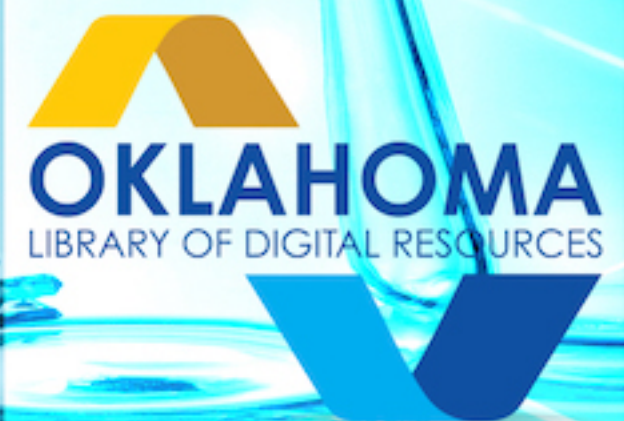


EVIDENCE OF UNDERSTANDING

## 7TH GRADE SCIENCE



The Oklahoma Library of Digital Resources is an innovative initiative to provide Oklahoma educators with high-quality, interactive teaching resources.

We appreciate our sponsors:



## Thank you to the following educators for their work in curating digital resources:

Anissa Angier, Edmond Public Schools

Eman Beck, Norman Public Schools

Joy Filer, Putnam City Public Schools

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# GETTING TO KNOW OKLDR

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# WHO IS OSSBA?

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The Oklahoma State School Boards Association (OSSBA) works to promote quality public education for the children of Oklahoma through training and information services to school board members. The Association is a leader among leaders in Oklahoma education and a visible presence in the local school districts and throughout the state.

The OSSBA was created in 1944 to provide support for local school board members with a variety of information, assistance, and representation services. OSSBA reaches every school board member through training opportunities. It creates and encouraged effective leaders to promote public education and cultivates productive alliances with governing bodies. OSSBA trains school board members to participate in an effective and supportive manner to provide direction for educational innovation and improves public perception of education in Oklahoma by sharing strategies and tools with our member school districts to focus on the success of Oklahoma public education.

OSSBA works with school boards to demonstrate the impact they have on student achievement. We work to provide meaningful two-way communication of advocacy, services, and training activities to local boards of education and their stakeholders. Other services we provide that have a direct impact on student achievement include strategic planning and superintendent searches. Our legal team provides free legal information to the school districts.



# WHY OKLDR?

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In the summer of 2016, OSSBA set out on a journey assist teachers in the integration of technology into their classrooms. The Oklahoma Library of Digital Resources (OKLDR) became a collection of digital content resources selected by Oklahoma educators to support the Oklahoma Academic Standards. The resources were curated by teachers from school districts across Oklahoma. Each collection contained a variety of learning resources, such as videos, apps, pdf documents, and websites, and are designed so that teachers can then build their lesson plans. The resources helped bridge the digital equity gap among students while helping schools make the most of limited resources.

After collaborating with educators, school and district leaders for a couple of years, OKLDR has been enhanced in the following ways:

- Resources are now an Open Education Resource (OER) “book” format, making it easier to use and accessible on multiple devices.
- Resources map to ESSA expectations for evidence of student understanding and students’ mastery of the academic standards.
- Tools are now agnostic and can be used on multiple devices.
- Lessons are now focused on student engagement through the use of technology. The first OKLDR version focused on teacher resources. **This is a major change.**
- To prioritize student learning, teacher resources are now located at the back of each book.



# HOW TO USE THIS BOOK

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**The Oklahoma Academic Standards** for this lesson are grouped together by key topics. Sometimes you will see only one standard, but other times you will see a grouping of standards.



**Evidence of Understanding** is the key. This is the concept you want your students to master that reinforces the standards. Mastery means deeper understanding, not just “skim the surface” learning.



**Digital Tools** are the recommended applications and/or tools for the lesson. Think of this element as the “supplies box.” An asterisk is found next to tools which can be used on multiple platforms where as no asterisk will indicate applications requiring Apple devices.



**In Practice** is a suggested activity to engage the students to demonstrate mastery of the standard. You will notice that this is just one suggested lesson, and sometimes there might be a second lesson. The suggested lesson, developed by Oklahoma teachers, is meant to give you a starting point. You might decide to use the lesson or it might give you an idea of something else you could do to teach the concept.

# MOVING FORWARD

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As you can see the OKLDR book has been designed to inspire educators to have students demonstrate their understanding of the Oklahoma Academic Standards through the use of technology as a productivity tool. While educators have limited time in the day to plan and research high quality content, this book is a jumping off point, with suggested peer-reviewed activities and resources.

While you might encounter extra white space in the book, it is intentional for growth. As you integrate the activities into your lessons, you are encouraged to send us student work samples that might be included in the book, as well as additional activities and resources that could be included in future revisions.

## Next Steps:

- We would love to add samples of student work to the activities, so please send the work to: [okldr@ossba.org](mailto:okldr@ossba.org).
- If you would like to be involved in future course creation, or know teachers who would like to be involved, please contact us at: [okldr@ossba.org](mailto:okldr@ossba.org).
- See anything that needs to be changed or enhanced? Contact us at: [okldr@ossba.org](mailto:okldr@ossba.org).

# PHYSICAL SCIENCES

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# MATTERS & INTERACTIONS

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7.PS1.1 Students who demonstrate understanding can:

Develop models to describe the atomic composition of simple molecules and extended structures.



## Evidence of Understanding

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Students will develop a model to demonstrate that atoms form molecules of different scales and proportions.



## Digital Tools

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- Content Application - Build a Molecule Simulation
- Video Recorder - Screencastify\*, Screen Recording on iPad, Record It



## In Practice

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- Students will use the screen capture app (or the built-in feature in ipads located in the control center) to record their screen and audio as they develop models of simple molecules in the simulation.
- Students' recordings should also include a verbal description of the composition of the molecules.

# CHEMICAL REACTIONS

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7.PS1.2 Students who demonstrate understanding can:

Analyze and interpret patterns of data related to the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.



## Evidence of Understanding

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Students will construct explanations before and after a chemical change to show their analysis of the following properties: color change, formation of a gas, temperature change, density, melting point, boiling point, solubility, flammability, and odor. Students will identify new substances which have different properties from those of the reactants.



## Digital Tools

- Website - Thought Co Website and Activity, Quizizz/chemical-vs-physical-changes, Baggie Chemistry
- Video Editor- Clips, WeVideo\*, Do-Ink\*, iMovie
- Presentation - Keynote, Google Slides\*, Microsoft PowerPoint\*



## In Practice

- Students will explore the Thought Co Website and take the Quizizz quiz to clear up misconceptions about physical and chemical changes before completing the "Baggie Chemistry" activity.
- Students will document the reaction they produce and observe by taking before and after pictures of the chemical change occurring in their bag.
- Students will then use a video editing app to describe the properties of the substances before and after the reaction. Students can search and identify what the new substances are.



# FORCES AND INTERACTIONS

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7.PS1.3 Students who demonstrate understanding can:

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

## Evidence of Understanding

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Students will obtain and evaluate information from at least two sources about synthetic materials, the chemical process used to create them from natural resources, and the societal need for them.



## Digital Tools

- *Device Camera*
- *Sketch Application - Tayasui Sketches, How to use Notes, Absolute Board, Google Draw\**
- *Video Editor- Clips, WeVideo\*, Do-Ink\*, iMovie*



## In Practice

- Students obtain information from digital sources about different types of synthetic materials.
- Students will model the chemical processes used to create the materials using a sketching tool.
- Students will evaluate how the structure of synthetic materials allows it to function in a way that is beneficial to society by interviewing and recording community members (classroom, school, etc.) through teacher guided questions.

# CONSERVATION OF MASS

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7.PS1.5 Students who demonstrate understanding can:

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.



## Evidence of Understanding

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Students will develop and use models to show the number of each atom in reactants is equal to the number of atoms in the product ; the atoms are regrouped and rearranged to form new substances with properties that differ from the original substance.



## Digital Tools

- Website - Balancing Chemical Equations
- Sketch Application - Tayasui Sketches, How to use Notes, Absolute Board, Google Draw\*



## In Practice

- Students will use the interactive site to model that the number of parts needed to make a sandwich are the same as the parts in the sandwich.
- Students will transfer this information using the interactive site to rearrange atoms as they make new products using chemical reactions.
- Students will use a drawing app to model chemical reactions showing that the number and types of atoms that make up the products are equal to the number and types of atoms that make up the reactants.

# EXOTHERMIC AND ENDOTHERMIC REACTIONS

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7.PS1.6 Students who demonstrate understanding can:

Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes to solve a problem.



## Evidence of Understanding

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Students will design, construct, and test a device that demonstrates either a chemical reaction which releases energy or one that absorbs energy. Once a solution is tested, then it needs modified on the basis of the test results in order to improve it.



## Digital Tools

- *Portfolio Application - Seesaw\**
- *Website - Endothermic and Exothermic Reactions Experiments*
- *Science Journal - Seesaw\*, Book Creator\*, Google Docs\**
- *Presentation - Keynote, Google Slides\*, Microsoft Power Point\**



## In Practice

- Students will complete the Endothermic and Exothermic Reactions Experiment under the digital tool section and then use knowledge gained to design and construct their own endothermic or exothermic device.
- Students will record their work in their Science Journal
- After students have designed and constructed their demonstration, they will use an online journaling application to show and explain how their device either releases or absorbs thermal energy by chemical processes. Then the student will make improvements to the device to improve it and record that method as well.
- Students will create a presentation to show how photosynthesis is an endothermic reaction and cellular respiration is an exothermic reaction.

# KINETIC ENERGY: MASS AND SPEED

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7.PS3.1 Students who demonstrate understanding can:

Construct and interpret graphical displays of data to describe the proportional relationships of kinetic energy to the mass of an object and to the speed of an object.



## Evidence of Understanding

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Students will analyze and interpret data to prove kinetic energy is proportional to the mass of a moving object.

Students will analyze and interpret data to verify that the proportionality of kinetic energy increases with the square of its speed.





## Digital Tools

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- Website - Phet Energy Skate Park
- Online Graphing Tool - Create a graph\*



## In Practice

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- Students will research energy to discover the differences between kinetic and potential energy and be able to describe the kinetic and potential differences between the two energy forms.
- Students will use the PhET activity Energy Skate Park to create a graph of their observations when using different masses and then record their observations using create a graph.

# POTENTIAL ENERGY

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7.PS3.2 Students who demonstrate understanding can:

Develop a model to describe that when objects interacting at a distance change their arrangement, different amounts of potential energy are stored in the system.



## Evidence of Understanding

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Students will use models to demonstrate the amount of potential energy an object has is dependent on their relative positions. Students should be able to develop a model to predict or describe phenomena.



## Digital Tools

- *Simulation Website* - [Phet Gravity Force Lab](#)
- *Website* - [Investigating Kinetic and Potential Energy](#)
- *Digital portfolio* - [Seesaw\\*](#) , [Book Creator\\*](#)
- *Interactive Whiteboard* - [Educreations\\*](#), [Absolute Board](#), [Show Me](#), [Google Jamboard\\*](#), [Explain Everything\\*](#)



## In Practice

- Students will explore the Gravity Force PhET simulation, and record their observations in a digital portfolio such as Seesaw or Science Journal.
- Students will complete the activities in Investigating Kinetic and Potential Energy, and will complete a lab report using an Interactive Whiteboard or a Digital Portfolio app.

# ENERGY IS TRANSFERRED

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7.PS3.5 Students who demonstrate understanding can:

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.



## Evidence of Understanding

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Students will construct, use, and present oral and written arguments supported by empirical evidence and scientific reasoning to explain how energy, both potential and kinetic, can never be lost but is transferred between objects within a closed system.



## Digital Tools

- *Interactive Website - PBS Transfer Energy Roller Coaster*
- *NoteTaking - Apple Notes, Notability*
- *Royalty Free Photo Library - Tech4Learning, Photos for Class*
- *Presentation - Keynote , Google Slides\*, Microsoft Power Point\**



## In Practice

- Students will use the PBS Transfer Energy Roller Coaster to make observations about energy transfer at the bottom and the top of the roller coaster.
- Students will use a drawing application to create a roller coaster and label the points of greatest potential energy and kinetic energy. Students should also label the points where potential energy is equal to kinetic energy.
- Students then need to apply these energy transfer ideas to another real world scenario. They will write a presentation to defend why their phenomenon transfers energy. They can draw, or import photos from a royalty free photo

# LIFE SCIENCES

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# PHOTOSYNTHESIS

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7.LS1.6 Students who demonstrate understanding can:

Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.



## Evidence of Understanding

---

Students will plan and carry out an investigation to demonstrate that in order for plants to produce complex food molecules, energy from the sun is required.

Students will analyze and interpret data that energy stored in the form of sugar during the process of photosynthesis may be used by producers immediately or stored for their later use, or stored and later used by consumers.





## Digital Tools

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- Digital Portfolio - Seesaw\*
- Video Editor - Clips, Do-Ink\*, WeVideo\*, iMovie
- Website - Virtual Photosynthesis Lab
- Video - Photosynthesis: Part 1: Overview
- Online Graphing Tool - Create a graph\*
- Spreadsheet- Numbers, Google Sheets\*, Microsoft Excel
- Presentation - Keynote, Google Slides\*, Microsoft PowerPoint
- Interactive Whiteboard Application - Educreations\*, Absolute Board, Show Me, Google Jamboard\*, Explain Everything



## In Practice

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- Students will view the photosynthesis animation video and use the Virtual Photosynthesis Lab to help develop their own explanations for how plants make food, move, and function using the sun.
- Students will explain their findings in a video journaling or portfolio tool.
- Students will measure the rate of photosynthesis and see the importance of light in the process using the Virtual Photosynthesis Lab website.
- Students can graph their data with a spreadsheet or graphing tool to determine patterns and trends to discuss.
- Students will produce a lab report showing their data and results using an interactive whiteboard or presentation app.

# GROWTH AND DEVELOPMENT

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7.LS1.7 Students who demonstrate understanding can:

Develop a model to describe how food molecules in plants and animals are broken down and rearranged through chemical reactions to form new molecules that support growth and/or release energy as this matter moves through an organism.

CCC: Matter is conserved because atoms are conserved in physical and chemical processes.



## Evidence of Understanding

---

Students will analyze models that represent the chemical reactions between the complex molecules which contain carbon and oxygen resulting in the release of carbon dioxide and stored energy in cellular respiration in plants and animals.

Students will develop models to show all matter used by organisms for growth and repair comes from the products of the chemical reactions.



## Digital Tools

- *Interactive Website - Photosynthesis & Cellular Respiration*
- *Interactive Website - Photosynthesis & Respiration Game*
- *Presentation - Keynote, Google Slides\*, Microsoft PowerPoint*
- *Interactive Whiteboard Application - Showbie, Miro\*, Simple Whiteboard, Explain EDU, Jamboard\*, ShowMe*



## In Practice

- Students will use models of cellular respiration and photosynthesis to identify and describe the relationships between the components in cellular respiration and photosynthesis for animals and plants.
- Students will develop models for a presentation to describe how food is rearranged through chemical reactions forming new molecules that support growth and release energy.
- Students will reason why oxygen is essential for energy in activities.

# INTERDEPENDENT RELATIONSHIPS

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7.LS2.1 Students who demonstrate understanding can:

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.



## Evidence of Understanding

---

Students will interpret data and show patterns to demonstrate that populations are limited by the availability of resources like food, water, oxygen, carbon dioxide and sunlight.

Students will construct an explanation that includes quantitative evidence that competition for available resources (both living and nonliving) can restrict the size of a given population(s).



## Digital Tools

- Website - Feed the Dingo Game
- Sketch Application - Sketches School, Notes, ibis, Absolute Board, Google Draw



## In Practice

- Students will play feed the dingo to gain an understanding of how plants and animals in an ecosystem depend on each other.
- Students will then construct an ecosystem of their choice using a sketch application.

# PATTERNS OF INTERACTIONS

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7.LS2.2 Students who demonstrate understanding can:

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.



## Evidence of Understanding

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Students will construct an explanation that includes the quantitative relationships between predators and prey to demonstrate that the population of one directly affects the population of the other.





## Digital Tools \_

- *Online Graphing Tool - Create a graph\**
- *Spreadsheet- Numbers, Google Sheets\*, Microsoft Excel*
- *Story Telling Application - Book Creator\*, Toontastic 3D\**



## In Practice

- Students will research food webs to learn how predator/prey relationships play an important role in a balanced ecosystem.
- Students will then choose an animal from the food web.
- Students will use a spreadsheet or graphing tool to explain the effects that could happen if the animal became overpopulated or underpopulated.
- Students can use a storytelling tool to present the data on a balanced ecosystem.

# CHEMICAL REACTIONS

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7.LS2.3 Students who demonstrate understanding can:

Develop a model to describe the cycling of matter and flow of energy among living and non-living parts of an ecosystem.



## Evidence of Understanding

---

Students will develop a model to demonstrate understanding that the atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and non-living parts of the ecosystem.



## Digital Tools

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- Content Video - [Food Webs & Energy Pyramid Video](#)
- Website - [CK12 Ecosystem Resource](#)
- Website - [Tracing Energy Through An Ecosystem](#)
- Presentation - [Keynote](#), [Google Slides\\*](#), [Microsoft PowerPoint](#)



## In Practice

---

- Students will watch a video about Food Webs and the Energy Pyramid to understand the relationships associated between them.
- Students can reference Tracing Energy Through An Ecosystem to create a digital presentation of energy flow throughout an ecosystem of their choice to demonstrate their understanding.

# INTERACTIONS, ENERGY, AND DYNAMICS

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7.LS2.4 Students who demonstrate understanding can:

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.



## Evidence of Understanding

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Students will interpret data and show patterns to demonstrate that populations are limited by the availability of resources like food, water, oxygen, carbon dioxide and sunlight.



## Digital Tools

- Content Video - Ecosystem Video from Khan Academy
- Website - The Habitable Planet Simulation
- Story Telling - Canva Comic Maker\*
- Classroom Management System - Google Classroom\*, Edmodo\*, Apple Classroom



## In Practice

- Students will start with a video explaining ecosystems.
- Students can then use the website Habitable Planet simulation to study relationships in an ecosystem.
- They will then use a story telling or presentation app to demonstrate what either an addition or removal of species looks like in their own ecosystem and how that affects the other populations.
- They can then upload their story or presentation to the teacher's classroom management system.

# INTERACTIONS, ENERGY, AND DYNAMICS

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7.LS2.5 Students who demonstrate understanding can:

Evaluate competing design solutions for maintaining biodiversity and ecosystem services.



## Evidence of Understanding

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Students will evaluate competing design solutions for maintaining biodiversity and ecosystem services based on jointly developed and agreed upon design criteria.



## Digital Tools

- Website - *Saving the World-One Ecosystem At a Time!*
- Website - *Regional Impacts & Predictions*
- Presentation - *Keynote, Google Slides\*, Microsoft PowerPoint*



## In Practice

- Students will use “Saving the World-One Ecosystem At a Time” to research an ecosystem and design a solution to maintain the health of ecosystem services.
- Students will then create a presentation to explain their design.
- Students will use Regional Impacts and Predictions to research a biome, and then use a presentation app to illustrate and describe their findings.



# EARTH SCIENCES

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# EARTH & THE SOLAR SYSTEM

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7.ESS3.1 Students who demonstrate understanding can:

Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

CCC: Cause and effect relationships may be used to predict phenomena in natural or designed systems.



## Evidence of Understanding

---

Students will construct explanations based on evidence to the cause and effects of the uneven distributions of Earth's minerals, energy, and groundwater resources.



## Digital Tools

- *Content Document - 7 Billion, Where Do You Stand?*
- *Content Videos - Natural Resources, Uneven Distribution of Natural Resources*
- *Science Journal - Arduino Science Journal\*, eLab Journal\*, SciNote Journal\**



## In Practice

- Students will watch the natural resources videos, access the statements on the "7 Billion Where do you Stand?" document, and construct scientific explanations in a Science Journal based on evidence for the responses to the statements through fifteen.
- Students will indicate whether they strongly agree, agree, question, disagree, or strongly disagree along with their explanation.
- Students will construct five World of 7 Billion Population statements for classmates to evaluate.

# EARTH & HUMAN ACTIVITY

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7.ESS3.3 Students who demonstrate understanding can:

Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.



## Evidence of Understanding

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Students will construct an explanation demonstrating how humans affect ecosystems both negatively or positively by restoring the health of an ecosystem.

Students will apply scientific principles to design a system for humans to monitor the health of an ecosystem.



## Digital Tools

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- *Website* - Plastic, Plastic, Everywhere!
- *Presentation* - Keynote, Google Slides, Microsoft PowerPoint



## In Practice

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- Students will identify different types of marine debris, specifically plastic bags with the activity “Plastic, Plastic Everywhere”.
- Students will explore ways to reduce their use of plastic shopping bags.
- Students will complete independent research projects using a digital presentation app to present their findings to their classmates.

# HUMAN IMPACT

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7.ESS3.4 Students who demonstrate understanding can:

Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

CCC: Cause and effect relationships may be used to predict phenomena in natural or designed systems.



## Evidence of Understanding

---

Students will construct an argument based on evidence that supports the claim that as the human population grows, so does its negative impact on Earth unless the activities and technologies involved are engineered otherwise.



## Digital Tools

- *Mind Mapping Application - Bubbl.us\*, MindMup\*, Lucid Chart,\* ReadWriteThink Venn Diagram\**
- *Website - Article: Population and Environment: A Global Challenge*
- *Word Processor - Pages, Google Docs\*, Microsoft Word*



## In Practice

- Students will analyze and interpret data from the Increase in Population article, create a mind map showing the impacts the increase has on Earth's systems, and write an argument for a solution for an impact listed in the map.
- Research news outlets to find real world examples of population impacts.



# HUMAN IMPACT

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7.ESS3.5 Students who demonstrate understanding can:

Obtain, evaluate, and communicate evidence of the factors that have caused changes in global temperatures over the past century.



## Evidence of Understanding

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Students will show evidence of their research by presenting evidence of the factors that have caused changes in global temperatures over the past century.



## Digital Tools

- Website - Article: Temperature Change Over the Last 100 Years, The Facts on Global Warming
- Example of a reputable fact checking website: NOAA Climate.gov, NASA Climate Change, How do We Know?
- Word Processor - Pages, Google Docs\*, Microsoft Word
- Presentation - Keynote, Google Slides\*, Microsoft PowerPoint



## In Practice

- Students will read the article "Temperature Change Over the Last 100 Years".
- Students will select three "Facts on Global Warming" to research. Students should search each fact using scientific websites to determine the validity of the fact.
- Students will share the fact and evidence they found supporting the validity or lack thereof pertaining to each fact.
- Students will create and share a presentation showing what they learned.

# ADDITIONAL RESOURCES

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# TEACHER

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- [The Periodic Table](#)
- [The Periodic Table and Energy Levels](#)
- [Nuclear App](#)
- [Periodic Table](#)
- [Molecularium](#)
- [States of Matter Simulation](#)
- [Build a Molecule Simulation](#)
- [RNA Virtual Lab](#)
- [Nova Elements App](#)
- [Energy Levels, Electrons, Covalent Bonding](#)
- [Temperature and the Rate of a Chemical Reaction](#)
- [Cooking with the Sun: Creating a Solar Oven](#)
- [Energy Forms and Changes Simulation](#)
- [Corn for Fuel: Hands on Activity](#)
- [Pigeonetics](#)

- [Natural Selection Simulation](#)
- [Animal Adaptations Interactives](#)
- [DNA Color Sheet](#)
- [What is a Mutation?](#)
- [Dragon Genetics](#)
- [Neuroscience Concepts & Activities by Grade Level: Middle School, Grades 7 - 8](#)
- [The Science of the Sun](#)
- [Oreo Moon Phases](#)
- [Moon Phase Calendar Plus App](#)
- [Solar Eclipse](#)
- [Season Interactive](#)
- [The Pull of the Planets](#)
- [Toilet Paper Solar System](#)
- [Pocket Solar System Video](#)
- [A Solar System Journey](#)
- [To Scale: The Solar System Video](#)
- [Weather Lab](#)

- The Coriolis Effect