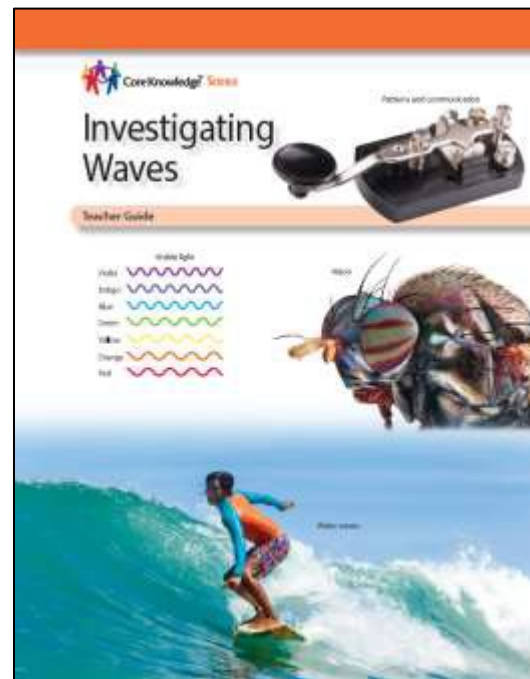


Investigating Waves

Click on each Lesson to access its online resources. Page numbers refer to pages in the Teacher Guide. Some links provide access to files created by the Core Knowledge Foundation, including PDF documents that you can download and view with the appropriate software (such as [Adobe Reader](#)).

	About This Unit
Part A	Lesson 1
	Lesson 2
	Lesson 3
Part B	Lesson 4
	Lesson 5
	Lesson 6
	Lesson 7
	Lesson 8
Part C	Lesson 9
	Lesson 10
	Lesson 11
	Lesson 12
Part D	Lesson 13
	Lesson 14
Unit Review & Assessment	UR Lesson
	Culminating Assessment
	Teacher Resources



Extend and customize this unit for your students using the [CKSci Additional Activities](#)

About This Unit

Page	Resource Links
1	<p>Note to Teachers and Curriculum Planners:</p> <ul style="list-style-type: none"> The learning progressions of Disciplinary Core Ideas PS4.A Wave Properties, PS4.C Information Technologies and Instrumentation, and ETS1.C Optimizing the Design Solution offer guidance regarding the scope and sequence of learning about properties of waves in the elementary grades and beyond. Learn more about these core ideas and their related content by reading the corresponding section of <i>A Framework for K-12 Science Education</i>: pg. 130- 133. <p>See also the Teachers Resources section of this guide.</p>
2	<p>Notes to Core Knowledge Teachers:</p> <p>2019 Core Knowledge Science Sequence for this unit:</p> <p>Domain—Investigating Waves</p> <p><i>CKSci correlations to the 2010 Core Knowledge Sequence—</i></p> <ul style="list-style-type: none"> GRADE 3 GRADE 4 GRADE 5
3	<p>This unit has been informed by the following Next Generation Science Standards (NGSS) Performance Expectations:</p> <p>Topic—4. Waves</p> <ul style="list-style-type: none"> 4-PS4-1 4-PS4-3* 4-PS3-4* <p><i>* Expectations that integrate engineering design practices and knowledge are noted above with an asterisk.</i></p>
9	<p>Resources for Effective and Safe Classroom Activities</p>
10	<p>Materials Supply List: Grade 4 Unit 2 Investigating Waves</p>
14	<p>Pacing Guides for CKSci Grades 3–5</p>

← [Table of Contents](#)

[Next Lesson](#) →

Part A: Waves Transfer Energy

Lesson 1

Page	Resource Links
18	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none"> From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none"> From the Framework: Page 85-87
	Crosscutting Concept: <i>Cause and Effect</i> <ul style="list-style-type: none"> From the Framework: Page 87-89
20	[video options] Waves on the surface of water

[← Table of Contents](#)

 [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).

Lesson 2

Page	Resource Links
24	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none"> From the Framework: pg. 131-133
	Crosscutting Concept: <i>Cause and Effect</i> <ul style="list-style-type: none"> From the Framework: Page 87-89
	Science and Engineering Practices: <i>Developing and Using Models</i> <ul style="list-style-type: none"> From the Framework: Page 56-59
25	[video options] The Science of Ocean Waves
26	[video options] Water Droplet Breaking the Surface of Water

[← Table of Contents](#) [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).



Online Resources

Lesson 3

Page	Resource Links
30	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none">From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none">From the Framework: Page 85-87
	Science and Engineering Practices: <i>Developing and Using Models</i> <ul style="list-style-type: none">From the Framework: Page 56-59
	Science and Engineering Practices: <i>Scientific Knowledge Is Based on Empirical Evidence</i> <ul style="list-style-type: none">Connections to the Nature of Science
32	[video options] Wave Machine
34	[video options] Wave Properties

[← Table of Contents](#) [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).



Online Resources

Part B: Sound Waves Transfer Energy

Lesson 4

Page	Resource Links
39	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none">From the Framework: pg. 131-133
	Crosscutting Concept: <i>Energy and Matter</i> <ul style="list-style-type: none">From the Framework: Page 94-96
41	[video options] Science of Sound Waves

[← Table of Contents](#) [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).



Online Resources

Lesson 5

Page	Resource Links
44	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none">From the Framework: pg. 131-133
	Crosscutting Concept: <i>Energy and Matter</i> <ul style="list-style-type: none">From the Framework: Page 94-96
46	[video options] Dolphin Sounds Underwater Dolphin Sounds Above Water
47	[video options] Whale Song
48	[video options] The Doppler Effect

[← Table of Contents](#)

[Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).



Online Resources

Lesson 6

Page	Resource Links
50	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none">From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none">From the Framework: Page 85-87
53	[video options] Tuning Fork in Water
54	[video options] Humpback whale and her calf sing
55	[video options] Sonic Boom from jet Breaking glass with sound
56	Snake hearing
57	[video options] Wire hanger sound experiment

[← Table of Contents](#) [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).

Lesson 7

Page	Resource Links
60	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none"> From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none"> From the Framework: Page 85-87
	Science and Engineering Practices: <i>Developing and Using Models</i> <ul style="list-style-type: none"> From the Framework: Page 56-59

[← Table of Contents](#) [Next Lesson →](#)



Online Resources

Part C: Light Waves Transfer Energy Lesson 8

Page	Resource Links
66	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none">From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none">From the Framework: Page 85-87
	Science and Engineering Practices: <i>Asking Questions and Defining Problems</i> <ul style="list-style-type: none">From the Framework: Page 54-56

[← Table of Contents](#) [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).

Lesson 9

Page	Resource Links
72	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none"> From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none"> From the Framework: Page 85-87
	Science and Engineering Practices: <i>Developing and Using Models</i> <ul style="list-style-type: none"> From the Framework: Page 56-59
	Science and Engineering Practices: <i>Scientific Knowledge Is Based on Empirical Evidence</i> <ul style="list-style-type: none"> Connections to the Nature of Science
74	[video options] Lighthouse at night
75	[video options] Solar fusion
78	[video options] Phototropism

[← Table of Contents](#)

 [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).

Lesson 10

Page	Resource Links
81	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none"> From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none"> From the Framework: Page 85-87
	Science and Engineering Practices: <i>Developing and Using Models</i> <ul style="list-style-type: none"> From the Framework: Page 56-59
82	[video options] Balloon demonstration
84	[video options] Build a Solar Oven
88	[video options] Energy from the sun

[← Table of Contents](#) [Next Lesson →](#)



Online Resources

Lesson 11

Page	Resource Links
90	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none">From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none">From the Framework: Page 85-87
93	[image option] Electromagnetic Spectrum

[← Table of Contents](#) [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).



Online Resources

Part D: People Use Waves to Transfer Information Lesson 12

Page	Resource Links
95	Disciplinary Core Idea: PS4.C <i>Information Technologies and Instrumentation</i> <ul style="list-style-type: none">From the Framework: pg. 136-137
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none">From the Framework: Page 85-87

[← Table of Contents](#)

[Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).



Online Resources

Lesson 13

Page	Resource Links
100	Disciplinary Core Idea: PS4.C <i>Information Technologies and Instrumentation</i> <ul style="list-style-type: none">From the Framework: pg. 136-137
	Disciplinary Core Idea: ETS1.C <i>Information Technologies and Instrumentation</i> <ul style="list-style-type: none">From the Framework: pg. 208-210
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none">From the Framework: Page 85-87
	Science and Engineering Practices: <i>Constructing Explanations and Designing Solutions</i> <ul style="list-style-type: none">From the Framework: Page 67-71

[← Table of Contents](#)

[Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).



Online Resources

Lesson 14

Page	Resource Links
106	Disciplinary Core Idea: PS4.A <i>Wave Properties</i> <ul style="list-style-type: none">From the Framework: pg. 131-133
	Crosscutting Concept: <i>Patterns</i> <ul style="list-style-type: none">From the Framework: Page 85-87

[← Table of Contents](#) [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).



Online Resources

Unit Review and Assessment

UR Lesson

Page	Resource Links
111	NGSS Performance Expectations addressed by this unit: Topic— 4. Waves <ul style="list-style-type: none">• 4-PS4-1• 4-PS4-3

Culminating Unit Assessment

Page	Resource Links
148	Unit Assessment Teacher Evaluation Guide

[← Table of Contents](#) [Next Lesson →](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).

Teacher Resources

Page	Resource Links
9	Resources for Effective and Safe Classroom Activities
10	Materials Supply List: Grade 4 Unit 2 Investigating Waves
156	Activity Pages Answer Key
159	Unit Assessment: Teacher Evaluation Guide
	Safety in the Science Classroom: <ul style="list-style-type: none"> • NSTA Safety Resources • Safety Resources for Elementary Teachers (See also Appendix B below)
	Teacher Guide Appendices: <ul style="list-style-type: none"> • Appendix A -- Glossary • Appendix B -- Classroom Safety for Activities and Demonstrations • Appendix C -- Strategies for Acquiring Materials • Appendix D -- Advance Preparation for Activities and Demonstrations • Appendix E -- What to Do When Activities Don't Give Expected Results

← [Table of Contents](#)

CKSci Online Resources include links to sites external to the Core Knowledge Foundation and the coreknowledge.org website. These external sites are owned and operated by third-parties, and the Core Knowledge Foundation is not responsible for any errors or omissions in either the links themselves or the content of the websites. If you experience any difficulties when attempting to access one of the linked resources found here, please [contact us](#).