Unit 1: Represent and Solve Problems involving Multiplication and Division

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Unit 1: Understand Multiplication and Division

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Mathematics: Grade 3

Unit 1: Understand Multiplication and Division

Belleville Board of Education

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Unit Overview

Unit 1 will cover two topics including (T1) Understand Multiplication and Division of Whole Numbers and (T2) Multiplication Facts: Use Patterns. These topics focus on interpreting the meaning of multiplication and division, and using patterns to begin to build fluency with multiplication facts. Students will work through different multiplication and division situations. These situations can be used to help students understand that an operation can have various interpretations.

Enduring Understandings

Topic 1 focuses on:

- Some real-world problems that involve joining or separating equal groups or making comparisons can be solved using multiplication. Repeated addition that involves joining equal groups is one way to think about multiplication.
- Some real-world problems that involve joining or separating equal groups or making comparisons can be solved using multiplication. Multiplication on the number line can involve joining equal groups and is one way to think about multiplication.
- Some real-world problems that involve joining or separating equal groups or making comparisons can be solved using multiplication. An array involves displaying objects in equal rows and columns, and is one way to think about multiplication.
- Two numbers can be multiplied in any order and the product remains the same.
- Sharing involves separating equal groups and is one way to think about division.
- Some real-world problems that involve joining or separating equal groups or making comparisons can be solved using multiplication and division. Repeated subtraction involves separating equal groups and is one way to think about division.
- Different tools can be used in different ways to solve problems.

Topic 2 focuses on:

- There are patterns in the products for multiplication with factors 2 or 5.
- There are patterns in the products for multiplication with a factor of 9.
- There are patterns in the products for multiplication facts with a factor of 0 or 1. The product of 0 and any number is 0. The product of 1 and any number is that same number.
- Patterns can be used to solve multiplication problems.
- Basic multiplication facts can be found by identifying patterns.
- Information in a problem often can be shown using a diagram that can be used to solve the problem. Some problems have hidden questions that need to be answered.

Essential Questions

(T1): Understand Multiplication and Division of Whole Numbers

- What are different meanings of multiplication and division?

(T2): Multiplication Facts: Use Patterns

- How can unknown multiplication facts be found using patterns and properties?

Exit Skills

Topics 1 and 2 Cluster:

- Represent and solve problems involving multiplication and division.
- Interpret the meaning of multiplication and division
- Use patterns to build fluency with multiplication facts

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.A	Represent and solve problems involving multiplication and division.
MA.3.OA.A.1	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each.
MA.3.OA.A.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

Interdisciplinary Connections

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

Topic 1: Forming Groups

- Have students help you list animals that form groups, such as ants, fish, birds, and elephants.
- Talk about why being in a group can help some birds survive. (Living in a group may help birds find food. Being in a large group can protect birds from predators. Birds can also huddle together in cold weather to keep warm.
- Do research on different animal groups
- Journal: Write a report to include the information learned.

Topic 2: Motion Patterns

- Ask students to look at the children in the photo on page 57 and discuss what would be moving in this situation. Ask them to explain what could cause the movement.
- Ask students to think about what would happen if the girl moves away from the swing.
- Do research on playground objects that move.
- Journal: Write a report explaining any patterns you may have found. Tell how you can use your patterns to predict how the objects will move in the future. Write an equation for one of the patterns. Explain what the numbers in your equation represent.

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 1, students will be able to:

Topic 1:

- Use repeated addition to show the relationship between multiplication and addition.
- Use number lines to join equal groups.
- Use arrays as one way to think about and understand multiplication.
- Understand and use the Commutative Property of Multiplication.
- Use sharing to separate equal groups and to think about division.
- Use repeated subtraction to show the relationship between division and subtraction.
- Think strategically about available tools that can be used to solve problems.

Topic 2:

- Gain fluency in multiplication when using 2 and 5 factors.
- Gain fluency in multiplication when using 9 as a factor.
- Gain fluency in multiplication when multiplying by 0 or 1.
- Gain fluency in multiplication when multiplying by 10.
- Students will use number relationships and patterns to develop reasoning strategies to support their recall of the basic multiplication facts.
- Use previously learned concepts and skills to represent and solve problems.

Suggested Activities & Best Practices

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

- 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 1-1, pg. 11A

- 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 1-1, pg. 7A

- 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 1-1, Error Intervention, pg. 9-10

- 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 1-1, pg. 11A

- 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

Sample Lesson

Unit Name: Understand Multiplication and Division; Topic 2: Gain fluency in multiplication when multiplying by 10.

NJSLS: 3.OA.A.2, 3.OA.A.3, 3.OA.D.9

Interdisciplinary Connection: n/a

Statement of Objective:

Students will be able to gain fluency in multiplication when multiplying by 10.

Anticipatory Set/Do Now:

Pose the Solve-and-Share Problem on page 79. Build understanding by ensuring that students understand what they are being asked to. Rephrase the question. Ask for pertinent information. Share and Discuss solutions.

Learning Activity:

Use structures to demonstrate patterns in the 10s Table. Reinforce that multiples of 10 follow the same pattern: they have a 0 in the Ones' place, to the right of the factor being multiplied by 10.

Student Assessment/CFU's:

Utilize Quick Checks to differentiate instruction

Materials:

Student Workbook, Activity Centers for differentiation

21st Century Themes and Skills:

Critical Thinking and Problem-solving

Differentiation/Modifications:

Intervention Reteaching Activity, On-Level and Advanced Activity Centers

Integration of Technology:

Math Tools and Math Games on pearsonrealize.com