HMH SCIENCE DIMENSIONS 2018 Alignment TEMPLATE

GRADE 4

EPSD Unit 8: Waves and Information Fourth Marking Period

Overview: In this unit of study, students use a model of waves to describe patterns of waves in terms of amplitude and wavelength and to show that waves can cause objects to move. The crosscutting concepts of patterns; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, and constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas.

Standards: (4-PS4-1) Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. (4-PS4-3) Generate and compare multiple solutions that use patterns to transfer information. (3-5-EST-1-2) Generate and compare

Instructional Days: 20

HMH Science Dimensions Program Resources

Unit 3: Waves and Information Transfer

Unit Video (student taking a picture of peers with her cell phone); Unit Overview p. 141; Vocabulary p. 143; Making Connections p. 143H; Unit Project p. 143I; Unit Performance Task p. 224-225; Unit Review pp. 226-228

Standard for all Units: Interactive Glossary (D); Leveled Readers (D); Beginning-of-Year Test (D/P); Unit Pretest (D/P); Lesson Quizzes (D/P); Unit Test (D/P)

Note: Refer to the Curriculum Alignment Common Language (CACL) Guide to decipher acronyms.

Lesson 1: What Are Waves? pp. 144-169

D/P- CYEI (video) Surfer surfing a wave. p. 145

P- ENB (prompt) How does a surfer know when to stand up on the board to "catch" a wave? p. 145 D/P- AWYK HO Activity Let's Make Waves! (Students collaborate with a partner or in small groups **Lesson 2:** How Does Light Reflect? pp. 170-199

D/P- CYEI (digital picture) Photo of a nebula. p. 171

P- ENB (prompt) How does a telescope allow us to see things that are millions of kilometers away from us? p. 171 D/P- AWYK HO Activity Disappearing Coins (Students collaborate **Lesson 3:** How Is Information Transferred from Place to Place? pp. 200-223

D/P- CYEI (digital picture) Two illustrations depicting the use of communication technology. p. 201

P- ENB (prompt) How has the way we receive information changed over the years? p. 201

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multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem (3-5-ETS-1-3) Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Objective 1: Students investigate how motion and wind create waves on water.

Objective 2: Students use what they have learned to develop questions about waves and begin to understand how waves transfer energy.

Objective 3: Students will work with a jump rope to develop questions and predict how to change the amplitude of a wave.

Objective 4: Students will learn that data can be sent across distances in a variety of different ways.

Topics: Waves and Information; Creativity' and Communication

Twenty-First Century Themes and Skills include: Environmental Literacy ● The Four C's ● Global Awareness to model the energy transfer that takes place in waves using a coiled spring toy.) pp. 146-148 P- CER (Students cite evidence to support their claims in Step 9 of the HO Activity and share their explanations with the whole class.) p. 148 D/P- Waves 101 (Students watch video to discover more about waves.) p. 149 D/P- Ocean Waves and **Energy Transfer (Students** watch video to learn more about how waves at the beach transfer energy.) pp. 150-151

P- AWKY HO Activity
Bobbing and Waving
(Students conduct mini
experiment and record
observations of water in a
bucket in terms of energy.)
p. 151

D/P- Waves That Move Up and Down: Side to Side (Students watch video to discover more about waves.) p. 152 with peers to investigate light's effect on objects.) pp. 172-173 P- CER (Student groups work together to discuss each other's claims and evidence from steps 7 and 8 of the HO Activity.) p. 173 D/P- Reflection and Our Eyes: What Do You See? (Students watch video to discover more about light.) pp. 174-175 P- ENB (prompt) What type of material is a telescope mirror? How does it interact with light?) p. 175 D/P- From the Sun to Your Eyes (Students watch the video to discover how we see things.) p. 180 P- AWYK HO Activity Seeing Color (Students conduct mini experiment and make a chart to

describe what different

colors look like through

D/P- LS Change Over Time (Students interview an older adult to find out how the ways they communicated changed over time.) p. 202 D/P- Never Ways (Students watch video to discover more about how technology allowed our ancestors to communicate quickly over long distances.) p. 204 P- LS Message Mistakes (Students research how telegraphs were sent and name some ways a message might be miscommunicated or misunderstood.) p. 204 P- ENB (prompt) Why was the Navajo language perfect for a code to use against the Japanese in World War II? p. 206 D/P- More Codes (Students watch video to discover more about codes.) p. 206 P- AWYK HO Activity Make a Scytale p. 207

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Essential Questions: If a beach ball lands in the surf, beyond the breakers, what will happen to it? Which team can design a way to use patterns to communicate with someone across the room?

P- ENB (prompt) In an ocean wave, what is moving toward the shore- the water or the energy? Cite evidence to support answer. p 153 D/P- Shake Like a Quake!: Back and Forth (Students watch video to discover more about wave direction.) p. 154 P- ENB (prompt) What types of waves are sound waves? How do they move matter and energy? p. 155 D/P- LS Classifying (Students classify examples on p. 155 or in eBook.) p. 155 D/P- Hunks and Chunks of Waves (Students view video to observe different combinations of amplitude and wavelength in waves.) p. 156 D/P-LS Understand Graphics (Students describe two distances that are the same in adjacent waves.) p. 156 D/P- High and Low...Long and Short (Students review digital examples for

the transparent colored light filters) p. 180 D/P- Let's Make Colors: A Rainbow Color Wheel (Students watch video to discover more about light and color.) p. 181 D/P- AWYK HO Activity Reflecting on Angles (Students collaborate with peers to investigate how angles of reflection affect light.) pp. 182-184 D/P- DTM Convert Units of Time p. 185 D/P- (Students watch videos to discover how an archerfish catches its prey and to discover how we see things.) p. 186 D/P- LS Using Word Parts (Students use a dictionary to divide the words "reflection" and "refraction" into parts and write original definitions for each word using the definitions of its parts.) p. 187 P- ENB (prompt) How do lenses and mirrors affect

light? p. 188

D/P- HO Activity Pixels to Pictures (Students discover how pixels work.) pp. 208-209 D/P- Bits of Code: information Processing on a Computer (Students watch video to discover how computers process and store information.) p. 210 P- AWYK HO Activity Make Your Own Code p. 210 D/P- Learn Binary Code (Students explore more about binary codes online.) p. 211 D/P- DTM Code Blue (Students complete the table by turning each number into binary code.) p. 211 P- LS (Students think about two criteria and two constraints to a device that can surf the Internet and record their response.) p. 212 P- ENB (prompt) How do you know when your cell phone signal strength is low? What can you do to improve it? p. 213

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additional source content.) p. 157 P- ENB (prompt) Write evidence from p. 158 or eBook that show sound waves have different amounts of energy. p. 158 D/P-DTM Relative Measures (Students identify which sounds have higher or lower amplitude.) p. 159 D/P- Surfing the Waves (Students watch video to discover more about how shorter wavelength give surfers more opportunities to catch waves.) p. 160 D/P- Harmony (Students watch the video to discover more about how waves interact.) p. 161 P- ENB (prompt) Students apply what they've learned on pp. 162-163 to ocean waves and surfing. p. 163

D/P- TIF (enrich) People in Science and Engineering: Christian Doppler and Debra Fischer pp. 165-166 D- Seismic Waves and Earthquakes D- Theater Acoustics P- ENB (prompt) How does the lens in your eye work to produce an image? p. 191 D/P- AWYK HO Activity Read This! (Students conduct mini experiment with convex and concave lenses and respond to the following question: How does the print look different with the different lenses?) p. 193 P- ENGIT Designed for Safety (Question #23) p. 194 P- LS Identifying Main **Ideas and Details**

D/P- TIF (enrich) Optics Engineers pp. 195-196 D- Light and Art D- Lighthouses and Lenses

(Question #24) p. 194

D/P- Lesson Check pp. 197-198 D/P- Lesson Roundup p. 199 D- Lesson Quiz

P- DI (ELL/RTI) p. 143G

D/P- How Computers help Us Communicate (Students watch video to discover ore about how computers help us communicate.) p. 214 D/P- LS Understanding Logical Connections

Logical Connections
(Students put steps in order of how a message would get from Kesha's computer to Grandma's computer.) p. 215
P- AWYK HO Activity
The Phone Is for You! p. 216
P- AWYK HO Activity Make

a Wave p. 216

D/P- How Cell Phones Help Us Communicate (Students watch video to discover how cell phones help us communicate.) p. 217 D/P- Bits of Color (Students watch video to learn how pixels form the images we see on television.) p. 218

D/P- TIF (enrich) Elephant Communication pp. 219-220

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D/P- Lesson Check pp. 167- 168 D/P- Lesson Roundup p. 169 D- Lesson Quiz P- DI (ELL/RTI) p. 143G P-Extension p. 143G P- COLLAB p. 143H P- Making Connections p. 143H D- Science Safety HB D- CCC-HB D- ELA-HB D- M- HB D- SEP-HB D- ScienceSarurs Reference	P-Extension p. 143G P- COLLAB p. 143H P- Making Connections p. 143H D- Science Safety HB D- CCC-HB D- ELA-HB D- M- HB D- SEP-HB D- ScienceSarurs Reference HB	D- People in Science and Engineering D- Wave That Flag D/P- Lesson Check pp. 221-222 D/P- Lesson Roundup p. 223 D- Lesson Quiz P- DI (ELL/RTI) p. 143G P-Extension p. 143G P-COLLAB p. 143H P- Making Connections p. 143H D- Science Safety HB D- CCC-HB
143H	D- ScienceSarurs	P- DI (ELL/RTI) p. 143G
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D. Scionco Safoty HB	кететенсе пв	•
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		143П
		D. Science Sefety IIB
		•
НВ		D- ELA-HB
D. VCI Cinc. Indian Man		D- M- HB
D- YSI Simulation Waves		D- SEP- HB
and Information Transfer:		D- ScienceSarurs
Build a Wave Pool		Reference HB

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Curriculum Alignment Common Language (CACL) Guide K-5

Acronym	Word/Phrase	Description
AWYK	Apply What You Know	Hands on opportunities for students to apply learning
CER	Claims Evidence Reasoning	Students make a claim and gather evidence along the way (during EXPLORATORY activities) to support claim
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 digit form.
DI (ELL/RTI) Extension COLLAB Connections to Science	Differentiated Instruction (English Language Learner/Response to Intervention) Collaboration Connections to Science	A page that lists all learning activities used to differentiate learning, engage students in collaborative activities and connect learning to oth subjects.
DTM	Do the Math	Integrated subject learning.

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ENB	Evidence Notebook (prompt)	Student notebook or journal used to gather evidence during EXPLORATORY learning activities to support their claims.	
ENGIT	Engineer It	Integrated subject learning.	
НВ	Handbooks		
ССС-НВ	Crosscutting Concepts	Students who need extra support in grasping concepts or to refresh student knowledge of skills.	
ELA-HB	English Language Arts		
М-НВ	Math		
SEP-HB	Science and Engineering Practices		
НО	Hands-On (Activity)	Student collaboration activities.	
LS	Language Smarts	Integrated subject learning.	
Р	Print	Program resources and features in print form.	
TIF	Take It Further (enrich)	Enrichment activities for students in print or digital.	
YSI	You Solve It (Simulation)	Open-ended simulation-based learning with multiple answer options.	