Belvidere Cluster Wide
Science Curriculum
8th grade
Updated Fall 2018

All Belvidere Cluster curriculum and instruction areas are aligned to the New Jersey Student Learning Standards (NJSLS) in accordance with the NJ Department of Education's curriculum implementation requirements.

Interdisciplinary Connections

- English Language Arts
- Mathematics
- Social Studies
- Technology
- Visual and Performing Arts

Technology Standards and Integration
iPads/Chromebooks
TCI Science
iXL
Scholastic Online
Interactive SmartBoard activities

NJSLA Technology
8.1.2.A.2
Create a document using a word processing application.
8.1.2.A.4
Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
8.1.P.B.1
Create a story about a picture taken by the student on a digital camera or mobile device.
8.1.P.C.1
Collaborate with peers by participating in interactive digital games or activities.
8.1.2.E.1
Use digital tools and online resources to explore a problem or issue.

CAREER EDUCATION (NJDOE CTE Clusters)

- Education & Training
- Finance
- Information Technology
- Science, Technology, Engineering & Mathematics (STEM)

21st Century Skills/ Themes

- Global Awareness
- Financial, Economic, Business and Entrepreneurial Literacy
- Civic Literacy
- Health Literacy
- Environmental Literacy
- Creativity and Innovation
- Critical Thinking
- Problem Solving
- Communication
- Collaboration
- Information Literacy

- Media Literacy
- ICT (Information, Communication and Technology) Literacy

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.

RST.6-8.1

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. *(MS-PS2-1),(MS-PS2-3)*

RST.6-8.3

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. *(MS-PS2-1),(MS-PS2-2),(MS-PS2-5)*

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-1),(MS-PS1-4)

WHST.6-8.1

Write arguments focused on *discipline-specific content*. (MS-PS2-4)

WHST.6-8.7

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. *(MS-PS2-1)*,(MS-PS2-2),*(MS-PS2-5)*

WHST.6- 8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-PS1-3)

Grade 8, Science, Unit 1, Force and Interactions

Content Area: **Science**
Course(s): **Science**
Time Period: **September**
Length: **8 weeks**
Status: **Published**

Enduring Understanding

Newton's Third Law of Motion explains the motion of objects.

Essential Questions

How can one describe physical interactions between objects and within systems of objects

Next Generation Science Standards

Force and Interaction

SCI.MS-PS2-2	**Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.**
SCI.MS-PS2-4	**Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.**
SCI.MS-PS2-3	**Ask questions about data to determine the factors that affect the strength of electric and magnetic forces.**
SCI.MS-PS2-1	**Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.**
SCI.MS	**Forces and Interactions**
SCI.MS-PS2-5	**Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.**

Student Learning Objectives

1	Apply Newton's Third Law to design a solution to a problem involving the motion of two collidin
2	Plan an investigation to provide evidence that the change in an object's motion depends on the mass of the object
3	Ask questions about data to determine the factors that affect the strength of electric and magne
4	Construct and present arguments using evidence to support the claim that gravitational interact masses of interacting objects.
5	Conduct an investigation and evaluate the experimental design to provide evidence that fields e each other even though the objects are not in contact.

Instructional Activities

http://phet.colorado.edu/en/teaching-resources/browse-activities?sims=all&types=LAB&levels=MIDDLE_SCHOOL&locales=en&query

Balloon Rocket with straw and string

Floating needle compass

www.pbs.org/wgbh/nova/education/activities/3016_magnetic.html

http://www.resa.net/curriculum/curriculum/science/professionaldevelopment/ngss-pd/lesson-plans-exploring-ngss/

Interdisciplinary Connections

ELA/Literacy -

RST.6-8.1

Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of

explanations or descriptions. *(MS-PS2-1),(MS-PS2-3)*

RST.6-8.3

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. *(MS-PS2-1),(MS-PS2-2),(MS-PS2-5)*

WHST.6-8.1

Write arguments focused on *discipline-specific content*. (MS-PS2-4)

WHST.6-8.7

Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. *(MS-PS2-1)*,(MS-PS2-2),*(MS-PS2-5)*

Mathematics -

MP.2 Reason abstractly and quantitatively. (MS-PS2-1),(MS-PS2-2),(MS-PS2-3)

6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-PS2-1)

6.EE.A.2 Write, read, and evaluate expressions in which letters stand for numbers. *(MS-PS2-1),(MS-PS2-2)*

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form, using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *(MS-PS2-1),(MS-PS2-2)*

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS-PS2-1),(MS-PS2-2)*

Assessment

Formative Assessments:

Exit tickets; teacher produced rubrics; student self checkoff rubric; three fact fold chart; conversations with students about their thinking

Index Card/Summaries/Questions: Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

Hand Signals: Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand_____ and can explain it (e.g., thumbs up). - I do not yet understand _____ (e.g., thumbs down). - I'm not completely sure about _____ (e.g., wave hand).

One Minute Essay: A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

Analogy Prompt: Present students with an analogy prompt: (A designated concept, principle, or process) is like _____ because _____.

Web or Concept Map: Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts. http://www.graphic.org/concept.html

Summative Assessments:

Selected response items: Multiple choice, True/false, Matching, Short answer, Fill in the blank, One or two sentence response, Extended written response

Performance assessment: Laboratory activities, models, various projects

End-of-unit or -chapter tests

End-of-term or -semester exams

Benchmark:

ELA Research Based Benchmark
Interim Assessments
Alternative
Self Selected Science Projects
Group Collaboration Projects
Concept Map
Demonstration Stations
Powerpoints

Texts and Resources

displacement beakers, metal density blocks, wooden blocks, graduate cylinder, balance, water, oil (vegetable), alcohol, measuring tape, stop watch, toy cars, toy tracks (for cars), brick, spring scale (newtons), dowels, meter stick, small objects (various masses), 100 Watt bulb, ring stand, flask (250 mL), thermometer, black rubber cover, string, ring stand, pulleys, hooked mass set, kinetic car launcher, modeling, clay pieces, raw egg, collision apparatus, various cushioning materials

Grade 8, Science, Unit 2, Energy

Content Area: **Science**
Course(s): **Science**

Time Period: **November**
Length: **8 weeks**
Status: **Published**

Enduring Understanding

The interactions of objects can be explained and predicted using the concept of transfer of energy from one object or system of objects to another, and that that the total change of energy in any system is always equal to the total energy transferred into or out of the system.

Essential Questions

How can energy be transferred from one object or system to another?

Next Generation Science Standards

Energy

SCI.MS-PS3-1	**Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.**
SCI.MS-PS3-4	**Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.**
SCI.MS-PS3-3	**Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.**
SCI.MS-PS3-5	**Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.**
SCI.MS-PS3-2	**Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.**
SCI.MS	**Energy**

Student Learning Objectives

1	Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the r an object and to the speed of an object.
2	Develop a model to describe that when the arrangement of objects interacting at a distance changes, d amounts of potential energy are stored in the system.
3	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes the energy transfer.*
4	Plan an investigation to determine the relationships among the energy transferred, the type of matter, mass, and the change in the average kinetic energy of the particles as measured by the temperature of sample.
5	Construct, use, and present arguments to support the claim that when the kinetic energy of an object cl energy is transferred to or from the object.

Instructional Activities

http://www.resa.net/curriculum/curriculum/science/professionaldevelopment/ngss-pd/lesson-plans-exploring-ngss/

wind up airplane for KE and PE

Calorimeter and calculating the specific heat of metals

Interdisciplinary Connections

NJSLS Connections:
ELA/Literacy -
RST.6-8.1
Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of

explanations or descriptions. (MS-PS3-1),(MS-PS3-5)
RST.6-8.3
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS3-3),(MS-PS3-3)
RST.6-8.7
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS3-1)
WHST.6-8.1
Write arguments focused on discipline content. (MS-PS3-5)
WHST.6-8.7
Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-PS3-3),(MS-PS3-4)
SL.8.5
Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-PS3-2)
Mathematics -
MP.2
Reason abstractly and quantitatively. (MS-PS3-1),(MS-PS3-4),(MS-PS3-5)
6.RP.A.1
Understand the concept of ratio and use ratio language to describe a ratio relationship between two quantities. (MS-PS3-1),(MS-PS3-5)
6.RP.A.2
Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. (MS-PS3-1)

Assessment

Formative Assessments:

Misconception Check: Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

Student Conference: One on one conversation with students to check their level of understanding.

3-Minute Pause: The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.
Observation: Walk around the classroom and observe students as they work to check for learning and take anecdotal notes.
Self-Assessment: A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

Index Card/Summaries/Questions: Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a

statement or question.

Hand Signals: Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand_____ and can explain it (e.g., thumbs up). - I do not yet understand _____ (e.g., thumbs down). - I'm not completely sure about _____ (e.g., wave hand).

One Minute Essay: A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

Analogy Prompt: Present students with an analogy prompt: (A designated concept, principle, or process) is like _____ because _____.

Web or Concept Map: Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts. http://www.graphic.org/concept.html

Summative Assessments:

Selected response items: Multiple choice, True/false, Matching, Short answer, Fill in the blank, One or two sentence response, Extended written response

Performance assessment: Laboratory activities, models, various projects

End-of-unit or -chapter tests

End-of-term or -semester exams

Benchmark:
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Interim Assessments

Alternative
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Concept Map
Demonstration Stations
Powerpoints

Texts and Resources

toy car, toy car track, kinetic car launcher, modeling clay pieces, meter stick, raw egg, collision apparatus, cushioning materials, calorimeter, metric thermometer, graduated cylinder, balance, specific heat metal kit, string, iron nails, wire (small gauge), battery, dominoes, aluminum cans (empty), rubber band, aluminum pie pans, dowel, string, wire hanger, pencil (with eraser), pin (straight), cardstock paper, scissors, protractor, ruler, empty and clean milk cartons, construction paper (various), thermometer, 100 watt bulb, meter stick

Grade 8, Science, Unit 3, Structure and Properties of Matter

Content Area: **Science**
Course(s): **Science**
Time Period: **January**
Length: **8 weeks**
Status: **Published**

Enduring Understanding

Pure substances have characteristic properties and are made from a single type of atom or molecule.

Essential Questions

How can particles combine to produce a substance with different properties?

How does thermal energy affect particles?

How do synthetic materials impact society?

Next Generation Science Standards

Structure and Properties of Matter

SCI.MS	**Structure and Properties of Matter**
SCI.MS-PS1-3	**Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.**
SCI.MS-PS1-4	**Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.**
SCI.MS-PS1-1	**Develop models to describe the atomic composition of simple molecules and extended structures.**

Student Learning Objectives

MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures.

MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

Instructional Activities

Phase change lab using paraffin wax

Probability of Electron distribution

Make plastic out of milk- Organic chemistry

Interdisciplinary Connections

ELA/Literacy -

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.(MS-PS1-3)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-1),(MS-PS1-4)

WHST.6- 8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-PS1-3)

Mathematics -

MP.2 Reason abstractly and quantitatively. (MS-PS1-1)

MP.4 Model with mathematics. (MS-PS1-1) 6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-1)

6.NS.C.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in realworld contexts, explaining the meaning of 0 in each situation. (MS-PS1-4)

8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. (MS-PS1-1)

Assessment

Formative Assessments:

Exit Card: Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

Portfolio Check: Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

Quiz: Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.
Journal Entry: Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic, lesson or concept that was taught.

Choral Response: In response t o a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

Misconception Check: Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

Student Conference: One on one conversation with students to check their level of understanding.
3-Minute Pause: The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.
Observation: Walk around the classroom and observe students as they work to check for learning.

Self-Assessment: A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.
Index Card/Summaries/Questions: Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand and word it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.
Hand Signals: Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand_____ and can explain it (e.g., thumbs up). - I do not yet understand _____ (e.g., thumbs down). - I'm not completely sure about _____ (e.g., wave hand).
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http://www.graphic.org/concept.html

Summative Assessments:

Selected response items: Multiple choice, True/false, Matching, Short answer, Fill in the blank, One or two sentence response, Extended written response
Performance assessment: Laboratory activities, models, various projects
End-of-unit or -chapter tests
End-of-term or -semester exams

Benchmark:

ELA Research Based Benchmark
Interim Assessments

Alternative

Self Selected Science Project
Group Collaboration Projects
Concept Map
Demonstration Stations
Powerpoints

Texts and Resources

large test tube, paraffin wax, thermometer, hot plate, 400 mL beaker, heat gloves, test tube rack, safety goggles, Bunsen Burners, safety starters, gas tubing, 250 mL beakers, glass stirring rod, ring stand, ring clamp, funnel, filter paper, large watch glass, sand, salt, heat gloves, large metal forceps, Iron (steel wool), magnesium ribbon, dice, colored pencils, cardboard, popsicle sticks, glue, 100 watt bulb, nichrome wire loops, HCl, Barium chloride, calcium chloride, cobalt chloride, copper chloride, potassium chloride, strontium chloride, water, lab apron, micro plate, conductivity tester, glucose solution, glycerol, silver nitrate, sodium chloride, sodium hydroxide, distilled water, vegetable oil

Grade 8, Science, Unit 4, Chemical Reactions

Content Area: **Science**
Course(s): **Science**
Time Period: **March**
Length: **8 weeks**
Status: **Published**

Enduring Understanding

There are changes at the atomic and molecular scale during chemical reactions.

Essential Questions

What happens when new materials are formed?

What stays the same and what changes?

Next Generation Science Standards

Chemical Reactions

SCI.MS-PS1-2	**Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.**
SCI.MS-PS1-5	**Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.**
SCI.MS-PS1-6	**Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.**

Student Learning Objectives

1	Design qualitative investigations to differentiate between physical and chemical changes in matter.
2	Analyze and interpret data on the properties of substances before and after the substances interact t determine if a chemical reaction has occurred.
3	Develop and use a model to describe how the total number of atoms does not change in a chemical r and thus mass is conserved.
4	Compare the properties of reactants with the properties of the products when two or more substanc combined and react chemically.
5	Undertake a design project to construct, test, and modify a device that either releases or absorbs the energy by chemical processes.*

Instructional Activities

Mg in the Bunsen burner

Steel Wool in the Bunsen burner

Cu powder in evaporating dish/ heat over burner

Exothermic and Endothermic reactions

Single replacement and double replacement reactions

Interdisciplinary Connections

ELA/Literacy -

RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.*(MS-PS1-2)*

RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS1-6)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-2),*(MS-PS1-5)*

WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-PS1-6)

Mathematics -

MP.2 Reason abstractly and quantitatively. (MS-PS1-2),(MS-PS1-5)

MP.4 Model with mathematics. (MS-PS1-5)

6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems. *(MS-PS1-2)*,(MS-PS1-5)

6.SP.B. Display numerical data in plots on a number line, including dot plots, histograms, and box plots. *(MS-PS1-2*

6.SP.B.5 Summarize numerical data sets in relation to their context. (MS-PS1-2)

Assessment

Formative Assessments:

A-B-C Summaries: Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

Debriefing: A form of reflection immediately following an activity.

Idea Spinner: The teacher creates a spinner marked into 4 quadrants and labeled "Predict, Explain, Summarize, Evaluate." After new material is presented, the teacher spins the spinner and if the spinner lands in the "Summarize" quadrant, the teacher might say, "List the key concepts just presented."

Inside-Outside Circle: Inside and outside circles of students face each other. Within each pair of facing students, students quiz each other with questions they have written. Outside circle moves to create new

Reader's Theater:

Exit Card: Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

Portfolio Check: Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

Quiz: Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

Journal Entry: Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic,lesson or concept that was taught.

Choral Response: In response t o a cue, all students respond verbally at the same time. The response can be either to

answer a question or to repeat something the teacher has said.

Misconception Check: Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

Student Conference: One on one conversation with students to check their level of understanding.

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Summative Assessments:

Selected response items: Multiple choice, True/false, Matching, Short answer, Fill in the blank, One or two sentence response, Extended written response

Performance assessment: Laboratory activities, models, various projects

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Benchmark:
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Powerpoints

Texts and Resources

safety goggles, lab apron, Bunsen Burner, gas tubing, ring stand, ring clamp, wire heat gauze, evaporating dish, double-pan balance, scoop, heat glove, copper powder, matches, wood splint, 250 mL beaker, liquid soap, Erlenmeyer flask, hydrochloric acid, Zinc, magnesium, aluminum, copper, iron, copper sulfate, silver nitrate, 250 mL beakers, glass stirring rod, 100 mL graduated cylinder, water, lead nitrate, potassium iodide, test tube rack, test tubes, scoop, hydrogen peroxide, cupric oxide, manganese dioxide, stop watch, 250 mL beaker, thermometer, calcium chloride, ammonium nitrate, hand warmers, instant cold packs,microplate, eyedroppers, litmus paper (blue and red), pH paper, phenolphthalein, tritration pipette, watch glass, acetic acid, ammonia, Various electrodes, electrolyte (acid), multi-meter, wires and clips, medium saucepan, spoon, whole milk or heavy cream, vinegar, strainer, paper towel, food coloring, organic modeling kit, "Radpars", small mixing box, geiger counter, Americium, smoke detectors

Grade 8, Science, Unit 5, Human Impact & Capstone Engineering Design Challenge

Content Area: **Science**
Course(s): **Science**
Time Period: **May**
Length: **8 weeks**
Status: **Published**

Enduring Understanding

Human activities impact Earth's other systems.

Essential Questions

How can natural hazards be predicted?

How do human activities affect Earth systems?

Next Generation Science Standards

Capstone Engineering Design Challenge & Human Impact

SCI.MS-ESS3-4	**Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.**
SCI.MS-ESS3-3	**Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.**
SCI.MS-ETS1-4	**Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.**
SCI.MS-ETS1-3	**Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.**
SCI.MS-ETS1-1	**Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.**
SCI.MS-ESS3-2	**Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.**
SCI.MS-ETS1-2	**Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.**

Student Learning Objectives

1	Use variables to represent quantities in a real-world data, and construct simple equations and inequalities to inform the development of technologies to mitigate the effects of natural hazards.
2	Write and present the findings of a student led investigation of human consumption of a natural resource that may alter the biosphere, hydrosphere, atmosphere, or geosphere and the consequences (positive or negative) of that behavior.
3	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
4	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*
5	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Instructional Activities

Plot latitude and longitude of hurricanes- predict where it will go

Plot latitude and longitude of earthquakes and volcanoes- discuss the location and why they occur where they do

Use Google Earth- go to before and after images and analyze

http://phet.colorado.edu/en/simulation/natural-selection - simulation for populations

Interdisciplinary Connections

ELA/Literacy - RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS3-2),(MS-ESS3-4)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS3-2)

WHST.6- 8.1 Write arguments focused on discipline content. (MS-ESS3-4)

WHST.6- 8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-ESS3-3)

WHST.6- 8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MSESS3-3)

WHST.6- 8.9 Draw evidence from informational texts to support analysis, reflection, and research. (MS-ESS3-4)

Mathematics - MP.2 Reason abstractly and quantitatively. (MS-ESS3-2) 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-ESS3-3),(MS-ESS3-4)

7.RP.A.2 Recognize and represent proportional relationships between quantities. (MS-ESS3-3),(MS-ESS3-4)

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS3-2),(MS-ESS3-3),(MS-ESS3-4)

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems

Assessment

Formative Assessments:

One Sentence Summary: Students are asked to write a summary sentence that answers the "who, what where, when, why, how" questions about the topic.

Summary Frames: Description: A _____ is a kind of_____ that
... Compare/Contrast: Problem/Solution/Cause/Effect

One Word Summary: Select (or invent) one word which best summarizes a topic.

Think-Pair- Share/Turn to Your Partner: Teacher gives direction to students. Students formulate individual response, and then turn to a partner to share their answers. Teacher calls on several random pairs to share their answers with the class.

Think-Write-Pair-Share: Students think individually, write their thinking, pair and discuss with partner, then share with the class.

A-B-C Summaries: Each student in the class is assigned a different letter of the alphabet and they must select a word starting with that letter that is related to the topic being studied.

Debriefing: A form of reflection immediately following an activity.

Idea Spinner: The teacher creates a spinner marked into 4 quadrants and labeled "Predict, Explain, Summarize, Evaluate." After new material is presented, the teacher spins the spinner and if the spinner lands in the "Summarize" quadrant, the teacher might say, "List the key concepts just presented."

Inside-Outside Circle: Inside and outside circles of students face each other. Within each pair of facing

students, students quiz each other with questions they have written. Outside circle moves to create new pairs.

Reader's Theater:

Exit Card: Exit cards are written student responses to questions posed at the end of a class or learning activity or at the end of a day.

Portfolio Check: Check the progress of a student's portfolio. A portfolio is a purposeful collection of significant work, carefully selected, dated and presented to tell the story of a student's achievement or growth in well-defined areas of performance, such as reading, writing, math, etc. A portfolio usually includes personal reflections where the student explains why each piece was chosen and what it shows about his/her growing skills and abilities.

Quiz: Quizzes assess students for factual information, concepts and discrete skill. There is usually a single best answer.

Journal Entry: Students record in a journal their understanding of the topic, concept or lesson taught. The teacher reviews the entry to see if the student has gained an understanding of the topic,lesson or concept that was taught.

Choral Response: In response t o a cue, all students respond verbally at the same time. The response can be either to answer a question or to repeat something the teacher has said.

Misconception Check: Present students with common or predictable misconceptions about a designated concept, principle, or process. Ask them whether they agree or disagree and explain why. The misconception check can also be presented in the form of a multiple-choice or true-false quiz.

Student Conference: One on one conversation with students to check their level of understanding.

3-Minute Pause: The Three-Minute Pause provides a chance for students to stop, reflect on the concepts and ideas that have just been introduced, make connections to prior knowledge or experience, and seek clarification.

Observation: Walk around the classroom and observe students as they work to check for learning.

Self-Assessment: A process in which students collect information about their own learning, analyze what it reveals about their progress toward the intended learning goals and plan the next steps in their learning.

Index Card/Summaries/Questions: Periodically, distribute index cards and ask students to write on both sides, with these instructions: (Side 1) Based on our study of (unit topic), list a big idea that you understand andword it as a summary statement. (Side 2) Identify something about (unit topic) that you do not yet fully understand and word it as a statement or question.

Hand Signals: Ask students to display a designated hand signal to indicate their understanding of a specific concept, principal, or process: - I understand_____ and can explain it (e.g., thumbs up). - I do not yet understand _____ (e.g., thumbs down). - I'm not completely sure about _____ (e.g., wave hand).

One Minute Essay: A one-minute essay question (or one-minute question) is a focused question with a specific goal that can, in fact, be answered within a minute or two.

Analogy Prompt: Present students with an analogy prompt: (A designated concept, principle, or process) is like _____ because _____.

Web or Concept Map: Any of several forms of graphical organizers which allow learners to perceive relationships between concepts through diagramming key words representing those concepts.
http://www.graphic.org/concept.html

Summative Assessments:

Selected response items: Multiple choice, True/false, Matching, Short answer, Fill in the blank, One or two sentence response, Extended written response

Performance assessment: Laboratory activities, models, various projects

End-of-unit or -chapter tests

End-of-term or -semester exams

Benchmark:

ELA Research Based Benchmark

Interim Assessments

Alternative

Self Selected Science Projects
Group Collaboration Projects
Concept Map
Demonstration Stations
Powerpoints

Texts and Resources

Stem materials:

2 liter bottle, scissors, various plants, various soils, beakers (250 mL), funnel, various filtering materials, various materials for sediment, air pump with gauge, rocket launcher, various materials for rockets, dialysis tubing, beakers, water, various salts, dialysis kit, potato,plastic sheets, rigid rods (wood, plastic, metal), sunny window access, tape and scissors, paper for designs, protractor, various other materials, tubing (various dimensions), tubing connectors, dissection kit, cake frosting (or lard), pipe cleaners, flowers, gardening tools, area to plant, paper for designing, raw egg, toy car, toy car track, collision apparatus, cushioning material, cardboard, popsicle sticks, glue, 100 watt bulb, various electrodes, electrolyte (acid), multi-meter, wires and clips, junior solar sprint kits,wheels, gears, solar cell, motor