Unit 5: Measurement, Data, Geometry - Part 1

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Unit 5: Measurement, Data, Geometry - Part 1

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Mathematics: Grade 5

Unit 5: Measurement, Data and Geometry - Part 1

Belleville Board of Education

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Unit Overview

Unit 5 will cover six topics including (T11-1) Convert Customary Units of Length, (T11-2) Convert Customary Units of Capacity, (T11-3) Convert Customary Units of Weight, (T12-1) Analyze Line Plots, (T12-2) Make Line Plots, (T13-1) Order of Operations, (T13-2) Evaluate Expressions, (T14-1) The Coordinate System, (T14-2) Graph Data using Ordered Pairs, (T15-1/2) Numerical Patterns, (T16-1) Classify Triangles, and (T16-2) Classify Quadrilaterals. Lessons have been sequenced to ensure students' exposure to selected topics prior to the NJSLA.

Enduring Understandings

Topic 11 focuses on:

- Multiplication and division are used to convert among different units of length.
- Multiplication and division are used to convert among different units of capacity.
- Multiplication and division are used to convert among different units of weight.
- Multiplication and division are used to convert among different units of length.
- Multiplication and division are used to convert among different units of capacity.
- Multiplication and division are used to convert among different units of mass.
- Some problems can be solved by first finding and solving one or more sub-problems and then using the answer(s) to solve the original problem.
- Good math thinkers are careful about what they write and say, so their ideas about math are clear.

Topic 12 focuses on:

- Line plots are one way to organize and represent numerical data collected in a survey. You can use line plots to answer questions about a data set.
- Line plots are one way to organize and represent numerical data. You can use a line plot to see how data are distributed.
- You can use line plots to solve problems that involve data.

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

Topic 13 focuses on:

- There is an agreed upon order in which operations are carried out in a numerical expression.
- The value of a numerical expression can be found by using the order of operations.
- Numerical expressions can represent the calculations needed to solve a problem.
- Numerical expressions show relationships among the quantities involved which you can interpret without evaluation of the expressions.
- Good math thinkers know how to think about words and numbers to solve problems.

Topic 14 focuses on:

- The coordinate system uses two perpendicular number lines intersecting at 0 to name the location of points in the plane.
- A coordinate grid has an x-axis and a y-axis that can be used to locate points in two dimensions.
- Points that lie on a line can be connected and extended to solve problems.
- Good math thinkers know how to think about words and numbers to solve problems.

Topic 15 focuses on:

- Two patterns can be extended using the same rule and there will be a relationship between the patterns.
- Two patterns can be extended using rules and there will be a relationship between the patterns.
- Analyze patterns and graph ordered pairs generated from number sequences.
- Good math thinkers make sense of problems and think of ways to solve them. If they get stuck, they don't give up.

Topic 16 focuses on:

- Triangles are classified by their sides and by their angles.
- Quadrilaterals are classified by their sides and by their angles.
- Good math thinkers use math to explain why they are right. They can talk about the math that others do, too.

Essential Questions

(T11) Convert Measurements

- What are customary measurement units and how are they related?

- What are metric measurement units and how are they related?

(T12) Represent and Interpret Data

- How can line plots be used to represent data and answer questions?

(T13) Write and Interpret Numerical Expressions

- How is the value of a numerical expression found?

(T14) Graph Points on the Coordinate Plane

- How are points plotted?
- How are relationships shown on a graph?

(T15) Algebra: Analyze Patterns and Relationships

- How can number patterns be analyzed and graphed?
- How can number patterns and graphs be used to solve problems?

(T16) Geometric Measurement

- How can triangles and quadrilaterals be described, classified, and named?

Exit Skills

Topics 11-16 Cluster:

- Convert like measurement units within a given measurement system
- Represent and interpret data
- Write and interpret numerical expressions
- Graph points on the coordinate plane to solve real-world and mathematical problems
- Analyze patterns and relationships
- Classify two-dimensional figures into categories based on their properties

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.5.MD.A	Convert like measurement units within a given measurement system.
MA.5.MD.A.1	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
MA.5.MD.B	Represent and interpret data.
MA.5.MD.B.2	Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.
MA.5.MD.C	Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.
MA.5.MD.C.3	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
MA.5.MD.C.3a	A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.
MA.5.MD.C.3b	A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
MA.5.MD.C.5	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
MA.5.G.A.1	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).
MA.5.G.A.2	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

MA.5.G.B	Classify two-dimensional figures into categories based on their properties.
MA.5.G.B.3	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.
MA.5.G.B.4	Classify two-dimensional figures in a hierarchy based on properties.

Interdisciplinary Connections

LA.RL.5.1	Quote accurately from a text, and make relevant connections when explaining what the text says explicitly and when drawing inferences from the text.
LA.RF.5.3	Know and apply grade-level phonics and word analysis skills in decoding and encoding words.
LA.RF.5.3.A	Use combined knowledge of all letter-sound correspondences, syllabication patterns, and morphology (e.g., roots and affixes) to read accurately unfamiliar multisyllabic words in context and out of context.
LA.L.5.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies.

Learning Objectives

After completing Unit 5, students will be able to:

Topic 11:

- Convert customary units of length.
- Convert customary units of capacity.
- Convert customary units of weight.
- Convert metric units of length.
- Convert metric units of capacity.
- Convert metric units of mass.
- Solve real-world problems with measurement conversions.
- Be precise when solving measurement problems.

Topic 12:

- Read and analyze line plots.
- Organize and display data in a line plot.
- Solve problems using data in a line plot.
- Critique the reasoning or others using understanding of line plots and fractions.

Topic 13:

- Use the order of operations to evaluate expressions.
- Evaluate expressions with parentheses, brackets, and braces.
- Write simple expressions that show calculations with numbers.
- Interpret numerical expressions without evaluating them.
- Use reasoning to solve problems by making sense of quantities and relationships in the situation.

Topic 14:

- Locate points on a coordinate grid.
- Graph points on a coordinate grid.
- Solve real-world problems by graphing points.
- Use reasoning to solve problems by making sense of quantities and relationships in the situation.

Topic 15:

- Analyze numerical patterns.
- Use tables to identify relationships between patterns.
- Analyze patterns and graph ordered pairs generated from number sequences.
- Make sense of problems and persevere in solving them.

Topic 16:

- Students will be able to:
- Classify triangles by their angles and sides.
- Classify quadrilaterals by their properties.
- Classify quadrilaterals using a hierarchy.
- Construct arguments about geometric figures.

Suggested Activities & Best Practices

- Consider Extension Activity e.g. Topic 11-1, pg. 631

- 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
- 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
- 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



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.8.1.5.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 11-1, pg. 643A

- 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 11-1, pg. 639A

- 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 11-1, Error Intervention, pg. 641-642

- 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 11-1, pg. 643A

- 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