EPSD Curriculum and HMH SCIENCE DIMENSIONS 2018 Alignment TEMPLATE

GRADE 8

EPSD Unit 5: Relationships Among Forms of Energy
Third Marking Period

<table>
<tr><td colspan="2">Overview: In this unit, students use the practices of analyzing and interpreting data, developing and using models, and engaging in argument from evidence to make sense of relationship between energy and forces. Students develop their understanding of important qualitative ideas about the conservation of energy. Students understand that objects that are moving have kinetic energy and that objects may also contain stored (potential) energy, depending on their relative positions. Students also understand the difference between energy and temperature, and the relationship between forces and energy. The crosscutting concepts of scale, proportion, and quantity, systems and system models, and energy and matter are called out as organizing concepts for these disciplinary core ideas. Students use the practices of analyzing and interpreting data, developing and using models, and engaging in argument from evidence. Students are also expected to use these practices to demonstrate understanding of the core ideas.</td><td colspan="3">Science Dimensions Program Resources Module I</td></tr>
<tr><td colspan="2" rowspan="2">Standards: (MS-PS3-1) Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of</td><td colspan="3">Unit 1: Energy
Unit Video (solar flares on the surface of the sun); Why it Matters p. 2; Unit Starter p. 3; Vocabulary p. 3I; Unit Project p. 3K; Unit Connections p. 62; Unit Review pp. 63-64; Unit Performance Task pp. 67-68</td></tr>
<tr><td colspan="3">Standard for all Units: (D) Interactive Multilingual Glossary; (D/P) Unit Pretest; (D) Lesson Quizzes; (D/P) Unit Tests

Note: Refer to the Curriculum Alignment Common Language (CACL) Guide to decipher acronyms.</td></tr>
<tr><td>Instructional Days: 25-30</td><td>Lesson 1: Introduction to Energy pp. 4-21

D/P- WIM Questions p. 2

D/P- CYEI (video) How is energy from the first domino able to topple the last domino? p. 5

P- ENB (prompt) Gather evidence to explain how energy flows through the domino system. p. 5</td><td>Lesson 2: Kinetic and Potential Energy pp. 22-41

D/P- WIM Questions p. 2

D/P- CYEI (video) Why doesn't the water balloon hit the student's face? p. 23

P- ENB (prompt) Gather evidence to explain how energy affects the motion of the water balloon. p. 23</td><td>Lesson 3: Engineer It: Transforming Potential Energy pp. 42-61

D/P- WIM Questions p. 2

D/P- CYEI (video) Why do these two balls bounce differently? p. 43

P- ENB (prompt) Gather evidence to explain why the balls bounce differently. p. 43</td></tr>
</table>

an object and to the speed of an object. (MS-PS3-2) Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. (MS-PS3-5) Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.		D- Students watch video of wind up toy and create a process chart that shows steps involved in making the toy move. P- DTM Solve a real -world mathematical problem using variables. p. 7 P- LS Explain the difference between the everyday and the scientific uses of the terms energy and work. Create a visual aid to explain the differences. p. 8 P- ENGIT Students consider how the weight of the soapbox derby cars affects the design of a barricade used to stop the cars at the end of a race. p. 9 P- ENB (prompt) How do the potential energy and kinetic energy of a domino change as it topples over? p. 9 D/P- DTM Students write numbers in scientific notation p. 13	D/P- DTM Graph Kinetic Energy pp. 28-29 P- LS Argue Using Evidence. p. 30 P- ENB (prompt) How does the gravitational potential energy of the water balloon before it was released compare with the gravitational potential energy of the water balloon when it returns almost to its release position? p. 31 P- ENGIT Conduct Research: Plan a method of conducting research to measure the amount of potential energy in a stretched rubber band. p. 31 P- ENB (prompt) How do the conservation of energy in a system relate to the water balloon's movement? p. 34 D/P- HOL Activity Analyze Energy in Systems pp. 35-36	D/P- Analyzing Potential Energy (Students watch video about energy transformation- two people jumping on pogo sticks.) p. 44 D/P- Play with Potential Energy: Gravitational Potential Energy (Students watch video to see how potential energy is transformed in the game of labyrinth.) p. 46 D/P- Magnetic Potential Energy (Students watch video to see an example of a toy that transforms potential energy into other forms of energy.) p. 47 D/P- Elastic Potential Energy (Students watch video to observe elastic potential energy in action.) p. 47 P- ENB (prompt) Describe how energy is related to the height a ball reaches when it bounces. Students record evidence in their ENB. p. 48 D/P- DTM Calculate Energy Needs (Students use the
Objectives 1: Students will: Construct and interpret graphical displays of data to identify linear and nonlinear relationships of kinetic energy to the mass of an object and to the speed of an object. Develop a model to describe what happens to the amount of potential energy stored in the system when the arrangement of objects interacting at a distance changes. Support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. Construct and present oral and written arguments supported by empirical evidence and scientific reasoning to support the claim that gravitational interactions are attractive and depend on the masses of				

interacting objects. Use models to represent the gravitational interactions between two masses. **Topics 1:** Forms of Energy- Energy Transformations Energy Conservation Twenty-First Century Themes and Skills include: • The Four C's • Life and Career Skills • Information and Media literacy. **Essential Questions**: How can physics explain sports? Is it better to have an aluminum (baseball/softball) bat or a wooden bat? What would give you a better chance of winning a bowling match, using a basketball that you can roll really fast, or a bowling ball that you can only roll slowly? Who can design the best roller coaster?	D/P- HOL Activity Investigate Energy in a Rollback Can pp. 14-15 P- ENB (prompt) What types of energy transfers and energy transformations are involved in the domino chain reaction? p. 16 D/P- TIF (enrich) Perpetual Motion pp. 17-18 D- Hands-On Labs; Ancient Structures; Propose Your Own Path D/P- Lesson Self Check pp. 19-21 D- Lesson Quiz D-Make Your Own Study Guide P- DI (ELL/RTI) p. 3I P- Extension p. 3I P- COLLAB p. 3J P- Connections to Other Disciplines p. 3J D- Science Safety HB D- CCC-HB D- ELA-HB D- Math-HB	D/P- TIF (enrich) Traffic Safety and Energy pp. 37-38 D- Hands-On Labs; Energy of a Yo-Yo; Propose Your Own Path D/P- Lesson Self Check pp. 39-41 D- Lesson Quiz D-Make Your Own Study Guide P- DI (ELL/RTI) p. 3I P- Extension p. 3I P- COLLAB p. 3J P- Connections to Other Disciplines p. 3J D-Science Safety HB D- CCC-HB D- ELA-HB D- Math-HB D- SEP-HB D-ScienceSaurus Reference HB D- VL Kinetic Energy D- YSI Simulation How Can You Use the Sun's Energy?	formula of gravitational potential energy to compare the potential energy of a roller coaster train under different conditions.) p. 48 D/P- HOL Activity Designing a Toy to Teach Potential Energy (Students design a toy to introduce the concept of potential energy to children between 8 and 10 years old.) pp. 50-51 D/P- Choose a Design to Prototype (Students view diagrams of four possible designs for a system to awaken a user; students identify which of the designs is most likely to satisfy the criteria and constraints in the table.) p. 52 D/P- Using Science to Make Design Decisions (Students watch video and think about the energy of a bow and arrow system.) p. 53 D/P- HOL Activity Optimize a Toy to Teach Potential Energy (Students test the

	D- SEP-HB D- ScienceSaurus Reference HB		prototype they designed to measure how well it meets criteria and constraints, and then redesign as needed.) pp. 54-55 P- ENB (prompt) How can a system be adjusted to change the amount of potential energy to bounce a ball higher or lower? Students record evidence in their ENB. p. 55 D/P- LS Create an Advertisement (Students recall that their toy is meant to introduce children aged 8-10 years to potential energy. Students create a magazine advertisement to market the device to the children.) p. 56 D/P- Optimize the Design of a Balloon-Powered Boat (Students watch video and think of the balloon-powered boat as a system and identify how they could modify the boat to improve how far it travels; students explain how the change will help.) p. 56

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			D/P- TIF (enrich) People in Engineering: Steve Okamoto, Roller Coaster Designer pp. 57-58 D- Hands-On Labs; Potential Energy in Power and Transportation; Propose Your Own Path D/P- Lesson Self Check pp. 59-61 D- Lesson Quiz D-Make Your Own Study Guide P- DI (ELL/RTI) p. 3I P- Extension p. 3I P- COLLAB p. 3J P- Connections to Other Disciplines p. 3J D-Science Safety HB D- CCC-HB D- ELA-HB D- Math-HB D- SEP-HB D-ScienceSaurus Reference HB D- VL Kinetic Energy

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Curriculum Alignment Common Language (CACL) Guide 6-8		
Acronym	**Word/Phrase**	**Description**
CER	Claims Evidence Reasoning	Students make a claim and gather evidence along the way (during EXPLORATORY activities) to support claim.
CCC-HB	Crosscutting Handbook	Students who need extra support in grasping concepts or to refresh student knowledge of skills.
CYEI	Can You Explain It	Lesson phenomenon used to ENGAGE students in learning at the beginning of the lesson.
CYSI	Can You Solve It	Lesson phenomenon used to ENGAGE students in learning at the beginning of the lesson.
D	Digital	Program resources and features in interactive digital form.
DI (ELL/RTI) **Extension** **COLLAB** **Connections to Other Disciplines**	Differentiated Instruction (English Language Learner/Response to Intervention) Collaboration Connections to Other Disciplines	A page that lists all learning activities used to differentiate learning, engage students in collaborative activities and connect learning to other subjects.
DTM	Do the Math	Integrated subject learning.
ENB	Evidence Notebook	Student notebook or journal used to gather evidence during EXPLORATORY learning activities to support their claims.
ENGIT	Engineer It	Integrated subject learning.
ELA-HB	English Language Arts Handbook	Students who need extra support in grasping concepts or to refresh student knowledge of skills.
HOL	Hands-On Lab	Activities or experiments that enable students to demonstrate scientific procedures and analysis.

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LS	Language SmArts	Integrated subject learning.
M-HB	Math Handbook	Students who need extra support in grasping concepts or to refresh student knowledge of skills.
P	Print	Program resources and features in print form.
SEP-HB	Science and Engineer Practices Handbook	Students who need extra support in grasping concepts or to refresh student knowledge of skills.
TIF	Take It Further (enrich)	Enrichment activities for students in digital or print.
VBP	Video Based Project	Real life videos related to science and/or engineering that enable students to demonstrate mastery of performance expectations.
VL	Virtual Lab	Fully interactive simulations in which students perform experiments, collect data and answer questions.
WIM	Why It Matters	Questions related to lessons within each unit that asks students to consider how science affects the world around them.
YSI	You Solve It (Simulation)	Open-ended simulation-based learning with multiple answer options.