relationship among the angles in triangles.*
- **Learn: Angle Sum of Triangles**  
*Students will understand the sum of the three interior angle measures of a triangle is 180 degrees.*
  - **Example 1: Find Missing Angle Measures**  
*Students will find missing angle measures in triangles.*
  - **Example 2: Use Ratios to Find Angle Measures**  
*Students will find the angle measures in a triangle given the ratio between each of the angles.*
- **Explore: Exterior Angles of Triangles**  
*Students will use Web Sketchpad to explore the relationship between an exterior angle and two remote interior angles of a triangle.*
- **Learn: Exterior Angles of Triangles**  
*Students will understand the relationship between an exterior angle and its two remote interior angles of a triangle.*
  - **Example 3: Find Exterior Angle Measures**  
*Students will find the missing angle measure of an exterior angle using the relationship between an exterior angle and two remote interior angles of a triangle.*
  - **Example 4: Use Exterior Angles to Find Missing Angle Measures**  
*Students will find the missing angle measures of two interior angles using the relationship between an exterior angle and two remote interior angle angles of a triangle.*
- **Apply: Geometry**  
*Students will come up with their own strategy to solve an application problem involving come up with their own strategy to solve an application problem involving geometric figures.*

## ● **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will determine the measure of the angle labeled  $x$  in a roofing structure.*
- **Practice (SE p. 731 – 732)**  
*Find missing angle measures in triangles. (1-2)*  
  
*Find missing angles measures in triangles using the ratio between each of the angles. (3)*  
  
*Find the missing angle measure of an exterior angle using the relationship between an exterior angle and two remote interior angles of a triangle. (4)*  
  
*Find the missing angle measures of two interior angles using the relationship between an exterior angle and two remote interior angles of a triangle. (5)*

*Extend concepts learned in class to apply them in new contexts. (6)*

*Solve application problems that involve angle relationships and triangles. (7-8)*

*Use higher-order and critical thinking skills. (9-12)*

## **Module 11-6: Scale Drawings**

- **LAUNCH**

*Students will participate in a real-world discussion about blueprints as examples of scale drawings.*

- **EXPLORE & DEVELOP**

- **Learn:** Use Scale Drawings to Find Length

*Students will understand how to use scale drawings and the scale to find actual length.*

- **Example 1:** Use Scale Drawings to Find Length

*Students will use the scale of a scale drawing to find actual length.*

- **Learn:** Create Scale Drawings

*Students will understand how to make a scale drawing.*

- **Learn:** Use Scale Drawings to Find Area

*Students will understand how to use scale drawings to find area.*

- **Example 2:** Use Scale Drawings to Find Area

*Students will use scale drawings to find area.*

- **Explore:** Scale Drawings

*Students will use Web Sketchpad to explore reproducing scale drawings using different scales.*

- **Learn:** Reproduce Scale Drawings

*Students will understand how to reproduce a scale drawing at a different scale.*

- **Example 3:** Reproduce Scale Drawings

*Students will reproduce a scale drawing at a different scale.*

- **Apply:** Construction

*Students will come up with their own strategy to solve an application problem involving the cost to install flooring.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine how tall the building is represented in the blueprint.*

- **Practice (SE p. 743 – 744)**

*Use the scale of a map to find actual length. (1-2)*

*Use scale drawings to find area. (3-4)*

*Reproduce scale drawings at different sizes. (5)*

*Extend concepts learned in class to apply them in new contexts. (6)*

*Solve application problems involving scale drawings. (7-8)*

*Use higher-order and critical thinking skills. (9-12)*

## **Module 11-7: Three-Dimensional Figures**

- **LAUNCH**

*Students will participate in a real-world discussion about the pyramid-shaped entrance to the Rock and Roll Hall of Fame in Cleveland, Ohio.*

- **EXPLORE & DEVELOP**

- **Learn:** Describe Three-Dimensional Figures

*Students will understand the attributes of polyhedron and non-polyhedron.*

- **Example 1:** Describe Three-Dimensional Figures

*Students will use the number of faces, edges, and vertices to describe three dimensional figures.*

- **Learn:** Describe Cross Sections of Three-Dimensional Figures

*Students will understand horizontal, vertical, and angled cross sections of three-dimensional figures.*

- **Example 2:** Describe Cross Sections of Three-Dimensional Figures

*Students will describe the shape resulting from vertical, horizontal, and angled cross sections of pyramids and cones.*

- **Example 3:** Describe Cross Sections of Three-Dimensional Figures

*Students will describe the shape resulting from vertical, horizontal, and angled cross sections of prisms and cylinders.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine the shape of a horizontal cross section of a skyscraper shaped like a cylinder.*

- **Practice (SE p. 749 – 750)**

*Use the number of faces, edges, and vertices to describe three dimensional figures. (1-2)*

*Describe the shape resulting from vertical, horizontal, and angled cross sections of three-dimensional figures. (3-5)*

*Extend concepts learned in class to apply them in new contexts. (6)*

Solve application problems involving three-dimensional figures. (7-8)

Use higher-order and critical thinking skills. (9-12)








## Module 11 Review

## Module 11 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

### Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<div data-bbox="529 758 602 831"></div> <p>Refer to green <b>BL</b> (<i>Beyond Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Beyond Level Differentiated Activities</li> <li>• Extension Activities</li> </ul> <div data-bbox="529 957 602 1031"></div> <div data-bbox="615 957 688 1031"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>Struggling Learners</b>	<div data-bbox="529 1094 602 1167"></div> <p>Refer to orange <b>AL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Remediation Activities</li> <li>• Extra Examples</li> <li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li> </ul> <div data-bbox="529 1329 602 1402"></div> <div data-bbox="615 1329 688 1402"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>English Language Learners</b>	<div data-bbox="529 1472 602 1545"></div> <p>Refer to purple <b>ELL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	

	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	<p>Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.</p>

Interdisciplinary Connections	
<p><b>Indicators:</b></p> <p><b><u>Social Studies (Grades 6-8):</u></b></p> <p><b>6.1.8.GeoSV.4.a</b>  <i>Map territorial expansion and settlement, highlighting the locations of conflicts with and resettlement of Native Americans.</i></p> <p><b><u>Science (Grades 6-8):</u></b></p> <p><b>MS-ESS1-3</b>  <i>Analyze and interpret data to determine scale properties of objects in the solar system.</i></p>	

Integration of 21 <sup>st</sup> Century Skills	
<p><b>Indicators:</b></p> <p><i>From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and creativity.</i></p> <p><b><u>Career &amp; Technical Education:</u></b></p> <p><b>9.3.12.AR-TEL.2</b>  <i>Demonstrate telecommunication installation processes using appropriate tools, materials, schematics, diagrams, blueprints and industry specific codes and regulations.</i></p> <p><b>9.3.12.AR-VIS.3</b>  <i>Analyze and create two and three-dimensional visual art forms using various media.</i></p>	

**9.3.ST-SM.1**

*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

Unit Title:

## Module 12

# Area, Surface Area, and Volume

### Unit Description:

In this module, students develop and *understanding* of radius and diameter and finding the circumference and area of circles. They will also gain *fluency* in finding the area of composite figures, volume, and surface area. They will use this knowledge to gain fluency in finding the volume and surface area of composite three-dimensional solids. They will also *apply* their fluency to solve real-world problems.

**Unit Duration:** 13 days

### Desired Results

#### Standard(s):

##### 7.G.B

*Solve real-life and mathematical problems involving angle measure, area, surface area and volume.*

##### 8.G.C

*Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.*

#### Indicators:

##### 7.G.B.4

*Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.*

##### 7.G.B.6

*Solve real-world and mathematical problems involving area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.*

#### Climate Change Example:

*Students may solve real-world problems involving area, surface area, and volume related to deforestation and increasing livestock farming as key contributors to climate change.*

##### 8.G.C.9

*Know the formulas for the volumes of cones, cylinders and spheres and use them to solve real-world and mathematical problems.*

#### Climate Change Example:

*Students may use the formula for the volume of a sphere to approximate the volume of hailstones to consider how climate change may affect the size of hailstones over time.*

<p><b>Understandings:</b> <i>Students will...</i></p> <ul style="list-style-type: none"> <li>• Use radius and diameter to find circumference.</li> <li>• Find the area of a circle.</li> <li>• Find the area of composite figures.</li> <li>• Find the volume of prisms and pyramids.</li> <li>• Find the surface area of prisms and pyramids.</li> <li>• Find the volume of cylinders.</li> <li>• Find the volume of cones.</li> <li>• Find the volume of spheres and hemispheres.</li> <li>• Find the volume and surface area of composite solids.</li> </ul>	<p><b>Essential Questions:</b></p> <p><i>How can we measure objects to solve problems?</i></p> <p><i>How does the distance around a circle relate to its diameter?</i></p> <p><i>How can you use the formula for the area of a parallelogram to help you find the area of a circle?</i></p> <p><i>How does the base area of a prism affect the volume of a prism?</i></p> <p><i>What is the relationship between the volume of a prism and the volume of a pyramid with the same base area and height?</i></p> <p><i>How can you find the surface area of prisms and pyramids without using nets?</i></p> <p><i>How can you determine the volume of a cylinder?</i></p> <p><i>How can you determine the volume of a cone?</i></p>
<p><b>Assessment Evidence</b></p>	
<p><b>Performance Tasks:</b></p> <ul style="list-style-type: none"> <li>• Warm-ups</li> <li>• Exit Tickets</li> <li>• Reveal Practice Assignments</li> <li>• Formative Assessment Math Probe</li> <li>• GoFormative Assignments</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>• Independent Work</li> <li>• Class Discussions</li> <li>• Online Activities</li> <li>• Practice</li> <li>• Homework</li> </ul>
<p><b>Benchmarks:</b> Departmental assessment for Module 12 will be developed from the following resources:</p> <p><b>On-Level Assessments (Form A)</b> <i>Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.</i></p> <p><b>Differentiated Assessments (Form B and C)</b> <i>Form B represents the approaching-level (AL) assessment.</i> <i>Form C represents the beyond-level (BL) assessment.</i></p>	
<p><b>Learning Plan</b></p>	
<p><b>Learning Activities:</b></p> <p><b><u>Module 12-1: Circumference of Circles</u></b></p> <ul style="list-style-type: none"> <li>• <b>LAUNCH</b> <i>Students will participate in a real-world discussion about pi using an infographic.</i></li> </ul>	



- **EXPLORE & DEVELOP**

- **Learn:** Radius and Diameter  
*Students will understand the relationship between the radius and diameter of a circle.*
- **Explore:** The Distance Around a Circle  
*Students will use Web Sketchpad to explore the relationship between the diameter of a circle and the distance around the same circle.*
- **Learn:** Circumference of Circles  
*Students will understand that the distance around a circle is called its circumference and how the circumference is related to the circle's diameter and radius.*
  - **Example 1:** Find the Circumference Given the Diameter  
*Students will find the circumference of a circle given the diameter.*
  - **Example 2:** Find the Circumference Given the Radius  
*Students will find the circumference of a circle given the radius.*
- **Learn:** Use Circumference to Find Missing Dimensions  
*Students will understand how the circumference formula can be applied to find the diameter or radius of a circle.*
  - **Example 3:** Find the Diameter Given the Circumference  
*Students will find the diameter of a circle given the circumference.*
  - **Example 4:** Find the Radius Given the Circumference  
*Students will find the radius of a circle given the circumference.*
- **Apply:** Gardening  
*Students will come up with their own strategy to solve an application problem involving a circular garden.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will determine the amount of rope used in the construction of the model of the five Olympic rings and explain how the problem was solved.*
- **Practice (SE p. 765 – 766)**  
*Find the circumference of a circle given the diameter. (1-2)*  
  
*Find the circumference of a circle given the radius. (3-4)*  
  
*Find the diameter of a circle given the circumference. (5-6)*  
  
*Find the radius of a circle given the circumference. (7-8)*  
  
*Solve application problems involving circumference of circles. (9-10)*  
  
*Use higher-order and critical thinking skills. (11-14)*

## **Module 12-2: Area of Circles**

- **LAUNCH**

*Students will participate in a real-world discussion about the use of longe lines when training a horse in a circular enclosure.*

- **EXPLORE & DEVELOP**

- **Explore:** Area of Circles

*Students will use Web Sketchpad to explore the formula for the area of a circle.*

- **Learn:** Derive the Formula for the Area of a Circle

*Students will understand how to derive the formula for the area of a circle from the area of a parallelogram.*

- **Learn:** Area of Circles

*Students will understand how to find the area of a circle.*

- **Example 1:** Find the Area Given the Radius

*Students will find the area of a circle given the radius.*

- **Example 2:** Find the Area Given the Diameter

*Students will find the area of a circle given the diameter.*

- **Learn:** Area of Semicircles

*Students will understand how the area of a semicircle is related to the area of a circle, with the same radius, and how that relationship can be expressed in a formula.*

- **Example 3:** Find Area of Semicircles

*Students will find the area of a semicircle.*

- **Learn:** Use Circumference to Find Area

*Students will understand how they can apply the formula for the circumference of a circle to find the circle's area, given the circumference.*

- **Example 4:** Use Circumference to Find Area

*Students will find the area of a circle given the circumference of the circle.*

- **Apply:** Crafting

*Students will come up with their own strategy to solve an application problem involving a square scrapbook page.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine the amount of area a horse can roam, while attached to the 30-foot-long longe line.*

- **Practice (SE p. 775 – 776)**

*Find the area of a circle given the radius. (1-2)*

*Find the area of a circle given the diameter. (3-4)*

*Find the area of a semicircle. (5-6)*

*Find the area of a circle given the circumference of the circle. (7)*

*Extend concepts learned in class to apply them to new contexts. (8)*

*Solve application problems involving areas of circles. (9-10)*

*Use higher-order and critical thinking skills. (11-14)*

## **Module 12-3: Area of Composite Figures**

- **LAUNCH**

*Students will participate in a real-world discussion about the state flag of Ohio as an example of a composite figure.*

- **EXPLORE & DEVELOP**

- **Learn: Area of Composite Figures**

*Students will understand how to decompose a composite figure into known shapes in order to find the area.*

- **Example 1: Area of Composite Figures**

*Students will find the area of composite figures.*

- **Learn: Area of Shaded Regions**

*Students will understand how to find the area of shaded regions.*

- **Example 2: Area of Shaded Regions**

*Students will find the area of shaded regions.*

- **Apply: Art**

*Students will come up with their own strategy to solve an application problem involving the creation of a mosaic.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will describe one way that the flag can be decomposed into smaller shapes to find its area and describe the dimensions needed to know in order to find the area of the flag.*

- **Practice (SE p. 783 – 784)**

*Find the area of composite figures. (1-6)*

*Find the area of shaded regions. (7)*

*Extend concepts learned in class to apply them in new contexts. (8)*

*Solve application problems involving area of composite figures. (9-10)*

## **Module 12-4: Graphs of Proportional Relationships**

- **LAUNCH**

*Students will find the volume of prisms and pyramids.*

- **EXPLORE & DEVELOP**

- **Explore:** Volume of Prisms

*Students will explore the relationships between the area of the base and the volume of a prism.*

- **Learn:** Volume of Prisms

*Students will understand how to find the volume of a prism.*

- **Example 1:** Volume of Rectangular Prisms

*Students will find the volume of a rectangular prism.*

- **Example 2:** Volume of Triangular Prisms

*Students will find the volume of a triangular prism.*

- **Explore:** Volume of Pyramids

*Students will explore the relationship between the volume of a prism and the volume of a pyramid that have the same base area and height.*

- **Learn:** Volume of Pyramids

*Students will understand how to find the volume of a pyramid.*

- **Example 3:** Volume of Pyramids

*Students will find the volume of a pyramid.*

- **Learn:** Use Volume to Find Missing Dimensions

*Students will understand how they can apply the volume formulas to find a missing dimension, given the volume and the other dimensions.*

- **Example 4:** Use Volume to Find Missing Dimensions

*Students will find the area of the base of a prism given the volume.*

- **Explore 5:** Use Volume to Find Missing Dimensions

*Students will find the height of a pyramid given the volume.*

- **Apply:** Packaging

*Students will come up with their own strategy to solve an application problem involving packaging a candle properly.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine which popcorn tin offers the better deal.*

- o **Practice (SE p. 795 – 796)**  
*Find the volume of a rectangular prism. (1-2)*  
  
*Find the volume of pyramids and triangular prisms. (3-6)*  
  
*Find the area of the base or the height of a prism given the volume. (7, 10)*  
  
*Find the area of the base or the height of a pyramid given the volume. (8-9)*  
  
*Solve application problems involving volume. (11-12)*  
  
*Use high-order and critical thinking skills. (13-16)*
- o **Formative Assessment Math Probe**  
*Students will understand what information is necessary and sufficient to determine the volume of a figure and accurately identify the information in a figure.*

## **Module 12-5: Surface Area of Prisms and Pyramids**

- **LAUNCH**  
*Students will participate in a real-world discussion about finding the surface area of prisms and pyramids.*
- **EXPLORE & DEVELOP**
  - o **Explore:** Surface Area of Prisms and Pyramids  
*Students will explore the relationship between nets and surface area.*
  - o **Learn:** Surface Area of Prisms  
*Students will understand the relationship between using a net and a formula for finding the surface area of a rectangular prism.*
    - **Example 1:** Surface Area of Rectangular Prisms  
*Students will find the surface area of rectangular prisms.*
    - **Example 2:** Surface Area of Triangular Prisms  
*Students will find the surface area of triangular prisms.*
  - o **Learn:** Surface Area of Pyramids  
*Students will understand the structure of a pyramid and how to find its surface area.*
    - **Example 3:** Surface Area of Pyramids  
*Students will find the surface area of pyramids.*
  - o **Apply:** Painting  
*Students will come up with their own strategy to solve an application problem involving painting a toy box.*
- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will explain the meaning of the constant of proportionality.*
- **Practice (SE p. 805 – 806)**  
*Find the surface area of rectangular prisms. (1-2)*  
  
*Find the surface area of triangular prisms. (3-4)*  
  
*Find the surface area of pyramids. (5-6)*  
  
*Solve application problems involving surface area. (7-8)*  
  
*Use higher-order and critical thinking skills. (9-12)*

## **Module 12-6: Volume of Cylinders**

- **LAUNCH**  
*Students will participate in a real-world discussion about estimating the number of objects in a cylindrical jar.*
- **EXPLORE & DEVELOP**
  - **Explore:** Volume of Cylinders  
*Students will explore how the volumes of cylinders and prisms are related.*
  - **Learn:** Volume of Cylinders  
*Students will learn how to find the volume of cylinders.*
    - **Example 1:** Find the Volume of Cylinders Given the Radius  
*Students will find the volume of a cylinder, given the radius.*
    - **Example 2:** Find Volume of Cylinders Given the Diameter  
*Students will find the volume of a cylinder in terms of  $\pi$ , given the diameter.*
    - **Example 3:** Solve Problems Involving the Volume of Cylinders  
*Students will solve a real-world problem involving the volume of a cylinder*
  - **Apply:** Swimming  
*Students will come up with their own strategy to solve an application problem that involves the amount of time it takes to fill a pool.*
- **REFLECT & PRACTICE**
  - **Exit Ticket**  
*Students will estimate the number of marbles that will fill a cylinder.*
  - **Practice (SE p. 813 – 814)**  
*Find volume of cylinders, given the radius. (1-2)*  
  
*Find the volume of cylinders in terms of  $\pi$ , given the diameter. (3-4)*

*Solve real-world problems involving the volume of cylinders. (5)*

*Extend concepts learned in class to apply them in new contexts. (6-7)*

*Solve application problems involving the volume of cylinders. (8-9)*

*Use higher-order and critical thinking skills. (10-13)*

## **Module 12-7: Volume of Cones**

- **LAUNCH**

*Students will participate in a real-world discussion about finding the volume of cones.*

- **EXPLORE & DEVELOP**

- **Explore:** Volume of Cones

*Students will explore the relationship between the volume of cones and the volume of cylinders.*

- **Learn:** Volume of Cones

*Students will learn how to find the volume of cones.*

- **Example 1:** Find Volume of Cones

*Students will find the volume of a cone in terms of  $\pi$ .*

- **Example 2:** Find Volume of Cones

*Students will find the volume of a cone in a real-world context.*

- **Apply:** Popcorn

*Students will come up with their own strategy to solve an application problem that involves the costs of popcorn.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine how many more jellybeans can fit in a treat bag than pieces of popcorn.*

- **Practice (SE p. 821 – 822)**

*Find the volume of cones in terms of  $\pi$ . (1-4)*

*Find the volume of cones in real-world contexts. (5-7)*

*Extend concepts learned in class to apply them in new contexts. (8)*

*Solve application problems involving the volume of cones. (9-10)*

*Use higher-order and critical thinking skills. (11-14)*

## **Module 12-8: Volume of Spheres**

- **LAUNCH**

*Students will participate in a real-world discussion about different circumferences of basketballs.*

- **EXPLORE & DEVELOP**

- **Learn: Volume of Spheres**

*Students will learn how to find the volume of spheres.*

- **Example 1: Find Volume of Spheres**

*Students will find the volume of a sphere in terms of  $\pi$ .*

- **Example 2: Find Volume of Spheres**

*Students will find the volume of a sphere in a real-world context.*

- **Example 3: Find Volume of Spheres**

*Students will solve a real-world problem involving the volume of a sphere.*

- **Learn: Volume of Hemispheres**

*Students will learn how to find the volume of hemispheres.*

- **Example 4: Find Volume of Hemispheres**

*Students will find the volume of a hemisphere.*

- **Apply: Packaging**

*Students will come up with their own strategy to solve an application problem that involves the volume of a cylindrical container filled with bouncy balls.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will find the amount of air that each size basketball will hold.*

- **Practice (SE p. 829 – 830)**

*Find the volume of spheres in terms of  $\pi$ . (1-2)*

*Find the volume of spheres in real-world contexts. (3)*

*Solve real-world problems involving the volume of spheres. (4)*

*Find the volume of hemispheres. (5-6)*

*Extend concepts learned in class to apply them in new contexts. (7-8)*

*Solve application problems involving the volume of spheres. (9-10)*

*Use higher-order and critical thinking skills. (11-14)*

## **Module 12-9: Volume and Surface Area of Composite Solids**

- **LAUNCH**

*Students will participate in a real-world discussion about a mailbox as an example of a composite*



object.

- **EXPLORE & DEVELOP**

- **Learn: Composite Solids**  
*Students will learn about composite solids.*
- **Learn: Volume of Composite Solids**  
*Students will learn how to find the volume of composite solids.*
  - **Example 1:** Find Volume of Composite Solids  
*Students will find the volume of composite solids.*
  - **Example 2:** Find Volume of Composite Solids  
*Students will find the volume of composite solids.*
  - **Example 3:** Volume of Composite Solids  
*Students will find the volume of three-dimensional composite solids.*
- **Learn: Surface Area of Composite Solids**  
*Students will learn how to find the surface area of three-dimensional composite solids.*
  - **Example 4:** Surface Area of Composite Solids  
*Students will find the surface area of three-dimensional composite solids.*
- **Apply: Art**  
*Students will come up with their own strategy to solve an application problem that involves the amount of concrete needed to make a concrete sculpture.*

- **REFLECT & PRACTICE**








- **Exit Ticket**  
*Students will find the volume of a mailbox.*
- **Practice (SE p. 839 – 840)**  
*Find the volume of three-dimensional composite solids. (1)*  
  
*Find the volume of three-dimensional composite solids. (2-3)*  
  
*Find the surface area of three-dimensional composite solids. (4)*  
  
*Extend concepts learned in class to apply them in new contexts. (5-6)*  
  
*Solve application problems involving volume and surface area of composite solids. (7-8)*  
  
*Use higher-order and critical thinking skills. (9-12)*

## Module 12 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

### Unit Modifications for Special Population Students

<b>Advanced Learners</b>	<div data-bbox="532 474 604 548"></div> <p>Refer to green <b>BL</b> (<i>Beyond Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Beyond Level Differentiated Activities</li> <li>• Extension Activities</li> </ul> <div data-bbox="532 674 604 747"></div> <div data-bbox="617 674 695 747"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>Struggling Learners</b>	<div data-bbox="532 814 604 888"></div> <p>Refer to orange <b>AL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Remediation Activities</li> <li>• Extra Examples</li> <li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li> </ul> <div data-bbox="532 1050 604 1123"></div> <div data-bbox="617 1050 695 1123"></div> <p>Use IXL and iReady to enhance targeted skills.</p>
<b>English Language Learners</b>	<div data-bbox="532 1188 604 1262"></div> <p>Refer to purple <b>ELL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
<b>Special Needs Learners</b>	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.

## Interdisciplinary Connections

### Indicators:

#### Social Studies (Grades 6-8):

##### **6.1.8.GeoSV.4.a**

*Map territorial expansion and settlement, highlighting the locations of conflicts with and resettlement of Native Americans.*

#### Science (Grades 6-8):

##### **MS-ESS1-3**

*Analyze and interpret data to determine scale properties of objects in the solar system.*

## Integration of 21<sup>st</sup> Century Skills

### Indicators:

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and creativity.*

#### Career & Technical Education:

##### **9.3.12.AR-VIS.3**

*Analyze and create two and three-dimensional visual art forms using various media.*

##### **9.3.ST-SM.1**

*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

Unit Title:

## Module 4

# Exponents and Scientific Notation

### Unit Description:

In this module, students draw on their knowledge of exponents to develop *understanding* of the properties of exponents and scientific notation. They use this understanding to build *fluency* with simplifying algebraic expressions involving powers and computing with scientific notation. They *apply* their fluency to solve multi-step real-world problems.

**Unit Duration:** 13 days

### Desired Results

#### Standard(s):

##### 8.EE.A

*Work with radicals and integer exponents.*

#### Indicators:

##### 8.EE.A.1

*Know and apply the properties of integer exponents to generate equivalent numerical expressions.*

##### 8.EE.A.3

*Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.*

##### 8.EE.A.4

*Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.*

#### Understandings:

*Students will...*

- Write and evaluate expressions involving powers and exponents.
- Use Laws of Exponents to multiply and divide monomials.
- Use Laws of Exponents to find powers of monomials.

#### Essential Questions:

*Why are exponents useful when working with very large or very small numbers?*

*How can you write repeated multiplication in a different way?*

*How can you simplify a product of powers with like bases?*

*How can you simplify a quotient of powers with like bases?*

<ul style="list-style-type: none"> <li>• Simplify expressions that have zero and negative exponents.</li> <li>• Write numbers in scientific notation.</li> <li>• Compute with numbers written in scientific notation.</li> </ul>	<p><i>How can you simplify a power raised to another power?</i></p> <p><i>What does it mean when a number has an exponent of zero?</i></p> <p><i>How can you simplify an expression with a negative exponent?</i></p> <p><i>How can you write very large or very small numbers in a different way?</i></p>
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### Assessment Evidence

<b>Performance Tasks:</b> <ul style="list-style-type: none"> <li>• Warm-ups</li> <li>• Exit Tickets</li> <li>• Reveal Practice Assignments</li> <li>• Formative Assessment Math Probe</li> <li>• GoFormative Assignments</li> </ul>	<b>Other Evidence:</b> <ul style="list-style-type: none"> <li>• Independent Work</li> <li>• Class Discussions</li> <li>• Online Activities</li> <li>• Practice</li> <li>• Homework</li> </ul>
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#### Benchmarks:

Departmental assessment for Module 4 will be developed from the following resources:

#### On-Level Assessments (Form A)

*Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.*

#### Differentiated Assessments (Form B and C)

*Form B represents the approaching-level (AL) assessment.*

*Form C represents the beyond-level (BL) assessment.*

### Learning Plan

#### Learning Activities:

#### Module 4-1: Powers and Exponents

- **LAUNCH**

*Students will participate in a real-world discussion about data storage capacity as based on powers of 2.*

- **EXPLORE & DEVELOP**

- **Explore:** Exponents

*Students will explore how to write repeated multiplication using exponents.*

- **Learn:** Write Products as Powers

*Students will learn how to write products as powers.*

- **Example 1:** Write Numeric Products as Powers

*Students will write numerical repeated multiplication expressions as powers.*

- **Example 2:** Write Algebraic Products as Powers  
*Students will write algebraic repeated multiplication expressions as powers.*

- **Learn:** Negative Bases and Parentheses  
*Students will learn what the inclusion and placement of parentheses around a negative base indicates about the value of the power.*

- **Learn:** Evaluate Powers  
*Students will learn how to evaluate an expression that contains a power.*

- **Example 3:** Evaluate Numerical Expressions  
*Students will evaluate numerical expressions that contain powers.*

- **Example 4:** Evaluate Algebraic Expressions  
*Students will evaluate algebraic expressions that contain powers.*

- **Example 5:** Evaluate Algebraic Expressions  
*Students will evaluate algebraic expressions that contain powers.*

- **Apply:** Mammals  
*Students will come up with their own strategy to solve an application problem involving the average weights of two mammals.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will determine the number of bytes of RAM the computer has and defend their solution.*

- **Practice (SE p. 229 – 230)**  
*Write numerical and algebraic multiplication expressions as powers. (1-2)*

*Evaluate numerical expressions that contain powers. (3-6)*

*Extend concepts learned in class to apply them in new contexts. (7-9)*

*Solve application problems involving powers and exponents. (10-1)*

*Use higher-order and critical thinking skills. (12-15)*

## Module 4-2: Multiply and Divide Monomials

- **LAUNCH**  
*Students will participate in a real-world discussion about the speeds and distances of comets.*

## • EXPLORE & DEVELOP

- **Explore:** Products of Powers  
*Students will use Web Sketchpad to explore how to simplify a product of powers with like bases.*

- **Learn: Monomials**  
*Students will understand what a monomial is and how to identify one.*
- **Learn: Product of Powers**  
*Students will understand how the Product of Powers Property can be applied to simplify a product of powers with the same base.*
  - **Example 1: Multiply Numerical Powers**  
*Students will use the Product of Powers Property to multiply numerical powers.*
  - **Example 2: Multiply Algebraic Powers**  
*Students will use the Product of Powers Property to multiply algebraic powers.*
  - **Example 3: Multiply Monomials**  
*Students will use the Product of Powers Property to multiply monomials.*
- **Explore: Quotient of Powers**  
*Students will use Web Sketchpad to explore how to simplify a quotient of powers with like bases.*
- **Learn: Quotient of Powers**  
*Students will understand how the Quotient of Powers Property can be applied to simplify the quotient of powers with the same base.*
  - **Example 4: Divide Algebraic Powers**  
*Students will use the Quotient of Powers Property to divide algebraic powers.*
  - **Example 5: Divide Powers**  
*Students will apply the Quotient of Powers Property to divide numerical powers in order to solve a real-world problem.*
  - **Example 6: Divide Numerical Powers**  
*Students will use the Quotient of Powers Property to divide numerical powers.*
  - **Example 7: Divide Monomials**  
*Students will use the Quotient of Powers Property to divide monomials.*
- **Apply: Computer Science**  
*Students will come up with their own strategy to solve an application problem involving the processing speed of computers.*

## ● **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will determine how long it takes for a comet to travel  $6^{12}$  miles given the traveling speed of  $6^7$  miles per hour.*
- **Practice (SE p. 241 – 242)**  
*Use the Product of Powers Property to multiply numerical powers and algebraic powers. (1-2)*  
  
*Use the Product of Powers Property to multiply monomials. (3-4)*  
  
*Use the Quotient of Powers Property to divide algebraic and numerical powers. (5-6)*

*Use the Quotient of Powers Property to divide numerical powers from a real-world problem. (7)*

*Use the Quotient of Powers Property to divide monomials. (8)*

*Extend concepts learned in class to apply them to new contexts. (9)*

*Solve application problems involving multiplying monomials. (10-11)*

*Use higher-order and critical thinking skills. (12-15)*

## **Module 4-3: Powers of Monomials**

- **LAUNCH**

*Students will participate in a real-world discussion about the large area of murals.*

- **EXPLORE & DEVELOP**

- **Explore:** Power of a Power

*Students will explore how to simplify a power of a power.*

- **Learn:** Power of a Power

*Students will understand how the Power of a Power Property can be applied to simplify powers of powers.*

- **Example 1:** Power of a Power

*Students will apply the Power of a Power Property to expressions with numerical bases.*

- **Example 2:** Power of a Power

*Students will apply the Power of a Power Property to expressions with algebraic bases.*

- **Learn:** Power of a Product

*Students will understand how the Power of a Product Property can be applied to find the powers of products.*

- **Example 3:** Power of a Product

*Students will use the Power of a Product Property to simplify monomials.*

- **Example 4:** Power of a Product

*Students will use the Power of a Product Property to simplify monomials.*

- **Apply:** Geometry

*Students will come up with their own strategy to solve an application problem involving the area of squares.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will write a simplified expression that represents the area of a mural and show the*



*steps used.*

- o **Practice (SE p. 249 – 250)**

*Apply the Power of a Power Property to expressions with numerical bases. (1-2)*

*Apply the Power of a Power Property to expressions with algebraic bases. (3-4)*

*Use the Power of a Power Property to simplify monomials. (5-8)*

*Extend concepts learned in class to apply them in new contexts. (9-10)*

*Solve application problems involving powers of monomials. (11-12)*

*Use higher-order and critical thinking skills. (13-16)*

## **Module 4-4: Zero and Negative Exponents**

- **LAUNCH**

*Students will participate in a real-world discussion about the small size of snowflakes.*

- **EXPLORE & DEVELOP**

- o **Explore:** Exponents of Zero

*Students will explore how to simplify expressions with exponents of zero.*

- o **Learn:** Exponents of Zero

*Students will understand how the Zero Exponent Rule can be applied to simplify expressions that contain exponents of zero.*

- **Example 1:** Exponents of Zero

*Students will simplify expressions with exponents of zero.*

- o **Explore:** Negative Exponents

*Students will use Web Sketchpad to explore how to simplify expressions with negative exponents.*

- o **Learn:** Negative Exponents

*Students will understand the relationship between negative exponents and repeated division.*

- **Example 2:** Negative Exponents

*Students will express powers with negative exponents using positive exponents.*

- **Example 3:** Negative Exponents

*Students will express fractions with powers in the denominator using negative exponents.*

- **Example 4:** Negative Exponents

*Students will simplify a product of powers with negative exponents.*

- **Example 5:** Negative Exponents

*Students will simplify a quotient of powers with negative exponents.*

- **Apply: Measurement**  
*Students will come up with their own strategy to solve an application problem that involves comparing diameters.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will explain how to determine the average diameter of a snowflake using a negative exponent.*
- **Practice (SE p. 259 – 260)**  
*Simplify expressions with exponents of zero. (1-2)*  
  
*Express powers with negative exponents using positive exponents. (3-4)*  
  
*Express fractions with powers in the denominator using negative exponents. (5-6)*  
  
*Simplify products of powers and quotients of powers with negative exponents. (7-10)*  
  
*Extend concepts learned in class to apply them in new contexts. (11-12)*  
  
*Solve application problems involving negative exponents. (13-14)*  
  
*Use high-order and critical thinking skills. (15-18)*
- **Formative Assessment Math Probe**  
*Students will identify the numerical expression that has the least value and explain their choice.*

## **Module 4-5: Scientific Notation**

- **LAUNCH**  
*Students will participate in a real-world discussion about using scientific notation to express very large or very small numbers.*
- **EXPLORE & DEVELOP**
  - **Explore: Scientific Notation**  
*Students will explore how to write very large and very small numbers using scientific notation.*
  - **Learn: Scientific Notation**  
*Students will understand how scientific notation can be used to write very large or very small numbers in a compact way.*
    - **Example 1: Write Numbers in Standard Form**  
*Students will write large numbers that are written in scientific notation in standard form.*

- **Example 2:** Write Numbers in Standard Form  
*Students will write small numbers that are written in scientific notation in standard form.*
- **Learn:** Scientific Notation and Technology  
*Students will learn how to interpret scientific notation generated by a calculator.*
- **Example 3:** Scientific Notation and Technology  
*Students will write numbers written in scientific notation generated by technology in standard form.*
- **Learn:** Write Numbers in Scientific Notation  
*Students will learn how to write numbers in scientific notation.*
- **Example 4:** Write Numbers in Scientific Notation  
*Students will write large numbers that are written in standard form in scientific notation.*
- **Example 5:** Write Numbers in Scientific Notation  
*Students will write small numbers that are written in standard form in scientific notation.*
- **Learn:** Use Scientific Notation  
*Students will learn about choosing units of appropriate size and estimating with scientific notation.*
- **Example 6:** Choose Units of Appropriate Size  
*Students will choose the appropriate units for measurements of large and smaller quantities.*
- **Example 7:** Estimate with Scientific Notation  
*Students will estimate very large or very small quantities using scientific notation.*
- **Apply:** Travel  
*Students will come up with their own strategy to solve an application problem that involves comparing the number of international visitors.*

## • REFLECT & PRACTICE

- **Exit Ticket**  
*Students will express the diameter of a specific red blood cell in scientific notation.*
- **Practice (SE p. 47 – 48)**  
*Write large and small numbers written in scientific notation in standard form. (1-2)*  
  
*Write numbers written in scientific notation generated by technology in standard form. (3-4)*  
  
*Write large and small numbers written in standard form in scientific notation. (5-6)*  
  
*Choose the appropriate units for measurements of large and small quantities. (7)*  
  
*Estimate quantities using scientific notation. (8-9)*

*Extend concepts learned in class to apply them in new contexts. (10)*

*Solve application problems involving scientific notation. (11-12)*

*Use higher-order and critical thinking skills. (13-16)*

## **Module 4-6: Compute with Scientific Notation**

- **LAUNCH**

*Students will participate in a real-world discussion about the differences in volume between Lake Superior and the Pacific Ocean.*

- **EXPLORE & DEVELOP**

- **Learn:** Multiply and Divide with Scientific Notation

*Students will learn how to multiply and divide with numbers written in scientific notation.*

- **Example 1:** Multiply with Scientific Notation

*Students will multiply numbers written in scientific notation.*

- **Example 2:** Divide with Scientific Notation

*Students will divide numbers written in scientific notation.*

- **Learn:** Add and Subtract with Scientific Notation

*Students will learn how to add and subtract with numbers written in scientific notation.*

- **Example 3:** Add or Subtract with Scientific Notation

*Students will add and subtract numbers written in scientific notation.*

- **Apply:** Population

*Students will come up with their own strategy to solve an application problem that involves comparing populations.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students explain how to determine how many times larger the Pacific Ocean is than Lake Superior.*

- **Practice (SE p. 279 – 280)**

*Multiply numbers written in scientific notation. (1)*

*Divide numbers written in scientific notation. (2)*

*Add and subtract numbers written in scientific notation. (3-4)*

*Extend concepts learned in class to apply them in new contexts. (5-6)*

*Solve application problems involving computations with scientific notation. (7-8)*

*Use higher-order and critical thinking skills. (9-12)*








## Module 4 Review

### Module 4 Assessment

#### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

### Unit Modifications for Special Population Students

<b>Advanced Learners</b>	 Refer to green <b>BL</b> ( <i>Beyond Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"><li>• Beyond Level Differentiated Activities</li><li>• Extension Activities</li></ul>   Use IXL and iReady to enhance targeted skills.
<b>Struggling Learners</b>	 Refer to orange <b>AL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"><li>• Remediation Activities</li><li>• Extra Examples</li><li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li></ul>   Use IXL and iReady to enhance targeted skills.
<b>English Language Learners</b>	 Refer to purple <b>ELL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"><li>• Spanish Interactive Student Edition</li><li>• Spanish Personal Tutors</li><li>• Math Language – Building Activities</li><li>• Language Scaffolds</li><li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li><li>• Multilingual Glossary</li><li>• Audio</li><li>• Graphic Organizers</li><li>• Web Sketchpad, Desmos and eTools</li></ul>
<b>Special Needs Learners</b>	Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:

	<ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.

### Interdisciplinary Connections

#### Indicators:

#### Science (Grades 6-8):

##### **MS-PS4-3**

*Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.*

### Integration of 21<sup>st</sup> Century Skills

#### Indicators:

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and critical thinking.*

#### Career & Technical Education:

##### **9.3.ST-SM.1**

*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

Unit Title:

## Module 5

# Real Numbers

### Unit Description:

In this module, students draw on their knowledge of the set of rational numbers to develop an *understanding* of the set of real numbers. They use this understanding to build *fluency* with determining if numbers are rational or irrational, finding roots of perfect squares and cubes, and estimating roots of numbers. They *apply* their fluency to solve multi-step real-world problems.

Unit Duration: 10 days

### Desired Results

#### Standard(s):

##### 8.NS.A

*Know that there are numbers that are not rational and approximate them by rational numbers.*

##### 8.EE.A

*Work with radicals and integer exponents.*

#### Indicators:

##### 8.NS.A.1

*Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually and convert a decimal expansion which repeats eventually into a rational number.*

##### 8.NS.A.2

*Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram and estimate the value of expressions.*

##### 8.NS.A.3 (NEW 2023)

*Understand that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.*

##### 8.EE.A.2 (REVISED 2023)

*Use square root and cube root symbols to represent solutions to equations of the form  $x^2 = p$  and  $x^3 = p$ , where  $p$  is a positive rational number.*

##### 8.EE.A.2a (NEW / REVISED 2023)

*Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that  $\sqrt{2}$  is irrational.*

**8.EE.A.2b (NEW 2023)**

*Simplify numerical radicals, limiting to square roots (i.e. nonperfect squares).*

*For example, simplify  $\sqrt{8}$  to  $2\sqrt{2}$ .*

**Understandings:**

*Students will...*

- Find square and cube roots.
- Identify and describe sets of numbers in the real number system.
- Estimate irrational numbers.
- Compare and order numbers in the real number system.

**Essential Questions:**

*Why do we classify numbers?*

*What does the square root of a number mean?*

*What different types of numbers can be found on the number line?*

*How does a square model help you find the square root of a non-perfect square?*

### Assessment Evidence

**Performance Tasks:**

- Warm-ups
- Exit Tickets
- Reveal Practice Assignments
- Formative Assessment Math Probe
- GoFormative Assignments

**Other Evidence:**

- Independent Work
- Class Discussions
- Online Activities
- Practice
- Homework

**Benchmarks:**

Departmental assessment for Module 5 will be developed from the following resources:

**On-Level Assessments (Form A)**

*Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.*

**Differentiated Assessments (Form B and C)**

*Form B represents the approaching-level (AL) assessment.*

*Form C represents the beyond-level (BL) assessment.*

### Learning Plan

**Learning Activities:****Module 5-1: Roots**

- **LAUNCH**  
*Students will participate in a real-world discussion about the Great Pyramid of Giza and its base side lengths.*
- **EXPLORE & DEVELOP**
  - **Explore:** Find Square Roots using a Square Model  
*Students will use Web Sketchpad to explore how to use square models to find square roots.*



o **Learn: Square Roots**

*Students will understand what it means for a number to be a square root and what it means for a number to be a perfect square.*

▪ **Example 1:** Find Positive Square Roots

*Students will find the positive square root of a number.*

▪ **Example 2:** Find Both Square Roots

*Students will find the positive and negative square root of a number.*

▪ **Example 3:** Find Negative Square Roots

*Students will find the negative square root of a number.*

▪ **Example 4:** Square Roots of Negative Numbers

*Students will determine that there is no rational number square root of negative numbers.*

o **Learn: Use Square Roots to Solve Equations**

*Students will learn how to solve equations of the form  $x^2 = p$ .*

▪ **Example 5:** Use Square Roots to Solve Equations

*Students will solve equations of the form  $x^2 = p$ .*

o **Learn: Cube Roots**

*Students will understand what it means for a number to be a cube root and what it means for a number to be a perfect cube.*

▪ **Example 6:** Cube Roots of Positive Numbers

*Students will find the cube root of a positive number.*

▪ **Example 7:** Cube Roots of Negative Numbers

*Students will find the cube root of a negative number.*

▪ **Example 8:** Use Cube Roots to Solve Equations

*Students will solve equations of the form  $x^3 = p$ .*

o **Apply: Bulletin Boards**

*Students will come up with their own strategy to solve an application problem involving a bulletin board display.*

• **REFLECT & PRACTICE**

o **Exit Ticket**

*Students will determine the approximate length of each side of the square base in the actual Great Pyramid of Giza, and then find the length of each side of the square base in its replica.*

o **Practice (SE p. 297 – 298)**

*Determine the positive and negative square roots of numbers. (1-4)*

*Solve equations of the form  $x^2 = p$ . (5)*

*Find the cube root of positive and negative numbers. (6-7)*

Solve equations of the form  $x^3 = p$ . (8)

Extend concepts learned in class to apply them in new contexts. (9-10)

Solve application problems involving square roots. (11-12)

Use higher-order and critical thinking skills. (13-16)

## **Module 5-2: Real Numbers**

- **LAUNCH**

*Students will participate in a real-world discussion about what it means for a number to be irrational.*

- **EXPLORE & DEVELOP**

- **Explore:** Real Numbers

*Students will use number lines to explore the set of real numbers.*

- **Learn:** Real Numbers

*Students will understand that the set of real numbers are numbers that can be found on the number line.*

- **Example 1:** Identify Real Numbers

*Students will determine whether a number is rational or irrational.*

- **Example 2:** Classify Real Numbers

*Students will identify the real number set(s) to which a decimal or fraction belongs.*

- **Example 3:** Classify Real Numbers

*Students will identify the real number set(s) to which a square root of a perfect square belongs.*

- **Example 4:** Classify Real Numbers

*Students will identify the real number set(s) to which an irrational number belongs.*

- **Learn:** Describe Sets of Real Numbers

*Students will learn how to describe the relationship between sets of real numbers.*

- **Example 5:** Describe Sets of Real Numbers

*Students will describe the relationship between sets of real numbers.*

- **Example 6:** Describe Sets of Real Numbers

*Students will describe the relationship between sets of real numbers.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine what type of number is the circumference of Earth ( $7,926\pi$  miles).*

- o **Practice (SE p. 307 – 308)**

*Determine whether a number is rational or irrational. (1-8)*

*Identify the real number sets to which decimals, fractions, square roots of perfect squares, and irrational numbers belong. (9-11)*

*Describe sets of real numbers. (12-13)*

*Extend concepts learned in class to apply them to new contexts. (14)*

*Use higher-order and critical thinking skills. (15-18)*

## **Module 5-3: Estimate Irrational Numbers**

- **LAUNCH**

*Students will participate in a real-world discussion about the amount of time it will take for an object to fall to the ground, using estimation of irrational numbers.*

- **EXPLORE & DEVELOP**

- o **Explore:** Roots of Non-Perfect Squares

*Students will use Web Sketchpad to explore how to find the square root of a non-perfect square.*

- o **Learn:** Estimate Irrational Numbers Using a Number Line

*Students will learn how to estimate irrational numbers using a number line.*

- **Example 1:** Estimate Square Roots to the Nearest Integer

*Students will estimate square roots to the nearest integer.*

- **Example 2:** Estimate Square Roots to the Nearest Tenth

*Students will estimate square roots to the nearest tenth.*

- **Example 3:** Estimate Cube Roots to the Nearest Integer

*Students will estimate cube roots to the nearest integer.*

- o **Learn:** Estimate Irrational Numbers by Truncating

*Students will learn how to estimate irrational numbers by truncating decimal expansions.*

- **Example 4:** Estimate by Truncating

*Students will solve problems that involve estimating irrational numbers by truncating decimal expansions.*

- o **Apply:** Golden Rectangle

*Students will come up with their own strategy to solve an application problem involving the golden rectangle.*

- **REFLECT & PRACTICE**

- o **Exit Ticket**

*Students will explain how to determine the estimated value of  $\sqrt{13}$  to the nearest tenth and*

use that estimate to approximate the value of  $\frac{\sqrt{13}}{4}$ .

- o **Practice (SE p. 317 – 318)**

*Estimate square roots and cube roots to the nearest integer. (1-4)*

*Estimate square roots to the nearest tenth. (5-8)*

*Estimate irrational numbers by truncating decimal expansions. (9)*

*Extend concepts learned in class to apply them in new contexts. (10-11)*

*Solve application problems involving estimating irrational numbers. (12-13)*

*Use higher-order and critical thinking skills. (14-17)*

### **Mini Lesson After 5-1 thru 5-3: Simplify Numerical Radicals**

**(NEW to address 8.EE.A.2b)**

- **EXPLORE & DEVELOP**

**Teacher Resources:**

**IXL:** *Simplify Radical Expressions*

<https://www.ixl.com/math/grade-8/simplify-square-roots?showVideoDirectly=true>

**Khan Academy:** *Simplifying Square Roots*

<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:rational-exponents-radicals/x2f8bb11595b61c86:simplifying-square-roots/v/simplifying-square-roots-1>

- o **Learn:** *Simplifying Numerical Radicals*

*Students will learn how to simplify numerical radicals, limiting to square roots (i.e. nonperfect squares).*

- o **Practice**

*Simplify numerical radicals, limiting to square roots (i.e. nonperfect squares)*

**Teacher Resources:**

**IXL:** *Simplify Square Roots*

<https://www.ixl.com/math/grade-8/simplify-square-roots>

**Worksheet:** *Simplifying Radicals - Not Perfect Square*

<https://mathmonks.com/wp-content/uploads/2021/06/Simplifying-Radicals-that-are-Not-Perfect-Squares-Worksheet.pdf>

## **Module 5-4: Compare and Order Real Numbers**

- **LAUNCH**

*Students will participate in a real-world discussion about the dimensions of a Little League Baseball field, written in different notations.*

- **EXPLORE & DEVELOP**

- **Learn:** Compare and Order Real Numbers

*Students will learn how to compare and order real numbers.*

- **Example 1:** Compare Real Numbers

*Students will compare two positive real numbers and graph the numbers on a number line.*

- **Example 2:** Compare Real Numbers

*Students will compare two negative real numbers and graph the numbers on a number line.*

- **Example 3:** Order Real Numbers

*Students will order a set of real numbers and graph the numbers on a number line.*

- **Example 4:** Use Real Numbers

*Students will solve problems that involve ordering real numbers.*

- **Apply:** Line of Sight

*Students will come up with their own strategy to solve an application problem involving the line of sight from atop a building.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will explain how to determine which outfield fence is farther from home plate.*

- **Practice (SE p. 329 – 330)**

*Compare two positive or two negative numbers and graph the numbers on a number line. (1-4)*

*Order a set of real numbers and graph the numbers on a number line. (5)*

*Extend concepts learned in class to apply them in new contexts. (6-7)*

*Solve application problems involving comparing and ordering real numbers. (8-9)*

*Use high-order and critical thinking skills. (10-13)*

- **Formative Assessment Math Probe**

*Students will understand the difference between square roots and cube roots and use what they know about square and cube roots to compare their values.*

## **Lesson Added After 5-4: Sum and Products of Rational & Irrational Numbers**

**(NEW to address 8.NS.A.3)**

### **• EXPLORE & DEVELOP**

#### **Teacher Resource:**

***Khan Academy: Sums and Products of Rational and Irrational Numbers***

<https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:irrational-numbers/x2f8bb11595b61c86:sums-and-products-of-rational-and-irrational-numbers/v/sum-and-product-of-rational-numbers>

- o **Learn:** Sum and Product of Two Rational Numbers  
*Students will learn that the sum or product of two rational numbers is rational.*
- o **Learn:** Sum of a Rational Number & an Irrational Number  
*Students will learn that the sum of a rational number and an irrational number is irrational.*
- o **Learn:** Product of a NonZero Rational Number & an Irrational Number  
*Students will learn that the product of a nonzero rational number and an irrational number is irrational.*
- o **Practice**  
*Classify the sum or product of two rational numbers.*

*Classify the sum of a rational number and an irrational number.*

*Classify the product of a nonzero rational number and an irrational number.*

#### **Teacher Resources:**

***IXL: Sort Rational and Irrational Numbers***

<https://www.ixl.com/math/algebra-1/sort-rational-and-irrational-numbers>

***IXL: Classify Rational and Irrational Numbers***

<https://www.ixl.com/math/algebra-1/classify-rational-and-irrational-numbers>

***IXL: Properties of Operations on Rational and Irrational Numbers***

<https://www.ixl.com/math/algebra-1/properties-of-operations-on-rational-and-irrational-numbers>








### **Module 5 Review**

### **Module 5 Assessment**

#### **Resources:**

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

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Unit Modifications for Special Population Students	
Advanced Learners	 Refer to green <b>BL</b> ( <i>Beyond Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Beyond Level Differentiated Activities</li> <li>• Extension Activities</li> </ul>   Use IXL and iReady to enhance targeted skills.
Struggling Learners	 Refer to orange <b>AL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Remediation Activities</li> <li>• Extra Examples</li> <li>• <i>Arrive Math</i> Take Another Look Mini Lessons</li> </ul>   Use IXL and iReady to enhance targeted skills.
English Language Learners	 Refer to purple <b>ELL</b> ( <i>Approaching Level</i> ) indicators in Teacher Edition and assign corresponding activities: <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
Special Needs Learners	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
<b>Learners with a 504</b>	Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.

## Interdisciplinary Connections

### Indicators:

#### Health and Physical Education (Grades 6-8):

##### **2.3.8.ATD.5**

*Analyze how the influence of peers and different social outcomes (e.g., home, school, party) can result in positive and/or negative outcomes.*

#### Social Studies (Grades 6-8):

##### **6.1.8.EconET.3.a**

*Identify the effect of inflation and debt on the American people and evaluate the policies of state and national governments during this time.*

#### Science (Grades 6-8):

##### **MS-PS2-2**

*Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.*

## Integration of 21<sup>st</sup> Century Skills

### Indicators:

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and critical thinking.*

#### Career & Technical Education:

##### **9.3.12.FN.1**

*Utilize mathematical concepts, skills and problem solving to obtain necessary information for decision making in the finance industry.*

##### **9.3.ST-SM.2**

*Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.*



Unit Title:

## Module 13

# Transformations, Congruence and Similarity

### Unit Description:

In this module, students draw on their knowledge of graphing in the coordinate plane to develop *understanding* of transformations. They use their understanding to build *fluency* with graphing and describing translations, reflections, rotations, and dilations using coordinates. They develop *understanding* that two figures are congruent or similar if the second figure can be obtained from the first by a series of transformations. They *apply* their understanding to solve real-world indirect measurement problems.

**Unit Duration:** 13 days

### Desired Results

#### Standard(s):

##### 8.G.A

*Understand congruence and similarity using physical models, transparencies, or geometry software.*

#### Indicators:

##### 8.G.A.1

*Verify experimentally the properties of rotations, reflections, and translations.*

##### 8.G.A.2

*Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.*

##### 8.G.A.3

*Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.*

##### 8.G.A.4

*Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.*

##### 8.G.B.5

*Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal and the angle-angle criterion for similarity of triangles.*

<p><b>Understandings:</b> <i>Students will...</i></p> <ul style="list-style-type: none"> <li>• Translate figures and describe translations on the coordinate plane.</li> <li>• Reflect figures and describe reflections on the coordinate plane.</li> <li>• Rotate figures and describe rotations on the coordinate plane.</li> <li>• Dilate figures and describe dilations on the coordinate plane.</li> <li>• Use a sequence of transformations to describe congruency between figures.</li> <li>• Use a sequence of transformations to describe similarity between figures.</li> <li>• Solve problems involving similar triangles.</li> </ul>	<p><b>Essential Questions:</b></p> <p><i>What does it mean to perform a transformation on a figure?</i></p> <p><i>How do the coordinates of a figure change after a translation?</i></p> <p><i>How can you determine the coordinate of a figure after a reflection across either axis?</i></p> <p><i>How can you determine the coordinates of an image about a 90°, 180° or 270° clockwise rotation about the origin?</i></p> <p><i>How does the scale factor change the size and coordinates of a figure after a dilation relative to the origin?</i></p> <p><i>What happens to a figure when you translate, reflect, or rotate it?</i></p> <p><i>How can you find lengths that are difficult to measure directly?</i></p>
<p><b>Assessment Evidence</b></p>	
<p><b>Performance Tasks:</b></p> <ul style="list-style-type: none"> <li>• Warm-ups</li> <li>• Exit Tickets</li> <li>• Reveal Practice Assignments</li> <li>• Formative Assessment Math Probe</li> <li>• GoFormative Assignments</li> </ul>	<p><b>Other Evidence:</b></p> <ul style="list-style-type: none"> <li>• Independent Work</li> <li>• Class Discussions</li> <li>• Online Activities</li> <li>• Practice</li> <li>• Homework</li> </ul>
<p><b>Benchmarks:</b> Departmental assessment for Module 13 will be developed from the following resources:</p> <p><b>On-Level Assessments (Form A)</b> <i>Three versions of the on-level assessment are available: Form A1, Form A2, and Form A3.</i></p> <p><b>Differentiated Assessments (Form B and C)</b> <i>Form B represents the approaching-level (AL) assessment.</i> <i>Form C represents the beyond-level (BL) assessment.</i></p>	
<p><b>Learning Plan</b></p>	
<p><b>Learning Activities:</b></p> <p><b><u>Module 13-1: Translations</u></b></p> <ul style="list-style-type: none"> <li>• <b>LAUNCH</b> <i>Students will participate in a real-world discussion about a GPS using coordinates to identify certain locations.</i></li> </ul>	

- **EXPLORE & DEVELOP**

- **Learn:** Transformations  
*Students will understand that transformations map one geometric figure onto another.*
- **Learn:** Translations on a Coordinate Plane  
*Students will understand that translating a figure on the coordinate plane slides the figure in one or two directions.*
  - **Example 1:** Translate Figures on the Coordinate Plane  
*Students will translate figures on the coordinate plane and determine the coordinates of the image.*
- **Explore:** Translate Using Coordinates  
*Students will use Web Sketchpad to explore how to translate figures using coordinates.*
- **Learn:** Translations Using Coordinates  
*Students will learn how to use coordinate notation to find the coordinates of an image after a translation.*
  - **Example 2:** Translate Using Coordinates  
*Students will write the coordinate notation for a translation and use it to find the coordinates of a figure's image.*
  - **Example 3:** Use Coordinate Notation to Describe Translations  
*Students will describe translations shown on the coordinate plane using coordinate notation.*
- **Apply:** Map Reading  
*Students will come up with their own strategy to solve an application problem involving distance on the coordinate plane.*

- **REFLECT & PRACTICE**

- **Exit Ticket**  
*Students will use coordinate notation to describe the transformation from  $(3, 4)$  to  $(-1, -3)$ .*
- **Practice (SE p. 855 – 856)**  
*Translate figures on the coordinate plane and determine the coordinates of the image. (1-2)*  
  
*Write the coordinate notation for a translation and use it to find the coordinates of a figure's image. (3-4)*  
  
*Describe translations using coordinate notation. (5)*  
  
*Extend concepts learned in class to apply them in new contexts. (6)*  
  
*Solve application problems involving translations. (7-8)*  
  
*Use higher-order and critical thinking skills. (9-12)*

## **Module 1-2: Understand Proportional Relationships**

- **LAUNCH**

*Students will participate in a real-world discussion about reflections and pattern changes when using a kaleidoscope.*

- **EXPLORE & DEVELOP**

- **Learn:** Reflections on a Coordinate Plane

*Students will understand that reflecting a figure on the coordinate plane results in a minor image of that figure across a line of reflection.*

- **Example 1:** Reflect Figures on the Coordinate Plane

*Students will determine the coordinates of an image after a reflection across an axis on the coordinate plane.*

- **Example 2:** Reflect Figures on the Coordinate Plane

*Students will determine the coordinates of an image after a reflection across horizontal or vertical lines on the coordinate plane.*

- **Explore:** Reflect Using Coordinates

*Students will use Web Sketchpad to explore how to reflect two-dimensional figures using coordinates.*

- **Learn:** Reflect Using Coordinates

*Students will learn how to use coordinate notation to find the coordinates of an image after a reflection across the x- or y-axis.*

- **Example 3:** Reflect Using Coordinates

*Students will write the coordinate notation for the reflection and use it to find the coordinates of a two-dimensional figure's image.*

- **Example 4:** Describe Reflections

*Students will use coordinate notation and words to describe reflections by analyzing the coordinates of a reflected image.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine the coordinates of the vertices of a triangle if it is reflected across the y-axis and the x-axis.*

- **Practice (SE p. 865 – 866)**

*Determine the coordinates of an image after a reflection across an axis on the coordinate plane. (1-2)*

*Determine the coordinates of an image after a reflection across horizontal or vertical lines on the coordinate plane. (3-4)*

*Write the coordinate notation for a reflection and use it to find the coordinates of a two-dimensional figure's image. (5)*

*Describe reflections by analyzing the coordinates of a reflected image. (6)*

*Extend concepts learned in class to apply them to new contexts. (7)*

*Use higher-order and critical thinking skills. (8-11)*

## **Module 13-3: Rotations**

- **LAUNCH**

*Students will participate in a real-world discussion about the rotation of Ferris Wheels.*

- **EXPLORE & DEVELOP**

- **Learn:** Rotations About a Vertex

*Students will understand how to rotate two-dimensional figures about a vertex on the coordinate plane.*

- **Example 1:** Rotate Figures About a Vertex

*Students will rotate two-dimensional figures about a vertex on the coordinate plane and determine the coordinates of the image.*

- **Explore:** Rotate Using Coordinates

*Students will use Web Sketchpad to explore how to rotate two-dimensional figures using coordinates.*

- **Learn:** Rotations About the Origin

*Students will understand how to use coordinate notation to rotate two-dimensional figures on the coordinate plane about the origin.*

- **Example 2:** Rotate Using Coordinates

*Students will write the coordinate notation for a rotation and use it to find the coordinates of a two-dimensional figure's image.*

- **Example 3:** Describe Rotations

*Students will describe rotations using coordinate notation and determine the angle of rotation.*

- **Apply:** Arranging Furniture

*Students will come up with their own strategy to solve an application problem involving a sequence of transformations.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine the coordinates of the vertices of the London Eye image.*

- **Practice (SE p. 875 – 876)**

*Rotate two-dimensional figures about a vertex on the coordinate plane and determine the coordinates of the image. (1-2)*

*Write the coordinate notation for a clockwise rotation about the origin and use it to find the coordinates of a two-dimensional figure's image. (3-4)*

*Describe clockwise rotations using coordinate notation and determine the angle of rotation about the origin. (5)*

*Extend concepts learned in class to apply them in new contexts. (6)*

*Solve application problems involving rotations. (7-8)*

*Use higher-order and critical thinking skills. (9-11)*

## **Module 13-4: Dilations**

- **LAUNCH**

*Students will participate in a real-world discussion about the use of microscopes to enlarge objects that are too small for the human eye to see.*

- **EXPLORE & DEVELOP**

- **Learn:** Dilations and Scale Factor

*Students will understand that a dilation is a transformation that can enlarge or reduce a figure proportionally.*

- **Explore:** Dilate Figures on the Coordinate Plane

*Students will use Web Sketchpad to explore how to dilate two-dimensional figures on the coordinate plane when the origin is the center of dilation.*

- **Learn:** Dilations on a Coordinate Plane

*Students will understand how to dilate two-dimensional figures on the coordinate plane using coordinate notation.*

- **Example 1:** Graph Dilations

*Students will dilate two-dimensional figures with a scale factor greater than 1 on the coordinate plane.*

- **Example 2:** Graph Dilations

*Students will dilate two-dimensional figures with a scale factor between 0 and 1 on the coordinate plane.*

- **Example 3:** Describe Dilations

*Students will describe dilations using coordinate notation.*

- **Apply:** Consumer Science

*Students will come up with their own strategy to solve an application problem that involves finding the cost of fencing.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine what the vertices of a magnified bacteria cell are after the dilation.*

- **Practice (SE p. 885 – 886)**

*Dilate two-dimensional figures with a scale factor greater than 1 on the coordinate plane. (1-2)*

*Dilate two-dimensional figures with a scale factor between 0 and 1 on the coordinate plane. (3-4)*

*Describe dilations using coordinate notation. (5)*

*Extend concepts learned in class to apply them in new contexts. (6)*

*Solve application problems involving dilations. (7-8)*

*Use high-order and critical thinking skills. (9-11)*

o **Formative Assessment Math Probe**

*Students will understand how geometric transformations appear in algebraic notation to select all of the true statements about each transformation and explain the choices.*

## **Module 13-5: Congruence and Transformations**

- **LAUNCH**

*Students will participate in a real-world discussion about congruence, using an infographic.*

- **EXPLORE & DEVELOP**

- o **Explore:** Congruence and Transformations

*Students will use Web Sketchpad to explore the properties of translations, reflections, and rotations.*

- o **Learn:** Congruence and Transformations

*Students will understand the properties of translations, reflections, and rotation and how these transformations are used to show that a pair of two-dimensional figures is congruent.*

- **Example 1:** Determine Congruence

*Students will determine that a pair of two-dimensional figures is congruent by applying a sequence of rotations, reflections, and translations.*

- **Example 2:** Determine Congruence

*Students will determine that a pair of two-dimensional figures is not congruent by applying a sequence of rotations, reflections, and translations.*

- o **Learn:** Identify Transformations

*Students will understand how the orientation of two congruent figures can be used to identify the sequence of transformations between them.*

- **Example 3:** Identify Transformations

*Students will describe a sequence of transformations between a pair of two-dimensional congruent figures.*

- **Example 4:** Identify Transformations

*Students will describe a sequence of transformations between two congruent real-world figures.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine what transformations can be used to show that triangle RST and triangle R'S'T' are congruent.*

- **Practice (SE p. 897 – 898)**

*Determine that a pair of two-dimensional figures is not congruent by applying a sequence of rotations, reflections, and translations. (1)*

*Determine that a pair of two-dimensional figures is congruent by applying a sequence of rotations, reflections, and translations. (2)*

*Describe a sequence of transformations between a pair of two-dimensional congruent figures. (3)*

*Describe a sequence of transformations between two congruent real-world figures. (4-5)*

*Extend concepts learned in class to apply them in new contexts. (6)*

*Use higher-order and critical thinking skills. (7-10)*

## **Module 13-6: Similarity and Transformations**

- **LAUNCH**

*Students will participate in a real-world discussion about the similarity of Russian nesting dolls, known as Matryoshka dolls.*

- **EXPLORE & DEVELOP**

- **Learn: Similarity**

*Students will understand how dilations, translations, reflections, and rotations are used to show that a pair of two-dimensional figures is similar.*

- **Example 1: Determine Similarity**

*Students will determine that a pair of two-dimensional figures is similar by applying a sequence of dilations, rotations, reflections, and translations.*

- **Example 2: Determine Similarity**

*Students will determine that a pair of two-dimensional figures is not similar by determining if a dilation occurred.*

- **Learn: Identify Transformations**

*Students will understand how the stress of two similar figures are related by the scale factor of the dilation.*

- **Example 3: Identify Transformations**

*Students will describe a sequence of transformations between a pair of two-dimensional similar figures.*



- **Example 4: Use the Scale Factor**

*Students will determine missing dimensions of similar figures by using the scale factor.*

- **Apply: Careers**

*Students will come up with their own strategy to solve an application problem involving similar figures.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine if two triangles are similar.*

- **Practice (SE p. 909 – 910)**

*Determine that a pair of two-dimensional figures is similar by applying a sequence of dilations, rotations, reflections, and translations. (1)*

*Determine that a pair of two-dimensional figures is not similar by determining if a dilation occurred. (2)*

*Describe a sequence of transformations between a pair of two-dimensional similar figures. (3)*

*Determine missing dimensions of similar figures by using the scale factor. (4)*

*Extend concepts learned in class to apply them in new contexts. (5)*

*Solve application problems involving similar figures. (6-7)*

*Use higher-order and critical thinking skills. (8-10)*

## **Module 13-7: Indirect Measurement**

- **LAUNCH**

*Students will participate in a real-world discussion about the length of a shadow being proportional to a person's height.*

- **EXPLORE & DEVELOP**

- **Explore: Similar Triangles and Indirect Measurement**

*Students will use Web Sketchpad to explore how to use similar triangles to solve problems involving indirect measurement.*

- **Learn: Indirect Measurement**

*Students will understand how properties of similar triangles can be used to solve problems involving indirect measurement.*

- **Example 1: Use Indirect Measurement**

*Students will use similar triangles to solve problems involving indirect measurement with shadows.*

- **Example 2: Use Indirect Measurement**  
*Students will use similar triangles to solve problems involving indirect measurement.*

- **REFLECT & PRACTICE**

- **Exit Ticket**

*Students will determine Jacob's height by using the properties of similar right triangles.*

- **Practice (SE p. 915 – 916)**

*Solve problems involving indirect measurement with shadows. (1-2)*

*Solve problems involving indirect measurement. (3-4)*

*Extend concepts learned in class to apply them in new contexts. (5-8)*

*Use higher-order and critical thinking skills. (9-11)*

## Module 13 Review

## Module 13 Assessment

### Resources:

- **Teacher Edition:** McGraw Hill Reveal Math Course 2
- **Interactive Student Edition:** McGraw Hill Reveal Math Course 2
- **Technology:** McGraw Hill Online Platform, Teacher Laptop, Projector, Student Laptop, Calculators

## Unit Modifications for Special Population Students

### Advanced Learners



Refer to green **BL** (*Beyond Level*) indicators in Teacher Edition and assign corresponding activities:

- Beyond Level Differentiated Activities
- Extension Activities



Use IXL and iReady to enhance targeted skills.

### Struggling Learners



Refer to orange **AL** (*Approaching Level*) indicators in Teacher Edition and assign corresponding activities:

- Remediation Activities
- Extra Examples
- *Arrive Math* Take Another Look Mini Lessons



Use IXL and iReady to enhance targeted skills.

English Language Learners	<div data-bbox="532 134 604 205" data-label="Image"></div> <p>Refer to purple <b>ELL</b> (<i>Approaching Level</i>) indicators in Teacher Edition and assign corresponding activities:</p> <ul style="list-style-type: none"> <li>• Spanish Interactive Student Edition</li> <li>• Spanish Personal Tutors</li> <li>• Math Language – Building Activities</li> <li>• Language Scaffolds</li> <li>• <i>Think About It!</i> and <i>Talk About It!</i> Prompts</li> <li>• Multilingual Glossary</li> <li>• Audio</li> <li>• Graphic Organizers</li> <li>• Web Sketchpad, Desmos and eTools</li> </ul>
Special Needs Learners	<p>Each special education student has an <b>Individualized Educational Plan (IEP)</b> that details the specific accommodations, modifications, services, and support needed. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include:</p> <ul style="list-style-type: none"> <li>• <b>Variation of Time:</b> adapting the time allotted for learning, task completion or testing</li> <li>• <b>Variation of Input:</b> adapting the way instruction is delivered</li> <li>• <b>Variation of Output:</b> adapting how a student can respond to instruction</li> <li>• <b>Variation of Size:</b> adapting the number of items the student is expected to complete</li> <li>• <b>Modifying content, process, or product</b></li> </ul>
Learners with a 504	<p>Refer to page four in the <a href="#">Parent and Educator Resource Guide to Section 504</a> to assist in the development of appropriate plans.</p>

Interdisciplinary Connections	
<p><b>Indicators:</b></p> <p><b><u>Computer Science and Design Thinking:</u></b></p> <p><b>8.1.8.DA.1</b>  <i>Organize and transform data collected using computational tools to make it usable for a specific purpose.</i></p> <p><b><u>Technology Education:</u></b></p> <p><b>9.3.ST.1</b>  <i>Use technology to acquire, manipulate, analyze, and report data.</i></p> <p><b>9.4.12.O.11</b>  <i>Apply active listening skills to obtain and clarify information.</i></p>	

### English Language Arts:

#### **W.6.1.B**

*Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text.*

### Science:

#### **MS-ETS1-2**

*Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.*

## **Integration of 21<sup>st</sup> Century Skills**

### **Indicators:**

*From the Partnership for 21<sup>st</sup> Century Skills (P21), the deeper learning competencies and skills for 21<sup>st</sup> century learning in this unit include collaboration, communication, and creativity.*

### Career & Technical Education:

#### **9.3.ST-SM.1**

*Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.*

#### **9.3.ST-SM.2**

*Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.*