

## 4th Grade Waves and their Applications Resources

Next Generation Science Standards:

### **PS4.A: Wave Properties**

Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (4-PS4- 1)

Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

### **PS4.B: Electromagnetic Radiation**

An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

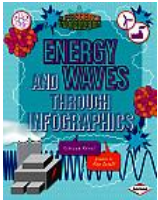
### **PS4.C: Information Technologies and Instrumentation**

Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

## Books

*Energy and Waves Through Infographics* by Rebecca Rowell (2014)

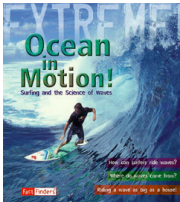
Includes bibliographical references (page 31) and index. Displays the facts about energy and waves, discussing energy sources, the power grid, splitting atoms, sound waves, energy use, and saving energy. Includes charts, maps, illustrations, and timelines.



Guided Reading: Q  
32 Pages

*Ocean in Motion: Surfing and the Science of Waves* by Paul Mason (2009)

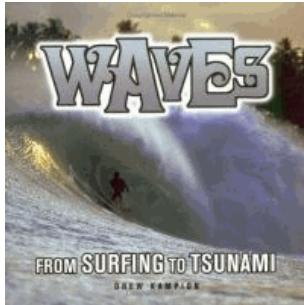
Includes bibliographical references (p. 31) and index.;The biggest ride? -- Where waves come from -- Friend and foe -- How waves break -- Catching a wave -- Turning -- Welcome to the Green Room -- Riding big waves -- Tow-in surfing -- Wiping out -- Water like concrete -- Brr! Ice-cold surfing -- Ripped away. Examines the science behind ocean waves and the sport of surfing.



Guided Reading: Q  
32 Pages

*Waves: From Surfing to Tsunami* by Drew Kampion (2005)

Takes a look at how waves form, what moves them and why they are important.

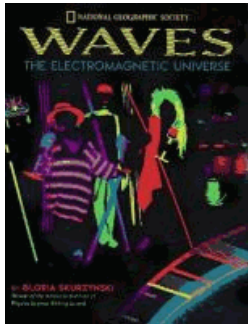


Guided Reading: n/a

79 Pages

*Waves: The Electromagnetic Universe* by Gloria Skurzynski (1996)

Examines different kinds of electromagnetic waves, including radio waves, microwaves, light, x-rays and gamma rays.

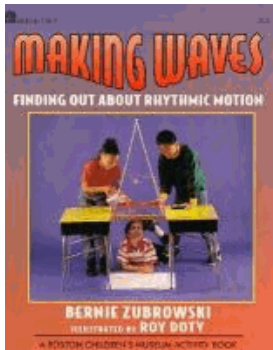


Guided Reading: n/a

48 Pages

*Making Waves: Finding Out About Rhythmic Motion* by Bernie Zubrowski (1994)

Step-by-step instructions are provided to build wave generators, bubble domes, and eighty-legged centipedes and then use the devices to do more than fifty ingenious experiments which demonstrate how wave energy travels through matter.



Guided Reading:

96 Pages

*What Makes an Ocean Wave* by Melvin and Gilda Berger (2000)

Provides information about various aspects of the world's oceans--waves, tides, the food chain, marine creatures, coastlines, and more.



Guided Reading: S

48 Pages

*Light* by Mari Schuh (2008)

Includes bibliographical references (p. 23) and index. Light -- Light moves in waves -- Light and color -- Properties of light -- What is Light? -- Sources of light -- Light rays -- Reflection. Explains introductory physical science concepts about light through real-world observation and simple scientific diagrams.

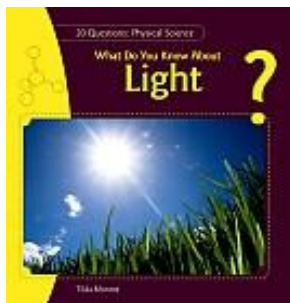


Guided Reading: N

24 Pages

*What Do You Know About Light* by Tilda Monroe (2011)

Includes index. Provides an introduction to light and includes answers to twenty questions about it.

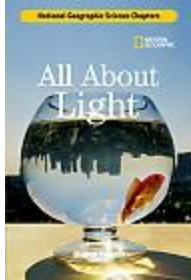


Guided Reading: P

24 Pages

*All About Light* by Monica Halpern (2006)

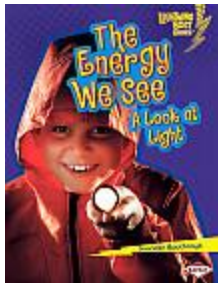
Sunlight, animal light, artificial light, the speed of light; reflection, refraction, shadows, colors, wavelengths--all explained in a new and illuminating book. Includes bibliographical references (p. 39) and index. Introduces the physics of light, discussing sources, shadows, color, and other related topics. Includes experiments.



Guided Reading: N  
40 Pages

*The Energy We See: A Look at Light* by Jennifer Boothroyd (2011)

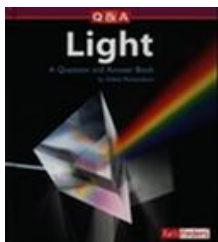
Includes bibliographical references (p. 31) and index.;What is light? -- How light travels -- Light stops here -- Just passing through -- Colors -- Activity. Photographs and text provide a scientific introduction to light, explaining what light is, where it comes from, and how it travels.



Guided Reading: O  
32 Pages

*Light: A Question and Answer Book* by Adele Richardson (2006)

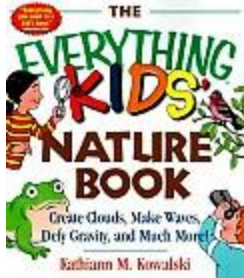
Includes bibliographical references (p. 31) and index. Discusses light's sources, components, forms, and movement, as well as humans' perception of light, in a question and answer format, and includes "fast facts" and an experiment on how light bounces with reflection and refraction.



Guided Reading: Q  
32 Pages

*The Everything Kids' Nature Book : create clouds, make waves, defy gravity and much more!*  
by Kathiann Kowalski (2000)

Includes bibliographical references (p. 125-127) and index. Presents a nature activity book for kids that explores rain forests, grasslands, deserts, oceans and rivers, and other natural habitats.



Guided Reading: N  
132 Pages

*Deadly Waves: Tsunamis* by Mary Dodson Wade (2013)

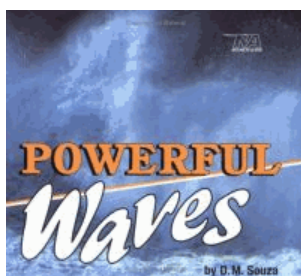
Includes bibliographical references and index. "Examines tsunamis, including how they form and where they occur, what scientists can do to predict them, and stories from survivors and witnesses to tsunamis around the world.



Guided Reading: T  
48 Pages

*Powerful Waves* by D.M. Souza (1992)

Facts about ordinary waves precede information about the causes of the huge waves known as tsunamis and the destruction they bring.



Guided Reading: S  
48 Pages

## Digital Resources

**Databases:** (To access these databases remotely, ask your librarian for your school's username and password.)

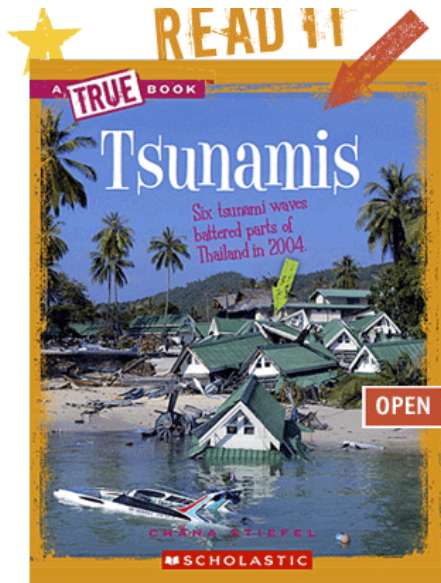
**Brainpop Jr.:** *Brainpop, Jr. is a database that provides a 3-6 minute video on informational topics followed by a comprehension quiz. The database includes activities and lesson plans as well. It is geared towards grades K-3.*

These are the videos offered by Brainpop Jr. that support Next Generation Science Standards on Waves for 4th Grade. Two different online quizzes are offered after each video to check for understanding. They are entitled "Easy" and "Hard" with 5 questions each.



**TrueFlix:** Trueflix is a database that includes non-fiction electronic books. Within each selected book you will find a 3-6 minute informational video on the subject, and a list of recommended websites.

Trueflix contains this book which support the Next Generation Science Standards on Waves and their properties for 4th Grade. The book is 48 pages long, and includes a “Read-Along” button which highlights each word as it is read aloud.



**Find the Truth!**

**What causes tsunamis to grow so tall?**

To get the Truth: Watch the video, then read the book.

This is the contents page of *Tsunamis*:

Contents	
<b>1 Out of the Blue</b> What caused the 2004 Indian Ocean tsunami? . . . . . 7	<p>A destructive, ocean-wide tsunami occurs about once every 15 years.</p>
<b>2 Tsunamis in Motion</b> What makes tsunamis so big? . . . . . 13	
<b>3 Surviving the Waves</b> How did a 10-year-old British girl become a hero? . . . . . 21	
<b>4 Cleaning Up</b> How can people help after a disaster? . . . . . 29	
<b>5 Preventing Future Disasters</b> What do sand dunes, coral reefs, and mangrove forests have in common? . . . . . 35	
	<b>True Statistics</b> . . . . . 43 <b>Resources</b> . . . . . 44 <b>Important Words</b> . . . . . 46 <b>Index</b> . . . . . 47 <b>About the Author</b> . . . . . 48
<p><b>Nature's Warning</b> What clues tell us that a tsunami is on its way? . . . . . 26</p>	<p>Coral</p>

Each subject in *Trueflix* has a part called “Show What You Know.” This is a ten question quiz that can be used to check understanding from the text.

## Show What You Know

5. Tsunami waves slow down and \_\_\_\_\_ near shore.



- get higher
- get smaller
- turn green
- spread out

SUBMIT

*Trueflix* also offers word match activity that can be done online. Word match gives a clue that can then be matched with a key word from the text. As you can see from the toolbar on the left, there are project ideas for the classroom, a list of other non-fiction resources on the same topic in “Explore More,” related websites that have been tested and recommended, and a 3-6 minute video in “Watch the Video.”



- Start
- Watch the Video
- Read the Book
- Explore More
- Project Idea
- Activity Center
  - Show What You Know
  - Word Match
- Explore the Web
- More Space

### Word Match

Read the clue below. Click on the word it matches.  
Match all the words to uncover a picture.

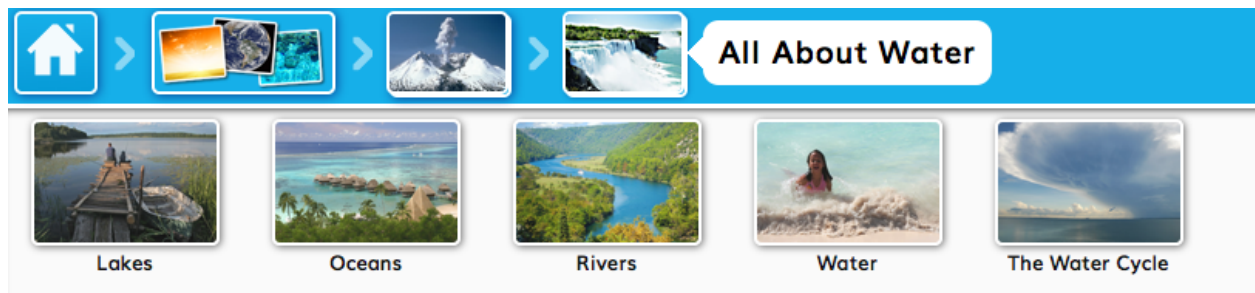
**CLUE:** a natural or human-made object that circles a larger object in space

mangrove forest	epicenter	satellite
insulation	wavelength	asteroid
tsunameter	landslide	seismic



**Pebble Go!** *Pebble Go is a database that includes non-fiction books, videos and activities. The target audience for Pebble Go is Kindergarten through 3rd grade, however Pebble Go can be a great way to pique interest in a topic for 4th and 5th graders. Each book is 5 pages long and includes a read-aloud button that highlights each word as it reads aloud. There are often one or two very short videos on the topic embedded within each book.*

There are several Pebble Go sections which align with the Next Generation Science Standards for 4th Grade on Waves and their Applications. Within Pebble Go's Earth and Space you will find a section called "All About Water." Its contents look like this:



The book that specifically deals with waves is called "Tsunamis." It can be found in the "Earth in Action" section.




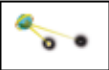


A screenshot of the Pebble Go interface showing the 'Tsunamis' section. The top navigation bar is blue with icons for home, a globe, a mountain, a volcano, and a tree. Below the navigation bar, there are six tabs: 'What Are They?', 'What Causes Them?', 'When a Tsunami Hits', 'Where They Happen', 'Staying Safe', and 'Related Articles'. The 'What Are They?' tab is selected, showing a text description of a tsunami and a video thumbnail. The text describes a tsunami as a set of huge ocean waves, noting that 'tsunami' is the Japanese word for 'harbor wave' and that water moves when the ocean floor shifts. The video thumbnail shows a large wave crashing onto a grassy area with trees and a wooden structure.

## World Book Web:

The World Book Web is a suite of online research tools that includes encyclopedia articles, primary source collections, educator tools, student activities, pictures, audio, and video, complemented by current periodicals and related Web sites. Most all of these World Book Web research tools include options where text can be read aloud to the user. All Ithaca elementary school libraries currently subscribe to **World Book Kids**, **World Book Student**, **World Book Discover**, **World Book Timelines** and **World Book Classroom: Early World of Learning**. For specific training in how to use these amazing tools consult Worldbook's training website or ask your school's librarian. <http://www.worldbookonline.com/training/>


World Book Discover has many articles which align with Next Generation Science Standards for 4th Grade on waves and their applications. You can simply type "waves" in World Book Discover and choose from the following articles:

[Check All](#) | [Clear All](#) | [Save to My Research](#) ▼

-  **Waves**  
Waves are movements that carry energy from place to place.
-  **Rogue wave**  
Rogue wave is a large ocean wave.
-  **Electromagnetic waves**  
Electromagnetic waves are traveling patterns of electric and magnetic force.
- Radio wave**  
A radio wave is a kind of electromagnetic wave.
-  **Light-year**  
A light-year is the distance that light travels in one year.
-  **Frequency**  
Frequency is a measure for waves.
- Wireless communication**  
Wireless communication is sending information using electromagnetic waves.
- Seismology**  
Seismology is the study of shock waves made by earthquakes or explosions.
- Microwave**  
A microwave is a short radio wave.
-  **Radiation**  
Radiation is energy given off as waves or small bits of matter.

This is the main article on waves in World Book Discover:

<http://www.worldbookonline.com/wbdiscover/article?id=ar832168&st=waves>



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**Article content**

Lexile<sup>®</sup> Measure: 820L

[Introduction](#)

**Other languages**

[En español](#)

**translate this text into:**

Arabic

Please Note: This translator will not produce a perfect translation but should adequately convey the general sense of the original.

**Content standards**

This World Book article aligns with New York Learning Standards

[View Learning Standards](#)

**Back**

**Tools**

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- [E-mail Article](#)
- [Save article](#)
- [Enable read-aloud toolbar](#)
- [Highlight search term in text](#)

**Waves**

Waves are movements that carry energy from place to place. Waves can move through water, air, and other materials. The up-and-down movements of water in the ocean are waves. Sound and light also travel in waves.

Waves have three basic characteristics. *Wavelength* is the distance from one *crest* (peak) of a wave to the next. *Amplitude* is the "height" of a wave. *Frequency* is the number of waves that pass a single point in a certain amount of time.

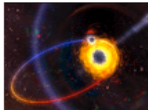





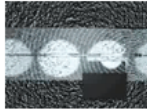
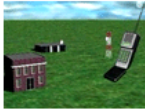


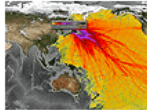
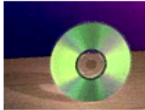
It is easy to start a wave. Imagine throwing a stone into a large, still pond. Ripples will travel outward from the point where the stone enters the water. The ripples are actually a number of ring-shaped waves. The waves get wider as they spread. But each wave has the same center—the point where the stone hit the water. The energy of the stone hitting water produces the waves. The waves carry this energy as they spread.



**Image**

[People ride surfboards on the smooth part of an ocean wave, just below the crest.](#)

World Book Student has 13 videos when you search for the keyword “wave.” All but one of them are applicable to 4th grade Next Generation Science Standards on waves and their applications.

<input type="checkbox"/>  <a href="#">Orbiting black holes give off gravitational waves</a>	<input type="checkbox"/>  <a href="#">Tsunami wave</a>	<input type="checkbox"/>  <a href="#">WB Explains: What do conductors do other than wave their hands around a lot?</a>	<input type="checkbox"/>  <a href="#">Ear: Hearing</a>
<input type="checkbox"/>  <a href="#">Surfer</a>	<input type="checkbox"/>  <a href="#">Microwave oven</a>	<input type="checkbox"/>  <a href="#">Doppler effect</a>	<input type="checkbox"/>  <a href="#">Cellular telephone</a>
<input type="checkbox"/>  <a href="#">Blood pressure</a>	<input type="checkbox"/>  <a href="#">Telephone call</a>	<input type="checkbox"/>  <a href="#">Honshu tsunami in the Pacific Ocean</a>	<input type="checkbox"/>  <a href="#">Compact disc</a>

## Websites:

### ***Types of Waves***

<http://scienceprimer.com/types-of-waves>

Explores transverse, longitudinal and surface waves.

### ***BBC Bitesize: What are Waves***

<http://www.bbc.co.uk/schools/gcsebitesize/science/aqa/waves/generalwavesrev1.shtml>

Talks about general properties of waves. Includes activity and quiz.

### ***BBC Bitesize: Sound and Light Waves***

<http://www.bbc.co.uk/schools/gcsebitesize/science/aqa/waves/soundandlightrev1.shtml>

Discusses properties of sound and light waves. Includes activity and quiz.

## iPad apps:

### ***Waves HD+ - by RC3, INC***

**Cost: Free**

A photographic collection of ocean waves worldwide.

### ***Light Sound HD - by Sprout Labs, LLC***

**Cost: \$1.99**

This app covers the topics of light and sound. You can use the read, touch, see, watch, and quiz functions.

### ***PixelWave - by Alexander Zolotov***

**Cost: \$0.99**

Use this basic interface to draw waveforms and play with sound waves.