EPSD Curriculum and HMH SCIENCE DIMENSIONS 2018 Alignment TEMPLATE

GRADE 8

EPSD Unit 6: Thermal Energy
Third Marking Period

<table>
<tr>
<td colspan="2" rowspan="3">Overview: In this unit, students ask questions, plan and carry out investigations, engage in argument from evidence, analyze and interpret data, construct explanations, define problems and design solutions as they make sense of the difference between energy and temperature. They use the practices to make sense of how the total change of energy in any system is always equal to the total energy transferred into or out of the system. The crosscutting concepts of energy and matter, scale, proportion, and quantity, and influence of science, engineering, and technology on society and the natural world are the organizing concepts for these disciplinary core ideas. Students ask questions, plan and carry out investigations, engage in argument from evidence, analyze and interpret data, construct explanations, define problems and design solutions. 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>
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<tr>
<td colspan="3">Unit 2: Energy Transfer
Unit Video (launching of the Orion Multi-Purpose Crew Vehicle); Why it Matters p. 70; Unit Starter p. 71l; Vocabulary p. 3l Unit Project p. 71K; Unit Connections p. 132; Unit Review pp. 133-135; Unit Performance Task pp. 137-138</td>
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<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>
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<td>Standards: (MS-PS3-3) Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. (MS-PS3-4) Plan an investigation to determine the</td>
<td>Instructional Days: 15-20</td>
<td>Lesson 1: Changes in Energy pp. 72-93

D/P- WIM Questions p. 70

D/P- CYEI (video) How can energy from the motion of the crank on a hand-powered flashlight produce light? p. 73

P- ENB (prompt) Gather evidence to explain how turning the crank of a</td>
<td>Lesson 2: Temperature and Heat pp. 94-111

D/P- WIM Questions p. 70

D/P- CYEI (video) What allows us to visualize temperature differences? p. 95

P- ENB (prompt) Gather evidence to help explain how temperature differences could be visualized. p. 95</td>
<td>Lesson 3: Engineer It: Thermal Energy Transfer in Systems pp. 112-131

D/P- WIM Questions p. 70

D/P- CYEI (digital pictures) Why are urban heat islands hotter than their surrounding regions? p. 113

P- ENB (prompt) Gather evidence to help explain</td>
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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. (MS-ETS1-1) Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. (MS-ETS1-2) Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. (MS-ETS1-3) Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. (MS-ETS1-4) Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such		hand-powered flashlight produces light. p. 73 D- Video of types of energy at a carnival. P- ENB (prompt) Think about the hand-cranked flashlight. What kinds of energy are involved in the operation of the flashlight? p. 78 P- ENGIT Analyze Applications of Mechanical Energy. p. 79 D/P- HOL Activity Investigate the Transfer of Energy p. 81 P- LS Use the results of the HOL Activity to construct a statement about how mass and speed affect the transfer of kinetic energy. How can this investigation serve as a model for collisions in the real world? p. 81. D- Animation of the energy transfer from the water to the water wheel. D- Animation of Newton's cradle. P- ENB (prompt) Describe the transfer of kinetic	D/P- HOL Activity Compare Thermal Energy in an Object p. 100 P- LS Use the of the HOL Activity to trade procedures with another group and follow the steps that they used. Did you get the same results? Why or why not? p. 101 P- ENB (prompt) The infrared photograph indicates that the surfaces and air nearer the cat are warmer than the surfaces and air farther away. What factors might cause these temperature differences? p. 101 D/P- DTM Compare Objects' Thermal Energies. p. 102 P- ENGIT Explore Thermal Energy Storage p. 103 P- ENB (prompt) If two objects have the same temperatures, will they always have the same thermal energies? Record your evidence p. 103 D- Animation of how thermal energy is	the causes of urban heat islands. p. 113 D/P- Modeling the Flow of Thermal Energy through Systems: Energy Transfer (Students watch video to observe how the vanes of a radiometer spin when they are exposed to bright light.) p. 114 P- ENB (prompt) Think about the energy inputs and outputs in an urban area. How do heat islands demonstrate the law of conservation of energy? p. 114 D/P- HOL Activity Examine the Transfer of Thermal Energy through Radiation (Students investigate how the composition of an object affects its absorption of thermal energy through radiation.) p. 118 P- ENB (prompt) How could paving roads with concrete or other light-colored materials instead of dark-colored asphalt affect urban heat islands? p. 118

that an optimal design can be achieved. **Objectives:** Students will: Determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of particles as measured by the temperature of the sample. Apply scientific ideas or principles to design, construct, and test a design of a device that either minimizes or maximizes thermal energy transfer. **Topics:** Temperature • Thermal Energy • Heat • Heat Transfer Twenty-First Century Themes and Skills include: • The Four C's • Life and Career Skills • Information and Media literacy. **Essential Questions**: How can a standard thermometer be used to tell you how particles are behaving?	energy that occurs between a person and the crank of a hand-cranked flashlight p. 84 P- ENB (prompt) What types of energy transformation occur during the transfer of energy in the hand-cranked flashlight? p. 87 D/P- DTM Students use empirical evidence (data) to analyze the energy efficiency of light bulbs. p. 88 D/P- TIF (enrich) Moving Water Uphill pp. 89-90 D- Hands-On Labs; Hydroelectric Power; Propose Your Own Path D/P- Lesson Self Check pp. 91-93 D- Lesson Quiz D-Make Your Own Study Guide P- DI (ELL/RTI) p. 71I P- Extension p. 71I P- COLLAB p. 71J P- Connections to Other Disciplines p. 71J	transferred by conduction, convection and radiation. P- ENB (prompt) What type of energy transfer is necessary for infrared photography? p. 105 D/P- TIF (enrich) Heat and Cooking. pp. 106-107 D- Hands-On Labs; Heat and Computing; Propose Your Own Path D/P- Lesson Self Check pp. 109-111 D- Lesson Quiz D-Make Your Own Study Guide P- DI (ELL/RTI) p. 71I P- Extension p. 71I P- COLLAB p. 71J P- Connections to Other Disciplines p. 71J D-Science Safety HB D- CCC-HB D- ELA-HB D- M-HB D- SEP-HB D-ScienceSaurus Reference HB	D/P- ENGIT Analyze Evaporative Cooling (Students consider green rooftops as a solution to the problem associated with urban heat islands.) p. 120 D/P- DTM Compare Thermal Properties of Different Materials (Students use data of thermal conductivity for different substances to compare thermal conductors and thermal insulators.) p. 123 D/P- HOL Activity Design and Test an Insulated Container (Students design, build, and test a model device that can insulate ice-cold water.) p. 125 D/P- LS Students suggest some modifications to improve their container; students support their argument using evidence from their experiment and the text. p. 126 D/P- TIF (enrich) Careers in Engineering: Energy

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	D-Science Safety HB D- CCC-HB D- ELA-HB D- M-HB D- SEP-HB D-ScienceSaurus Reference HB D- VL Temperature and Thermal Energy	D- VBP Just Add Heat D- VL How Are Temperature and Kinetic Energy Related? D- VL Temperature and Thermal Energy	Conservationist pp. 127-128 D- Hands-On Labs; Maximizing Heat Transfer; Propose Your Own Path D/P- Lesson Self Check pp. 129-131 D- Lesson Quiz D-Make Your Own Study Guide P- DI (ELL/RTI) p. 71I P- Extension p. 71I P- COLLAB p. 71J P- Connections to Other Disciplines p. 71J D-Science Safety HB D- CCC-HB D- ELA-HB D- M-HB D- SEP- HB D-ScienceSaurus Reference HB D- YSI Simulation How Can You Use the Sun's 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.
LS	Language SmArts	Integrated subject learning.

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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.