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| Subject: Science | Grade: 7 | | Unit ID: |
| Unit 1: Forms and Types of Energy | | | Length: 4 weeks |
| Stage 1: Desired Results | | | |
| Standards: **Content Standards:**  **7.MS-PS3-1.**  **Pearson Grade 7 Textbook: Ch 11: Energy**  Construct and interpret data and graphs to describe the relationships among kinetic energy, mass, and speed of an object.  Clarification Statements:  • Examples could include riding a bicycle at different speeds and rolling different sized rocks downhill.  • Consider relationships between kinetic energy vs. mass and kinetic energy vs. speed separate from each other; emphasis is on the difference between the linear and exponential relationships.  State Assessment Boundary:  • Calculation or manipulation of the formula for kinetic energy is not expected in state assessment.  **7.MS-PS3-2.**  **Pearson Grade 7 Textbook: Ch 10: Energy**  Develop a model to describe the relationship between the relative positions of objects interacting at a distance and their relative potential energy in the system.  Clarification Statements:  • Examples of objects within systems interacting at varying distances could include Earth and either a roller coaster cart at varying positions on a hill or objects at varying heights on shelves, changing the direction/orientation of a magnet, and a balloon with static electrical charge being brought closer to a stream of water.  • Examples of models could include representations, diagrams, pictures, and written descriptions of systems.  State Assessment Boundaries:  • State assessment will be limited to electric, magnetic, and gravitational interactions and to interactions of two objects at a time.  • Calculations of potential energy are not expected in state assessment.  **7.MS-PS3-7(MA).** -*Also covered in the Thermal Energy Unit*  **Pearson Grade 7 Textbook: Ch 10: Energy**  Use informational text to describe the relationship between kinetic and potential energy and illustrate conversions from one form to another.  Clarification Statement:  • Types of kinetic energy include motion, sound, thermal, and light; types of potential energy include gravitational, elastic, and chemical.  **Practice Standards/Concepts & Skills:**  1. Asking questions (for science) and defining problems (for engineering).  2. *Developing and using models.*  3. Planning and carrying out investigations.  4. *Analyzing and interpreting data.*  5. Using mathematics and computational thinking.  6. Constructing explanations (for science) and designing solutions (for engineering).  7. Engaging in argument from evidence.  8. Obtaining, evaluating, and communicating information | | | |
| Overview: Students learn about the relationship between energy and moving objects by investigating objects in the real world that move. Through investigations, students will be able to define energy, identify forms of energy, explain energy transformation and conservation.  **FOCUS LANGUAGE GOALS:**  Students will communicate in scientific ways by *organizing data and observations* and *reason from evidence* or *models to explain the data collected*. | | | |
| Understandings Students will understand that…   * Motion energy (kinetic energy) of an object increases as its mass and speed increase. * A system of objects may also contain stored (potential) energy, and the amount of potential energy depends on the objects’ relative positions. * Within a closed system, energy is never created nor destroyed but transformed into some other form of energy. | | Essential Questions Where does the energy come from, what does it do, and where does it go?  Students will keep considering…   * What is energy, and what forms does it take? * How is energy transferred and conserved? | |
| **Knowledge:** *Students will know …*  **Content:**   * Identify the two types of energy, kinetic energy and potential energy * describe the relationship between energy and a moving object * explain how energy is transferred, * explain how stored energy is converted into a desired form for practical use.   **Language:**  Students will become familiar with a variety of different text types in the four skills (reading, writing, listening and speaking) for such purposes as:   * Describing how energy works * Classifying the different types of energy and sources of energy * Explaining energy transformations  Vocabulary: [(see definition of CCSS tiered vocabulary)](https://drive.google.com/open?id=0B1oO5U3iU008Q1ZGaEpFeFpLVnc)  |  |  |  | | --- | --- | --- | | **Tier 1** | **Tier 2** | **Tier 3** | |  | Mass  Speed  Energy  Various forms of energy, which could include but not limited to: Light, mechanical, gravitational, electrical,  Sound, chemical, nuclear | Conservation of Energy  Kinetic Energy  Potential Energy  Thermal Energy  Friction | | | **Skills**: *Students can …*  **Content:**   * constructing and interpreting data and graphs to describe the relationships among kinetic energy, mass, and speed of an object; consider relationships between kinetic energy vs. mass and kinetic energy vs. speed separate from each other (7.MS-PS3-1) * collecting, analyzing and presenting evidence to support the claim that when the motion energy of an object changes, energy is transferred to or from the object (7.MS-PS3-5) * developing a model to describe the relationship between the relative position of objects interacting at a distance and their relative potential energy in the system (7.MS-PS3-2)   **Language:** *Students can...*   * Organize data and observations * Develop and use models | |
| Stage 2: Assessments | | | |
| Assessments administered in this unit   * Possible assessment could include open responses with graphs. Need to provide a scenario (written or some form of media) where the potential and kinetic energy transfers and the kinds of energy transfers. The students should be able to identify and explain these energy transfers. * Common district assessment questions (pending) * Pearson Resource: [Performance Expectations Activity 7.MS-PS3-7(MA) Energy](https://drive.google.com/file/d/1PSzo6UMJ2x79Z6z4l9NV8fuPsswy5L_f/view?usp=sharing) * Pearson Quick Lab: [Soaring Straws](https://drive.google.com/drive/folders/1NTCdBDrJA_IYeHhebOoJQ729cEV4TW1m) (link to folder in Middle School Science Team Drive) | | | |
| Stage 3: Learning Plan | | | |
| Summary of Key Learning Events and Instructions: **Engage students with lessons and activities that demonstrate how energy is transformed rather than lost or created. Lessons will also focus on the difference between stored energy and energy that is causing change. (7.MS-PS3-3, 7.MS-PS3-7)**   * Kinetic vs potential energy: model the transfer of this energy in a system.   Possible resources for lesson   * + - <https://phet.colorado.edu/sims/pendulum-lab/pendulum-lab_en.html>     - <http://www.physicsclassroom.com/Physics-Interactives/Work-and-Energy>     - <https://phet.colorado.edu/en/simulation/legacy/energy-skate-park> * Graphing and interpreting data on the relationships among kinetic energy, mass, and speed of an object. * Energy transference and transformation.Describe the difference between different kinds of energy and how energy transfers between these kinds of energy. Energy kinds should include the kinetic energy types: motion, sound, and electromagnetic, and types of potential energy: gravitational, elastic, and chemical. **(7.MS-PS3-5., 7.MS-PS3-7(MA).)**   Possible resources for lesson   * + - [Energy Webquest](https://drive.google.com/open?id=0B5LzQ741HGVMLTJlRjU2R3VPdzA)     - <http://www.pbs.org/wgbh/nova/labs/lab/energy/1/2/> (Types of energy and conversions)     - <https://phet.colorado.edu/en/simulation/legacy/energy-forms-and-changes> | | | |
| Instructional Notes: **Sociocultural implications**   * More than likely students will be used to measuring using English units. A conversation/discussion may be needed around different ways scientists and engineers measure using the metric system   **Connections to Prior Knowledge**   * Basic graphing skills * Basic understanding and measuring of mass * Difference between matter and energy * Difference between observing, inferring, predicting and classifying * Developing and using models   **Connections to Future Knowledge**   * Thermal Energy * Energy in Ecosystems * Plate tectonics, earthquakes and volcanoes   **Common Misconceptions**   * Only living things have energy * A stationary object has no energy * Energy can be created or destroyed * Difference between mass and weight   **Instructional Strategies**   * Provide formative feedback in the form of comments on all assignments. This allows students to make changes and/adjustments on grade work * Warmups/Ticket to Leave: Make true and false statements using lesson content and have students agree or disagree with thumbs up/thumbs down or four corners to check for whole class comprehension * Have a visual word wall or concept map that can be used in the classroom as a reference point when students are stuck * Create homework assignments that reinforce content vocabulary | | | |
| Resources: **Texts:** Pearson Interactive Science Grade 7 2017 Massachusetts Textbook Reading Chapter 11: [Energy](https://drive.google.com/file/d/0B9cpq4aLWhTVcXFzQnp4eGhsbUI5NkNjcGFfQkxFQll1X0I0/view?usp=sharing) **Websites:**   * CDSM Curriculum Documents: [CDSM G7 U1](https://docs.google.com/document/d/1NAGwZdb4tP2JhiY_HB7Ay0SABA6FhvPgMJ0IC3-7X6g/edit?usp=sharing) Forms and Types of Energy * Video: [Energy](http://viewpure.com/Q0LBegPWzrg?start=0&end=0) * Video: [Potential Energy vs. Kinetic Energy](http://viewpure.com/IqV5L66EP2E?start=0&end=0) * Video: [What is kinetic and potential energy](https://www.youtube.com/embed/Ehx1P4adv6I) * Video: [Types of Energy](https://www.youtube.com/embed/Dqkg6WMkpoA) * Website: [U.S. Energy Information Administration-Kids Energy](https://www.eia.gov/kids/energy.php?page=about_forms_of_energy-basics) * Website: [Potential Energy vs. Kinetic Energy Cards](https://quizlet.com/227825598/potential-energy-and-kinetic-energy-flash-cards/) | | | |