Unit 1: Use Positive Rational Numbers

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Unit 1: Use Positive Rational Numbers

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Mathematics: Grade 6

Unit 1: Use Positive Rational Numbers

Belleville Board of Education

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Unit Overview

Unit 1 focuses on the deep understanding of our number system through fluency in computations with decimals and fractions. Students use all four operations with decimals before multiplying and dividing with fractions and mixed numbers. Students apply these skills to solve real-world problems.

Enduring Understandings

- Fluently Add, Subtract, and Multiply Decimals
- Fluently Divide Whole Numbers and Decimals
- Multiply Fractions
- Understand Division with Fractions

Essential Questions

- How are multiplication and division related?
- How do you determine where to place the decimal point in the product in a decimal multiplication problem?
- What is the reciprocal of a fraction?

Exit Skills

By the end of Grade 6, Math Unit 1, students will be able:

- Fluently add, subtract, and multiply decimals
- Fluently divide whole numbers and decimals
- Multiply fractions
- Understand divisions with fractions

- Divide fractions by fractions
- Divide mixed numbers
- Solve problems with rational numbers

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.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.
MA.6.NS.A	Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
MA.6.NS.A.1	Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
MA.6.NS.B	Compute fluently with multi-digit numbers and find common factors and multiples.
MA.6.NS.B.2	Fluently divide multi-digit numbers using the standard algorithm.
MA.6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Interdisciplinary Connections

LA.RL.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.SL.6.4	Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate speaking behaviors (e.g., eye contact, adequate volume, and clear pronunciation).

LA.L.6.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 6 reading and content, choosing flexibly from a range of strategies.

Learning Objectives

- Add and subtract decimals with precision
- Multiply decimals
- Add, subtract, and multiply decimals to solve real world problems
- Use place-value structure to divide whole numbers and decimals
- Divide whole numbers and decimals to solve real world problems
- Use models to multiply fractions
- Multiply the numerator then the denominator to find the product of two fractions
- Multiply mixed numbers
- Use mathematical modeling to represent a situations and to propose a solution
- Test and verify the appropriateness of their math models
- Explain why the results from their mathematical models may not align exactly to the problem situation

Suggested Activities & Best Practices

Embedded in Pearson TE, Grade 6:

- Unit 1 STEM Project: Students are introduced to the science of engineering. They learn about the ways that engineers solves problems to improve products. Students begin to think like engineers and identify needed improvements around their school.

- Decimal Menu: Provide students with a variety of menus. Explain to students that they will each have $50 to purchase their lunches for the week. Students must list their food choices and the individual and total cost. Challenge: Students are given $1000 and need to plan a party for 25 people.

- Fraction Recipe: Find a recipe of your choice. The recipe must contain at least one whole number, a mixed number and fractions. Rewrite the recipe to double and triple all the ingredients in the recipe. Challenge: Find the amount of ingredients needed to feed the entire class.

Assessment Evidence - Checking for Understanding (CFU)

- Common Formative Assessments (Formative)
- Common Summative Assessments (Summative)
- District Benchmark (Benchmark)
- Do Now
- Exit Tickets

- Higher-order Questioning / Rich Discussion
- Journals
- KWL Chart
- Learning Center Activities
- Performance Task (Alternative)
- 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

Technology Infusion

- Online Practice with Math IXL for School. Assign Grade 6: G1, H2 and H4 to develop fluency with adding, subtracting, multiplying and dividing decimals.

- Video Tutorials: Students can access instructional videos with the Virtual Nerd App to review how to add, subtract, multiply and divide decimals.



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.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.

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. 12A

- 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. 9

- 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. 11-12

- 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 Enrichment to target advanced learners e.g. Topic 1-1, pg. 8

- 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

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NJSLS: See below

Interdisciplinary Connection: LA.RL.6.1 Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.

Objective:

- Students will be able to fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

- Students will be able to use mathematical modeling to represent a problem situation and propose a solution.

Anticipatory Set/Do Now: Play the Video from the Unit 1: 3-Act Math for students. The video shows a boy filling up his shopping cart with groceries. After students have watched the video direct them to write down the first question that comes into their mind. Discuss these questions as a class. After brainstorming, pose the main questions that students will be tasked with answering: How much does everything cost? Does the boy have enough money? How do you know?

Learning Activity: Direct students to predict whether or not the boy has enough money. Have students identify the important information needed to answer the main question. [How many items is the boy buying and how much does each item cost? How do you know?] Next use the video to reveal the important information and have students record this information in their student book. Instruct students to develop a model for how they can find out how much everything costs. Students may use repeated addition or multiplication to solve this problem. Discuss how multiplication is more efficient at solving this question. Next direct students to find out how much everything costs. Use a document camera to display student solutions. and facilitate a discussion about solution methods. Then play the final part of the video to reveal the answer and the amount of money the boy has.

Student Assessment/CFU's: Have students complete questions 11 and 12 in their student book. Encourage students to discuss possible sources of error inherent in using math to model real world situations. Look for students to point out that their mdoels are still useful even though they are not perfect. Questions to ask: 1) Why does your answer not match the answer in the video? 2) How useful is your model at predicting the answer? 3) How could your model better represent the

situation?

Materials: Unit 1: 3-Act Math Video; Pearson Realize Student Book

21st Century Themes and Skills: PFL.9.1.8.B.8 Develop a system for keeping and using financial records.

Differentiation/Modifications:

Think/Pair/Share: Can be used to brainstorm the first question that comes to mind.

Peer Tutoring: Have students work in partners to develop their models and solutions.

Challenge students to find out how much profit the store makes from this purchase if the store pays $1.62 for the pasta and $0.82 for each can of sauce.

Integration of Technology Students will watch a video of a boy filling up a shopping cart with groceries.

LA.RL.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
MA.K-12.4	Model with mathematics.
MA.6.NS.B.3	Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
PFL.9.1.8.B.8	Develop a system for keeping and using financial records.