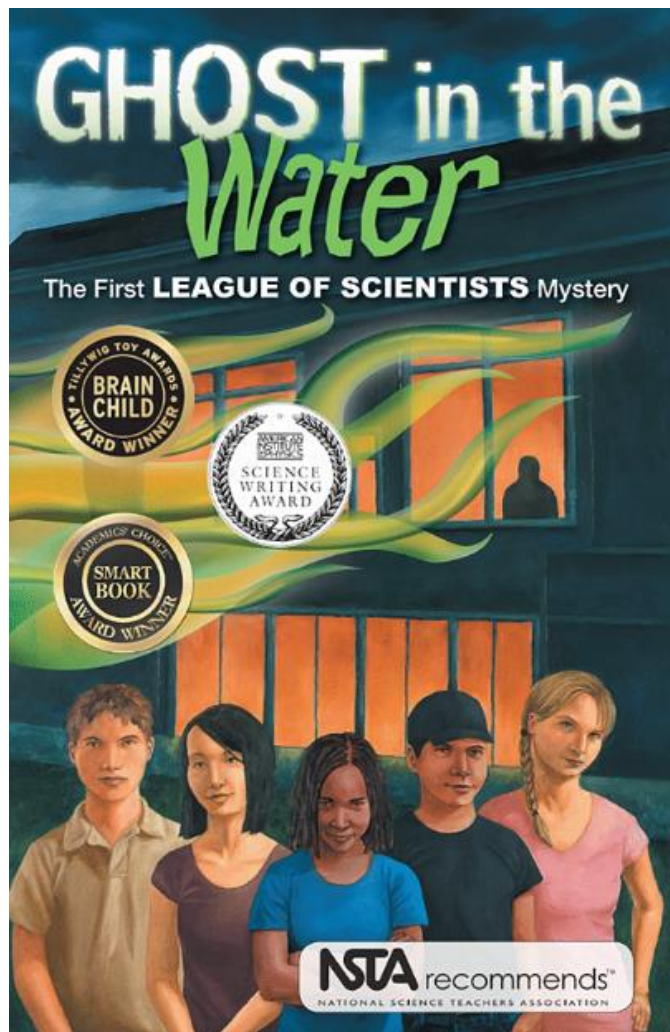


League of Scientists: Ghost in the Water

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Ages 10-14 | Grades 5-9



John Hawkins is in yet another new school as he begins the 7th grade. Unfortunately, the school bully has it out for him. Things change when he lands an invitation to join Malena, Natsumi, Hector, and Kimmey in the League of Scientists. Together, these friends pool their science knowledge of biology, technology, logic, and chemistry to unravel the mysteries that haunt their quiet town.

This book shows students working together to solve mysteries and can be used as an introduction to how scientists learn about the natural world. A number of science topics are covered such as cell structure, light induced chemical reactions, and light energy. Crosscutting NGSS topics are developed in the engineering of the robot called Houdini. Reading this story is an excellent way for students to see how greatly their lives are affected by science, math, and engineering.

The free downloadable [Teacher's Guide](#) works through the book chapter-by-chapter to extend the its science content and expand opportunities for learning.

Articulated to the **Next Generation Science Standards** and **Common Core State Standards**

Science curriculum standards were identified by Joan Wagner.

Joan Wagner is the Director of Focus on Learning, a science education consulting firm, as well as a former president of the Science Teachers Association of New York State. She provides professional development for K-12 science teachers. Joan is also an author of four science books and numerous articles for national, state and regional journals and newsletters. She can be reached at Joan@ScienceNaturally.com.



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Summary and Articulation of the Next Generation Science Standards

Connections to Engineering, Technology, and Applications to Science

Defining and Delimiting an Engineering Problem

- The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that is likely to limit possible solutions.

Developing and Using Models

Modeling in 6-8 builds on K-5 and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to predict and/or describe phenomena.
- Develop a model to describe unobservable mechanisms.

Analyzing and Interpreting Data

Analyzing data in 6-8 builds on K-5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to determine similarities and difference in findings.

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6-8 builds on K-5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.

- Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints.

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 6-8 builds on K-5 and progresses to evaluating the merit and validity of ideas and methods.

- Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence.

Developing Possible Solutions

1. A solution needs to be tested, and then modified on the basis of the test results in order to improve it. There are systematic processes for evaluating solutions with respect to how well they meet criteria and constraints of a problem.

MS-PS1: Matter and Its Interactions

PS1.A: Structures and Properties of Matter

- Forensic chromatography and triboluminescence activities

Note: this book also strongly supports the Language Arts and Science component of the Common Core State Standards/Reading for Science.

Common Core State Standard Connections

NGSS Crosscutting Concepts for Middle School in Science:

- RST.6-8.1 Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- RTS.6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculations in a text.
- RST.6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading the text on the same topic.

NGSS Crosscutting Concepts for Middle School Social Studies:

- WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; quote or paraphrase the data and conclusions of others while avoiding plagiarism.
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.

NGSS Crosscutting Concepts for Middle School Math:

- 6.RP.A.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
- 6.RP.A.3 Use ratio and rate reasoning to solve real-world and mathematical problems.
- 7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about quantities.
- 7.RP.A.2 Recognize and represent proportional relationships between quantities.
- 8.EE.A.3 Distinguish among facts, reasoned judgment based on research findings, and speculations in a text.
- RST.6-8.9 Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.

English Language Arts Standards » History/Social Studies » Grade 6-8

- Key Ideas and Details: CCSS.ELA-LITERACY.RH.6-8.1:
Cite specific textual evidence to support analysis of primary and secondary sources.
- Craft and Structure: CCSS.ELA-LITERACY.RH.6-8.4:
Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.
- CCSS.ELA-LITERACY.RH.6-8.5:
Describe how a text presents information (e.g., sequentially, comparatively, causally).
- CCSS.ELA-LITERACY.RH.6-8.6:
Identify aspects of a text that reveal an author's point of view or purpose (e.g., loaded language, inclusion or avoidance of particular facts).
- Integration of Knowledge and Ideas: CCSS.ELA-LITERACY.RH.6-8.8:
Distinguish among fact, opinion, and reasoned judgment in a text.
- CCSS.ELA-LITERACY.RH.6-8.9:
Analyze the relationship between a primary and secondary source on the same topic.

NGSS Crosscutting Concepts for Middle School Language Arts:

- [RI.8.8](#) Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced.
- [SL.8.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
- [SL.8.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.
- [SL.8.5](#) Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

NGSS Crosscutting Concepts for Middle School Social Studies:

- WHST.6-8.1 Write arguments focused on discipline-specific content.
- WHST.6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- WHST.6-8.8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; quote or paraphrase the data and conclusions of others while avoiding plagiarism.
- WHST.6-8.9 Draw evidence from informational texts to support analysis, reflection, and research.