NEPTUNE TOWNSHIP SCHOOL DISTRICT

Mathematics
Curriculum
Grade 7 Honors

NEPTUNE TOWNSHIP SCHOOL DISTRICT
Office of the Superintendent
60 Neptune Blvd.
Neptune, NJ 07753-4836

February 28, 2024 Document C1#1

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NEPTUNE TOWNSHIP SCHOOL DISTRICT

MATHEMATICS
GRADE 7 HONORS
CURRICULUM

Table of Contents

Curriculum

NEPTUNE TOWNSHIP SCHOOL DISTRICT

Mathematics
Grade 7 Honors

Acknowledgements

The Mathematics Grade 7 Honors curriculum guide was developed for Neptune Middle School through the efforts of Dawn Reinhardt, Department Chairperson, with guidance from Dolores Dalelio, Supervisor of STEM, and Sally A. Millaway, Ed.D., Director for Curriculum, Instruction and Assessment.

The team is to be commended for their dedication in creating this curriculum in the UbD format and their expertise in the area of mathematics. The Mathematics Grade 7 Honors guide was written in alignment with the 2023 New Jersey Student Learning Standards for Mathematics and the increased rigor that those standards bring to the teaching and learning of mathematics. This curriculum guide focuses on developing students' conceptual understanding and growing students into procedurally fluent mathematicians. Students will practice productive perseverance and work collaboratively to solve problems. Units integrate growth mindset strategies, and social-emotional learning instruction to support creating a culture where students embrace math learning.

NEPTUNE TOWNSHIP SCHOOL DISTRICT

DISTRICT MISSION STATEMENT

The primary mission of the Neptune Township School District is to prepare all of our students for a life-long learning process and to become confident, competent, socially-, and culturally-conscious citizens in a complex and diverse world. It is with high expectations that our schools foster:

- A strong foundation in academics and modern technologies
- A positive, equitable, and varied approach to teaching and learning
- An emphasis on critical thinking skills and problem-solving techniques
- A respect for and an appreciation of our world, its resources, and its diverse people
- A sense of responsibility, good citizenship, and accountability
- An involvement by the parents and the community in the learning process

Neptune Township School District

Educational Outcome Goals

The students in the Neptune Township schools will become life-long learners and will:

- Become fluent readers, writers, speakers, listeners, and viewers with comprehension and critical thinking skills.
- Acquire the mathematical skills, understandings, and attitudes that are needed to be successful in their careers and everyday life.
- Understand fundamental scientific principles, develop critical thinking skills, and demonstrate safe practices, skepticism, and open-mindedness when collecting, analyzing, and interpreting information.
- Become technologically literate.
- Demonstrate proficiency in all New Jersey Student Learning Standards (NJSLS).
- Develop the ability to understand their world and to have an appreciation for the heritage of America with a high degree of literacy in civics, history, economics and geography.
- Develop a respect for different cultures and demonstrate trustworthiness, responsibility, fairness, caring, and citizenship.
- Become culturally literate by being aware of the historical, societal, and multicultural aspects and implications of the arts.
- Demonstrate skills in decision-making, goal setting, and effective communication, with a focus on character development.
- Understand and practice the skills of family living, health, wellness and safety for their physical, mental, emotional, and social development.
- Develop consumer, family, and life skills necessary to be a functioning member of society.
- Develop the ability to be creative, inventive decision-makers with skills in communicating ideas, thoughts and feelings.
- Develop career awareness and essential technical and workplace readiness skills, which are significant to many aspects of life and work.

NEPTUNE TOWNSHIP SCHOOL DISTRICT

MATHEMATICS
GRADE 7 HONORS

COURSE DESCRIPTION

This course is designed to cover the 7th grade math standards in the first half of the year, while also introducing the algebra concepts of pre-algebra to prepare students to take Algebra I in 8th grade. The Mathematics Grade 7 Honors course is an introduction to basic algebra concepts and a review of arithmetic algorithms. This course emphasizes the language of algebra and problem-solving. Topics covered in this course include transforming and constructing geometric figures, equations and inequalities in one variable, similarity, slope and linear functions, data analysis and sampling, applications of real numbers and exponents, area and volume, and probability. Students will solve real-world and mathematical problems utilizing various data and formulas.

INTEGRATED SOCIAL AND EMOTIONAL LEARNING COMPETENCIES *The following social and emotional competencies are integrated in this curriculum document:*	
Self-Awareness	
	Recognize one's own feelings and thoughts
	Recognize the impact of one's feelings and thoughts on one's own behavior
X	Recognize one's personal traits, strengths and limitations
X	Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	
	Understand and practice strategies for managing one's own emotions, thoughts and behaviors
X	Recognize the skills needed to establish and achieve personal and educational goals
X	Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals
Social Awareness	
	Recognize and identify the thoughts, feelings, and perspectives of others
	Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds
X	Demonstrate an understanding of the need for mutual respect when viewpoints differ
X	Demonstrate an awareness of the expectations for social interactions in a variety of setting
Responsible Decision Making	
X	Develop, implement and model effective problem solving and critical thinking skill
X	Identify the consequences associated with one's action in order to make constructive choices
	Evaluate personal, ethical, safety and civic impact of decisions
Relationship Skills	
X	Establish and maintain healthy relationships
X	Utilize positive communication and social skills to interact effectively with others
X	Identify ways to resist inappropriate social pressure
X	Demonstrate the ability to present and resolve interpersonal conflicts in constructive ways
X	Identify who, when, where, or how to seek help for oneself or others when needed

Unit Plan Title	Unit 1: Transform and Construct Geometric Figures
Suggested Time Frame	30 Days

Overview
In this introductory unit, students will transform and construct geometric figures. ● **Module 1:** Students will use transformations and recognize congruent figures. ● **Module 2:** Students will draw and analyze 2-D figures given conditions for sides and angles. Students will use proportional reasoning to create scale drawings. ● **Module 3:** Students will divide fractions and mixed numbers.

STAGE 1: Desired Results

New Jersey Student Learning Standards for Mathematics (2023)	
8.G.A	**Understand congruence and similarity using physical models, transparencies, or geometry software.**

8.G.A.1 Verify experimentally the properties of rotations, reflections, and translations

a. Lines are transformed to lines, and line segments to line segments of the same length.

b. Angles are transformed to angles of the same measure.

c. Parallel lines are transformed to parallel lines.

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.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Essential Questions	**Enduring Understandings** ***Students will understand…***
● How can you show that two figures are either congruent or similar to one another? ● How does a sequence of translations, reflections and rotations result in congruent figures? ● What effects do dilations have on two-dimensional geometric figures? ● How can you use angle measures to determine whether two figures are similar?	● It is possible to use more than one transformation to map a preimage onto its image. ● Each transformation can be drawn using figures on a coordinate plane and each follows algebraic rules. ● Transformations produce congruent figures. ● Dilations produce similar figures. ● The image that is a result of enlarging or reducing a preimage is not congruent to the preimage.
Learning Targets: Knowledge ***Students will know…***	**Learning Targets: Skills** ***Students will be able to…***
● A transformation is a change in size or position of a figure. ● Translation is a transformation that slides a figure right, left, up, or down. ● Reflection flips a figure across a line. ● Rotation turns a figure around a specific point. ● The difference between congruent and similar. ● Two figures are similar if one can be obtained from the other by a sequence of dilations and rotations, reflections, and/or translations. ● Two figures are congruent if one can be obtained from the other by a sequence of rotations, reflections, and/or translations.	● Describe a sequence of transformations that maps one similar figure onto another. ● Describe the effects of dilations, translations, rotations, and reflections using coordinates. ● Dilate, translate, rotate, and reflect two-dimensional figures on a coordinate plane. ● Verify that when a reflection, rotation, and/or translation is performed, lines are transformed to lines, and line segments to line segments of the same length. ● Verify that when a reflection, rotation, and/or translation is performed, angles are transformed to angles of the same measure.

Key Academic Vocabulary	
Review: ● Trapezoid ● Coordinate plane ● Segment ● Vertex ● Corresponding Angles ● Parallelogram ● Quadrant ● X-axis ● Y-axis ● Origin ● Corresponding Sides ● Proportional Relationship ● Enlargement ● Similar ● Analyze ● Compute ● Interpret	New: ● Transformation ● Image ● Preimage ● Prime notation ● Translate ● Reflection ● Line of Reflection ● Center of Rotation ● Rotation ● Congruent ● Diameter ● Radius ● Scale ● Scale Drawing ● Center of Dilation ● Dilation ● Reduction ● Scale Factor

Interdisciplinary Connections

2023 New Jersey Student Learning Standards for English Language Arts

- **RI.CR.7.1.** Cite several pieces of textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
- **RI.AA.7.7.** Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.
- **W.IW.7.2**. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- **SL.PE.7.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- **SL.II.7.2.** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

2020 New Jersey Student Learning Standards for Computer Science and Design Thinking

NJSLS 8.1 Computer Science

- **8.1.8.NI.1:** Model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination.
- **8.1.12.AP.6:** Refine a solution that meets users' needs by incorporating feedback from team members and users.

NJSLS 8.2 Design Thinking

- **8.2.8.ED.6:** Analyze how trade-offs can impact the design of a product.
- **8.2.8.ED.3:** Develop a proposal for a solution to a real-world problem that includes a model.

2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills

NJSLS 9.2 Career Awareness, Exploration, Preparation and Training

- **9.2.8.CAP.3:** Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
- **9.2.8.CAP.19:** Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level.

NJSLS 9.4 Life Literacies and Key Skills

- **9.4.8.IML.4:** Ask insightful questions to organize different types of data and create meaningful visualizations.
- **9.4.8.IML.7:** Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose.
- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Making Connections to Careers	
● Construction ● Medical Imaging ● Urban Planner ● Graphic Designer ● Architect ● Surveyor ● Engineer ● Scientist ● Computer Programmer	● Real Estate ● Computer Software Developer ● Astronomer ● Manufacturing ● Food Service ● Fire Fighter ● Meteorologist ● Economist ● Farmer, Agricultural

Student Resources

Text: Houghton Mifflin Harcourt **Into Math Advanced 2**, grade 7, 1st edition, 2020

Resources: **Into Math Advanced 2** grade 7

- More Practice / Homework

- Reteach and Interactive Reteach
- Challenge and Interactive Challenge

Websites:
- http://www.hmhco.com Into Math
- http://khanacademy.org Tutorials on individual lessons

Integrated Technology:
- Google Suite: Docs, Sheets, Slides, Forms
- Into Math online program
- Devices:
  - Chromebooks
  - Texas Instruments (TI-30X Calculators)

Teacher Resources

Texts: Houghton Mifflin Harcourt **Into Math Advanced 2**, grade 7

Resource:
- **Into Math** Resource Boxes, grades 7 and 8
  - Unit STEM Task Cards
  - Online Data-Driven Interventions
  - More Practice / Homework
  - Illustrative Mathematics
  - Reteach and Interactive Reteach
  - Challenge and Interactive Challenge
  - Ed – Your Friend in Learning
  - Mini-Lesson Tabletop Flipchart
- Google Suite: Docs, Sheets, Slides, Forms
- New Jersey Climate Education Hub
- Devices: SMART / Promethean Interactive Boards
- Math vocabulary
  http://www.corestandards.org/Math/Content/mathematics-glossary/glossary/
  http://partnersforlearning.org/wp-content/uploads/2014/09/Common-Core-Academic-Vocabulary-Mathematics-K-12.pdf

Websites:
- https://www.hmhco.com/one/ Into Math Interactive
- http://www.kutasoftware.com Test and worksheet generator for teachers
- http://khanacademy.org Tutorials on individual lessons

Stage 2 – Assessment Evidence

Performance Task(s):

- Unit STEM activity: *A Puzzling Transformation*
- Illustrative Mathematics
- Interactive Reteach
- Interactive Challenge
- NJSLA practice test problems: https://nj.mypearsonsupport.com/practice-tests/math/

Pre-Assessments:

- Gr 7 Math *LinkIt!* NJSLS Form A
- HMS Pre-Assessment
- *Are You Ready?*

Formative Assessments:

- Gr 7 Math *LinkIt!* NJSLS Form B
- Exit Slip
- Student *"I Can"* Self-Assessment
- Informal Observations

Summative Assessments:

- Lesson quizzes
- Module Tests A and B
- HMH Midyear Assessment
- NJDOE Digital Item Library- Released NJSLA items
- EOY Exams:
  - Gr 7 Math *LinkIt!* NJSLS Form C
  - HMH EOY Assessment

Stage 3 – Learning Plan

STEM Task: *Puzzle Designer*

Learning Mindset: *Challenge Seeking*

Module Opener:

- **Module 1:** *Treasure Hunt*
- **Module 2:** *Mousetrap on the Coordinate Plane!*
- **Module 3:** *Do you Haul Bones?*

Diagnostic Assessment: *Are You Ready?*

Module 1: Transform and Construct Geometric Figures

- **Lesson 1.1:** Investigate Transformations
- **Lesson 1.2:** Explore Transformations
- **Lesson 1.3:** Explore Reflections
- **Lesson 1.4:** Explore Rotations
- **Lesson 1.5:** Understand and Recognize Congruent Figures

Module 2: Draw and Analyze Two-Dimensional Figures

- **Lesson 2.1:** Draw Shapes with Given Conditions
- **Lesson 2.2:** Draw and Construct Triangles Given Side Lengths
- **Lesson 2.3:** Draw and Construct Triangles Given Angle Measures
- **Lesson 2.4:** Draw and Analyze Shapes to Solve Problems
- **Lesson 2.5:** Practice Proportional Reasoning with Scale Drawings

Module 3: Transformations and Similarity

- **Lesson 3.1:** Investigate Reductions and Enlargements
- **Lesson 3.2:** Explore Dilations
- **Lesson 3.3:** Understand and Recognize Similar Figures

Unit Plan Title	Unit 2: Equations and Inequalities in One variable
Suggested Time Frame	16 Days

Overview
In this unit, students will apply and extend previous understandings of operations to solve linear equations and inequalities. ● **Module 4:** Students solve one step equations and apply properties of operations to write equivalent expressions. ● **Module 5:** Students will compare rational numbers. Students will interpret, write and graph inequalities.

STAGE 1: Desired Results

New Jersey Student Learning Standards for Mathematics (2023)	
7.EE.A	**Use properties of operations to generate equivalent expressions.**
7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **7.EE.A.2** Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, *a+0.05a=1.05a* means that "increase by 5%" is the same as "multiply by 1.05."	
7.EE.B	**Solve real-life and mathematical problems using numerical and algebraic expressions and equations.**
7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 ½ 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. Students may solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, based on quantitative data related to the five main contributors to climate change: ● Burning coal, oil and gas produces carbon dioxide and nitrous oxide ● Cutting down forests (deforestation) ● Increasing livestock farming ● Fertilizers containing nitrogen produce nitrous oxide emissions, and ● Fluorinated gasses are emitted from equipment and products that use these gasses.	

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.

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

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

7.RP.A	**Ratios and Proportional Relationships: Analyze proportional relationships and use them to solve real-world and mathematical problems.**

7.RP.A.2 Recognize and represent proportional relationships between quantities.

c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t=pn$.

7.RP.A.3 Use proportional relationships to solve multi-step ratios and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

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

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. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

8.EE.C	**Analyze and solve linear equations and pairs of simultaneous linear equations**

8.EE.C.7 Solve linear equations in one variable

- **a.** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
- **b.** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Key Academic Vocabulary	
Review: ● Expression ● Like terms ● Solution of an equation ● Coefficient ● Common denominator ● Distributive Property ● Multiple ● Substitute ● Inequality ● Number line ● Solution of an inequality	New: ● Infinitely many solutions ● No solution ● Adjacent angles ● Complementary angles ● Supplementary angles ● Vertical angles ● Rate of change

Essential Questions	**Enduring Understandings** ***Students will understand…***
● How can you solve multi-step equations and inequalities? ● How can you check the reasonableness of ● your solution? ● How can I use and evaluate algebraic expressions and inequalities in relation to real world applications? ● How are multi-step inequality solutions graphed?	● The solution to an equation or inequality is the value(s) of the variable which makes the equation true. ● With one solution the variables do not cancel out and only one value makes the equation true. ● With no solution the variables cancel out and constants are not equal, no real number makes the equation true. ● With infinite solutions the variables cancel and constants are equal, any real number makes the equation true.
Learning Targets: Knowledge ***Students will know…***	**Learning Targets: Skills** ***Students will be able to…***
● A solution can replace a variable and will make the equation true. ● Distribution and combining like terms simplifies an expression or equation. ● Inverse operations are needed to solve equations and inequalities. ● Vertical angles are congruent. ● When solving inequalities, multiplying or dividing by a negative reverses the sign.	● Solve linear equations using distributive property and combining like terms. ● Determine the number of solutions for an equation. ● Apply properties to solve one step inequalities. ● Write and solve two step inequalities.

Interdisciplinary Connections
2023 New Jersey Student Learning Standards for English Language Arts ● **RI.CR.7.1.** Cite several pieces of textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text. ● **RI.AA.7.7.** Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. ● **W.IW.7.2**. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. ● **SL.PE.7.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. ● **SL.II.7.2.** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study. **2020 New Jersey Student Learning Standards for Computer Science and Design Thinking** **NJSLS 8.1 Computer Science** ● **8.1.12.AP.6**: Refine a solution that meets users' needs by incorporating feedback from team members and users. ● **8.1.12.AP.2:** Create clearly named variables that represent different data types and perform operations on their values. **NJSLS 8.2 Design Thinking** ● **8.2.8.ED.2:** Identify the steps in the design process that could be used to solve a problem. ● **8.2.8.ED.3:** Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). **2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills** **NJSLS 9.1 Financial Literacy** ● **9.1.8.FP.1:** Describe the impact of personal values on various financial scenarios. ● **9.1.8.FP.3:** Explain how self-regulation is important to managing money (e.g., delayed gratification, impulse buying, peer pressure, etc.). ● **9.1.8.FI.4:** Analyze the interest rates and fees associated with financial products. ● **9.1.8.EG.1:** Explain how taxes affect disposable income and the difference between net and gross income. ● **9.1.8.PB.2:** Explain how different circumstances can affect one's personal budget. ● **9.1.8.PB.6:** Construct a budget to save for short-term, long term, and charitable goals. ● **9.1.8.CP.1:** Compare prices for the same goods or services. **NJSLS 9.2 Career Awareness, Exploration, Preparation and Training** ● **9.2.8.CAP.3:** Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income. ● **9.2.8.CAP.6:** Compare the costs of postsecondary education with the potential increase in income from a career of choice.

NJSLS 9.4 Life Literacies and Key Skills

- **9.4.8.GCA.1:** Model how to navigate cultural differences with sensitivity and respect.
- **9.4.8.GCA.2:** Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
- **9.4.8.IML.7:** Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose.
- **9.4.8.TL.2:** Gather data and digitally represent information to communicate a real-world problem.
- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Making Connections to Careers	
● Construction ● Medical Imaging ● Urban Planner ● Graphic Designer ● Architect ● Surveyor ● Business Manager ● Engineer ● Business Manager ● Financial Analyst ● Cryptographer ● Business Analyst ● Statistician	● Computer Software Developer ● Astronomer ● Manufacturing ● Food Service ● Purchasing Manager ● Meteorologist ● Market Research Analyst ● Health Physicist ● Financial Analyst ● Financial Engineer ● Economist ● Farmer, Agricultural ● Stock Broker

Student Resources

Text: Houghton Mifflin Harcourt **Into Math Advanced 2**, grade 7, 1st Edition, 2020

Resources: **Into Math Advanced 2**, grade 7

- More Practice / Homework
- Reteach and Interactive Reteach
- Challenge and Interactive Challenge

Websites:

- http://www.hmhco.com Into Math
- http://khanacademy.org Tutorials on individual lessons

Integrated Technology

- Google Suite: Docs, Sheets, Slides, Forms
- Into Math online program
- Devices:
  - Chromebooks
  - Texas Instruments (TI-30X Calculators)

Teacher Resources

Text: Houghton Mifflin Harcourt **Into Math: Advanced 2**, grade 7, 1st Edition, 2020

Resources:

- **Into Math Advanced 2** Resource Boxes, grades 7 and 8
  - Unit STEM Task Cards
  - Online Data-Driven Interventions
  - More Practice / Homework
  - Illustrative Mathematics
  - Reteach and Interactive Reteach
  - Challenge and Interactive Challenge
  - Mini-Lesson Tabletop Flipchart
- Google Suite: Docs, Sheets, Slides, Forms
- New Jersey Climate Education Hub
- Devices: SMART / Promethean Interactive Boards

Websites:

- https://www.hmhco.com/one/ Into Math Interactive
- http://www.kutasoftware.com Test and worksheet generator for teachers
- http://khanacademy.org Tutorials on individual lessons

NJDOE Instructional Units for Mathematics:

- https://www.state.nj.us/education/cccs/instructionalunits/math/

Stage 2 – Assessment Evidence

Performance Task(s):

- Unit STEM Activity: *The Rhind Papyrus*
- Illustrative Mathematics
- Interactive Reteach
- Interactive Challenge
- NJSLA practice test problems: https://nj.mypearsonsupport.com/practice-tests/math/

Pre-Assessments:

- Gr 7 Math *LinkIt!* NJSLS Form A
- HMS Pre-Assessment
- *Are You Ready?*

Formative Assessments:

- Gr 7 Math *LinkIt!* NJSLS Form B
- Exit Slip
- Student *"I Can"* Self-Assessment
- Informal Observations

Summative Assessments:

- Lesson quizzes
- Module Tests A and B
- HMH Midyear Assessment
- NJDOE Digital Item Library- Released NJSLA items
- EOY Exams:
  - Gr 7 Math *LinkIt!* NJSLS Form C
  - HMH EOY Assessment

Stage 3 – Learning Plan
STEM Task: *The Rhind Papyrus* **Learning Mindset:** *Resilience* **Module Opener:** ● **Module 4:** Balance Mystery ● **Module 5:** The Suspect is Over There **Diagnostic Assessment:** *Are You Ready?* **Module 4: Solve Linear Equations** ● **Lesson 4.1:** Write Two-Step Equations for Situations ● **Lesson 4.2:** Apply Two-Step Equations to Solve Real-World Problems ● **Lesson 4.3:** Solve Multi-Step Linear Equations ● **Lesson 4.4:** Examine Special Cases ● **Lesson 4.5:** Apply Linear Equations **Module 5: Solve Problems Using Inequalities** ● **Lesson 5.1:** Understand and Apply Properties to Solve One-Step Inequalities ● **Lesson 5.2:** Write Two-Step Inequalities for Situations ● **Lesson 5.3:** Apply Two-Step Inequalities to Solve Problems

Unit Plan Title	Unit 3: Similarity, Slope and Linear Functions
Suggested Time Frame	34 days

Overview
In this unit, students will apply their understanding of angle and proportional relationships. They will extend their knowledge of equations and functions. ● **Module 6:** Students will investigate angle relationships in triangles and parallel lines cut by a transversal ● **Module 7:** Students will explain slope with similar triangles. They will compare and interpret proportional relationships. ● **Module 8:** Students will compare and construct functions. Students will identify and sketch nonlinear functions. ● **Module 9:** Students will solve systems of equations.

STAGE 1: Desired Results

New Jersey Student Learning Standards for Mathematics (2023)	
7.EE.B	**Solve real-life and mathematical problems using numerical and algebraic expressions and equations.**

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 ½ 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. Students may solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, based on quantitative data related to the five main contributors to climate change:

- Burning coal, oil and gas produces carbon dioxide and nitrous oxide
- Cutting down forests (deforestation)
- Increasing livestock farming
- Fertilizers containing nitrogen produce nitrous oxide emissions, and
- Fluorinated gasses are emitted from equipment and products that use these gasses.

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.

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

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

7.RP.A	**Ratios and Proportional Relationships: Analyze proportional relationships and use them to solve real-world and mathematical problems.**

7.RP.A.2 Recognize and represent proportional relationships between quantities.

c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as *t=pn.*

7.RP.A.3 Use proportional relationships to solve multi-step ratios and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

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

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. 1. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

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 for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.

8.EE.C	**Analyze and solve linear equations and pairs of simultaneous linear equations.**

8.EE.C.8 Analyze and solve pairs of simultaneous linear equations.

a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

b. Solve systems of two linear equations in two variables **using the substitution method** and estimate solutions by graphing the equations. Solve simple cases by inspection. For example: by inspection, conclude that *3x+2y=S* and *3x+2y=6* have no solution because *3x+2y* cannot simultaneously be 5 and 6. Solve *3x+y=30* and *y=2x* using the substitution method; Solve *y=3x+1* and *y=-2x+7* using the substitution method.

c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

8.F.A	**Define, evaluate, and compare functions.**

8.F.A.1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. Clarification: Function notation is not required in Grade 8.

8.F.A. 2. Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

8.F.A.3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. For example, the function giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.

8.F.B	**Use functions to model relationships between quantities.**

8.F.B.4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

8.F.B.5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

8.G.A	**Understand congruence and similarity using physical models, transparencies, or geometry software.**

8.G.A.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. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Key Academic Vocabulary	
Review: ● Interior angles ● Unit rate ● Equivalent expressions	New: ● Exterior Angle and Theorem ● Remote Interior Angle ● Triangle Sum Theorem ● Angle-Angle Similarity Postulate ● Alternate Exterior/Interior Angles ● Corresponding Angles ● Same-side Exterior/Interior Angles ● Transversal ● Hypotenuse ● Legs ● Rise and Run ● Slope ● Linear Equation, Y = mx + b ● Discrete Graph ● Continuous graph ● Domain and Function ● Input and Output ● Range ● Relation ● Vertical line test ● Linear/ Nonlinear Functions ● Slope-intercept form ● Y-intercept ● System of Equations ● Substitute ● Elimination

Essential Questions	**Enduring Understandings** ***Students will understand…***
● How are patterns used to understand mathematics and model situations? ● How are the horizontal and vertical axes related? ● How can you describe angles formed by parallel lines and transversals? ● How can you describe the relationships among the angles of a triangle? ● How can you use angles to tell whether triangles are similar?	● A solution to a system of linear equations is an ordered pair that satisfies both equations. ● Graphed lines with one point of intersection will have one solution. Lines that are the same have infinitely many solutions. Parallel lines have no solution. ● Y=mx+b defines a linear equation. ● Similar triangles have the same angles.

Learning Targets: Knowledge ***Students will know…***	**Learning Targets: Skills** ***Students will be able to…***
● Parallel lines have the same slope and different y intercepts. ● Lines with different slopes will intercept. ● Lines are the same if they have the same slope and same y intercept. ● Straight lines can be represented by y=mx+b. ● Systems of equations are 2 or more equations. ● Functions have one output for every input. ● Slope intercept form has the slope and the y intercept identified. ● Similar triangles have corresponding angles that are congruent. ● Straight angles add up to 180 degrees ● Sum of interior angles of a triangle is 180 degrees.	● Solve systems graphically and algebraically. ● Compare functions from different representations. ● Identify function and non-functions using equations, tables, and graphs. ● Categorize functions as linear or nonlinear. ● Construct a function to model a linear situation. ● Determine the rate of change and initial value from tables, graphs, equations, or verbal descriptions. ● Sketch a graph to model a given situation. ● Identify interior/exterior angles and similar triangles. ● Make informal arguments about angles of similar triangles and angles formed from a transversal.

Interdisciplinary Connections
2023 New Jersey Student Learning Standards for English Language Arts ● **RI.CR.7.1.** Cite several pieces of textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text. ● **W.IW.7.2**. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. ● **SL.PE.7.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. ● **SL.II.7.2.** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study. **2020 New Jersey Student Learning Standards for Computer Science and Design Thinking** **NJSLS 8.1 Computer Science**

- **8.1.12.AP.6**: Refine a solution that meets users' needs by incorporating feedback from team members and users.
- **8.1.12.AP.2:** Create clearly named variables that represent different data types and perform operations on their values.

NJSLS 8.2 Design Thinking

- **8.2.8.ED.2:** Identify the steps in the design process that could be used to solve a problem.
- **8.2.8.ED.3:** Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills

NJSLS 9.1 Financial Literacy

- **9.1.8.FP.3:** Explain how self-regulation is important to managing money (e.g., delayed gratification, impulse buying, peer pressure, etc.).
- **9.1.8.FI.4:** Analyze the interest rates and fees associated with financial products.
- **9.1.8.PB.6:** Construct a budget to save for short-term, long term, and charitable goals.
- **9.1.8.CP.2:** Analyze how spending habits affect one's ability to save.

NJSLS 9.2 Career Awareness, Exploration, Preparation and Training

- **9.2.8.CAP.3:** Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
- **9.2.8.CAP.7:** Devise a strategy to minimize costs of postsecondary education.

NJSLS 9.4 Life Literacies and Key Skills

- **9.4.8.GCA.1:** Model how to navigate cultural differences with sensitivity and respect.
- **9.4.8.GCA.2:** Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
- **9.4.8.IML.7:** Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose.

Making Connections to Careers	
● Construction ● Medical Imaging ● Urban Planner ● Graphic Designer ● Architect ● Surveyor ● Bank Teller ● Business Manager ● Engineer ● Scientist ● Health Care Provider ● Business Manager	● Medical Manager ● Real Estate ● Data entry ● Computer Software Developer ● Astronomer ● Manufacturing ● Food Service ● Fire Fighter ● Purchasing Manager ● Meteorologist ● Market Research Analyst ● Health Physicist

• Financial Analyst • Computer Programmer • Cryptographer • Business Analyst • Statistician	• Financial Analyst • Financial Engineer • Economist • Farmer, Agricultural • Stock Broker

Student Resources

Text: Houghton Mifflin Harcourt **Into Math Advanced 2**, grade 7, 1st Edition, 2020

Resources: **Into Math Advanced 2**, grade 7
- More Practice / Homework
- Reteach and Interactive Reteach
- Challenge and Interactive Challenge

Websites:
- http://www.hmhco.com Into Math
- http://khanacademy.org Tutorials on individual lessons

Integrated Technology
- Google Suite: Docs, Sheets, Slides, Forms
- Into Math online program
- Devices:
  - Chromebooks
  - Texas Instruments (TI-30X Calculators)

Teacher Resources

Text: Houghton Mifflin Harcourt **Into Math: Advanced 2**, grade 7, 1st Edition, 2020

Resources:
- **Into Math Advanced 2** Resource Boxes, grades 7 and 8
  - Unit STEM Task Cards
  - Online Data-Driven Interventions
  - More Practice / Homework
  - Illustrative Mathematics
  - Reteach and Interactive Reteach
  - Challenge and Interactive Challenge
  - Mini-Lesson Tabletop Flipchart
- Google Suite: Docs, Sheets, Slides, Forms
- New Jersey Climate Education Hub
- Devices: SMART / Promethean Interactive Boards

Websites:
- https://www.hmhco.com/one/ Into Math Interactive
- http://www.kutasoftware.com Test and worksheet generator for teachers
- http://khanacademy.org Tutorials on individual lessons

NJDOE Instructional Units for Mathematics:
- https://www.state.nj.us/education/cccs/instructionalunits/math/

Stage 2 – Assessment Evidence
Performance Task(s): ● Unit STEM Activity: *Which Car Costs Less?* ● Illustrative Mathematics ● Interactive Reteach ● Interactive Challenge ● NJSLA practice test problems: https://nj.mypearsonsupport.com/practice-tests/math/ **Pre-Assessments:** ● Gr 7 Math *LinkIt!* NJSLS Form A ● HMS Pre-Assessment ● *Are You Ready?* **Formative Assessments:** ● Gr 7 Math *LinkIt!* NJSLS Form B ● Exit Slip ● Student *"I Can"* Self-Assessment ● Informal Observations **Summative Assessments:** ● Lesson quizzes ● Module Tests A and B ● HMH Midyear Assessment ● NJDOE Digital Item Library- Released NJSLA items ● EOY Exams: o Gr 7 Math *LinkIt!* NJSLS Form C o HMH EOY Assessment

Stage 3 – Learning Plan
STEM Task: *Which Car Cost Less?* **Learning Mindset:** *Challenge Seeking* **Module Opener:** ● **Module 6:** *A Fox From Any Angle* ● **Module 7:** *Proportional Smoothies* ● **Module 8:** *Bead or No Bead* ● **Module 9:** *Wags Per Mile* **Diagnostic Assessment:** *Are You Ready?* **Module 6: Angle Relationships** ● **Lesson 6.1:** Develop Angle Relationships for Triangles ● **Lesson 6.2:** Investigate Angle-Angle Similarity ● **Lesson 6.3:** Explore Parallel Lines Cut by a Transversal

Module 7: Proportional Relationships

- **Lesson 7.1:** Explain Slope with Similar Triangles
- **Lesson 7.2:** Derive y=mx
- **Lesson 7.3:** Graph, Interpret, and Compare Proportional Relationships

Module 8: Understand and Analyze Functions

- **Lesson 8.1:** Understand and Graph Functions
- **Lesson 8.2:** Derive and Interpret y=mx+b
- **Lesson 8.3:** Interpret Rate of Change and Initial Value
- **Lesson 8.4:** Construct and Compare Functions
- **Lesson 8.5:** Describe and Sketch Nonlinear Functions

Module 9: Systems of Linear Equations

- **Lesson 9.1:** Represent Systems by Graphing
- **Lesson 9.2:** Solve Systems by Graphing
- **Lesson 9.3:** Solve Systems by Substitution
- **Lesson 9.4:** Solve Systems by Elimination
- **Lesson 9.5:** Examine Special Systems
- **Lesson 9.6:** Apply Systems of Equations

Unit Plan Title	Unit 4: Data Analysis and Sampling
Suggested Time Frame	23 Days

Overview
In this unit, students will use statistics and graphs to make inferences. ● **Module 10:** Students will create and interpret scatter plots. Students will identify a line of best fit. ● **Module 11:** Students will make inferences based on given samples ● **Module 12:** Students will use statistics and graphs to compare data. ● **Module 13:** Students will create and interpret two way tables.

STAGE 1: Desired Results

New Jersey Student Learning Standards for Mathematics (2023)	
7.SP.B	**Draw informal comparative inferences about two populations.**
7.SP.B.3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable. **7.SP.B.4.** Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.	
8.SP.A	**Investigate patterns of association in bivariate data.**
8.SP.A.1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. Students may investigate patterns of association in bivariate data involving the amount of a greenhouse gas in the atmosphere and its effect on temperature. **8.SP.A.2.** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit (e.g. line of best fit) by judging the closeness of the data points to the line. **8.SP.A.3.** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height. Students may use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept involving the physical properties of the principle gasses that cause climate change. **8.SP.A.4.** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way	

table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Essential Questions	**Enduring Understandings** ***Students will understand…***
● How can we gather, organize and display data to communicate and justify results in the real world? ● How can we analyze data to make inferences and/or predictions, based on surveys, experiments, probability and observational studies?	● Scatter plots can be used to identify patterns for bivariate data. ● A straight line can be used to identify a linear association in scatter plots. ● A linear equation can be used to model situations. ● Conditional relative frequency can be seen if there is an association between two variables.
Learning Targets: Knowledge ***Students will know…***	**Learning Targets: Skills** ***Students will be able to…***
● Scatter plots are used for bivariate measurement data. ● Linear association can be shown by a trend line. ● An equation can be written to represent bivariate data. ● Two way tables summarize data for two categorical variables. ● There can be positive, negative, or no association for bivariate data.	● Construct and interpret scatter plots. ● Investigate patterns between bivariate data. ● Identify a trend line. ● Use a trend line to solve problems. ● Construct and interpret a two way table. ● Use relative frequencies to describe possible association between variables. ● Sketch a graph to model a given situation.

Key Academic Vocabulary	

Review:
● Data set
● Outlier
● Mean
● Median
● Range
● Box plot
● Interquartile range
● Lower quartile
● Upper quartile
● Mean absolute deviation
	New:
	● Association/No Association
	● Linear/Nonlinear Association
	● Negative/Positive Association
	● Scatter plot
	● Trend line
	● Bias
	● Population
	● Random/Representative Sample
	● Two-Way Table
	● Event
	● Frequency:
	  ● Joint Frequency
	  ● Marginal Relative Frequency
	  ● Relative Frequency
	  ● Conditional Relative Frequency
	  ● Two-Way Relative Frequency Table

Interdisciplinary Connections

2023 New Jersey Student Learning Standards for English Language Arts

- **RI.CR.7.1.** Cite several pieces of textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.
- **W.IW.7.2**. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- **SL.PE.7.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- **SL.II.7.2.** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

2020 New Jersey Student Learning Standards for Computer Science and Design Thinking
NJSLS 8.1 Computer Science

- **8.1.8.DA.1:** Organize and transform data collected using computational tools to make it usable for a specific purpose.
- **8.1.12.AP.6:** Refine a solution that meets users' needs by incorporating feedback from team members and users.
- **8.1.12.AP.2:** Create clearly named variables that represent different data types and perform operations on their values.

NJSLS 8.2 Design Thinking

- **8.2.8.ED.2:** Identify the steps in the design process that could be used to solve a problem.
- **8.2.8.ED.3:** Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills

NJSLS 9.1 Financial Literacy

- **9.1.8.FI.4:** Analyze the interest rates and fees associated with financial products.
- **9.1.8.PB.2:** Explain how different circumstances can affect one's personal budget.
- **9.1.8.CP.2:** Analyze how spending habits affect one's ability to save.

NJSLS 9.2 Career Awareness, Exploration, Preparation and Training

- **9.2.8.CAP.6:** Compare the costs of postsecondary education with the potential increase in income from a career of choice.
- **9.2.8.CAP.12:** Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.
- **9.2.8.CAP.19:** Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level.

NJSLS 9.4 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 (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).
- **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.1:** Analyze the resource citations in online materials for proper use.
- **9.4.8.IML.14:** Analyze the role of media in delivering cultural, political, and other societal messages
- **9.4.8.TL.5:** Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration.

Making Connections to Careers	
● Construction ● Medical Imaging ● Urban Planner ● Graphic Designer ● Architect ● Surveyor ● Bank Teller ● Business Manager ● Engineer ● Scientist	● Medical Manager ● Real Estate ● Data entry ● Computer Software Developer ● Astronomer ● Manufacturing ● Food Service ● Fire Fighter ● Purchasing Manager ● Meteorologist

• Health Care Provider • Business Manager • Financial Analyst • Computer Programmer • Cryptographer • Business Analyst • Statistician	• Market Research Analyst • Health Physicist • Financial Analyst • Financial Engineer • Economist • Farmer, Agricultural • Stock Broker

Student Resources

Text: Houghton Mifflin Harcourt **Into Math Advanced 2**, grade 7, 1st Edition, 2020

Resources: **Into Math Advanced 2**, grade 7

- More Practice / Homework
- Reteach and Interactive Reteach
- Challenge and Interactive Challenge

Websites:

- http://www.hmhco.com Into Math
- http://khanacademy.org Tutorials on individual lessons

Integrated Technology

- Google Suite: Docs, Sheets, Slides, Forms
- Into Math online program
- Devices:
  - Chromebooks
  - Texas Instruments (TI-30X Calculators)

Teacher Resources

Text: Houghton Mifflin Harcourt **Into Math: Advanced 2**, grade 7, 1st Edition, 2020

Resources:

- **Into Math Advanced 2** Resource Boxes, grades 7 and 8
  - Unit STEM Task Cards
  - Online Data-Driven Interventions
  - More Practice / Homework
  - Illustrative Mathematics
  - Reteach and Interactive Reteach
  - Challenge and Interactive Challenge
  - Mini-Lesson Tabletop Flipchart
- Google Suite: Docs, Sheets, Slides, Forms
- New Jersey Climate Education Hub
- Devices: SMART / Promethean Interactive Boards

Websites:

- https://www.hmhco.com/one/ Into Math Interactive
- http://www.kutasoftware.com Test and worksheet generator for teachers
- http://khanacademy.org Tutorials on individual lessons

NJDOE Instructional Units for Mathematics:

- https://www.state.nj.us/education/cccs/instructionalunits/math/

Stage 2 – Assessment Evidence
Performance Task(s): ● Unit STEM Activity: *A Birthday Puzzle* ● Illustrative Mathematics ● Interactive Reteach ● Interactive Challenge ● NJSLA practice test problems: https://nj.mypearsonsupport.com/practice-tests/math/ **Pre-Assessments:** ● Gr 7 Math *LinkIt!* NJSLS Form A ● HMS Pre-Assessment ● *Are You Ready?* **Formative Assessments:** ● Gr 7 Math *LinkIt!* NJSLS Form B ● Exit Slip ● Student *"I Can"* Self-Assessment ● Informal Observations **Summative Assessments:** ● Lesson quizzes ● Module Tests A and B ● HMH Midyear Assessment ● NJDOE Digital Item Library- Released NJSLA items ● EOY Exams: o Gr 7 Math *LinkIt!* NJSLS Form C o HMH EOY Assessment

Stage 3 – Learning Plan
STEM Task: *A Birthday Puzzle* **Learning Mindset:** *Resilience* **Module Opener:** ● **Module 10:** *Taken for a Ride* ● **Module 11:** *Which Fraction Does Not Belong?* ● **Module 12:** *And the Best Player Is...* ● **Module 13:** *Build a Deck* **Diagnostic Assessment:** *Are You Ready?* **Module 10: Scatter Plots** ● **Lesson 10.1:** Construct Scatter Plots and Examine Association ● **Lesson 10.2:** Draw and Analyze Trend Lines ● **Lesson 10.3:** Interpret Linear Data in Context

Module 11: Proportional Reasoning with Samples

- **Lesson 11.1:** Understand Representative Samples
- **Lesson 11.2:** Make Inferences from a Random Sample
- **Lesson 11.3:** Make Inferences from Repeated Random Samples

Module 12: Use Statistics to Compare Data

- **Lesson 12.1:** Compare Center and Spread of Data Displayed in Dot Plots
- **Lesson 12.2:** Compare Center and Spread of Data Displayed in Box Plots
- **Lesson 12.3:** Compare Means Using Mean Absolute Deviation and Repeated Sampling

Module 13: Two- Way Tables

- **Lesson 13.1:** Construct and Interpret Two-Way Frequency Tables
- **Lesson 13.2:** Analyze and Interpret Two-Way Relative Frequency Tables

Unit Plan Title	Unit 5: Applications of Real Numbers and Exponents
Suggested Time Frame	19 Days

Overview
In this unit, students will apply rational and irrational numbers to solve problems involving pythagorean theorem, exponents, and scientific notation. ● **Module 14:** Students will identify and compare rational and irrational numbers ● **Module 15:** Students will use Pythagorean theorem to solve problems involving right triangles and distance on a coordinate plane ● **Module 16:** Students will apply properties of exponents and compute scientific notation.

STAGE 1: Desired Results

New Jersey Student Learning Standards for Mathematics (2023)	
8.EE.A	**Work with radicals and integer exponents.**

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3}^3 = \frac{1}{27}$.

8.EE.A.2 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.

- a. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational
- b. Simplify numerical radicals, limiting to square roots (i.e. non perfect squares). For example, simplify √8 to 2√2.

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. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.

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.(e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

8.G.B	**Understand and apply the Pythagorean Theorem.**

8.G.B.6 Explain a proof of the Pythagorean Theorem and its converse

8.G.B.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real world and mathematical problems in two and three dimensions.

8.G.B.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

8.NS.A	**Know that there are numbers that are not rational, and approximate them by rational numbers.**

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 (e.g., π^2).For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.

8.NS.A.3 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.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Key Academic Vocabulary	
Review: ● Rational number ● Repeating Decimal ● Terminating Decimal ● Cube ● Cone ● Base ● Exponent ● Power	New: ● Irrational Numbers ● Cube Root ● Perfect Cube and Perfect Square ● Square Root and Principal Square Root ● Radical Symbol ● Real numbers ● Pythagorean Theorem ● Pythagorean Triple ● Properties of Exponents ● Scientific Notation ● Standard Form of a Number

Essential Questions	**Enduring Understandings** ***Students will understand…***
● What is a rational number? ● How can Pythagorean Theorem be used to solve problems? ● How can you find the shortest distance between two points? ● How do numbers relate and compare to one another? ● How do you use patterns to understand mathematics and model situations? ● How can we communicate and generalize algebraic relationships?	● The difference between rational and irrational numbers. ● Non-perfect squares and cubes are irrational. ● The square root is the inverse of squaring a number. ● The sum of the squares of the legs of a right triangle equals the square of the hypotenuse. ● Pythagorean Theorem can be used to find the distance between two points on a coordinate plane by using the vertical and horizontal distances. ● The exponent affects one base unless there is a parenthesis. ● If an exponent for scientific notation increases by 1 the value increases by 10.
Learning Targets: Knowledge ***Students will know…***	**Learning Targets: Skills** ***Students will be able to…***
● Rational numbers can be represented as a fraction, or by repeating/terminating decimals. ● Pythagorean theorem can be used to find an unknown side of a right triangle and the distance between two points. ● Product of powers involves adding exponents of the same base. Quotient of powers involves subtracting exponents of the same base. Power of powers involves multiplying exponents. ● Scientific notation consists of a number between 1 and 10 multiplied by a power of 10. It can be written in standard form.	● Write rational numbers as decimals or fractions. ● Evaluate square roots and cube roots and solve problems. ● Identify decimal estimates of imperfect square roots and cube roots. ● Compare numerical expressions involving roots. ● Order rational and irrational numbers. ● Use Pythagorean theorem to find missing sides of right triangles. Apply Pythagorean theorem to find distance between two points on a coordinate plane. ● Develop and use the properties of integer exponents. ● Generate equivalent numerical expressions using exponents. ● Compute with numbers written in scientific notation.

Interdisciplinary Connections
2023 New Jersey Student Learning Standards for English Language Arts ● **RI.CR.7.1.** Cite several pieces of textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text. ● **W.IW.7.2**. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. ● **SL.PE.7.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. ● **SL.II.7.2.** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study. **2020 New Jersey Student Learning Standards for Computer Science and Design Thinking** **NJSLS 8.1 Computer Science** ● **8.1.12.AP.6** Refine a solution that meets users' needs by incorporating feedback from team members and users. ● **8.1.8.CS.3** Justify design decisions and explain potential system tradeoffs. **NJSLS 8.2 Design Thinking** ● **8.2.8.ED.2** Identify the steps in the design process that could be used to solve a problem. ● **8.2.8.ED.3** Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). **2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills** **NJSLS 9.1 Financial Literacy** ● **9.1.8.FP.7:** Identify the techniques and effects of deceptive advertising. ● **9.1.8.FI.4:** Analyze the interest rates and fees associated with financial products. ● **9.1.8.PB.2:** Explain how different circumstances can affect one's personal budget. ● **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). ● **9.1.8.PB.6:** Construct a budget to save for short-term, long term, and charitable goals. ● **9.1.8.CP.1:** Compare prices for the same goods or services. ● **9.1.8.CP.2:** Analyze how spending habits affect one's ability to save. **NJSLS 9.2 Career Awareness, Exploration, Preparation and Training** ● **9.2.8.CAP.3:** Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income. ● **9.2.5.CAP.5:** Identify various employee benefits, including income, medical, vacation time, and lifestyle benefits provided by different types of jobs and careers.

- **9.2.8.CAP.6:** Compare the costs of postsecondary education with the potential increase in income from a career of choice.

NJSLS 9.4 Life Literacies and Key Skills

- **9.4.8.IML.4:** Ask insightful questions to organize different types of data and create meaningful visualizations.
- **9.4.8.IML.7:** Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose.
- **9.4.8.IML.9:** Distinguish between ethical and unethical uses of information and media.

Student Resources
Text: Houghton Mifflin Harcourt **Into Math Advanced 2**, grade 7, 1st Edition, 2020 **Resources:** **Into Math Advanced 2**, grade 7 ● More Practice / Homework ● Reteach and Interactive Reteach ● Challenge and Interactive Challenge **Websites:** ● http://www.hmhco.com Into Math ● http://khanacademy.org Tutorials on individual lessons **Integrated Technology** ● Google Suite: Docs, Sheets, Slides, Forms ● Into Math online program ● Devices: ● Chromebooks ● Texas Instruments (TI-30X Calculators)
Teacher Resources
Text: Houghton Mifflin Harcourt **Into Math: Advanced 2**, grade 7, 1st Edition, 2020 **Resources:** ● **Into Math Advanced 2** Resource Boxes, grades 7 and 8 ● Unit STEM Task Cards ● Online Data-Driven Interventions ● Illustrative Mathematics ● Reteach and Interactive Reteach ● Challenge and Interactive Challenge ● Mini-Lesson Tabletop Flipchart ● Google Suite: Docs, Sheets, Slides, Forms ● Devices: SMART / Promethean Interactive Boards **Websites:** ● https://www.hmhco.com/one/ Into Math Interactive ● http://www.kutasoftware.com Test and worksheet generator for teachers ● http://khanacademy.org Tutorials on individual lessons **NJDOE Instructional Units for Mathematics:** ● https://www.state.nj.us/education/cccs/instructionalunits/math/

Stage 2 – Assessment Evidence
Performance Task(s): ● Unit STEM Activity ● Illustrative Mathematics ● Interactive Reteach ● Interactive Challenge ● NJSLA practice test problems: https://nj.mypearsonsupport.com/practice-tests/math/ **Pre-Assessments:** ● Gr 7 Math *LinkIt!* NJSLS Form A ● HMS Pre-Assessment ● *Are You Ready?* **Formative Assessments:** ● Gr 7 Math *LinkIt!* NJSLS Form B ● Exit Slip ● Student *"I Can"* Self-Assessment ● Informal Observations **Summative Assessments:** ● Lesson quizzes ● Module Tests A and B ● HMH Midyear Assessment ● NJDOE Digital Item Library- Released NJSLA items ● EOY Exams: o Gr 7 Math *LinkIt!* NJSLS Form C o HMH EOY Assessment

Stage 3 – Learning Plan
STEM Task: *The Wheel of Theodorus* **Learning Mindset:** *Resilience* **Module Opener: Mod 14: Track the Distance** ● **Mod 15:** *Try Your Angle* ● **Mod 16:** *A-Mazing Expressions* **Diagnostic Assessment:** *Are You Ready?* **Module 14: Real Numbers** ● **Lesson 14.1:** Understand Rational and Irrational Numbers ● **Lesson 14.2:** Investigate Roots ● **Lesson 14.3:** Order Real Numbers **Module 15: The Pythagorean Theorem**

- **Lesson 15.1:** Prove the Pythagorean Theorem and Its Converse
- **Lesson 15.2:** Apply the Pythagorean Theorem
- **Lesson 15.3:** Apply the Pythagorean Theorem in the Coordinate Plane

Module 16: Exponents and Scientific Notation

- **Lesson 16.1:** Know and Apply Properties of Exponents
- **Lesson 16.2:** Understand Scientific Notation
- **Lesson 16.3:** Compute with Scientific Notation

Unit Plan Title	Unit 6: Area and Volume
Suggested Time Frame	14 Days

Overview
In this unit, students will find area and circumference of 2-D figures and find surface area and volume of 3-D figures. ● **Module 17:** Students will analyze figures to find circumference and area. ● **Module 18:** Students will find cross sections of solids. Students will determine surface area and volume of solid figures

STAGE 1: Desired Results

New Jersey Student Learning Standards for Mathematics (2023)	
7.G.A	**Draw, construct, and describe geometrical figures and describe the relationships between them.**
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	**Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.**
7.G.B.4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. **7.G.B.5.** Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. **7.G.B.6.** Solve real-world and mathematical problems involving area, volume and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Students may solve multi-step real-life and mathematical problems involving angle measure, area, surface area, and volume quantitative data related to the five main contributors to climate change: ● Burning coal, oil and gas produces carbon dioxide and nitrous oxide ● Cutting down forests (deforestation) ● Increasing livestock farming ● Fertilizers containing nitrogen produce nitrous oxide emissions, and ● Fluorinated gasses are emitted from equipment and products that use these gasses.	

8.G.C	**Solve real-world and mathematical problems including volume of cylinders, cones and spheres**

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. Students may solve real-world mathematical problems involving the physical properties of the principle gasses that cause climate change molecules.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Essential Questions	**Enduring Understandings** ***Students will understand…***
● How can geometric ideas be communicated? ● How can geometry be used to solve problems about real-world situations and spatial relationships?	● Circumference and area can be found for 2-D figures. ● The relationships between the volume of cylinders, cubes, and spheres.
Learning Targets: Knowledge ***Students will know…***	**Learning Targets: Skills** ***Students will be able to…***
● Circumference is used to find the distance around a circle. ● Volume represents the space inside of a 3-d figure.	● Determine the area and circumference of a circle. ● Develop and use formulas for volume of a cylinder, cone, and sphere. ● Use volume formulas to solve real-world problems involving cylinders, cones, and spheres.

Key Academic Vocabulary	
Review: ● Composite Figure ● Pyramid ● Rectangular prism ● Surface Area	New: ● Circumference ● Pi ● Cross section ● Cylinder ● Sphere

Interdisciplinary Connections

2023 New Jersey Student Learning Standards for English Language Arts

- **RI.CR.7.1.** Cite several pieces of textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text.

- **W.IW.7.2**. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
- **SL.PE.7.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- **SL.II.7.2.** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

2020 New Jersey Student Learning Standards for Computer Science and Design Thinking
NJSLS 8.1 Computer Science

- **8.1.8.NI.1:** Model how information is broken down into smaller pieces, transmitted as addressed packets through multiple devices over networks and the Internet, and reassembled at the destination.
- **8.1.12.AP.6:** Refine a solution that meets users' needs by incorporating feedback from team members and users.

NJSLS 8.2 Design Thinking

- **8.2.8.ED.6:** Analyze how trade-offs can impact the design of a product.
- **8.2.8.ED.3:** Develop a proposal for a solution to a real-world problem that includes a model.

2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills
NJSLS 9.2 Career Awareness, Exploration, Preparation and Training

- **9.2.8.CAP.3:** Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
- **9.2.8.CAP.19:** Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level.

NJSLS 9.4 Life Literacies and Key Skills

- **9.4.8.IML.4:** Ask insightful questions to organize different types of data and create meaningful visualizations.
- **9.4.8.IML.7:** Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose.
- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Making Connections to Careers	
● Construction ● Medical Imaging ● Urban Planner ● Graphic Designer ● Architect ● Surveyor ● Engineer	● Real Estate ● Computer Software Developer ● Astronomer ● Manufacturing ● Food Service ● Fire Fighter ● Meteorologist

• Scientist • Computer Programmer • Cryptographer	• Economist • Farmer, Agricultural

Student Resources

Text: Houghton Mifflin Harcourt **Into Math Advanced 2**, grade 7, 1st Edition, 2020
Resources: **Into Math Advanced 2**, grade 7
• More Practice / Homework
• Reteach and Interactive Reteach
• Challenge and Interactive Challenge
Websites:
• http://www.hmhco.com Into Math
• http://khanacademy.org Tutorials on individual lessons
Integrated Technology
• Google Suite: Docs, Sheets, Slides, Forms
• Into Math online program
• Devices:
  • Chromebooks
  • Texas Instruments (TI-30X Calculators)

Teacher Resources

Text: Houghton Mifflin Harcourt **Into Math: Advanced 2**, grade 7, 1st Edition, 2020
Resources:
• **Into Math Advanced 2** Resource Boxes, grades 7 and 8
  • Unit STEM Task Cards
  • Online Data-Driven Interventions
  • Illustrative Mathematics
  • Reteach and Interactive Reteach
  • Challenge and Interactive Challenge
  • Mini-Lesson Tabletop Flipchart
• Google Suite: Docs, Sheets, Slides, Forms
• New Jersey Climate Education Hub
• Devices: SMART / Promethean Interactive Boards
Websites:
• https://www.hmhco.com/one/ Into Math Interactive
• http://www.kutasoftware.com Test and worksheet generator for teachers
• http://khanacademy.org Tutorials on individual lessons
NJDOE Instructional Units for Mathematics:
• https://www.state.nj.us/education/cccs/instructionalunits/math/

Stage 2 – Assessment Evidence
Performance Task(s): ● Unit STEM Activity ● Illustrative Mathematics ● Interactive Reteach ● Interactive Challenge ● NJSLA practice test problems: https://nj.mypearsonsupport.com/practice-tests/math/ **Pre-Assessments:** ● Gr 7 Math *LinkIt!* NJSLS Form A ● HMS Pre-Assessment ● *Are You Ready?* **Formative Assessments:** ● Gr 7 Math *LinkIt!* NJSLS Form B ● Exit Slip ● Student *"I Can"* Self-Assessment ● Informal Observations **Summative Assessments:** ● Lesson quizzes ● Module Tests A and B ● HMH Midyear Assessment ● NJDOE Digital Item Library- Released NJSLA items ● EOY Exams: o Gr 7 Math *LinkIt!* NJSLS Form C o HMH EOY Assessment

Stage 3 – Learning Plan
STEM Task: *Buffon's Needle* **Learning Mindset:** *Perseverance* **Module Opener:** ● **Mod 17:** What Comes Next in the Pattern? ● **Mod 18:** The Prism Family **Diagnostic Assessment:** *Are You Ready?* **Module 17: Analyze Figures to Find Circumference and Area** ● **Lesson 17.1:** Derive and Apply Formulas for Circumference ● **Lesson 17.2:** Derive and Apply a Formula for the Area of a Circle ● **Lesson 17.3:** Areas of Composite Figures **Module 18: Cross Sections, Surface Area, and Volume** ● **Lesson 18.1:** Describe and Analyze Cross Sections of Solids ● **Lesson 18.2:** Derive and Apply Formulas for Surface Areas of Cubes and Right Prisms ● **Lesson 18.3:** Derive and Apply a Formula for the Volume of a Right Prism ● **Lesson 18.4:** Find Volume of Cylinders ● **Lesson 18.5:** Find Volume of Cones and Spheres ● **Lesson 18.6:** Solve Multi-Step Problems with Surface Area and Volume

Unit Plan Title	Unit 7: Probability
Suggested Time Frame	15 Days

Overview
In this unit, students will investigate experimental and theoretical probability. ● **Module 19:** Students will understand and apply experimental probability. ● **Module 20:** Students will understand and apply theoretical probability

STAGE 1: Desired Results

New Jersey Student Learning Standards for Mathematics (2023)	
7.SP.C	**Investigate chance processes and develop, use, and evaluate probability models**

7.SP.C.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

7.SP.C.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

7.SP.C. 7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

- **7a.** Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.
- 7**b.** Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?

7.SP.C.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

- **8a.** Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
- **8b.** Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event.
- **8c.** Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Essential Questions	**Enduring Understandings** ***Students will understand…***
● How do we gather, organize, and display data? ● How can we analyze data to make inferences about a population? ● When do you use theoretical probability instead of experimental probability?	● Probabilities can be represented as decimals, fractions, and percentages. ● The probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. ● The probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.
Learning Targets: Knowledge ***Students will know…***	**Learning Targets: Skills** ***Students will be able to…***
● Probability as represented as a number between 0 and 1. ● Probability of 0 means that an event is impossible. ● Theoretical probability is what is expected to happen. ● Experimental probability is what happens when an experiment is performed.	● Describe the likelihood of an event in terms of a probability between 0 and 1. ● Find the experimental probability of an event. ● Determine the probability of compound events. ● Use experimental probability and proportional reasoning to make predictions about real-world situations. ● Find theoretical probability of simple events and compare to experimental probability. ● Find and compare theoretical probabilities of compound events using a tree diagram. ● Use theoretical probabilities and proportional reasoning to make predictions about a simple or compound event. ● Design and perform a simulation to test the probability of a simple and compound event.

Key Academic Vocabulary
New: ● Experiment ● Outcome ● Probability of and event ● Probability ● Sample Space ● Trial ● Complement of an event ● Experimental probability ● Simulation ● Compound event ● Theoretical probability ● Tree diagram

Interdisciplinary Connections
2023 New Jersey Student Learning Standards for English Language Arts ● **RI.CR.7.1.** Cite several pieces of textual evidence and make relevant connections to support analysis of what an informational text says explicitly as well as inferences drawn from the text. ● **W.IW.7.2**. Write informative/explanatory texts (including the narration of historical events, scientific procedures/ experiments, or technical processes) to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. ● **SL.PE.7.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly. ● **SL.II.7.2.** Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study. **2020 New Jersey Student Learning Standards for Computer Science and Design Thinking** **NJSLS 8.1 Computer Science** ● **8.1.12.AP.6:** Refine a solution that meets users' needs by incorporating feedback from team members and users. ● **8.1.8.IC.2:** Describe issues of bias and accessibility in the design of existing technologies. ● **8.1.8.DA.1:** Organize and transform data collected using computational tools to make it usable for a specific purpose. **NJSLS 8.2 Design Thinking** ● **8.2.8.ED.2:** Identify the steps in the design process that could be used to solve a problem. ● **8.2.8.ED.3:** Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). **2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and**

Key Skills

NJSLS 9.1 Financial Literacy

- **9.1.8.FP.1:** Describe the impact of personal values on various financial scenarios.
- **9.1.8.FP.3:** Explain how self-regulation is important to managing money (e.g., delayed gratification, impulse buying, peer pressure, etc.).
- **9.1.8.FP.7:** Identify the techniques and effects of deceptive advertising.
- **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).
- **9.1.8.PB.6:** Construct a budget to save for short-term, long term, and charitable goals.

NJSLS 9.2 Career Awareness, Exploration, Preparation and Training

- **9.2.8.CAP.3:** Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.
- **9.2.8.CAP.4:** Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement.
- **9.2.8.CAP.15:** Present how the demand for certain skills, the job market, and credentials can determine an individual's earning power.
- **9.2.8.CAP.19:** Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level.

NJSLS 9.4 Life Literacies and Key Skills

- **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.IML.7:** Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose.
- **9.4.8.IML.11:** Predict the personal and community impact of online and social media activities.
- **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.
- **9.4.8.TL.6:** Collaborate to develop and publish work that provides perspectives on a real-world problem.

Making Connections to Careers	
● Medical Imaging ● Urban Planner ● Surveyor ● Business Manager ● Engineer ● Scientist ● Business Manager ● Financial Analyst ● Computer Programmer ● Business Analyst ● Statistician	● Real Estate ● Astronomer ● Purchasing Manager ● Meteorologist ● Market Research Analyst ● Health Physicist ● Financial Analyst ● Financial Engineer ● Economist ● Farmer, Agricultural ● Stock Broker

Student Resources

Text: Houghton Mifflin Harcourt **Into Math Advanced 2**, grade 7, 1st Edition, 2020

Resources: **Into Math Advanced 2**, grade 7

- More Practice / Homework
- Reteach and Interactive Reteach
- Challenge and Interactive Challenge

Websites:

- http://www.hmhco.com Into Math
- http://khanacademy.org Tutorials on individual lessons

Integrated Technology

- Google Suite: Docs, Sheets, Slides, Forms
- Into Math online program
- Devices:
  - Chromebooks
  - Texas Instruments (TI-30X Calculators)

Teacher Resources

Text: Houghton Mifflin Harcourt **Into Math: Advanced 2**, grade 7, 1st Edition, 2020

Resources:

- **Into Math Advanced 2** Resource Boxes, grades 7 and 8
  - Unit STEM Task Cards
  - Online Data-Driven Interventions
  - More Practice / Homework
  - Illustrative Mathematics
  - Reteach and Interactive Reteach
  - Challenge and Interactive Challenge
  - Mini-Lesson Tabletop Flipchart
- Google Suite: Docs, Sheets, Slides, Forms
- New Jersey Climate Education Hub
- Devices: SMART / Promethean Interactive Boards

Websites:

- https://www.hmhco.com/one/ Into Math Interactive
- http://www.kutasoftware.com Test and worksheet generator for teachers
- http://khanacademy.org Tutorials on individual lessons

NJDOE Instructional Units for Mathematics:

- https://www.state.nj.us/education/cccs/instructionalunits/math/

Stage 2 – Assessment Evidence

Performance Task(s):

- Unit STEM Activity
- Illustrative Mathematics
- Interactive Reteach
- Interactive Challenge
- NJSLA practice test problems: https://nj.mypearsonsupport.com/practice-tests/math/

Pre-Assessments:

- Gr 7 Math *LinkIt!* NJSLS Form A
- HMS Pre-Assessment
- *Are You Ready?*

Formative Assessments:

- Gr 7 Math *LinkIt!* NJSLS Form B
- Exit Slip
- Student *"I Can"* Self-Assessment
- Informal Observations

Summative Assessments:

- Lesson quizzes
- Module Tests A and B
- HMH Midyear Assessment
- NJDOE Digital Item Library- Released NJSLA items
- EOY Exams:
  - Gr 7 Math *LinkIt!* NJSLS Form C
  - HMH EOY Assessment

Stage 3 – Learning Plan

STEM Task: *Class Arcade*

Learning Mindset: *Challenge Seeking*

Module Opener:

- **Mod 19:** *Go for the Gold!*
- **Mod 20:** *Analyzing Rock-Paper-Scissors*

Diagnostic Assessment: *Are You Ready?*

Module 19: Understand and Apply Experimental Probability

- **Lesson 19.1:** Understand Probability of an Event
- **Lesson 19.2:** Find Experimental Probability of a Simple Event
- **Lesson 19.3:** Find Experimental Probability of Compound Events
- **Lesson 19.4:** Use Experimental Probability and Proportional Reasoning to Make Predictions

Module 20: Understand and Apply Theoretical Probability

- **Lesson 20.1:** Find Theoretical Probability of Simple Events
- **Lesson 20.2:** Find Theoretical Probability of Compound Events
- **Lesson 20.3:** Use Theoretical Probability and Proportional Reasoning to Make Predictions
- **Lesson 20.4:** Conduct Simulations

Accommodations and Modifications

Below please find a list of suggestions for accommodations and modifications to meet the diverse needs of our students. Teachers should consider this a resource and understand that they are not limited to the recommendations included below.

An accommodation *changes* HOW *a student learns*; the change needed does not alter the grade-level standard. A modification *changes* WHAT *a student learns*; the change alters the grade-level expectation.

Special Education and 504 Plans

All modifications and accommodations must be specific to each individual child's IEP (Individualized Educational Plan) or 504 Plan.

- Pre-teach or preview vocabulary
- Repeat or reword directions
- Have students repeat directions
- Use of small group instruction
- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments
- Repetition and time for additional practice
- Model skills/techniques to be mastered
- Extended time to complete task/assignment/work
- Provide a copy of class notes
- Strategic seating (with a purpose - eg. less distraction)
- Flexible seating
- Repetition and additional practice
- Use of manipulatives
- Use of assistive technology (as appropriate)
- Assign a peer buddy
- Emphasize key words or critical information by highlighting
- Use of graphic organizers
- Scaffold with prompts for sentence starters
- Check for understanding with more frequency
- Provide oral reminders and check student work during independent practice
- Chunk the assignment - broken up into smaller units, work submitted in phases
- Encourage student to proofread assignments and tests
- Provide regular home/school communication
- Teacher checks student planner
- Provide student with clear expectations in writing and grading criteria for assignments (rubrics)

Testing Accommodations:

Students should receive all testing accommodations for Benchmark assessments that they receive for State testing.

- Setting: Alternate setting for assessments, small groups, screens to block distractions
- Presentation: large print, test readers, use of audio, fewer questions on each page

- Response: answer verbally, use large block answer sheet, speech-to-text dictation, accept short answers
- Allow for retakes
- Provide study guides
- Use of reference aids such as glossary, multiplication tables, calculator
- Choice of test format (multiple-choice, essay, true-false)
- Alternate ways to evaluate (projects or oral presentations instead of written tests)
- Open-book or open-note tests

Multilingual Learners:

All modifications and accommodations should be specific to each individual child's LEP level as determined by the WIDA screening or ACCESS, utilizing the WIDA Can Do Descriptors.

- Pre-teach or preview vocabulary
- Repeat or reword directions
- Have students repeat directions
- Use of small group instruction
- Scaffold language based on their Can Do Descriptors
- Alter materials and requirements according to Can Do Descriptors
- Adjust number of paragraphs or length of writing according to their Can Do Descriptor
- TPR (Total Physical Response-Sheltered Instruction strategy) Demonstrate concepts through multi-sensory forms such as with body language, intonation
- Pair visual prompts with verbal presentations
- Repetition and additional practice
- Model skills and techniques to be mastered
- Native Language translation (peer, assistive technology, bilingual dictionary)
- Emphasize key words or critical information by highlighting
- Use of graphic organizers
- Scaffold with prompts for sentence starters
- Check for understanding with more frequency
- Use of self-assessment rubrics
- Increase one-on-one conferencing; frequent check ins
- Use study guide to organize materials
- Make vocabulary words available in a student created vocabulary notebook, vocabulary bank, Word Wall, or vocabulary ring
- Extended time
- Select text complexity and tiered vocabulary according to Can Do Descriptors
- Projects completed individually or with partners
- Use online dictionary that includes images for words: http://visual.merriamwebster.com/.
- Use online translator to assist students with pronunciation: http://www.reverso.net/text_translation.aspx?lang=EN.

Students at Risk of Failure:

- Use of self-assessment rubrics for check-in
- Pair visual prompts with verbal presentations
- Ask students to restate information and/or directions

- Opportunity for repetition and additional practice
- Model skills/techniques to be mastered
- Extended time
- Provide copy of class notes
- Strategic seating with a purpose
- Provide students opportunity to make corrections and/or explain their answers
- Support organizational skills
- Check daily planner
- Encourage student to proofread work
- Assign a peer buddy
- Build on students' strengths based on Multiple Intelligences: Linguistic (verbal); Logical (reasoning); Musical/Rhythmic; Intrapersonal Intelligence (understanding of self); Visual Spatial Intelligence; Interpersonal Intelligence (the ability to interact with others effectively); Kinesthetic (bodily); Naturalist Intelligence; and Learning Styles: Visual; Auditory; Tactile; Kinesthetic; Verbal

<u>High Achieving</u>:

Extension Activities

- Allow for student choice from a menu of differentiated outcomes; choices grouped by complexity of thinking skills; variety of options enable students to work in the mode that most interests them
- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more complex material
- Allow opportunities for peer collaboration and team-teaching
- Set individual goals
- Conduct research and provide presentation of appropriate topics
- Provide students opportunity to design surveys to generate and analyze data to be used in discussion
- Allow students to move through the assignment at their own pace (as appropriate)

<u>Strategies to Differentiate to Meet the Needs of a Diverse Learning Population</u>

- Vocabulary Sorts-students engage with the vocabulary word by sorting into groups of similar/different rather than memorizing definitions
- Provide "Realia" (real life objects to relate to the five senses) and ask questions relating to the senses
- Role Play-students create or participate in role playing situations or Reader's Theater
- Moving Circle-an inside and outside circle partner and discuss, circles moves to new partner (Refer to Kagan Differentiated Strategies)
- Brainstorm Carousel-Large Post Its around the room, group moves in a carousel to music. Group discusses topic(s) and responses on paper. Groups rotate twice to see comments of others. (Refer to Kagan Differentiated Strategies)
- Gallery Walk-Objects, books, or student work is displayed. Students examine artifacts and rotate.
- Chunking-chunk reading, tests, questions, homework, etc to focus on particular elements.

- Think Pair Share Write
- Think Talk Write
- Think Pair Share
- Note-taking -can be done through words, pictures, phrases, and sentences depending on level
- KWL (Know, Want to Know, Learned)/KWHL(Know, What to Know, How Will I Learn, learned)/KWLS (Know, Want to Know, Learned, Still Want to Know) /KWLQ (Know, What to Know, Learned, Questions I Still Have) Charts
- Corners Cooperative Learning Strategy: http://cooperativelearningstrategies.pbworks.com/w/page/28234420/Corners.
- Circle Map strategy- place the main topic in a small circle and add student ideas in a bigger circle around the topic. Students may use their native language with peers to brainstorm.
- Flexible grouping -as a whole class, a small group, or with a partner, temporary groups are created: http://www.teachhub.com/flexible-grouping-differentiated-instruction-strategy.
- Jigsaw Activities -cooperative learning in a group, each group member is responsible for becoming an "expert" on one section of the assigned material and then "teaching" it to the other members of the team: http://www.adlit.org/strategies/22371/.

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NEPTUNE TOWNSHIP SCHOOL DISTRICT

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