BLOOMINGDALE PUBLIC SCHOOLS

MATHEMATICS
GRADE 7

<u>**Adapted from:**</u>
New Jersey Student Learning Standards
New Jersey Department of Education Instructional Units for Mathematics

<u>**Approval Date:**</u>
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I. OVERVIEW

This full-year course has been designed to further student understanding of mathematical concepts in each of five areas identified by the New Jersey Student Learning Standards for Mathematics (NJSLS-M) as critical in Grade 7: Numerical Operations, Expressions & Equations, Ratio & Proportion, Statistics & Probability, and Geometry. Real-life problems and concrete representations of concepts will form the center of lessons that will implement this integration. The New Jersey Student Learning Standards for - Career Readiness, Life Literacies, Key Skills are infused throughout the course with specific attention to Critical Thinking and Problem Solving, Technology Literacy, and Financial Literacy. These standards endorse the use of manipulatives, cooperative learning, financial applications and technology as a means to effectively communicate mathematical ideas. This course is designed to prepare students for higher-level mathematics instruction and includes opportunities for self-motivated students to challenge themselves with differentiated instructional and independent learning opportunities that introduce further concepts in mathematics.

This course is aligned with the 2020 New Jersey Student Learning Standards (NJSLS) for 7th grade Mathematics and is enriched with some extensions into 8th grade mathematics. The enriched 8th grade content standards are intended for differentiation opportunities that prepare students for placement into the advanced mathematics course in 8th grade. This course is also aligned with the 2020 New Jersey Student Learning Standards (NJSLS) for Career Readiness, Life Literacies, and Key Skills and is designed to prepare the students for success in their future mathematical courses

II. RATIONALE

The purpose of this course, the second in the three-year middle school sequence, is to prepare students for higher-level mathematics. It is aligned with the 2020 New Jersey Student Learning Standards (NJSLS) for Mathematics and the 2020 New Jersey Student Learning Standards for Career Readiness, Life Literacies, and Key Skills.

III. AFFIRMATIVE ACTION COMPLIANCE STATEMENT

Bloomingdale Public Schools are committed to the achievement of increased cultural awareness, respect, and equity amongst our students, teachers, and community. We are pleased to present all pupils with information pertaining to possible career, professional, or vocational opportunities which in no way restricts or limits options on the basis of race, color, creed, religion, sex, ancestry, national origin, or socioeconomic status.

IV. STUDENT OUTCOMES (Link to New Jersey Student Learning Standards)

In accordance with district policy as mandated by the New Jersey Administrative Code and the New Student Learning Standards, the following are proficiencies required for the successful completion of the above named course.

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As a result of a Bloomingdale Mathematics education, students will be able to...

- Synthesize mathematical skills across disciplines
- Develop into confident mathematicians
- Learn at their own pace and advance their understanding in a variety of ways
- Collaborate with others and contribute productively and articulately
- Act responsibly and be accountable for actions, in person and online
- Effectively approach, analyze, plan, and apply appropriate strategies for problem solving in ambitious contexts with accommodations for those who need it.
- Persevere through difficult situations and tasks and maintain a growth mindset despite adversity.
- Draw on knowledge from a wide variety of mathematical topics with flexibility to approach the same problem from different mathematical perspectives or represent the mathematics in different ways.
- Evaluate situations, draw logical conclusions, and develop, describe and apply solutions.
- Construct and support arguments.
- Evaluate their own reasoning and critique the reasoning of others.
- Assess the reasonableness of a solution with respect to the given construct or problem context.
- Use effective communication to engage in peer collaboration, reflecting on whether or not a solution is viable.
- Create appropriate representations of mathematical situations across a variety of mediums. These models will support the student's ability to demonstrate and explain their mathematical understanding.
- Use mathematical tools to explore and deepen their understanding of mathematical concepts.
- Make effective choices regarding the use of any available tools.
- Make appropriate use of technology as a tool that is constantly changing and evolving.
- Attend to precision in their mathematical calculations and in their communication.
- Calculate accurately and efficiently and express numerical answers with a degree of precision that is appropriate to the given context.
- Develop precision in their use of mathematical language.
- Look closely to determine patterns and structures within mathematics.
- Make meaningful connections between their knowledge from previous experiences and the content they are currently exploring.
- Develop deep understandings of mathematical concepts such that these understandings become applicable building blocks for future learning.
- Use their mathematical understandings to make generalizations that apply to various mathematical circumstances.
- Identify patterns in mathematics that can be used to solve problems that are challenging relative to their learning comfort zone.
- Use generalizations to increase the efficiency and manageability of their work.

- Demonstrate growth mindset and grit in effectively approaching ever-rigorous problem solving.
- Apply appropriate strategies with differentiated levels of support.
- Be confident in participating in higher level discussions that will assess and advance the understanding of concepts.
- Learn mathematics through exploring and solving contextual and mathematical problems

V. Links to NEW JERSEY STUDENT LEARNING STANDARDS

- Visual and Performing Arts
- English Language Arts
- Mathematics
- Science
- Social Studies
- Technology
- 21st Century Life and Careers

VI. INTEGRATED ACCOMMODATIONS AND MODIFICATIONS

Students with IEPs, 504s, and/or Students at Risk of Failure Students read authentic texts and write authentic pieces at their independent and instructional reading levels. Individualized feedback is provided through conferences and small groups. The teacher utilizes visual and multi-sensory methods of instruction in addition to assistive technology when needed. Students are provided with graphic organizers and other scaffolded material. Modification of content and product may be deemed necessary based on student needs. Students are provided with testing accommodations and authentic assessments.

Gifted & Talented Students Students read authentic texts and write authentic pieces at their independent and instructional reading levels. Individualized feedback is provided to the student through conferences and small groups. Students are engaged through inquiry-based instruction to develop higher-order thinking skills. Activities are developed based on student interests and student goals. Students engage in real-world projects and scenarios.

English Language Learners Students read authentic texts and write authentic pieces at their independent and instructional reading levels. Individualized feedback is provided to students through conferences and small groups. Students are pre-taught vocabulary terms and concepts. Teachers engage students through visual learning, including the use of graphic organizers. Teachers use cognates to increase comprehension. The teacher models tasks and concepts, and pairs students learning English with students who have more advanced English language skills. Scaffolding is provided including word walls, sentence frames, think-pair-share, cooperative learning groups, and teacher think-alouds.

VII. 21ST CENTURY THEMES & SKILLS

Embedded in many of our units of study and problem based learning projects are the 21st Century Themes as prescribed by the New Jersey Department of Education. These themes are as follows:

- Global Awareness
- Financial, Economic, Business, and Entrepreneurial Literacy
- Civic Literacy
- Health Literacy

VIII. CURRICULUM ADDENDA FOR SPECIAL EDUCATION

This curriculum can be both grade and age appropriate for special education students and serves as a guide for the special education teacher in line with the district's written philosophy of special education, as stated within Policy #6700 concerning Programs for Educationally Disabled Students. Based on the Child Study Team evaluation and consultation with the parent and classroom teacher, an individualized education plan may include modifications to content, instructional procedures, student expectations, and targeted achievement outcomes of this curriculum document in accordance with the identified needs of an eligible student. This educational plan will then become a supplement guide that the classroom teacher, parent, and Child Study Team will use to measure the individual student's performance and achievement.

IV. CURRICULUM ADDENDA FOR ENGLISH LANGUAGE LEARNERS

This curriculum guide is appropriate and is implemented for all students according to age and grade, and is in line with the district's written philosophy of English language acquisition concerning Bilingual Instruction and English as a Second Language Programs. In accordance with the New Jersey Administrative Code 6A:15, the contents herein provide equitable instructional opportunities for English Language Learners to meet the New Jersey Student Learning Standards and to participate in all academic and non-academic courses. Students enrolled in a Bilingual and/or an ESL program may, in consultation with the classroom teacher and Bilingual and/or ESL teacher, receive modification to content, instructional procedures, student expectations and targeted achievement outcomes of this curriculum document in accordance with the students developmental and linguistic needs.

SCOPE AND SEQUENCE
(*Pacing Guide*)

Unit of Study	Estimated Time
Unit 1: Operations with Rational Numbers	10 weeks
Unit 2: Equations, Inequalities, and Two-Dimensional Geometric Concepts	12 weeks
Unit 3: Proportionality and Three-Dimensional Geometric Concepts	10 weeks

Unit 4: Probability and Statistics	4 weeks

UNIT 1
Operations with Rational Numbers
UNIT SUMMARY
In this unit, students will focus on operations with rational numbers and algebraic expressions. Learners extend previous understandings of addition and subtraction to add and subtract rational numbers. Similarly, they extend previous understandings of multiplication and division of fractions to multiply and divide rational numbers. They 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. They apply properties of operations to calculate with numbers in any form and convert between forms as appropriate.

NEW JERSEY STUDENT LEARNING STANDARDS MATHEMATICS

Module A:

7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

> **a.** Describe situations in which opposite quantities combine to make 0. *For example, In the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?*
>
> **b.** Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
>
> **c.** Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
>
> **d.** Apply properties of operations as strategies to add and subtract rational numbers.

7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.

> **a.** Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
>
> **b.** Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are

integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.

c. Apply properties of operations as strategies to multiply and divide rational numbers.

d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Module B:

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

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

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

INTERDISCIPLINARY CONNECTIONS

New Jersey Student Learning Standards- Science 2020:

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

NJSLS Language Arts Companion Standards for Technical subjects:

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NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table

New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills (2020)

9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal

9.4.8.IML.5: Analyze and interpret local or public data sets to summarize and effectively communicate the data

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

21st CENTURY LIFE AND CAREER STANDARDS

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success.

1. Act as a responsible and contributing community member and employee.
2. Attend to financial well-being.
3. Consider the environmental, social and economic impacts of decisions.
4. Demonstrate creativity and innovation.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
6. Model integrity, ethical leadership and effective management.
7. Plan education and career paths aligned to personal goals.
8. Use technology to enhance productivity, increase collaboration and communicate effectively.
9. Work productively in teams while using cultural global competence.

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9.1: Personal Financial Literacy	9.2: Career Awareness, Exploration & Preparation, and Training	9.3: Career and Technical Education
A. Civic Responsibility B. Financial Institutions C. Financial Psychology D. Planning and Budgeting E. Risk Management and Insurance F. Civic Financial Responsibility G. Credit Profile H. Economic and Government Influences I. Credit and Debt Management	A. Career Awareness (K-2) B. Career Awareness and Planning (3-5) C. Career Awareness and Planning (6-8) D. Career Awareness and Planning (9-12) **9.4 Life Literacies and Key Skills** A. Creativity and Innovation B. Critical Thinking and Problem-solving C. Digital Citizenship D. Global and Cultural Awareness E. Information and Media Literacy F. Technology Literacy	A. Agriculture B. Architecture C. Arts,A/V, Technology D. Business Management E. Education F. Finance G. Government H. Health Science I. Hospital & Tourism J. Human Services K. Information Tech. L. Law and Public Safety M. Manufacturing N. Marketing O. Science, Technology, Engineering & Math P. Trans./Logistics

TECHNOLOGY STANDARDS

8.1: Computer Science	8.2 Design Thinking
A. Computing systems B. Networks and the Internet C. Impacts of Computing D. Data & Analysis E. Algorithms & Programming	A. Engineering Design B. Interaction of Technology and Humans C. Nature of Technology D. Effects of Technology on the Natural World E. Ethics & Culture

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Module A: • $p + q$ is the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative.	**Module A:** • Why does one need rational numbers? • When does one use decimal forms versus fractional forms of rational numbers?

• subtraction of rational numbers is the same as adding the additive inverse, $p - q = p + (-q)$.
• properties of operations.
• if a factor is multiplied by a number greater than one, the answer is larger than that factor.
• if a factor is multiplied by a number between 0 and 1, the answer is smaller than that factor.
• multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers.
• integers can be divided, provided that the divisor is not zero.
• a number and its opposite have a sum of 0.
• a number and its opposite are called additive inverses.
• properties of operations.
• absolute value represents distance on a number line, therefore it is always non-negative.
• every quotient of integers (with non-zero divisor) is a rational number.
• if p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$.
• the decimal form of a rational number terminates in 0s or eventually repeats.

Module B:
• only like terms can be combined, e.g., $x + y = x + y$ but $x + x = 2x$.
• to factor an expression, one must factor out the greatest common factor.
• rewriting an expression in different forms in a problem context can clarify the problem.

• In what real world contexts would negative numbers be used?

Module B:
• Why would one need to find equivalent forms of an expression?

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• rewriting an expression can clarify how the quantities in the problem are related.
• how to add, subtract, multiply, and divide rational numbers.
• $a(b + c) = ab + ac$.
• how to find the greatest common factor of two or more terms.

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STUDENT LEARNING OBJECTIVES (Students are learning to / Students are learning that)

Students are learning to/that…

__Module A:__

- apply previous understandings of addition to add rational numbers
- describe situations in which opposites combine to make zero
- show by modeling, a number and its opposite have a sum of zero (additive inverse)
- $p + q$ is the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative (e.g. $5 + -4$ is 4 units in the negative direction from 5 and, similarly, $5 + 4$ is also 4 units away in the positive direction)
- represent addition and subtraction of signed rational numbers on a vertical or horizontal number line
- interpret sums of rational numbers in real world situations
- apply previous understandings of subtraction to subtract rational numbers
- subtraction of rational numbers is the same as adding the additive inverse, $p - q = p + (-q)$
- show by modeling on a number line that the distance between two rational numbers is the absolute value of their differences and apply the concept in real world contexts
- apply properties of operations as strategies to add and subtract rational numbers
- apply previous understandings of multiplication of fractions to multiply signed rational numbers
- operations on signed rational numbers continue to satisfy the properties of operations
- the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers
- interpret the products of signed rational numbers in real world situations
- apply previous understandings of division of fractions to divide signed rational numbers
- integers can be divided as long as the divisor is not zero
- division of integers results in a signed rational number
- If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$
- interpret quotients of signed rational numbers by describing real world contexts

- apply properties of operations as strategies to multiply and divide signed rational numbers
- convert a rational number to a decimal using long division
- the decimal form of a rational number terminates in zeros or eventually repeats
- solve real-world and mathematical problems involving the four operations with rational numbers in fraction form
- solve real-world and mathematical problems involving the four operations with rational numbers in decimal form

Module B:
- apply the properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients
- rewriting an expression in different forms can clarify the problem and how the quantities are related
- convert between forms (fractions, decimals, and whole numbers) as appropriate to solve multi-step real life and mathematical problems with positive and negative rational numbers in any form
- apply the properties of operations to calculate with numbers in any form when solving multi-step real-life and mathematical problems, and assess the reasonableness of answers using mental computation and estimation strategies

SUGGESTED ACTIVITIES

- presentations
- project and problem based learning
- exploration with manipulatives
- tiered lessons
- real world connections
- cooperative learning

EVIDENCE OF LEARNING

Formative Assessments:
Classroom Discussion
Exit Slip
Checklists
Peer Assessment
Vocabulary Quizzes
Rubrics
Participation and teacher observation
Mini Whiteboard Responses
Think-Pair-Share
Concept Map
Classroom Poll

Summative Assessment:
Unit Tests
End-of-Book Test

NJSLA Test

Nearpod Interactive activities	
Benchmark Assessment: iReady Benchmark Unit Benchmarks	**Alternative Assessments:** Project Portfolio

INSTRUCTIONAL RESOURCES

Core Instructional Resource: ● HMH Into Math ● Achieve the Core	**Teacher Created materials:** Nearpod Presentations	**Supplemental Resources:** ● Reflex Math ● Nearpod ● Khan Academy ● Kendell Hunt ● Desmos

INTEGRATED ACCOMMODATIONS AND MODIFICATIONS

Special Education:
Provide modified notes and access to extra copies online
Provide oral reminders and check student work during independent work time
Model skills/techniques to be mastered
Check and sign assignment planner
Preferential seating
Pair visual prompts with verbal presentations
Modified or scaffolded homework and classwork
Extended time as needed
Provide graphic organizers and study guides

English Learners:
Provide scaffolded assignments and assessments
Pair visual prompts with visual presentations
Check and sign assignment planner
Native Language translation (peer, online assistive technology, translation device, bilingual dictionary)
Extended time for assignment and assessment as needed
Highlight key vocabulary
Use graphic organizers
Provide verbal and written directions
Preferential seating with a English-speaking peer

At Risk of Failure:
Check and sign assignment planner

Encourage class participation and reinforce skills

Model skills and assignments

Extended to time to complete class work

Preferential seating

Provide extra help outside of class and 1:1 instruction when needed

Communicate regularly with students' other teachers

Provide positive feedback for tasks well done

Encourage student to proofread assessments and projects and ask for teacher proofreading of large writing assignments

Gifted and Talented:

Pose higher-level thinking questions

Provide higher level reading and writing materials for literacy based activities

Probe student to extend thinking beyond the text or connect two or more texts

Provide alternate or project-based assessments and assignments

Students with 504 Plans

Provide extended time as needed

Modify length of writing assignment

Provide short breaks within the lesson

Provide scaffolding for students

Utilize graphic organizers

UNIT 2
Equations, Inequalities, and Two-Dimensional Geometric Concepts
UNIT SUMMARY
In this unit, students will focus on equations, inequalities and geometric concepts. Learners construct simple equations and inequalities to solve problems by reasoning about the quantities. They solve simple equations of particular forms fluently, graph the solution set of inequalities, and interpret solutions in the context of the problem. The unit also includes geometric concepts of area, surface area and volume. Learners add finding area and circumference of circles to their repertoire of skills related to area and perimeter. They solve real-world and mathematical problems involving areas of two dimensional objects composed of triangles, quadrilaterals and polygons. Learners return to writing and solving simple equations to conclude the unit, using facts about supplementary, complementary, vertical, and adjacent angles in multi-step problems.
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Module A:

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 fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*

Module B:

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.

> **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.*

Module C:

7.G.B.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

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.

INTERDISCIPLINARY CONNECTIONS

NJSLS- Science:

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

NJSLS Language Arts Companion Standards for Technical subjects:

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NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

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RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics

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New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills (2020)

9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions

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9.4.8.IML.5: Analyze and interpret local or public data sets to summarize and effectively communicate the data

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21st CENTURY LIFE AND CAREER STANDARDS

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success.

1. Act as a responsible and contributing community member and employee.
2. Attend to financial well-being.
3. Consider the environmental, social and economic impacts of decisions.
4. Demonstrate creativity and innovation.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
6. Model integrity, ethical leadership and effective management.

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7. Plan education and career paths aligned to personal goals.
8. Use technology to enhance productivity, increase collaboration and communicate effectively.
9. Work productively in teams while using cultural global competence.

9.1: Personal Financial Literacy	9.2: Career Awareness, Exploration & Preparation, and Training	9.3: Career and Technical Education
J. Civic Responsibility K. Financial Institutions L. Financial Psychology M. Planning and Budgeting N. Risk Management and Insurance O. Civic Financial Responsibility P. Credit Profile Q. Economic and Government Influences R. Credit and Debt Management	G. Career Awareness (K-2) H. Career Awareness and Planning (3-5) I. Career Awareness and Planning (6-8) J. Career Awareness and Planning (9-12) **9.4 Life Literacies and Key Skills** A. Creativity and Innovation B Critical Thinking and Problem-solving C. Digital Citizenship D. Global and Cultural Awareness K. Information and Media Literacy L. Technology Literacy	Q. Agriculture R. Architecture S. Arts,A/V, Technology T. Business Management U. Education V. Finance W. Government X. Health Science Y. Hospital & Tourism Z. Human Services AA. Information Tech. BB. Law and Public Safety CC. Manufacturing DD. Marketing EE. Science, Technology, Engineering & Math FF. Trans./Logistics

TECHNOLOGY STANDARDS

8.1: Computer Science	8.2 Design Thinking
A. Computing systems B. Networks and the Internet C. Impacts of Computing D. Data & Analysis E. Algorithms & Programming	A. Engineering Design B. Interaction of Technology and Humans C. Nature of Technology D. Effects of Technology on the Natural World E. Ethics & Culture

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Module A & B:	**Module A:** • What real world problems could be represented by equations?

• one form of a number may be more advantageous to use in a problem context than another form.
• using estimation strategies helps to determine the reasonableness of answers.
• finding one percent or ten percent of a number can facilitate solving percent problems.

Module C:
• area is the number of square units needed to cover a two-dimensional figure.
• circumference is the number of linear units needed to surround a circle.
• the circumference of a circle is related to its diameter (and also its radius).
• there is a relationship between the circumference and the area of a circle.
• relationships between angles depends on where the angles are located.
• a cube is a special case of a right rectangular prism.
• volume is the number of cubic units needed to fill a three-dimensional space.
• surface area is the number of square units needed to cover all faces of a three-dimensional figure.
• area and volume are additive (small pieces can be found and added together to make the whole).
• $A=\pi r^2$
• $C=\pi d=2\pi r$
• supplementary angles are angles whose measures add to 180 degrees.
• complementary angles are angles whose measures add to 90 degrees.
• vertical angles are opposite angles formed when two lines intersect.
• adjacent angles are non-overlapping angles which share a common vertex and side.

Module B:
• What real world problems could be represented by inequalities?

Module C:
• When would one want to find the area of a figure?
• When would one want to find the surface area of a figure?
• When would one want to find the volume of a figure?
• How would changing the radius or diameter of a circle affect its circumference and area?

• volume of a cube $= s^3$, where s equals the length of a side.

• volume of a right prism $=$ Bh, where B equals the area of the base and h equals the height of the prism.

• an irregular two-dimensional figure can be broken apart into triangles, quadrilaterals, and other polygons whose areas are easy to find.

STUDENT LEARNING OBJECTIVES (Students are learning to / Students are learning that)

Students are learning to/that…

Module A:

- solve world problems by reasoning about their quantities and constructing simple equations of the form $p(x + q) = r$, where p, q, and r are specific rational numbers
- compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
- solve equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers with accuracy and efficiency

Module B:

- solve world problems by reasoning about their quantities and constructing simple inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers
- use variables to represent unknown quantities in mathematical problems to construct and solve simple inequalities
- describe the solution of an inequality using a graph and inequality statement and interpret its meaning in the context of the problem

Module C:

- know the formulas for area and circumference of a circle
- solve problems using the formula for circumference of a circle and for the area of a circle
- informally derive the relationship between the circumference and area of a circle
- solve real-world and mathematical problems involving area of two-dimensional objects composed of triangles, quadrilaterals, and polygons
- supplementary angles are two angles whose sum is 180 degrees and complementary angles are two angles whose sum is 90 degrees
- vertical angles, the pairs of opposite angles made by two intersecting lines, have equal measures
- adjacent angles are two angles that share a vertex and a side
- 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

BLOOMINGDALE PUBLIC SCHOOLS

SUGGESTED ACTIVITIES

- presentations
- project and problem based learning
- exploration with manipulatives
- tiered lessons
- real world connections
- cooperative learning

EVIDENCE OF LEARNING

Formative Assessments:	**Summative Assessment:**
Classroom Discussion	Unit Tests
Exit Slip	End-of-Book Test
Checklists	
Peer Assessment	NJSLA Test
Vocabulary Quizzes	
Rubrics	
Participation and teacher observation	
Mini Whiteboard Responses	
Think-Pair-Share	
Concept Map	
Classroom Poll	
Nearpod Interactive activities	
Benchmark Assessment:	**Alternative Assessments:**
iReady Benchmark	Project
Unit Benchmarks	Portfolio

INSTRUCTIONAL RESOURCES

Core Instructional Resource:	**Teacher Created materials:**	**Supplemental Resources:**
- HMH Into Math - Achieve the Core	Nearpod Presentations	- Reflex Math - Nearpod - Khan Academy - Kendell Hunt - Desmos

INTEGRATED ACCOMMODATIONS AND MODIFICATIONS

Special Education:
Provide modified notes and access to extra copies online

Provide oral reminders and check student work during independent work time
Model skills/techniques to be mastered
Check and sign assignment planner
Preferential seating
Pair visual prompts with verbal presentations
Modified or scaffolded homework and classwork
Extended time as needed
Provide graphic organizers and study guides

English Learners:
Provide scaffolded assignments and assessments
Pair visual prompts with visual presentations
Check and sign assignment planner
Native Language translation (peer, online assistive technology, translation device, bilingual dictionary)
Extended time for assignment and assessment as needed
Highlight key vocabulary
Use graphic organizers
Provide verbal and written directions
Preferential seating with a English-speaking peer

At Risk of Failure:
Check and sign assignment planner
Encourage class participation and reinforce skills
Model skills and assignments
Extended to time to complete class work
Preferential seating
Provide extra help outside of class and 1:1 instruction when needed
Communicate regularly with students' other teachers
Provide positive feedback for tasks well done
Encourage student to proofread assessments and projects and ask for teacher proofreading of large writing assignments

Gifted and Talented:
Pose higher-level thinking questions
Provide higher level reading and writing materials for literacy based activities
Probe student to extend thinking beyond the text or connect two or more texts
Provide alternate or project-based assessments and assignments

Students with 504 Plans
Provide extended time as needed
Modify length of writing assignment
Provide short breaks within the lesson
Provide scaffolding for students

Utilize graphic organizers

UNIT 3
Proportionality and Three-Dimensional Geometric Concepts
UNIT SUMMARY

In this unit, students will focus on proportionality. Learners begin the unit, extending the work with unit rates from grade 6, to compute unit rates associated with ratios of fractions. They recognize and represent proportional relationships in multiple ways, deciding whether two quantities are in a proportional relationship. They identify the constant of proportionality in a variety of representations (e.g tables, graphs, equations, diagrams, and verbal descriptions) and use proportions to solve problems involving scale drawings of geometric figures. Grade 7 learners work with proportions as they represent proportional relationships by equations, interpret points on graphs of proportional relationships in context, and use proportional relationships to solve multi-step percent and ratio problems.

The geometric concepts of Unit 3 focus on analyzing geometric figures. Learners solve real-world and mathematical problems involving volume and surface area of three-dimensional objects, describe the two-dimensional figures that result from slicing three-dimensional figures and draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. They focus on constructing triangles and noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

NEW JERSEY STUDENT LEARNING STANDARDS MATHEMATICS

<u>**Module A:**</u>
7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction ½ miles per hour, equivalently 2 miles per hour.*

7.RP.A.2
Recognize and represent proportional relationships between quantities.
    a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
    b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

Module B:
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.*

      d. Explain what a point (*x, y*) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r*) where *r* is the unit rate.

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

Module C:
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.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.

INTERDISCIPLINARY CONNECTIONS

NJSLS- Science:

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

NJSLS Language Arts Companion Standards for Technical subjects:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table

New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills (2020)

9.4.8.CI.1: Assess data gathered on varying perspectives on causes of climate change (e.g., crosscultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions

9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal

9.4.8.IML.5: Analyze and interpret local or public data sets to summarize and effectively communicate the data

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

21st CENTURY LIFE AND CAREER STANDARDS

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success.

1. Act as a responsible and contributing community member and employee.
2. Attend to financial well-being.
3. Consider the environmental, social and economic impacts of decisions.
4. Demonstrate creativity and innovation.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
6. Model integrity, ethical leadership and effective management.

7. Plan education and career paths aligned to personal goals.
8. Use technology to enhance productivity, increase collaboration and communicate effectively.
9. Work productively in teams while using cultural global competence.

9.1: Personal Financial Literacy	9.2: Career Awareness, Exploration & Preparation, and Training	9.3: Career and Technical Education
S. Civic Responsibility T. Financial Institutions U. Financial Psychology V. Planning and Budgeting W. Risk Management and Insurance X. Civic Financial Responsibility Y. Credit Profile Z. Economic and Government Influences AA. Credit and Debt Management	M. Career Awareness (K-2) N. Career Awareness and Planning (3-5) O. Career Awareness and Planning (6-8) P. Career Awareness and Planning (9-12) **9.4 Life Literacies and Key Skills** A. Creativity and Innovation B Critical Thinking and Problem-solving C. Digital Citizenship D. Global and Cultural Awareness Q. Information and Media Literacy R. Technology Literacy	GG. Agriculture HH. Architecture II. Arts,A/V, Technology JJ. Business Management KK. Education LL. Finance MM. Government NN. Health Science OO. Hospital & Tourism PP. Human Services QQ. Information Tech. RR. Law and Public Safety SS. Manufacturing TT. Marketing UU. Science, Technology, Engineering & Math VV. Trans./Logistics

TECHNOLOGY STANDARDS

8.1: Computer Science	8.2 Design Thinking
A. Computing systems B. Networks and the Internet C. Impacts of Computing D. Data & Analysis E. Algorithms & Programming	A. Engineering Design B. Interaction of Technology and Humans C. Nature of Technology D. Effects of Technology on the Natural World E. Ethics & Culture

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Module A & B:	**Module A & B:** • What is the purpose of finding a unit rate?

• the two measurements that create a unit rate are always different, e.g., miles per gallon, dollars per hour.
• ratios and percent represent the same information in different formats.
• unit rates allow for comparison of proportional relationships.

Module C:
• figures are similar only if
-corresponding side lengths are proportional; and corresponding angles are congruent.
• applying a scale factor less than one will shrink a figure.
• applying a scale factor greater than one will enlarge a figure.
• only certain combinations of angle and side measures will create triangles.
• slicing a three-dimensional figure creates a two-dimensional cross section.
• there is a proportional relationship between the corresponding sides of similar figures.
• the corresponding angles of similar figures are congruent.
• scale factor is the number that the side lengths of one figure can be multiplied by to give the corresponding side lengths of the other figure.
• a proportion can be set up using the appropriate corresponding side lengths of two similar figures.
• if a side length is unknown, a proportion can be solved to determine the measure of it.
• the names and properties of two-dimensional shapes.
• the names and properties of three-dimensional solids.

• Why are the two measurements in a unit rate different?

Module C:
• How do certain professions utilize scale drawings?

STUDENT LEARNING OBJECTIVES (Students are learning to / Students are learning that)

Students are learning to/that…

Module A:
- compute unit rates involving ratios of fractions (complex fractions) in quantities measured in like or different unit
- decide whether two quantities show a proportional relationship by testing for equivalent ratios in a table
- decide whether two quantities show a proportional relationship by graphing on a coordinate plane and observing whether the graph is a straight line through the origin
- identify the constant of proportionality (unit rate) in equations and verbal descriptions of proportional relationships
- identify the constant of proportionality (unit rate) in tables, graphs, and diagrams
- solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale

Module B:
- represent proportional relationships by equations using the constant of proportionality (unit rate)
- explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate
- solve multistep ratio and percent problems using proportional relationships
- solve multistep ratio and percent problems using proportional relationships involving simple interest and sales tax
- solve multistep ratio and percent problems using proportional relationships involving markups and markdowns
- solve multistep ratio and percent problems using proportional relationships involving gratuities, commissions, and fees
- solve multistep ratio and percent problems using proportional relationships involving percent increase, percent decrease, and percent error

Module C:
- draw geometric shapes with given conditions with technology, with rulers and protractors, as well as freehand
- construct triangles from three measures of angles or sides using technology and notice when the conditions determine a unique triangle, more than one triangle, or no triangle
- construct triangles from three measures of angles or sides using rulers and protractors and notice when the conditions determine a unique triangle, more than one triangle, or no triangle
- describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids
- solve real-world and mathematical problems involving volume and surface area of three-dimensional objects composed of cubes and right prisms

SUGGESTED ACTIVITIES

- presentations
- project and problem based learning
- exploration with manipulatives
- tiered lessons
- real world connections
- cooperative learning

EVIDENCE OF LEARNING

Formative Assessments:	**Summative Assessment:**
Classroom Discussion Exit Slip Checklists Peer Assessment Vocabulary Quizzes Rubrics Participation and teacher observation Mini Whiteboard Responses Think-Pair-Share Concept Map Classroom Poll Nearpod Interactive activities	Unit Tests End-of-Book Test NJSLA Test
Benchmark Assessment: iReady Benchmark Unit Benchmarks	**Alternative Assessments:** Project Portfolio

INSTRUCTIONAL RESOURCES

Core Instructional Resource:	**Teacher Created materials:**	**Supplemental Resources:**
● HMH Into Math ● Achieve the Core	Nearpod Presentations	● Reflex Math ● Nearpod ● Khan Academy ● Kendell Hunt ● Desmos

INTEGRATED ACCOMMODATIONS AND MODIFICATIONS

Special Education:
Provide modified notes and access to extra copies online
Provide oral reminders and check student work during independent work time
Model skills/techniques to be mastered
Check and sign assignment planner

Preferential seating
Pair visual prompts with verbal presentations
Modified or scaffolded homework and classwork
Extended time as needed
Provide graphic organizers and study guides

English Learners:
Provide scaffolded assignments and assessments
Pair visual prompts with visual presentations
Check and sign assignment planner
Native Language translation (peer, online assistive technology, translation device, bilingual dictionary)
Extended time for assignment and assessment as needed
Highlight key vocabulary
Use graphic organizers
Provide verbal and written directions
Preferential seating with a English-speaking peer

At Risk of Failure:
Check and sign assignment planner
Encourage class participation and reinforce skills
Model skills and assignments
Extended to time to complete class work
Preferential seating
Provide extra help outside of class and 1:1 instruction when needed
Communicate regularly with students' other teachers
Provide positive feedback for tasks well done
Encourage student to proofread assessments and projects and ask for teacher proofreading of large writing assignments

Gifted and Talented:
Pose higher-level thinking questions
Provide higher level reading and writing materials for literacy based activities
Probe student to extend thinking beyond the text or connect two or more texts
Provide alternate or project-based assessments and assignments

Students with 504 Plans
Provide extended time as needed
Modify length of writing assignment
Provide short breaks within the lesson
Provide scaffolding for students
Utilize graphic organizers

UNIT 4
Probability and Statistics
UNIT SUMMARY

In this unit, students will...learners are introduced to probability. The focus of the unit is on both probability and statistics. Learners understand that the probability of a chance event is a number between 0 and 1, with larger numbers indicating greater likelihood and probabilities near 0 indicating an unlikely event. They collect data to approximate the probability of a chance event. Learners develop uniform and non-uniform probability models, use them to find probabilities, and compare probabilities from a model to observed frequencies. Learners conclude the first module of the unit by representing sample spaces and finding probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

In the final grade 7 module, learners understand that statistics can be used to gain information about a population by examining a sample of the population, and understand the role of random sampling in producing valid inferences. They use data from a random sample to draw inferences about a population and generate multiple samples to gauge the variation in predictions. Building on the work of grade 6, they use measures of center and measures of variability for data from random samples to make informal inferences and compare two populations.

NEW JERSEY STUDENT LEARNING STANDARDS MATHEMATICS

Module A:

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.

> **a.** Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.*

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.

    a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.

    b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.

    c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*

Module B:

7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population;generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*

7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*

7.SP.B.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*

INTERDISCIPLINARY CONNECTIONS

NJSLS- Science:

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

NJSLS Language Arts Companion Standards for Technical subjects:

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

RST.6-8.2. Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST.6-8.3. Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics

RST.6-8.7. Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table

New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills (2020)

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9.4.8.CT.2: Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option

9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal

9.4.8.IML.5: Analyze and interpret local or public data sets to summarize and effectively communicate the data

9.4.8.TL.1: Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.

BLOOMINGDALE PUBLIC SCHOOLS

21st CENTURY LIFE AND CAREER STANDARDS

Career Readiness, Life Literacies, and Key Skills Practices describe the habits of the mind that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success.

1. Act as a responsible and contributing community member and employee.
2. Attend to financial well-being.
3. Consider the environmental, social and economic impacts of decisions.
4. Demonstrate creativity and innovation.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
6. Model integrity, ethical leadership and effective management.
7. Plan education and career paths aligned to personal goals.
8. Use technology to enhance productivity, increase collaboration and communicate effectively.
9. Work productively in teams while using cultural global competence.

9.1: Personal Financial Literacy	9.2: Career Awareness, Exploration & Preparation, and Training	9.3: Career and Technical Education
BB. Civic Responsibility	S. Career Awareness (K-2)	WW. Agriculture
CC. Financial Institutions	T. Career Awareness and Planning (3-5)	XX. Architecture
DD. Financial Psychology	U. Career Awareness and Planning (6-8)	YY. Arts,A/V, Technology
EE. Planning and Budgeting	V. Career Awareness and Planning (9-12)	ZZ. Business Management
FF. Risk Management and Insurance		AAA. Education
GG. Civic Financial Responsibility		BBB. Finance
HH. Credit Profile	**9.4 Life Literacies and Key Skills**	CCC. Government
II. Economic and Government Influences	A. Creativity and Innovation	DDD. Health Science
JJ. Credit and Debt Management	B Critical Thinking and Problem-solving	EEE. Hospital & Tourism
	C. Digital Citizenship	FFF. Human Services
	D. Global and Cultural Awareness	GGG. Information Tech.
	W. Information and Media Literacy	HHH. Law and Public Safety
	X. Technology Literacy	III. Manufacturing
		JJJ. Marketing
		KKK. Science, Technology, Engineering & Math
		LLL. Trans./Logistics

TECHNOLOGY STANDARDS

8.1: Computer Science	8.2 Design Thinking
A. Computing systems	A. Engineering Design

B. Networks and the Internet C. Impacts of Computing D. Data & Analysis E. Algorithms & Programming	B. Interaction of Technology and Humans C. Nature of Technology D. Effects of Technology on the Natural World E. Ethics & Culture

ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Module A: • the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. • 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. • probability models can be used to find the probability of events. • probability is equal to the ratio of favorable number of outcomes to total possible number of outcomes. • as a number for probability increases, so does the likelihood of the event occurring. • a probability near 0 indicates an unlikely event. • a probability around 1/2 indicates an event that is neither unlikely nor likely. • a probability near 1 indicates a likely event. • long-run relative frequencies allow one to approximate the probability of a chance event and vice versa. *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.* • a probability model is a visual display of the sample space and each corresponding probability. *For example, toss a die—the sample space is {1, 2, 3, 4, 5, 6} and the probability of each is 1/6. Therefore, the probability model is*	**Module A:** • What real-life applications would involve finding the probability of an event? • What is the purpose of a simulation? • Why would one need to use a probability model? **Module B:** • What is the relationship between a sample and a population? • Why would one want to compare two populations? • What does the shape of data in a display tell one about the data?

outcome	1	2	3	4	5	6
probability	⅙	⅙	⅙	⅙	⅙	⅙

• a uniform probability model has equally likely probabilities.

• discrepancies between a model and observed frequencies could occur for various reasons, including experimental error, recording error or simulations that were improperly designed.

• a compound event consists of two or more simple events.

• a sample space is a list of all possible outcomes of an experiment.

• how to make an organized list.

• how to create a tree diagram.

Module B:

• statistics can be used to gain information about a population by examining a sample of the populations.

• generalizations about a population from a sample are valid only if the sample is representative of that population.

• random sampling tends to produce representative samples and support valid inferences.

• a random sample can be found by various methods, including simulations or a random number generator (from a graphing calculator or table).

• Samples should be the same size in order to compare the variation in estimates or predictions.

• outliers skew data, which in turn affects the display.

• measures of center give information about the location of mean, median and mode, whereas measures of variability give information about how spread out the data is.

• mean is the result if all of the data values are combined and then redistributed evenly among individuals so that each has the same amount.

• mean is often called the average, and is the sum of the numerical values divided by the number of values.

• median is the number that is the midpoint of an ordered set of numerical data.

• when a distribution contains an even number of data values, the median is computed by finding the average of the two middle data values in an ordered list of the data values.

• mode is the data value or category occurring with the greatest frequency (there can be no mode, one mode, or several modes).

• mean absolute deviation of a data set is found by the following steps:

1. calculate the mean
2. determine the deviation of each variable from the mean
3. divide the sum of the absolute value of each deviation by the number of data points

• range is a number found by subtracting the minimum value from the maximum value.

STUDENT LEARNING OBJECTIVES (Students are learning to / Students are learning that)

Students are learning to/that…

Module A:

▪ the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around ½ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event

▪ approximate the probability of a chance event by collecting data on the chance process that it produces observing long run relative frequency

▪ predict the approximate relative frequency

▪ develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events

▪ develop a probability model, which may not be uniform, by observing frequencies in data generated from a chance process

- compare probabilities from a model to observed frequencies and explain possible sources of the discrepancy if the agreement is not good
- the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs
- represent the sample space for a compound event using various methods such as, organized lists, tables, and tree diagrams
- identify the outcomes in the sample space which compose an event that has been described in everyday language
- design and use a simulation to generate frequencies for compound events

Module B:

- statistics is used to gain information about a population by examining a sample of the population
- generalizations about a population from a sample are valid only if the sample is representative of that population
- random sampling tends to produce representative samples of the population and support valid inferences
- use data from a random sample to make inferences about a population with an unknown characteristic
- generate multiple samples, or simulated samples, of the same size to gauge variation in estimates or predictions
- informally gauge the extent of visual overlap between two numerical distributions with similar variabilities, measure the difference between the centers and express the difference as a multiple of the measure of variability
- draw informal comparative inferences about two populations by using the measures of center (mean and median) and measures of variability (interquartile range and mean absolute deviation) from random samples

SUGGESTED ACTIVITIES

- presentations
- project and problem based learning
- exploration with manipulatives
- tiered lessons
- real world connections
- cooperative learning

EVIDENCE OF LEARNING

Formative Assessments:	**Summative Assessment:**
Classroom Discussion	Unit Tests
Exit Slip	End-of-Book Test
Checklists	
Peer Assessment	NJSLA Test
Vocabulary Quizzes	

Rubrics Participation and teacher observation Mini Whiteboard Responses Think-Pair-Share Concept Map Classroom Poll Nearpod Interactive activities	
Benchmark Assessment: iReady Benchmark Unit Benchmarks	**Alternative Assessments:** Project Portfolio

INSTRUCTIONAL RESOURCES

Core Instructional Resource:	**Teacher Created materials:**	**Supplemental Resources:**
● HMH Into Math ● Achieve the Core	Nearpod Presentations	● Reflex Math ● Nearpod ● Khan Academy ● Kendell Hunt ● Desmos

INTEGRATED ACCOMMODATIONS AND MODIFICATIONS

Special Education:
Provide modified notes and access to extra copies online
Provide oral reminders and check student work during independent work time
Model skills/techniques to be mastered
Check and sign assignment planner
Preferential seating
Pair visual prompts with verbal presentations
Modified or scaffolded homework and classwork
Extended time as needed
Provide graphic organizers and study guides

English Learners:
Provide scaffolded assignments and assessments
Pair visual prompts with visual presentations
Check and sign assignment planner
Native Language translation (peer, online assistive technology, translation device, bilingual dictionary)
Extended time for assignment and assessment as needed
Highlight key vocabulary

Use graphic organizers
Provide verbal and written directions
Preferential seating with a English-speaking peer

At Risk of Failure:
Check and sign assignment planner
Encourage class participation and reinforce skills
Model skills and assignments
Extended to time to complete class work
Preferential seating
Provide extra help outside of class and 1:1 instruction when needed
Communicate regularly with students' other teachers
Provide positive feedback for tasks well done
Encourage student to proofread assessments and projects and ask for teacher proofreading of large writing assignments

Gifted and Talented:
Pose higher-level thinking questions
Provide higher level reading and writing materials for literacy based activities
Probe student to extend thinking beyond the text or connect two or more texts
Provide alternate or project-based assessments and assignments

Students with 504 Plans
Provide extended time as needed
Modify length of writing assignment
Provide short breaks within the lesson
Provide scaffolding for students
Utilize graphic organizers