

Unit 3 Solve Problems Involving the Four Operations

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Unit 3 Solve Problems Involving the Four Operations

Department of Curriculum and Instruction



Belleville Public Schools

Curriculum Guide

Math, Third Grade

Unit 3: Solve Problems Involving the Four Operations

Belleville Board of Education

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Unit Overview

In Unit 3, students will be able to gain a deeper understanding of place value and properties of operations to perform multi-digit arithmetic.

Topic 8 Use Strategies and Properties to Add and Subtract

- Addition Properties
- Algebra: Addition Patterns
- Round Whole Numbers
- Mental Math: Addition
- Mental Math: Subtraction
- Estimate Sums
- Estimate Differences
- Relate Addition and Subtraction

Topic 9 Fluently Add and Subtract within 1,000

- Use Partial Sums to Add
- Add 3-Digit Numbers
- Continue to Add 3-Digit Numbers
- Add 3 or More Numbers
- Use Partial Differences to Subtract
- Subtract 3-Digit Numbers
- Continue to Subtract 3-Digit Numbers

Topic 10 Multiply Multiples of 10

- Use an Open Number Line to Multiply

- Use Properties to Multiply
- Multiply by Multiples of 10

NJSLS

Below are the New Jersey Student Learning Standards associated with the student learning objectives for Unit 3; in addition, the Mathematical Practices (the habits of mind, processes, and dispositions that enable a learner to understand mathematics and to use or do mathematics with understanding) are listed below:

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.

Exit Skills

By the end of Grade 3 Mathematics, students in the Belleville Public Schools will be able to:

- Develop an understanding of multiplication and division and strategies for multiplication and division within 100. Students will also work toward fluency in addition and subtraction within 1,000 and multiplication and division within 100. In addition, students will know all products of two one-digit numbers from memory:

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

- Develop an understanding of fractions, especially unit fractions (fractions with numerator 1):

Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, $\frac{1}{2}$ of the paint in a small bucket could be less paint than $\frac{1}{3}$ of the paint in a large bucket, but $\frac{1}{3}$ of a ribbon is longer than $\frac{1}{5}$ of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing

fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.

- Develop an understanding of the structure of rectangular arrays and of area:

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

Enduring Understanding

Topic 8 Use Strategies and Properties to Add and Subtract

- 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.
- Because addition and subtraction are inverse operations, they share a distinct relationship.
- Good math thinkers choose and apply math they know to show and solve problems from everyday life.

Topic 9 Fluently Add and Subtract within 1,000

- 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 subtracting 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.
- Good math thinkers use math to explain why they are right. They can talk about the math that others do, too.

Topic 10 Multiply by Multiples of 10

- 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

Topic 8 Use Strategies and Properties to Add and Subtract

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

Topic 9 Fluently Add and Subtract within 1,000

- What are standard procedures for adding and subtracting?

Topic 10 Multiply by Multiples of 10

- What are ways to multiply by multiples of 10?

Learning Objectives

Topic 8 Use Strategies and Properties to Add and Subtract

- Students will be able to solve real-world problems using properties of addition.
- Students will be able to identify patterns in the addition table and explain them using algebraic thinking.
- Students will be able to use place value and a number line to round numbers.
- Students will be able to use mental math to add.
- Students will be able to use mental math to subtract.
- Students will be able to use rounding or compatible numbers to estimate a sum.

Topic 9 Fluently Add and subtract within 1,000

- Students will be able to add two 3-digit numbers by breaking apart problems into simpler problems.
- Students will be able to add 3-digit numbers using the standard algorithm.
- Students will be able to add three or more numbers using the standard algorithm.
- Students will be able to subtract multi-digit numbers using the expanded algorithm.
- Students will be able to subtract a 3-digit number from another 3-digit number with one or more zeros using the standard algorithm.

- Students will be able to use addition and subtraction to justify a conjecture.

Topic 10 Multiply by Multiples of 10

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

Interdisciplinary Connections

Math and Science Project STEM

Topic 8 Use Strategies and Properties to Add and Subtract

The science theme for this topic is traits and the environment.

- 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 within 1,000

The science theme for this topic is changing environments.

- Have students create a chart that shows the stages of growth after a forest fire.
- Have students include the length of time for each stage and find the total time it takes for a mature forest to regrow.

Topic 10 Multiply by Multiples of 10

The science theme for this topic is animal and plant characteristics.

- 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.K-12.NJSLSA.R

Reading

LA.K-12.NJSLSA.W

Writing

SCI.3-5-ETS1

Engineering Design

TECH.8.1.5

Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

Alignment to 21st Century Skills & Technology

Key SUBJECTS AND 21st CENTURY THEMES

Mastery of key subjects and 21st century themes is essential for all students in the 21st century.

Key subjects include:

- English, reading or language arts
- World languages
- Arts
- Mathematics
- Economics
- Science
- Geography
- History
- Government and Civics

21st Century/Interdisciplinary Themes

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

21st Century Skills

- 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

Technology Infusion

What technology can be used in this unit to enhance learning?

Originally taken from <http://www.coetail.com/vzimmer/files/2013/02/iPadagogy-Wheel.001.jpg>
And adapted for Windows 8.1 devices by Charlotte Beckhurst @CharBeckhurst



enVision Math 2.0 Differentiated Instruction

Ongoing Intervention

- During the core lesson, monitor progress, reteach as needed, and extend students' thinking.
- Utilize the Guiding Questions found in the Teacher's Edition Guide during the lesson.

Strategic Intervention

- At the end of the lesson, assess to identify students' strengths and needs and then provide appropriate support.
- Provide extra and differentiated practice via the On-Level and Advanced Activity Centers

Intensive Intervention

- As needed, provide more instruction that is on or below grade level for students who are struggling.
- Utilize the Math Diagnosis and Intervention System 2.0

English Language Learners

- Provide ELL support through visual learning throughout the program, ELL instruction in every lesson, and additional ideas in an ELL Toolkit.

Math Vocabulary

- Build math vocabulary using the vocabulary cards, vocabulary activities, vocabulary review, and glossary plus the online glossary and vocabulary game.

Math and Reading

- Connect reading and math using a data-filled reading mat for the topic with accompanying activity masters and guide.

Special Education

- printed copy of board work/notes provided
- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction

- check work frequently for understanding
- computer or electronic device utilizes
- extended time on tests/ quizzes
- have student repeat directions to check for understanding
- highlighted text visual presentation
- modified assignment format
- modified test content
- modified test format
- modified test length
- multiple test sessions
- multi-sensory presentation
- preferential seating
- preview of content, concepts, and vocabulary
- reduced/shortened reading assignments
- Reduced/shortened written assignments
- secure attention before giving instruction/directions
- shortened assignments
- student working with an assigned partner
- teacher initiated weekly assignment sheet
- Use open book, study guides, test prototypes

ELL

- teaching key aspects of a topic. Eliminate nonessential information
- using videos, illustrations, pictures, and drawings to explain or clarify
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning;
- allowing students to correct errors (looking for understanding)
- allowing the use of note cards or open-book during testing
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- tutoring by peers

Intervention Strategies

- allowing students to correct errors (looking for understanding)
- teaching key aspects of a topic. Eliminate nonessential information
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning

- allowing students to select from given choices
- allowing the use of note cards or open-book during testing
- collaborating (general education teacher and specialist) to modify vocabulary, omit or modify items to reflect objectives for the student, eliminate sections of the test, and determine how the grade will be determined prior to giving the test.
- decreasing the amount of work presented or required
- having peers take notes or providing a copy of the teacher's notes
- marking students' correct and acceptable work, not the mistakes
- modifying tests to reflect selected objectives
- providing study guides
- reducing or omitting lengthy outside reading assignments
- reducing the number of answer choices on a multiple choice test
- tutoring by peers
- using authentic assessments with real-life problem-solving
- using true/false, matching, or fill in the blank tests in lieu of essay tests
- using videos, illustrations, pictures, and drawings to explain or clarify

Evidence of Student Learning-CFU's

Please list ways educators may effectively check for understanding in this section.

- Admit Tickets
- Anticipation Guide
- Common benchmarks
- Compare & Contrast
- Create a Multimedia Poster
- Define
- Describe
- Evaluate
- Evaluation rubrics
- Exit Tickets
- Explaining
- Fist- to-Five or Thumb-Ometer
- Illustration
- Journals
- KWL Chart
- Newspaper Headline
- Outline
- Question Stems
- Quickwrite
- Quizzes

- Red Light, Green Light
- Self- assessments
- Socratic Seminar
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Top 10 List
- Unit tests

Primary Resources

- ELL Kit
- enVision Math 2.0 Centers
- Intervention Kit
- Teacher's Guide

Ancillary Resources

- Grade Level Curriculum
- Model Curriculum