Unit 2: Matter and Energy

Content Area: **Science**
Course(s): **Fundamentals of Science**
Time Period: **1st Marking Period**
Length: **8 Weeks**
Status: **Published**

Unit Overview

This unit is designed to have the students explore the building blocks of matter on a small scale. It will also show how that matter will change as energy is taken and added from the system.

Transfer

Students will be able to use their knowledge to predict what will happen to objects/substances as they gain and lose energy. Also, they will be able to convert between temperature scales, helping them better relate Fahrenheit to Celsius which is commonly used around the world.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

1) Students will understand what matter is composed of and how these components can combine.

2) Students will understand the difference between a mixture and a pure substance.

3) Students will be able convert temperatures between the three temperature scales.

4) Students will understand the three types of energy transfer.

5) Students will understand the concepts of Specific Heat and be able to solve the equation for all variables.

Essential Questions

1) What the heck is EVERYTHING really made of?

2) If there are three different temperature scales, how could you get from one scale to another?

3) How can you give or take energy from an object you aren't even friends with? Will the energy affect objects differently based on their attitude?

Application of Knowledge and Skill

1) SWBAT determine how to break down a substance based on whether it is mixture or pure substance.

2) SWBAT convert between the three temperature scales.

3) SWBAT solve specific heat problems and identify how the energy was added/removed from the system.

Students will know...

1) Students will know the the difference between elements, atoms, molecules, compounds and how they relate.

2) Students will know the difference between a mixture and pure substance.

3) Students will know the difference between the three temperature scales.

4) Students will know the three types of energy and be able to describe them.

5) Students will know what specific heat is and how it can relate to an object changing temperature.

Students will be skilled at...

1) Solving temperature conversion problems.

2) Solve Density Problems

3) Solving Specific Heat problems.

4) Students will be able to experimentally identify the three types of energy transfer.

Academic Vocabulary

Academic Vocabulary	Application Vocabulary
Matter	Construct
Element	Solve
Atom	GUFSA
Compound	"Change in" Δ
Molecule	Thermometer
Chemical Formula	Absolute Zero
Pure Substance	Transfer
Mixture	Evaporate
Physical Change	Melt
Chemical Change	Condensate
Density	Freeze
Heat	Sublimation
Termperature	
Conduction	
Convection	
Radiation	
Specific Heat	
Solid	
Liquid	
Gas	
Plasma	

Learning Goal 1

SWBAT explain how matter is broken down into different categories and how that matter can change.

Proficiency Scale

- SWBAT explain how matter is broken down into different categories and how that matter can change.

MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
SCI.HS-PS1-1	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
SCI.HS-PS1-4	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
SCI.HS-PS1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.
	Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning. For example, p + 0.05p can be interpreted as the addition of a 5% tax to a price p. Rewriting p + 0.05p as 1.05p shows that adding a tax is the same as multiplying the price by a constant factor.

Target 1

SWBAT Describe what matter is made of starting with the smallest particles.

- SWBAT Describe what matter is made of starting with the smallest particles.

Target 2

SWBAT to distinguish between a mixture and a pure substance and compare and contrast them

- SWBAT to distinguish between a mixture and a pure substance and compare and contrast them

Target 3

SWBAT Describe what density is and how it can affect an object along with solve for all the variables in the density equation.

- SWBAT Describe what density is and how it can affect an object along with solve for all the variables in the density equation.

Target 4

SWBAT Compare and contrast the four different states of matter along with explaining how adding or removing energy can affect them.

- SWBAT Compare and contrast the four different states of matter along with explaining how adding or removing energy can affect them.

Learning Goal 2

SWBAT explain how energy can be exchanged on a molecular level and how this energy relates to temperature.

Proficiency Scale

- SWBAT explain how energy can be exchanged on a molecular level and how this energy relates to temperature.

MA.N-Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
SCI.HS-PS1-4	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
SCI.HS-PS1-5	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
	Reading an expression with comprehension involves analysis of its underlying structure. This may suggest a different but equivalent way of writing the expression that exhibits some different aspect of its meaning. For example, p + 0.05p can be interpreted as the addition of a 5% tax to a price p. Rewriting p + 0.05p as 1.05p shows that adding a tax is the same as multiplying the price by a constant factor.

Target 1

SWBAT Describe the three different temperatures scales and convert between them.

- SWBAT Describe the three different temperatures scales and convert between them.

Target 2

SWBAT describe the three ways that energy can be transferred from one object to another.

- SWBAT describe the three ways that energy can be transferred from one object to another.

Target 3

SWBAT Explain how the specific heat of an object relates to how it can change temperature and solve for all variable in the specific heat equation.

- SWBAT Explain how the specific heat of an object relates to how it can change temperature and solve for all variable in the specific heat equation.

Formative Assessment and Performance Opportunities

Lab Reports

Worksheets

PowerPoints with Notes

Homework and Classwork Activities

Group Activities

In Class Discussion

Do Nows and Closures

Class Polling

Observation

Summative Assessment

Unit Assessment will be created collaboratively and used for every student in the course. In addition, there will be other assessments in the form of lab reports, pen and paper tests, and quizzes.

Common Assessment is administered through LinkIt.

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Accommodations/Modifications

- All instruction, labs, activities, and assessments will be modified and enhanced to adhere to individual student's IEPs and 504s. As well differentiated classroom management strategies will be utilized as to

adhere to these students individual plans as well.

- Provide additional visual resources for the structure of an atom
- Work with small groups to reinforce math needed for this unit.

Unit Resources

Teacher generated PowerPoints, Notes, Labs and Worksheets

Textbooks

Resource Books

Internet Resources

Computer Based Activities

Projector

Smart Board

Calculators

21st Century Life and Careers

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
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.CRP5.1	Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.
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.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP10.1	Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.