

Unit 2 Operations & Algebraic Thinking

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Title Section

Department of Curriculum and Instruction



Belleville Public Schools

Curriculum Guide

Operations & Algebraic Thinking

GRADE 5

Belleville Board of Education

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Unit Overview

- Multiply greater numbers by powers of 10.
- Estimate products.
- Multiply 3-digit by 2-digit numbers.
- Multiply whole numbers with zeros.
- Solve word problems using multiplication.
- Multiply decimals by powers of 10.
- Estimate the product of a decimal and a whole number.
- Multiply a decimal by a whole number.
- Use models to multiply a decimal and a decimal.
- Use patterns and mental math to divide.
- Estimate quotients with 2-digit divisors.
- Use models to divide with 2-digit divisors.
- Use partial quotients to divide.
- Divide by multiples of 10.
- Use estimation to place the first digit of the quotient.
- Patterns for dividing with decimals.
- Estimate decimal Quotients.
- Use models to divide by a 1-digit whole number.
- Divide by a 1-and 2-digit whole number.
- Use number sense to divide decimals.
- Divide by a decimal.
- Multiply greater numbers by powers of 10.

- Use extra week to build in Assessment for each Topic and or Unit, as well as Re-teaching and Enrichment.

NJSLS

MA.5.NBT.A	Understand the place value system.
MA.5.NBT.A.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 $\frac{1}{10}$ of what it represents in the place to its left.
MA.5.NBT.A.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 whole-number exponents to denote powers of 10.
MA.5.NBT.B.5	Fluently multiply multi-digit whole numbers using the standard algorithm.
MA.5.NBT.B.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.
MA.5.NBT.B.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.

Exit Skills

By the end of Grade 5 Mathematics, students in the Belleville Public Schools will be able to:

- **Develop fluency with addition and subtraction of fractions, and develop 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):**

Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.).

- **Extend division to two-digit divisors, integrating decimal fractions into the place value system and develop understanding of operations with decimals to hundredths, develop fluency with whole number and decimal operations:**

Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition, subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain

why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

- **Develop an understanding of volume:**

Students recognize volume as an attribute of three-dimensional space. They understand that volume can be measured by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to determine volumes to solve real-world and mathematical problems.

Enduring Understanding

- Place value patterns and mental math can be used to write the product of a whole number and a power of 10 by simply annexing the correct number of zeros to the whole number factor.
- Estimating products is a useful technique to quickly solve mathematical problems and understand the value of numbers used in real world situations. there is more than one way to estimate a product.
- Multiply 3-digit numbers by 2-digit numbers by combining equal groups. Rounding to the nearest 10 or using compatible numbers helps estimate with greater accuracy when multiplying with greater numbers.
- The process for multiplying factors with zeros is always the same regardless of the size of the numbers with zeros. Estimation is a strategy that can be used to check the final product for reasonableness.
- No matter the size of the numbers, the standard algorithm for multiplying whole numbers is always based on properties of operations and can be used to solve problems.
- Using a bar diagram and writing an equation are two strategies that can be used to solve multi-step problems.
- Patterns can be identified and used to multiply decimals by 10, 100, 1,000. Representations such as symbols, diagrams, and words can help you multiply and communicate mathematical ideas.
- You can estimate the product of a decimal and a whole number by using compatible numbers and rounding. Comparing two strategies can help you decide which strategy provides an estimate that is closer to the exact answer.
- The standard multiplication algorithm used with decimals is an extension of the standard algorithm used when multiplying whole numbers. You can use models to represent multiplication problems and communicate ideas to others.
- The steps involved in multiplying a decimal by a whole number are similar to the steps used in multiplying two whole numbers. Place value in the factors determines the placement of the decimal point in the product.
- The partial products process for multiplying whole numbers can be used for multiplying with decimals. You can use models and other strategies to find the answer and determine if reasonable.
- The associative and commutative properties can be used to break apart and multiply two decimals.
- Thinking about the relative size of the decimals being multiplied can help you determine the relative size of the product, and the location of the decimal point in the product.
- Division problems with dividends and divisors that are multiples of ten can be solved using basic facts and patterns. Multiplication can be used to check whether quotients are reasonable.
- Using compatible numbers is one of many estimation strategies that can be used to estimate a quotient.
- Area models and arrays are two ways to represent division with multi-digit whole numbers.
- Dividing with 2-digit divisors is just an extension of the steps for dividing with 1-digit divisors. Estimation and place value can help determine the placement of digits in the quotient.
- Compatible numbers can be used to simplify division problems involving dividing 3-digit dividends by 2-digit multiples of ten.
- Estimation and place value understandings can be used to determine where to place the first digit in a quotient.
- Place value patterns can be used to divide decimals by powers of ten.
- Rounding and compatible numbers can be used to estimate quotients with decimals.
- The standard algorithm used for dividing decimals is an extension of the standard algorithm for dividing whole numbers.

Place value blocks can be used as a tool to show this connection.

- When dividing by a whole number, place the decimal point in the quotient directly above the decimal point in the dividend.
- An area model uses the inverse relationship between multiplication and division to show dividing a decimal by a 2-digit whole number.
- Number sense and reasoning can be used to place the decimal point in the quotient when dividing a decimal by a decimal.
- When dividing with decimals, it is sometimes necessary to annex zeros to the dividend so you can keep dividing until there is no remainder.

Essential Questions

- What are the standard procedures for estimating and finding products of multi-digit numbers?
- What are the standard procedures for estimating and finding products involving decimals?
- What is the standard procedure for division and why does it work?
- What are the standard procedures for estimating and finding quotients involving decimals?

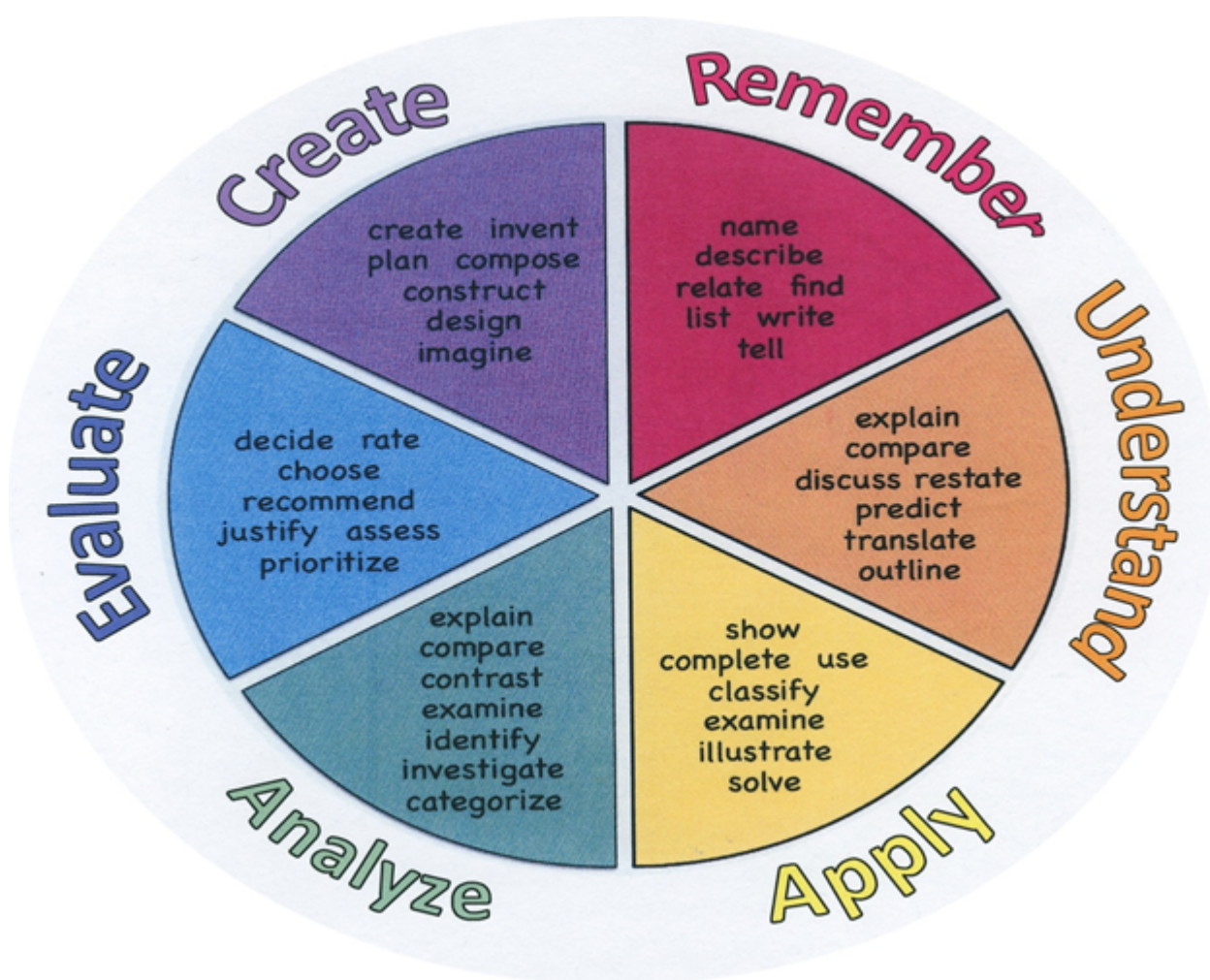
Learning Objectives

After understanding multiplying greater numbers by power of 10, students will be able to:

- **Identify** numbers in their place value, **express** patterns and **calculate** the response.
- **Illustrate** knowledge of basic facts to **support** the computation and **construct** a reasonable response.

Remember	Understand	Apply	Analyze	Evaluate	Create
Choose	Classify	Choose	Categorize	Appraise	Combine
Describe	Defend	Dramatize	Classify	Judge	Compose
Define	Demonstrate	Explain	Compare	Criticize	Construct
Label	Distinguish	Generalize	Differentiate	Defend	Design
List	Explain	Judge	Distinguish	Compare	Develop
Locate	Express	Organize	Identify	Assess	Formulate
Match	Extend	Paint	Infer	Conclude	Hypothesize
Memorize	Give Examples	Prepare	Point out	Contrast	Invent
Name	Illustrate	Produce	Select	Critique	Make
Omit	Indicate	Select	Subdivide	Determine	Originate
Recite	Interrelate	Show	Survey	Grade	Organize
Select	Interpret	Sketch	Arrange	Justify	Plan
State	Infer	Solve	Breakdown	Measure	Produce
Count	Match	Use	Combine	Rank	Role Play
Draw	Paraphrase	Add	Detect	Rate	Drive
Outline	Represent	Calculate	Diagram	Support	Devise

Point Quote Recall Recognize Repeat Reproduce	Restate Rewrite Select Show Summarize Tell Translate Associate Compute Convert Discuss Estimate Extrapolate Generalize Predict	Change Classify Complete Compute Discover Divide Examine Graph Interpolate Manipulate Modify Operate Subtract	Discriminate Illustrate Outline Point out Separate	Test	Generate Integrate Prescribe Propose Reconstruct Revise Rewrite Transform
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Interdisciplinary Connections

LA.K-12.NJSLSA.W	Writing
SOC.6.1.8.C	Economics, Innovation, and Technology
SOC.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.
SOC.6.3.8.CS9	Make informed and reasoned decisions.
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.CS1	Understand and use technology systems
TECH.8.1.5.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.

Alignment to 21st Century Skills & Technology

- 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

- Smart Board
- Student Lap-top

Differentiation

Utilize **Quick Check** in order to determine differentiation of instruction. **Assess and differentiate** page will prescribe the differentiated instruction activity.

- Intervention activity.
- Reteach.
- Technology center.
- On-level and advanced activity center.
- Leveled Assignment.

Resources:

- NJDOE: Instructional Supports and Scaffolds for Success in Implementing the Common Core State Standards <http://www.state.nj.us/education/modelcurriculum/success/math/k2/>

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
- decreasing the amount of work presented or required
- 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
- using computer word processing spell check and grammar check features
- using true/false, matching, or fill in the blank tests in lieu of essay tests

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

- Admit Tickets
- Anticipation Guide
- Choral response
- 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
- Thumbs up
- Top 10 List
- Unit tests

Primary Resources

- en-Vision 2.0
- en-Vision 2.0 Digit Resources

Ancillary Resources

New Jersey Center for Teaching and Learning: www.njctl.org

PARCC site: www.parcconline.org

Khan Academy:
www.khanacademy.org

<http://www.mathworksheets4kids.com/activities/4th-grade.html>

<http://www.education.com/worksheets/fourth-grade/math/>

<http://www.math-drills.com/privacy.php>

http://www.internet4classrooms.com/printables/common_core/math_mathematics_4th_fourth_grade/

<http://imathworksheets.com/geometry-worksheets-2complementary-angles-worksheets/volume-worksheets/volume-of-a-rectangular-prism/>

<http://illuminations.nctm.org/Search.aspx?view=search&type=ls&gr=3-5>

<http://www.k6-geometric-shapes.com/4th-grade-math-Worksheets.html>

<http://www.math-aids.com/>

<http://www.mathworksheetsland.com/>

<http://www.mathsisfun.com/worksheets/multiplication.php>

<http://www.softschools.com/mathg.jsp>

<http://interactivesites.weebly.com/addition.html>

<http://www.worksheetworks.com/math/geometry/measuring-figures/volume.html>

<http://www.math-salamanders.com/equivalent-fractions-worksheet.html>

<http://www.printable-math-worksheets.com/multiplication-array.html>

