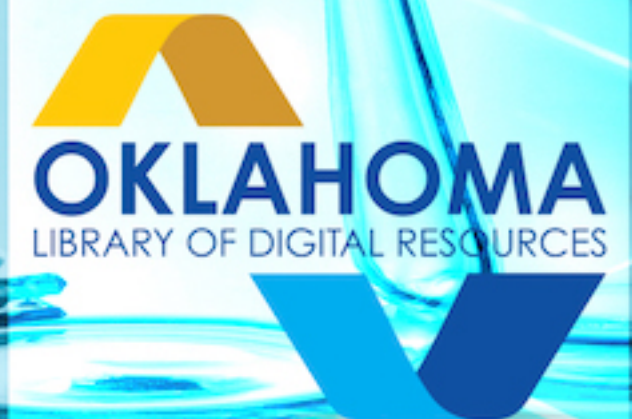


EVIDENCE OF UNDERSTANDING

## 6TH 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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<b>Getting To Know OKLDR</b>	<b>5</b>	<b>Earth Systems and Interactions</b>	<b>37</b>
Who Is OSSBA?	6	Water Cycle	38
Why OKLDR?	7	Air Masses	40
How to Use this Book	8	Atmospheric and Oceanic Circulation	42
Moving Forward	9	Natural hazards	44
<b>Kinetic Energy as Temperature and Waves</b>	<b>10</b>	<b>Additional Resources</b>	<b>46</b>
Matter and Its Interactions	11	Teacher	47
Thermal Energy Transfer	13		
Conservation of Energy	15		
Light and Mechanical Waves	17		
<b>From Molecules to Organisms: Structures and Processes</b>	<b>19</b>		
Cells	20		
Structure and Function of Cells	22		
Structure and Functions of Subsystems	24		
Sensory Receptors	26		
<b>Energy Flow and Earth Processes</b>	<b>28</b>		
Geologic Time Scale	29		
Cycles and Energy flow	31		
Geoscience Processes	33		
Fossils & Rocks	35		

# 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).

# KINETIC ENERGY AS TEMPERATURE AND WAVES

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# MATTER AND ITS INTERACTIONS

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6.PS1.4 Students who demonstrate understanding can:

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.



## Evidence of Understanding

---

Students will plan and carry out an investigation to determine that total thermal energy depends on state, type of matter, and number of atoms in the system.



## Digital Tools

- Content Video - Heat, Temperature, and Conduction Video
- Website - Heating and Cooling a Liquid, Simulation Heat, Temperature, and Conduction
- Website - Fake News Generator



## In Practice

- Students will watch the Heat, Temperature, and Conduction video to start the lesson.
- Students will use the simulator website and do an activity in which they observe heat being transferred from one item to the next.
- Students will create a video reporting their findings in the activity using Fake News Maker or a similar program.

# THERMAL ENERGY TRANSFER

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6.PS3.3 Students who demonstrate understanding can:

Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.



## Evidence of Understanding

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Students will modify a design based on data analysis to improve the efficiency of a device to reduce or increase the amount of energy that is transferred.



## Digital Tools

- Video - Conductors and Insulators: Thermal Energy Transfer
- Website - Legends of Learning: Flow of Thermal Energy game (This site will need your students to create avatars before they play the game.), All About Insulation Experiment, Alternate lesson for teachers: Keep it Hot!
- Presentation - Keynote, Google Slides\*, Microsoft PowerPoint\*



## In Practice

- Students will use information from the video and game to learn how energy transfers and the role of conductors and insulators. Students can take screen shots of valuable moments in their game to use later in the presentation.
- Create a energy transfer experiment using an insulator or conductor. Here is an example: All About Insulation Experiment
- What could be changed to help the energy transfer faster or slower? Create it next and re-do the experiment you originally chose.
- Students will present using their preferred presentation app.



# CONSERVATION OF ENERGY

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6.PS3.4 Students who demonstrate understanding can:

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.



## Evidence of Understanding

---

Students will plan and carry out an investigation to determine that total thermal energy depends on state, type of matter, and number of atoms in the system.

Students should be able to describe what happens when thermal energy is added or taken away.



## Digital Tools

- Website - States of Matter PhET Simulation
- Presentation - Keynote, Google Slides\*, Microsoft PowerPoint\*
- Website - Melting Ice
- Online Graphing Tool - Create a graph\*, Numbers
- Spreadsheet- Numbers, Google Sheets\*, Microsoft Excel



## In Practice

- Students will learn about the states of matter using the PhET simulation to identify what happens when thermal energy is added or taken away.
- Students will monitor the temperature of a melting ice cube using a thermometer.
- Students will create graphs based on the data they collected using graphing tool or a spreadsheet.
- Students will capture all of their findings with a presentation tool.

# LIGHT AND MECHANICAL WAVES

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6.PS4.2 Students who demonstrate understanding can:

Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.



## Evidence of Understanding

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Students will explore light wave behaviors as the wave interacts with materials, then identify and describe the wave behaviors in different materials.

Students will identify and describe the properties of materials that serve particular functions for light behavior.



## Digital Tools

- Content Website - Nasa: Wave Behaviors
- Interactive Website - Bending Light Phet Simulation
- Mind Mapping Application - Read Write Think\*, Popplet\*, Mindomo (up to 3 free maps)\*, Bubbl.us\*, Simple Mind Mapping app
- Interactive Whiteboard Application - Educreations\*, Absolute Board, Show Me, Jamboard\*, Explain Everything\*



## In Practice

- Students will use the interactive whiteboard application to describe and model the light wave behaviors in different materials.
- Students will explain why the different materials cause waves to either reflect, absorb, or transmit light.
- Students will create a concept map to communicate the characteristics of mediums that reflect light, absorb light, and transmit light. Then include our society's need for the mediums in relation to light behavior.

# FROM MOLECULES TO ORGANISMS: STRUCTURES AND PROCESSES

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# CELLS

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6.LS1.1 Students who demonstrate understanding can:

Conduct an Investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.



## Evidence of Understanding

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Students will conduct an investigation to produce data to demonstrate organisms are made up of cells.

Students will conduct an investigation to produce data that organisms may be unicellular or multicellular.





## Digital Tools

- Content Video - [Amoeba Sisters Cell Tour Video](#)
- Content App - [iCell App\\*](#), [Hudson Alpha iCell](#),
- Content Website - [Nat Geo and Legends of Learning Game\\*](#)
- Sketch Application - [Sketches School](#), [Notes](#), [ibis](#), [Absolute Board](#), [Google Draw\\*](#)
- Mind Mapping - [MindMode](#), [Lucidchart](#), [Google Drawings\\*](#)



## In Practice

- Students will watch a video introducing cells.
- Students will investigate cells using the Content Apps to see the organelles in action and learn more about their functions or by visiting the Content Website Nat Geo and playing the game.
- Students will then draw and label their own cell using a sketch application.
- Students will compare the anatomy of animal cells and plant cells using the interactive cell models.
- Students will create their own digital Venn diagram comparing the two.

# STRUCTURE AND FUNCTION OF CELLS

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6.LS1.2 Students who demonstrate understanding can:

Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.



## Evidence of Understanding

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Students will develop a model to describe the primary role of the nucleus, chloroplast, and mitochondria.

Students will develop a model to demonstrate the structure and function of the cell membrane, which forms the boundary that controls what enters and leaves the cell and the cell wall, which provides extra support for the plant cell.



## Digital Tools

- *Content App - iCell App, Hudson Alpha iCell*
- *Content Video & Website - Plant and Animal Cells (Generation Genius), 3D Ultrastructure of Cells*
- *Story Telling Application - Toontastic 3D\*, Google Docs\**
- *Presentation - Keynote, Google Slides\*, Microsoft Power Point\**
- *Digital portfolio - Seesaw\**



## In Practice

- Students will use the iCell Apps or the Content Video and Websites to view the three dimensional images of both plants and animal cells to view the organelles that make up the cells.
- Using the Plant and Animal Cells (Generation Genius) website, play one of the games listed under the "Assessment" tab.
- Students will then use a story telling or presentation tool to create a story about the activity that happens in a cell.
- Have students upload their story to digital portfolio.

# STRUCTURE AND FUNCTIONS OF SUBSYSTEMS

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6.LS1.3 Students who demonstrate understanding can:

Use an argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.



## Evidence of Understanding

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Students will use a written argument supported by evidence to explain that the body is a system of multiple interacting subsystems.

Students will develop a model to demonstrate that the body subsystems are groups of cells that work together to form tissues



## Digital Tools

- Website - *ck12 Resources Cell Organization, Science Games: Body Systems*
- Story Telling Application - *Toontastic 3D\**, *Google Docs\**



## In Practice

- Teachers can use the resources from the ck12.org and Science Games websites which include, videos, lesson plans, interactive resources and labs to teach concepts.
- Students will create a story with a storytelling app that explains the levels of

# SENSORY RECEPTORS

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6.LS1.8 Students who demonstrate understanding can:

Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.



## Evidence of Understanding

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Students will effectively communicate information to explain that sensory receptors respond to stimuli resulting in immediate behaviors and/or memories.





## Digital Tools

- Website - Virtual Neuron
- Sketch Application- Sketches School, ibis, Absolute Board, Google Draw\*



## In Practice

- Students will use the Virtual Neurons software to construct neural circuits and visualize how messages travel through the circuits.
- Students will then use a drawing app to create a diagram explaining how sensory receptors respond to stimuli.

# ENERGY FLOW AND EARTH PROCESSES

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# GEOLOGIC TIME SCALE

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6.ESS1.4 Students who demonstrate understanding can:

Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's geologic history.

CCC: Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.



## Evidence of Understanding

---

Students will construct a scientific explanation based on valid and reliable evidence in order to show that major events at national parks (i.e. formation of mountain chains and ocean basins, adaptation and extinction of organism, volcanic eruptions, glaciation, development of water structures, and erosion) are recorded in the layers of Earth's strata.



## Digital Tools

- *Interactive Website - Understanding Geologic Time Tour*
- *Website - Making Your Own National Park Geologic Tour*
- *Story Telling Application - Toontastic 3D\*, Google Docs\**



## In Practice

- Students will analyze the rock strata and fossil records of national parks, ask questions, and construct explanations from evidence of major events in Earth's history.
- Students will communicate findings from the chosen national park in the form of a story.
- Students will use reasoning in the story to show that events that happened in the past continue today.

# CYCLES AND ENERGY FLOW

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6.ESS2.1 Students who demonstrate understanding can:

Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

CCC: Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale.



## Evidence of Understanding

---

Students will develop a model of the rock cycle processes of melting, crystallization, weathering, deformation, and sedimentation.

Students will create a game for the class to play that takes students through the rock cycle processes. Students will use a classroom management system to record the procedures and rules for their game.



## Digital Tools

- Website - Earth's Processes
- Interactive Website - The Rock Cycle Diagram, Erosion Investigation Lab
- Classroom Management System - Google Classroom\*, Edmodo\*, Apple Classroom, Canvas\*
- Data Collection - Arduino Science Journal\*, eLab Journal\*, SciNote Journal\*



## In Practice

- Students work in teams to create proposed solutions to schoolyard erosion problems.
- They will journal their responses using a data collection tool of their choice.

# GEOSCIENCE PROCESSES

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6.ESS2.2 Students who demonstrate understanding can:

Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

CCC: Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.



## Evidence of Understanding

---

Students will make observations of satellite images from Google Earth to construct explanations based on evidence for how geoscience processes have changed Earth's surface at varying times and spatial scales.

Students will construct explanations based on evidence from maps that show past earthquakes and volcanoes and how these events have changed Earth's surface and





## Digital Tools

- Content Videos - *A Guide to the Energy of Earth, Can We Predict Earthquakes?*
- Website - *Earthquake Date* scroll down to Teacher Prep, *Google Earth - Satallite Images*
- Content - *Earthquake Alerts and Map*
- Video Editing - *TV News Maker \**, *Clips*, *WeVideo\**, *Do-Ink\**, *iMovie*



## In Practice

- Students will use web links in the digital tools section and an Earthquake app to map earthquake locations in order to predict future earthquakes or volcanos.
- Students will use news making apps to make a news broadcast that predicts the disaster, and supports why the disaster is imminent.
- Students will make observations of satellite images to construct an explanation based on evidence that weathering and erosion has occurred at varying times and spatial scales.
- Students will include this in their news broadcast.

# FOSSILS & ROCKS

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6.ESS2.3 Students who demonstrate understanding can:

Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

CCC: Patterns in rates of change and other numerical relationships can provide information about natural systems.



## Evidence of Understanding

---

Students will use digital tools to analyze large data sets for patterns and trends in simple wave patterns.



## Digital Tools

- *Interactive Websites - Plate Tectonics, Mountain Making*
- *Website - Geography Reference Links*
- *Presentation - Keynote, Google Slides\*, Microsoft Powerpoint\**



## In Practice

- Students will analyze and interpret data from the tools websites on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motion.
- Students will create a presentation to show evidence that the continents were once all one landmass known as Pangaea and the constant movement of Earth's plates has created continental shapes.

# EARTH SYSTEMS AND INTERACTIONS

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# WATER CYCLE

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6.ESS2.4 Students who demonstrate understanding can:

Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.



## Evidence of Understanding

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Students will engage in an argument from evidence to describe how global movements of water and its changes in form are propelled by sunlight and gravity and water cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation as well as downhill flows on land.



## Digital Tools

- Website - [Animated Water Cycle](#), [Exploring the Water Cycle](#)
- Sketch - [Sketches School](#), [Notes, ibis](#), [Absolute Board](#), [Google Draw](#)\*



## In Practice

- Students will view the Animated Water Cycle to gain knowledge on building a model to simulate parts of the water cycle.
- Students will then use a sketch application to create and present their own model of the water cycle.

# AIR MASSES

---



6.ESS2.5 Students who demonstrate understanding can:

Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.

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



## Evidence of Understanding

---

Students will use mathematical thinking to explain that weather patterns are complex and can only be predicted using probabilities.





## Digital Tools

- *Interactive Website - Weather Lab Interactive*
- *Video Editing Application - TV News Maker\**
- *Story Telling Application - Fake Newspaper\**
- *Video Editor- Clips, WeVideo\*, Do-Ink\*, iMovie*



## In Practice

- Students will use the interactive weather map to model the interactions between air masses and ocean currents, to predict possible outcomes.
- Students will then create their own weather cast using a news making or Video editing app.

# ATMOSPHERIC AND OCEANIC CIRCULATION

---



6.ESS2.6 Students who demonstrate understanding can:

Develop and use a model to describe unequal heating and rotation of the Earth causes patterns of atmospheric and oceanic circulation that determine regional climates.



## Evidence of Understanding

---

Students will demonstrate their understanding of how the resulting temperature patterns, together with the Earth's rotation (e.g. Coriolis effect) and location of continents and oceans, create large-scale patterns of atmospheric circulation.



## Digital Tools

- Website and Video - *The Coriolis Effect*
- Sketch Application - *Sketches School, Notes, ibis, Absolute Board, Google Draw\**
- Video Editor - *Clips, WeVideo\*, Do-Ink\*, iMovie*
- Student Response - *Flipgrid\**



## In Practice

- Students will watch the NOVA episode on the Coriolis Effect to model and describe that the spinning of Earth around its axis affects the movement of air and water as it travels across Earth's surface.
- Students (or student groups) will use a student response app like Flipgrid to showcase and explain their model and the reasoning behind it.
- Students can view other students responses and comment on other students videos.

# NATURAL HAZARDS

---



6.ESS3.2 Students who demonstrate understanding can:

Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

CCC: Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small.



## Evidence of Understanding

---

Students will analyze and interpret data on natural hazards to design solutions for problems presented from the natural hazards depending on the knowledge of history of catastrophic events.

Students will communicate designed solutions for the catastrophic events.



## Digital Tools

- *Interactive Website - Stop Disasters Game*
- *Content Document - Catastrophic Events Powerpoint*
- *Paperless Classroom - Showbie app*



## In Practice

- Students will analyze and interpret data on natural hazards to forecast catastrophic events and design solutions on the Stop Disaster Website to prevent future destruction.
- Students will use paperless classroom apps to take pictures of design solutions on the Stop Disaster Website, test the design solutions, and construct an explanation for the solutions.

# ADDITIONAL RESOURCES

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# TEACHER

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- [Rock Types Tell Stories -Lesson](#)
- [\*Online Graphing Tool\* - Create a graph](#)
- [The Periodic Table](#)
- [The Periodic Table and Energy Levels](#)
- [Nuclear App](#)
- [Periodic Table](#)
- [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](#)
- [PBS Reproduction](#)



- [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](#)
- [A Solar System Journey](#)
- [To Scale: The Solar System Video](#)

- Weather Lab
- The Coriolis Effect
- Probes for Science Journal
- iCell App
- *Venn Diagram Creator* - ReadWriteThink