

**NORTHERN VALLEY SCHOOLS CONSORTIUM
OFFICE OF CURRICULUM AND INSTRUCTION**

MATHEMATICS CURRICULUM GUIDE

K – 8



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NORTHERN VALLEY SCHOOLS CONSORTIUM

Member Districts:

Closter

Demarest

Harrington Park

Haworth

Northvale

Norwood

Old Tappan

Northern Valley Regional High School District

Bergen County, New Jersey

**Mathematics
Curriculum Guide**

K – 8

**Office Of Curriculum And Instruction
Northern Valley Schools
Curriculum Center
Demarest, New Jersey 07627**

**Ms. Kathleen O’Flynn, Director
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2016-2017

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Preface and Acknowledgments

Continuing a long tradition, the Northern Valley Schools have collaboratively worked to revise curriculum based on NJDOE approved standards. Teams of teachers and other school leaders have come together to look at the needed changes and supporting resources. This process has been the connection that brings educators from throughout the Valley to a common understanding of what students need to learn.

In each writing cycle it has been recognized that the process of curriculum writing must be collaborative and continuous. Change is constantly affecting the areas of professional learning for teachers, technology use and resources in education, and shifts in mandates from state and federal departments of education. The districts of the Northern Valley Schools are to be commended for their commitment to high quality instruction and their determination to devote resources to teacher learning and collaboration.

The NVCC looks forward to continuing the comprehensive collaborative review and revision of curriculum to meet the needs of all students. The office is confident that the work of educators and the documents produced, contribute to the goal of improving student achievement throughout the Northern Valley Schools.

Acknowledgments

A special expression of gratitude is extended to our administrative assistants and secretaries in the office of Curriculum and Instruction for their efforts in the preparation of this guide for publication. The numerous hours working on the collation of information and their attention to detail and technology skills are most evident in the final product.

A handwritten signature in cursive script that reads "Kathleen O'Flynn".

Kathleen O'Flynn
Director of Curriculum and Instruction

Northern Valley Curriculum Guide

Accommodations and Modifications for Students

New Teacher Academy and Professional Learning Opportunities:

All teachers new to the Northern Valley participate in the New Teacher Academy. This comprehensive sequence of workshops is designed to support Northern Valley educators with the resources to meet the needs of all learners including English language learners, students receiving special education services, students at risk of failing and students identified for gifted and talented services. In year one of employment educators attend “Getting off to a Great Start and Instructional Skills Seminar,” which is a five-day learning experience with the intent of meeting the instructional needs of all learners. First year teachers also attend “Classroom Leadership” which is a one-day professional development offering designed to teach classroom management skills.

During year two of employment Northern Valley educators attend “Assessment: Strategies for Design” with the goal of honing assessment practices for effective differentiation of learning. This group also attends “Student Collaboration: Supporting Success with NJ Student Learning Standards.” Educators in their second year also select a workshop from our instructional strategies, curriculum connections, social and emotional, or technology strands that best suits their pedagogical needs.

During year three of employment Northern Valley educators attend “Meeting Students Where They Are & Strategies for Growth” which is a full day learning experience that examines instructional strategies to ensure all learners can access skills designated in the New Jersey Student Learning Standards. Third year teachers also engage in one full day elective from the instructional strategies, curriculum connections, social and emotional, or technology strands and engage in an action research activity tailored to the needs of student learning and engagement.

Northern Valley also provides an award winning professional learning program. We offer over 80 full day workshops that take place during the school year. Our workshops allow for varied experiences in the areas of Instructional Strategies, Content Specific, Technology and Social-Emotional Wellbeing. All teachers in Northern Valley are offered a minimum of two full day learning experiences that align with their own professional goals.

Benchmark Assessments:

Teachers of the Northern Valley create grade level and department level assessments - several are utilized for Student Growth Objective target assessments. These assessments are rigorous and include multiple measures from Webb’s Depth of Knowledge chart. Assessments may include portfolios, rubrics, journal assignments, literacy evaluations (i.e. Fountas & Pinnell, Independent Reading Level Assessment), projects, unit tests, or end of course exams. The Northern Valley is also committed to Criterion Reference Tests across schools and in multiple grades.

Special Education:

Throughout the Northern Valley Region special needs students receive a high quality specialized education to meet their individual social, emotional and educational needs. Within each individual school district there are programs designed to meet the needs of students in the “least restrictive environment”. These programs, from least restrictive to most restrictive, include; In-Class-Support, whereby a special education teacher or instructional aide is assigned to assist special education students in the general education classroom and Resource Room replacement, whereby students are pulled from their general education class for Math or Language Arts to a separate room for small group instruction with a special education teacher. The students who require this level of support, in some cases, receive modified curriculum and differentiated instruction, study guides, extended time on assessments, assistive technology in the form of an iPad or computer programs such as co-writer/word predictor to assist with written assignments. All modifications are stated specifically in a student’s Individual Education Plan or IEP to ensure that each student consistently receives the appropriate level of support.

In addition to the programs within the mainstream and/or resource room setting, throughout Northern Valley, districts utilize Region III Regional Programs and Services to meet the needs of special education students with a variety of disabilities. Self-Contained Programs include; Little Tots/Slice, for Pre-School age students, Valley, for primary and upper students on the autistic spectrum, TIP, for students who require social emotional and academic support, ACCESS Program– NVD, Bridge– NVD, and STEP – NVOT. Each school district in Northern Valley is encouraged to support the Regional Program model to ensure that all students receive a high quality, consistent level of education and services. Additional services include occupational therapy, physical therapy, speech therapy, behavior consultation, social skills, and counseling (individual and/or group). These “related services” are provided by Region III specialists certified in their respective fields.

For those students who are more significantly impaired, and a program cannot be provided by their school district or Regional Programs, there are specialized Out- of-District Programs, or “Private Schools”. For these few students programs are researched and suggested by the Child Study Team, CST, in conjunction with the parent(s), to ensure that individual student needs are being met. In most cases these students receive transportation to and from school, specialized equipment, if necessary and all related services as per their IEP at no cost to the parent(s).

English Language Learners

All English Language learners receive instruction in accordance to the state adopted WIDA standards which are as follows:

- English Language Development Standard 1: English language learners communicate for Social and Instructional purposes within the school setting
- English Language Development Standard 2: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Language Arts
- English Language Development Standard 3: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Mathematics
- English Language Development Standard 4: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science

- English Language Development Standard 5: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Social Studies

<https://wida.wisc.edu/resources>

Growth for these standards are measured annually using the state mandated ACCESS for ELLs assessment.

In general, ELL and ESL students have the following accommodations:

- Use of a paper bilingual dictionary during class and during assessments
- Extended time for all assessments
- Word banks for tests and quizzes,
- Access to teacher-created PowerPoints and notes
- Simplification of requirements (for example, accepting a 2-page paper rather than 5, or Accepting a PowerPoint vs. paper)

In High School, ELL students take their midterms and final exams in the ESL room, where they can get extra time, access to dictionaries and clarification of directions and questions. Alternate assessment locations are also made available as appropriate at the elementary and middle school levels. Finally, the ESL teacher will work out accommodations, in collaboration with the classroom teacher, on a case-by-case basis, depending on the level of the student. For example, for students in need of greater support, teachers may allow those students to use their notes during an assessment, or to take their tests with the ESL teacher in the ESL room so instructions and the expectation for particular questions can be explained. In the case of students with more intensive literacy support, the ESL teacher may actually read the questions and answer choices out loud to students.

The accommodations for NJSLA are much more complex and are spelled out in detail in the NJSLA manual: <https://nj.mypersonsupport.com/resources/manuals/NJSLASpring2019AFA.pdf>

Gifted and Talented:

The Northern Valley differentiates learning for our high achieving students by providing a specialized setting in each district for students identified as eligible for Gifted and Talented Programming services through the Northern Valley Screening/Identification Process.

In addition to in-district specialized programming, each district also provides out-of-district specialized settings through Outreach or multi-district convocation experiences. For example, all 7th, 8th and 9th grade Northern Valley Gifted and Talented students have the opportunity to participate in

the Valley Interdisciplinary Approach Program: Explorations in Team Problem Solving. Other examples may include “Invengineering Expo”, Bergen Brain Busters, Evolution Earth/World Game, Blokus Event, Dare to Fly, etc.

Each district supports their own schedule of Outreach Programming, which may include districts within the Northern Valley, County, or State. Northern Valley administrators and the Northern Valley Curriculum Center provide opportunities for Gifted and Talented staff to work together to develop and implement these curricula.

During the development process, appropriate standards are referenced from the New Jersey Student Learning Standards and the National Association for Gifted Children Gifted Program Standards Pre-K - Grade 12.

Gifted opportunities are also a part of the AP and Honors programs, as well as coursework that comes with awarding of college credits and Cap Stone Projects. Independent study projects are created for the gifted in need of specialized academic opportunities. Specialized co- curricular activities such as Math League, Science Team and Debate Club also allow for extensions of the gifted program.

Students in Danger of Failing

The purpose of the Intervention and Referral Team (I&RS) is to provide in-house professional assistance to an administrator or teacher for a pupil who demonstrates social, emotional or educational problems. The Principal is the chair and primary faculty contact for the I&RS team.

The I&RS committee provides assistance in understanding the pupil’s problem(s) in developing strategies, which will, hopefully, help the pupil overcome the problem. The I&RS committee consists of a standing membership panel including the Principal, Assistant Principal, classroom teacher(s), Guidance Counselor, School Nurse, Child Study Team member(s) or any other professional assigned to the building who may have pertinent information regarding a specific student. Parent(s) and/or the student may be asked to participate where it is determined advisable.

When a child encounters a problem, the teacher, after in-class interventions and ongoing parental contact/conferences, may submit a student referral form to the I&RS Committee. The I&RS Committee will convene to review the form and determine if follow-up is warranted. Some or all of the following factors will be considered:

1. Mental Capacity

- a) Ability
- b) Expectancy

2. Academic

- a) Strengths and weaknesses
- b) Test results
- c) Functional levels
- d) Class work and participation
- e) Homework
- f) Learning style
- g) Rate and degree of learning
- h) Abstract thinking
- i) Recall ability

3. Emotional

- a) Personality
- b) Needs
- c) Motivation
- d) Overt behavior
- e) Cognition as influenced by affective factors

4. Social

- a) Interpersonal relationships
- b) Participation
- c) General behavior in school, home and community

5. Physical

- a) Visual and auditory acuity
- b) General medical history

6. Work and Study

- a) Classroom behavior
- b) Task orientation/ completion
- c) Independent functioning
- d) Attending behavior
- e) Class participation
- f) Quality of work
- g) Following directions
- h) Organizing work

Intervention and Referral Service Procedure

1. The teacher identifies a student with academic or behavioral difficulties. The teacher communicates concerns to the parents. After informal interventions in the classroom do not appear to be successful, the teacher refers the child to the I&RS Committee.

2. The Principal schedules the first I&RS Committee meeting and notifies attendees: Committee members, parents/guardians, teacher(s), and designated staff.
3. The Principal gathers information from teachers/staff who have information relevant to the identified problem, including the prior year's teacher where relevant.
4. The teacher collects work samples and anecdotal notes to bring to the meeting to illustrate the problem. (Textbooks may also be brought). The teacher will be asked to discuss all interventions/accommodations attempted to date and their results/outcomes.
5. The Principal chairs the scheduled meeting and outlines its purpose: to develop strategies, interventions, and/or accommodations to assist the student in the classroom and/or at home. A time frame to monitor and evaluate student progress with the interventions, strategies, and accommodation is designated. Staff responsible for implementing the intervention, strategies, and accommodations is determined and documented.
6. The Principal will notify the parents/guardians of the meeting outcomes. The teacher and responsible staff will notify/update the Principal within the designated time period about the progress of the interventions. Updates will be shared with Committee members at a follow-up meeting. Parents/guardians may be invited to attend.

I&RS meetings follow a specific format: First, the student's background is reviewed and a main problem is identified. Discussion and analysis of the problem follows its identification. Subsequently, the members of the I&RS Committee list strategies to remedy or alleviate the problem(s). If the parents do not attend the meeting, the intervention plan is subsequently discussed with them.

Problem Solving Model

- 1) Problem Identification
 - a) Teacher tentatively identifies the problem
 - b) Observation by CST member or Guidance Counselor where appropriate
- 2) Data is collected
 - a) Samples of work depicting problem areas
 - b) Discussion
 - c) Problem is clarified
- 3) Intervention
 - a) Brainstorming of interventions

- b) Development of an intervention plan
 - c) Implementation of the plan
- 4) Teacher evaluation of plan
- a) Decision regarding further meetings/intervention

After the plan has been in effect for a reasonable amount of time, the I&RS Committee may recommend continuation of the recommended strategies or consider additional/alternative strategies. The student may be referred to the Child Study Team after all building resources have been exhausted and the student continues to demonstrate significant social, emotional, and/or educational difficulties.

If the intended action is a referral to the Child Study Team, Parents are notified and are provided with Notice of Referral, Parental Rights in Special Education and a copy of the strategies already attempted. All information gathered by the I&RS is included in the referral packet.

All questions regarding the I&RS process may be directed to the Principal and/or Committee Chairperson.

Assessments to Support and Monitor the Northern Valley Curriculum

To support the implementation of the curriculum and the monitoring of student learning across each grade level, districts will develop and collect appropriate assessments aligned to state standards.

Locally created formative and summative benchmark assessments are used at all grade levels.

To support this curriculum guide, assessments may include the use of the following but are not limited to this list:

- District level classroom assessments aligned to specific standards.
- Reading Benchmark assessment tools (ie: Fountas & Pinnell, TCRWP reading level assessments, Reading A-Z, Scholastic Independent Reading Assessment)
- Criterion Referenced Tests available to district schools through the Northern Valley Curriculum Center.
- Formative assessments from the NJ DOE support materials (i.e. Model Curriculum)
- Performance assessments from the Teachers College Reading and Writing Project
- (Northwest Evaluation Association) and the related MAP assessments
- Renaissance Learning and Assessment

Districts are encouraged to collect assessment items that support standards and utilize these [educator assessment resources](#).

**Northern Valley School Consortium
Mathematics
Curriculum Guide**

Kindergarten

Unit 1: Operations and Algebraic Thinking	Weeks 1-6
Unit 2: Number and Operations in Base Ten	Weeks 7-12
Unit 3: Measurement and Data	Weeks 13-19
Unit 4: Geometry	Weeks 20-26
Unit 5: Counting and Cardinality	Weeks 27-32

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment is designed at the discretion of the district.
Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Kindergarten – Grade 2 Overview

Kindergarten	Grade 1	Grade 2
<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. 	<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Represent and solve problems involving addition and subtraction. ✓ Understand and apply properties of operations and the relationship between addition and subtraction. ✓ Add and subtract within 20. ✓ Work with addition and subtraction equations. 	<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Represent and solve problems involving addition and subtraction. ✓ Add and subtract within 20. ✓ Work with equal groups of objects to gain foundations for multiplication.
<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Work with numbers 11-19 to gain foundations for place value. 	<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Extend the counting sequence. ✓ Understand place value. ✓ Use place value understanding and properties of operations to add and subtract. 	<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Understand place value. ✓ Use place value understanding and properties of operations to add and subtract.
<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Describe and compare measurable attributes. ✓ Classify objects and count the number of objects in categories. 	<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Measure lengths indirectly and by iterating length units. ✓ Tell and write time. ✓ Represent and interpret data. 	<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Measure and estimate lengths in standard units. ✓ Relate addition and subtraction to length ✓ Work with time and money. ✓ Represent and interpret data.
<p>Geometry</p> <ul style="list-style-type: none"> ✓ Identify and describe shapes. ✓ Analyze, compare, create, and compose shapes. 	<p>Geometry</p> <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes 	<p>Geometry</p> <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes
<p>Counting and Cardinality</p> <ul style="list-style-type: none"> ✓ Know number names and the count sequence. ✓ Count to tell the number of objects. ✓ Compare numbers. 		
<p>Mathematical Practices for Grades K – 2</p> <p>1. Make sense of problems and persevere in solving them. 4. Model with mathematics. 7. Look for and make use of structure.</p> <p>2. Reason abstractly and quantitatively 5. Use appropriate tools strategically. 8. Look for and express regularity in repeated reasoning.</p> <p>3. Construct viable arguments and critique the reasoning of others. 6. Attend to precision.</p>		
	<p>Entering Expected Skills:</p> <ul style="list-style-type: none"> ✓ Number sense ✓ Language – number sentence – basic vocabulary ✓ Understanding basic number sense ✓ Transition (beginning) to mental math – not just manipulatives ✓ Compose/decompose up to 5 ✓ How to use manipulatives 	<p>Entering Expected Skills:</p> <ul style="list-style-type: none"> ✓ Fact practice ✓ Fact families ✓ Skip counting ✓ Number patterns ✓ Number sense ✓ Friends of 10 (facts that make 10)

Kindergarten: Curriculum Connections

<p>Interdisciplinary Connections</p>	<p>NJSLS/ELA: NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p>	<p>Social Studies: 6.1.4.B.1 Compare and contrast information that can be found on different types of maps and determine how the information may be useful.</p>
<p>Integration of 21st Century Standards NJSLS 9:</p>	<p>9.1.4.A.2: Identify potential sources of income. 9.2.4.A.1: Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals. 9.1.4.B.3: Explain what a budget is and why it is important. 9.1.4.E.2: Apply comparison shopping skills to purchasing decisions</p>	
<p>Integration of Technology Standards NJSLS 8:</p>	<p>8.1.2.B.1 Illustrate and communicate original ideas and stories using multiple digital tools and resources. 8.1.2.F.1 Use geographic mapping tools to plan and solve problems.</p>	
<p>Career Ready Practices:</p>	<p>CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity</p>	
<p>Core Instructional Materials</p>	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>	
<p>Accommodations and Modifications:</p>	<p><u>Students with special needs:</u> Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.</p> <p><u>ELL/ESL students:</u> Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/</p> <p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.</p> <p><u>Gifted and Talented Students:</u> Students excelling in mastery of standards will be challenged with complex, high level challenges related to the math learning. This will include multistep word problems that utilize mastery of grade level standards.</p>	

Kindergarten

In Kindergarten, instructional time should focus on two critical areas: (1) representing, relating, and operating on 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.

Anchor Standards for Math	
Counting and Cardinality K.CC (.1....7)	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How do we use ordinal numbers in everyday life? 2. Where do we see numerals in the real world? 3. What do numerals represent? 4. How can you show, count, and write numbers 0 to 5? 5. How can you show, count, and write numbers 6 to 9? 6. How can you show, count, and write numbers 10 to 20 and beyond? 7. How can building and comparing sets help you compare numbers? 8. How can you show and compare numbers to 10? 9. How can you solve problems using the strategy draw a picture?
<ul style="list-style-type: none"> • Know number names and the count sequence. • Count to tell the number of objects. • Compare numbers. 	<p>Know number names and the count sequence.</p> <ol style="list-style-type: none"> 1. Count to 100 by ones and by tens. 2. Count forward beginning from a given number within the known sequence (instead of having to begin at 1). 3. Write and name numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects). <p>Count to tell the number of objects.</p> <ol style="list-style-type: none"> 4. Understand the relationship between numbers and quantities; connect counting to cardinality. <ol style="list-style-type: none"> 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. 5. Count to answer “how many?” questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1-20, count out that many objects. For example: When given a number (1-20), represent the number with objects. <p>Compare numbers.</p> <ol style="list-style-type: none"> 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. 7. Compare two numbers between 1 and 10 presented as written numerals.

Suggested Vocabulary: match, pairs, larger, fewer, more, and, number words 0-20, same number, greater, less, compare, tens, fifty, one hundred

<p>Operations and Algebraic Thinking K.OA (.1....5)</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How do we use ordinal numbers in everyday life? 2. Where do we see numerals in the real world? 3. What do numerals represent? 4. How can you show addition? 5. How can you show subtraction?
<ul style="list-style-type: none"> • Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. 	<p>Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.</p> <ol style="list-style-type: none"> 1. Represent addition and subtraction with up to 10 objects, fingers, mental images, drawings 2, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. 2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem. 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 $5 = 4 + 1$). 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. 5. Demonstrate fluency for addition and subtraction within 5.

Suggested Vocabulary: add, plus, is equal to, subtract, minus

<p>Number and Operations in Base Ten K.NBT (.1)</p>	<p>Essential Question:</p> <ol style="list-style-type: none"> 1. Why is it important to understand tens and ones? 2. How can you show, count, and write numbers 11 to 19?
<ul style="list-style-type: none"> • Work with numbers 11–19 to gain foundations for place value. 	<p>Work with numbers 11–19 to gain foundations for place value.</p> <ol style="list-style-type: none"> 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.

Suggested Vocabulary: number words 11-20

<p>Measurement and Data K.MD (.1....3)</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. What types of things can be measured? 2. How can something be measured? 3. How do you use weight and measurement in your life? 4. What tools and units are used to measure the attributes of an object? 5. How can comparing objects help you measure them? 6. How does sorting help you display information?
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<ul style="list-style-type: none"> Describe and compare measurable attributes. Classify objects and count the number of objects in categories. Encompasses graphing and sorting. 	<p>Describe and compare measurable attributes.</p> <ol style="list-style-type: none"> 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 see which object has “more of”/“less of” the attribute, and describe the difference. <i>For example, directly compare the heights of two children and describe one child as taller/shorter.</i> <p>Classify objects and count the number of objects in each category.</p> <ol style="list-style-type: none"> Classify objects into given categories; count the numbers of objects in each category and sort the categories by count. For example: pennies and dimes could be used as manipulatives, as well as any other group of similar objects.
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Suggested Vocabulary: longer, same length, shorter, same height, taller, heavier, lighter, same weight, color, blue, red, yellow, green, category, classify, shape, big, size, small, graph

<p>Geometry K.G (.1....6)</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> How can I identify and describe solid figures by describing the faces, edges, and sides? In what ways can I match solid geometric figures to real-life objects? How can I put shapes together and take them apart to form other shapes? How can you identify, name, and describe two-dimensional shapes? How can identifying and describing shapes help you sort them?
<ul style="list-style-type: none"> Identify and describe shapes. Analyze, compare, create, and compose shapes. 	<p>Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).</p> <ol style="list-style-type: none"> Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as <i>above, below, beside, in front of, behind, and next to</i>. Correctly name shapes regardless of their orientations or overall size. Identify shapes as two-dimensional (lying in a plane, “flat”) or three dimensional (“solid”). <p>Analyze, compare, create, and compose shapes.</p> <ol style="list-style-type: none"> 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). Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes. Compose simple shapes to form larger shapes. <i>For example, “Can you join these two triangles with full sides touching to make a rectangle?”</i>

Suggested Vocabulary: circle, square, triangle, rectangle, hexagon, two-dimensional shapes, curve, corner, side, sides of equal length, vertex, vertices, alike, different, flat surface, curved surface, roll, stack, slide, sphere, Three-dimensional shapes, cube, cylinder, cone, flat, solid, above, below, beside, next to, in front of, behind

Mathematical Practices

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

Useful Vocabulary for Understanding the Curriculum Guide:

Fluently - Students have automatic recall of material.
Compose - To create.
Decompose - To breakdown.

Literature Resources:

*Counting/Comparing Numbers:

One Monkey Too Many, by Jackie French Koller
Mouse Count, by Ellen Walsh
More or Less, by Stuart Murphy
The Cheerios Counting Book, by Barbara McGrath

*Addition/Subtraction:

Who Sank the Boat?, by Allen Pamela

*Shapes:

Mouse Shapes, by Ellen Walsh
Circus Shapes, by Stuart Murphy
Cubes, Cones, Cylinders & Spheres, by Tana Hoban
The Greedy Triangle, by Marilyn Burns

*Sorting:

Three Little Firefighters, by Stuart Murphy
Sorting, by Henry Pluckrose
Tally O'Malley, by Stuart Murphy

*Patterns:

Pattern Fish, by Trudy Harris
Pattern Bugs, by Trudy Harris

*Measurement:

How Big Is A Foot?, by Rolf Myller
Inch by Inch, by Leo Lionni

Other Resources:

Counting/Comparing Numbers:

- *Use sand, shaving cream to write numbers; use wikki sticks, pipe cleaners, straws to form numbers.
- *Musical Math - Kimberly Jordano and Trisha Callella (Creative Teaching Press) Book
- *Stamp pad and stamps to represent number of objects when counting and when using ordinal numbers.

Addition/Subtraction:

- *Wipe off boards to solve addition and subtraction problems.
- *Use die to add and subtract (available on SMART Board as well under gallery essentials).
- *Create a class book called Domino Math.
 1. Each child gets a page to create for the book.
 2. Each child gets a domino.

3. Each child has to recreate that domino on their page of the book using black dots that need to be cut out.

*Use the song "Five Little Monkeys" for subtraction.

Shapes:

*Use Geo Boards, toothpicks, straws, and yarn to create shapes.

*Use geometric shapes to create pictures - Shape Art.

*Use shape songs or poems from various websites.

Sorting:

*Use a variety of objects to sort and discuss their methods of sorting. For example, you can sort by color, shape, and size.

*Sort the children in the class by hair color, eye color, clothing, etc.

SMART Exchange

Balanced Literacy Catalogue

Measurement:

*Have children jump and measure their distances using non-unit standards of measure.

*Have children use hands-on manipulatives to measure items such as paper clips, uniflex cubes, and yarn.

*Trace each child's foot on a white sheet of paper. Create a class book of the traced feet to compare sizes and measurements.

SMART Board Resources: www.exchange.smarttech.com

Website Resources:

www.primarygames.com

www.internet4classrooms.com

www.funbrain.com

www.sitesforteachers.com

www.mathfactcafe.com

www.aaamath.com

www.ixl.com/math/grade/kindergarten

www.mathwire.com

Math Links For Parents

[Helping Your Child Learn Math](#)

[Math Challenges for Families](#)

Grade 1

Unit 1: Operations and Algebraic Thinking	Weeks 1-8
Unit 2: Number and Operations in Base Ten	Weeks 9-14
Unit 3: Measurement and Data	Weeks 15-21
Unit 4: Geometry	Weeks 22-29

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment is designed at the discretion of the district.
Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Kindergarten - Grade 2 Overview

Kindergarten	Grade 1	Grade 2
<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. 	<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Represent and solve problems involving addition and subtraction. ✓ Understand and apply properties of operations and the relationship between addition and subtraction. ✓ Add and subtract within 20. ✓ Work with addition and subtraction equations. 	<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Represent and solve problems involving addition and subtraction. ✓ Add and subtract within 20. ✓ Work with equal groups of objects to gain foundations for multiplication.
<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Work with numbers 11-19 to gain foundations for place value. 	<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Extend the counting sequence. ✓ Understand place value. ✓ Use place value understanding and properties of operations to add and subtract. 	<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Understand place value. ✓ Use place value understanding and properties of operations to add and subtract.
<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Describe and compare measurable attributes. ✓ Classify objects and count the number of objects in categories. 	<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Measure lengths indirectly and by iterating length units. ✓ Tell and write time. ✓ Represent and interpret data. 	<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Measure and estimate lengths in standard units. ✓ Relate addition and subtraction to length ✓ Work with time and money. ✓ Represent and interpret data.
<p>Geometry</p> <ul style="list-style-type: none"> ✓ Identify and describe shapes. ✓ Analyze, compare, create, and compose shapes. 	<p>Geometry</p> <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes 	<p>Geometry</p> <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes
<p>Counting and Cardinality</p> <ul style="list-style-type: none"> ✓ Know number names and the count sequence. ✓ Count to tell the number of objects. ✓ Compare numbers. 		
<p>Mathematical Practices for Grades K – 2</p> <p>1. Make sense of problems and persevere in solving them. 4. Model with mathematics. 7. Look for and make use of structure. 2. Reason abstractly and quantitatively 5. Use appropriate tools strategically. 8. Look for and express regularity in repeated reasoning. 3. Construct viable arguments and critique the reasoning of others. 6. Attend to precision.</p>		
	<p>Entering Expected Skills:</p> <ul style="list-style-type: none"> ✓ Number sense ✓ Language – number sentence – basic vocabulary ✓ Understanding basic number sense ✓ Transition (beginning) to mental math – not just manipulatives ✓ Compose/decompose up to 5 ✓ How to use manipulatives 	<p>Entering Expected Skills:</p> <ul style="list-style-type: none"> ✓ Fact practice ✓ Fact families ✓ Skip counting ✓ Number patterns ✓ Number sense ✓ Friends of 10 (facts that make 10)

Grade 1: Curriculum Connections

<p>Interdisciplinary Connections</p>	<p>NJSLS/ELA: NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p>	<p>Social Studies: 6.1.4.B.1 Compare and contrast information that can be found on different types of maps and determine how the information may be useful.</p>
<p>Integration of 21st Century Standards NJSLS 9:</p>	<p>9.1.4.A.2: Identify potential sources of income. 9.2.4.A.1: Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals. 9.1.4.B.3: Explain what a budget is and why it is important. 9.1.4.E.2: Apply comparison shopping skills to purchasing decisions</p>	
<p>Integration of Technology Standards NJSLS 8:</p>	<p>8.1.2.B.1 Illustrate and communicate original ideas and stories using multiple digital tools and resources. 8.1.2.F.1 Use geographic mapping tools to plan and solve problems.</p>	
<p>Career Ready Practices:</p>	<p>CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity</p>	
<p>Core Instructional Materials</p>	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>	
<p>Accommodations and Modifications:</p>	<p><u>Students with special needs:</u> Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.</p> <p><u>ELL/ESL students:</u> Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/</p> <p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.</p> <p><u>Gifted and Talented Students:</u> Students excelling in mastery of standards will be challenged with complex, high level challenges related to the math learning. This will include multistep word problems that utilize mastery of grade level standards.</p>	

Grade 1

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.

Operations and Algebraic Thinking 1.OA (.1....9)	Essential Questions: <ol style="list-style-type: none"> 1. How can I use what I know about tens and ones to add & subtract two-digit numbers? 2. How do I recognize what strategy to use for a specific problem? 3. What makes a strategy for working with numbers efficient and effective? 4. How can I model adding within 10? 5. How can I solve addition problems? 6. How can I subtract numbers from 10 or less? 7. How can relating addition and subtraction help you to learn and understand facts within 20? 8. How can I solve subtraction problems?
<ul style="list-style-type: none"> • Represent and solve problems involving addition and subtraction. • Understand and apply properties of operations and the relationship between addition and subtraction. • Add and subtract within 20. • Work with addition and subtraction equations. 	<p>Represent and solve problems involving addition and subtraction.</p> <ol style="list-style-type: none"> 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. 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. <p>Understand and apply properties of operations and the relationship between addition and subtraction.</p> <ol style="list-style-type: none"> 3. Apply properties of operations as strategies to add and subtract. <i>3 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.)</i> 4. Understand subtraction as an unknown-addend problem. <i>For example, subtract $10 - 8$ by finding the number that makes 10 when added to 8.</i> <p>Add and subtract within 20.</p> <ol style="list-style-type: none"> 5. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2). 6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 12. 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 $6 + 6 + 1 = 12 + 1 = 13$). <p>Work with addition and subtraction equations.</p> <ol style="list-style-type: none"> 7. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. <i>For example, which of the following equations are true and which are false? $6 = 6$, $7 = 8 - 1$, $5 + 2 = 2 + 5$, $4 + 1 = 5 + 2$.</i> 8. Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations $8 + ? = 11$, $5 = \square - 3$, $6 + 6 = \square$</i>

<p>Number and Operations in Base Ten 1.NBT (.1....6)</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How can I use place value to decompose numbers to find sums or differences? 2. How do I take apart and recombine numbers in a variety of ways for finding sums and differences? 3. How do I use place value to model, read, and write numbers to 120? 4. How can I add and subtract two digit numbers? 5. How can I use place value to compare numbers?
<ul style="list-style-type: none"> • Extend the counting sequence. • Understand place value. • Use place value understanding and properties of operations to add and subtract. 	<p>Extend the counting sequence.</p> <ol style="list-style-type: none"> 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. <p>Support Strategies</p> <ol style="list-style-type: none"> a. Skip-count by 2s, 5s, and 10s b. Understands odd and even numbers using concrete numbers. <p>Understand place value.</p> <ol style="list-style-type: none"> 2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases: <ol style="list-style-type: none"> 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). 3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols $>$, $=$, and $<$. <p>Use place value understanding and properties of operations to add and subtract.</p> <ol style="list-style-type: none"> 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. 5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. 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.
<p>Measurement and Data 1.MD (.1....4)</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. What tools or units could be used to measure the attributes of an object? 2. How do I measure accurately? 3. How and why do you collect data 4. How do you order objects by length? 5. How can you compare lengths of three objects to put them in order? 6. How do you tell and write time to the hour and half hour?

<ul style="list-style-type: none"> • Measure lengths indirectly and by iterating length units. • Tell and write time. • Represent and interpret data 	<p>7. How can graphs and charts help you organize, represent, and interpret data?</p> <p>Measure lengths indirectly and by iterating length units.</p> <ol style="list-style-type: none"> 1. Order three objects by length; compare the lengths of two objects indirectly by using a third object. 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. <i>Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.</i> <p>Tell and write time.</p> <ol style="list-style-type: none"> 3. Tell and write time in hours and half-hours using analog and digital clocks. <p>Represent and interpret data.</p> <ol style="list-style-type: none"> 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. Example: graphing, predictions, sorting, tallying <p>Support Strategies</p> <p>Coins can be used for counting (tallying) or representing data. Solving math problems value will be introduced in Grade 2. Money can still be used as a manipulative.</p>
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<p>Geometry 1.G (.1....3)</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. Where in the real world can I find shapes? 2. How can I identify and describe solid figures by describing the faces, edges, and sides? 3. How can I put shapes together and take them apart to form other shapes? 4. How do I identify and describe three-dimensional shapes? 5. How can I use a combined shape to build new shapes? 6. What two dimensional shapes do I see on the flat surfaces of three dimensional shapes? 7. How do I sort and describe two dimensional shapes?
<ul style="list-style-type: none"> • Reason with shapes and their attributes. 	<p>Reason with shapes and their attributes.</p> <ol style="list-style-type: none"> 1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes. 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. 3. Partition circles and rectangles into two and four equal shares, describe the shares using the words <i>halves</i>, <i>fourths</i>, and <i>quarters</i>, and use the phrases <i>half of</i>, <i>fourth of</i>, and <i>quarter of</i>. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares. <p>Support Strategy</p> <p>When partitioning circles and other shapes into fractions, reference the relationship to fractions on a number line.</p>

<p>Mathematical Practices</p> <ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. 	<p><u>Useful Vocabulary for Understanding the Curriculum Guide:</u></p> <p>Fluently - Students have automatic recall of material</p> <p>Mentally-The students will be able to solve problems in their head without paper pencil</p> <p>Compose - To create</p> <p>Decompose - To breakdown</p> <p>Partition-To divide equally</p> <p>Composite Shape- A figure (or shape) that can be divided into more than one of the basic figures is said to be a composite figure (or shape)</p> <p>For example, figure ABCD is a composite figure as it consists of two basic figures. That is, a figure is formed by a rectangle and triangle shown below.</p>
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Literature Resources:

Counting/Comparing Numbers

Anno's Counting Book: by Anno Mitsumasa

Alfie the Alligator: by Sandy Turley

Greg Tang Math collection: Grapes of Math, Math Potatoes, Math for all Seasons, Math Appeal.

Addition/Subtraction

Hershey's Kisses Addition Book: by Jerry Pollata

The Doorbell Rang: by Pat Hutchins

Mission Addition: by Loreen Leedy

Shapes

Greedy Triangle: by Marilyn Burns

Cubes, Cones, Cylinders & Spheres: by Tana Hoban

Grandfather Tang's Story: by Ann Tompert

Silly Story of Goldilocks and The Three Squares: by Grace Macon

Patterns

Busy Bugs: by Jayne Harvey

Twizzlers, Shapes & Patterns: by Jerry Pollata

Measurement

How Big Is A Foot?: by Rolf Myller

Inch by Inch: by Leo Lionni

Geometry

Eating Fractions: by Bruce McMillan

Give Me Half!: by Stuart Murphy

Telling Time

The Grouchy Ladybug: by Eric Carle

Telling Time: by Jules Older

It's About Time: by Stuart Murphy

Skip Counting

Two of Everything: Lily Toy Hong

SMART Board Resources

Money

<http://exchange.smarttech.com/details.html?id=x43813aab00b441f384ab50bffb4dd49d>

Website Resources:

www.primarygames.com

www.internet4classrooms.com

www.funbrain.com

www.sitesforteachers.com

www.mathfactcafe.com

www.aaamath.com

www.ixl.com/math/grade/first

www.mathwire.com

Math Links For Parents

[Helping Your Child Learn Math](#)

[Math Challenges for Families](#)

Grade 2

Unit 1: Operations and Algebraic Thinking	Weeks 1-8
Unit 2: Number and Operations in Base Ten	Weeks 9-14
Unit 3: Measurement and Data	Weeks 15-21
Unit 4: Geometry	Weeks 22-28

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment is designed at the discretion of the district.
Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Kindergarten - Grade 2 Overview

Kindergarten	Grade 1	Grade 2
<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from. 	<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Represent and solve problems involving addition and subtraction. ✓ Understand and apply properties of operations and the relationship between addition and subtraction. ✓ Add and subtract within 20. ✓ Work with addition and subtraction equations. 	<p>Operations and Algebraic Thinking</p> <ul style="list-style-type: none"> ✓ Represent and solve problems involving addition and subtraction. ✓ Add and subtract within 20. ✓ Work with equal groups of objects to gain foundations for multiplication.
<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Work with numbers 11-19 to gain foundations for place value. 	<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Extend the counting sequence. ✓ Understand place value. ✓ Use place value understanding and properties of operations to add and subtract. 	<p>Number and Operations in Base Ten</p> <ul style="list-style-type: none"> ✓ Understand place value. ✓ Use place value understanding and properties of operations to add and subtract.
<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Describe and compare measurable attributes. ✓ Classify objects and count the number of objects in categories. 	<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Measure lengths indirectly and by iterating length units. ✓ Tell and write time. ✓ Represent and interpret data. 	<p>Measurement and Data</p> <ul style="list-style-type: none"> ✓ Measure and estimate lengths in standard units. ✓ Relate addition and subtraction to length ✓ Work with time and money. ✓ Represent and interpret data.
<p>Geometry</p> <ul style="list-style-type: none"> ✓ Identify and describe shapes. ✓ Analyze, compare, create, and compose shapes. 	<p>Geometry</p> <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes 	<p>Geometry</p> <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes
<p>Counting and Cardinality</p> <ul style="list-style-type: none"> ✓ Know number names and the count sequence. ✓ Count to tell the number of objects. 		
<p>Mathematical Practices for Grades K – 2</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others. </div> <div style="width: 30%;"> <ol style="list-style-type: none"> 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. </div> <div style="width: 30%;"> <ol style="list-style-type: none"> 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. </div> </div>		
	<p>Entering Expected Skills:</p> <ul style="list-style-type: none"> ✓ Number sense ✓ Language – number sentence – basic vocabulary ✓ Understanding basic number sense ✓ Transition (beginning) to mental math – not just manipulatives ✓ Compose/decompose up to 5 ✓ How to use manipulatives 	<p>Entering Expected Skills:</p> <ul style="list-style-type: none"> ✓ Fact practice ✓ Fact families ✓ Skip counting ✓ Number patterns ✓ Number sense ✓ Friends of 10 (facts that make 10)

Grade 2: Curriculum Connections

<p>Interdisciplinary Connections</p>	<p>NJSLS/ELA: NJSLSA.R2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p>	<p>Social Studies: 6.1.4.B.1 Compare and contrast information that can be found on different types of maps and determine how the information may be useful.</p>
<p>Integration of 21st Century Standards NJSLS 9:</p>	<p>9.1.4.A.2: Identify potential sources of income. 9.2.4.A.1: Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals. 9.1.4.B.3: Explain what a budget is and why it is important. 9.1.4.E.2: Apply comparison shopping skills to purchasing decisions</p>	
<p>Integration of Technology Standards NJSLS 8:</p>	<p>8.1.2.B.1 Illustrate and communicate original ideas and stories using multiple digital tools and resources. 8.1.2.F.1 Use geographic mapping tools to plan and solve problems.</p>	
<p>Career Ready Practices:</p>	<p>CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity</p>	
<p>Core Instructional Materials</p>	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>	
<p>Accommodations and Modifications:</p>	<p><u>Students with special needs:</u> Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.</p> <p><u>ELL/ESL students:</u> Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/</p> <p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.</p> <p><u>Gifted and Talented Students:</u> Students excelling in mastery of standards will be challenged with complex, high level challenges related to the math learning. This will include multistep word problems that utilize mastery of grade level standards.</p>	

Grade 2

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.

Anchor Standards for Math	
Operations and Algebraic Thinking 2.OA (.1....4)	Essential Questions: <ol style="list-style-type: none"> 1. How do operations affect numbers? 2. How do I recognize what strategy to use for a specific problem? 3. How are even numbers and odd numbers different? 4. Why can an even number be shown as the sum of two equal addends? 5. How can you use doubles facts to find sums for near doubles facts? 6. How is the make a ten strategy used to find sums? 7. How do you add three numbers? 8. How are addition and subtraction related? 9. How does getting to 10 in subtraction help when finding differences?
<ul style="list-style-type: none"> • Represent and solve problems involving addition and subtraction. • Add and subtract within 20. • Work with equal groups of objects to gain foundations for multiplication. 	<p>Represent and solve problems involving addition and subtraction.</p> <ol style="list-style-type: none"> 1. Use addition and subtraction within 100 to solve one- and two-step word problems. This includes: adding to, taking from, putting together, taking apart, and comparing, with unknowns in all position, e.g., $70 + \underline{\quad} = 80$; $\underline{\quad} + 10 = 80$ <p>Add and subtract within 20.</p> <ol style="list-style-type: none"> 2. Fluently add and subtract within 20 using mental strategies. By the end of Grade 2, know from memory all sums of two one-digit numbers. <p>Work with equal groups of objects to gain foundations for multiplication.</p> <ol style="list-style-type: none"> 3. Explain and 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. ($2+2=4$; $5+5=10$) 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.*

Suggested Vocabulary:

Even, Odd, Sum, doubles, addends, count on, number sentence, difference, related facts, count back, bar model, row, addition sentence,

Suggested Resources:

- ✓ [How Much is a Million](#), Schwartz
- ✓ [Two Ways to Count to Ten: A Liberian Folktale](#), Retold by Ruby Dee
- ✓ [12 Ways to Get to 11](#), by Eve Merriam
- ✓ [Two of Everything: A Chinese Folktale](#)
- ✓ [The M&M's Counting Book](#), Barbara Barbieri McGrath
- ✓ [The Doorbell Rang](#), Pat Hutchins
- ✓ [Circle and Stars Game](#), Marilyn Burns (intro to multiplication)
- ✓ Xtra math:
Xtramath.org

- ✓ Ambleweb Function Machine: This site allows children to work with numbers using a function machine.
<http://www.amblesideprimary.com/ambleweb/mentalmaths/functionmachines.html>
- ✓ Hooda Math: This website gives you games and worksheets for all math strands. Excellent site!
http://hoodamath.com/index.php?utm_source=phplist&utm_medium=email&utm_campaign=newjersey
- ✓ The Math Worksheet Site: With The Math Worksheet Site you can create an endless supply of printable math worksheets.
<http://themathworksheetsite.com/>
- ✓ Math Fact Café: This is a great site to practice math facts!
<http://www.mathfactcafe.com/>
- ✓ MathCats: This site has some fun interactive math activities.
<http://www.mathcats.com/>
- ✓ IXL: This is a great site for all math strands!
<http://www.ixl.com/math/grade/second/>
- ✓ Fun Brain: This is a wonderful site for math activities!
<http://www.funbrain.com>
- ✓ Super Kids: One excellent feature of this site is being able to generate math worksheets for our addition and subtraction facts. This site has many other subject areas too!
<http://www.superkids.com>
- ✓ www.brainpop.com
- ✓ Numbernut.com
- ✓ Discovery Streaming (subscription site, but most schools have it)
- ✓ ThinkCentral (Go Math)

<p>Number and Operations in Base Ten 2.NBT (.1....9)</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How can I use what I know about number relationships to develop efficient strategies for adding and/or subtracting multi-digit numbers? 2. How do you know the value of a digit? 3. What are different ways to write a 2 and 3-digit number? 4. How can you show the value of a number in different ways? 5. How do you count by 1s, 5s, and 10s with numbers less than 1,000? 6. How do you group tens as hundreds? 7. How do you use place value to find 10 more, 10 less, 100 more, 100 less than a given number? 8. How do you compare 3-digit numbers? 9. How can you make an addend a ten to help solve an addition problem? 10. When do you regroup in addition and subtraction? 11. How can you use addition to solve subtraction problems? 12. How do you break apart addends to add hundreds, tens, and then ones?
<ul style="list-style-type: none"> • Understand place value. • Use place value understanding and properties of operations to add and subtract. 	<p>Understand place value.</p> <ol style="list-style-type: none"> 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. <u>Understand the following as special cases:</u> <ol style="list-style-type: none"> 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. Count within 1000; skip-count by 5s, 10s, and 100s. 3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. 4. Compare two three digit numbers based on meanings of the hundreds, tens, and ones digits, using $>$, $=$, and $<$ symbols (up to 2-three digit numbers). <p>Use place value understanding and properties of operations to add and subtract.</p> <ol style="list-style-type: none"> 5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. 6. Add up to four two-digit numbers using strategies based on place value and properties of operations. <p>Support Strategy This will include with and without regrouping and in vertical and horizontal formats.</p> <ol style="list-style-type: none"> 7. Add and subtract within 1000 <ul style="list-style-type: none"> • Using concrete models or drawings and strategies based on place value • Properties of operations (commutative, associative, and identity) 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; aligning in order of place holding and sometimes it is necessary to compose or decompose (regrouping) tens or hundreds. 8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900. 9. Explain why addition and subtraction strategies work, using place value and the properties of operations.

Suggested Vocabulary:

Digits, Tens, Ones, Hundred, Thousand, Less Than, More Than, Pattern, more, fewer, compare, = is equal to, > is greater than, < is less than, regroup, subtract, difference, regroup,

Suggested Resources:

- ✓ **Adding 2-digits with Regrouping: (Decomposing)**
<http://exchange.smarttech.com/details.html?id=027fdc97c28ea21853836a2364a266c625ee1b6953a60289b131b6053cb425b3>
- ✓ **Word Problems:**
<http://exchange.smarttech.com/details.html?id=0f720c0bc868f497119d2d8bbcad56cba311ffd68af3f53e393f44371ffe3ed9>
- ✓ Xtra math:
- ✓ [Xtramath.org](http://www.xtramath.org)
- ✓ Ambleweb Function Machine: This site allows children to work with numbers using a function machine.
<http://www.amblesideprimary.com/ambleweb/mentalmaths/functionmachines.html>
- ✓ Hooda Math: This website gives you games and worksheets for all math strands. Excellent site!
http://hoodamath.com/index.php?utm_source=phplist&utm_medium=email&utm_campaign=newjersey
- ✓ The Math Worksheet Site: With The Math Worksheet Site you can create an endless supply of printable math worksheets.
<http://themathworksheetsite.com/>
- ✓ Math Fact Café: This is a great site to practice math facts!
<http://www.mathfactcafe.com/>
- ✓ MathCats: This site has some fun interactive math activities.
<http://www.mathcats.com/>
- ✓ IXL: This is a great site for all math strands!
<http://www.ixl.com/math/grade/second/>
- ✓ Fun Brain: This is a wonderful site for math activities!
<http://www.funbrain.com>
- ✓ Super Kids: One excellent feature of this site is being able to generate math worksheets for our addition and subtraction facts. This site has many other subject areas too!
<http://www.superkids.com>
- ✓ www.brainpop.com
- ✓ [Numbnut.com](http://www.numbnut.com)
- ✓ *Number and Numerical Operations:
 - o Use Base 10 Blocks and 100 Boards
 - o Place Value Mats
 - o Estimating Jars
 - o Use graph paper for addition and subtraction to line up numbers correctly.
- ✓ Discovery Streaming (subscription site, but most schools have it)
- ✓ ThinkCentral (Go Math)

<p>Measurement and Data 2.MD (.1....10)</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How can you collect, organize, and display data? 2. What kinds of questions can be answered using different data displays? 3. How do I choose the appropriate tool and unit when measuring? 4. How can measurements be used to solve problems? 5. How do you find the total value of a group of coins? 6. How do you order coins to find the value of a group of coins? 7. How do you choose coins to show a money amount in different ways. 8. How can you show the value of one dollar with coins? 9. How do you tell time to the hour, half hour and five minutes, on a clock? 10. How do you use A.M. and P.M. to describe times? 11. How do you estimate the lengths of objects in inches, feet, centimeters and meters? 12. How do you use an inch ruler and centimeter ruler to measure lengths? 13. Why is measuring in feet different from measuring in inches? 14. How do you find the difference between the lengths of two objects?
<ul style="list-style-type: none"> • Measure and estimate lengths in standard units. • Relate addition and subtraction to length. • Work with time and money. • Represent and interpret data. 	<p>Measure and estimate lengths in standard units.</p> <ol style="list-style-type: none"> 1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes 2. Measure the length of an object twice using different units of length. Describe how the two measurements relate to the size of the unit chosen. 3. Estimate lengths using units of inches, feet, centimeters, and meters. 4. Measure to determine how much longer one object is than another. <p>Relate addition and subtraction to length.</p> <ol style="list-style-type: none"> 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. 6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., represent whole-number sums and differences within 100 on a number line diagram. <p>Work with time and money.</p> <ol style="list-style-type: none"> 7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m. 8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. <i>Example: If you have 2 dimes and 3 pennies, how many cents do you have?</i> <p>Represent and interpret data.</p> <ol style="list-style-type: none"> 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. 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 problems using information presented in a bar graph.

Suggested Vocabulary:

dime, nickel, penny, cent sign, quarter, dollar, dollar sign \$, decimal point, minutes, half past, hour hand, minute hand, hour, quarter past, noon, midnight, A.M., P.M., inch, length, foot, feet, measuring tape, yardstick, inch ruler, line plot, lengths, centimeter, meter, survey, data, tally chart, tally marks, picture graph, key, bar graph, data

Suggested Resources:

- ✓ [How Much is a Foot](#), Rolf Myller
- ✓ [Grandfather's Tang's Story](#), Ann Tompert
- ✓ [The Greedy Triangle](#), Marilyn Burns
- ✓ [Three Pigs, One Wolf & Seven Magic Shapes](#), Grace Maccaron
- ✓ [How Long and How Wide](#), by Brian P. Cleary
- ✓ [A Clock for a Dreamer](#), by Aileen Friedman
- ✓ [The Coin Counting Book](#), by Lanczak Williams
- ✓ [The Penny Pot](#), by Stuart J. Jurphy
- ✓ [Measuring Penny](#), by Loreen Leedy
- ✓ [Me and the Measure of Things](#), by Joan Sweeney
- ✓ [Pigs will be Pigs](#), Amy Axelrod (money)
- ✓ **Graphing (Pictographs):**
<http://exchange.smarttech.com/details.html?id=9b4e7fad550a9137f1f42e00309eba91dcc6084067e0c04d18f532e945352261>
- ✓ **Counting Money:**
<http://exchange.smarttech.com/details.html?id=x031222adaffd4436b536363ad5fe409d>
- ✓ **Measurement (using a ruler to ½ inch):**
<http://exchange.smarttech.com/details.html?id=xdf93b30cac984b19bac723f0724a8be9>
- ✓ Graph: This site allows students to create their own graph.
<http://www.amblesideprimary.com/ambleweb/mentalmaths/grapher.html>
- ✓ Analog Clock: This interactive lesson allows your child to set the clock.
<http://www.amblesideprimary.com/ambleweb/mentalmaths/clock.html>
- ✓ <http://www.usmint.gov/kids/>
- ✓ Hooda Math: This website gives you games and worksheets for all math strands. Excellent site!
http://hoodamath.com/index.php?utm_source=phplist&utm_medium=email&utm_campaign=newjersey
- ✓ MoneyInstructor.com: This site will allow you to print paper money for math activities.
<http://www.moneyinstructor.com/wsp/playmoney.asp>
- ✓ IXL: This is a great site for all math strands!
<http://www.ixl.com/math/grade/second/>
- ✓ Fun Brain: This is a wonderful site for math activities!
<http://www.funbrain.com>
- ✓ Sen Teacher: This is a great site for generating worksheets dealing with the concept of telling time.
<http://www.senteacher.org/Worksheet/18/Clocks.xhtml>
- ✓ www.brainpop.com
- ✓ Numbernut.com
- ✓ Discovery Streaming (subscription site, but most schools have it)
- ✓ ThinkCentral (Go Math)

Geometry 2.G (.1....3)	Essential Questions: <ol style="list-style-type: none"> 1. How can I use fractions in real life? 2. What objects match three-dimensional shapes? 3. How would you describe the faces of a rectangular prism and the faces of a cube? 4. What shapes can you name just by knowing the number of sides and vertices? 5. How do you find and count angles in two-dimensional shapes? 6. How do you use the number of sides and angles to sort two-dimensional shapes? 7. How do you find the total number of same-size squares that will cover a rectangle? 8. What are halves, thirds, and fourths of a whole? 9. How do you find a half of, a third of, or a fourth of a whole?
<ul style="list-style-type: none"> • Reason with shapes and their attributes. 	Reason with shapes and their attributes. <ol style="list-style-type: none"> 1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. 2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them. 3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words <i>halves</i>, <i>thirds</i>, <i>half of</i>, <i>a third of</i>, 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.

Suggested Vocabulary:

Cube, rectangular prism, sphere, cylinder, cone, face, edge, vertex, vertices, side, quadrilateral, pentagon, hexagon, angle, triangle, rectangle, rows, columns, halves, thirds, fourths, equal parts, whole, half of, third of, fourth of, quarter of

Suggested Resources:

- ✓ Each Orange Had 8 Slices, Paul Giganti, Jr.
- ✓ Apple Fractions, Jerry Pallotta
- ✓ The Action of Subtraction, by Brian P. Cleary
- ✓ Fraction Acton, by Loreen Leedy
- ✓ Apple Fractions, by Jerry Pallotta
- ✓ The Hershey's Fraction Book, by Jerry Pallotta
- ✓ Tangram shapes: This site allows your child to work with tangram pieces to complete a picture. It also has a time element.
<http://kids.nationalgeographic.com/kids/games/puzzlesquizzes/geoshapes/>
- ✓ Isometric Drawing Tool: This site enables children to work on making 3D shapes
<http://illuminations.nctm.org/ActivityDetail.aspx?ID=125>
- ✓ Hooda Math: This website gives you games and worksheets for all math strands. Excellent site!
http://hoodamath.com/index.php?utm_source=phplist&utm_medium=email&utm_campaign=newjersey
- ✓ IXL: This is a great site for all math strands! (MEMBERSHIP REQUIRED)
<http://www.ixl.com/math/grade/second/>
- ✓ Fun Brain: This is a wonderful site for math activities!
<http://www.funbrain.com>
- ✓ www.brainpop.com

*Fraction Concepts:

- ✓ Make a fraction salad.
- *Geometry:
 - ✓ Use geoboards and rubber bands to create shapes.
 - ✓ Discovery Streaming (subscription site, but not all schools have it)
 - ✓ ThinkCentral (Go Math)

Mathematical Practices

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.

X	X	X
X	X	X
X	X	X
X	X	X
4	4	4

3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

***Example for 2.OA.4**

Add $4 + 4 + 4 = 12$

Grade 3

Unit 1: Operations and Algebraic Thinking	Weeks 1-6
Unit 2: Number and Operations in Base Ten	Weeks 7-12
Unit 3: Measurement and Data	Weeks 13-19
Unit 4: Geometry	Weeks 20-26
Unit 5: Number and Operations/Fractions	Weeks 27-32

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment is designed at the discretion of the district.
Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Grades 3 – 5 Overview

Grade 3	Grade 4	Grade 5
Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Represent and solve problems involving multiplication and division. ✓ Understand properties of multiplications and the relationship between multiplication and division. ✓ Multiply and divide within 100. ✓ Solve problems involving the four operations, and identify and explain patterns in arithmetic. 	Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Use the four operations with whole numbers to solve problems. ✓ Gain familiarity with factors and multiples. ✓ Generate and analyze patterns. 	Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Write and interpret numerical expressions. ✓ Analyze patterns and relationships.
Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Use place value understanding and properties of operations to perform multi-digit arithmetic. 	Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Generalize place value understanding for multi-digit whole numbers. ✓ Use place value understanding and properties of operations to perform multi-digit arithmetic. 	Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Understand the place value system. ✓ Perform operations with multi-digit whole numbers and with decimals to hundredths.
Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Develop understanding of fractions as numbers. 	Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Extend understanding of fraction equivalence and ordering. ✓ Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. ✓ Understand decimal notation for fractions, and compare decimal fractions. 	Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Use equivalent fractions as a strategy to add and subtract fractions. ✓ Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Measurement and Data <ul style="list-style-type: none"> ✓ Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of area and relate area to multiplication and to addition. ✓ Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures 	Measurement and Data <ul style="list-style-type: none"> ✓ Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of angle and measure angles. 	Measurement and Data <ul style="list-style-type: none"> ✓ Convert like measurement units within a given measurement system. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
Geometry <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes. 	Geometry <ul style="list-style-type: none"> ✓ Draw and identify lines and angles, and classify shapes by properties of their lines and angles. 	Geometry <ul style="list-style-type: none"> ✓ Graph points on the coordinate plane to solve real-world and mathematical problems. ✓ Classify two-dimensional figures into categories based on their properties.
Mathematical Practices for Grades 3 – 5		
1. Make sense of problems and persevere in solving them. 4. Model with mathematics. 7. Look for and make use of structure. 2. Reason abstractly and quantitatively 5. Use appropriate tools strategically. 8. Look for and express regularity in repeated reasoning. 3. Construct viable arguments and critique the reasoning of others. 6. Attend to precision.		
Entering Expected Skills: <ul style="list-style-type: none"> ✓ Fact practice ✓ Addition and subtraction fact families ✓ Skip counting ✓ Number sense ✓ Coin recognition 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Multiplication Facts Fluency ✓ Place value concepts ✓ Knowledge of \$ and rulers ✓ Addition and multiplication properties ✓ Unit/benchmark fractions ✓ Coin recognition ✓ How to write money using dollar symbol and decimal point 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Basic facts ✓ Base ten ✓ Common denominators ✓ LCM ✓ GCF ✓ Area/perimeter ✓ Place value

Grade 3: Curriculum Connections

Interdisciplinary Connections	<p>NJSLS/ELA: NJSLSA.R.2: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.</p> <p>NJSLSA.R.7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p>	<p>Social Studies: 6.1.4.C.13: Examine the qualities of entrepreneurs in a capitalistic society.</p> <p>6.1.4.C.10: Explain the role of money, savings, debt, and investment in individuals' lives.</p>
Integration of 21st Century Standards NJSLS 9:	<p>9.1.4.A.2: Identify potential sources of income.</p> <p>9.2.4.A.1: Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.</p> <p>9.2.4.A.3: Investigate both traditional and nontraditional careers and related information to personal likes and dislikes.</p>	
Integration of Technology Standards NJSLS 8:	<p>8.1.5.A.4: Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.</p> <p>8.1.5.A.6: Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.</p> <p>8.1.5.F.1: Apply digital tools to collect, organize, and analyze data that support a scientific finding.</p>	
Career Ready Practices:	<p>CRP2. Apply appropriate academic and technical skills.</p> <p>CRP4. Communicate clearly and effectively and with reason.</p> <p>CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>	
Core Instructional Materials	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>	
Accommodations and Modifications:	<p><u>Students with special needs:</u> Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.</p> <p><u>ELL/ESL students:</u> Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/</p> <p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.</p> <p><u>Gifted and Talented Students:</u> Students excelling in mastery of standards will be challenged with complex, high level challenges related to the math learning. This will include multistep word problems that utilize mastery of grade level standards. NJSLA released questions will be used as complex assessment exemplars.</p>	

Grade 3

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.

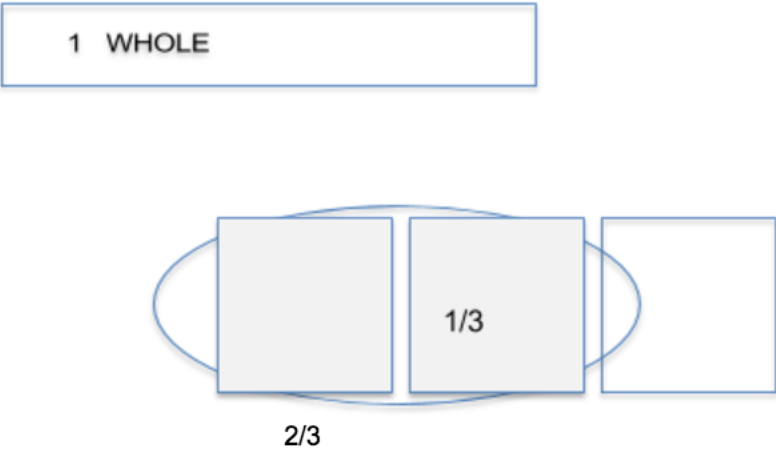
Operations and Algebraic Thinking 3.OA	Essential Questions: <ol style="list-style-type: none"> 1. What is multiplication? 2. How can arrays model multiplication? 3. What is division? 4. How are multiplication and division related? 5. What are the properties of multiplication? 6. How can properties be used to solve multiplication problems? 7. What strategies help to memorize multiplication facts?
<ul style="list-style-type: none"> • Represent and solve problems involving multiplication and division. • Understand properties of multiplication and the relationship between multiplication and division. • Multiply and divide within 100. • Solve problems involving the four operations, and identify and explain patterns in arithmetic. 	<p>Represent and solve problems involving multiplication and division.</p> <ol style="list-style-type: none"> 1. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. <i>For example, describe and/or represent a context in which a total number of objects can be expressed as 5×7.</i> Vocabularies should include repeated addition, array, area, factor, product and multiples. 2. Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ 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. <i>For example, describe and/or represent a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.</i> Vocabularies should include repeated subtraction, sharing, divisor, dividend, quotient and remainder. 3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, eg, by using drawings and equations with a symbol for the unknown number to represent the problem. 4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = \square \div 3$, $6 \times 6 = ?$.</i> Vocabulary should include the term variable, eg, $2 \times p = 6$. Solve for p. <p>Understand properties of multiplication and the relationship between multiplication and division.</p> <ol style="list-style-type: none"> 5. Apply properties of operations as strategies to multiply and divide. <i>2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)</i> 6. Understand division as an unknown-factor problem. <i>For example, find $32 \div 8$ by finding the number that makes 32 when multiplied.</i> Multiply and divide within 100. 7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. <p>Solve problems involving the four operations, and identify and explain patterns in arithmetic.</p> <ol style="list-style-type: none"> 8. Solve two-step word problems using the four operations. Vocabularies should include: sum, difference, product, and quotient. 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. Answers should have a label.

	<ul style="list-style-type: none"> • Perform addition and subtraction of money using dollar signs, decimal and cents • Make change using fewest possible coins • Recognize the relationship between the decimal system and money (dollars and cents) <p><i>Must Do Example:</i> Charles wants to plant 35 flowers in 5 flower beds. He decides to plant the same number in each flower bed. How many does he plant in each?</p> <p><i>Reach Example:</i> Erin needs to earn \$24. She gets paid \$3 per hour babysitting. Erin babysits for 5 hours on Saturday and 4 hours on Sunday. Does she earn at least \$24? Explain how you know. The answer is yes, she actually earns \$27.</p> <p>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. Count by multiples of a number from a given point. For example, start at 20 and count by 4s.</p>
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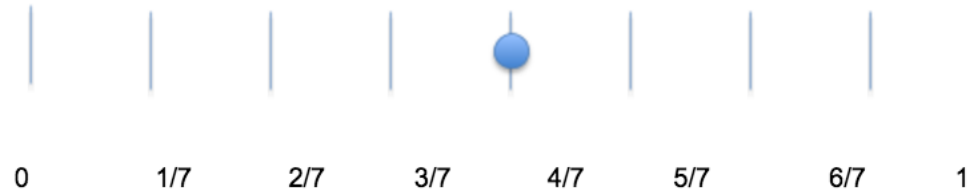
Suggested vocabulary: equal groups, each, factor, multiple, product, array, quotient, equation, dividend, divisor, related facts

Number and Operations in Base Ten 3.NBT	Essential Questions: <ol style="list-style-type: none"> 1. What is place value? 2. How do we use place value to round numbers? 3. How do we round numbers to the nearest 10, 100, and 1000?
<ul style="list-style-type: none"> • Use place value understanding and properties of operations to perform multi-digit arithmetic. 	<p>Use place value understanding and properties of operations to perform multi-digit arithmetic.</p> <ol style="list-style-type: none"> 1. Use place value understanding to round whole numbers to the nearest 10 or 100. <ul style="list-style-type: none"> • Read and write numbers and numerals through hundred thousands • Express a number in expanded form • Identify the place value of each digit through hundred thousand’s using “periods” • Estimate to the nearest 10 cents and dollar 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. <p><i>Must Do Example:</i> Write seventy-thousand two hundred four in standard form. The answer is 70, 204.</p> <p><i>Reach Example:</i> Samantha deposits two checks at her bank. One check reads “five thousand, seven dollars.” The other check reads “four hundred thirty-one dollars.” How much money did Samantha deposit? The answer is \$5, 438.</p> 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.

Suggested vocabulary: Commutative Property of Addition, Identity Property of Addition, Associative Properties of Addition, pattern, round, compatible numbers, estimate, addend, sum, regroup, combine, difference, how many more

<p>Number and Operations Fractions 3.NF</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. What is a fraction? 2. How can we show parts of a whole? 3. What does the numerator of a fraction represent? 4. What does the denominator of a fraction represent? 5. How are unit fractions and non-unit fractions different? 6. How are fractions used in our daily lives? 7. What are equivalent fractions? 8. How do we compare and order fractions using fraction bars or fraction circles?
<ul style="list-style-type: none"> • Develop understanding of fractions as numbers. 	<p>Develop understanding of fractions as numbers.</p> <ol style="list-style-type: none"> 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 $1/b$. Identify that fractions are equal parts of a whole. Vocabularies should include: numerator and denominator. <p>Ex. $b = 3$</p>  <ol style="list-style-type: none"> 2. Understand a fraction as a number on the number line; represent fractions on a number line diagram. <ol style="list-style-type: none"> 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.

Ex. $a = 4$; $b = 7$



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.
- Know that a decimal is a fractional equivalent
 - Identify money as fractional parts of \$1.00
 - Relate $\frac{1}{4}$ to \$0.25 and $\frac{1}{2}$ to \$0.50

Must Do Example: *Marinella gave her daughter 1 quarter to ride the horse at the grocery store. What fraction of a dollar did she give her daughter? The answer is $\frac{1}{4}$.*

Reach Example: *A storm caused a power line to fall down. By 6:00 PM $\frac{1}{3}$ of the homes in Newton were without electricity. By 7:00 PM another $\frac{1}{3}$ of the homes were without electricity. The power company promised to work 24 hours a day to repair the lines if more than $\frac{1}{2}$ the homes were without electricity. Will the power company work 24 hours a day to make repairs? Explain how you know. The answer is yes because $\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$ which is greater than $\frac{1}{2}$.*


- b. Recognize and generate simple equivalent fractions, e.g., $\frac{1}{2} = \frac{2}{4}$, $\frac{4}{6} = \frac{2}{3}$. 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 $3 = \frac{3}{1}$; recognize that $\frac{6}{1} = 6$; locate $\frac{4}{4}$ 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.

Suggested vocabulary: fraction, unit fraction, numerator, denominator, whole, equal parts, halves, thirds, fourths, sixths, eighths, fraction greater than one

Measurement and Data 3.MD	Essential Questions: <ol style="list-style-type: none"> 1. How is data collected and organized? 2. How is data represented and analyzed? 3. How are bar graphs, pictographs, line plots, and frequency tables created and interpreted?
<ul style="list-style-type: none"> • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. • Represent and interpret data. 	<p>Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.</p> <ol style="list-style-type: none"> 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. 2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).⁶ 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. <p>Represent and interpret data.</p> <ol style="list-style-type: none"> 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. <i>For example, draw a bar graph in which each square in the bar graph might represent 5 pets.</i> 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.

Suggested vocabulary: analog clock, digital clock, half hour, hour, quarter hour, A.M., midnight, noon, P.M., elapsed time

Measurement and Data 3.MD	Measurement and Data: <ol style="list-style-type: none"> 1. How do we find the perimeter and area of a given shape? 2. What are different ways to calculate area?
<ul style="list-style-type: none"> • Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. 	<p>Geometric measurement: understand concepts of area and relate area to multiplication and to addition.</p> <ol style="list-style-type: none"> 1. Recognize area as an attribute of plane figures and understand concepts of area measurement. <ol style="list-style-type: none"> 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. 2. Measure areas by counting unit squares (square cm, square m, square in, square ft, and non-standard units). 3. Relate area to the operations of multiplication and addition. <ol style="list-style-type: none"> 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. For example,

	 <p>9in. 9in. 30 in.</p> <p>The area is $(9 \times 9) + (9 \times 30)$</p> <p>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. See example above.</p> <p>Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.</p> <p>4. 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.</p> <p><i><u>Must Do Example:</u> What is the perimeter of a triangle with sides measuring 6 cm, 8 cm, and 10 cm? The answer is 24 cm.</i></p> <p><i><u>Reach Example:</u> Dave and Lisa have a garden. The perimeter is 20 feet. The area is 16 square feet. How long is the garden? How wide is it? The answer is 8 feet long and 2 feet wide.</i></p>
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Suggested vocabulary: square unit, unit square, pattern, Distributive Property

Geometry 3.G	Geometry: <ol style="list-style-type: none"> 1. What are lines, line segments, points, and rays? 2. What is a two-dimensional shape? 3. How do we identify, name and classify plane figures based on their characteristics?
<ul style="list-style-type: none"> Reason with shapes and their attributes. 	<p>Reason with shapes and their attributes.</p> <ol style="list-style-type: none"> 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. <ul style="list-style-type: none"> Identify, classify, and describe 3D figures: cube, cylinder, cone, sphere, rectangular prism and pyramid Identify faces, edges, vertices, and angles. Understand and apply line, end point, line segment, rays, congruent figures, symmetry, angle, right angle, intersecting lines, perpendicular lines, parallel lines and circles Recognize, describe, extend and create space filling patterns. For example, describe and use slides, flips and turns. <p><i><u>Must Do Example:</u> How many right angles are there is a square? The answer is 4.</i></p> <p><i><u>Reach Example:</u> Kim drew a line through the center of a square. She made 2 congruent figures. What figures did she make? Possible answers are 2 triangles or 2 rectangles.</i></p> 2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. <i>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.</i>

Suggested vocabulary: closed shape, endpoint, line, line segment, open shape, plane shape, point, ray, two-dimensional shape, angle, right angle, vertex, decagon, hexagon, octagon, pentagon, polygon, quadrilateral, side, triangle, intersecting lines, parallel lines, perpendicular lines, rectangle, rhombus, square, trapezoid, Venn Diagram

Resources for Grade 3

Literature:

How Much is a Million? - David Shwartz
The Doorbell Rang - Pat Hutchins
Anno's Counting House – Mitsumasa
Pizza Fractions - Jerry Pallotta
Grandfather Tang's Story by Ann Tompert
Berloiz the Bear - Jan Brett
Probably Pistachio - Stuart Murphy

The Problem Solver - Creative Publications
Anno's Mysterious Multiplying Jar - Masaichiro and Mitsumasa Ano
Apple Fractions - Jerry Pallotta
The Greedy Triangle
Inchworm and a Half - Elinor J. Pinczes
Clocks and More Clocks by Pat Hutchins

Resources:

[Create a Graph](#)
[Time activity](#)
[Time Review](#)
[Hooda Math Games](#)
[Fun Brain Math](#)
[IXL - Third Grade Math Practice](#)
[Interactive Math](#)
[Line Graphs](#)
[Interactive Geometry Activities](#)
[Money activities](#)
[Apples for the Teacher Math activities](#)
[Super Kids Math Worksheet Creator](#)
[Kid Zone Math Brain Teasers](#)
[Cool Math 4 Kids](#)
[SMARTBoard Lessons](#)
www.brainpop.com
www.aplusmath.com
www.xtramath.org

Grade 4

Unit 1: Operations and Algebraic Thinking	Weeks 1-6
Unit 2: Number and Operations in Base Ten	Weeks 7-12
Unit 3: Measurement and Data	Weeks 13-19
Unit 4: Geometry	Weeks 20-26
Unit 5: Number and Operations/Fractions	Weeks 27-32

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment is designed at the discretion of the district.
Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Grades 3 – 5 Overview

Grade 3	Grade 4	Grade 5
Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Represent and solve problems involving multiplication and division. ✓ Understand properties of multiplications and the relationship between multiplication and division. ✓ Multiply and divide within 100. ✓ Solve problems involving the four operations, and identify and explain patterns in arithmetic. 	Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Use the four operations with whole numbers to solve problems. ✓ Gain familiarity with factors and multiples. ✓ Generate and analyze patterns. 	Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Write and interpret numerical expressions. ✓ Analyze patterns and relationships.
Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Use place value understanding and properties of operations to perform multi-digit arithmetic. 	Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Generalize place value understanding for multi-digit whole numbers. ✓ Use place value understanding and properties of operations to perform multi-digit arithmetic. 	Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Understand the place value system. ✓ Perform operations with multi-digit whole numbers and with decimals to hundredths.
Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Develop understanding of fractions as numbers. 	Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Extend understanding of fraction equivalence and ordering. ✓ Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. ✓ Understand decimal notation for fractions, and compare decimal fractions. 	Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Use equivalent fractions as a strategy to add and subtract fractions. ✓ Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Measurement and Data <ul style="list-style-type: none"> ✓ Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of area and relate area to multiplication and to addition. ✓ Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures 	Measurement and Data <ul style="list-style-type: none"> ✓ Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of angle and measure angles. 	Measurement and Data <ul style="list-style-type: none"> ✓ Convert like measurement units within a given measurement system. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
Geometry <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes. 	Geometry <ul style="list-style-type: none"> ✓ Draw and identify lines and angles, and classify shapes by properties of their lines and angles. 	Geometry <ul style="list-style-type: none"> ✓ Graph points on the coordinate plane to solve real-world and mathematical problems. ✓ Classify two-dimensional figures into categories based on their properties.
Mathematical Practices for Grades 3 – 5		
1. Make sense of problems and persevere in solving them. 4. Model with mathematics. 7. Look for and make use of structure. 2. Reason abstractly and quantitatively 5. Use appropriate tools strategically. 8. Look for and express regularity in repeated reasoning. 3. Construct viable arguments and critique the reasoning of others. 6. Attend to precision.		
Entering Expected Skills: <ul style="list-style-type: none"> ✓ Fact practice ✓ Addition and subtraction fact families ✓ Skip counting ✓ Number sense ✓ Coin recognition 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Multiplication Facts Fluency ✓ Place value concepts ✓ Knowledge of \$ and rulers ✓ Addition and multiplication properties ✓ Unit/benchmark fractions ✓ Coin recognition ✓ How to write money using dollar symbol and decimal point 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Basic facts ✓ Base ten ✓ Common denominators ✓ LCM ✓ GCF ✓ Area/perimeter ✓ Place value

Grade 4: Curriculum Connections


<p>Interdisciplinary Connections</p>	<p>NJSLS/ELA: NJSLSA.R.2: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. NJSLSA.R.7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p>	<p>Social Studies: 6.1.4.C.13: Examine the qualities of entrepreneurs in a capitalistic society. 6.1.4.C.10: Explain the role of money, savings, debt, and investment in individuals' lives.</p>
<p>Integration of 21st Century Standards NJSLS 9:</p>	<p>9.1.4.A.2: Identify potential sources of income. 9.2.4.A.1: Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals. 9.2.4.A.3: Investigate both traditional and nontraditional careers and related information to personal likes and dislikes.</p>	
<p>Integration of Technology Standards NJSLS 8:</p>	<p>8.1.5.A.4: Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data. 8.1.5.A.6: Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data. 8.1.5.F.1: Apply digital tools to collect, organize, and analyze data that support a scientific finding.</p>	
<p>Career Ready Practices:</p>	<p>CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>	
<p>Core Instructional Materials</p>	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>	
<p>Accommodations and Modifications:</p>	<p><u>Students with special needs:</u> Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.</p> <p><u>ELL/ESL students:</u> Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/</p> <p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.</p> <p><u>Gifted and Talented Students:</u> Students excelling in mastery of standards will be challenged with complex, high level challenges related to the math learning. This will include multistep word problems that utilize mastery of grade level standards. NJSLA released questions will be used as complex assessment exemplars.</p>	

Grade 4

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.

Operations and Algebraic Thinking 4.OA	Essential Questions: <ol style="list-style-type: none"> 1. When would it be more useful to multiply than use repeated addition? 2. When will you use division in your daily life? 3. How can I easily multiply with multiples of 10, 100, and 1000? 4. How is multiplication and division related?
<ul style="list-style-type: none"> • Use the four operations with whole numbers to solve problems. • Gain familiarity with factors and multiples. • Generate and analyze patterns. 	<p>Use the four operations with whole numbers to solve problems.</p> <ol style="list-style-type: none"> 1. Interpret a multiplication equation as a comparison, e.g., interpret $35 = 5 \times 7$ 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. 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. Play Circles and Stars to illustrate concept. 3. Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. <ul style="list-style-type: none"> <i><u>Must Do Example:</u> Jill has 24 cupcakes. Michael has 28 cupcakes. Jill and Michael will place the cupcakes on 6 serving trays. How many cupcakes will go on each tray? Will there be any cupcakes left over? If so, how many? Answer: 8 cupcakes on each tray with 4 cupcakes left over.</i> <i><u>Reach Example:</u> There were 30 students and 4 teachers going on a field trip. Each van could hold 7 people. How many vans are needed for the trip? Solution: $30 + 4 = 34$; $34/7 = 4R6$. Therefore, 5 vans are needed.</i> <p>Represent these problems using equations with a letter standing for the unknown quantity (use the term variable). Assess the reasonableness of answers using mental computation and estimation strategies including rounding.</p> <p>Gain familiarity with factors and multiples.</p> <ol style="list-style-type: none"> 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. <ul style="list-style-type: none"> Resource: Continue multiplication songs learned in third grade. Use timed multiplication tests. Marilyn Burns activities. <p>Generate and analyze patterns.</p> <ol style="list-style-type: none"> 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. <i>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.</i> <ul style="list-style-type: none"> • Use input/output tables and T-charts to explore the basic concept of a function.

Suggested vocabulary: Commutative Property, Distributive Property, Associative Property of Multiplication, factor, multiple, product, estimate, round, partial product, expanded form, regroup

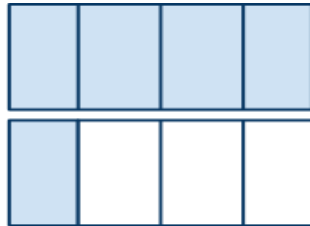
Number and Operations in Base Ten 4.NBT	Essential Questions: 1. How do we read and write numbers containing one or more period? 2. How can I use place value to compare and order numbers?
<ul style="list-style-type: none"> • Generalize place value understanding for multi-digit whole numbers. • Use place value understanding and properties of operations to perform multi-digit arithmetic. 	<p>Generalize place value understanding for multi-digit whole numbers.</p> <ol style="list-style-type: none"> 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. <i>Example, recognize that $700 \div 70 = 10$ by applying concepts of place value and division.</i> 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. <ul style="list-style-type: none"> • Write a standard numeral in expanded notation • Write a standard numeral in standard notation • Identify “period” of numbers: ones, thousands, millions. (recognize period with the proper use of commas) 3. Use place value understanding to round multi-digit whole numbers to any place. <p>Use place value understanding and properties of operations to perform multi-digit arithmetic.</p> <ol style="list-style-type: none"> 4. Fluently add and subtract multi-digit whole numbers using the standard algorithm. <ul style="list-style-type: none"> • Estimate sums and differences prior to actual computation. • Use the inverse relationship between addition and subtraction to check computation. 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. <p>Resource: Possibly use Lattice Multiplication Use “train” drawings of base ten manipulatives For example: $23 \times 2 = 46$</p>  <p style="text-align: center;">$40 + 6 = 46$</p> 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. Use inverse relationship as a checking device. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. Find the average of two or more numbers. <p><i><u>Must Do Example:</u> Steve read 8 books over summer vacation whose lengths were 84, 108, 82, 124, 79, 98, 115, and 94 pages. What was the average length of the books? Answer: 98 pages</i></p> <p><i><u>Reach Example:</u> Mel read 6 books over vacation. The lengths of the books were 89, 114, 121, 120, 99 and 99 pages. What was the average length of Mel’s books? What is the difference between Steve and Mel’s average length book? Answer: 107 pages. The difference between Steve and Mel’s books is 9 pages.</i></p>

Suggested vocabulary: digit, place value, expanded form, period, standard form, word form, sum, estimate, round, regroup, addend, period

<p>Number and Operations Fractions 4.NF</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How do fractions and probability related to one another? 2. What is the relationship between the numerator and denominator in a fraction? 3. What are equivalent fractions? 4. What are unit fractions? 5. How do we add and subtract fractions with like or unlike denominators? 6. How do we multiply fractions? 7. How do we multiply mixed numbers and whole numbers?
<ul style="list-style-type: none"> • Extend understanding of fraction equivalence and ordering. • Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. • Understand decimal notation for fractions, and compare decimal fractions. 	<p>Extend understanding of fraction equivalence and ordering.</p> <ol style="list-style-type: none"> 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. Example: $\frac{4}{5} = 4 \times 3 / 5 \times 3$ therefore $\frac{4}{5} = \frac{12}{15}$ 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 $\frac{1}{2}$. 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. Identify fractions as a location on a number line. <p>Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.</p> <ol style="list-style-type: none"> 3. Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$. <ul style="list-style-type: none"> • For example, $\frac{3}{4}$ is the sum of $\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$. 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. <i>Examples:</i> $\frac{3}{8} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8}$; $\frac{3}{8} = \frac{1}{8} + \frac{2}{8}$; $2 \frac{1}{8} = 1 + 1 + \frac{1}{8} = \frac{8}{8} + \frac{8}{8} + \frac{1}{8}$. 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. <p><u>Must Do Example:</u> Annette makes a pumpkin pie. She adds $\frac{1}{4}$ teaspoon nutmeg, $\frac{1}{4}$ teaspoon cloves, and $\frac{1}{4}$ teaspoon allspice. What is the total amount of these 3 ingredients? The answer is $\frac{3}{4}$ teaspoon.</p> <p><u>Reach Example:</u> Sheila is building bookshelves. She needs a board that is at least $1 \frac{1}{2}$ in. thick. She has no boards that thick, so she decides to glue together two boards. Which pair of boards can she use?</p> <ol style="list-style-type: none"> A. a $\frac{3}{8}$ in. board and a $\frac{1}{8}$ in. board B. a $\frac{1}{8}$ in. board and a $\frac{7}{8}$ in. board C. a $\frac{3}{4}$ in. board and a $\frac{3}{4}$ in. board D. a $\frac{1}{2}$ in. board and a $\frac{1}{2}$ in. board <p>The Answer is C.</p>

- Extend understanding of fraction equivalence and ordering.
- Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.
- Understand decimal notation for fractions, and compare decimal fractions

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 $5 \times (1/4)$, recording the conclusion by the equation $5/4 = 5 \times (1/4)$. In the model below $4/4$ is equal to one whole. Therefore, $5/4$ is equal to 1 and $1/4$.*



- 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 $3 \times (2/5)$ as $6 \times (1/5)$, recognizing this product as $6/5$. (In general, $n \times (a/b) = (n \times a)/b$.) Multiply the numerators, then multiply the denominators. If there is a whole number, place that number in the numerator and a one in the denominator.*
- 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? Identify fraction as a location on a number line.*

Understand decimal notation for fractions, and compare decimal fractions.

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. *For example, express $3/10$ as $30/100$, and add $3/10 + 4/100 = 34/100$. Explore addition and subtraction of fractions with unlike denominators.*
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 and recognize $.62$ as 62 cents.*
- *Count and perform simple computations with money using standard dollars and cents notation.*
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.

<p>Measurement and Data 4.MD</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. What are customary units of length? 2. What are metric units? 3. How can I solve measurement problems? 4. How is the place value chart related to unit conversions?
<ul style="list-style-type: none"> • Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. • Represent and interpret data. • Geometric measurement: understand concepts of angle and measure angles. 	<p>Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</p> <ol style="list-style-type: none"> 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. <i>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), ...</i> When converting smaller to larger units, divide. For example, when converting 36 inches to feet, divide 36 by 12. When converting larger to smaller units, multiply. For example, when converting 3 ft to inches, multiply 3 by 12. 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. 3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. <i>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.</i> <p><i><u>Must Do Example:</u> Nadia’s parents are carpeting their family room. The room is a rectangle that measures 6 yards by 5 yards. How many square yards of carpeting do they need? The answer is 30 square yards.</i></p> <p><i><u>Reach Example:</u> Jose’s living room is L-shaped. He measures 4 of the walls. They measure 12 feet, 14 feet, 14 feet, and 12 feet. The perimeter is 104 feet. If the last two walls have the same length, what is the length of each side? The answer is 26 feet.</i></p> <p>Represent and interpret data.</p> <ol style="list-style-type: none"> 4. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. <i>For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.</i> <ul style="list-style-type: none"> • <i>Collect, generate, organize, and display data in response to questions, claims, or curiosity from school environment.</i> • <i>Read, interpret, construct, analyze, generate questions about, and draw inferences from display of data: in pictographs, bar graphs, line plots, line graphs, and tables.</i> • <i>Find the average (mean), most frequent (mode), and middle term (median).</i> <p>Geometric measurement: understand concepts of angle and measure angles.</p> <ol style="list-style-type: none"> 5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: <ol style="list-style-type: none"> 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 $\frac{1}{360}$ of a circle is called a “one-degree angle,” and can be used to measure angles. <ul style="list-style-type: none"> • identify diameter, radius, and center of a circle b. An angle that turns through n one-degree angles is said to have an angle measure of n degrees. 6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

	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.
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Geometry 4.G	Essential Questions: 1. How do geometric shapes exist in our everyday world? 2. How is geometry useful in our daily lives? 3. How are angles present in our environment?
<ul style="list-style-type: none"> Draw and identify lines and angles, and classify shapes by properties of their lines and angles. 	<p>Draw and identify lines and angles, and classify shapes by properties of their lines and angles.</p> <ol style="list-style-type: none"> 1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. <i>Must Do Example:</i> Harold notices that the sign, "Road Slippery When Wet" has 5 angles. What kind of polygon is this sign? The answer is pentagon. 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. <i>Reach Example:</i> Name a quadrilateral that has only 1 pair of parallel sides and no right angles. The answer is a trapezoid. 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. <ul style="list-style-type: none"> Describe geometric transformation and related properties (flips, slides, turns) Resource: Create a sailboat picture

Useful vocabulary for understanding the Curriculum Guide:

Fluently - Students have automatic recall of material.

Mentally - The students will be able to solve problems in their head without paper pencil.

Compose - To create.

Decompose - To breakdown.

Partition - To divide equally.

Algorithms - Precise rule(s) to solve a problem.

Rectilinear - Straight line(s).

Quantitatively - Expressed as numbers.

Resources for Grade 4

SMARTBoard Lessons	www.brainpop.com	www.aplusmath.com
www.aaamath.com	www.funbrain.com	www.ixl.com - 4th Grade Math Practice
Create a Graph	Time activity	Time Review
Hooda Math Games	Fun Brain Math	Broken Calculator Math Game
Interactive Math	Line Graphs	Interactive Geometry Activities
Interactive Geometry Activities	Money activities	Apples for the Teacher Math activities
Super Kids Math Worksheet Creator	Math Mastery	Kid Zone Math Brain Teasers
Cool Math 4 Kids		

Books

[How Much is a Million?](#) By David M. Schwartz
[The 329th Friend](#) by Marjorie Weinman
[Gater Pie](#) by Louise Mathews
[Ultimate Kid's Money Book](#) by Neale S. Godfrey
[The Dot and the Line](#) by Norton Juster
[How Much is a Foot](#) by Rolf Myller
[A Remainder of One](#) by Elinor J. Pinczes
[Sir Cumference and the First Round Table](#) by Cindy Neuschwander and Wayne Geehan

[A Million Fish...More or Less](#) by Patricia C. McKissack
[The Doorbell Rang](#) by Pat Hutchins
[Pigs will be Pigs](#) by Amy Axelrod
[Round is a Pancake](#) by Joan Baranski
[The Greedy Triangle](#) by Marilyn Burns
[One Hundred Hungry Ants](#) by Elinor J. Pinczes

Grade 5

Unit 1: Operations and Algebraic Thinking	Weeks 1-6
Unit 2: Number and Operations in Base Ten	Weeks 7-12
Unit 3: Measurement and Data	Weeks 13-19
Unit 4: Geometry	Weeks 20-26
Unit 5: Number and Operations/Fractions	Weeks 27-32

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment (in addition to the grade level Northern Valley Criterion Reference Test "CRT")
is designed at the discretion of the district.

Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Grades 3 – 5 Overview

Grade 3	Grade 4	Grade 5
Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Represent and solve problems involving multiplication and division. ✓ Understand properties of multiplications and the relationship between multiplication and division. ✓ Multiply and divide within 100. ✓ Solve problems involving the four operations, and identify and explain patterns in arithmetic. 	Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Use the four operations with whole numbers to solve problems. ✓ Gain familiarity with factors and multiples. ✓ Generate and analyze patterns. 	Operations and Algebraic Thinking <ul style="list-style-type: none"> ✓ Write and interpret numerical expressions. ✓ Analyze patterns and relationships.
Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Use place value understanding and properties of operations to perform multi-digit arithmetic. 	Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Generalize place value understanding for multi-digit whole numbers. ✓ Use place value understanding and properties of operations to perform multi-digit arithmetic. 	Number and Operations in Base Ten <ul style="list-style-type: none"> ✓ Understand the place value system. ✓ Perform operations with multi-digit whole numbers and with decimals to hundredths.
Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Develop understanding of fractions as numbers. 	Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Extend understanding of fraction equivalence and ordering. ✓ Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers. ✓ Understand decimal notation for fractions, and compare decimal fractions. 	Number and Operations - Fractions <ul style="list-style-type: none"> ✓ Use equivalent fractions as a strategy to add and subtract fractions. ✓ Apply and extend previous understandings of multiplication and division to multiply and divide fractions.
Measurement and Data <ul style="list-style-type: none"> ✓ Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of area and relate area to multiplication and to addition. ✓ Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures 	Measurement and Data <ul style="list-style-type: none"> ✓ Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of angle and measure angles. 	Measurement and Data <ul style="list-style-type: none"> ✓ Convert like measurement units within a given measurement system. ✓ Represent and interpret data. ✓ Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
Geometry <ul style="list-style-type: none"> ✓ Reason with shapes and their attributes. 	Geometry <ul style="list-style-type: none"> ✓ Draw and identify lines and angles, and classify shapes by properties of their lines and angles. 	Geometry <ul style="list-style-type: none"> ✓ Graph points on the coordinate plane to solve real-world and mathematical problems. ✓ Classify two-dimensional figures into categories based on their properties.
Mathematical Practices for Grades 3 – 5		
1. Make sense of problems and persevere in solving them. 4. Model with mathematics. 7. Look for and make use of structure. 2. Reason abstractly and quantitatively 5. Use appropriate tools strategically. 8. Look for and express regularity in repeated reasoning. 3. Construct viable arguments and critique the reasoning of others. 6. Attend to precision.		
Entering Expected Skills: <ul style="list-style-type: none"> ✓ Fact practice ✓ Addition and subtraction fact families ✓ Skip counting ✓ Number sense ✓ Coin recognition 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Multiplication Facts Fluency ✓ Place value concepts ✓ Knowledge of \$ and rulers ✓ Addition and multiplication properties ✓ Unit/benchmark fractions ✓ Coin recognition ✓ How to write money using dollar symbol and decimal point 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Basic facts ✓ Base ten ✓ Common denominators ✓ LCM ✓ GCF ✓ Area/perimeter ✓ Place value

Grade 5: Curriculum Connections

<p>Interdisciplinary Connections</p>	<p>NJSLS/ELA: NJSLSA.R.2: Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. NJSLSA.R.7: Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p>	<p>Social Studies: 6.1.8.C.3.b: Summarize the effect of inflation and debt on the American people and the response of state and national governments during this time.</p>
<p>Integration of 21st Century Standards NJSLS 9:</p>	<p>9.2.8.B.3: Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.</p>	
<p>Integration of Technology Standards NJSLS 8:</p>	<p>8.1.5.A.4: Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data. 8.1.5.A.6: Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data. 8.1.5.F.1: Apply digital tools to collect, organize, and analyze data that support a scientific finding.</p>	
<p>Career Ready Practices:</p>	<p>CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.</p>	
<p>Core Instructional Materials</p>	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>	
<p>Accommodations and Modifications:</p>	<p><u>Students with special needs:</u> Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.</p> <p><u>ELL/ESL students:</u> Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/</p> <p><u>Students at risk of school failure:</u> Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.</p> <p><u>Gifted and Talented Students:</u> Students excelling in mastery of standards will be challenged with complex, high level challenges related to the math learning. This will include multistep word problems that utilize mastery of grade level standards. NJSLA released questions will be used as complex assessment exemplars.</p>	

Grade 5

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.

Operations and Algebraic Thinking 5.OA	Essential Questions: <ol style="list-style-type: none"> 1. How can you use a numerical expression to describe a situation? 2. In what order must operations be evaluated to find the solution to a problem? 3. In what order must operations be evaluated to find a solution when there are parentheses within parentheses? 4. How can you identify a relationship between two numerical patterns? 5. How can you write and graph ordered pairs on a coordinate grid using two numerical patterns?
<ul style="list-style-type: none"> • Write and interpret numerical expressions. • Analyze patterns and relationships. 	<p>Write and interpret numerical expressions.</p> <p>5.OA. 1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. (order of operations)</p> <p>5.OA. 2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. <i>For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product.</i></p> <p>Analyze patterns and relationships.</p> <p>5.OA. 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. <i>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.</i> (input and output charts)</p>
Resources	www.illustrativemathematics.org www.insidemathematics.org www.state.nj.us/education/modelcurriculum/math www.parcconline.org/samples/item-task-prototypes http://www.ccsstoolbox.org/ http://www.mathalicious.com/ achievethecore.org

<p>Number and Operations in Base Ten 5.NBT</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How can you describe the relationship between two place-value positions? 2. How do you read, write, and represent whole numbers through hundred millions? 3. How can you use an exponent to show powers of 10? 4. How can you use a basic fact and a pattern to multiply by a 2-digit number? 5. How do you multiply by 1-digit numbers? 6. How do you multiply by Multi-digit numbers? 7. How is multiplication used to solve a division problem? 8. How can you use the strategy solve a simpler problem to help you solve a division problem? 9. How can you tell where to place the first digit of a quotient without dividing? 10. How can you use base-ten blocks to model and understand division of whole numbers? 11. How can you use partial quotients to divide by 2-digit divisors? 12. How can you adjust the quotient if your estimate is too high or too low? 13. How can the strategy draw a diagram help you solve a division problem? 14. How can you describe the relationship between two decimal place-value positions? 15. How do you read, write, and represent decimals through thousandths? 16. How can you use place value to compare and order decimals? 17. How can you use place value to round decimals to a given place? 18. How can you use base-ten blocks to model decimal addition? 19. How can you use base-ten blocks to model decimal subtraction? 20. How can you use addition or subtraction to describe a pattern or create a sequence with decimals? 21. How can the strategy make a table help you organize and keep track of your bank account balance? 22. How can patterns help you place the decimal point in a product? 23. How can you use properties and place value to multiply a decimal and a whole number? 24. How can you use expanded form and place value to multiply a decimal and a whole number? 25. How can you use a model to multiply decimals? 26. What strategies can you use to place a decimal point in a product? 27. How can patterns help you place the decimal point in a quotient? 28. How can you use a model to divide a decimal by a whole number? 29. How can you divide decimals by whole numbers? 30. How can you use a model to divide by a decimal? 31. When do you write a zero in the dividend to find a quotient? 32. How do you use the strategy work backward to solve multistep decimal problems?
<ul style="list-style-type: none"> • Understand the place value system. • Perform operations with multi-digit whole numbers and with decimals to hundredths. 	<p>Understand the place value system.</p> <p>5.NBT. 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.</p> <p>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</p>

	<p>whole-number exponents to denote powers of 10.</p> <p>5.NBT. 3. Read, write, and compare decimals to thousandths.</p> <p>a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.</p> <p>b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.</p> <p>5.NBT. 4. Use place value understanding to round decimals to any place.</p> <p>Perform operations with multi-digit whole numbers and with decimals to hundredths.</p> <p>5.NBT. 5. Fluently multiply multi-digit whole numbers using the standard algorithm. (mastering multiplication computation)</p> <p>5.NBT. 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.</p> <p>5.NBT. 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.</p>
Resources	<p>www.illustrativemathematics.org</p> <p>www.insidemathematics.org</p> <p>www.state.nj.us/education/modelcurriculum/math</p> <p>www.parcconline.org/samples/item-task-prototypes</p> <p>http://www.ccsstoolbox.org/</p> <p>http://www.mathalicious.com/</p> <p>achievethecore.org</p>

<p style="text-align: center;">Number and Operations Fractions 5NF</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How can you use models to add fractions that have different denominators? 2. How can you use models to subtract fractions that have different denominators? 3. How can you make reasonable estimates of fraction sums and differences? 4. How can you add and subtract mixed numbers with unlike denominators? 5. How can you use a common denominator to add and subtract fractions with unlike denominators? 6. How can you add and subtract mixed numbers with unlike denominators? 7. How can you use renaming to find the difference of two mixed numbers? 8. How can you use addition or subtraction to describe a pattern or create a sequence with fractions? 9. How can the strategy work backward help you solve a problem with fractions that involves addition and subtraction? 10. How can properties help you add fractions with unlike denominators? 11. How can you find a fractional part of a group? 12. How can you use a model to show the product of a fraction and a whole number? 13. How can you find the product of a fraction and a whole number without using a model? 14. How can you use an area model to show the product of two fractions? 15. How does the size of the product compare to the size of one factor when multiplying fractions? 16. How do you multiply fractions? 17. How can you use a unit tile to find the area of a rectangle with fractional side lengths? 18. How does the size of the product compare to the size of one factor when multiplying fractions greater than one? 19. How do you multiply mixed numbers? 20. How do you divide a whole number by a fraction and divide a fraction by a whole number? 21. How can you divide fractions by solving a related multiplication sentence? 22. How can you use diagrams, equations, and story problems to represent division?
<ul style="list-style-type: none"> • Use equivalent fractions as a strategy to add and subtract fractions. • Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 	<p>Use equivalent fractions as a strategy to add and subtract fractions.</p> <p>5.NF. 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. <i>For example, $2/3 + 5/4 = 8/12 + 15/12 = 23/12$. (In general, $a/b + c/d = (ad + bc)/bd$.)</i> (least common multiple LCM to teach common denominators)</p> <p>5.NF. 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. <i>For example, recognize an incorrect result $2/5 + 1/2 = 3/7$, by observing that $3/7 < 1/2$.</i> Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</p> <p>5.NF. 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. <i>For example, interpret $3/4$ as the result of dividing 3 by</i></p>

4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. 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. 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 $(\frac{2}{3}) \times 4 = \frac{8}{3}$, and create a story context for this equation. Do the same with $(\frac{2}{3}) \times (\frac{4}{5}) = \frac{8}{15}$. (In general, $(a/b) \times (c/d) = ac/bd$.) (multiply fractions)
- 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. (area = length X width)

5.NF. 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. 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. 7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. **Students able to in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement in this grade.**

- a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. For example, create a story context for $(\frac{1}{3}) \div 4$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $(\frac{1}{3}) \div 4 = \frac{1}{12}$ because $(\frac{1}{12}) \times 4 = \frac{1}{3}$.
- b. Interpret division of a whole number by a unit fraction, and compute such quotients. For example, create a story context for $4 \div (\frac{1}{5})$, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that $4 \div (\frac{1}{5}) = 20$ because $20 \times (\frac{1}{5}) = 4$.
- 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 $\frac{1}{2}$ lb. of chocolate equally? How many $\frac{1}{3}$ -cup servings are in 2 cups of raisins?

Resources	www.illustrativemathematics.org www.insidemathematics.org www.state.nj.us/education/modelcurriculum/math www.parconline.org/samples/item-task-prototypes http://www.ccsstoolbox.org/ http://www.mathalicious.com/ achievethecore.org
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Measurement and Data 5.MD	Essential Questions: <ol style="list-style-type: none"> 1. How can you compare and convert customary units of length? 2. How can a line plot help you find an average with data given in fractions? 3. How can you compare and convert customary units of capacity? 4. How can you compare and convert customary units of weight? 5. How can you solve multistep problems that include measurement conversions? 6. How can you compare and convert metric units? 7. How can you use the strategy make a table to help solve problems about customary and metric conversions? 8. How can you solve elapsed time problems by converting units of time?
<ul style="list-style-type: none"> • Convert like measurement units within a given measurement system. • Represent and interpret data. • Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition. 	<p>Convert like measurement units within a given measurement system.</p> <p>5.MD. 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.</p> <p>Represent and interpret data.</p> <p>5.MD. 2. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots. <i>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.</i> (find the mean, median, mode, and range using fractions)</p> <p>Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.</p> <p>5.MD. 3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.</p> <ol style="list-style-type: none"> 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. <p>5.MD. 4. Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and non-standard units.</p> <p>5.MD. 5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.</p> <ol style="list-style-type: none"> 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

	<p>by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.</p> <p>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.</p> <p>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.</p>
Resources	<p>www.illustrativemathematics.org</p> <p>www.insidemathematics.org</p> <p>www.state.nj.us/education/modelcurriculum/math</p> <p>www.parcconline.org/samples/item-task-prototypes</p> <p>http://www.ccsstoolbox.org/</p> <p>http://www.mathalicious.com/</p> <p>achievethecore.org</p>

<p style="text-align: center;">Geometry 5.G</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How can you identify and plot points on a coordinate grid? 2. How can you use a coordinate grid to display data collected in an experiment? 3. How can you use a line graph to display and analyze real-world data? 4. How can you identify and classify polygons? 5. How can you classify triangles? 6. How can you classify and compare quadrilaterals? 7. How can you identify, describe, and classify three-dimensional figures?
<ul style="list-style-type: none"> • Graph points on the coordinate plane to solve real-world and mathematical problems. • Classify two-dimensional figures into categories based on their properties. (rectangles, square, triangle, quadrilateral, pentagon, hexagon, octagon, decagon) 	<p>Graph points on the coordinate plane to solve real-world and mathematical problems.</p> <p>5.G. 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). (plotting on a coordinate grid in quadrant I)</p> <p>5.G. 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.</p> <p>Classify two-dimensional figures into categories based on their properties.</p> <p>5.G. 3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. <i>For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.</i> (attributes = vertex, edge, face, side, angles)</p> <p>5.G. 4. Classify two-dimensional figures in a hierarchy based on properties. (line of symmetry, congruent line segments, vertex, edges, face, sides, angles, parallel and perpendicular line segments)</p>

Resources	www.illustrativemathematics.org www.insidemathematics.org www.state.nj.us/education/modelcurriculum/math www.parcconline.org/samples/item-task-prototypes http://www.ccsstoolbox.org/ http://www.mathalicious.com/ achievethecore.org
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Terms for Grades 5 and 6:

<ul style="list-style-type: none"> ✓ Absolute value ✓ Additive- characterized by addition; cumulative ✓ Algebraic expression ✓ Algorithm ✓ Area ✓ Arrays ✓ Associative of addition and multiplication ✓ Attributes- closely associated with a specific person or thing; an inherent characteristic ✓ Axis - The vertical and horizontal lines that make up the quadrants of a coordinate plane. The vertical axis is usually referred to as the y-axis and the horizontal axis is usually referred to as the x-axis. ✓ Benchmark ✓ Box plot ✓ Coefficient ✓ Commutative of addition and multiplication ✓ Compute ✓ Congruent- two objects have the same dimensions and shape; “equal” ✓ Constant speed ✓ Coordinate axes ✓ Coordinate planes- it has two axes and four quadrants; the two number lines form the axes. The horizontal number line is called the x-axis and the vertical number line is called the y-axis. ✓ Corresponding terms - Having the same or nearly the same relationship. ✓ Data ✓ Denominators ✓ Dependent and independent variables ✓ Distributive property ✓ Dividends 	<ul style="list-style-type: none"> ✓ Equivalent fractions ✓ Evaluate - an expression or a proposition, often algebraic, asserting the equality of two quantities using an equal sign. ✓ Expanded form ✓ Exponents - The exponent of a number shows you how many times the number is to be used in a multiplication. It is written as a small number to the right and above the base number. In this example: $8^2 = 8 \times 8 = 64$ (Another name for exponent is index or power) ✓ Faces- a flat surface of a three-dimensional figure ✓ Factor ✓ Formula ✓ Fractions ✓ Function tables (input/output tables) ✓ Greatest Common factors ✓ Histogram ✓ Identity (zero and one) ✓ Improper fractions ✓ Inequality ✓ Interpret ✓ Inverse operations ✓ Least common multiple ✓ Line diagrams ✓ Line of symmetry- imaginary line where you can fold the image and have both halves match exactly ✓ Line plot (dot plot)- shows data on a number line with ‘x’ or other marks to show frequency ✓ Mean - the mathematical average of all the terms. ✓ Measures of central tendency ✓ Median ✓ Mixed numbers
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<ul style="list-style-type: none"> ✓ Divisors ✓ Dot plot ✓ Edges- the boundary of a surface; determines the limits of an area ✓ Equations ✓ Equivalent 	<ul style="list-style-type: none"> ✓ Mode ✓ Model ✓ Multiple ✓ Negative number ✓ Nets ✓ Number line ✓ Numerator ✓ Numerical expressions - A numerical expression is an expression that combines numbers and one or more operation symbols. There is no equal sign in the expression. ✓ Numerical patterns - A list of numbers that follow a certain sequence or pattern.
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Order of operations - The rules of which calculation comes first in an expression They are: Do everything inside parentheses first: () then do exponents: x^2 then do multiplies and divides from left to right lastly do the adds and subtracts from left to right Ordered Pairs- two numbers written in parenthesis in a certain order; Can be used to show the position on a graph, where the "x" (horizontal) value is first, and the "y" (vertical) value is second.

<ul style="list-style-type: none"> ✓ Parallel line segments ✓ Part ✓ Percent ✓ Perimeter ✓ Perpendicular line segments ✓ Polygons ✓ Positive number ✓ Powers of 10 - EX: 10 to the power of 3 is 1,000; 10⁻⁴ is 10,000; 10⁻⁵ is 100,000; 10⁻⁶ is 1,000,000 and so on and so forth. ✓ Prism: a figure made of two parallel faces that are polygons of the same shape and sides that are parallelograms. ✓ Product ✓ Quadrants- the four sections in which the x and y plane is divided by the x and y axes ✓ Quantity ✓ Quotient ✓ Range ✓ Ratio ✓ Rational numbers ✓ Rectangles ✓ Rectangular prisms- A prism with rectangular faces; 6 faces are rectangular and it has the same cross-section along a length. ✓ Represent ✓ Right angle- an internal angle which is equal to 90° 	<ul style="list-style-type: none"> ✓ Right rectangular prism ✓ Right triangles ✓ Sides- links two angles together ✓ Solid figures- three-dimensional figures ✓ Solution ✓ Special quadrilaterals ✓ Statistical question ✓ Sum ✓ Surface area ✓ Tape diagrams ✓ Term ✓ Three-dimensional figure ✓ Triangles ✓ Two-dimensional figures- a two-dimensional shape that consists of a set of sides and arcs all lying in a single plane ✓ Unit cube- cube all of the sides are 1 unit long ✓ Unit price ✓ Units ✓ Variable (vertices) ✓ Vertex- (vertices) a corner or a point where lines meet ✓ Volume- Volume is measured in "cubic" units; how much three-dimensional space a substance (solid, liquid, gas, or plasma) or shape occupies or contains whole numbers
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Grade 6

Unit 1: Operations and Algebraic Thinking	Weeks 1-6
Unit 2: Number and Operations in Base Ten	Weeks 7-12
Unit 3: Measurement and Data	Weeks 13-19
Unit 4: Geometry	Weeks 20-26
Unit 5: Number and Operations/Fractions	Weeks 27-32

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment (in addition to the grade level Northern Valley Criterion Reference Test "CRT")
is designed at the discretion of the district.

Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Grades 6 – 8 Overview

Grade 6	Grade 7	Grade 8
Ratios and Proportional Relationships <ul style="list-style-type: none"> ✓ Understand ratio concepts and use ratio reasoning to solve problems. 	Ratios and Proportional Relationships <ul style="list-style-type: none"> ✓ Analyze proportional relationships and use them to solve real-world and mathematical problems. 	The Number System <ul style="list-style-type: none"> ✓ Know that there are numbers that are not rational, and approximate them by rational numbers.
The Number System <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of multiplication and division to divide fractions by fractions. ✓ Compute fluently with multi-digit numbers and find common factors and multiples. ✓ Apply and extend previous understandings of numbers to the system of rational numbers. 	The Number System <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 	Expressions and Equations <ul style="list-style-type: none"> ✓ Work with radicals and integer exponents. ✓ Understand the connections between proportional relationships, lines, and linear equations. ✓ Analyze and solve linear equations and pairs of simultaneous linear equations.
Expressions and Equations <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of arithmetic to algebraic expressions. ✓ Reason about and solve one-variable equations and inequalities. ✓ Represent and analyze quantitative relationships between dependent and independent variable. 	Expressions and Equations <ul style="list-style-type: none"> ✓ Use properties of operations to generate equivalent expressions. ✓ Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 	Functions <ul style="list-style-type: none"> ✓ Define, evaluate, and compare functions.
Geometry <ul style="list-style-type: none"> ✓ Solve real-world and mathematical problems involving area, surface area, and volume. 	Geometry <ul style="list-style-type: none"> ✓ Draw, construct and describe geometrical figures and describe the relationships between them. ✓ Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 	Geometry <ul style="list-style-type: none"> ✓ Understand congruence and similarity using physical models, transparencies or geometry software. ✓ Understand and apply the Pythagorean Theorem. ✓ Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.
Statistics and Probability <ul style="list-style-type: none"> ✓ Develop understanding of statistical variability. ✓ Summarize and describe distributions. 	Statistics and Probability <ul style="list-style-type: none"> ✓ Use random sampling to draw inferences about a population. ✓ Draw informal comparative inferences about two populations. ✓ Investigate chance processes and develop, use, and evaluate probability models. 	Statistics and Probability <ul style="list-style-type: none"> ✓ Investigate patterns of association in bivariate data.
Mathematical Practices for Grades 6 - 8		
<ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 	<ol style="list-style-type: none"> 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. 	
Entering Expected Skills: <ul style="list-style-type: none"> ✓ Exponents ✓ Volume ✓ Decimals ✓ Division and multiplication ✓ Remainders to mixed numbers ✓ Ratio 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Fractions ✓ Decimals ✓ Proportions ✓ Solve for missing variable ✓ Order of operations ✓ Rational numbers 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Proportions ✓ Integers ✓ Rational numbers ✓ Conversions: fractions, decimals, %

Grade 6: Curriculum Connections

<p>Interdisciplinary Connections</p>	<p>NJSLS/ELA NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.</p> <p>NJSLSA.R4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.</p> <p>RL.6.4. Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of a specific word choice on meaning and tone</p> <p>RI.6.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.</p> <p>RI.6.7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.</p> <p>RI.7.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone.</p> <p>RI.8.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.</p>	<p>Social Studies: 6.1.8.C.1.b Explain why individuals and societies trade, how trade functions, and the role of trade during this period.</p> <p>6.1.8.A.2.c Explain how demographics (i.e., race, gender, and economic status) affected social, economic, and political opportunities during the Colonial era.</p> <p>Science: MS-PS4-1: Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.</p>
<p>Integration of 21st Century Standards NJSLS 9:</p>	<p>9.1.8.E.5 Analyze interest rates and fees associated with financial services, credit cards, debit cards, and gift cards. 9.1.8.E.6 Compare the value of goods or services from different sellers when purchasing large quantities and small quantities. 9.1.8.E.1 Explain what it means to be a responsible consumer and the factors to consider making consumer decisions.</p>	
<p>Integration of Technology Standards NJSLS 8:</p>	<p>8.1.8.A.1: Demonstrate knowledge of a real world problem using digital tools. 8.1.8.A.4: Graph and calculate data within a spreadsheet and present a summary of the results 8.1.8.A.5: Create a database query, sort and create a report and describe the process, and explain the report results.</p>	
<p>Career Ready Practices:</p>	<p>CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity</p>	

<p>Core Instructional Materials</p>	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>
<p>Accommodations and Modifications:</p>	<p><i>Students with special needs:</i> Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.</p> <p><i>ELL/ESL students:</i> Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/</p> <p><i>Students at risk of school failure:</i> Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.</p> <p><i>Gifted and Talented Students:</i> Students excelling in mastery of standards will be challenged with complex, high level challenges related to the math learning. This will include multistep word problems that utilize mastery of grade level standards. NJSLA released questions will be used as complex assessment exemplars. Utilizing the pullout program for G&T in this grade, math scores and data will be used to design activities to support advanced math learning during these opportunities.</p>

Grade 6

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.

Ratios and Proportional Relationships 6.RP	Essential Questions: <ol style="list-style-type: none"> 1. Is it important to know how to solve for unit rates? 2. What is the connection between a ratio and a fraction/decimal? 3. How are ratios used in the real world? 4. What does a percent represent? 5. Where can examples of ratios and rates be found?
<ul style="list-style-type: none"> • Understand ratio concepts and use ratio reasoning to solve problems. 	<p>Understand ratio concepts and use ratio reasoning to solve problems.</p> <p>6.RP.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. <i>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.”</i></p> <p>6.RP.2. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. <i>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.”</i>¹</p> <p>6.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.</p> <ol style="list-style-type: none"> 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. <i>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?</i> 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.
Resources	http://mathalicious.com/ http://mathalicious.com/blueprints/grades/6/units/2 http://mathalicious.com/blueprints/grades/6/units/3 https://www.illustrativemathematics.org/ https://www.illustrativemathematics.org/content-standards/6/6/1 http://www.insidemathematics.org/ http://www.insidemathematics.org/common-core-resources/mathematical-content-standards/standards-by-grade/6th-grade

	https://www.khanacademy.org/coach/dashboard https://www.khanacademy.org/math/cc-sixth-grade-math/cc-6th-ratios-prop-topic http://map.mathshell.org/lessons.php http://map.mathshell.org/stds.php?standardid=1706 http://sbac.portal.airast.org/ http://achievethecore.org/ http://ccsstoolbox.org/ http://www.state.nj.us/education/modelcurriculum/math/ http://www.parcconline.org/assessments/practice-tests
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<p style="text-align: center;">The Number System 6.NS</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How do operations affect numbers? 2. How do we solve real world application problems? 3. How are opposite and negative numbers used in real-world contexts? 4. What is the difference between an integer and a rational number? 5. What is the Cartesian Plane and what does an ordered pair represent?
<ul style="list-style-type: none"> • Apply and extend previous understandings of multiplication and division to divide fractions by fractions. • Compute fluently with multi-digit numbers and find common factors and multiples. Apply and extend previous understandings of numbers to the system of rational numbers 	<p>Apply and extend previous understandings of multiplication and division to divide fractions by fractions.</p> <p>6.NS. 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. <i>For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that $(2/3) \div (3/4) = 8/9$ because $3/4$ of $8/9$ is $2/3$. (In general, $(a/b) \div (c/d) = ad/bc$.) 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?</i></p> <p>Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>6.NS. 2. Fluently divide multi-digit numbers using the standard algorithm. (master division computation)</p> <p>6.NS. 3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. (mastering + - X / of decimals)</p> <p>6.NS. 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. <i>For example, express $36 + 8$ as $4(9 + 2)$. (focus on distributive property)</i></p> <ol style="list-style-type: none"> a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram . <i>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.</i> b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. <i>For example, write -3 degrees</i>

$C > -7$ degrees C to express the fact that -3 degrees C is warmer than -7 degrees 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. 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. 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. (plotting coordinates in all four quadrants)

- 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. (reflection)
- 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. (plotting ordered pairs in all four quadrants)

6.NS. 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 $-3 > -7$ to express the fact that -3 °C is warmer than -7 °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. 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.

Resources	http://map.mathshell.org/lessons.php http://map.mathshell.org/stds.php?standardid=1715 http://mathalicious.com/ http://mathalicious.com/blueprints/grades/6/units/3 http://mathalicious.com/blueprints/grades/6/units/4 http://mathalicious.com/blueprints/grades/6/units/6-fd4413a4-5bf6-4656-a502-72d175742ef7 https://www.illustrativemathematics.org/ https://www.illustrativemathematics.org/6.NS http://www.insidemathematics.org/ http://www.insidemathematics.org/common-core-resources/mathematical-content-standards/standards-by-grade/6th-grade https://www.khanacademy.org https://www.khanacademy.org/commoncore/grade-6-NS http://sbac.portal.airast.org/ http://achievethecore.org/ http://ccsstoolbox.org/ http://www.state.nj.us/education/modelcurriculum/math/ http://www.parcconline.org/assessments/practice-tests
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Expressions and Equations 6.EE	Essential Questions: 1. How do powers affect numbers? 2. How can order of operations, the distributive property, and combining like terms help solve an algebraic equation? 3. How can an algebraic expression help me solve a real-world application problem? 4. How are inequalities different than equality equations? 5. How will inequalities help model real world problems?
<ul style="list-style-type: none"> Apply and extend previous understandings of arithmetic to algebraic expressions. Reason about and solve one-variable equations and inequalities. Represent and analyze quantitative relationships between dependent and independent variables. 	Apply and extend previous understandings of arithmetic to algebraic expressions. 6.EE. 1. Write and evaluate numerical expressions involving whole-number exponents. 6.EE. 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. <i>For example, express the calculation “Subtract y from 5” as $5 - y$. (algebraic expressions)</i> 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. <i>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.</i> c. 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). <i>For</i>

example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 1/2$.

6.EE. 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. 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.*

Reason about and solve one-variable equations and inequalities.

6.EE. 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. (example: $x + 3 > 7$; is $x = 1$; 5 ; 0 ?)

6.EE. 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. 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. 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.

Represent and analyze quantitative relationships between dependent and independent variables.

6.EE. 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.*

Resources	http://map.mathshell.org/lessons.php http://map.mathshell.org/stds.php?standardid=1734 http://achievethecore.org/ http://achievethecore.org/page/2851/modeling-equivalent-expressions http://mathalicious.com/ http://mathalicious.com/blueprints/grades/6/units/5 https://www.illustrativemathematics.org/ https://www.illustrativemathematics.org/content-standards/6/EE http://www.insidemathematics.org/ http://www.insidemathematics.org/common-core-resources/mathematical-content-standards/standards-by-grade/6th-grade http://www.state.nj.us/education/modelcurriculum/math/ http://www.parconline.org/assessments/practice-tests http://ccsstoolbox.org/
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Geometry 6.G	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How is the area of a figure calculated? 2. How do irregular figures and shaded region affect the area of the figure? 3. What is a 3-dimensional figure compared to a 2-dimensional figure? 4. Are surface area and volume the same as area?
<ul style="list-style-type: none"> • Solve real-world and mathematical problems involving area, surface area, and volume. 	<p>Solve real-world and mathematical problems involving area, surface area, and volume.</p> <p>6.G. 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.</p> <p>6.G. 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.</p> <p>6.G. 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.</p> <p>6.G. 4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to</p>

	find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. ("NETS" - two-dimensional figure that can be folded into a three-dimensional geometric solid) site: http://www.lifeisastoryproblem.org/explore/index_net.htm/
Resources	http://map.mathshell.org/lessons.php http://sbac.portal.airast.org/ http://achievethecore.org/ http://mathalicious.com/ http://ccsstoolbox.org/ https://www.illustrativemathematics.org/ http://www.insidemathematics.org/ http://www.insidemathematics.org/common-core-resources/mathematical-content-standards/standards-by-grade/6th-grade http://www.state.nj.us/education/modelcurriculum/math/ http://www.parconline.org/assessments/practice-tests

Statistics and Probability 6.SP	Essential Questions: 1. What are the ways to organize, measure, and display data?
<ul style="list-style-type: none"> Develop understanding of statistical variability. Summarize and describe distributions. 	<p>Develop understanding of statistical variability.</p> <p>6.SP. 1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. <i>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.</i> (use questioning strategies to help collect data)</p> <p>6.SP. 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. (measures of central tendency: range, median, mode, mean)</p> <p>6.SP. 3. Recognize that a measure of center (mean, median, mode) for a numerical data set summarizes all of its values with a single number, while a measure of variation (range) describes how its values vary with a single number.</p> <p>Summarize and describe distributions.</p> <p>6.SP. 4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p> <p>6.SP. 5. Summarize numerical data sets in relation to their context, such as by:</p> <ol style="list-style-type: none"> Reporting the number of observations. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. (being able to interpret information using different types of plots, for example: scatter plots, line

	<p>(dot) plots, box plots using correct units of measurement)</p> <p>c. Giving quantitative measures of center (median and/or mean) and variability (inter-quartile 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. (range of the box: top section minus the bottom section)</p> <p>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. (comparing the center point to the lowest and highest points being measured)</p>
Resources	<p>http://map.mathshell.org/lessons.php</p> <p>http://sbac.portal.airast.org/</p> <p>http://achievethecore.org/</p> <p>http://mathalicious.com/</p> <p>http://ccsstoolbox.org/</p> <p>https://www.illustrativemathematics.org/</p> <p>http://www.insidemathematics.org/</p> <p>http://www.insidemathematics.org/common-core-resources/mathematical-content-standards/standards-by-grade/6th-grade</p> <p>http://www.state.nj.us/education/modelcurriculum/math/</p> <p>http://www.parconline.org/assessments/practice-tests</p>

Grade 7

Unit 1: Operations and Algebraic Thinking	Weeks 1-6
Unit 2: Number and Operations in Base Ten	Weeks 7-12
Unit 3: Measurement and Data	Weeks 13-19
Unit 4: Geometry	Weeks 20-26
Unit 5: Number and Operations/Fractions	Weeks 27-32

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment (in addition to the grade level Northern Valley Criterion Reference Test "CRT")
is designed at the discretion of the district.

Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Grades 6 – 8 Overview

Grade 6	Grade 7	Grade 8
Ratios and Proportional Relationships <ul style="list-style-type: none"> ✓ Understand ratio concepts and use ratio reasoning to solve problems. 	Ratios and Proportional Relationships <ul style="list-style-type: none"> ✓ Analyze proportional relationships and use them to solve real-world and mathematical problems. 	The Number System <ul style="list-style-type: none"> ✓ Know that there are numbers that are not rational, and approximate them by rational numbers.
The Number System <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of multiplication and division to divide fractions by fractions. ✓ Compute fluently with multi-digit numbers and find common factors and multiples. ✓ Apply and extend previous understandings of numbers to the system of rational numbers. 	The Number System <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 	Expressions and Equations <ul style="list-style-type: none"> ✓ Work with radicals and integer exponents. ✓ Understand the connections between proportional relationships, lines, and linear equations. ✓ Analyze and solve linear equations and pairs of simultaneous linear equations.
Expressions and Equations <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of arithmetic to algebraic expressions. ✓ Reason about and solve one-variable equations and inequalities. ✓ Represent and analyze quantitative relationships between dependent and independent variable. 	Expressions and Equations <ul style="list-style-type: none"> ✓ Use properties of operations to generate equivalent expressions. ✓ Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 	Functions <ul style="list-style-type: none"> ✓ Define, evaluate, and compare functions.
Geometry <ul style="list-style-type: none"> ✓ Solve real-world and mathematical problems involving area, surface area, and volume. 	Geometry <ul style="list-style-type: none"> ✓ Draw, construct and describe geometrical figures and describe the relationships between them. ✓ Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 	Geometry <ul style="list-style-type: none"> ✓ Understand congruence and similarity using physical models, transparencies or geometry software. ✓ Understand and apply the Pythagorean Theorem. ✓ Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.
Statistics and Probability <ul style="list-style-type: none"> ✓ Develop understanding of statistical variability. ✓ Summarize and describe distributions. 	Statistics and Probability <ul style="list-style-type: none"> ✓ Use random sampling to draw inferences about a population. ✓ Draw informal comparative inferences about two populations. ✓ Investigate chance processes and develop, use, and evaluate probability models. 	Statistics and Probability <ul style="list-style-type: none"> ✓ Investigate patterns of association in bivariate data.
Mathematical Practices for Grades 6 - 8		
<ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 	<ol style="list-style-type: none"> 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. 	
Entering Expected Skills: <ul style="list-style-type: none"> ✓ Exponents ✓ Volume ✓ Decimals ✓ Division and multiplication ✓ Remainders to mixed numbers ✓ Ratio 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Fractions ✓ Decimals ✓ Proportions ✓ Solve for missing variable ✓ Order of operations ✓ Rational numbers 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Proportions ✓ Integers ✓ Rational numbers ✓ Conversions: fractions, decimals, %

Grade 7: Curriculum Connections

<p>Interdisciplinary Connections</p>	<p>NJSLS/ELA NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. NJSLSA.R4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. RL.7.4. Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of a specific word choice on meaning and tone RI.7.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone. RI.7.7: Compare and contrast a text to an audio, video, or multimedia version of the text, analyzing each medium’s portrayal of the subject (e.g., how the delivery of a speech affects the impact of the words).</p>	<p>Social Studies: 6.1.8.C.1.b Explain why individuals and societies trade, how trade functions, and the role of trade during this period. 6.1.8.A.2.c Explain how demographics (i.e., race, gender, and economic status) affected social, economic, and political opportunities during the Colonial era. Science: MS-PS4-1: Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.</p>
<p>Integration of 21st Century Standards NJSLS 9:</p>	<p>9.1.8.E.5 Analyze interest rates and fees associated with financial services, credit cards, debit cards, and gift cards. 9.1.8.E.6 Compare the value of goods or services from different sellers when purchasing large quantities and small quantities. 9.1.8.E.1 Explain what it means to be a responsible consumer and the factors to consider making consumer decisions.</p>	
<p>Integration of Technology Standards NJSLS 8:</p>	<p>8.1.8.A.1: Demonstrate knowledge of a real world problem using digital tools. 8.1.8.A.4: Graph and calculate data within a spreadsheet and present a summary of the results 8.1.8.A.5: Create a database query, sort and create a report and describe the process, and explain the report results.</p>	
<p>Career Ready Practices:</p>	<p>CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity</p>	
<p>Core Instructional Materials</p>	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>	

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/

Students at risk of school failure: Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to the math learning. This will include multistep word problems that utilize mastery of grade level standards. NJSLA released questions will be used as complex assessment exemplars. Utilizing the pullout program for G&T in this grade, math scores and data will be used to design activities to support advanced math learning during these opportunities.

Grade 7

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

Ratios and Proportional Relationships 7.RP	Essential Questions: <ol style="list-style-type: none"> 1. How are fractions, decimals and percent's related? 2. How do you use proportional relationships to solve multistep percent problems? 3. How do you use percent's in daily life?
Analyze proportional relationships and use them to solve real-world and mathematical problems.	<p>Analyze proportional relationships and use them to solve real-world and mathematical problems.</p> <p>7.RP.1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. <i>For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.</i> https://www.khanacademy.org/search?search_again=1&page_search_query=unit+rates</p> <p>7.RP.2. Recognize and represent proportional relationships between quantities.</p> <ol style="list-style-type: none"> a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. Use cross-products to test for equivalence. https://www.khanacademy.org/search?page_search_query=solving%20proportions https://learnzillion.com/search?m=LessonPlan&q=ratios b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. https://www.khanacademy.org/search?page_search_query=constant%20of%20proportionality c. Represent proportional relationships by equations. <i>For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.</i> d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate. Ex: If the cost of a t-shirt is \$5, show how much it costs for 0, 1, 2, 3... using a chart and graph. Use this to predict the cost of n items and explain the relationship between n items and cost. https://www.khanacademy.org/search?page_search_query=slope <p>7.RP.3. Use proportional relationships to solve multi-step ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i></p>
Resources	<p>https://www.engageny.org/ccss-library/?f[0]=field_subject%253Aparents_all%3A13601&f[1]=field_grade%253Aparents_all%3A13531</p> <p>https://www.khanacademy.org/search?page_search_query=constant%20of%20proportionality</p> <p>https://www.khanacademy.org/search?search_again=1&page_search_query=unit+rates</p> <p>https://www.khanacademy.org/search?page_search_query=slope</p> <p>https://www.khanacademy.org/search?page_search_query=solving%20proportions</p> <p>https://learnzillion.com/search?m=LessonPlan&q=ratios</p> <p>https://parcc.pearson.com/practice-tests/math/</p> <p>https://www.engageny.org/resource/grade-7-mathematics-module-1</p> <p>http://schools.nyc.gov/NR/ronlyres/41C0F04C-0BD6-491F-9BF0-16485EC080BE/0/NYCDOEG7MathProportionalReasoning_Final.pdf</p> <p>http://www.state.nj.us/education/modelcurriculum/assessment/pw/math/7u3.pdf</p>

<p>The Number System 7.NS</p>	<p>Essential Questions: 1. How can you use addition, subtraction, multiplication, and division of integers and rational numbers to solve real-world problems? 2. How can number lines and diagrams be used to interpret real world problems?</p>
<p>Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</p>	<p>Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.</p> <p>7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.</p> <ol style="list-style-type: none"> Describe situations in which opposite quantities combine to make 0. <i>For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.</i> Ex: In the first round of a game, Maria scored 20 points. In the second round of the game, she lost 20 points. What is her score at the end of the second round? Understand $p + q$ as the number located a distance q from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. Ex: gaining and losing weight, temperature, walking forwards and backwards. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. Ex: mountain climber and submarine, rollercoaster. Apply properties of operations as strategies to add and subtract rational numbers. https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=rational+numbers https://www.khanacademy.org/search?page_search_query=rational%20numbers http://www.ck12.org/na/Real-World-and-Mathematical-Problems-with-Rational-Numbers---7.NS.3-1/lesson/user%3Ac2ZveDJA3N3Z/WdvLm9yZw../Real-World-and-Mathematical-Problems-with-Rational-Numbers---7.NS.3/ http://www.factmonster.com/ipka/A0876704.html <p>7.NS.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.</p> <ol style="list-style-type: none"> Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts. Apply properties of operations as strategies to multiply and divide rational numbers. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. Solve real-world and mathematical problems involving the four operations with rational numbers. http://www.ck12.org/na/Real-World-and-Mathematical-Problems-with-Rational-Numbers---7.NS.3-1/lesson/user%3Ac2ZveDJA3N3Z/WdvLm9yZw../Real-World-and-Mathematical-Problems-with-Rational-Numbers---7.NS.3/ http://www.factmonster.com/ipka/A0876704.html <p>7.NS.3. Solve real-world and mathematical problems involving the four operations with rational numbers. * (Computations with</p>

	rational numbers extend the rules for manipulating fractions to complex fractions) Ex: cooking and recipes, travel and distance.
Resources	https://www.engageny.org/ccss-library/?ff0]=field_subject%253Aparents_all%3A13601&f1]=field_grade%253Aparents_all%3A13531 https://parcc.pearson.com/practice-tests/math/ https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=rational+numbers https://www.khanacademy.org/search?page_search_query=rational%20numbers http://www.ck12.org/na/Real-World-and-Mathematical-Problems-with-Rational-Numbers---7.NS.3-1/lesson/user%3Ac2ZveDJAb3N3Z/WdvLm9yZw../Real-World-and-Mathematical-Problems-with-Rational-Numbers---7.NS.3/ http://www.factmonster.com/ipka/A0876704.html https://www.youtube.com/watch?feature=player_embedded&v=4a_xlHgdv5s https://www.engageny.org/resource/grade-7-mathematics-module-2 http://www.state.nj.us/education/modelcurriculum/assessment/pw/math/7u1.pdf http://maccss.ncdpi.wikispaces.net/file/view/CCSSMathTasks-Grade7.pdf/460716188/CCSSMathTasks-Grade7.pdf http://mrnussbaum.com/orderops/

Expressions and Equations 7.EE	Essential Questions: <ol style="list-style-type: none"> 1. How can you communicate mathematical ideas effectively? 2. How can you use numbers and symbols to represent mathematical ideas? 3. What does it mean to say two quantities are equal? 4. How can we communicate and generalize algebraic relationships?
<ul style="list-style-type: none"> • Use properties of operations to generate equivalent expressions. • Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 	<p>Use properties of operations to generate equivalent expressions.</p> <p>7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (find GCF and use distributive property) https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=simplifying+expressions</p> <p>7.EE.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. <i>For example, $a + 0.05a = 1.05a$ means that “increase by 5%” is the same as “multiply by 1.05.”</i></p> <p>Solve real-life and mathematical problems using numerical and algebraic expressions and equations.</p> <p>7.EE.3.. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. <i>For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.</i> https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=solving+equations http://www.mathworksheets4kids.com/equations/</p> <p>7.EE.4. Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p>a. Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. <i>For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?</i></p> <p>b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. <i>For example: As a salesperson, you are paid</i></p>

	<p>\$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.</p> <p>https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=solving+inequalities</p>
Resources	<p>https://www.engageny.org/ccss-library/?ff0=field_subject%253Aparents_all%3A13601&ff1=field_grade%253Aparents_all%3A13531</p> <p>https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=solving+equations</p> <p>https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=simplifying+expressions</p> <p>https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=solving+inequalities</p> <p>https://www.khanacademy.org/search?page_search_query=solving%20equations</p> <p>http://www.mathworksheets4kids.com/equations/</p> <p>https://parcc.pearson.com/practice-tests/math/</p> <p>https://www.engageny.org/resource/grade-7-mathematics-module-3</p> <p>http://www.state.nj.us/education/modelcurriculum/assessment/pw/math/7u2.pdf</p>

<p>Geometry 7.G</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. How does geometry/measurement help us describe real-world objects? 2. Why are geometry and geometric figures relevant and important? 3. How can geometric ideas be communicated using a variety of representations? (i.e maps, grids, charts, spreadsheets) 4. How can geometry be used to solve problems about real-world situations, spatial relationships, and logical reasoning?
<ul style="list-style-type: none"> • Draw, construct and describe geometrical figures and describe the relationships between them. • Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 	<p>Draw, construct, and describe geometrical figures and describe the relationships between them. (proportional relationships; unit rate and constant of proportionality; ratios and rates involving fractions; ratios of scale drawings)</p> <p>7.G.1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. https://www.khanacademy.org/search?page_search_query=scale%20drawings</p> <p>7.G.2. Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. https://www.khanacademy.org/search?search_again=1&page_search_query=construct+triangles</p> <p>7.G.3. Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids https://vimeo.com/82400980</p> <p>Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.</p> <p>7.G.4. Know the formulas for the area and circumference of a circle and use them to solve problems; <i>give an informal derivation of the relationship between the circumference and area of a circle. For example, writing the formulas in terms of the radius, diameter, or Pi.</i></p> <p>7.G.5. Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.</p> <p>7.G.6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. http://www.math-aids.com/Geometry/Volume/ https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=real+world+volume</p>

Resources	https://www.engageny.org/ccss-library/?ff0=field_subject%253Aparents_all%3A13601&ff1=field_grade%253Aparents_all%3A13531 https://vimeo.com/82400980 http://www.visnos.com/demos/basic-angles https://parcc.pearson.com/practice-tests/math/ http://www.math-aids.com/Geometry/Volume/ https://www.khanacademy.org/search?page_search_query=scale%20drawings https://www.khanacademy.org/search?search_again=1&page_search_query=construct+triangles https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=real+world+volume https://www.engageny.org/resource/grade-7-mathematics-module-6 http://www.state.nj.us/education/modelcurriculum/assessment/pw/math/7u5.pdf
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Statistics and Probability 7.SP	Essential Questions: <ol style="list-style-type: none"> 1. How can you predict the outcome of future events? 2. How do you know which type of graph to use when displaying data? 3. How can various data organizers be used to make predictions and conjectures in real world problems? 4. How can data be analyzed so that misleading representations and interpretations be recognized and inferences will be reasonable? 5. How can devising and carrying out experiments and simulations help develop counting theory and an understanding of theoretical probability?
<ul style="list-style-type: none"> • Use random sampling to draw inferences about a population. • Draw informal comparative inferences about two populations. • Investigate chance processes and develop, use, and evaluate probability models. (calculating and interpreting probabilities; estimating probabilities; 	<p>Use random sampling to draw inferences about a population.</p> <p>7.SP.1. Understand that statistics can be used to gain information about a population by examining a sample of the population (define population, random sample, types of samples/sampling techniques, convenience sample, systematic samples, stratified sample); generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. (Capture and Recapture) Random number generator. http://www.shodor.org/interactivate/activities/ExpProbability/</p> <p>7.SP.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. <i>For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.</i> https://www.khanacademy.org/math/probability/probability-geometry/probability-basics/v/basic-probability https://www.khanacademy.org/search?referrer=%2Fmath%2Fprobability%2Fprobability-geometry%2Fprobability-basics%2Fv%2Fbasic-p robability&page_search_query=calculating+probability http://www.shodor.org/interactivate/activities/ExpProbability/</p> <p>Draw informal comparative inferences about two populations.</p> <p>7.SP.3. Informally assess the degree of visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers by expressing it as a multiple of a measure of variability. <i>For example, the mean height of players on</i></p>

<p>random sampling and estimating population characteristics; comparing populations)</p>	<p><i>the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.</i></p> <p>http://www.learner.org/courses/learningmath/data/session5/part_e/index.html http://www.ehow.com/how_4918826_absolute-deviation-average-absolute-deviation.html</p> <p>*Focus should also include data representation (box plots & scatter plot)</p> <p>7.SP.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. <i>For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth grade science book.</i></p>
<p>Resources</p>	<p>http://www.internet4classrooms.com/online_practice/common_core/math_mathematics_6th_sixth_grade/quiz_calculate_stats_16_numbers_order_them_6th_sixth_grade_math_mathematics_start.htm http://www.mathsisfun.com/data/mean-deviation.html https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=mean+absolute+deviation https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=interquartile+range</p>
<p>Statistics and Probability Continued</p>	<p>Statistics and Probability: 7.SP</p>
<ul style="list-style-type: none"> • Use random sampling to draw inferences about a population. • Draw informal comparative inferences about two populations. • Investigate chance processes and develop, use, and evaluate probability models. 	<p>Investigate chance processes and develop, use, and evaluate probability models.</p> <p>7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. Place problems on a number line based on probability http://www.doetest.vi.virginia.gov/instruction/mathematics/elementary/probability_module/mprobstat5.pdf</p> <p>7.SP.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. <i>For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.</i> Suggested resource: Graphing calculator Prob Sim application</p> <p>Show that experimental probability results will approximate theoretical given enough trials</p> <p>7.SP.7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.</p> <ol style="list-style-type: none"> a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. <i>For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.</i> b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. <i>For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?</i> <p>https://www.khanacademy.org/math/probability/probability-geometry/probability-basics/v/basic-probability</p>

	<p>https://www.khanacademy.org/search?referer=%2Fmath%2Fprobability%2Fprobability-geometry%2Fprobability-basics%2Fv%2Fbasic-probability&page_search_query=calculating+probability http://www.shodor.org/interactivate/activities/ExpProbability/</p> <p>7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.</p> <ol style="list-style-type: none"> Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. Tossing a coin and rolling a die. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., “rolling double sixes”), identify the outcomes in the sample space which compose the event. Design and use a simulation to generate frequencies for compound events. <i>For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?</i>
Resources	<p>https://www.engageny.org/ccss-library/?f0]=field_subject%253Aparents_all%3A13601&f1]=field_grade%253Aparents_all%3A13531 https://parcc.pearson.com/practice-tests/math/ https://www.explorelarning.com/index.cfm?method=cResource.dspView&ResourceID=261 https://www.khanacademy.org/math/probability/probability-geometry/probability-basics/v/basic-probability https://www.khanacademy.org/search?referer=%2Fmath%2Fprobability%2Fprobability-geometry%2Fprobability-basics%2Fv%2Fbasic-probability&page_search_query=calculating+probability http://www.shodor.org/interactivate/activities/ExpProbability/ http://www.shodor.org/interactivate/activities/Coin/?version=1.6.0_06&browser=MSIE&vendor=Sun_Microsystems_Inc http://www.internet4classrooms.com/online_practice/common_core/math_mathematics_6th_sixth_grade/quiz_calculate_stats_16_numbers_order_them_6th_sixth_grade_math_mathematics_start.htm http://www.mathsisfun.com/data/mean-deviation.html https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=mean+absolute+deviation https://learnzillion.com/search?m=LessonPlan&grades%5B%5D=7th&q=interquartile+range http://shodor.org/interactivate/activities/Marbles/ https://www.engageny.org/resource/grade-7-mathematics-module-5 http://www.state.nj.us/education/modelcurriculum/assessment/pw/math/7u4.pdf</p>

Grade 8

Unit 1: Operations and Algebraic Thinking	Weeks 1-6
Unit 2: Number and Operations in Base Ten	Weeks 7-12
Unit 3: Measurement and Data	Weeks 13-19
Unit 4: Geometry	Weeks 20-26
Unit 5: Number and Operations/Fractions	Weeks 27-32

Each unit should be implemented at the discretion of an individual district

Please refer to [Accommodations and Modifications](#) for students as needed

*Each unit assessment (in addition to the grade level Northern Valley Criterion Reference Test "CRT"
) is designed at the discretion of the district.

Please refer to local districts for specific assessment guidelines and examples.
Additional info can be found in the preface of this guide.*

Materials used for units are determined and budgeted for by individual districts.

Grades 6 – 8 Overview

Grade 6	Grade 7	Grade 8
Ratios and Proportional Relationships <ul style="list-style-type: none"> ✓ Understand ratio concepts and use ratio reasoning to solve problems. 	Ratios and Proportional Relationships <ul style="list-style-type: none"> ✓ Analyze proportional relationships and use them to solve real-world and mathematical problems. 	The Number System <ul style="list-style-type: none"> ✓ Know that there are numbers that are not rational, and approximate them by rational numbers.
The Number System <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of multiplication and division to divide fractions by fractions. ✓ Compute fluently with multi-digit numbers and find common factors and multiples. ✓ Apply and extend previous understandings of numbers to the system of rational numbers. 	The Number System <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. 	Expressions and Equations <ul style="list-style-type: none"> ✓ Work with radicals and integer exponents. ✓ Understand the connections between proportional relationships, lines, and linear equations. ✓ Analyze and solve linear equations and pairs of simultaneous linear equations.
Expressions and Equations <ul style="list-style-type: none"> ✓ Apply and extend previous understandings of arithmetic to algebraic expressions. ✓ Reason about and solve one-variable equations and inequalities. ✓ Represent and analyze quantitative relationships between dependent and independent variable. 	Expressions and Equations <ul style="list-style-type: none"> ✓ Use properties of operations to generate equivalent expressions. ✓ Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 	Functions <ul style="list-style-type: none"> ✓ Define, evaluate, and compare functions.
Geometry <ul style="list-style-type: none"> ✓ Solve real-world and mathematical problems involving area, surface area, and volume. 	Geometry <ul style="list-style-type: none"> ✓ Draw, construct and describe geometrical figures and describe the relationships between them. ✓ Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. 	Geometry <ul style="list-style-type: none"> ✓ Understand congruence and similarity using physical models, transparencies or geometry software. ✓ Understand and apply the Pythagorean Theorem. ✓ Solve real-world and mathematical problems involving volume of cylinders, cones and spheres.
Statistics and Probability <ul style="list-style-type: none"> ✓ Develop understanding of statistical variability. ✓ Summarize and describe distributions. 	Statistics and Probability <ul style="list-style-type: none"> ✓ Use random sampling to draw inferences about a population. ✓ Draw informal comparative inferences about two populations. ✓ Investigate chance processes and develop, use, and evaluate probability models. 	Statistics and Probability <ul style="list-style-type: none"> ✓ Investigate patterns of association in bivariate data.
Mathematical Practices for Grades 6 - 8		
<ol style="list-style-type: none"> 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 	<ol style="list-style-type: none"> 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning. 	
Entering Expected Skills: <ul style="list-style-type: none"> ✓ Exponents ✓ Volume ✓ Decimals ✓ Division and multiplication ✓ Remainders to mixed numbers ✓ Ratio 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Fractions ✓ Decimals ✓ Proportions ✓ Solve for missing variable ✓ Order of operations ✓ Rational numbers 	Entering Expected Skills: <ul style="list-style-type: none"> ✓ Proportions ✓ Integers ✓ Rational numbers ✓ Conversions: fractions, decimals, %

Grade 8: Curriculum Connections

<p>Interdisciplinary Connections</p>	<p>NJSLS/ELA: NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. NJSLSA.R4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone. RL.8.4. Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts RI.8.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.</p>	<p>Social Studies: 6.1.8.C.1.b Explain why individuals and societies trade, how trade functions, and the role of trade during this period. 6.1.8.A.2.c Explain how demographics (i.e., race, gender, and economic status) affected social, economic, and political opportunities during the Colonial era. Science: MS-PS4-1: Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.</p>
<p>Integration of 21st Century Standards NJSLS 9:</p>	<p>9.1.8.E.5 Analyze interest rates and fees associated with financial services, credit cards, debit cards, and gift cards. 9.1.8.E.6 Compare the value of goods or services from different sellers when purchasing large quantities and small quantities. 9.1.8.E.1 Explain what it means to be a responsible consumer and the factors to consider making consumer decisions.</p>	
<p>Integration of Technology Standards NJSLS 8:</p>	<p>8.1.8.A.1: Demonstrate knowledge of a real world problem using digital tools. 8.1.8.A.4: Graph and calculate data within a spreadsheet and present a summary of the results 8.1.8.A.5: Create a database query, sort and create a report and describe the process, and explain the report results</p>	
<p>Career Ready Practices:</p>	<p>CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity</p>	
<p>Core Instructional Materials</p>	<p>All units contain Learning plans with all the supplemental materials needed to complete the activities. Each district will support the learning units with materials from a chosen Math Text. Additional resources can be referenced through the “Resources” list for each unit of study.</p>	

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Manipulatives, extra time, alternative assessments, and scaffolding strategies will be used to support this math learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for “can do’s” as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/

Students at risk of school failure: Formative and summative data will be used to monitor student success. At first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to math learning. This will include multi step word problems that utilize mastery of grade level standards. NJSLA released questions will be used as complex assessment examples. Utilizing the pullout program for G&T in this grade, math scores and data will be used to design activities to support advanced math learning during these opportunities.

Grade 8

In Grade 8, instructional time should focus on three critical areas: (1) formulating and reasoning about expressions and equations, including modeling an association in bivariate data with a linear equation, and solving linear equations and systems of linear equations; (2) grasping the concept of a function and using functions to describe quantitative relationships; (3) analyzing two- and three-dimensional space and figures using distance, angle, similarity, and congruence, and understanding and applying the Pythagorean Theorem.

The Number System 8.NS	Essential Questions: 1. When do you use an exact vs. an estimated solution?
<ul style="list-style-type: none"> • Know that there are numbers that are not rational, and approximate them by rational numbers. 	<p>Know that there are numbers that are not rational, and approximate them by rational numbers.</p> <p>8.NS.1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion, which repeats eventually into a rational number.</p> <p>8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). <i>For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</i></p>
Resources	<p>http://illuminations.nctm.org/TooBigTooSmall/ http://www.scsk12.org/SCS/curriculum_guides/6-12_Math_Webpage/PDF/gr8stations.pdf <i>Great station activities for the math classroom</i></p> <p>http://illuminations.nctm.org/TooBigTooSmall/ <i>scientific notation activity on a million dollars</i></p> <p>http://htwins.net/scale2/?bordercolor=white <i>An interactive scale model of everyday items</i></p> <p>https://www.engageny.org/resource/grade-8-mathematics-module-1 <i>Engage New Year website</i></p> <p>http://www.aaamath.com/grade8.htm <i>on line practice of concepts</i></p> <p>https://www.livebinders.com/play/play?id=1342139 <i>great over view of engage new year</i></p> <p>https://njctl.org/courses/math/8th-grade-math/scientific-notation/ <i>New jersey Center for Teaching and Learning Scientific Notation unit Great station activities for the math classroom</i></p>

<p>Expressions and Equations 8.EE</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. What are the inverse operations? Name them. 2. How do you solve equations? 3. What do you do when an equation has variables on both sides? 4. How do you transform equations? Why would you want to? 5. What is the difference between no solution and an infinite amount of solutions? 6. When is something a solution to an equation? 7. How would you prove a solution algebraically and graphically? 8. How is the direct variation in a linear equation a representation of a proportional relationship? How would that apply to similar triangles? 9. How can the relationship between an independent and dependent event be represented graphically and how can two such events be analyzed?
<ul style="list-style-type: none"> • Work with radicals and integer exponents. • Understand the connections between proportional relationships, lines, and linear equations. • Analyze and solve linear equations and pairs of simultaneous linear equations. 	<p>Work with radicals and integer exponents.</p> <p>8.EE.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. <i>For example, $3^2 \times 3^{-5} = 3^{(-3)} = 1/3^3 = 1/27$.</i></p> <p>8.EE.2. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.</p> <p>8.EE.3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. <i>For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.</i></p> <p>8.EE.4. Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.</p> <p>Understand the connections between proportional relationships, lines, and linear equations.</p> <p>8.EE.5. Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. <i>For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</i></p> <p>8.EE.6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.</p> <p>Analyze and solve linear equations and pairs of simultaneous linear equations.</p> <p>8.EE.7. Solve linear equations in one variable.</p> <ol style="list-style-type: none"> a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.

	<p>c. Apply linear equations to real world problems. Ex: consecutive integer, perimeter, translating verbal expressions Use format for word problems: Find key words, define the variable using “let” statements, write a formula or equation, solve and write a complete concluding statement.</p> <p>8.EE.8. Analyze and solve pairs of simultaneous linear equations.</p> <p>a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.</p> <p>b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. <i>For example, $3x + 2y = 5$ and $3x + 2y = 6$ have no solution because $3x + 2y$ cannot simultaneously be 5 and 6.</i></p> <p>c. Solve real-world and mathematical problems leading to two linear equations in two variables. <i>For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</i></p>
Resources	<p>http://www.youtube.com/watch?v=htlUcWwXJjA You tube video on how to solve equations</p> <p>http://www.internet4classrooms.com/grade_level_help/algebra_solve_linear_equations_math_eighth_8th_grade.htm students explore games in which the equation is solved or they create their own equations to be solved</p> <p>http://www.insidemathematics.org/assets/common-core-math-tasks/picking%20apples.pdf Students create equations based on information and then use equations to predict questions (rubric included for grading)</p> <p>http://illuminations.nctm.org/Search.aspx?view=search&kw=linear%20equations&st=a&gr=6-8 bunch of different tasks and activities for students to explore Resources</p> <p>https://www.engageny.org/sites/default/files/resource/attachments/math-g8-m4-teacher-materials.pdf Engage New York materials</p> <p>http://schools.nyc.gov/NR/rdonlyres/835F949D-A3D9-419E-A54C-A004209AAC80/0/NYCDOEG8MathExpressionsandEquations_Final.pdf Full assessment and performance based questions on the unit</p> <p>https://www.teachingchannel.org/videos/graphing-linear-equations-lesson Video of students physically moving to solve an equation</p> <p>http://exchange.smarttech.com/search.html?q=%22linear%20equations%22 Need notebook software</p> <p>http://www.virtualnerd.com/pre-algebra/linear-functions-graphing/equations/introduction-linear-equations/linear-equation-definition Tutorials on setting up, evaluating, solving and graphing equations</p> <p>https://sites.google.com/site/techingthecccs/grade-8---solve-linear-equations lots of notes on linear equations</p> <p>http://njctl.org/courses/math/8th-grade-math/solving-equations/ Unit and tasks on linear equations</p>

<p>Functions 8.F</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. What are the different ways to represent a function? 2. How can you determine the rate of change given the equation of a linear function? 3. How can patterns, relations, functions be used as tools to best describe and help explain real-world situations? 4. How can we use multiple representations such as: tables, graphs, and relations to describe and predict a relationship? 5. How can you determine if a function is linear or not?
<ul style="list-style-type: none"> • Define, evaluate, and compare functions. • Use functions to model relationships between quantities. 	<p>Define, evaluate, and compare functions.</p> <p>8.F.1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. Define domain and range.</p> <p>8.F.2. Compare properties (rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i></p> <p>8.F.3. Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. <i>For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.</i></p> <p>Use functions to model relationships between quantities.</p> <p>8.F.4. Construct a function to model a linear relationship between two quantities. Determine the rate of change (slope) and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.</p> <p>8.F.5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. Understand domain and range of a function.</p>

<p>Geometry 8.G</p>	<p>Essential Questions:</p> <ol style="list-style-type: none"> 1. When do you use exact versus an estimated solution? 2. How does the volume of a cone relate to the volume of a cylinder? 3. How does a shape change through geometric transformations on a coordinate plane? How does that relate to congruence or similarity? 4. How do geometric relationships between cylinders, cones, spheres help solve problems in a real-world context? 5. How does Pythagorean Theorem apply to my world?
<ul style="list-style-type: none"> • Understand congruence and similarity using physical models, transparencies, or geometry software. • Understand and apply the Pythagorean Theorem. • Solve real-world and mathematical problems involving volume of cylinders, cones and spheres. 	<p>Understand congruence and similarity using physical models, transparencies, or geometry software.</p> <p>8.G.1. Verify experimentally the properties of rotations, reflections, and translations:</p> <ol style="list-style-type: none"> a. Lines are transformed to lines, and line segments to line segments of the same length. b. Angles are transformed to angles of the same measure. c. Parallel lines are transformed to parallel lines. <p>8.G.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.</p> <p>8.G.3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.</p> <p>8.G.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.</p> <p>8.G.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. <i>For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.</i> (Alternate interior, alternate exterior, corresponding, same-side interior, vertical, supplementary)</p> <p>Understand and apply the Pythagorean Theorem.</p> <p>8.G.6. Explain a proof of the Pythagorean Theorem and its converse. Find a specific proof to include (cut apart squares on legs of triangle to make the square on hypotenuse)</p> <p>8.G.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (Spider/ant on box)</p> <p>8.G.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. (verify with distance formula)</p> <p>Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.</p> <p>8.G.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p>

Resources	<p>http://www.ixl.com/math/grade-8/similar-and-congruent-figures Practice on similar figures</p> <p>http://www.mathworksheetsland.com/8/ Great visual worksheets</p> <p>http://books.google.com/books?id=u2FFGs_WfqAC&pg=PA74&lpg=PA74&dq=the+concept+of+congruence+8th+grade&source=bl&ots=IUs7ZnjSSg&sig=EYnL_vNKMfkQo8OX2-z6uQGKCs&hl=en&sa=X&ei=6ZXCU_PeCJWkyAT1zYCoDw&ved=0CCgQ6AEwAjqK#v=onepage&q=the%20concept%20of%20congruence%208th%20grade&f=false Road map task for students to explore real life situations of similar figures</p> <p>https://betterlesson.com/community/directory/all/similarity_and_congruence students explore relationships between transformations</p> <p>http://www.mathplayground.com/TransformationWorkshop/Workshop.html interaction grid for students to create transformations</p> <p>http://illuminations.nctm.org/Lesson.aspx?id=2523 students manipulate shapes</p> <p>These link to proofs of the Pythagorean Theorem for Grade 8 , Geometry Module</p> <p>http://www.youtube.com/watch?v=uaj0XcLtn5c http://www.youtube.com/watch?v=pVo6szYE13Y</p> <p>Water Demo</p> <p>http://www.youtube.com/watch?v=CAkMUdeB06o https://sites.google.com/a/uainstitute.org/8thgrademath/learningculturesmaterials/unit6congruencesimilarityangles</p> <p>I-movies that students can explore with drawings and definitions</p> <p>http://www.charleston.k12.il.us/cms/Teachers/math/PreAlgebra/paunit2.html</p> <p>Pre-test, lessons and homework online problems</p> <p>http://www.husd.org/cms/lib07/AZ01001450/Centricity/Domain/738/8th%20Grade%20Math%20AZCCRSS%20Q2.pdf visual representation of Pythagorean theorem</p>
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Statistics and Probability 8.P	Essential Question: 1. What are the steps involved in creating a line of best-fit for a scatter plot? 2. How can you use the line of best-fit to predict future behavior?
<ul style="list-style-type: none"> Investigate patterns of association in bivariate data. 	Investigate patterns of association in bivariate data. 8.SP.1. Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 8.SP.2. Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

	<p>8.SP.3. Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. <i>For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height. (line of best fit)</i></p>
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8.SP.4. Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*

Suggested resources

Khan academy, NJCTL.org, you tube videos, DESMOS.com, explore learning (Gizmos), Engage New York,