Unit 3: Solve Problems Involving the Four Operations

Content Area: **Math**
Course(s): **Math Gr. 3**
Time Period: **JanFeb**
Length: **32 Days**
Status: **Published**

Unit 3: Solve Problems Involving the Four Operations

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Mathematics: Grade 3

Unit 3: Solve Problems Involving the Four Operations

Belleville Board of Education

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Board Approved: September 23, 2019

Unit Overview

Unit 3 will cover three topics including (T8) Use Strategies and Properties to Add and Subtract, (T9) Fluently Add and Subtract within 1,000, and (T10) Topic 10 Multiply Multiples of 10. Students will be able to gain a deeper understanding of place value and properties of operations to perform multi-digit arithmetic.

Enduring Understandings

Topic 8 focuses on:

- Some real-world problems that involve joining, separating, part-part whole, or comparing can be solved using addition. Two or more numbers can be added in any order, and the sum of any number and 0 is that number.
- Generalizations about how addition works emerge from investigating patterns and reasoning about mathematical relationships.
- Rounding is a process for finding multiples of 10 and 100, closest to a given number.
- There is more than one way to do mental math. Techniques involve changing the numbers or the expressions so that calculations are easy to do mentally.
- There is more than one way to estimate a sum. Two ways to estimate are rounding and using compatible numbers.
- There is more than one way to estimate a difference. Two ways to estimate are rounding and using compatible numbers.
- Addition and subtraction have an inverse relationship. That relationship can be used to solve problems.
- Good math thinkers choose and apply math they know to show and solve problems from everyday life.

Topic 9 focuses on:

- The expanded algorithm for adding 3-digit numbers breaks the addition problem into a series of easier problems based on place value. Answers to the simpler problems are then used to find the final sum.

- The standard algorithm for adding 3-digit numbers is an extension to the standard algorithm for adding 2-digit numbers.
- The addition of three or more numbers is an extension of adding two numbers.
- The expanded algorithm for subtracting multi-digit numbers breaks a larger subtraction problem into a series of easier problems based on place value. Answers to the simpler problems are then used to find the final difference.
- The standard algorithm for subtracting 3-digit numbers is an extension to the standard algorithm for subtracting 2-digit numbers.
- Good math thinkers use math to explain why they are right. They can talk about the math that others do, too.

Topic 10 focuses on:

- An open number line can be used to find products when one factor is a multiple of 10.
- Basic multiplication facts and properties of multiplication can be used to find products when one factor is a multiple of 10.
- Different strategies can be used to find products when one factor is a multiple of 10.
- Good math thinkers look for relationships in math to help solve problems.

Essential Questions

(T8): Use Strategies and Properties to Add and Subtract

- How can sums and differences be estimated and found mentally?

(T9): Fluently Add and Subtract within 1,000

- What are standard procedures for adding and subtracting whole numbers?

(T10): Topic 10 Multiply Multiples of 10

- What are ways to multiply by multiples of 10?

Exit Skills

Topics 8-10 Cluster: Use place-value understanding and properties of operations to perform multi-digit arithmetic

New Jersey Student Learning Standards (NJSLS)

The Math Practices, as put forth by the National Council of Teachers of Mathematics (NCTM), are connected within all lessons:

MP.1 - Make sense of problems and persevere in solving them.

MP.2 - Reason abstractly and quantitatively.

MP.3 - Construct viable arguments and critique the reasoning of others.

MP.4 - Model with mathematics.

MP.5 - Use appropriate tools strategically.

MP.6 - Attend to precision.

MP.7 - Look for and make use of structure.

MP.8 - Look for and express regularity in repeated reasoning.

MA.3.OA.D.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.
MA.3.NBT.A	Use place value understanding and properties of operations to perform multi-digit arithmetic.
MA.3.NBT.A.1	Use place value understanding to round whole numbers to the nearest 10 or 100.
MA.3.NBT.A.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
MA.3.NBT.A.3	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

Interdisciplinary Connections

Math and Science Projects / STEM Connections embedded within TE, EnVision Math e.g. Topic 8-1, pg. 401

Topic 8: Use Strategies and Properties to Add and Subtract

- Have students research an animal that is extinct.
- Ask students to describe any changes in the environment that caused the animal to become extinct.

Topic 9: Fluently Add and Subtract withing 1,000

- Have students create a chart that shows the stages of growth after a forest fire.

- Have students include the lenght of time for each stage adn find the total time it takes for a mature forest to regrow.

Topic 10: Multiply by Multiples of 10

- Have students choose an environment and research the characteristics of plants and animals that live there.
- Write a report/journal entry detailing the information gathered.

LA.W.3.8	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.
LA.SL.3.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.
LA.SL.3.1.A	Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.
LA.SL.3.1.B	Follow agreed-upon norms for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).
LA.SL.3.1.C	Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.
LA.SL.3.1.D	Explain their own ideas and understanding in light of the discussion.

Learning Objectives

After completing Unit 3, students will be able to:

Topic 8:

- Solve real-world problems using properties of addition.
- Identify patterns in the addition table and explain them using algebraic thinking.
- Use place value and a number line to round numbers.
- Use mental math to add.
- Use mental math to subtract.
- Use rounding or compatible numbers to estimate a sum.
- Use rounding or compatible numbers to estimate a difference.
- Solve one-step and multi-step problems using strategies based on the relationship between addition and subtraction.
- Solve one-step and multi-step problems by modeling with math.

Topic 9:

- Add two 3-digit numbers by breaking apart problems into simpler problems.
- Add 3-digit numbers using the standard algorithm.
- Add three or more numbers using the standard algorithm.

- Subtract multi-digit numbers using the expanded algorithm.
- Subtract 3-digit numbers using the standard algorithm.
- Subtract a 3-digit number from another 3-digit number with one or more zeros by using the standard algorithm.
- Use addition and subtraction to justify a conjecture.

Topic 10:

- Use an open number line to find products when one factor is a multiple of 10.
- Use properties of multiplication to find products when one factor is a multiple of 10.
- Use different strategies to find products when one factor is a multiple of 10.
- Use the structure of multiplication and place value to find products when one factor is a multiple of 10.

Suggested Activities & Best Practices

- Consider Extension Activity e.g. Topic 8-1, pg. 401

- Further suggested activities embedded within each Topic

Assessment Evidence - Checking for Understanding (CFU)

- Common Formative Assessments (Formative)
- Common Summative Assessments (Summative)
- District Benchmark (Benchmark)
- Do Now
- EnVision Performance Task (Alternative)
- Exit Tickets
- Higher-order Questioning / Rich Discussion
- Journals
- KWL Chart
- Learning Center Activities
- Quick Check (enVisionmath)
- Quick Write
- Quizzes (Formative)
- Rubrics
- Surveys
- Teacher Observation Checklist

- Think-Pair-Share
- Turn-and-Talk / Share-out
- Unit Assessments (Summative)
- WIK / WINK

Primary Resources & Materials

EnVision Math Teacher Edition

PearsonRealize.com

Ancillary Resources

New Jersey Student Learning Standards for Mathematics

NJSLS Mathematics Crosswalk

IXL Learning

NCTM Illuminations

Prodigy Game

Technology Infusion

Alignment to 21st Century Skills & Technology

Mastery and infusion of **21st Century Skills & Technology** and their Alignment to the core content areas is essential to student learning. The core content areas include:

- English Language Arts;
- Mathematics;
- Science and Scientific Inquiry (Next Generation);
- Social Studies, including American History, World History, Geography, Government and Civics, and Economics;
- World languages;
- Technology;

- Visual and Performing Arts.

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CAEP.9.2.4.A.4	Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.
TECH.8.1.5.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
TECH.8.1.5.A.CS1	Understand and use technology systems
TECH.8.1.5.A.CS2	Select and use applications effectively and productively.

21st Century Skills/Interdisciplinary Themes

- Communication and Collaboration
- Creativity and Innovation
- Critical thinking and Problem Solving
- ICT (Information, Communications and Technology) Literacy

- Information Literacy
- Life and Career Skills
- Media Literacy

21st Century Skills

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

Differentiation

- Use the "Quick Check" feature on Pearson Realize (embedded in each Unit) to help determine the strategy for differentiating instruction; the "Assess and Differentiate" page will prescribe the differentiated instructional activity

Differentiations:

- Small group instruction
- Small group assignments
- Extra time to complete assignments
- Pairing oral instruction with visuals
- Repeat directions
- Use manipulatives
- Center-based instruction
- Token economy
- Study guides
- Teacher reads assessments aloud
- Scheduled breaks
- Rephrase written directions
- Multisensory approaches
- Additional time
- Preview vocabulary
- Preview content & concepts
- Story guides
- Behavior management plan
- Highlight text
- Student(s) work with assigned partner
- Visual presentation
- Assistive technology
- Auditory presentations
- Large print edition

- Dictation to scribe

Hi-Prep Differentiations:

- Alternative formative and summative assessments
- Choice boards
- Games and tournaments
- Group investigations
- Guided Reading
- Independent research and projects
- Interest groups
- Learning contracts
- Leveled rubrics
- Literature circles
- Multiple intelligence options
- Multiple texts
- Personal agendas
- Project-based learning
- Problem-based learning
- Stations/centers
- Think-Tac-Toes
- Tiered activities/assignments
- Tiered products
- Varying organizers for instructions

Lo-Prep Differentiations

- Choice of books or activities
- Cubing activities
- Exploration by interest
- Flexible grouping
- Goal-setting with students
- Jigsaw
- Mini workshops to re-teach or extend skills
- Open-ended activities
- Think-Pair-Share
- Reading buddies
- Varied journal prompts
- Varied supplemental materials

Special Education Learning (IEP's & 504's)

- Consider Intervention Activity and/or Reteach e.g. Topic 8-1, pg. 409A

- Use suggestions under Technology Center section in Pearson Realize to target students with disabilities

- Use the Pacer Center Action Information Sheet for research-based ideas on accommodations and modifications

- Allow for open-note/open-book assessments
- Check classwork frequently for understanding
- Conduct preview of content, concepts, and vocabulary
- Consider behavior management plan
- Implement accommodations/modifications as dictated in the student's IEP/504 plan
- Modified test content/format
- Modified written assignments
- Multi-sensory presentation
- Pre-annotate text
- Preferential seating
- Promote pair work
- Provide extended time on various assignments
- Provide printed/online copies of lesson notes
- Secure attention before providing instruction/directions
- Use assistive technology

English Language Learning (ELL)

- Use Teaching Tool 48 as a graphic organizer to help students connect a visual to the vocabulary term

- Use Teaching Tool 49 to connect students' understanding of vocabulary terms with actual meanings

- Use suggestions under English Language Learners section in Pearson Realize to target beginning, intermediate, and advanced learners e.g. Topic 8-1, pg. 405A

- Use suggestions under Technology Center section in Pearson Realize to target ELLs

- Allow for multiple student revisions
- Allow for open-note / open-book assessments
- Allow multiple forms of student products (projects, models, slide-shows, etc.) to demonstrate student learning
- Ask and give information using key words
- Demonstrate listening comprehension by responding to questions
- Develop basic sight vocabulary
- Differentiate assessments to reflect selected objectives
- Express ideas in single words

- Leverage computer spell checker
- Modify reading assignments to correlate with lexile level
- Peer tutoring / Peer note-taking
- Speak using content area vocabulary in context
- Teacher-created Study Guide
- Use prior experiences to understanding meanings
- Use videos, illustrations, pictures, and drawings to explain or clarify

At Risk

- Decrease the amount of work represented or required by assigning the "Do You Understand?" and the "Do You Know How?" sections of each lesson

- Use suggestions under Technology Center section in Pearson Realize to target at-risk students

- Use suggestions under Intervention Activity e.g. Topic 8-1, Error Intervention, pg. 407-408

- Allow for multiple student revisions
- Allow for open-note / open-book assessments
- Allow multiple forms of student products (projects, models, slide-shows, etc.) to demonstrate student learning
- Allow students to select from given assignment choices
- Differentiate assessments to reflect selected objectives
- Mark students' correct and acceptable work, not the mistakes
- Peer tutoring / Peer note-taking
- Promote student collaboration on in-class / outside class assignments
- Reduce lengthy outside reading assignments
- Teach key aspects of a topic - eliminate non-essential information
- Teacher-created Study Guide
- Use authentic assessments with real-life problem-solving
- Use videos, illustrations, pictures, and drawings to explain or clarify

Talented and Gifted Learning (T&G)

- Use suggestions under Extension for Early Finishers section in Pearson Realize to target advanced learners
- Use suggestions under Advanced Activity Centers to target advanced learners e.g. Topic 8-1, pg. 409A

- Administer Unit Assessment to determine level of proficiency
- Allow gifted children to create and publish a class newspaper to distribute
- Allow students to work at a faster pace
- Complete activities aligned with above grade-level text using Benchmark results
- Consider parental input about the education of their gifted children

- Create a blog or social media page about a topic of interest
- Create a plan to solve an issue presented in the class or in a text
- Debate issues with research to support arguments
- Involve students in academic contests
- Promote advanced problem-solving
- Remember that gifted children may not excel in all areas
- Set individual goals
- Utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge