Fairfield Public Schools

Math Curriculum
K-6

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Fairfield Mathematics

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Instructional Materials

Math Expressions
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Connected Math Project 3
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Supplemental Resources

- Connected Ed https://connected.mcgraw-hill.com/connected/login.do
- Illustrative Mathematics https://www.illustrativemathematics.org/
- Khan Academy https://www.khanacademy.org/
- Math for Elementary School Teachers http://www.mathforelementaryteachers.org/ video clips that contain explanations of arithmetic topics including: Place Value/Arithmetic Models/Arithmetic Algorithms, Mental Math, Primes/Divisibility, Fraction Arithmetic, and Word Problems/Model Drawing.
- National Council of Teachers of Mathematics http://www.nctm.org/
- National Library of Virtual Manipulatives http://nlvm.usu.edu/
- NCTM Illuminations Resources for Teaching Math http://illuminations.nctm.org/
- Open Up Resources https://openupresources.org/
- Eureka Mathematics https://greatminds.org/math/eurekamath

Kindergarten

Interdisciplinary Connections

Mathematics is a unified body of knowledge whose concepts build upon each other. Connecting mathematical concepts includes linking ideas to related ideas learned previously.

Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas. Students need to connect their mathematical learning to appropriate real-world contexts. They need to create interest and maintain the interest after the novelty of the work has worn off.

Mathematics is the language of science and is greatly utilized in industry and business. It gives us the power to solve difficult real-world problems, but also helps us to understand how the universe operates.

Every mathematics teacher needs to make students unafraid of the subject by convincing the students of the usefulness of learning mathematics in their daily lives and for higher studies. The world today, which leans more and more heavily on Science and Technology, demands more from mathematics. Tomorrow's world will, no doubt, make still greater demands from mathematics.

Interdisciplinary Connections for Kindergarten

Literature:

~ The Greedy Triangle, By Meghan Everette

- Introduce the lesson by reading The Greedy Triangle
- Follow the lesson in the Interdisciplinary Supplemental Section.

~ Ten Little Monkeys: Jumping on the Bed by Annie Kubler

- Introduce the lesson by reading Ten Little Monkeys: Jumping on the Bed.
- Follow the lesson in the Interdisciplinary Supplemental Section.

~ Ten Fat Turkeys

- Subtraction book used in November

~Dr. Seuss Math

- Follow the worksheets in the Interdisciplinary Supplemental Section

(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.

RL.K.1. With prompting and support, ask and answer questions about key details in a text (e.g., who, what, where, when, why, how).)

New Jersey Student Learning Standards (NJSLS)
In Kindergarten, instructional time should focus on two critical areas: (1) representing and comparing whole numbers, initially with sets of objects; (2) describing shapes and space. More learning time in Kindergarten should be devoted to number than to other topics. (1) Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as 5 + 2 = 7 and 7 – 2 = 5. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away. (2) Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

Counting and Cardinality

Know number names and the count sequence.

K.CC.A.1 Count to 100 by ones and by tens.

K.CC.A.2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1).

K.CC.A.3 Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).

Understandings	Essential Questions
Students will understand… • Counting involves one-to-one correspondence. • One can count by different amounts (ones, tens, etc.).	• Why do we need to count? • How do we count?

Knowledge	Skills
Students will know . . . • Multiples of ten • How to count • How to write the numerals 0 – 9 • Count a number of objects	Students will be able to . . . • Count to 100 by ones • Count to 100 by tens • Count forward beginning from a given number within the known sequence • Write numbers from 0-20 • Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects)

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.7, 1.12, 1.13, 1.14, 1.16, 1.17, 2.1, 2.2, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.14, 2.15, 2.16, 2.18, 2.19, 3.1, 3/2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.11, 3.12, 3.13, 3.14, 3.18, 3.19, 4.3, 4.8, 4.10, 4.12, 4.13, 4.15, 4.16, 4.17, 4.18, 4.20, 5.2, 5.3, 5.4, 5.5, 5.7, 5.8, 5.10, 5.11, 5.13, 5.14, 5.16, 5.17, 5.20, 5.23

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk • Workbook Pages (“Check for Understanding” extension)	• Unit Tests • Benchmarks (beginning, middle, end of year)

Counting and Cardinality

Count to tell the number of objects.

K.CC.B.4 Understand the relationship between numbers and quantities to 10; connect counting to cardinality.

a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.

b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.

c. Understand that each successive number name refers to a quantity that is one larger.

K.CC.B.5 Count to answer "how many?" questions about as many as 10 things arranged in a line, a rectangular array, or a circle, or as many as 5 things in a scattered configuration; given a number from 1–10, count out that many objects

Understandings	Essential Questions
Students will understand… • there is a relationship between the numbers and quantities. • when counting, each object has one and only one number name and each number name is paired with one and only one object (one-to-one correspondence). • when counting, the last number name said tells the number of objects counted. • the number of objects is the same regardless of the order in which they were counted. • each successive number name refers to a quantity that is one larger.	• How do we count?

Knowledge	Skills
Students will know . . . • the connection between counting and cardinality. • one-to-one correspondence.	Students will be able to . . . • count objects while saying the number names in the standard order. • state the total number of objects in a group. • count as many as 20 things arranged in a line, a rectangular array, or a circle, when asked "how many…?". • count as many as 10 things in a scattered configuration, when asked "how many…?". • count out the correct number of objects when given a number from 1-20.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 2.1, 2.2, 2.3, 2.4, 2.5, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.14, 2.15, 2.16, 2.18, 2.19, 2.20, 3.1, 3.2, 3.5, 3.7, 3.8, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.18, 3.19, 3.20, 3.21, 4.1, 4.3, 4.5, 4.6, 4.7, 4.8, 4.12, 4.15, 4.16, 4.20, 5.1, 5.2, 5.3, 5.4, 5.7, 5.9, 5.14, 5.15, 5.16, 5.17, 5.19, 5.20, 5.23

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk • Workbook Pages ("Check for Understanding" extension)	• Unit Tests • Benchmarks (beginning, middle, end of year)

Counting and Cardinality

Compare numbers.

K.CC.C.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies (include groups with up to ten objects).

K.CC.C.7 Compare two numbers between 1 and 10 presented as written numerals.

Understandings	Essential Questions
Students will understand… • "greater than" means the amount is more; "less than" means the amount is less. • a numeral stands for number of concrete objects.	• How do we compare two numbers?

Knowledge	Skills
Students will know . . . • matching strategies to identify the number of objects in a group of up to 10 objects. • counting strategies to identify the number of objects in a group of up to 10 objects.	Students will be able to . . . • identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group. • compare two numbers between 1 and 10 presented as written numerals.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018: Lessons 1.9, 1.11, 1.12, 1.13, 1.15, 1.16, 1.17, 2.9, 3.10, 3.12, 3.14, 4.6, 4.10, 5.10, 5.16, 5.17, 5.20**

Assessment

Formative Assessment	Summative Assessment
• **Do Now** • **Homework** • **Puzzled Penguin** • **Math Talk** • **Workbook Pages ("Check for Understanding" extension)**	• **Unit Tests** • **Benchmarks (beginning, middle, end of year)**

Operations and Algebraic Thinking

Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

K.OA.A.1 Represent addition and subtraction up to 10 with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.

K.OA.A.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.

K.OA.A.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1).

K.OA.A.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.

K.OA.A.5 Demonstrate fluency for addition and subtraction within 5.

Understandings	Essential Questions
Students will understand… • numbers can be decomposed. • making a sum of 10 will be important to make work easier. • objects, mental images, drawings, sounds, acting out situations, verbal explanations, expressions, or equations can help one understand problems and find solutions.	• Why do we need to add and subtract? • What happens when we put groups together or add to a group? • What happens when we take apart groups or take away from a group?
Knowledge	**Skills**
Students will know . . . • addition and subtraction can be represented in multiple ways. • numbers can be decomposed.	Students will be able to . . . • represent addition and subtraction with objects, mental images, drawings, sounds, acting out situations, verbal explanations, expressions, or equations. • solve addition and subtraction word problems. • add and subtract within 10. • decompose numbers less than or equal to 10 into pairs in more than one way by using objects or drawings. • record decompositions of numbers by a drawing or equation (5 = 4 + 1). • find the number that makes 10 when added to a given number, for any number 1-9, by using objects or drawings and record the answer with a drawing or an equation. • fluently add and subtract within 5.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.

MP5. Use appropriate tools strategically. MP7. Look for and make use of structure. MP8. Look for and express regularity in repeated reasoning.
Resources
• **Math Expressions, 2018: Lessons 1.6, 1.7, 1.8, 1.14, 1.21, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.9, 2.10, 2.11, 2.12, 2.14, 2.15, 2.16, 2.19, 2.20, 3.1, 3.3, 3.4, 3.5, 3.6, 3.7, 3.11, 3.12, 3.14, 3.15, 3.16, 3.17, 3.18, 3.19, 3.20, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.10, 4.11, 4.12, 4.13, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12, 5.13, 5.14, 5.15, 5.16, 5.18, 5.19**

Assessment	
Formative Assessment • **Do Now** • **Homework** • **Puzzled Penguin** • **Math Talk** • **Workbook Pages ("Check for Understanding" extension)**	**Summative Assessment** • **Unit Tests** • **Benchmarks (beginning, middle, end of year)**

Numbers and Operation in Base 10

Work with numbers 11-19 to gain foundations for place value.

K.NBT.A.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.

Understandings	Essential Questions
Students will understand… • teen numbers (11-19) are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.	• Why do we compose and decompose numbers?

Knowledge	Skills
Students will know . . . • composing and decomposing numbers into tens and ones will help solve problems	Students will be able to . . . • compose and decompose numbers from 11-19 into ten ones and some further ones, by using objects or drawings. • record compositions and decompositions with drawings or equations.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018: Lessons 3.2, 3.3, 3.5, 3.6, 3.8, 3.13, 3.15, 3.16, 3.17, 3.18, 3.19, 3.20, 4.3, 4.5, 4.7, 4.12, 4.16, 4.18, 4.20, 5.1, 5.3, 5.4, 5.5, 5.6, 5.7, 5.9, 5.10, 5.15, 5.17, 5.18, 5.19, 5.20, 5.23**

Assessment

Formative Assessment	Summative Assessment
• **Do Now** • **Homework** • **Puzzled Penguin** • **Math Talk** • **Workbook Pages ("Check for Understanding" extension)**	• **Unit Tests** • **Benchmarks (beginning, middle, end of year)**

Measurement and Data

Describe and compare measurable attributes.

K.MD.A.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.

K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.

Understandings	Essential Questions
Students will understand… • measurable attributes are a way to compare objects. • an object may have multiple measurable attributes. • multiple objects may have the same measurable attribute.	• Why do we need to measure objects? • What attributes are measurable? • How do we compare objects?
Knowledge	**Skills**
Students will know . . . • the potential attributes are measurable. • words that compare attributes.	Students will be able to . . . • describe measurable attributes of objects, such as length or weight. • describe several measurable attributes of a single object. • directly compare two objects with a measurable attribute in common to determine which has "more of"/"less of" the attribute, e.g. heights of two children. • describe the difference between two objects with the common attribute that was compared, one child is taller/shorter than the other child.

Standards for Mathematical Practice

MP6. Attend to precision.
MP7. Look for and make use of structure.

Resources

- **Math Expressions, 2018: Lessons 5.21, 5.22, 5.23**

Assessment

Formative Assessment	Summative Assessment
• **Do Now** • **Homework** • **Puzzled Penguin** • **Math Talk** • **Workbook Pages ("Check for Understanding" extension)**	• **Unit Tests** • **Benchmarks (beginning, middle, end of year)**

Measurement and Data	
Classify objects and count the number of objects in each category. **K.MD.B.3** Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. *Limit category counts to be less than or equal to 10.*	
Understandings	**Essential Questions**
Students will understand… • classifying objects helps to count total numbers. • objects can be described by their attributes. • objects can be sorted by their attributes.	• Why do we need to classify objects? • How does sorting help us to count?
Knowledge	**Skills**
Students will know . . . • attributes that can be used to sort or classify objects.	Students will be able to . . . • classify objects into given categories. • count the number of objects in a category (counts less than or equal to 10). • sort the categories by count.
Standards for Mathematical Practice	
MP2. Reason abstractly and quantitatively. MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018: Lessons 1.10, 2.13, 2.17, 2.20, 3.10, 3.12, 3.21, 4.1, 4.9, 4.22**	
Assessment	
Formative Assessment • **Do Now** • **Homework** • **Puzzled Penguin** • **Math Talk** • **Workbook Pages ("Check for Understanding" extension)**	**Summative Assessment** • **Unit Tests** • **Benchmarks (beginning, middle, end of year)**

Geometry	
Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cylinders, and spheres). **K.G.A.1** Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind, and next to*. **K.G.A.2** Correctly name shapes regardless of their orientations or overall size. **K.G.A.3** Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").	
Understandings	**Essential Questions**
Students will understand… • shapes have positions in the world relative to other things. • characteristics of shapes give it a name.	• What characteristics of a shape help us to name it? • How does knowing the name of shapes help us? • Why do we need to know positions of shapes?
Knowledge	**Skills**
Students will know . . . • the characteristics of a square, circle, triangle, rectangle, hexagon, cube, cylinder, and sphere. • the meaning of the words above, below, beside, in front of, behind, and next to.	Students will be able to . . . • Describe objects in the environment using names of shapes. • Describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind, and next to*.
Standards for Mathematical Practice	
MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018: Lessons 1.8, 1.10, 1.18, 2.13, 2.17, 2.20, 3.10, 3.12, 3.21, 4.9, 4.14, 4.21, 4.22**	
Assessment	
Formative Assessment • **Do Now** • **Homework** • **Puzzled Penguin** • **Math Talk** • **Workbook Pages ("Check for Understanding" extension)**	**Summative Assessment** • **Unit Tests** • **Benchmarks (beginning, middle, end of year)**

Geometry

Analyze, compare, create, and compose shapes.

K.G.B.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

K.G.B.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

K.G.B.6 Compose simple shapes to form larger shapes. For example, *"Can you join these two triangles with full sides touching to make a rectangle?"*

Understandings	Essential Questions
Students will understand… • shapes in the world can be built with components such as sticks and clay balls. • shapes in the world can be drawn. • shapes can be formed by composing other shapes.	• Why do we need to identify shapes? • Why would we compose shapes?
Knowledge	**Skills**
Students will know . . . • the characteristics of a square, circle, triangle, rectangle, hexagon, cube, cylinder, and sphere. • components/representations that can be used to model shapes in the world.	Students will be able to . . . • analyze two- and three-dimensional shapes, using informal language. • compare two- and three-dimensional shapes, using informal language. • model shapes in the world by building shapes from components and drawing shapes.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP4. Model with mathematics.
MP7. Look for and make use of structure.

Resources

- **Math Expressions, 2018: Lessons 1.8, 1.10, 1.18, 2.13, 2.17, 3.9, 3.21, 4.9, 4.14, 4.21, 4.22**

Assessment

Formative Assessment	Summative Assessment
• **Do Now** • **Homework** • **Puzzled Penguin** • **Math Talk** • **Workbook Pages ("Check for Understanding" extension)**	• **Unit Tests** • **Benchmarks (beginning, middle, end of year)**

Additional Lesson for Kindergarten: Measurement	
Although not required in the standards, students need to be exposed to additional topics in order to prepare for what is required in future grades. These topics in Kindergarten include **MONEY**, time, and patterns.	
Understandings	**Essential Questions**
Students will understand… • different coins have unique values. • the relative sizes of the coins are not related to the relative values of the coins (i.e., a penny is larger than a dime but it is not worth more than a dime.) • some coins can be exchanged for other coins, e.g., 5 pennies can be exchanged for 1 nickel. • the value of some coins and bills can be represented by a combination of other coins. • money amounts can be counted and compared. • coins can be identified by their color, size, and edge.	• Why do we need money? • How do we count money?
Knowledge	**Skills**
Students will know . . . • pennies are copper and nickels, dimes, and quarters are silver. • a nickel is bigger than a dime but smaller than a quarter. • pennies and nickels have a smooth edge while dimes and quarters have an edge with ridges.	Students will be able to . . . • identify a penny, nickel, dime, and quarter. • sort coins. • identify the value of a penny, nickel, dime, and quarter. • skip count to count one type of coin, e.g., 10, 20, 30 for dimes.
Resources	
• Done in morning routines.	

Additional Lesson for Kindergarten: Measurement

Although not required in the standards, students need to be exposed to additional topics in order to prepare for what is required in future grades. These topics in Kindergarten include money, **TIME**, and patterns.

Understandings	**Essential Questions**
Students will understand… • some activities take more time than others to complete. • a day has three parts that we discuss: morning, afternoon, and evening. • when time passes, the hour hand and the minute hand move at different rates. • the hour hand represents the approximate time of the day, the minute hand gives a more exact time. • events happen in order- we use terms such as first, next, and last.	• Why do we need clocks? • What are the different types of clocks? • How do we tell time?
Knowledge	**Skills**
Students will know . . . • there are two cycles to the passage of time, 12:00 through 11:59, during the 24 hours of a day. • the hour hand must be pointing at the number exactly for it to be "o'clock."	Students will be able to . . . • identify the part of day, morning, afternoon, evening. • recognize the numbers 1-12 on the face of a clock. • tell time to the hour WITH THE HOUR HAND ONLY.

Resources

Done in morning routines.

Additional Lesson for Kindergarten: Algebraic Thinking	
Although not required in the standards, students need to be exposed to additional topics in order to prepare for what is required in future grades. These topics in Kindergarten include money, time, and **PATTERNS**.	
Understandings	**Essential Questions**
Students will understand… • the same set of objects can be used to create different patterns. • some patterns are made up of units that repeat. • some patterns can be identified by type, e.g., ABABAB. • many things can be used to create patterns, e.g., shapes, colors, sounds, letters, and objects.	• Why do we need to identify patterns? • How do we recognize a pattern?
Knowledge	**Skills**
Students will know . . . • some common patterns types, e.g. ABABAB…; clap, clap, stomp, clap, clap, stomp….	Students will be able to . . . • recognize patterns. • create patterns. • extend a given pattern.
Resources	
Done in morning routines.	

Career Readiness, Life Literacies, and Key Skills

Career Readiness, Life Literacies, and Key Skills
Rapid advancements in technology and subsequent changes in the economy have created opportunities for individuals to compete and connect on a global scale. In this increasingly diverse and complex world, the successful entrepreneur or employee must not only possess the requisite education for specific industry pathways but also employability skills necessary to collaborate with others and manage Resources effectively in order to establish and maintain stability and independence. This document outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K–12 academic and technical content areas, the New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy.

Mission
Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision
An education in career readiness, life literacies, and key skills fosters a population that:
•Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
•Uses effective communication and collaboration skills and Resources to interact with a global society;
•Possesses financial literacy and responsibility at home and in the broader community;
•Plans, executes, and alters career goals in response to changing societal and economic conditions; and
•Seeks to attain skill and content mastery to achieve success in a chosen career path.

Career Readiness, Life Literacies, and Key Skills

- **9.1.2. FI.1:** Differentiate the various forms of money and how they are used (e.g., coins, bills, checks, debit and credit cards).
- **9.1.2.FP.2**: Differentiate between financial wants and needs.
- **9.1.2.FP.3:** Identify the factors that influence people to spend or save (e.g., commercials, family, culture, society).
- **9.1.2.PB.2:** Explain why an individual would choose to save money.
- **9.4.2.CI.1**: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
- **9.4.2.CI.2**: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- **9.4.2.CT.1:** Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
- **9.4.2.CT.2:** Identify possible approaches and Resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- **9.4.2.CT.3:** Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- **9.4.2.DC.3:** Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
- **9.4.2.DC.6:** Identify respectful and responsible ways to communicate in digital environments.
- **9.4.2.IML.2:** Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10)

Computer Science and Design Thinking

Computer Science and Design Thinking
New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Mission
Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision
All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

• develop and apply computational and design thinking to address real-world problems and design creative solutions;

• engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;

• navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and

• participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

COMPUTER SCIENCE AND DESIGN THINKING

- **8.1.2.CS.1:** Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
- **8.1.2.AP.1:** Model daily processes by creating and following algorithms to complete tasks.
- **8.1.2.AP.4:** Break down a task into a sequence of steps.
- **8.1.2.AP.5:** Describe a program's sequence of events, goals, and expected outcomes.
- **8.1.2.AP.6:** Debug errors in an algorithm or program that includes sequences and simple loops.
- **8.1.2.DA.1:** Collect and present data, including climate change, in various visual formats.
- **8.1.2.DA.3:** Identify and describe patterns in data visualizations.
- **8.1.2.DA.4:** Make predictions based on data using charts or graphs.
- **8.2.2.ED.1:** Communicate the function of a product or device.
- **8.2.2.ITH.4:** Identify how various tools reduce work and improve daily tasks.
- **8.2.2.NT.2:** Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

Differentiation Strategies

Students with Disabilities/ Students at Risk of School Failure

(For students with disabilities, appropriate accommodations, instructional adaptations, and/or modifications should be determined by the IEP or 504 team)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Give repetition and practice exercises
- Model skills/techniques to be mastered
- Give extended time to complete class work
- Provide copy of class notes
- Determine if preferential seating would be beneficial
- Provide access to a computer
- Provide copies of textbooks for home
- Provide access to books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long- and short-term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication

Modifications for Homework and Assignments

- Provide extended time to complete assignments
- Break down assignments
- Provide the student with clearly stated (written) expectations and grading criteria for assignments
- Implement RAFT activities as they pertain to the types/modes of communication (role, audience, format, topic)

Modifications for Assessments

- Provide extended time on classroom tests and quizzes
- Provide alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations /modifications for assessments

Differentiation Strategies

Gifted and Talented

(content, process, product and learning environment)

- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more advanced material
- Allow team-teaching opportunities and collaboration
- Set individual goals
- Conduct research and provide presentation of appropriate topics
- Design surveys to generate and analyze data to be used in discussion.
- Use Higher-Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Provide repetition and practice
- Model skills/techniques to be mastered

Modifications for Homework/Assignments

- Provide Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Provide extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

First Grade

Interdisciplinary Connections

Mathematics is a unified body of knowledge whose concepts build upon each other. Connecting mathematical concepts includes linking ideas to related ideas learned previously.

Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas. Students need to connect their mathematical learning to appropriate real-world contexts. They need to create interest and maintain the interest after the novelty of the work has worn off.

Mathematics is the language of science and is greatly utilized in industry and business. It gives us the power to solve difficult real-world problems, but also helps us to understand how the universe operates.

Every mathematics teacher needs to make students unafraid of the subject by convincing the students of the usefulness of learning mathematics in their daily lives and for higher studies. The world today, which leans more and more heavily on Science and Technology, demands more from mathematics. Tomorrow's world will, no doubt, make still greater demands from mathematics.

Interdisciplinary Connections for Grade 1

"Pumpkin Math"
~Introduce with *How Many Seeds in a Pumpkin* (skills covered- skip counting, addition, estimating) -
~Pumpkin Packet
Record Estimate & Actual
- Weight
- Inches around
- Number of Seeds
- Sink or Float
- Describing Words (adjectives)
- Illustration

"10 Fat Turkeys"
~Introduce with 10 Fat Turkeys (skills covered- counting forward & backward, complements of 10)
~Record Complements of 10 on individual feathers (reference illustrations- How many turkeys are on the fence? (6) How many are off? (4) What do you know about 6 and 4? (=10)
~Create "This turkey is a 10!" project with feathers and other copy patterns

"Seeing Double"
~Read Two of Everything
~Comprehension Questions
- What was special about the pot that Mr. Haktak found? (everything he put in was doubled)
- What happened when Mr. Haktak fell into the pot? (2 Mr. Haktak's came out)
- What happened when Mr. & Mrs. Haktak put 5 coins in? (10 came out)
- After understanding is confirmed, write equations to show what happened in the text (1+1=2, 5+5=10)

~Introduce "doubling machine" (mirror) and model & play "Seeing Double" activity
~After students have rolled die and held that number of items in the mirror the see it doubled, they can write one equation and create a drawing representation on the "Doubling Pot" activity sheet.
~Present work & display class book

“Lifetime: The Amazing Numbers in Animal Lives”
~The story is set up in a style where every page states something along the lines of, “In one lifetime caribou grow and shed 10 sets of antlers.”
~Note that each illustration matches the numbers stated in the text.

(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.

RL.1.1. Ask and answer questions about key details in a text.)

New Jersey Student Learning Standards (NJSLS)

In Grade 1, instructional time should focus on four critical areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

(1) Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

(2) Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). Through activities that build number sense, they understand the order of the counting numbers and their relative magnitudes.

(3) Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object 1 with equal-sized units) and the transitivity principle for indirect measurement. *

(4) Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

*Students should apply the principle of transitivity of measurement to make indirect comparisons, but they need not use this technical term.

Operations and Algebraic Thinking

Represent and solve problems involving addition and subtraction.

1.OA.A.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

1.OA.A.2 Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Understandings	Essential Questions
Students will understand… • addition involves adding to and putting together. • subtraction involves taking from, taking apart, and comparing. • missing numbers in a math sentence can be found using addition and subtraction. • a symbol can represent an unknown. • objects, drawings, and equations can be used to solve problems.	• How can one find the total of parts? • How can one find the missing part of a whole?

Knowledge	Skills
Students will know . . . • the meaning of addition. • the meaning of subtraction. • there are multiple interpretations of addition and subtraction.	Students will be able to . . . • add on to a group in order to find a total amount. • solve problems as part-part-whole problems when joining or putting them together. • use subtraction to determine how many more are in one group than another (comparing). • solve word problems that call for the addition of three whole numbers whose sum is less than 20. • use objects and drawings to represent problems. • use equations with a symbol for the unknown number to represent the problem.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 2.1, 2.2, 2.3, 2.4, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 3.2, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3,10, 3.11, 3.12, 4.5, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.11, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

Operations and Algebraic Thinking

Understand and apply properties of operations and the relationship between addition and subtraction.

1.OA.B.3 Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.) (Students need not use formal terms for these properties.)*

1.OA.B.4 Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8. Add and subtract within 20.*

Understandings	Essential Questions
Students will understand… • properties of operations are used as strategies for solving addition and subtraction problems. • knowing how addition and subtraction are related helps us to solve math problems.	• What is the relationship between addition and subtraction? • How can properties of operations help to solve addition and subtraction problems?

Knowledge	Skills
Students will know . . . • the properties of operations (but will not use formal terms for these properties.)	Students will be able to . . . • apply the properties of operations to solve problems involving addition and subtraction. • solve a subtraction problem by making it an unknown-addend problem.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.7, 3.6, 3.7, 3.8, 3.9, 3.10, 3.12, 4.5, 5.1, 5.2, 5.5, 5.6

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

Operations and Algebraic Thinking

Add and subtract within 20.

1.OA.C.5 Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).

1.OA.C.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).

Understandings	Essential Questions
Students will understand… • there are multiple strategies to add and subtract. • counting is related to addition and subtraction. • how many or how much there is of something increases with addition and decreases with subtraction.	• How is counting related to addition and subtraction? • How can a problem be simplified? • What strategies are available to determine how much or how many we have?

Knowledge	Skills
Students will know . . . • numbers that make 10 will help solve problems. • numbers can be decomposed into simpler terms. • counting on strategies. • "making 10" strategies. • "decomposing 10" strategies. • the inverse relationship between addition and subtraction. • solutions can be found by forming equivalent but easier or known sums.	Students will be able to . . . • add within 20. • subtract within 20. • fluently add within 10. • fluently subtract within 10. • count on to add. • decompose a number leading to 10.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.1, 2.2, 2.3, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.14, 2.15, 2.16, 3.1, 3.3, 3.4, 3.5, 3.6, 3.7, 3.10, 3.11, 3.12, 4.1, 4.4, 4.5, 4.6, 4.7, 4.10, 4.11, 4.15, 4.16, 5.1, 5.2, 5.3, 5.4, 5.5, 5.10, 5.11, 6.3, 6.8, 7.5, 7.8, 7.13, 8.5

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

Operations and Algebraic Thinking

Work with addition and subtraction equations.

1.OA.D.7 Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.

1.OA.D.8 Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + ? = 11, 5 = _ – 3, 6 + 6 = _.*

Understandings	Essential Questions
Students will understand… • the equal sign represents two sides that are balanced and have equivalent expressions on each side. • an equation is true if the representation on the left side of the equal sign is equivalent to the representation on the right side of the equal sign; otherwise it is false. • if an unknown number must be found, it must make the equation true.	• How can one determine if an equation is true or false? • When the unknown number is found for an equation, how can one tell if it is correct?
Knowledge	**Skills**
Students will know . . . • an equation is true only if the left and right sides of an equal sign have equivalent expressions. • that an unknown represents a number that will make an equation true.	Students will be able to . . . • determine if an equation is true or false. • determine the value of an unknown which will make the equation true. • relate three numbers to each other through the use of an equation.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP6. Attend to precision.
MP7. Look for and make use of structure.

Resources

- Math Expressions, 2018: Lessons 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12, 2.13, 2.16, 3.3, 3.4, 3.6, 3.7, 3.9, 3.11, 3.12, 4.4, 4.5, 4.10, 4.11, 5.1, 5.2, 5.3, 5.4, 5.5

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

Number and Operations in Base Ten

Extend the counting sequence.

1.NBT.A.1 Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.

Understandings	Essential Questions
Students will understand… • counting involves patterns.	• How does where the digits are located affect how one reads the number? • How do counting patterns help one to count?

Knowledge	Skills
Students will know . . . • counting patterns. • how to read a number in the hundreds, tens, and ones place (for example, in 88 the 8 in the tens place is read as eighty whereas the 8 in the ones place is read as eight.)	Students will be able to . . . • count to 120, starting at any number less than 120. • read numerals from 0 to 120. • write numerals from 0 to 120. • represent a number of objects with a written numeral, up to 120.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018: Lessons 4.1, 4.2, 4.7, 4.8, 4.9, 4.10, 4.11, 4.15, 4.16, 4.18, 5.7, 5.8, 5.9**

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

Number and Operations in Base Ten

Understand place value.

1.NBT.B.2 Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:

a. 10 can be thought of as a bundle of ten ones — called a "ten."

b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.

c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

1.NBT.B.3 Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.

Understandings	Essential Questions
Students will understand… • the location of digits in a number determines the value of the number. • to compare two numbers, one must compare the digits	• Why is place value important?

Knowledge	Skills
Students will know . . . • the representation of 1 – 9 as ones; 11 – 19 as a composition of one ten plus ones. • the two digits in a two-digit number represent the amount of tens and ones. • the numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).	Students will be able to . . . • identify ten as ten ones bundled. • identify tens and ones in a two-digit number. • compare two digit numbers using <, =, and >.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP6. Attend to precision.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: 4.1, 4.2, 4.3, 4.4, 4.5, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.16, 4.17, 4.18, 5.7, 5.8, 5.9, 5.10

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

<table>
<tr><th colspan="4">Number and Operations in Base Ten</th></tr>
<tr><td colspan="4">Use place value understanding and properties of operations to add and subtract.

1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models (e.g., base-ten blocks) or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.

1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.</td></tr>
<tr><th colspan="2">Understandings</th><th colspan="2">Essential Questions</th></tr>
<tr><td colspan="2">Students will understand…
• concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction can help one solve problems.
• when adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
• when subtracting multiples of 10 from multiples of 10, one subtracts tens from tens</td><td colspan="2">• How does place value help one find the answers to addition and subtraction problems?</td></tr>
<tr><th>Knowledge</th><th colspan="3">Skills</th></tr>
<tr><td>Students will know . . .
• properties of operations to add and subtract.
• the values of digits in a two-digit number.</td><td colspan="3">Students will be able to . . .
• add a two-digit number and a one-digit number, with a sum within 100.
• add a two-digit number and a multiple of ten, with a sum within 100.
• given a two-digit number, mentally find 10 more or 10 less than the number, without having to count.
• subtract multiples of 10 in the range 10 – 90, from multiples of 10 in the range 10 – 90 (positive or 0 differences).
• relate a strategy to a written method.
• explain the reasoning used for a given strategy.</td></tr>
<tr><th colspan="4">Standards for Mathematical Practice</th></tr>
<tr><td colspan="2">MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.</td><td colspan="2">MP5. Use appropriate tools strategically.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.</td></tr>
<tr><th colspan="4">Resources</th></tr>
<tr><td colspan="4">• Math Expressions, 2018: 4.1, 4.9, 4.10, 4.11, 4.13, 4.14, 4.15, 4.16, 4.17, 4,18, 5.8, 5.9, 5.10, 5.11, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6</td></tr>
<tr><th colspan="4">Assessment</th></tr>
<tr><td colspan="2">Formative Assessment
• Do Now
• Homework
• Puzzled Penguin
• Math Talk</td><td colspan="2">Summative Assessment
• Unit Tests
• Benchmarks (beginning, middle, end of year)</td></tr>
</table>

Measurement and Data

Measure lengths indirectly and by iterating length units.

1.MD.A.1 Order three objects by length; compare the lengths of two objects indirectly by using a third object.

1.MD.A.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*

Understandings	Essential Questions
Students will understand… • lengths of objects can be compared to lengths of other objects. • measurement is an iteration of same-size units.	• How do we measure the length of an object? • How do we compare the lengths of two objects?

Knowledge	Skills
Students will know . . . • the units used to measure an object should not overlap. • the units used to measure an object should not have gaps between them. • the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps.	Students will be able to . . . • order three objects by length. • compare the lengths of two objects indirectly by using a third object. • express the length of an object as a whole number of length units.

Standards for Mathematical Practice

MP6. Attend to precision.
MP7. Look for and make use of structure.

Resources

- Math Expressions, 2018: Lessons 7.12, 7.13, 7.14

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

Measurement and Data	
Tell and write time. **1.MD.B.3** Tell and write time in hours and half-hours using analog and digital clocks.	
Understandings	**Essential Questions**
Students will understand… • when time passes, the hour hand and the minute hand move at different rates.	• How do the positions of the hands on an analog clock indicate the time? • How do the numbers on a digital clock indicate the time?
Knowledge	**Skills**
Students will know . . . • on an analog clock, the difference between the hour hand and the minute hand. • on an analog clock, on the hour, the hour hand is pointing exactly to the number that represents the hour; on the half-hour, the hour hand is pointing exactly half-way between two numbers. • on a digital clock, the digits to the left of the colon represent the hour and the digits to the right of the colon represent the minutes.	Students will be able to . . . • tell and write time in hours using an analog clock. • tell and write time in hours using a digital clock. • tell and write time in half-hours using an analog clock. • tell and write time in half-hours using a digital clock.
Standards for Mathematical Practice	
MP6. Attend to precision. MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018: Lessons 7.1, 7.2, 7.3, 7.4, 7.5, 7.14**	
Assessment	
Formative Assessment • Do Now • Homework • Puzzled Penguin • Math Talk	Summative Assessment • Unit Tests • Benchmarks (beginning, middle, end of year)

Measurement and Data

Represent and interpret data.

1.MD.C.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.

Understandings	Essential Questions
Students will understand… • there are many ways to analyze data.	• How can representing data help us to interpret it and draw conclusions?

Knowledge	Skills
Students will know . . . • the total number of data points will be represented in two or more categories.	Students will be able to . . . • organize data with up to three categories. • represent data with up to three categories. interpret data with up to three categories. • compare the number of data points in two categories.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.

Resources

- Math Expressions, 2018: Lessons 6.1, 6.2, 6.3, 6.4, 6.5, 6.9

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

Geometry

Reason with shapes and their attributes.

1.G.A.1 Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus nondefining attributes (e.g., color, orientation, overall size) ; build and draw shapes to possess defining attributes.

1.G.A.2 Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.

1.G.A.3 Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.

Understandings	Essential Questions
Students will understand… • attributes may or may not define a shape. • new shapes can be made from two or more other shapes. • compositions must be within the same dimension. • shares of a whole must always be equal. • decomposing into more equal shares creates smaller shares.	• Why do we need to identify shapes? • Why would we compose or decompose shapes?

Knowledge	Skills
Students will know . . . • shapes are characterized by their defining attributes (number of sides, size of angles, etc.). • non-defining attributes (color, overall size, orientation, etc.) give additional information but do not characterize the shape.	Students will be able to . . . • distinguish between defining and non-defining attributes. • build and draw shapes to possess defining attributes. • compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) to create a composite shape. • compose three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders)* to create a composite shape. • partition circles into two and four equal shares. • partition rectangles into two and four equal shares. • appropriately use the words halves, fourths and quarters and the phrases *half of*, *fourth of*, and *quarter of*. • describe the whole as two of, or four of the shares. *Students do not need to learn formal names.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP6. Attend to precision.
MP7. Look for and make use of structure.

Resources

- **Math Expressions, 2018: Lessons 7.6, 7.7, 7.8, 7.9, 7.10, 7.11, 7.14**

Assessment

Formative Assessment	Summative Assessment
• Do Now • Homework • Puzzled Penguin • Math Talk	• Unit Tests • Benchmarks (beginning, middle, end of year)

Additional Lesson for Grade 1	
Although not required in the standards, students need to be exposed to additional topics in order to prepare for what is required in future grades. In Grade 1 this includes money.	
Understandings	**Essential Questions**
Students will understand… • different coins have unique values. • the relative sizes of the coins are not related to the relative values of the coins (i.e., a penny is larger than a dime but it is not worth more than a dime.) • some coins can be exchanged for other coins, e.g., 5 pennies can be exchanged for 1 nickel. • the value of some coins and bills can be represented by a combination of other coins. • money amounts can be counted and compared. • coins can be identified by their color, size, and edge.	• Why do we need money? • How do we count money?
Knowledge	**Skills**
Students will know . . . • pennies are copper and nickels, dimes, and quarters are silver. • a nickel is bigger than a dime but smaller than a quarter. • pennies and nickels have a smooth edge while dimes and quarters have an edge with ridges	Students will be able to . . . • identify a penny, nickel, dime, quarter, and dollar bill. • sort coins. • identify the value of a penny, nickel, dime, quarter and dollar bill. • skip count to count money. • compare value of set of coins or money amounts.
Resources	
• **Done in morning routine**	

Career Readiness, Life Literacies, and Key Skills

Career Readiness, Life Literacies, and Key Skills
Rapid advancements in technology and subsequent changes in the economy have created opportunities for individuals to compete and connect on a global scale. In this increasingly diverse and complex world, the successful entrepreneur or employee must not only possess the requisite education for specific industry pathways but also employability skills necessary to collaborate with others and manage Resources effectively in order to establish and maintain stability and independence. This document outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K–12 academic and technical content areas, the New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy.

Mission
Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision
An education in career readiness, life literacies, and key skills fosters a population that:
•Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
•Uses effective communication and collaboration skills and Resources to interact with a global society;
•Possesses financial literacy and responsibility at home and in the broader community;
•Plans, executes, and alters career goals in response to changing societal and economic conditions; and
•Seeks to attain skill and content mastery to achieve success in a chosen career path.

Career Readiness, Life Literacies, and Key Skills

- **9.1.2. FI.1:** Differentiate the various forms of money and how they are used (e.g., coins, bills, checks, debit and credit cards).
- **9.1.2.FP.2**: Differentiate between financial wants and needs.
- **9.1.2.FP.3:** Identify the factors that influence people to spend or save (e.g., commercials, family, culture, society).
- **9.1.2.PB.2:** Explain why an individual would choose to save money.
- **9.4.2.CI.1**: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
- **9.4.2.CI.2**: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- **9.4.2.CT.1:** Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
- **9.4.2.CT.2:** Identify possible approaches and Resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- **9.4.2.CT.3:** Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- **9.4.2.DC.3:** Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
- **9.4.2.DC.6:** Identify respectful and responsible ways to communicate in digital environments.
- **9.4.2.IML.2:** Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10)

Computer Science and Design Thinking

Computer Science and Design Thinking
New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Mission
Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision
All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- develop and apply computational and design thinking to address real-world problems and design creative solutions;
- engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
- navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

COMPUTER SCIENCE AND DESIGN THINKING

- **8.1.2.CS.1:** Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
- **8.1.2.AP.1:** Model daily processes by creating and following algorithms to complete tasks.
- **8.1.2.AP.4:** Break down a task into a sequence of steps.
- **8.1.2.AP.5:** Describe a program’s sequence of events, goals, and expected outcomes.
- **8.1.2.AP.6:** Debug errors in an algorithm or program that includes sequences and simple loops.
- **8.1.2.DA.1:** Collect and present data, including climate change, in various visual formats.
- **8.1.2.DA.3:** Identify and describe patterns in data visualizations.
- **8.1.2.DA.4:** Make predictions based on data using charts or graphs.
- **8.2.2.ED.1:** Communicate the function of a product or device.
- **8.2.2.ITH.4:** Identify how various tools reduce work and improve daily tasks.
- **8.2.2.NT.2:** Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

Differentiation Strategies

Students with Disabilities/ Students at Risk of School Failure

(For students with disabilities, appropriate accommodations, instructional adaptations, and/or modifications should be determined by the IEP or 504 team)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Give repetition and practice exercises
- Model skills/techniques to be mastered
- Give extended time to complete class work
- Provide copy of class notes
- Determine if preferential seating would be beneficial
- Provide access to a computer
- Provide copies of textbooks for home
- Provide access to books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long- and short-term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication

Modifications for Homework and Assignments

- Provide extended time to complete assignments
- Break down assignments
- Provide the student with clearly stated (written) expectations and grading criteria for assignments
- Implement RAFT activities as they pertain to the types/modes of communication (role, audience, format, topic)

Modifications for Assessments

- Provide extended time on classroom tests and quizzes
- Provide alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations /modifications for assessments

Differentiation Strategies
Gifted and Talented
(content, process, product and learning environment) • Allow students to pursue independent projects based on their individual interests • Provide enrichment activities that include more advanced material • Allow team-teaching opportunities and collaboration • Set individual goals • Conduct research and provide presentation of appropriate topics • Design surveys to generate and analyze data to be used in discussion. • Use Higher-Level Questioning Techniques • Provide assessments at a higher level of thinking
English Language Learners
Modifications for Classroom • Pair visual prompts with verbal presentations • Provide repetition and practice • Model skills/techniques to be mastered **Modifications for Homework/Assignments** • Provide Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary) • Provide extended time for assignment completion as needed • Highlight key vocabulary • Use graphic organizers

Second Grade

Interdisciplinary Connections

Mathematics is a unified body of knowledge whose concepts build upon each other. Connecting mathematical concepts includes linking ideas to related ideas learned previously.

Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas. Students need to connect their mathematical learning to appropriate real-world contexts. They need to create interest and maintain the interest after the novelty of the work has worn off.

Mathematics is the language of science and is greatly utilized in industry and business. It gives us the power to solve difficult real-world problems, but also helps us to understand how the universe operates.

Every mathematics teacher needs to make students unafraid of the subject by convincing the students of the usefulness of learning mathematics in their daily lives and for higher studies. The world today, which leans more and more heavily on Science and Technology, demands more from mathematics. Tomorrow's world will, no doubt, make still greater demands from mathematics.

Interdisciplinary Connections for Grade 2

Literature:

~*Even Steven Odd Todd* by Kathryn Cristaldi

~*How Big is a Foot* by Rolf Myller

Math Expressions Math Readers:

Unit 1 – *Game Time!*
Unit 2 – *The Number Machine*
Unit 3 – *Taking Shape*
Unit 4 – *Comic Books for Sale*
Unit 5 – *Wow! Fluffo Sure Can Eat*
Unit 6 – *The If Game*
Unit 7 – *The Pizza Puzzle*

(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.

RL.2.1. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.)

Social Studies Themed Projects Infusing Math:

Fact Family Pumpkins
Turkey Name Collection Box
Flower Pot Telling Time
Spring Umbrella Fact Fluency

(6.1.2.HistoryCC.3: Make inferences about how past events, individuals, and innovations affect our current lives.
6.1.2.Geo.HE.1: Explain how seasonal weather changes, climate, and other environmental characteristics affect people's lives in a place or region.)

New Jersey Student Learning Standards (NJSLS)

In Grade 2, instructional time should focus on four critical areas: (1) extending understanding of base ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

(1) Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

(2) Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.

(3) Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.

(4) Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

Operations and Algebraic Thinking

Represent and solve problems involving addition and subtraction.

2.OA.A.1 Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Understandings	Essential Questions
Students will understand… • addition involves adding to and putting together. • subtraction involves taking from, taking apart, and comparing. • missing numbers in a math sentence can be found using addition and subtraction. • a symbol can represent an unknown. • the unknown may be located in any position in the equation. • objects, drawings, and equations can be used to solve problems.	• How can one find the total of parts? • How can one find the missing part of a whole?

Knowledge	Skills
Students will know . . . • the meaning of addition. • the meaning of subtraction. • there are multiple interpretations of addition and subtraction. • some problems take more than one step to solve.	Students will be able to . . . • use addition and subtraction within 100 to solve word problems that involve one-and twostep problems. • use objects and drawings to represent problems. • use equations with a symbol for the unknown number to represent the problem.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.1, 1.2, 1.4, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 1.18, 1.19, 1.20, 1.21, 2.1, 2.2, 2.7, 2.15, 4.3, 4.4, 4.5, 4.12, 4.13, 4.14, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 5.1, 5.4, 5.5, 5.6, 5.7, 5.9, 5.10, 6.8, 6.9, 6.14, 6.15, 7.3, 7.4, 7.5

Assessment

Formative Assessment	Summative Assessment
• Minute Math • Fluency Checks • Do Now • Homework • Puzzled Penguin • Math Talk • Exit Slips • IXL and other online tools	• Unit Tests • Quick Quizzes • Benchmarks (beginning, middle, end of year)

Operations and Algebraic Thinking

Add and subtract within 20.

2.OA.B.2 Fluently add and subtract within 20 using mental strategies.*

*By end of Grade 2, know from memory all sums of two one-digit numbers.

Understandings	Essential Questions
Students will understand… • there are multiple strategies to add and subtract	• How can a problem be simplified? • What strategies are available to determine how much or how many we have?

Knowledge	Skills
Students will know . . . • numbers that make 10 will help solve problems. • numbers can be decomposed into simpler terms. • the inverse relationship between addition and subtraction. • solutions can be found by forming equivalent but easier or known sums.	Students will be able to . . . • fluently add within 20 using mental strategies. • fluently subtract within 20 using mental strategies.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.1, 1.2, 1.3, 1.4, 1.5, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 1.18, 2.1, 2.2, 2.6, 3.1, 3.2, 3.4, 4.6, 4.13, 5.3, 5.4, 5.5, 5.9, 5.10

Assessment

Formative Assessment	Summative Assessment
• Minute Math • Fluency Checks • Do Now • Homework • Puzzled Penguin • Math Talk • Exit Slips • IXL and other online tools	• Unit Tests • Quick Quizzes • Benchmarks (beginning, middle, end of year)

Operations and Algebraic Thinking

Work with equal groups of objects to gain foundations for multiplication.

2.OA.C.3 Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.

2.OA.C.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

Understandings	Essential Questions
Students will understand… • a total number of objects can be found in a rectangular array by finding the sum of equal addends. • odd numbers cannot be paired and even numbers can be paired. • even numbers can be counted using skip counting by 2s.	• Why would one need to pair things?

Knowledge	Skills
Students will know . . . • odd numbers cannot be paired completely and even numbers can. • that when counting by 2s, even numbers will finish the group off	Students will be able to . . . • determine whether a group of objects (up to 20) has an odd or even number of members • use addition to find the total number of objects in a rectangular array (with up to 5 rows and 5 columns). • write an equation expressing the total of a rectangular array as a sum of equal addends.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.6, 1.7, 1.21, 7.1, 7.6

Assessment

Formative Assessment	Summative Assessment
• Minute Math • Fluency Checks • Do Now • Homework • Puzzled Penguin • Math Talk • Exit Slips • IXL and other online tools	• Unit Tests • Quick Quizzes • Benchmarks (beginning, middle, end of year)

Numbers and Operations in Base Ten

Understand place value.

2.NBT.A.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases: a. 100 can be thought of as a bundle of ten tens — called a "hundred." b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).

2.NBT.A.2 Count within 1000; skip-count by 5s, 10s, and 100s.

2.NBT.A.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

2.NBT.A.4 Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

Understandings	Essential Questions
Students will understand… • the location of digits in a number determines the value of the number. • to compare two numbers, one must compare the digits in each place, starting with the largest place.	• Why is place value important?

Knowledge	Skills
Students will know . . . • the three digits in a three-digit number represent the amount of hundreds, tens and ones, respectively. • the numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).	Students will be able to . . . • identify one hundred as a bundle of ten tens and ten as a bundle of ten ones. • count within 1000. • skip-count by 5s, 10s, and 100s. • read numbers to 1000. • write numbers to 1000 using base-ten numerals, number names, and expanded form. • compare three digit numbers using <, =, and >.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Math Expressions, 2018: Lessons 1.6, 2.1, 2.2, 2.3, 2.4, 2.5, 2.12, 2.15, 3.6, 4.7, 5.2, 5.10, 6.1, 6.2, 6.3, 6.4, 6.15

Assessment

Formative Assessment	Summative Assessment
• Minute Math • Fluency Checks • Do Now • Homework • Puzzled Penguin • Math Talk • Exit Slips • IXL and other online tools	• Unit Tests • Quick Quizzes • Benchmarks (beginning, middle, end of year)

Numbers and Operations in Base Ten

Use place value understanding and properties of operations to add and subtract.

2.NBT.B.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

2.NBT.B.6 Add up to four two-digit numbers using strategies based on place value and properties of operations.

2.NBT.B.7 Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.

2.NBT.B.8 Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.

2.NBT.B.9 Explain why addition and subtraction strategies work, using place value and the properties of operations.

Understandings	Essential Questions
Students will understand… • concrete models, drawings, strategies based on place value, properties of operations, and/or the relationship between addition and subtraction can help one solve problems. • when adding 10 or 100, one must add one to the tens digit or one to the hundreds-digit and not change the ones-digit. • when subtracting 10 or 100, one must subtract one from the tens-digit or one from the hundreds-digit and not change the ones-digit	• How does place value help one find the answers to addition and subtraction problems?

Knowledge	Skills
Students will know . . . • properties of operations to add and subtract. • the values of the digits in a three-digit number. • sometimes it is necessary to compose or decompose tens or hundreds.	Students will be able to . . . • fluently add and subtract within 100 • add up to four two-digit numbers, using strategies using place value and properties of operations. • add and subtract within 1000 • mentally add 10 or 100 to a given number 100900. • mentally subtract 10 or 100 from a given number 100-900. • explain why addition and subtraction strategies work, using place value and the properties of operations.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

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Quick Quizzes
Benchmarks (beginning, middle, end of year)</td></tr>
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Measurement and Data

Measure and estimate lengths in standard units.

2.MD.A.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

2.MD.A.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

2.MD.A.3 Estimate lengths using units of inches, feet, centimeters, and meters.

2.MD.A.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Understandings	Essential Questions
Students will understand… • the difference between non-standard and standard measurement. • measurement tools vary in the size of the unit on them; this variation will affect the choice of tools.	• Why do we measure objects? • How do we measure objects? • Why do we need standard units of measurement?

Knowledge	Skills
Students will know . . . • appropriate tools must be used in order to properly measure an object. • the approximate length of an inch, foot, centimeter, and meter.	Students will be able to . . . • select an appropriate tool to measure an object. • measure the length of an object. • measure the length of an object with two different tools. • describe how the measurements of one object differ when using two different tools (relate the measurement to the size of the unit chosen). • estimate lengths using units of inches, feet, centimeters, and meters. • measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.
MP7. Look for and make use of structure.

Resources

- **Math Expressions, 2018: Lessons 3.1, 3.2, 3.3, 3.4, 3.6, 3.7, 3.8, 3.9, 4.23, 7.1**

Assessment

Formative Assessment	Summative Assessment
• Minute Math • Fluency Checks • Do Now • Homework • Puzzled Penguin • Math Talk • Exit Slips • IXL and other online tools	• Unit Tests • Quick Quizzes • Benchmarks (beginning, middle, end of year)

Measurement and Data

Relate addition and subtraction to length.

2.MD.B.5 Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2.MD.B.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.

Understandings	Essential Questions
Students will understand… • addition and subtraction can be used to solve word problems involving lengths that are given in the same units. • whole numbers can be represented as the lengths from 0 to the number located on an equally-spaced number line. • whole number sums and differences can be represented on a number line.	• How are the locations of numbers on a number line related to length? • How can addition and subtraction be used to find lengths?

Knowledge	Skills
Students will know . . . • drawings (such as drawings of rulers) can be used to solve problems involving length. • equations with an unknown can be used to solve problems involving length	Students will be able to . . . • add within 100 to solve word problems involving length. • subtract within 100 to solve word problems involving length. • represent whole numbers on a number line as length from 0. • represent whole numbers sums and differences with 100 on a number-line diagram

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.

Resources

- Math Expressions, 2018: Lessons 4.23, 7.3, 7.4, 7.5

Assessment

Formative Assessment	Summative Assessment
• Minute Math • Fluency Checks • Do Now • Homework • Puzzled Penguin • Math Talk • Exit Slips • IXL and other online tools	• Unit Tests • Quick Quizzes • Benchmarks (beginning, middle, end of year)

Measurement and Data

Work with time and money.

2.MD.C.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

2.MD.C.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?

Understandings	Essential Questions
Students will understand… • when time passes, the hour hand and the minute hand move at different rates. • different coins have different values, not related to the size of the coin.	• How do the positions of the hands on an analog clock indicate the time? • How do the numbers on a digital clock indicate the time? • How do we determine how much money is needed and how money one has?

Knowledge	Skills
Students will know . . . • between the hour hand and the minute hand. • on an analog clock, on the hour, the hour hand is pointing exactly to the number that represents the hour; on the half-hour, the hour hand is pointing exactly half-way between two numbers. • on a digital clock, the digits to the left of the colon represent the hour and the digits to the right of the colon represent the minutes. • the value of a dollar bill, quarter, dime, nickel and penny.	Students will be able to . . . • • tell and write time to the nearest five minutes using a.m. and p.m., on an analog clock. • tell and write time to the nearest five minutes using a.m. and p.m., on a digital clock. • solve word problems involving dollar bills, quarters, dimes, nickels and pennies using $ and ¢ symbols appropriately.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.

Resources

- Math Expressions, 2018: Lessons 2.11, 2.12, 2.15, 4.1, 4.2, 4.10, 4.15, 5.1, 5.2, 6.1

Assessment

Formative Assessment	Summative Assessment
• Minute Math • Fluency Checks • Do Now • Homework • Puzzled Penguin • Math Talk • Exit Slips • IXL and other online tools	• Unit Tests • Quick Quizzes • Benchmarks (beginning, middle, end of year)

<table>
<tr><th colspan="2">Measurement and Data</th></tr>
<tr><td colspan="2">Represent and interpret data.

2.MD.D.9 Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.

2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems1 using information presented in a bar graph.</td></tr>
<tr><th>Understandings</th><th>Essential Questions</th></tr>
<tr><td>Students will understand…
• there are many ways to analyze data.</td><td>• How can representing data help us to interpret it and draw conclusions?</td></tr>
<tr><th>Knowledge</th><th>Skills</th></tr>
<tr><td>Students will know . . .
• the difference between a picture graph and a bar graph.
• how to make a line plot.</td><td>Students will be able to . . .
• generate measurement data by measuring lengths of several objects to the nearest whole unit
• generate measurement data by making repeated measurements of the same object.
• show measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
• organize data with up to four categories.
• represent data with up to four categories using a picture graph.
• represent data with up to four categories using a bar graph.
• solve simple put-together, take-apart, and compare problems using a bar graph</td></tr>
<tr><th colspan="2">Standards for Mathematical Practice</th></tr>
<tr><td colspan="2">MP1. Make sense of problems and persevere in solving them.
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MP6. Attend to precision.
MP8. Look for and express regularity in repeated reasoning.</td></tr>
<tr><th colspan="2">Resources</th></tr>
<tr><td colspan="2">• Math Expressions, 2018: Lessons 3.6, 3.7, 3.8, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10</td></tr>
<tr><th colspan="2">Assessment</th></tr>
<tr><td>Formative Assessment
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• Puzzled Penguin
• Math Talk
• Exit Slips
• IXL and other online tools</td><td>Summative Assessment
• Unit Tests
• Quick Quizzes
• Benchmarks (beginning, middle, end of year)</td></tr>
</table>

Geometry

Reason with shapes and their attributes.

2.G.A.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.1 Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

2.G.A.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

2.G.A.3 Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Understandings	Essential Questions
Students will understand… • shares of a whole must always be equal. • decomposing into more equal shares creates smaller shares. • equal shares of identical wholes need not have the same shape.	• Why do we need to identify shapes? • Why would we partition shapes?

Knowledge	Skills
Students will know . . . • the characteristics of triangles, quadrilaterals, pentagons, hexagons, and cubes. • the word half , third, and fourth refers, respectively, to having 2, 3, and 4equal parts.	Students will be able to . . . • recognize shapes having specified attributes. • draw shapes having specified attributes. • identify triangles, quadrilaterals, pentagons, hexagons, and cubes. • partition a rectangle into rows and columns of the same-size squares. • count the squares in a partitioned rectangle to find the total number. • partition circles into two, three, or four equal shares. • partition rectangles into two, three, or four equal shares. • appropriately use the words halves, thirds, fourths and quarters and the phrases half of, a third of, a fourth of, and quarter of. • describe the whole as two halves, three thirds, or four fourths. • identify equal shares of identical wholes even though they do not have the same shape.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP6. Attend to precision.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018: Lessons 3.2, 3.3, 3.4, 3.5, 3.9, 5.2, 7.1, 7.2, 7.4, 7.6**

Assessment

Formative Assessment	Summative Assessment
• Minute Math • Fluency Checks • Do Now • Homework • Puzzled Penguin • Math Talk • Exit Slips • IXL and other online tools	• Unit Tests • Quick Quizzes • Benchmarks (beginning, middle, end of year)

Career Readiness, Life Literacies, and Key Skills

Career Readiness, Life Literacies, and Key Skills

Rapid advancements in technology and subsequent changes in the economy have created opportunities for individuals to compete and connect on a global scale. In this increasingly diverse and complex world, the successful entrepreneur or employee must not only possess the requisite education for specific industry pathways but also employability skills necessary to collaborate with others and manage Resources effectively in order to establish and maintain stability and independence. This document outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K–12 academic and technical content areas, the New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy.

Mission

Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision

An education in career readiness, life literacies, and key skills fosters a population that:

•Continually self-reflects and seeks to improve the essential life and career practices that lead to success;

•Uses effective communication and collaboration skills and Resources to interact with a global society;

•Possesses financial literacy and responsibility at home and in the broader community;

•Plans, executes, and alters career goals in response to changing societal and economic conditions; and

•Seeks to attain skill and content mastery to achieve success in a chosen career path.

Career Readiness, Life Literacies, and Key Skills

- **9.1.2. FI.1:** Differentiate the various forms of money and how they are used (e.g., coins, bills, checks, debit and credit cards).
- **9.1.2.FP.2**: Differentiate between financial wants and needs.
- **9.1.2.FP.3:** Identify the factors that influence people to spend or save (e.g., commercials, family, culture, society).
- **9.1.2.PB.2:** Explain why an individual would choose to save money.
- **9.4.2.CI.1**: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
- **9.4.2.CI.2**: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
- **9.4.2.CT.1:** Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
- **9.4.2.CT.2:** Identify possible approaches and Resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
- **9.4.2.CT.3:** Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
- **9.4.2.DC.3:** Explain how to be safe online and follow safe practices when using the internet (e.g., 8.1.2.NI.3, 8.1.2.NI.4).
- **9.4.2.DC.6:** Identify respectful and responsible ways to communicate in digital environments.
- **9.4.2.IML.2:** Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10)

Computer Science and Design Thinking

Computer Science and Design Thinking

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Mission

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision

All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

• develop and apply computational and design thinking to address real-world problems and design creative solutions;

• engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;

• navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and

• participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

COMPUTER SCIENCE AND DESIGN THINKING

- **8.1.2.CS.1:** Select and operate computing devices that perform a variety of tasks accurately and quickly based on user needs and preferences.
- **8.1.2.AP.1:** Model daily processes by creating and following algorithms to complete tasks.
- **8.1.2.AP.4:** Break down a task into a sequence of steps.
- **8.1.2.AP.5:** Describe a program's sequence of events, goals, and expected outcomes.
- **8.1.2.AP.6:** Debug errors in an algorithm or program that includes sequences and simple loops.
- **8.1.2.DA.1:** Collect and present data, including climate change, in various visual formats.
- **8.1.2.DA.3:** Identify and describe patterns in data visualizations.
- **8.1.2.DA.4:** Make predictions based on data using charts or graphs.
- **8.2.2.ED.1:** Communicate the function of a product or device.
- **8.2.2.ITH.4:** Identify how various tools reduce work and improve daily tasks.
- **8.2.2.NT.2:** Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

Differentiation Strategies

Students with Disabilities/ Students at Risk of School Failure

(For students with disabilities, appropriate accommodations, instructional adaptations, and/or modifications should be determined by the IEP or 504 team)

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments.
- Give repetition and practice exercises
- Model skills/techniques to be mastered
- Give extended time to complete class work
- Provide copy of class notes
- Determine if preferential seating would be beneficial
- Provide access to a computer
- Provide copies of textbooks for home
- Provide access to books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long- and short-term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication

Modifications for Homework and Assignments

- Provide extended time to complete assignments
- Break down assignments
- Provide the student with clearly stated (written) expectations and grading criteria for assignments
- Implement RAFT activities as they pertain to the types/modes of communication (role, audience, format, topic)

Modifications for Assessments

- Provide extended time on classroom tests and quizzes
- Provide alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations /modifications for assessments

Differentiation Strategies

Gifted and Talented

(content, process, product and learning environment)

- Allow students to pursue independent projects based on their individual interests
- Provide enrichment activities that include more advanced material
- Allow team-teaching opportunities and collaboration
- Set individual goals
- Conduct research and provide presentation of appropriate topics
- Design surveys to generate and analyze data to be used in discussion.
- Use Higher-Level Questioning Techniques
- Provide assessments at a higher level of thinking

English Language Learners

Modifications for Classroom

- Pair visual prompts with verbal presentations
- Provide repetition and practice
- Model skills/techniques to be mastered

Modifications for Homework/Assignments

- Provide Native Language Translation (peer, online assistive technology, translation device, bilingual dictionary)
- Provide extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Third Grade

Interdisciplinary Connections

Mathematics is a unified body of knowledge whose concepts build upon each other. Connecting mathematical concepts includes linking ideas to related ideas learned previously.

Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas. Students need to connect their mathematical learning to appropriate real-world contexts. They need to create interest and maintain the interest after the novelty of the work has worn off.

Mathematics is the language of science and is greatly utilized in industry and business. It gives us the power to solve difficult real-world problems, but also helps us to understand how the universe operates.

Every mathematics teacher needs to make students unafraid of the subject by convincing the students of the usefulness of learning mathematics in their daily lives and for higher studies. The world today, which leans more and more heavily on Science and Technology, demands more from mathematics. Tomorrow's world will, no doubt, make still greater demands from mathematics.

Interdisciplinary Connections for Grade 3

Literature:

~"The Doorbell Rang" by Pat Hutchins **(R.I.3.2)**

- Introduce the lesson by reading *The Doorbell Rang.*
- Follow the lesson in the Supplemental Section. The lesson provided can cover up to 3 days, but modify as needed for time and student needs.

~"A Remainder of One" by Elinor Princzes (**R.I.3.2**)

- Introduce the lesson by reading *A Remainder of One.*
- Follow the lesson in the Supplemental Section.

~"How Big is a Foot?" by Rolf Myller **(R.I.3.1)**

- Introduce the lesson by reading *How Big is a Foot?* There is a you tube video of the story as well.
- Follow the lesson in the Supplemental Section.

Social Studies:

~Bar Graphs (**6.1.5.GeoPP.4**)

- Students will interview their classmates about their nationalities.
- Compile the data collected, organize the data and create bar graphs displaying their results.
- Use the worksheet in the Supplemental Section as a guide

New Jersey Student Learning Standards (NJSLS)

In Grade 3, instructional time should focus on four critical areas: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, especially unit fractions (fractions with numerator 1); (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes.

(1) Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.

(2) Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.

(3) Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

(4) Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

Operations & Algebraic Thinking
3.OA.A.1. Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe and/or represent a context in which a total number of objects can be expressed as 5 × 7.* **3.OA.A.2.** Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* **3.OA.A.3.** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1] **3.OA.A.4.** Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?*

Understandings	Essential Questions
Students will understand… • the total number of objects, when grouped, can be found most efficiently by multiplication. • there are two different interpretations to a division problem. • when two out of three numbers are known in an equation, there is exactly one number, represented by the unknown, which will make the statement true.	• How are multiplication and division related?

Knowledge	Skills
Students will know . . . • the product of a x b is "a" groups of "b" things. • the quotient of c ÷ d can be interpreted as the number of objects when "c" things are partitioned equally into "d" shares or it can be interpreted as the number of groups when "c" things are partitioned into equal shares of "d" things.	Students will be able to . . . • interpret products of whole numbers. • interpret whole-number quotients of whole numbers. • by using multiplication and division in drawings and equations, solve word problems within 100. The word problems will involve equal groups, arrays, and measurement quantities. • determine the unknown whole number in a multiplication or division equation relating three whole numbers.

Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively.	MP3. Construct viable arguments and critique the reasoning of others. MP4. Model with mathematics. MP8. Look for and express regularity in repeated reasoning.

Resources
• **Math Expressions, 2018:** Unit 1, Unit 2, Unit 6, Unit 7

Assessment	
Formative Assessment Quick Check Quiz Puzzled Penguin Exit Slips White Board Checks Homework	**Summative Assessment** Unit Assessment Mid-Unit Quiz Unit Projects

Operations & Algebraic Thinking

3.OA.B.5. Apply properties of operations as strategies to multiply and divide.[2] *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*

3.OA.B.6. Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*

Understandings	Essential Questions
Students will understand… • multiplication and division are inverse operations. • using properties can make problems easier.	• How can one use properties as strategies to solve problems? • How can one use multiplication to help solve division problems?

Knowledge	Skills
Students will know . . . • a x b = b x a • (a x b) x c = a x (b x c) • a x (b + c) = (a x b) + (a x c) • how to solve unknown-factor problems.	Students will be able to . . . • apply properties (commutative, associative, and distributive) of operations as strategies to multiply and divide. • find the answer to a division problem by solving the related unknown-factor problem.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018:** Unit 1, Unit 2

Assessment

Formative Assessment	Summative Assessment
Quick Check Quiz Puzzled Penguin Exit Slips White Board Check Homework	Unit Assessment Mid-Unit Quiz Unit Projects

Operations & Algebraic Thinking	
3.OA.C.7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. **By the end of Grade 3, know from memory all products of two one-digit numbers.** [2] Students need not use formal terms for these properties.	
Understandings	**Essential Questions**
Students will understand… • there is an inverse relationship between multiplication and division.	• How can one use the relationship between multiplication and division to find products and quotients?
Knowledge	**Skills**
Students will know . . . • strategies to multiply and divide.	Students will be able to . . . • fluently multiply within 100, using properties of operations or the relationship between multiplication and division. • fluently divide within 100, using properties of operations or the relationship between multiplication and division.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP4. Model with mathematics. MP8. Look for and express regularity in repeated reasoning.	
Resources	
• **Math Expressions, 2018:** Unit 1, Unit 2	
Assessment	
Formative Assessment Quick Check Quiz Puzzled Penguin Exit Slips White Board Check Homework	**Summative Assessment** Unit Assessment Mid-Unit Quiz Unit Projects

Operations & Algebraic Thinking

3.OA.D.8. Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.[3]

3.OA.D.9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

[3] This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order.

Understandings	Essential Questions
Students will understand… • there are strategies to find patterns in a sequence of numbers. • equations can model real-world problems.	• How can patterns be used to solve problems?

Knowledge	Skills
Students will know . . . • how to round a number. • how to estimate. • properties of operations.	Students will be able to . . . • represent word problems using equations with a letter standing for the unknown quantity. • solve two-step word problems using the four operations. • assess the reasonableness of answers using mental computation and estimation strategies including rounding. • identify arithmetic patterns (including patterns in the addition or multiplication tables), and explain them using properties of operations. *For example, observe that four times a number is always even and explain why four times a number can be decomposed into two equal addends.*

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018:** Unit 1, Unit 2, Unit 6

Assessment

Formative Assessment	Summative Assessment
Quick Check Quiz Puzzled Penguin Exit Slips White Board Check Homework	Unit Assessment Mid-Unit Quiz Unit Projects

Numbers and Operations in Base Ten

3.NBT.A.1. Use place value understanding to round whole numbers to the nearest 10 or 100.

3.NBT.A.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

3.NBT.A.3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

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[1] A range of algorithms may be used.

Understandings	Essential Questions
Students will understand… • the place that a digit is located assigns a value to that digit. • products that involve multiples of 10 can be found by multiplying the non-zero digits of the two numbers and then multiplying by 10.	• Why is place value important?

Knowledge	Skills
Students will know . . . • the procedure needed to round a whole number. • properties of operations. • strategies involving place-value, properties of operations, and inverse operations. • multiples of 10 in the range 10 – 90	Students will be able to . . . • use place-value understanding to round whole numbers to the nearest ten or hundred. • fluently add and subtract within 1000, using strategies and algorithms based on place-value, properties of operations, and/or the relationship between addition and subtraction. • multiply one-digit whole numbers by multiples of 10 in the range 10 – 90, using strategies based on place-value and properties of operations.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.
MP7. Look for and make use of structure.

Resources

- **Math Expressions, 2018:** Unit 3, Unit 4, Unit 6

Assessment

Formative Assessment	Summative Assessment
Quick Check Quiz Puzzled Penguin Exit Slips White Board Check Homework	Unit Assessment Mid-Unit Quiz Unit Projects

Numbers and Operations - Fractions

3.NF.A.1. Understand a fraction 1/*b* as the quantity formed by 1 part when *a* whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by a parts of size 1/*b*.

3.NF.A.2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.
b. Represent a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.

3.NF.A.3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.
c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.*
d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

[1] Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, 8.

Understandings	Essential Questions
Students will understand… • other numbers exist in addition to whole numbers. • the number one can be broken down into fractional parts that are also numbers.	• Why do we need fractions?
Knowledge	**Skills**
Students will know . . . • a fraction 1/b is the quantity formed by 1 part when a whole is partitioned into *b* equal parts; when *b* gets larger, more parts are formed and each part gets smaller. • a fraction a/b is the quantity formed by *a* parts of size 1/*b* . • a fraction is a number on the number line. • two fractions are equivalent (equal) if they represent the same amount of the whole. • two fractions are equivalent (equal) if they represent the same point on the number line. • comparing fractions is valid only when the two fractions refer to the same whole.	Students will be able to . . . • represent fractions on a number line diagram. • represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line. • represent a fraction *a*/*b* on a number line diagram by defining the interval from 0 to 1 as the whole, partition it into *b* equal parts and mark off *a*, lengths 1/*b*, from 0. Recognize that the resulting interval has size *a*/b and that its endpoint locates the number *a*/*b* on the number line. • explain equivalence of fractions in special cases. • compare fractions by reasoning about their size. • recognize simple equivalent fractions. • generate simple equivalent fractions.

	• explain why fractions are equivalent, e.g., using a visual fraction model. • express whole numbers as fractions. • recognize fractions that are equivalent to whole numbers. • compare two fractions with the same numerator or the same denominator by reasoning about their size. • compare fractions using <, =, or > . • justify fraction comparisons, e.g., using a visual fraction model.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.

Resources

- **Math Expressions, 2018:** Unit 4, Unit 5

Assessment

Formative Assessment	**Summative Assessment**
Quick Check Quiz	Unit Assessment
Puzzled Penguin	Mid-Unit Quiz
Exit Slips	Unit Projects
White Board Check	
Homework	

Measurement and Data

3.MD.A.1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

3.MD.A.2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[1] Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.[2]

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[1] Excludes compound units such as cm^3 and finding the geometric volume of a container.
[2] Excludes multiplicative comparison problems (problems involving notions of "times as much").

Understandings	Essential Questions
Students will understand… • measurement involves units that must match in order to add or subtract them.	• Why does one need to measure? • How does one measure liquids? • How does one measure mass?

Knowledge	Skills
Students will know . . . • time intervals involve a start time and an end time. • how to add or subtract on a number line.	Students will be able to . . . • tell and write time to the nearest minute. • measure time intervals in minutes. • solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. • measure liquid volumes . • estimate liquid volumes. • measure masses of objects using standard units of grams (g), kilograms (kg), and liters (l). • estimate masses of objects using standard units of grams (g), kilograms (kg), and liters (l). • add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018:** Unit 4, Unit 7

Assessment

Formative Assessment	Summative Assessment
Quick Check Quiz Puzzled Penguin Exit Slips White Board Check Homework	Unit Assessment Mid-Unit Quiz Unit Projects

Measurement and Data
3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.* **3.MD.B.4**. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Understandings	Essential Questions
Students will understand… • different scales are needed to represent various data.	• How can representing data help us to interpret it and draw conclusions? • How can one determine the best representation to display data?

Knowledge	Skills
Students will know . . . • the characteristics of picture graphs. • the characteristics of bar graphs. • the characteristics of a line plot.	Students will be able to . . . • draw a scaled picture graph to represent a data set with several categories. • draw a scaled bar graph to represent a data set with several categories. • solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs (*e.g., one square = 5 pets*). • generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. • use a line plot to show measurement data found with a ruler, where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters.

Standards for Mathematical Practice
MP1. Make sense of problems and persevere in solving them. MP3. Construct viable arguments and critique the reasoning of others. MP4. Model with mathematics. MP5. Use appropriate tools strategically.

Resources
• **Math Expressions, 2018:** Unit 4

Assessment	
Formative Assessment Quick Check Quiz Puzzled Penguin Exit Slips White Board Check Homework	**Summative Assessment** Unit Assessment Mid-Unit Quiz Unit Projects

Measurement and Data

3.MD.C.5. Recognize area as an attribute of plane figures and understand concepts of area measurement.

a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.

b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.

3.MD.C.6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units).

3.MD.C.7. Relate area to the operations of multiplication and addition.

a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.

Understandings:	**Essential Questions**
Students will understand… • area measurement involves covering a surface. • area is measured in square units. • that area is related to the operations of multiplication and division.	• Why do we need to measure the area of a surface? • How do we find areas of irregular shapes?

Knowledge	**Skills**
Students will know . . . • area is an attribute of plane figures. • a square with side length 1 unit, called “a unit square” is said to have “one square unit” of area. • a unit square can be used to measure area. • a plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units. • area is additive.	Students will be able to . . . • measure areas by counting unit squares (square cm, square m, square in, square ft., and improvised units). • find the area of a rectangle with whole-number side lengths by tiling it • show that the area of a rectangle found by tiling is the same as would be found by multiplying the side lengths. • multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real-world and mathematical problems. • represent whole-number products as rectangular areas in mathematical reasoning. • use tiling in a concrete case that the area of a rectangle with whole-number side lengths a and $b+c$ is the sum of a x b and a x c. • use area models to represent the distributive property in mathematical reasoning. • find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts. • apply this technique to solve real-world problems.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018**: Unit 1, Unit 2

Assessment

Formative Assessment	**Summative Assessment**
Quick Check Quiz Puzzled Penguin Exit Slips White Board Check Homework	Unit Assessment Mid-Unit Quiz Unit Projects

Measurement and Data	
3.MD.D.8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	
Understandings	**Essential Questions**
Students will understand… • perimeter is a linear measure and area is a square measure.	• What types of problems involve perimeter? • What types of problems involve area?
Knowledge	**Skills**
Students will know . . . • the difference between area and perimeter. • rectangles with the same area do not necessarily have the same perimeter and vice versa.	Students will be able to . . . • find the perimeter of a polygon given the side lengths. • find an unknown side length of a polygon. • exhibit rectangles with the same perimeter but different areas. • exhibit rectangles with the same area but different perimeters. • solve real-world and mathematical problems involving perimeters of polygons.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others. MP4. Model with mathematics. MP6. Attend to precision.	
Resources	
• **Math Expressions, 2018:** Unit 5 • **Supplemental Lessons:** Binder pages	
Assessment	
Formative Assessment Quick Check Quiz Puzzled Penguin Exit Slips White Board Check Homework	**Summative Assessment** Unit Assessment Mid-Unit Quiz Unit Projects

<table>
<tr><th colspan="2">Geometry</th></tr>
<tr><td colspan="2">3.G.A.1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

3.G.A2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.</td></tr>
<tr><th>Understandings</th><th>Essential Questions</th></tr>
<tr><td>Students will understand…
• shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals).</td><td>• What characteristics define a polygon?</td></tr>
<tr><th>Knowledge</th><th>Skills</th></tr>
<tr><td>Students will know . . .
• shapes in different categories may share attributes (e.g., rhombuses and rectangles both have four sides).
• shared attributes can define a larger category (e.g., rhombuses and rectangles are part of the category called quadrilaterals.</td><td>Students will be able to . . .
• recognize that rhombuses, rectangles, and squares are examples of quadrilaterals.
• draw examples of quadrilaterals that do not belong to any of these subcategories.
• partition shapes into parts with equal areas.
• express area of a part of a shape as a unit fraction of the whole. (For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the whole shape.)</td></tr>
<tr><th colspan="2">Standards for Mathematical Practice</th></tr>
<tr><td colspan="2">MP1. Make sense of problems and persevere in solving them.
MP3. Construct viable arguments and critique the reasoning of others.
MP4. Model with mathematics
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.</td></tr>
<tr><th colspan="2">Resources</th></tr>
<tr><td colspan="2">Math Expressions, 2018: Unit 4, Unit 7
• Supplemental Lessons: Binder pages</td></tr>
<tr><th colspan="2">Assessment</th></tr>
<tr><td>Formative Assessment
Quick Check Quiz
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Exit Slips
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Homework</td><td>Summative Assessment
Unit Assessment
Mid-Unit Quiz
Unit Projects</td></tr>
</table>

Career Readiness, Life Literacies, and Key Skills

Career Readiness, Life Literacies, and Key Skills

Rapid advancements in technology and subsequent changes in the economy have created opportunities for individuals to compete and connect on a global scale. In this increasingly diverse and complex world, the successful entrepreneur or employee must not only possess the requisite education for specific industry pathways but also employability skills necessary to collaborate with others and manage resources effectively in order to establish and maintain stability and independence. This document outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K–12 academic and technical content areas, the New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy.

Mission

Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision

An education in career readiness, life literacies, and key skills fosters a population that:

•Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
•Uses effective communication and collaboration skills and resources to interact with a global society;
•Possesses financial literacy and responsibility at home and in the broader community;
•Plans, executes, and alters career goals in response to changing societal and economic conditions; and
•Seeks to attain skill and content mastery to achieve success in a chosen career path.

Career Readiness, Life Literacies, and Key Skills Standards

- 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.
- 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Computer Science and Design Thinking

Computer Science and Design Thinking
New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Mission
Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision
All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

• develop and apply computational and design thinking to address real-world problems and design creative solutions;

• engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;

• navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and

• participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Computer Science and Design Thinking Standards

- **8.1.5.IC.1:** Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.
- **8.1.5.IC.2:** Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.
- **8.1.5.DA.1:** Collect, organize, and display data in order to highlight relationships or support a claim.
- **8.1.5.DA.3:** Organize and present collected data visually to communicate insights gained from different views of the data.
- **8.1.5.AP.1:** Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
- **8.1.5.AP.4:** Break down problems into smaller, manageable sub-problems to facilitate program development.
- **8.1.5.AP.5:** Modify, remix, or incorporate pieces of existing programs into one’s own work to add additional features or create a new program.
- **8.2.5.ED.2:** Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- **8.2.5.ITH.4:** Describe a technology/tool that has made the way people live easier or has led to a new business or career.

Grade 4

Interdisciplinary Connections

Mathematics is a unified body of knowledge whose concepts build upon each other. Connecting mathematical concepts includes linking ideas to related ideas learned previously.

Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas. Students need to connect their mathematical learning to appropriate real-world contexts. They need to create interest and maintain the interest after the novelty of the work has worn off.

Mathematics is the language of science and is greatly utilized in industry and business. It gives us the power to solve difficult real-world problems, but also helps us to understand how the universe operates.

Every mathematics teacher needs to make students unafraid of the subject by convincing the students of the usefulness of learning mathematics in their daily lives and for higher studies. The world today, which leans more and more heavily on Science and Technology, demands more from mathematics. Tomorrow's world will, no doubt, make still greater demands from mathematics.

Interdisciplinary Connections for Grade 4

Literacy: **(RL.4.1, RI.4.1, RI.4.4)**

~ *The Beautiful Oops*

- Read *The Beautiful Oops* by Barney Saltzberg.
- Discuss the story with students. Are mistakes okay to make? Why?
- Have students talk about a time when they made a mistake, but it turned out to be better than expected.

~ *Grandfather Tang's Story*

- Introduce lesson by reading *Grandfather Tang's Story* by Ann Tompert.
- Follow the attached lesson in the Supplemental Section.

~ *Great Estimations*

- Introduce lesson by reading *Great Estimations* by Bruce Goldstone
- Follow attached lesson in the Supplemental Section

~ *Zachary Zormer* Book

- Introduce lesson by reading *Zachary Zormer* by Joanne Reisberg
- Discuss the book as you read.

~Vocabulary Poster Project

- See the attached document in the Supplemental Section for directions and rubric.

New Jersey Student Learning Standards
(NJSLS)

In Grade 4, instructional time should focus on three critical areas: (1) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (2) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; (3) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

> (1) Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.
>
> (2) Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.
>
> (3) Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

Operations & Algebraic Thinking

Use the four operations with whole numbers to solve problems.

4.OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.[1]

4.OA.A.3 Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Understandings	Essential Questions
Students will understand… • multiplication involving whole numbers (greater than 1) makes the answer become larger than either number. • when solving word problems, remainders must be interpreted.	• What types of problems involve multiplication and division in the answer?

Knowledge	Skills
Students will know . . . • sometimes one needs to multiply or divide numbers to find an answer.	Students will be able to . . . • Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. • Represent verbal statements of multiplicative comparisons as multiplication equations. • Multiply to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. • Divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. • Distinguish multiplicative comparison from additive comparison. • Solve multi-step word problems posed with whole numbers and having whole number answers using the four operations, including problems in which remainders must be interpreted. • Represent word problems using equations with a letter standing for the unknown quantity. • Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others.	MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP7. Look for and make use of structure. MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018:** Unit 1, Unit 2, Unit 3, Unit 4

Assessment

Formative Assessment	Summative Assessment
Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	Performance Task Unit Assessment Mid-Unit Quiz

Operations & Algebraic Thinking

Gain familiarity with factors and multiples.

4.OA.B.4 Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Understanding	Essential Questions
Students will understand… • factors of a number are less than or equal to the number. • multiples of a number are greater than or equal to the number. • the determination of prime or composite is unrelated to the size of the number.	• Why do we need factors and multiples? • Why do we need to distinguish a number as being prime or composite? • How does finding factors or multiples of a number help us to solve problems?
Knowledge	**Skills**
Students will know . . . • a factor is one of 2 or more numbers that form a product when multiplied together . • a multiple is a number which is a product of some specified number and another number. • a prime number is a number that has only two factors, 1 and itself. • a composite number is a number that has more than 2 factors. • a whole number is a multiple of each of its factors.	Students will be able to . . . • Find all factor pairs for a whole number in the range 1 – 100. • Determine whether a given whole number in the range 1 – 100 is a multiple of a given one-digit number. • Determine whether a given whole number in the range 1 – 100 is prime or composite.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP6. Attend to precision.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018:** Unit 4

Assessment

Formative Assessment	Summative Assessment
Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	Performance Task Unit Assessment Mid-Unit Quiz

Operations & Algebraic Thinking

Generate and analyze patterns.

4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*

Understanding	Essential Questions
Students will understand… • patterns have units that repeat over and over. • the unit in a pattern must be identified.	• How does recognizing a pattern help one to solve problems? • Why does one need to look for patterns?

Knowledge	Skills
Students will know . . . • pattern types, e.g., ABABAB… • patterns can be made from numbers, shapes, letters, etc.	Students will be able to . . . • Generate a pattern that follows a given rule. • Identify apparent features of the pattern that were not explicit in the rule itself.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP6. Attend to precision.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- **Math Expressions, 2018:** Unit 4

Assessment

Formative Assessment	Summative Assessment
Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	Performance Task Unit Assessment Mid-Unit Quiz

Numbers and Operations in Base Ten[1]

Generalize place value understanding for multi-digit whole numbers.

4.NBT.A.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*

4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.

[1]Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000

Understanding	Essential Questions
Students will understand… • place value is used to round numbers. • place value can be used to compare and order numbers.	• What does knowing place value help us to do?

Knowledge	Skills
Students will know . . . • how a base-ten numeral is related to the numeral name and the expanded form. • that in a multi-digit whole number, a digit in one place represents ten times what it represents to its right.	Students will be able to . . . • read multi-digit whole numbers using base-ten numerals, numeral names, and expanded form. • write multi-digit whole numbers using base-ten numerals, numeral names, and expanded form. • compare two multi-digit numbers based on meanings of the digits in each place, using <, =, and > symbols. • use place-value understanding to round multi-digit whole numbers to any place.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others.	MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP7. Look for and make use of structure.

Resources

- **Math Expressions, 2018**: Unit 1, Unit 2

Assessment

Formative Assessment	Summative Assessment
Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	Performance Task Unit Assessment Mid-Unit Quiz

Numbers and Operations in Base Ten[1]	
Use place value understanding and properties of operations to perform multi-digit arithmetic. **4.NBT.B.4** Fluently add and subtract multi-digit whole numbers using the standard algorithm. **4.NBT.B.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **4.NBT.B.6** Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. [1]Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000	
Understanding	**Essential Questions**
Students will understand… • the standard algorithm is one way to get the answer to an addition or subtraction problem. • one should use an alternate algorithm to check the answer to a problem. • place value helps to understand the appropriate size of an answer.	• How are strategies useful in solving computation problems? • Why does it help to know inverse relationships?
Knowledge	**Skills**
Students will know . . . • addition and subtraction are inverse operations. • multiplication and division are inverse operations.	Students will be able to . . . • fluently add multi-digit whole numbers using the standard algorithm. • fluently subtract multi-digit whole numbers using the standard algorithm. • multiply a whole number of up to four digits by a one-digit whole number. • multiply two two-digit numbers. • find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors. • illustrate and explain calculations by using equations, rectangular arrays, and/or area models.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others.	MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP7. Look for and make use of structure.
Resources	
• **Math Expressions, 2018**: Unit 1, Unit 2, Unit 3, Unit 4	
Assessment	
Formative Assessment Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	**Summative Assessment** Performance Task Unit Assessment Mid-Unit Quiz

Number & Operations - Fractions[1]

Extend understanding of fraction equivalence and ordering.

4.NF.A.1 Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

[1] Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.

Understanding	Essential Questions
Students will understand… • equivalent fractions represent the same amount of a whole. • fraction comparisons are only valid when they refer to the same whole. • in order to find the fraction equivalent to one half, the numerator must be the denominator divided by 2; or the denominator must be 2 times the numerator.	• Why does one need to use fractions? • Why does one need to find equivalent fractions?

Knowledge	Skills
Students will know . . . • the same number must multiply the numerator and denominator in order for fractions to be equivalent. • 1/2 can be used as a benchmark to compare fractions. • "<" means less than; ">" means greater than; and "=" means equal to.	Students will be able to . . . • identify equivalent fractions. • generate equivalent fractions. • explain fractions that are equivalent through visual models. • compare two fractions using a benchmark fraction. • compare two fractions using common numerators or denominators.

Standards for Mathematical Practice
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP7. Look for and make use of structure.

Resources
• **Math Expressions, 2018:** Unit 6, Unit 7

Assessment	
Formative Assessment Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	**Summative Assessment** Performance Task Unit Assessment Mid-Unit Quiz

Number & Operations - Fractions[1]	
Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. **4.NF.B.3** Understand a fraction *a*/*b* with *a* > 1 as a sum of fractions 1/*b*. a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.* c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. a. Understand a fraction *a*/*b* as a multiple of 1/*b*. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).* b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)* c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie?* [1] Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.	
Understanding	**Essential Questions**
Students will understand… • a fraction (with a numerator greater than 1) is made up of unit fractions, e.g. 3/7 = 1/7 + 1/7 + 1/7. • addition and subtraction of fractions is joining and separating parts referring to the same whole. • a fraction *a*/*b* is a multiple of 1/*b*. • a multiple of a/b is a multiple of 1/b.	• How operations are allowed with fractions? • When would one need to add, subtract, multiply, or divide a fraction?
Knowledge	**Skills**
Students will know . . . • fractions must have common denominators in order to be added or subtracted. • when adding or subtracting fractions with like denominators, one must add or subtract the numerators and keep the denominator the same. • mixed numbers are multiples of fractions.	Students will be able to . . . • decompose a fraction into the sum of fractions in more than one way. • justify decompositions. • add mixed numbers with like denominators. • subtract mixed numbers with like denominators. • solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.

	• multiply a fraction by a whole number. • solve word problems involving multiplication of a fraction by a whole number.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018:** Unit 6	
Assessment	
Formative Assessment Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	**Summative Assessment** Performance Task Unit Assessment Mid-Unit Quiz

<table>
<tr><th colspan="2">Number & Operations - Fractions[1]</th></tr>
<tr><td colspan="2">Understand decimal notation for fractions, and compare decimal fractions.

4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.[2] For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.

4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100. For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.

4.NF.C./7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.

[1] Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.
[2] Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade.</td></tr>
<tr><th>Understanding</th><th>Essential Questions</th></tr>
<tr><td>Students will understand…
• decimals and fractions are related.
• fractions with a denominator of 10 or 100 can be written in decimal form.
• comparisons of decimals are valid only when the two decimals refer to the same whole.</td><td>• Why does one need to change a fraction to a decimal?
• When is it easier to use the decimal form of a fraction?
• Why would decimal forms of a fraction need to be compared?</td></tr>
<tr><th>Knowledge</th><th>Skills</th></tr>
<tr><td>Students will know . . .
• the decimal point location is related to the size of the denominator when the denominator is a multiple of 10.
• decimal forms of numbers are easiest to find when the denominator is a multiple of 10.</td><td>Students will be able to . . .
• find an fraction with a denominator of 100 for a fraction with a denominator of 10.
• add two fractions with respective denominators 10 and 100.
• write fractions with denominators 10 or 100 in decimal form.
• compare two decimals to hundredths by reasoning about their size.
• compare two decimals using the symbols >, =, or <, and justify the conclusions.</td></tr>
<tr><th colspan="2">Standards for Mathematical Practice</th></tr>
<tr><td colspan="2">MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP7. Look for and make use of structure.</td></tr>
<tr><th colspan="2">Resources</th></tr>
<tr><td colspan="2">• Math Expressions, 2018: Unit 7</td></tr>
<tr><th colspan="2">Assessment</th></tr>
<tr><td>Formative Assessment
Diagnostic Checks
Puzzled Penguin
Exit Slips
Quick Quiz
Fluency Check</td><td>Summative Assessment
Performance Task
Unit Assessment
Mid-Unit Quiz</td></tr>
</table>

Measurement and Data	
Solve problems involving measurement and conversion of measurement from a larger unit to a smaller unit. **4.MD.A.1** Know relative sizes of measurement units within one system of units including km, m , cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* **4.MD.A.2** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. **4.MD.A.3** Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*	
Understandings	**Essential Questions**
Students will understand… • the size of the unit used to measure has an effect on the number of units in the answer. • area and perimeter measure different things therefore the types of label on the answers are different. • the region covered by square units in an array is the same as the area of the rectangle.	• What can be measured? • Why does one need to measure things?
Knowledge	**Skills**
Students will know . . . • relative sizes of measurement units within one system of units including km, m, cm, mm; kg, g; lb, oz.; l, ml; hr, min, sec. • the larger the unit used to measure, the smaller the number of units in the answer and vice versa. • area of a rectangle is equal to the length x the width (A = l x w)	Students will be able to . . • express measurements in a larger unit in terms of a smaller unit. • record measurement equivalents in a two-column table. • find the area of a rectangle using the formula. • find the perimeter of a rectangle using the formula.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018:** Unit 1, Unit 2, Unit 4, Unit 5, Unit 6, Unit 7	
Assessment	
Formative Assessment Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	**Summative Assessment** Performance Task Unit Assessment Mid-Unit Quiz

<table>
<tr><th colspan="2">Measurement and Data</th></tr>
<tr><td colspan="2">Represent and interpret data.

4.MD.A.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.</td></tr>
<tr><th>Understanding</th><th>Essential Questions</th></tr>
<tr><td>Students will understand…
• a line plot is a visual display of data used to help see trends in the data.</td><td>• When would a line plot be used?
• Why does one need to display data graphically?</td></tr>
<tr><th>Knowledge</th><th>Skills</th></tr>
<tr><td>Students will know . . .
• the scale of a line plot must be equally spaced as in a number line.
• the scale of a line plot can contain fractions.</td><td>Students will be able to . .
• make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8).
• solve problems involving addition and subtraction of fractions by using information presented in line plots.</td></tr>
<tr><th colspan="2">Standards for Mathematical Practice</th></tr>
<tr><td colspan="2">MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP7. Look for and make use of structure.</td></tr>
<tr><th colspan="2">Resources</th></tr>
<tr><td colspan="2">• Math Expressions, 2018: Unit 5, Unit 6, Unit 7</td></tr>
<tr><th colspan="2">Assessment</th></tr>
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Diagnostic Checks
Puzzled Penguin
Exit Slips
Quick Quiz
Fluency Check</td><td>Summative Assessment
Performance Task
Unit Assessment
Mid-Unit Quiz</td></tr>
</table>

Measurement and Data	
Geometric measurement: understand concepts of angle and measure angles. **4.MD.B.5** Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. **4.MD.B.6** Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. **4.MD.B.7** Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.	
Understanding	**Essential Questions**
Students will understand… • the measure of an angle is the measure of the turn.	• Why would one need to measure an angle?
Knowledge	**Skills**
Students will know . . . • that an angle is formed wherever two rays share a common endpoint. • angle measure is additive. • an angle decomposed into non-overlapping parts is the sum of the measure of each parts. • an angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. • an angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. • an angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.	Students will be able to . . . • measure angles in whole-number degrees using a protractor. • sketch angles of specified measure. • solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP3. Construct viable arguments and critique the reasoning of others. MP5. Use appropriate tools strategically. MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018:** Unit 8	
Assessment	
Formative Assessment Diagnostic Checks Puzzled Penguin Exit Slips Quick Quiz Fluency Check	Summative Assessment Performance Task Unit Assessment Mid-Unit Quiz

<table>
<tr><th colspan="2">Geometry</th></tr>
<tr><td colspan="2">Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.

4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.</td></tr>
<tr><th>Understanding</th><th>Essential Questions</th></tr>
<tr><td>Students will understand…
• characteristics of a figure enables one to identify it by a name.</td><td>• Why does one need to classify shapes?
• Why does one need to identify lines of symmetry?</td></tr>
<tr><th>Knowledge</th><th>Skills</th></tr>
<tr><td>Students will know . . .
• a right triangle is a category of triangles.
• a line of symmetry is such that the figure can be folded along the line into matching parts.</td><td>Students will be able to . . .
• draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.
• identify these in two-dimensional figures.
• classify two-dimensional figures based on properties of parallel and perpendicular lines and sizes of angles.
• identify right triangles.
• identify line-symmetric figures.
• draw lines of symmetry.</td></tr>
<tr><th colspan="2">Standards for Mathematical Practice</th></tr>
<tr><td colspan="2">MP1. Make sense of problems and persevere in solving them.
MP3. Construct viable arguments and critique the reasoning of others.
MP5. Use appropriate tools strategically.
MP7. Look for and make use of structure.</td></tr>
<tr><th colspan="2">Resources</th></tr>
<tr><td colspan="2">• Math Expressions, 2018: Unit 8</td></tr>
<tr><th colspan="2">Assessment</th></tr>
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</table>

Career Readiness, Life Literacies, and Key Skills

Career Readiness, Life Literacies, and Key Skills

Rapid advancements in technology and subsequent changes in the economy have created opportunities for individuals to compete and connect on a global scale. In this increasingly diverse and complex world, the successful entrepreneur or employee must not only possess the requisite education for specific industry pathways but also employability skills necessary to collaborate with others and manage resources effectively in order to establish and maintain stability and independence. This document outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K–12 academic and technical content areas, the New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy.

Mission

Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision

An education in career readiness, life literacies, and key skills fosters a population that:

•Continually self-reflects and seeks to improve the essential life and career practices that lead to success;

•Uses effective communication and collaboration skills and resources to interact with a global society;

•Possesses financial literacy and responsibility at home and in the broader community;

•Plans, executes, and alters career goals in response to changing societal and economic conditions; and

•Seeks to attain skill and content mastery to achieve success in a chosen career path.

Career Readiness, Life Literacies, and Key Skills Standards

- 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.
- 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Computer Science and Design Thinking

Computer Science and Design Thinking
New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Mission
Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision
All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

- develop and apply computational and design thinking to address real-world problems and design creative solutions;
- engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;
- navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and
- participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Computer Science and Design Thinking Standards

- **8.1.5.IC.1:** Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.
- **8.1.5.IC.2:** Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.
- **8.1.5.DA.1:** Collect, organize, and display data in order to highlight relationships or support a claim.
- **8.1.5.DA.3:** Organize and present collected data visually to communicate insights gained from different views of the data.
- **8.1.5.AP.1:** Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
- **8.1.5.AP.4:** Break down problems into smaller, manageable sub-problems to facilitate program development.
- **8.1.5.AP.5:** Modify, remix, or incorporate pieces of existing programs into one’s own work to add additional features or create a new program.
- **8.2.5.ED.2:** Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- **8.2.5.ITH.4:** Describe a technology/tool that has made the way people live easier or has led to a new business or career.

Fifth Grade

Interdisciplinary Connections

Mathematics is a unified body of knowledge whose concepts build upon each other. Connecting mathematical concepts includes linking ideas to related ideas learned previously.

Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas. Students need to connect their mathematical learning to appropriate real-world contexts. They need to create interest and maintain the interest after the novelty of the work has worn off.

Mathematics is the language of science and is greatly utilized in industry and business. It gives us the power to solve difficult real-world problems, but also helps us to understand how the universe operates.

Every mathematics teacher needs to make students unafraid of the subject by convincing the students of the usefulness of learning mathematics in their daily lives and for higher studies. The world today, which leans more and more heavily on Science and Technology, demands more from mathematics. Tomorrow's world will, no doubt, make still greater demands from mathematics.

Interdisciplinary Connections for Grade 5

See Me in Space-A Walk through the Solar System

SUBJECT AREA: Science (**5-ESSI-1**)

A practice in scientific notation, measurement, and scale distances, this lesson plan integrates mathematics into the science curriculum. Students will apply knowledge of the properties, movements, and locations of objects in our solar system. We hope that our students will be able to recognize and elaborate on each of the planets and be able to transfer knowledge from one curricular area to the next.

http://www.learnnc.org/lp/pages/3091

Myahsteward.weebly.com

Be the Author of Your Own Problem!

SUBJECT AREA: ELA- Writing, Reading (**W.5.2.D**)

Students will become authors of their own division word problems. Before writing students will brainstorm ideas and wording for their word problems. Word problems can be centered around a grade level related theme. (read-aloud book, science unit, ss unit, season etc). Students will need to write a division word problem that includes a remainder in the quotient. The final result should include: word problem, number sentence, illustration, solution, and an explanations of what they did with the remainder and why.

5th Grade Shape Sorter

SUBJECT AREA: Math, Science, ELA-Writing and Presenting (**NJSLA.SL4, NJSLA.SL5**)

Students will work in small groups to design a machine that sorts triangles and quadrilaterals. They are required to draw, describe and present their machines. Their drawing is a detailed diagram that explains how their machine sorts the shapes. The written response is a description of what happens with two different shapes as they travel through the machine. Presentations are an overview of their machine, where both teacher and classmates can ask questions.

Google Doc- directions

Interdisciplinary Connections (continued)

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Fairytale Word Problems

SUBJECT AREA: ELA- Writing, **(W.5.3)**

This lesson is a hands-on math lesson that is meant to stimulate critical thinking as well as reinforce vocabulary that is necessary to be able to create and solve word problems both on paper and on the computer. Students will be able to generate and utilize a list of math vocabulary words by identifying which operations they reflect and by using them when they create their own word problems incorporating fairytales as their LA focus. Students will be able to work cooperatively with a partner to participate in creating their own word problem and showing the work for a class book. They will first sketch out this page and then be asked to input it using Google Slides. The students will then need to present their word problems to the class via slideshow on Google Slides.
Google Docs- directions & rubric

New Jersey Student Learning Standards (NJSLS)

In Grade 5, instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; and (3) developing understanding of volume.

(1) Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

(2) Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

(3) Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real world and mathematical problems.

Operations and Algebraic Thinking	
Write and interpret numerical expressions. **5.OA.A.1** Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **5.OA.A.2** Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*	
Understandings	**Essential Questions**
Students will understand… • the order of operations affects the value of the answer.	• Why is there an order to follow to compute answers?
Knowledge	**Skills**

Students will know . . .
• the order of operations is as follows:
  • parentheses
  • exponents
  • multiplication and division, left to right
  • addition and subtraction, left to right.
	Students will be able to . . .
	• use the order of operations to find answers to expressions.
	• write simple expressions that record calculations with numbers.
	• interpret numerical expressions without evaluating them.

Standards for Mathematical Practice	
MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others. MP6. Attend to precision.	
Resources	
• **Math Expressions, 2018: Unit 7**	
Assessment	
Formative Assessment Fluency Check Puzzled Penguin Homework Check for understanding Exit ticket Strategy Check Personal Math Trainer	**Summative Assessment** End of Unit Assessment Quick Quiz Unit Project Performance Assessment

Operations and Algebraic Thinking

Analyze patterns and relationships.

5.OA.B.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*

Understandings	Essential Questions
Students will understand… • patterns can be put together to generate new patterns.	• How are the coordinate points related to patterns?

Knowledge	Skills
Students will know . . . • that to determine if there is a pattern present in a set of numbers, one can look for constant change between the variables.	Students will be able to . . . • generate patterns from other patterns. • graph ordered pairs generated by the pattern on a coordinate plane.

Standards for Mathematical Practice

MP2. Reason abstractly and quantitatively.

MP3. Construct viable arguments and critique the reasoning of others.

MP6. Attend to precision.

Resources

- **Math Expressions, 2018: Unit 7**

Assessment

Formative Assessment	Summative Assessment
Fluency Check Puzzled Penguin Homework Check for understanding Exit ticket Strategy Check Personal Math Trainer	End of Unit Assessment Quick Quiz Unit Project Performance Assessment

Numbers and Operations in Base Ten

Understand the place value system.

5.NBT.A.1 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

5.NBT.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

5.NBT.A.3 Read, write, and compare decimals to thousandths.

a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.

b. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

5.NBT.A.4 Use place value understanding to round decimals to any place.

Understandings	Essential Questions
Students will understand… • each place in the place-value system has a limit to the value which can be placed there. • the same relationship exists between any two adjacent places in the place-value system. • placement of a number into a place in the place-value system has a significant effect on its value.	• How does the location of a number in a place-value system affect the value of the number? • How is place value used to round numbers? • What is the significance of the decimal point?

Knowledge	Skills
Students will know . . . • when the value in a place exceeds the limit, it must change places. • in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • place-value understanding is needed to round decimals to any place. • the place to examine in order to round numbers, including decimals.	Students will be able to . . . • read and write decimals to thousandths using base-ten numerals, number names, and expanded form. • compare two decimals to thousandths. • use >, =, and < symbols to record the results of comparisons.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP3. Construct viable arguments and critique the reasoning of others.
MP6. Attend to precision.

Resources

- **Math Expressions, 2018:** Unit 2, Unit 4, Unit 5

Assessment

Formative Assessment	Summative Assessment
Fluency Check Puzzled Penguin Homework Check for understanding Exit ticket Strategy Check Personal Math Trainer	End of Unit Assessment Quick Quiz Unit Project Performance Assessment

Numbers and Operations in Base 10	
Perform operations with multi-digit whole numbers and with decimals to hundredths. **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm. **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	
Understandings	**Essential Questions**
Students will understand… • rectangles have an area that represents the product of the two dimensions.	• How are products and quotients related?
Knowledge	**Skills**
Students will know . . . • multi-digit computation is just an extension of single-digit computations.	Students will be able to . . . • fluently multiply multi-digit whole numbers using the standard algorithm. • find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors. • illustrate and explain calculations by using equations, rectangular arrays, and/or area models. • add, subtract, multiply, and divide decimals to hundredths.
Standards for Mathematical Practice	
MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others. MP6. Attend to precision. MP8. Look for and express regularity in repeated reasoning.	
Resources	
• **Math Expressions, 2018: Unit 2, Unit 4, Unit 5, Unit 6**	
Assessment	
Formative Assessment Fluency Check Puzzled Penguin Homework Check for understanding Exit ticket Strategy Check Personal Math Trainer	**Summative Assessment** End of Unit Assessment Quick Quiz Unit Project Performance Assessment

Number and Operations - Fractions	
Use equivalent fractions as a strategy to add and subtract fractions. **5.NF.A.1** Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **5.NF.A.2** Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*	
Understandings	**Essential Questions**
Students will understand… • fractions must have common denominators in order to be added or subtracted.	• When would one use addition or subtraction of fractions?
Knowledge	**Skills**
Students will know . . . • that a common denominator is a common multiple of the two denominators (usually the least common one). • that when adding fractions, the common denominators do not get added together, only the numerators do.	Students will be able to . . . • add and subtract fractions with unlike denominators (including mixed numbers). • solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators. • use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others. MP4. Model with mathematics. MP6. Attend to precision.	
Resources	
• **Math Expressions, 2018: Unit 1, Unit 3, Unit 6**	
Assessment	
Formative Assessment Fluency Check Puzzled Penguin Homework Check for understanding Exit ticket Strategy Check Personal Math Trainer	**Summative Assessment** End of Unit Assessment Quick Quiz Unit Project Performance Assessment

Numbers and Operations – Fractions

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

5.NF.B.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*

5.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.

a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)*

b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

5.NF.B.5 Interpret multiplication as scaling (resizing), by:

a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.

b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.

5.NF.B.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.

5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions.[1]

a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.*

b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*

c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*

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[1] Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.

(Continued on next page)

Understandings	Essential Questions
Students will understand… • a fraction is division of the numerator by the denominator ($a/b = a \div b$). • when multiplying by a fraction less than one, the product will be smaller than the first factor. • when multiplying by a fraction greater than one, the product will be larger than the first factor.	• What does it mean to divide by a fraction? • Why would one need to divide by a fraction?
Knowledge	**Skills**
Students will know . . . • the relative size of the answer based on the sizes of the factors.	Students will be able to . . . • solve word problems involving division of whole numbers. • multiply a fraction or whole number by a fraction. • find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths. • show that the area from tiles is the same as would be found by multiplying the side lengths. • multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. • solve real world problems involving multiplication of fractions and mixed numbers. • divide unit fractions by whole numbers and whole numbers by unit fractions. • interpret division of a unit fraction by a non-zero whole number. • interpret division of a whole number by a unit fraction. • solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others. MP4. Model with mathematics. MP6. Attend to precision.	
Resources	
• **Math Expressions, 2018:** Unit 3, Unit 6	
Assessment	
Formative Assessment Fluency Check Puzzled Penguin Homework Check for understanding Exit ticket Strategy Check Personal Math Trainer	**Summative Assessment** End of Unit Assessment Quick Quiz Unit Project Performance Assessment

<table>
<tr><th colspan="2">Measurement & Data</th></tr>
<tr><td colspan="2">Convert like measurement units within a given measurement system.

5.MD..A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.</td></tr>
<tr><th>Understandings</th><th>Essential Questions</th></tr>
<tr><td>Students will understand…
• measurement units vary in the customary system differently than in the metric system.
• understanding place value helps one to understand the metric system.</td><td>• Why would one need to convert measurements from one unit to another?
• How does one know whether the new answer should be a bigger or smaller number of units?</td></tr>
<tr><th>Knowledge</th><th>Skills</th></tr>
<tr><td>Students will know . . .
• every step in the metric system involves a power of 10, e.g. 10 cm = 1 decimeter, 10 mm = 1 cm, etc.)
• customary equivalents.</td><td>Students will be able to . . .
• convert among different-sized standard measurement units within a given measurement system.
• solve real-world problems involving conversions.</td></tr>
<tr><th colspan="2">Standards for Mathematical Practice</th></tr>
<tr><td colspan="2">MP3. Construct viable arguments and critique the reasoning of others.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.
MP7. Look for and make use of structure.</td></tr>
<tr><th colspan="2">Resources</th></tr>
<tr><td colspan="2">• Math Expressions, 2018. Unit 8</td></tr>
<tr><th colspan="2">Assessment</th></tr>
<tr><td>Formative Assessment
Fluency Check
Puzzled Penguin
Homework
Check for understanding
Exit ticket
Strategy Check
Personal Math Trainer</td><td>Summative Assessment
End of Unit Assessment
Quick Quiz
Unit Project
Performance Assessment</td></tr>
</table>

Measurement & Data	
Represent and interpret data. **5.MD.B.2** Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*	
Understandings	**Essential Questions**
Students will understand… • data entries do not have to be only whole numbers. • the scale on a line plot must be evenly spaced.	• What types of data can be graphed on a line plot with a fractional scale?
Knowledge	**Skills**
Students will know . . . • there will still be a whole number of pieces of data even though there is a fractional scale.	Students will be able to . . . • make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). • use operations on fractions for this grade to solve problems involving information presented in line plots.
Standards for Mathematical Practice	
MP3. Construct viable arguments and critique the reasoning of others. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018:** Unit 8	
Assessment	
Formative Assessment Fluency Check Puzzled Penguin Homework Check for understanding Exit ticket Strategy Check Personal Math Trainer	**Summative Assessment** End of Unit Assessment Quick Quiz Unit Project Performance Assessment

Measurement & Data	
Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. **5.MD.C.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units. **5.MD. C.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units. **5.MD. C.5** Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	
Understandings	**Essential Question**
Students will understand… • volume is an attribute of solid figures. • the concept of volume measurement involves filling up space. • volume is related to the operations of multiplication and addition. • volume is additive.	• For what types of items can we measure volume?
Knowledge	**Skills**
Students will know . . . • a cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume. • a solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.	Students will be able to . . . • measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. • solve real world and mathematical problems involving volume. • apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. • find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts.
Standards for Mathematical Practice	
MP3. Construct viable arguments and critique the reasoning of others. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018:** Unit 8	
Assessment	
Formative Assessment Fluency Check Puzzled Penguin Homework Check for understanding Exit ticket Strategy Check Personal Math Trainer	**Summative Assessment** End of Unit Assessment Quick Quiz Unit Project Performance Assessment

Geometry
Graph points on the coordinate plane to solve real-world and mathematical problems. **5.G.A.1** Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate). **5.G.A.2** Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

Understandings	Essential Questions
Students will understand… • the first number in an ordered pair indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis.	• Why would one graph on a coordinate plane?

Knowledge	Skills
Students will know . . . • a pair of perpendicular number lines, called axes, define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line. • a given point in the plane is located by using an ordered pair of numbers, called its coordinates. • the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).	Students will be able to . . . • graph points in the coordinate plane. • represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane.

Standards for Mathematical Practice
MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others MP6. Attend to precision.

Resources
• **Math Expressions, 2018:** Unit 7

Geometry	
Classify two-dimensional figures into categories based on their properties. **5.G.B.3** Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles. **5.G.B.4** Classify two-dimensional figures in a hierarchy based on properties.	
Understandings	**Essential Questions**
Students will understand… • attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.	• How does one classify two-dimensional figures? • Why would one need to classify a two-dimensional figure?
Knowledge	**Skills**
Students will know . . . • the characteristics of figures.	Students will be able to . . . • classify two-dimensional figures in a hierarchy based on properties.
Standards for Mathematical Practice	
MP3. Construct viable arguments and critique the reasoning of others. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP7. Look for and make use of structure.	
Resources	
• **Math Expressions, 2018:** Unit 8	

Career Readiness, Life Literacies, and Key Skills

Career Readiness, Life Literacies, and Key Skills
Rapid advancements in technology and subsequent changes in the economy have created opportunities for individuals to compete and connect on a global scale. In this increasingly diverse and complex world, the successful entrepreneur or employee must not only possess the requisite education for specific industry pathways but also employability skills necessary to collaborate with others and manage resources effectively in order to establish and maintain stability and independence. This document outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K–12 academic and technical content areas, the New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy.

Mission
Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision
An education in career readiness, life literacies, and key skills fosters a population that:
•Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
•Uses effective communication and collaboration skills and resources to interact with a global society;
•Possesses financial literacy and responsibility at home and in the broader community;
•Plans, executes, and alters career goals in response to changing societal and economic conditions; and
•Seeks to attain skill and content mastery to achieve success in a chosen career path.

Career Readiness, Life Literacies, and Key Skills Standards

- 9.4.5.CI.3: Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity.
- 9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.5.CT.4: Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global.
- 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Computer Science and Design Thinking

Computer Science and Design Thinking

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Mission

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision

All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

• develop and apply computational and design thinking to address real-world problems and design creative solutions;

• engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;

• navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and

• participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Computer Science and Design Thinking Standards

- **8.1.5.IC.1:** Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.
- **8.1.5.IC.2:** Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.
- **8.1.5.DA.1:** Collect, organize, and display data in order to highlight relationships or support a claim.
- **8.1.5.DA.3:** Organize and present collected data visually to communicate insights gained from different views of the data.
- **8.1.5.AP.1:** Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
- **8.1.5.AP.4:** Break down problems into smaller, manageable sub-problems to facilitate program development.
- **8.1.5.AP.5:** Modify, remix, or incorporate pieces of existing programs into one’s own work to add additional features or create a new program.
- **8.2.5.ED.2:** Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- **8.2.5.ITH.4:** Describe a technology/tool that has made the way people live easier or has led to a new business or career.

Sixth Grade

Interdisciplinary Connections
Mathematics is a unified body of knowledge whose concepts build upon each other. Connecting mathematical concepts includes linking ideas to related ideas learned previously. Major emphasis should be given to ideas and concepts across mathematical content areas that help students see that mathematics is a web of closely connected ideas. Students need to connect their mathematical learning to appropriate real-world contexts. They need to create interest and maintain the interest after the novelty of the work has worn off. Mathematics is the language of science and is greatly utilized in industry and business. It gives us the power to solve difficult real-world problems, but also helps us to understand how the universe operates. Every mathematics teacher needs to make students unafraid of the subject by convincing the students of the usefulness of learning mathematics in their daily lives and for higher studies. The world today, which leans more and more heavily on Science and Technology, demands more from mathematics. Tomorrow's world will, no doubt, make still greater demands from mathematics.
Interdisciplinary Connections for Grade 6
Covering & Surrounding Language Arts/Science – (MS ETS 1-1), (NJSLSA.W2) • Design an Aquarium – Unit Project Science (MS LS 1-1) • Microscope lens – Ace Question 93

New Jersey Student Learning Standards (NJSLS)
In Grade 6, instructional time should focus on four critical areas: (1) connecting ratio and rate to whole number multiplication and division and using concepts of ratio and rate to solve problems; (2) completing understanding of division of fractions and extending the notion of number to the system of rational numbers, which includes negative numbers; (3) writing, interpreting, and using expressions and equations; and (4) developing understanding of statistical thinking. (1) Students use reasoning about multiplication and division to solve ratio and rate problems about quantities. By viewing equivalent ratios and rates as deriving from, and extending, pairs of rows (or columns) in the multiplication table, and by analyzing simple drawings that indicate the relative size of quantities, students connect their understanding of multiplication and division with ratios and rates. Thus students expand the scope of problems for which they can use multiplication and division to solve problems, and they connect ratios and fractions. Students solve a wide variety of problems involving ratios and rates. (2) Students use the meaning of fractions, the meanings of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for dividing fractions make sense. Students use these operations to solve problems. Students extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, and in particular negative integers. They reason about the order and absolute value of rational numbers and about the location of points in all four quadrants of the coordinate plane. (3) Students understand the use of variables in mathematical expressions. They write expressions and equations that correspond to given situations, evaluate expressions, and use expressions and formulas to solve problems. Students understand that expressions in different forms can be equivalent, and they use the properties of operations to rewrite expressions in equivalent forms. Students know that the solutions of an equation are the values of the variables that make the equation true. Students use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations. Students construct and analyze tables, such as tables of quantities that are in equivalent ratios, and they use equations (such as $3x = y$) to describe relationships between quantities. (4) Building on and reinforcing their understanding of number, students begin to develop their ability to think statistically. Students recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. Students recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability. Students learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected. Students in Grade 6 also build on their work with area in elementary school by reasoning about relationships among shapes to determine area, surface area, and volume. They find areas of right triangles, other triangles, and special quadrilaterals by decomposing these shapes, rearranging or removing pieces, and relating the shapes to rectangles. Using these methods, students discuss, develop, and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into pieces whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths. They prepare for work on scale drawings and constructions in Grade 7 by drawing polygons in the coordinate plane.

Ratios and Proportional Relationships

Understand ratio concepts and use ratio reasoning to solve problems.

6.A.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes."*

6. A.RP.2 Understand the concept of a unit rate *a/b* associated with a ratio *a:b* with b ≠ 0, and use rate language in the context of a ratio relationship. *For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3/4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of $5 per hamburger."*[1]

6. A.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

a. Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
b. Solve unit rate problems including those involving unit pricing and constant speed. *For example, if it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?*
c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

[1] Expectations for unit rates in this grade are limited to non-complex fractions.

Understandings	Essential Questions
Students will understand that… • Ratios compare two values. • unit rates are *a/b* given that the ratio is *a:b*, such that *b ≠ 0*.	• Why does one need to compare numbers? • When does one need to use ratios to compare numbers? • How can one compare and contrast numbers?

Knowledge	Skills
Students will know… • ratio language (the ratio of *a:b* means that there is *a* of something for every *b* of a corresponding item). • *a/b* is the same as *a:b* or *a to b*. • how to relate a percent of a quantity to a rate per 100.	Students will be able to... • use ratio language to describe a ratio relationship between two quantities. • use rate language in the context of a ratio relationship. • use ratio and rate reasoning to solve real-world and mathematical problems. • make a table of equivalent ratios relating quantities with whole-number measurements. • solve unit rate problems including those involving unit pricing and constant rate. • find a percent of a quantity as a rate per 100 and solve problems involving finding the whole, given a part or the percent. • use ratio reasoning to convert measurement units. • manipulate and transform units appropriately when multiplying or dividing quantities.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.

MP3. Construct viable arguments and critique the reasoning of others. MP4. Model with mathematics. MP7. Look for and make use of structure. MP8. Look for and express regularity in repeated reasoning.
Resources
• Comparing Bits and Pieces: Inv. 1, 2, 3, 4; Decimal OPS: Inv. 1, 4; Variables and Patterns Inv. 3, 4

Assessment	
Formative Binder Quiz Exit Slips Do Now Homework	Summative Check-up Partner Quiz Unit Assessments Unit Projects

The Number System	
Apply and extend previous understandings of multiplication and division to divide fractions by fractions. **6. NS. A.1** Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general*, ***(a/b) ÷ (c/d) = ad/bc.)*** *How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?*	
Understandings	**Essential Questions**
Students will understand that… • the size of a factor impacts the size of the answer with respect to the other factor. • division by a rational number may result in a quotient whose value is bigger than, equal to, or smaller than the value of the dividend.	• What is represented by division of a fraction by a fraction? • What type of visual models can be used to represent division of fractions? • How are division and multiplication of a fraction by a fraction related?
Knowledge	**Skills**
Students will know… • multiplication with fractions represents part of a part. • division of a fraction by a <u>proper fraction</u> creates a larger answer. • multiplication of a fraction by a <u>proper fraction</u> creates a smaller answer.	Students will be able to... • compute quotients of fractions. • interpret quotients of fractions. • create a story context for division. • solve word problems involving division of fractions.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP4. Model with mathematics MP7. Look for and make use of structure. MP8. Look for and express regularity in repeated reasoning.	
Resources	
Let's Be Rational: Inv. 3, 4	
Assessment	
Formative Binder Quiz Exit Slips Do Now Homework	Summative Check-up Partner Quiz Unit Assessments Unit Projects

The Number System

Compute fluently with multi-digit numbers and find common factors and multiples.

6.NS. B.2 Fluently divide **multi-digit numbers** using **the standard algorithm**.

6.NS. B.3 Fluently add, subtract, multiply, and divide **multi-digit decimals** using **the standard algorithm** for each operation.

6.NS. B.4 Find the **greatest common factor** of two whole numbers less than or equal to 100 and the **least common multiple** of two whole numbers less than or equal to 12. Use the **distributive property** to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*

Understandings	Essential Questions
Students will understand that… • the proper operations and procedures must be determined in order to solve problems. • factors of a (whole) number are always less than or equal to the number itself. • multiples of a (whole) number are always greater than or equal to the number itself.	• Why would one need to find common factors and multiples? • In what situation would one want to use the distributive property to add two whole numbers? • What type(s) of problems require using multi-digit decimal operations?

Knowledge	Skills
Students will know… • the standard algorithm for division of multidigit numbers • the standard algorithms for addition, subtraction, multiplication, and division of multi-digit decimals • the definition of a factor. • the process of finding a factor. • the definition of a multiple. • the process of finding a multiple. • how to find the prime factorization of a number. • how to factor out a number from the sum of two whole numbers	Students will be able to... • fluently divide using the standard algorithm. • fluently add multi-digit decimals using the standard algorithm. • fluently subtract multi-digit decimals using the standard algorithm. • fluently multiply multi-digit decimals using the standard algorithm. • fluently divide multi-digit decimals using the standard algorithm. • find the greatest common factor of two whole numbers less than or equal to 100 • find the least common multiple of two whole numbers less than or equal to 12. • use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of the sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4(9 + 2).*

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics
MP5. Use appropriate tools strategically.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

- Comparing Bits and Pieces: Inv. 1, 2, 3, 4; Let's Be Rational: Inv. 1, 2, 3, 4; Decimal OPS: Inv. 1, 2, 3, 4; Data About Us: Inv. 3; Prime Time: Inv. 2

Assessment

Formative	Summative
Binder Quiz Exit Slips Do Now Homework	Check-up Partner Quiz Unit Assessments Unit Projects

The Number System
Apply and extend previous understandings of numbers to the system of rational numbers. **6.NS. C.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. **6.NS. C.6** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane. **6.NS. C.7** Understand ordering and absolute value of rational numbers. a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 ^{o}C > –7 ^{o}C to express the fact that –3 ^{o}C is warmer than –7 ^{o}C.* c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* d. Distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.* **6.NS. C.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

Understandings	Essential Questions
Students will understand that… • positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge). • a rational number is a point on the number line. • rational numbers on the number line are oriented from left to right • rational numbers have an order that exists related to their location on a number line. • the absolute value of a rational number is its distance from 0 on the number line. • the distance from a point on the coordinate system to the origin (0,0) is related to the absolute value of its x- and y-coordinates .	• What are some rational numbers around us? • What are some non-rational numbers around us? • How can ordering of rational numbers help to make sense of the world around us? • When is the absolute value of a rational number used in real life?

Knowledge	Skills
Students will know… • opposite signs of numbers indicate locations on opposite sides of 0 on the number line. • the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite. • signs of numbers in ordered pairs indicate locations in quadrants of the coordinate plane. • that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. • how to find the absolute value of a rational number.	Students will be able to... • use positive and negative numbers to represent quantities in real-world contexts. • explain the meaning of 0 in situations using positive and negative numbers. • extend number-line diagrams and coordinate axes to represent points on the line and in the plane with negative number coordinates. • find and position integers and other rational numbers on a horizontal or vertical number line diagram. • find and position pairs of integers and other rational numbers on a coordinate plane. • interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right.* • write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 °C > –7 °C to express the fact that –3 °C is warmer than –7 °C.* • interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.* • distinguish comparisons of absolute value from statements about order. *For example, recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.* • solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. • find distances between points with the same first coordinate or the same second coordinate, using coordinates and absolute value.

Standards for Mathematical Practice
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP4. Model with mathematics. MP5. Use appropriate tools strategically.

Resources
• Comparing Bits and Pieces: Inv. 3; Let's Be Rational: Inv. 1; Variables and Patterns: Inv. 1, 2, 3, 4; Covering and Surrounding: Inv. 1

Assessment	
Formative Binder Quiz Exit Slips Do Now Homework	Summative Check-up Partner Quiz Unit Assessments Unit Projects

Expressions and Equations
Apply and extend previous understandings of arithmetic to algebraic expressions. **6.EE. A.1** Write and evaluate numerical expressions involving whole-number exponents. **6.EE. A.2** Write, read, and evaluate expressions in which letters stand for numbers. a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as 5 – y.* b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.* c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in realworld problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas* $V = s^3$ *and* $A = 6\ s^2$ *to find the volume and surface area of a cube with sides of length* $s = 1/2$. **6.EE. A.3** Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.* **6.EE. A.4** Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

Understandings	Essential Questions
Students will understand that… • algebraic expressions have letters that stand for numbers and arithmetic expressions have only numbers and no letters. • numbers can be substituted in place of letters in algebraic expressions • algebraic expressions can be equivalent to each other • area, perimeter, or volume formulas are algebraic expressions • that verbal sentences or expressions can be written as algebraic expressions	• How are mathematical expressions in which letters stand for numbers useful in real life? • What is the purpose of identifying equivalent expressions? • What is the difference between an algebraic expression and an arithmetic expression?

Knowledge	Skills
Students will know… • the definition of sum, term, product, factor, quotient, coefficient. • how to identify two algebraic expressions that are equivalent . • to apply the conventional order of operations when no parentheses are given. • how to apply the distributive property.	Students will be able to... • write numerical expressions involving whole-number exponents. • evaluate numerical expressions involving whole-number exponents. • write expressions in which letters stand for numbers. • read expressions in which letters stand for numbers. • evaluate expressions in which letters stand for numbers. • write expressions that record operations with numbers and with letters standing for numbers. • identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. • evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). • apply the properties of operations to generate equivalent expressions. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

Standards for Mathematical Practice
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP8. Look for and express regularity in repeated reasoning.
Resources
• Prime Time: Inv. 1, 2, 3, 4; Let's Be Rational: Inv. 4; Covering and Surrounding: Inv. 1, 2, 3, 4; Decimal OPS: Inv. 2, 3; Variables and Patterns: Inv. 3, 4; Data About Us: Inv. 3

Assessment	
Formative Binder Quiz Exit Slips Do Now Homework	Summative Check-up Partner Quiz Unit Assessments Unit Projects

Expressions and Equations

Reason about and solve one-variable equations and inequalities.

6.EE. B.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

6.EE. B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

6.EE. B.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.

6.EE. B.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x <$ c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Understandings

Students will understand that…

- solving an equation or inequality will find the value(s) that will make the statement true.
- a variable can represent an unknown number.
- a variable can represent any number in a specified set.

Essential Questions

- What is the difference between an equation and an inequality?
- What does it mean when a number does not satisfy an equation or inequality?

Knowledge

Students will know…

- that a random number may not make an equation or inequality true.
- that a variable in an equation or inequality represents an unknown number.
- inequalities of the form $x > c$ or $x <$ c have infinitely many solutions.
- that solutions of inequalities of form x>c or x<c can be represented as intervals on the number line.
- that while inequalities may have infinitely many solutions, equations have a finite number of solutions.

Skills

Students will be able to...

- use substitution to determine whether a given number in a specified set will make an equation or inequality true.
- use variables to represent numbers
- solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ for cases in which p, q and x are all nonnegative rational numbers.
- solve real-world and mathematical problems by writing and solving equations of the form $px = q$ for cases in which p, q and x are all nonnegative rational numbers.
- write inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem.
- recognize that inequalities of the form $x > c$ or $x <$ c have infinitely many solutions
- represent solutions of inequalities on number line diagrams

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP2. Reason abstractly and quantitatively.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.

Resources

- Let's Be Rational: Inv. 4; Variables and Patterns: Inv. 3, 4; Covering and Surrounding: Inv. 1, 2, 4

Assessment

Formative	Summative
Binder Quiz	Check-up
Exit Slips	Partner Quiz
Do Now	Unit Assessments
Homework	Unit Projects

Expressions and Equations
6.EE. C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using **graphs and tables, and relate these to the equation**. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*

Understandings	Essential Questions
Students will understand that… • quantities can change in relation to one another and the relationship can be expressed as an equation relating the two. • the value of one quantity determines the value of the second quantity. • two quantities may or may not be related.	• How is a relationship represented in tables? • How is a relationship represented in graphs? • How is a relationship represented in an equation? • How can one tell that there is a relationship between two quantities? • Why is it useful to write an equation to express one quantity in terms of another quantity?

Knowledge	Skills
Students will know… • the meaning of a dependent variable. • the meaning of an independent variable. • when two quantities are related to each other.	Students will be able to... • use variables to represent two quantities in a realworld problem that change in relationship to one another. • write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. • analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. • use the equation of a relationship between two dependent and independent variables to predict ordered pairs that are not displaced in a given graph or table

Standards for Mathematical Practice
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP4. Model with mathematics. MP5. Use appropriate tools strategically.

Resources
• Variables and Patterns: Inv. 1, 2, 3, 4; Covering and Surrounding: Inv. 1

Assessment	
Formative Binder Quiz Exit Slips Do Now Homework	Summative Check-up Partner Quiz Unit Assessments Unit Projects

Geometry	
6.G. A.1 Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real world and mathematical problems. **6.G. A.2.** Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. **6.G. A.3.** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. **6.G. A.4.** Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.	
Understandings	**Essential Questions**
Students will understand that… • triangles and rectangles can be used to find areas of other polygons • a 2-D net of a 3-D figure can be used to find the surface area of the figure • surface area is related to "wrapping" or "covering" of a surface with square units, i.e. squares with side length of one unit • volume is related to "filling" of space with cubic units, i.e. cubes with edges of one-unit length	• Why would one want to calculate areas of polygons? • How are areas of polygons found? • How are volume and surface area of a right rectangular prism found? • Why are volumes represented in cubic units? • What is the connection between the net and surface area of 3-D figures?
Knowledge	**Skills**
Students will know… • that areas of triangles, including right triangles, and rectangles can be used to find areas of other polygons, when the other polygons are decomposed into triangles or composed into rectangles • that the volume of a right rectangular prism is the number of unit cubes it contains (of the appropriate unit fraction edge length) • the total area of a net of a 3-D figure is the surface area of the figure	Students will be able to... • find the area of right triangles. • find the area of other triangles. • find the area of special quadrilaterals. • find the areas of polygons by composing them into rectangles or decomposing them into triangles • represent three-dimensional figures using nets • to find the surface area of a 3-D figure by finding the total area of its 2-D net
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP7. Look for and make use of structure.	
Resources	
• Covering and Surrounding: Inv. 1, 2, 3, 4; Decimal OPS: Inv. 3	
Assessment	
Formative Binder Quiz Exit Slips Do Now Homework	Summative Check-up Partner Quiz Unit Assessments Unit Projects

Statistics and Probability	
6.SP. A.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.* **6.SP. A.2.** Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. **6.SP. A.3.** Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.	
Understandings	**Essential Questions**
Students will understand that… • statistical questions anticipate variability • a set of data has a distribution • center and spread are two related but different ways of describing a set of data	What is a statistical question? • What is a distribution? • What is the difference between the center and the spread of a numerical set? • How are data sets described?
Knowledge	**Skills**
Students will know… • that a set of data can be described by its center, spread, and overall shape • how to find the center of a numerical data set • the center summarizes a data set with a single number • the spread is a measure of variation of all values in a data set about the center	Students will be able to... • recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.* • understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape. • recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
Standards for Mathematical Practice	
MP1. Make sense of problems and persevere in solving them. MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP7. Look for and make use of structure. MP8. Look for and express regularity in repeated reasoning.	
Resources	
• Data About Us: Inv. 1, 2, 3, 4	
Assessment	
Formative Binder Quiz Exit Slips Do Now Homework	Summative Check-up Partner Quiz Unit Assessments Unit Projects

Statistics and Probability	
Summarize and describe distributions. **6.SP. B.4.** Display numerical data in plots on a number line, including dot plots, histograms, and box plots. **6.SP. B.5.** Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.	
Understandings	**Essential Questions**
Students will understand that… • numerical data can be displayed in multiple ways. • summaries of numerical data vary based on their contexts. • overall patterns of numerical data can vary. • some patters in numerical data can have striking deviations.	• How do measures of center and variability help us make sense of the world around us? • In what contexts are the measures of center and variability preferred descriptions of the data? • Why do we need multiple ways of describing numerical data?
Knowledge	**Skills**

Students will know…
• how to display numerical data using dot plots, histograms, and box plots.
• how to summarize numerical data in multiple ways.
• that the choice of measures of center and variability depends on the context.
• how to identify a striking deviation from the overall pattern.
• real life examples of patterns with, and without, striking deviations.
	Students will be able to...
	• construct dot plots, histograms, and box plots.
	• summarize numerical data by: o reporting the number of observations; o describing the nature of the attribute under investigation, including how it was measured and its units of measurement;
	  ○ giving quantitative measures of center (median and/or mean) o giving quantitative measures of variability (interquartile range and/or mean absolute deviation);
	  ○ describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered;
	  ○ relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them.
MP4. Model with mathematics.
MP5. Use appropriate tools strategically.
MP6. Attend to precision.
MP7. Look for and make use of structure.
MP8. Look for and express regularity in repeated reasoning.

Resources

Data About Us: Inv. 1, 2, 3, 4

Assessment

Formative	Summative
Binder Quiz	Check-up
Exit Slips	Partner Quiz
Do Now	Unit Assessments
Homework	Unit Projects

Career Readiness, Life Literacies, and Key Skills

Career Readiness, Life Literacies, and Key Skills
Rapid advancements in technology and subsequent changes in the economy have created opportunities for individuals to compete and connect on a global scale. In this increasingly diverse and complex world, the successful entrepreneur or employee must not only possess the requisite education for specific industry pathways but also employability skills necessary to collaborate with others and manage resources effectively in order to establish and maintain stability and independence. This document outlines concepts and skills necessary for New Jersey's students to thrive in an ever-changing world. Intended for integration throughout all K–12 academic and technical content areas, the New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) provides the framework for students to learn the concepts, skills, and practices essential to the successful navigation of career exploration and preparation, personal finances and digital literacy.

Mission
Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

Vision
An education in career readiness, life literacies, and key skills fosters a population that:
•Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
•Uses effective communication and collaboration skills and resources to interact with a global society;
•Possesses financial literacy and responsibility at home and in the broader community;
•Plans, executes, and alters career goals in response to changing societal and economic conditions; and
•Seeks to attain skill and content mastery to achieve success in a chosen career path.

Standards for Career Readiness, Life Literacy and Key Skills

- **9.1.8.CDM.1:** Compare and contrast the use of credit cards and debit cards for specific purchases and the advantages and disadvantages of using each.
- **9.1.8.CDM.2:** Demonstrate an understanding of the terminology associated with different types of credit (e.g. credit cards, installment loans, mortgages, lines of credit) and compare and calculate the interest rates associated with each.
- **9.1.8. FP.7:** Identify the techniques and effects of deceptive advertising.
- **9.4.8.IML.2:** Identify specific examples of distortion, exaggeration, or misrepresentation of information.
- **9.4.8.IML.12:** Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.
- **9.4.8.TL.2:** Gather data and digitally represent information to communicate a real-world problem (e.g. MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4)
- **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.

Computer Science and Design Thinking

Computer Science and Design Thinking

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing-intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices of computer science and design thinking, engaging students in computational thinking and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Mission

Computer science and design thinking education prepares students to succeed in today's knowledge-based economy by providing equitable and expanded access to high-quality, standards-based computer science and technological design education.

Vision

All students have equitable access to a rigorous computer science and design thinking education. Students will benefit from opportunities to engage in high-quality technology programs that foster their ability to:

• develop and apply computational and design thinking to address real-world problems and design creative solutions;

• engage as collaborators, innovators, and entrepreneurs on a clear pathway to success through postsecondary education and careers;

• navigate the dynamic digital landscape to become healthy, productive, 21st century global-minded individuals; and

• participate in an inclusive and diverse computing culture that appreciates and incorporates perspectives from people of different genders, ethnicities, and abilities.

Standards for Computer Science and Design Thinking

- **8.1.8.DA.1:** Organize and transform data collected using computational tools to make it usable for a specific purpose.
- **8.1.8.DA.5:** Test, analyze, and refine computational models.
- **8.1.8.AP.1:** Design and illustrate algorithms that solve complex problems using flowcharts and/or pseudocode.
- **8.1.8.AP.4:** Decompose problems and sub-problems into parts to facilitate the design, implementations and review of programs.