Unit 2 Understand Properties of Multiplication

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Unit 2 Understand Properties of Multiplication

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Math, Third Grade

Unit 2: Understand Properties of Multiplication

Belleville Board of Education

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Unit Overview

During Unit 2, students will develop a deeper understanding of the relationship between multiplication and division. The following topics will provide students with the necessary knowledge to understand and utilize the properties of multiplication.

In Topic 3, Apply Properties: Multiplication Facts for 3, 4, 6,7, 8, the students will be able to:

- use the Distributive Property
- apply properties for 3, 4, 6,7, and 8 as factors
- utilize the Associative Property to multiply 3 factors

In Topic 4, Use Multiplication to Divide: Division Facts, the students will be able to:

- relate miltiplication and division
- use multiplication to divide with 2, 3, 4, and 5
- Use multiplication to divide with 6, 7, 8 and 9
- divde using 0 and 1
- solve multiplication and division equations

In Topic 5, Fluently Multiply and Divide within 100, the students will be able to:

- use patterns for multiplication facts
- use a Multiplication Table
- find missing numbers in a Multiplication Table
- use strategies to multiply
- write multiplication and division math stories

In Topic 6, Connect Area to Multiplication and Addition, the students will be able to:

- cover regions
- measure area using nonstandard units
- measure area with standards units
- find the area of squares and rectangles
- apply properties (area and the Distributive property)
- find area of irregular shapes

In Topic 7, Represent and Interpret Data, students will be able to:

- read picture graphs and bar graphs
- make a picture graph
- make a bar graph
- solve word problems using information in graphs

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 build 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, ? of the paint in a small bucket could be less paint than 1/3 of the paint in a large bucket, but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. The 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 3 Apply Properties of Multiplication Facts for 3, 4, 6, 7, and 8

- The Distributive Property can be used to break a large array into smaller arrays.
- Basic multiplication facts with 3, 4, 7, and 8 as a factor can be found by breaking apart the unkonwn fact into known facts. The answers to the known facts are added to get the final product.
- Strategies such as bar diagrams and arrays with known facts can be used to solve multiplication problems.
- Three or more numbers can be grouped and multiplied in any order.
- Good math thinkers look for things that repeat, and they make generalizations.

Topic 4 Use Multiplication to Divide: Division Facts

- Multiplication and division have an inverse relationship.
- The inverse relationship between multiplication and division can be used to find division facts; every division fact has a related multiplication fact.
- Factors and products can be identified by patterns as well as other characteristics, such as even or odd.
- Any number (except 0) divided by itself is equal to 1. Any number divided by is that number. 0 divided by any number (except 0) is 0. 0 cannot be a divisor.
- Patterns and known facts can be used to find unkonwn multiplication facts. Division facts can be fond by thinking of a related multiplication fact.
- You can use a multiplication fact to find the unknown value in an equation.
- Good math thinkers make sense of problems and think of ways to solve them. If they get stuck, they don't give up.

Topic 5 Fluently Multiply and Divide within 100

- There are patterns in the factors and the products for multiplication facts.
- Any division problem can be thought of as a missing factor multiplication problem.
- Strategies and reasoning can be used to recall multiplication and division basic facts.
- Strategies such as using properties of operations, drawings, and skip couting can be used to multiply.
- Some real-world problems can be represented and solved using different mltiplication and division strategies.

- Some real-world problems that involve equal groups can be solved using multiplication/division.
- Good math thinkers look for relationships in math to help solve problems.

Topic 6 Connect Area to Multiplication and Addition

- The amount of space inside a shsape is its area, and area can be found or estimated using unit squares.
- Area can be measured using nonstandard units including unit squares of different sizes.
- Standard measurement units are used for consistency in finding and communicating measurements.
- The amount of space inside a region is its area, and area can be found by counting unit swaures or by multiplying the side lenghts.
- The areas of rectangles can be used to model the Distributive Property.
- The area of some irregular shapes can be found by dividing the original shape into rectangles, finding the area of each rectangle, and adding all the areas.
- Good math thinkers look for relationships in math to help solve problems.

Topic 7 Represent and Interpret Data

- Certain types of graphs are appropriate for certain kinds of data. Picture graphs and bar graphs make it easy to compare data.
- The type of graph used is based on the data being presented. The key for a picture graph determines the number of pictures needed to represent the data.
- The type of graph used is based on the data being presented. In a scaled bar graph, the scale determines how long each bar needs to be to represent eveyr number in the data set.
- Some problems can be solved by making, reading, and analyzing a graph.
- Good math thinkers are careful about what they write and say, so their ideas about math are clear.

Essential Questions

Topic 3 Apply Properties: Multiplication Facts for 3, 4, 6, 7, and 8

- How can unknown multiplication facts be found using known facts?

Topic 4 Use Multiplication to Divide: Division Facts

- How can unknown division facts be found using known multiplication facts?

Topic 5 Fluently Multiply and Divide within 100

- What are strategies to solve multiplication and division facts?

Topic 6 Connect Are to Multiplication and Addition

- How can area be measured and found?

Topic 7 Represent and Interpret Data

- How can data be represented, interpreted, and analyzed?

Learning Objectives

Topic 3 Apply Properties: Multiplication Facts for 3, 4, 6, 7, and 8

- Students will be able to use the Distributive Property to solve problems involving multiplication within 100.
- Students will be able to use approprite tools and the Distributive Property to break apart unknown facts with 3 as a factor.
- Students will be able to use the Distributive Property to break apart unkown facts with 4 as a factor.
- Studetns will be able to use the Dsitributive Property to break apart unknown facts with 6 or 7 as a factor.
- Students will be able to use the Distributive Property and known facts to break apart unknown facts with 8 as a factor.
- Students will be able to use strategies such as bar diagrams and arrays with known facts to solve multiplication problems.
- Students will be able to use the Associative Property of Multiplication to group 3 factors and multiply.
- Students will be able to use repeated reasoning with known facts to make generalizations when multipying.

Topic 4 Use Multiplication to Divide: Divsion Facts

- Students will be able to use multiplication facts to divide.

- Students will be able to use multiplication facts to find related diviion facts.
- Students will be able to use knowledge of even and odd numbers to identify multiplicatoin patterns.
- Studetns will be able to use properties to understand division involving 0 and 1.
- Students will be able to use patterns and known facts to find unknown multiplication facts. use multiplication facts to find relatedd division facts.
- Students will be able to use multiplication and division facts to find unknown values in equations.
- Students will be able to use previously learned concepts to find and answer hidden questions to solve problems.

Topic 5 Fluently Multiply and Divide within 100

- Students will be able to use the multiplication table adn the Distributive Property to find patterns in factors and products.
- Students will be able to use the use a multiplication table to find missing factor in a division problem.
- Students will be able to use number sense adn reasoning while practicing multiplication and division facts.
- Students will be able to use strategies such as skip counting and properties of operations to multiply.
- Students will be able to solve multiplication and division problmes that involve different strategies and representations.
- Students will be able to use multiplication to wirte and solve real-world problmes involving equal groups.
- Studnets will be able to use division to write adn solve real-world problmes involving equal groups.
- Students will be able to use the structure of multiplication and division to compare expressions.

Top 6 Connect Area to Multiplication and Addition

- Students will be able to use unit squares to find the area of a shape.
- Students will be able to use unit squares to find the area of a figure.
- Students will be able to use standard units to measure the area of a shape.
- Students will be able to use unit squares adn multiplication to find the areas of squares and rectangles.
- Students will be able to use areas of rectangles to model the Distributive Property of Multiplication.
- Students will be able to use areas of rectangles to find the area of irregular shapes.
- Students will be able to solve problems by breaking apart or changing the problem into simpler problems.

Topic 7 Represent and Interpret Data

- Students will be able to use graphs to compare and interpret data.
- Students will be able use frequency tables and picture graphs to compare and interpret data.
- Students will be able to use scaled bar graphs to represent data sets.
- Students will be able to use graphs to solve problems.

- Students will be able to use words, symbols, and numbers to accurately and precisely solve math problem.

Interdisciplinary Connections

Math and Science Project STEM

Topic 3 Apply Properties: Multiplication Facts for 3, 4, 6, 7, and 8

The science theme for this topic is inherited traits.

- Ask students what they notice first about the picture on page 105 in their workbook. If they don't mention the colors of the flowers, then point out the rows of the same type of flower in different colors.
- Explain to sudents that flowers inherit traits from parents just like humans do. Disucss inherited traits of organisms, leading to wath is inherited versus what is learned.
- Have students research characteristics of organisms are inherited.
- Have the students write a report/journal entry about the information they have gathered.

Topic 4 Use Multiplication to Divide: Division Facts

The science theme for this topic is testing models.

- Have students help you list exampels of things that are tested, such as cars, computers, and video games.
- Explain that when a new product is being made, people test the product many times.
- Have students research models or prototypes that were tested. Have them identify how the testing was done.
- Have the sutdents write a report/journal entry about the information they have gathered.

Topic 5 Fluently Multiply adn Divide within 100

The science theme for this topic is weather information.

- Ask students what they think when they hear the word weather. Then point out the image and have students help you list things in the picture that make them think of weather.
- Have the students rearch what the weather is like in different places on Earth. Find the weather at different times of the day.
- Have the students write a report/journal entry with the information gathered.

Topic 6 Connect Area to Multiplication and Addition

The science theme for this topic is design solutions.

- Discuss situations in whcih people may need protection from the weather, such as tornadoes and hurricanes.
- Have students help you list other designs that help protect us from unsafe weather. Talk about why math and research are important when designing ways to protect us against weather.
- Have students research designs that help protect against weather.
- Have the students write a report/journal entry to include the information they have gathered.

Topic 7 Represent and Interpret Data

The science theme for this topic is seasons.

- Discuss the seasons with your students.
- Explain that the changing seasons are caused by the increasing number of daylight hours and Earth's tilt. Different seasons have different weather patterns, such as temperature and the amount of rainfall or snowfall.
- Have the students research information about patterns of temperature in the different seasons where you live.
- Have the students write a report/journal entry with the information they gathered.

LA.K-12.NJSLSA.R	Reading
LA.K-12.NJSLSA.W	Writing
SCI.3	Inheritance and Variation of Traits: Life Cycles and Traits
SCI.3	Weather and Climate
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 21stcentury.

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

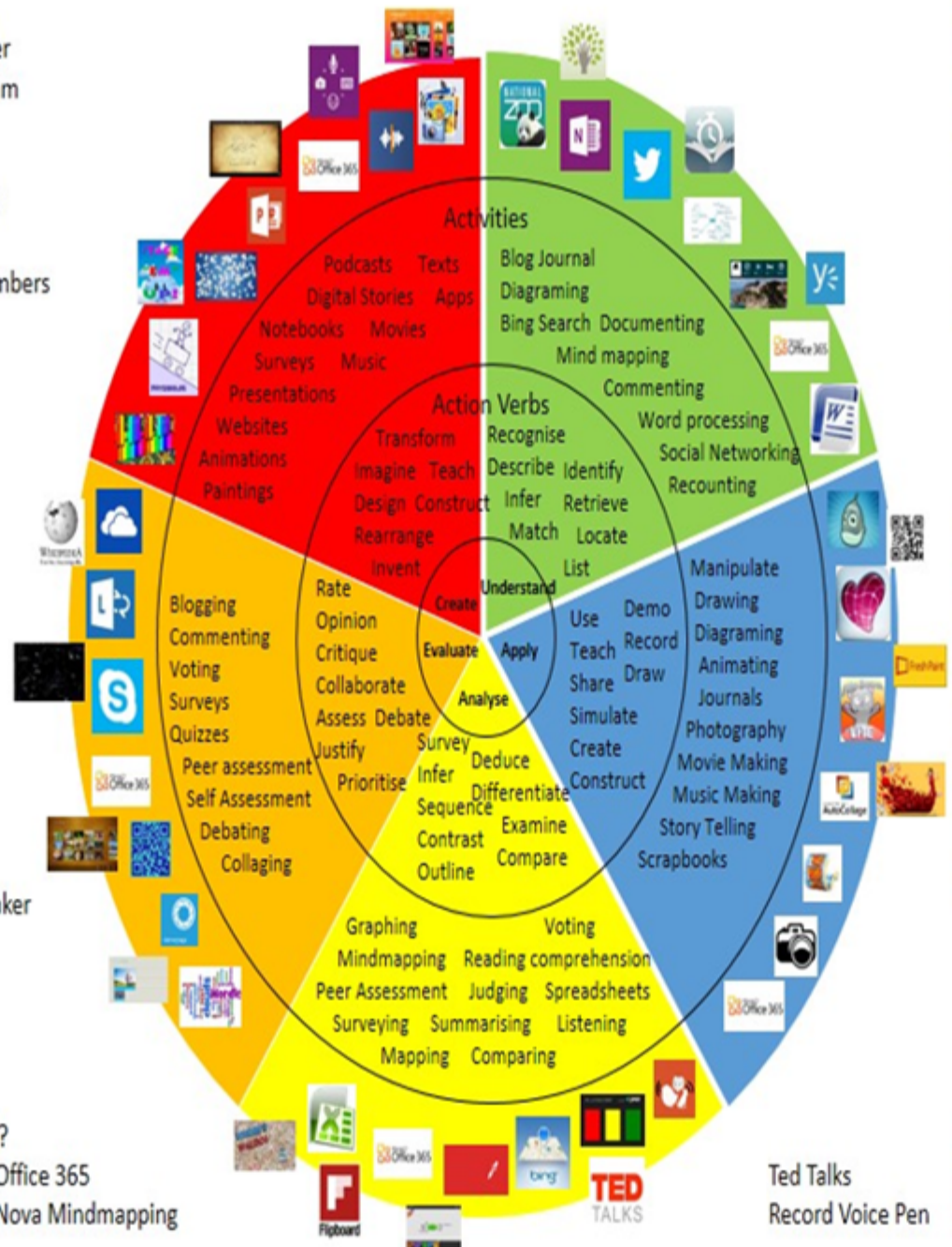What technology can be used in this unit to enhance learning?

Win 8.1 Apps/Tools Pedagogy Wheel

Podcasts
Photostory 3
Kid Story Builder
Music Maker Jam
Paint A Story
Office 365
MS PowerPoint
Stack 'Em Up
NqSquared Numbers
Physamajig
Xylophone 8

Wikipedia
Skydrive
Lync
SkyMap
Skype
Office 365
Puzzle Touch
Easy QR
Memorylage
Life Moments
Word Cloud Maker

Where's Waldo?
MS Excel   Office 365
Flipboard   Nova Mindmapping

Ted Talks
Record Voice Pen

Activities

Podcasts   Texts
Digital Stories   Apps
Notebooks   Movies
Surveys   Music
Presentations
Websites
Animations
Paintings

Blog Journal
Diagraming
Bing Search Documenting
Mind mapping
Commenting
Word processing
Social Networking
Recounting

Action Verbs

Transform   Recognise
Imagine Teach   Describe Identify
Design Construct   Infer   Retrieve
Rearrange   Match   Locate
Invent   List

Rate
Opinion
Critique
Collaborate
Assess Debate
Justify
Peer assessment
Self Assessment
Debating
Collaging

Create   Understand

Evaluate   Apply

Analyse

Survey   Deduce
Infer   Differentiate
Sequence
Contrast   Examine
Outline   Compare

Use   Demo
Teach   Record
Share   Draw
Simulate
Create
Construct

Manipulate
Drawing
Diagraming
Animating
Journals
Photography
Movie Making
Music Making
Story Telling
Scrapbooks

Blogging
Commenting
Voting
Surveys
Quizzes

Graphing   Voting
Mindmapping   Reading comprehension
Peer Assessment   Judging   Spreadsheets
Surveying   Summarising   Listening
Mapping   Comparing

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 supporth 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 eview, 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 clarif
- 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
- having peers take notes or providing a copy of the teacher's notes
- 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

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 workpresented 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 secion.

- 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

Please list all resources available to you that are located either within the district or that can be obtained by district resources.

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

Ancillary Resources

Please list ALL other resources available to strengthen your lesson.

- Grade Level Curriculum Guide
- Model Curriculum