EVIDENCE OF UNDERSTANDING

PHYSICS

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

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

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GETTING TO KNOW OKLDR

WHO IS OSSBA?

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?

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

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."

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

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.
- 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.
- See anything that needs to be changed or enhanced? Contact us at: okldr@ossba.org.

BASIC MATH REVIEW

ALGEBRA & TRIGONOMETRY

There is not a standard in physics for math skills, but these math skills are necessary to be successful in physics.

Evidence of Understanding

Students should be able to utilize trigonometry and algebra to solve equations for physics.

Digital Tools

- *Website - Khan Academy Math*

In Practice

- Students will use these Khan Academy Math Tutorials to review essential math skills to prepare for Physics, specifically algebra and trigonometry.

GRAPHICAL ANALYSIS

There is not a standard in physics for graphing skills, but these graphing and math skills are necessary to be successful in physics.

Evidence of Understanding

Students will be able to create graphical representation of data collected or given in a lab or physics problem.
Students should be able to interpret graphs to determine types of motion, relate variable, and predict possible outcomes of a given scenario.

Digital Tools

- *Website* - Graphs of Motion , Graph-That-Motion-Interactive

In Practice

- Students will utilize tutorials and practice problems to create useful graphs and be able to interpret graphs.

KINEMATICS 1-D

PH.PS2.1 Students who demonstrate understanding can: Analyze and interpret data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Evidence of Understanding

Students can identify the relationship between the net force on an object, its mass, and its acceleration. Students should be able to organize and interpret data and use the analyzed data as evidence to describe the relationship Fnet=ma in terms of causality.

Digital Tools

- *Content Website* - D-Kinematic Speed Activity, Kinematics Interactives
- *Story Telling Application* - Canva Comic Strip Maker*, Powtoon, Comic Strip - Comic Maker , Book Creator
- *Sketch Application* - Sketches School, Absolute Board, Google Draw*, Sketchbook*

In Practice

- Students will use this D-Kinematic Speed Activity with real life scenarios to expand their understanding of one dimensional kinematics.
- Student will use the evidence before them to determine fault in a collision based upon the evidence and eye witness reports.
- Students will create a storyline and use a story telling application to present their findings to the class.

MECHANICS

KINEMATICS 2-D

PH.PS2.1 Students who demonstrate understanding can:

Analyze and interpret data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Evidence of Understanding

Students can identify the relationship between the net force on an object, its mass, and its acceleration. Students should be able to organize and interpret data and use the analyzed data as evidence to describe the relationship Fnet=ma in terms of causality.

Digital Tools

- *Content Video* - MythBusters Bullet Fired Dropped Video
- *Video Editor*- Clips, WeVideo*, Do-Ink, iMovie
- *Content Application* - *Stopwatch**

In Practice

- In this video a bullet is fired at the same time a bullet is dropped.
- Students will watch the video and use their understanding of two dimensional kinematics, specifically projectile motion, to determine why the phenomenon in the video occurs.
- Students can take inspiration from this video and create a lab activity demonstrating this concept using a marble launcher or a nerf gun.
- Students can create a video of the experiment using a video editing application.
- Students can use video analysis software such as Video Stopwatch to measure variables and perform analysis of the results.

DYNAMICS 1-D

PH.PS2.1 Students who demonstrate understanding can: Analyze and interpret data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Evidence of Understanding

Students can identify the relationship between the net force on an object, its mass, and its acceleration. Students should be able to organize and interpret data and use the analyzed data as evidence to describe the relationship Fnet=ma in terms of causality.

Digital Tools

- *Content Website* - Basketball Physics, Podcast on Basketball Physics
- *Content Video* - Would you weigh less in an elevator? - Carol Hedden
- *Sketch Application* - Sketches School, ibis, Absolute Board, Google Draw*, Notability, Sketchbook*
- *Video Editor*- Clips, WeVideo*, Do-Ink, iMovie

In Practice

- Students will listen to a podcast and view the content website to gain a deeper understanding of the physics behind the sport of basketball.
- Students can also use a video lesson to explore the concept of one dimensional dynamics and jumpstart an investigation/discussion of Newton's Laws.
- Students will begin to use Newton's Laws and apply them to a real life scenario by using a sketch application to explore the classroom and determine the forces acting upon various objects in the classroom. For example, students can choose a sport or activity and use a video editing application to explain the forces involved.

DYNAMICS 2-D

PH.PS2.1 Students who demonstrate understanding can: Analyze and interpret data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Evidence of Understanding

Students who can demonstrate understanding can analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Digital Tools

- *Video Editor-* Clips, WeVideo*, Do-Ink, iMovie
- *Simulation -* PHET simulation for projectile motion, *PHET app*

In Practice

- Students will use this PHET simulation for projectile motion to manipulate variables to increase understanding of two dimensional dynamics, specifically projectile motion.
- Once the students have finished using the simulation, they should feel comfortable designing an experiment to test projectile motion while changing variables and conditions.
- Students can create a video product to demonstrate their experiment to the class and defend their work.

ENERGY

ENERGY TRANSFER

PH.PS3.1 Students who demonstrate understanding can: Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

PH.PS3.3 Students who demonstrate understanding can: Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.

Evidence of Understanding

Students should be able to identify and describe the components of the system, the initial energy of those components (quantitatively), energy flows in and out of the systems, and the final energies of the system components.
Students should also be able to calculate the changes in energy using their computational model.
Students should also be able to systematically and quantitatively evaluate the performance of the device they designed.

Digital Tools

- *Content Website* - Off the Grid Lesson
- *Video- Renewable energy challenge in CA : Earthquakes*
- *Presentation* - Keynote, Google Slides, Microsoft PowerPoint

In Practice

- After students learn about the advantages and disadvantages of renewable and non-renewable energy sources, they will deepen their understanding of energy transfer by considering a real life scenario transferring types of energy from natural resources into useful forms of energy.
- Students can expand on this lesson by designing a system in which energy is transferred to a more useful type of energy.
- The students can create a presentation to explain their concept to the classroom including the transfers of energy and expected efficiency of their design.

CONSERVATION OF ENERGY

PH.PS3.2 Students who demonstrate understanding can:

Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as either motions of particles or energy stored in fields.

Evidence of Understanding

Students should be able to develop models where they identify individual components of the system, depict both a macroscopic (motion, sound, light, thermal, potential, kinetic energy) and molecular level (kinetic, chemical, potential) representation of the system, and describing the relationships between the components in those models. Finally, students should make connections that energy is conserved on both the macroscopic and molecular scale in a closed system.

Digital Tools

- *Simulation Website* - Energy Skate Park Simulation
- *Video Editor-* Clips, WeVideo*, Do-Ink*, iMovie

In Practice

- Students can explore the simulation, manipulating variables and conditions to examine the conservation of types of energy.
- Students can then work in groups to explore other examples of conservation of energy.
- The students can video each other demonstrating how energy is conserved as it relates to the different types of energy.
- Students can compile and edit the videos together and share with the class with an applications such as Clips.

MOMENTUM

COLLISIONS

PH.PS2.2 Students who demonstrate an understanding can:

Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.

PH.PS2.3 Students who demonstrate an understanding can:

Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

Evidence of Understanding

Students who demonstrate understanding can use quantitative conservation of mass data to show understanding of the qualitative meaning. They can apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.

Digital Tools

- *Website - Teacher-Toolkits/Momentum-Conservation/Momentum-Conservation-Complete-ToolKit*
- *Video Editor-* Clips, WeVideo*, Do-Ink*, iMovie

In Practice

- Students will work through the website starting with the review reading: "Readings from The Physics Classroom Tutorial, Momentum and its Conservation Chapter, Lesson 2". They will answer the two questions at the bottom then begin the four interactive simulations.
- Students will then research the question, "How can physics be used to reduce injury?"
- Students will design a safety feature that will protect a person in a collision with another vehicle.
- Students will create a video advertisement for their vehicle, using physics to explain the safety features of their new design and show data to support the

GRAVITATIONAL & ELECTROSTATIC FORCES

NEWTON'S LAW OF GRAVITATION

PH.PS2.4 Students who demonstrate understanding can:

Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Evidence of Understanding

Students who demonstrate understanding can use both quantitative and conceptual descriptions of interactions between two objects each with a mass in gravitational fields and electrical charges in electric fields using Newton's Law of Gravitation and Coulomb's Law.

Digital Tools

- *Spreadsheet*- Numbers, Google Sheets*, Microsoft Excel
- *Gravity and Force Simulation*- PHET - Gravity & Orbits , *How to calculate your mass on other planets*, *Mass on other planets calculator*.

In Practice

- Students will analyze and interpret data from the Gravity and Force Simulation, participate in a discussion, and record the mathematical representations on a spreadsheet of the computational thinking related to Newton's Law of Universal Gravitation.
- After discussing the variables involved and how they relate to each other, students will predict the results of changing the known variables of planets in the solar system.
- Students will then show work as to how they can calculate their mass on four planets of their choice. They can check their work using the Mass on other planets calculator.

COULOMB'S LAW

PH.PS2.4 Students who demonstrate understanding can:

Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Evidence of Understanding

Students who demonstrate understanding can use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Digital Tools

- Website - Coulomb's Law Resources, Interactive Coulomb's Law Activity
- *Coulomb's Law Simulation:*PHET - Coulombs Law
- *Video Editor-* Clips, WeVideo*, Do-Ink*, iMovie

In Practice

- Students will predict the results of changing variables in Coulomb's law after practice using the equation in class.
- Students can use the referenced interactive activity from Physics classroom.com to manipulate the variables in Coulomb's law to test and prove their predictions.
- Students will use a video-making app to record the simulation and explain how the variables are related to each other.
- Students will use the Coulomb's Law Simulation website to create different scenarios manipulating variables and watching the effects in action to explore the concepts of electrostatic forces between objects.

ELECTRIC CURRENT

PH.PS2.5 Students who demonstrate understanding can: Plan and conduct an investigation to provide evidence that an electric current can cause a magnetic field and that a changing magnetic field can cause an electric current.

Evidence of Understanding

Students who demonstrate understanding can plan and conduct an investigation to provide evidence that an electric current can cause a magnetic field and that changing magnetic field can cause an electric current.

Digital Tools

- *Interactive Website* - Circuit Construction Kit: DC - Virtual Lab
- *Generator Simulation:Electric-generator*
- *Word Processor* - Pages, Google Docs*, Microsoft Word

In Practice

- Before building the circuits on a simulation, students should make predictions based on the concepts pertaining to circuits, currents, resistance, potential difference, and magnetic fields.
- Students will use the PHET simulation-Circuit Construction Kit: DC interactive activity to build circuits and make claims in the science journal that altering the number of resistors, charging of the battery, and positioning of resistors will change the current, potential difference, resistance and magnetic field of the circuit.
- Students need to create a document detailing the results of the simulation and the accuracy of their predictions.
- Students will investigate the generator simulation to provide evidence for claims that an electric current can produce a magnetic field and that changing the magnetic field can produce an electric current.

MAGNETIC FIELDS

PH.PS3.5 Students who demonstrate understanding can:

Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Evidence of Understanding

Students who demonstrate understanding can develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Digital Tools

- *Presentation* - Keynote, Google Slides*, Microsoft PowerPoint
- *Simulation website:* *Hockey and Electric Fields*

In Practice

- Students will investigate the hockey puck simulation to provide evidence that an electric current can produce a magnetic field.
- After investigating the hockey puck simulation, students will design a game that uses magnetic or electric currents for forces and then create a presentation to share the game.

ELECTROMAGNETIC FIELDS

PH.PS3.5 Students who demonstrate understanding can:

Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Evidence of Understanding

Students who demonstrate understanding can develop and use a model of two objects interacting through electric and magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Digital Tools

- *Video Editor-* Clips, WeVideo*, Do-Ink*, iMovie
- *Interactive Website* - Magnetic and Electric Forces Interactive, Magnetic Forces Interactive
- *Presentation* - Keynote, Google Slides*, Microsoft PowerPoint

In Practice

- Students will complete the interactive activities to understand how electric and magnetic forces are used in the real world.
- Students can watch the videos that go with each of the interactive activities.
- Students can relate the interactive activities to real life need for forces and produce video of classroom circuits and magnetic forces with metals and writing an explanation in their notebooks for other uses for the electric and magnetic forces.

TRANSFER OF HEAT

PH.PS3.4 Students who demonstrate understanding can:

Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

Evidence of Understanding

Students who demonstrate understanding can plan and conduct an investigation to provide evidence that the transfer of thermal energy when the components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

Digital Tools

- *Interactive Website* - Our Sun and Heat Transfer Basics: Heat It Up! Activity
- *Word Processor* - Pages, Google Docs*, Microsoft Word
- *Note Taking* - Notes, Paper by WeTransfer, Evernote*, Book Creator
- *Sketch Application* - Sketches School,ibis, Absolute Board, Google Draw*, Sketchbook*
- *Mind Mapping Application* - Bubbl.us*, MindMup*, Lucid Chart*

In Practice

- Students will explore how heat is transferred from one medium to another using an interactive activity Our Sun and Heat Transfer Basics: Heat It Up! .
- After performing the lab activity, the students will create a flow chart using note taking, sketch, or mind mapping app to show the transfer of heat energy.

THERMAL ENERGY & WORK

PH.PS3.4 Students who demonstrate understanding can:

Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

Evidence of Understanding

Students who demonstrate understanding can plan and conduct an investigation to provide evidence that the transfer of thermal energy when the components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics).

Digital Tools

- *Website* - *Khan Academy - Thermodynamics Lesson*
- *Word Processor* - Pages, Google Docs*, Microsoft Word
- *Mind Mapping Application* - Popplet*, Padlet*, Post-It, Visme*

In Practice

- Students will watch and discuss the Khan Academy tutorials as an introduction to the laws of thermodynamics.
- Students will investigate the transfer of energy occurring in other real world phenomena like cold ice packs, hand warmers, combustion reactions, etc.
- The students could also design their own thermodynamics problem and solve the problem.
- The students will then post the problem to a shared platform, such as a shared word processing document or a mind mapping application for other groups to solve.
- Students can present the solutions in class to compare and contrast solutions.

WAVES

PROPERTY OF WAVES

PH.PS4.1 Students who demonstrate understanding can:

Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Evidence of Understanding

Students who demonstrate understanding can use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.

Digital Tools

- *Video Editor-* Clips, WeVideo*, Do-Ink*, iMovie
- *Website* - Waves tutorial
- *Student Response-* Flipgrid*

In Practice

- Students will read the waves tutorial as an introduction to the properties of waves and the variables.
- The groups of students will each take one of the equations for waves and create a lesson to teach the rest of the class.
- The students will then record themselves presenting the lesson and post the videos onto a student response platform such as Flipgrid for the other students to watch and critique and/or defend their findings.

DIGITAL TRANSMISSION OF INFORMATION

PH.PS4.2 Students who demonstrate understanding can:

Evaluate questions about the advantages and disadvantages of using a digital transmission and storage of information.

Evidence of Understanding

Students who demonstrate understanding can evaluate questions about the advantages and disadvantages of using digital transmission and storage of information.

Digital Tools

- *Content Video* - Physics-Waves-Analogue and Digital signals Video
- *Presentation* - Keynote*, Google Slides*, Microsoft PowerPoint

In Practice

- Student will watch a video about Physics - Waves - Analogue and Digital Signals to gather more understanding on how information is transmitted digitally.
- This video explores digital transmission of data compared to analog transmission.
- Students will research methods and uses for digital transmission and storage both in the past and present.
- Students will use the information gathered to create a presentation.

ELECTROMAGNETIC RADIATION

PH.PS4.3 Students who demonstrate understanding can: Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described by a wave model or a particle model, and that for some situations one model is more useful than the other.

Evidence of Understanding

Students who demonstrate understanding can evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.

Digital Tools

- *Website* - Anatomy of an Electromagnetic Wave Resource
- *Student Response* - Kahoot*! Quizlet*, Quizzizz*

In Practice

- Student can use these NASA Resources to collect data on the visible wave spectrum and use as a discussion point for the wave particle duality of electromagnetic radiation.
- Students will create a student response program to develop test questions that require explanations, interpretations, applications, perspectives and empathy on wave/particle duality of the visible wave spectrum.

VALIDITY OF PUBLISHED MATERIALS REGARDING ELECTROMAGNETIC RADIATION

PH.PS4.4 Students who demonstrate understanding can: Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.

Evidence of Understanding

Students who demonstrate understanding can evaluate the validity and reliability of claims in published materials of the effects of electromagnetic radiation when absorbed by matter.

Digital Tools

- *Presentation* - Keynote, Google Slides*, Microsoft PowerPoint
- *Website* - If You Get Gel Manicures, This Is What You Need To Know About UV Lamps And Skin Cancer

In Practice

- Students will use this article If You Get Gel Manicures, This Is What You Need To Know About UV Lamps And Skin Cancer as a talking point on a discussion over electromagnetic radiation and its effects on the human body.
- Students will do research to find another real world example relating to the effects of electromagnetic radiation and create a presentation explaining their findings.

TECHNOLOGY & WAVES

PH.PS4.5 Students who demonstrate understanding can: Communicate technical information about how some technological devices use the principle of wave behavior and wave interactions with matter to transmit and capture information and energy.

Evidence of Understanding

Students who demonstrate understanding can communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.

Digital Tools

- *Content Applications - TimeLine Builder SmartDraw*, Sutori**
- *Website - The Physics of Cell Phones*

In Practice

- Students will reference an article about The Physics of Cell Phones to help them explore the physics involved.
- Students will learn how waves transmit information such as sound.
- After gaining a working knowledge, the students can create a digital timeline to show the progression of technology using waves to transmit sound.

FISSION/FUSION

PH.PS1.8 Students who demonstrate understanding can: Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Evidence of Understanding

Students who demonstrate understanding can develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Digital Tools

- *Video Editor*- Clips, WeVideo*, Do-Ink*, iMovie
- *Website* - Nuclear Energy through a Virtual Field Trip Lesson

In Practice

- Students will use Nuclear Energy through a Virtual Field Trip to take a virtual field trip to a nuclear power plant to understand how nuclear fission is used to generate energy.
- Students can then use a video recording application to create a "news conference" defending the power plant to "reporters" highlighting the nuclear processes.

RADIOACTIVE DECAY

PH.PS1.8 Students who demonstrate understanding can: Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Evidence of Understanding

Students who demonstrate understanding can develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

Digital Tools

- *Simulation Website* - PHET simulation-Alpha Decay
- *Story Telling Application* - Canva Comic Strip Maker*, Powtoon*, Comic Strip - Comic Maker

In Practice

- Students will use a simulation website such as PHET simulation-Alpha Decay to explore how an atom decays and examine the particles created by nuclear decay.
- Students will create a comic strip using a Story Telling Application or a Drawing Program to describe what occurs in nuclear decay.

RESOURCES

TEACHER

- Graphing Stories website*
- Displacement & Velocity definition website*
- Readwords.org - How Soccer Can Help Us Understand Physics*
- Vector Calculator*
- Calculate any type of physics problem*
- Phet: Forces & Motion Basics Simulation*
- Interactive Lesson:students can create FBD for various physical scenarios*
- Khan Academy Tutorial: What is Gravitaional Potential Energy*
- YouTube Video: Rube Goldburg Machine
- TED-Ed: The Physics of the Hardest Move in Ballet
- Phet Simulation: Gravity Force Lab*
- Coulomb's Law*
- Physics Ineractives: Electric Circuit Builder*
- YouTube: Monster Magnet Meets Magnetic Fluid
- Physics Interactives: Magnetic Field*
- Phet Simulations: Radio Waves*
- Crazy Games Physics complilation*