Unit 2: Matter (Structure and Properties of Matter)

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Title Section

Department of Curriculum and Instruction

Belleville Public Schools

Curriculum Guide

Science: Grade 2

Unit 2: Matter

Belleville Board of Education

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Unit Overview

In this unit, students will

- describe and classify materials by their observable properties
- select and use materials based on these properties
- use evidence to describe how heating and cooling cause changes to matter
- use evidence to describe reversible and irreversible changes to matter
- explore how an object can be taken apart and its pieces used to make another object

Enduring Understanding

Lesson 1

- Enduring Understanding: use evidence to describe and classify materials based on their observable properties (the properties of matter)
- Essential Question: What are the properties of matter?

Lesson 2

- Enduring Understanding: use evidence to describe how heating and cooling matter may cause changes that can be observed
- Essential Question: How do heating and cooling change matter?

Lesson 3

- Enduring Understanding: Construct an argument with evidence that some changes to matter can be reversed and some cannot

- Essential Question: How does matter change?

Lesson 4

- Enduring Understanding: use observations as evidence to explain how an object made of a small set of pieces can be taken apart and made into a new object
- Essential Question: How are objects put together?

Essential Questions

Unit 2 Essential Questions:

- What is matter?
- What are the properties of matter?
- How does heating change matter?
- How does cooling change matter?
- How does matter change?
- What is the cause and effect of changing matter?
- How are objects taken apart?
- How can object pieces be put back together?

Exit Skills

By the end of Grade 2, Science Unit 2, the student should be able to:

- describe matter and identify its properties
- describe how heating and cooling changes matter
- identify how pieces of matter can be joined to create objects

New Jersey Student Learning Standards (NJSLS-S) & NGSS

SEP - Planning and Carrying Out Investigations

SEP - Analyzing and Interpreting Data

SEP - Constructing Explanations and Designing Solutions

SEP - Engaging in Argument from Evidence

SEP - Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

DCI - Structure and Properties of Matter

DCI - Chemical Reactions

CCC - Patterns

CCC - Cause and Effect

CCC - Energy and Matter

CCC - Influence of Engineering, Technology, and Science on Society and the Natural World

NextGen Science Standards

2-PS1-1	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
2-PS1-4	Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.
2-PS1-3	Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
2-PS1-2	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.

Interdisciplinary Connections

Do the Math! pp. 53, 68, 80, 92

MA.2.OA.A.1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
MA.2.NBT.A.4	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

LA.RI.2.1	Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
LA.RI.2.8	Describe and identify the logical connections of how reasons support specific points the author makes in a text.
MA.2.MD.D.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in a bar graph.
MA.2.G.A.2	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
LA.W.2.8	Recall information from experiences or gather information from provided sources to answer a question.

Learning Objectives

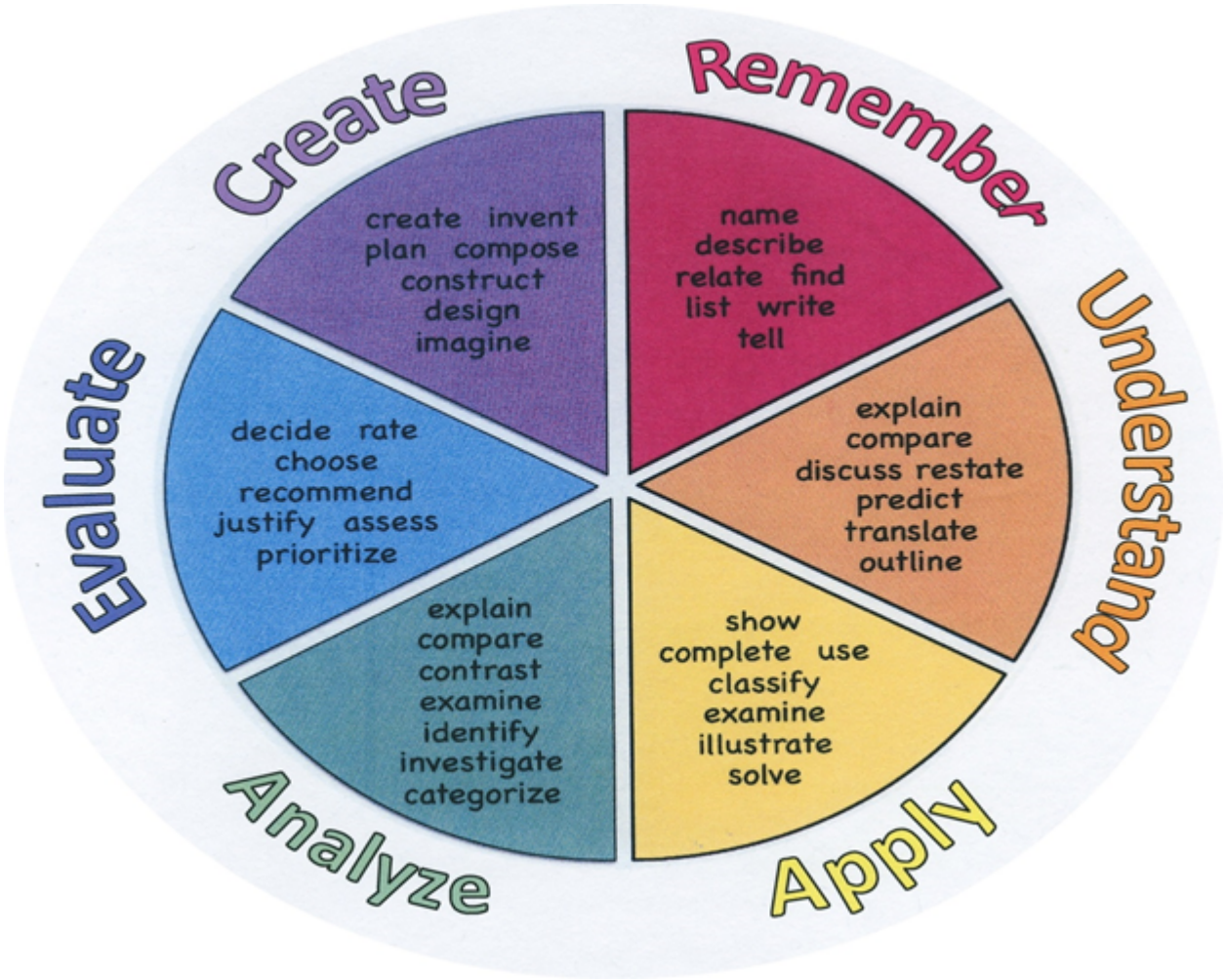
Unit 2 Learning Objectives:

- SWBAT: identify and describe what matter is
- SWBAT: describe and classify matter by their observable properties
- SWBAT: select and use materials based on these properties
- SWBAT: use evidence to describe how heating and cooling cause changes to matter
- SWBAT: use evidence to describe reversible and irreversible changes to matter
- SWBAT: explore how an object can be taken apart and its pieces used to make another object

Action Verbs: Below are examples of action verbs associated with each level of the Revised Bloom's Taxonomy.

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



Suggested Activities & Best Practices

- Vocabulary Game - Guess the word

- Unit Hands-on Projects
- Student collaborations to build on prior knowledge
- Engineer it activity to explore properties of matter

Assessment Evidence - Checking for Understanding (CFU)

- Compare & Contrast
- Create a Multimedia Poster
- Evaluation rubrics
- Exit Tickets
- HMH End-of-Year Test (Benchmark)
- HMH Mid-Year Test (Benchmark)
- HMH Performance-based Assessment (Alternative)
- Illustration
- Journals
- KWL Chart
- Multimedia Reports
- Quizzes (Formative)
- Red Light, Green Light
- Self- assessments
- Study Guide
- Teacher Observation Checklist
- Think, Pair, Share
- Think, Write, Pair, Share
- Unit tests (Summative)

Primary Resources & Materials

HMH Science Dimensions: Teacher Edition, Student workbooks, online resources

HMH Equipment & Safety Kits

HMH Science Dimensions S&E Leveled Readers

- On Level: What Can We Learn About Matter?
- Extra Support: What Can We Learn About Matter?
- Enrichment: Making Coins

Ancillary Resources

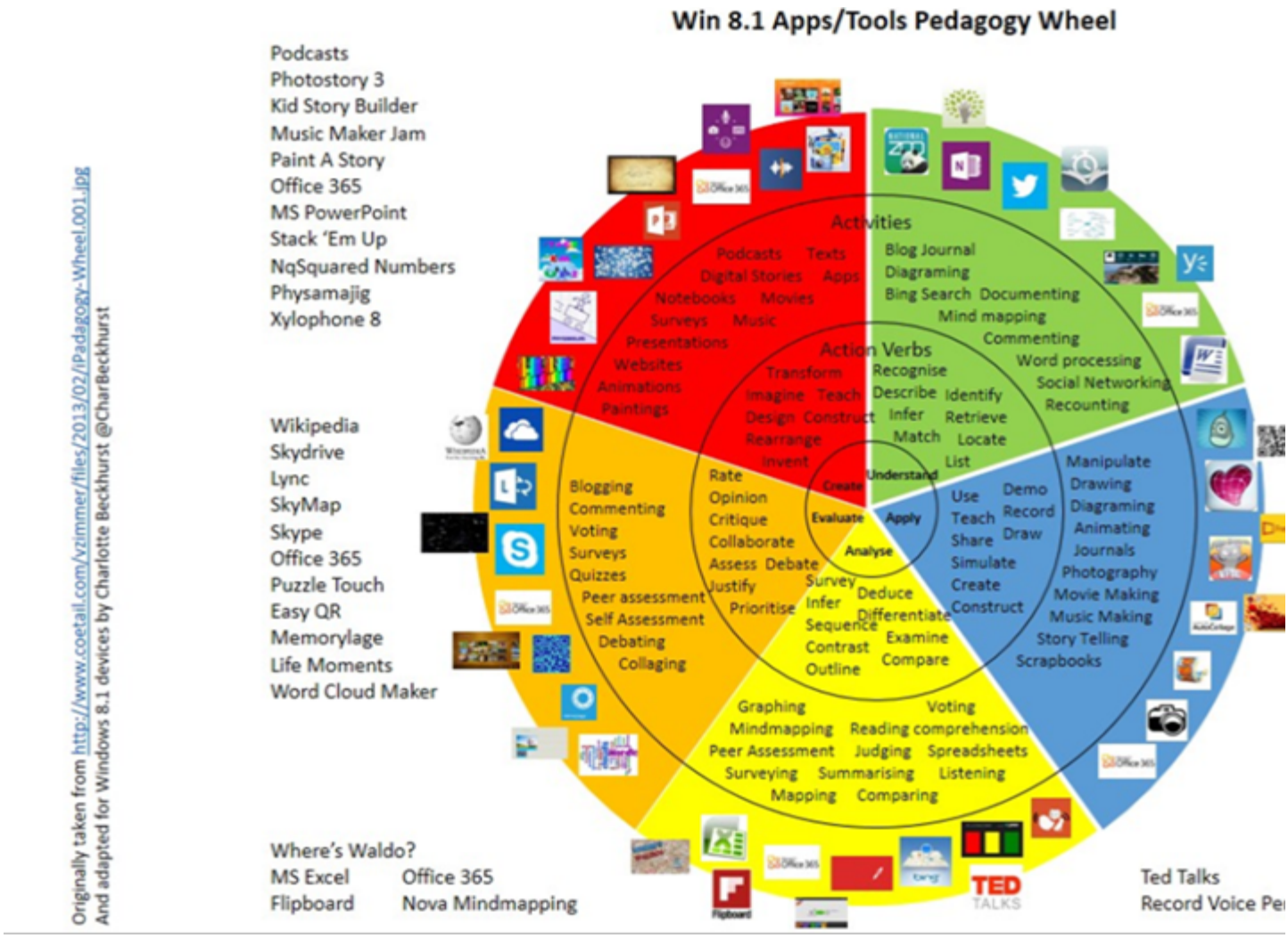
Additional Resources:

- online resources to provide further information to students (see resources listed under technology infusion)
- vocabulary cards
- word wall
- posters
- http://www.mccracken.kyschools.us/Downloads/2%20NGSS%20UNIT%20Matter.pdf

Technology Infusion

Technology available:

- SMART Technology
- Online Websites - student edition of text
- Computer Access - ChromeBooks - Google slides, Google docs, Google sheets
- Online Activities and Assessments -
    - DK Find Out - states of matter - website with online quizzes - https://www.dkfindout.com/us/science/solids-liquids-and-gases/
    - YouTube video - states of matter - https://www.youtube.com/watch?v=UnBoQe2rsgo&feature=youtu.be
    - BrainPop - Matter Sorter https://www.brainpop.com/games/mattersorter/



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.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
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.8.2.2.C	Design: The design process is a systematic approach to solving problems.

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

- Have students work in pairs to identify objects in the classroom that can be defined as MATTER.

- Preview vocab words with definitions and illustrations - play a game matching the pictures to the definition to the term.

- Have students define MATTER in their own words (open-ended, restate) and then draw two examples of MATTER.

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 allowed
- 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
- Small group setting

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)

- Multi-sensory presentation - how matter changes its state - how vinegar changes from liquid to gas when mixed with baking soda - using a beaker or mason jar and a balloon or rubber/latex glove (https://www.youtube.com/watch?v=eXs4gs_jfCo)

- Have students explain what happened in the above experiment verbally instead of in writing.

- additional time for skill mastery
- assistive technology
- behavior management plan
- Center-Based Instruction
- check work frequently for understanding
- check work frequently for understanding
- computer or electronic devices utilized
- 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
- multi-sensory presentation
- multiple test sessions
- preferential seating
- preview of content, concepts, and vocabulary
- printed copy of board work/notes provided
- provide modifications as dictated in the student's IEP/504 plan
- 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

English Language Learning (ELL)

- Have students design their own vocab cards with definitions and illustrations and use these cards during their assessment.

- Have students demonstrate their learning via a poster, model, or video which describes the different states of matter.

- Eliminate extended response questions from assessment or have students respond in pictures rather than words.

- 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
- 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 choice on a multiple choice test
- teaching key aspects of a topic - eliminate nonessential information
- 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

At Risk

- Have students design their own vocab cards with definitions and illustrations and use these cards during their assessment.

- Give students the extended response questions prior to an assessment, let them brainstorm ideas about how to answer, and then help them fomulate a response

- allowing students to correct errors (looking for understanding)
- allowing products (projects, timelines, demonstrations, models, drawings, dioramas, poster boards, charts, graphs, slide shows, videos, etc.) to demonstrate student's learning
- 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
- modifying tests to reflect selected objectives
- providing study guides
- reducing the number of answer choices on a multiple choice test

- teaching key aspects of a topic - eliminate nonessential information
- 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

Talented and Gifted Learning (T&G)

- Have students design a bulleting board showing the three different states of matter (definitions and illustrations) and describing reversible and irreversible changes of matter.

- Create a newspaper headline and story, including an illustration and caption, about how heating and cooling change matter.

- above grade level placement option for qualified students
- advanced problem solving
- allow students to work at a faster pace
- cluster grouping
- complete activities aligned with above grade level text using benchmark results
- create a blog or social media page about their unit
- create a plan to solve an issue presented in the class or in a text
- debate issues with research to support arguments
- flexible skill grouping within a class or across grade level for rigor
- Higher order, critical & creative thinking skills, and discovery
- multi-disciplinary unit and/or project
- teacher-selected instructional strategies that are focused to provide challenge, engagement, and growth opportunities
- utilize exploratory connections to higher-grade concepts
- Utilize project-based learning for greater depth of knowledge