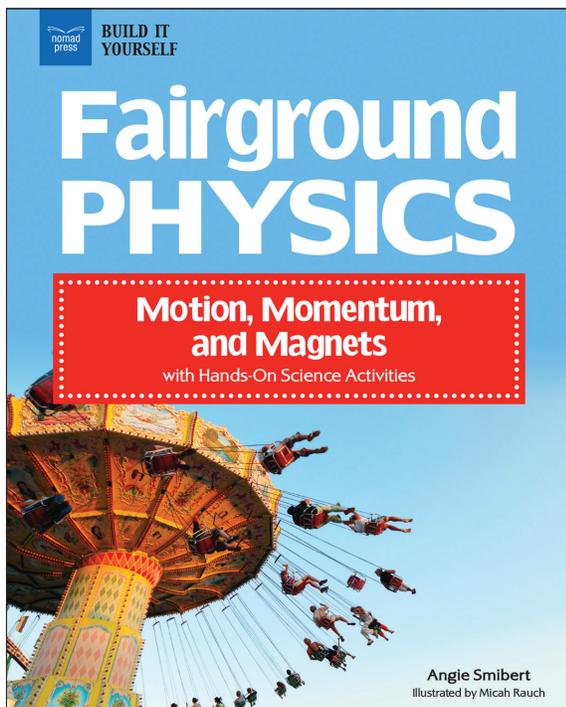




## Fairground Physics: Motion, Momentum, and Magnets with Hands-On Science Activities

Nomad Press offers concise classroom guides to help educators explore content-related topics with students and encourage them to develop ideas in meaningful ways. Includes Essential Questions and Common Core Connections.

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Age: 9–12

Grade: 4–6

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Specs: 8 x 10, 128 pages, color interior

Focus: Physics

GRL: Z

Where can you experience the laws of motion, the fun of physics, and the chemistry of cotton candy? The fair!

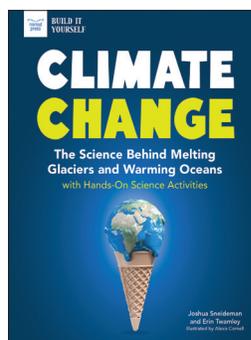
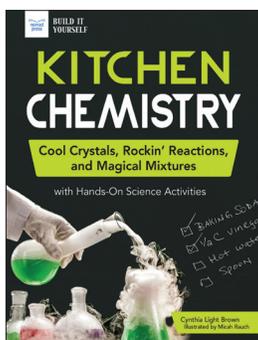
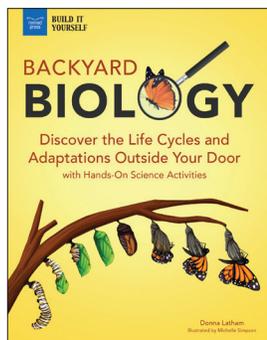
In *Fairground Physics: Motion, Momentum, and Magnets with Hands-On Science Activities*, readers ages 9 to 12 learn about the forces that rule our world and everything in it by examining the rides, games, and even food you might find at a county fair. Hands-on STEM activities, essential questions, and links to online primary resources help readers learn the fundamentals of the world of physics!

*Fairground Physics* is part of a set of four Build It Science books that explore accessible science.

Learn more about *Fairground Physics* at [nomadpress.net/nomadpress-books/fairground-physics/](http://nomadpress.net/nomadpress-books/fairground-physics/)



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## ESSENTIAL QUESTIONS TO ASK

### KEY VOCABULARY

acceleration, amplitude,  
conduction, current,  
electromagnetism, inertia,  
molecular, momentum,

### BEFORE READING

#### 1 Establish Background Knowledge

- Have you ever been to a fair and ridden on fairground rides? Which kind was your favorite?
- Have you ever eaten ice cream or funnel cakes or fried dough?
- Why do you think so many people find fairground rides a lot of fun?

#### 2 Skill Introduction

- What do you do when you come to a word or phrase you do not know?
- How do photographs and videos help someone learn about a topic?

**CCC: CCSS.ELA-Literacy.L.8.4c** Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.

### DURING READING

#### 1 Check for Understanding

- What is the connection between fairground rides and physics?
- How does physics affect your life in other ways?
- Why is the science of physics part of every other kind of science?
- What are some things that confuse you about physics?
- Why learn physics?

**CCC: CCSS.ELA-Literacy.L.8.4d** Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).



Check out this video to learn more about how bumper cars work!

[https://www.youtube.com/watch?v=\\_qWmwtGZipw](https://www.youtube.com/watch?v=_qWmwtGZipw)



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## ESSENTIAL QUESTIONS TO ASK

### AFTER READING

#### 1 Summary and Expansion

- a Do people love carnival rides today for the same reasons they loved them in the last century?
- b How do bumper cars move? Why do they bounce?
- c How do roller coasters get their energy?
- d How do different carnival rides come to a stop?
- e Why do carnival rides make some people feel sick?
- f What's the difference between heat and temperature?
- g How does chemistry produce some of the delicious food you find at a fairground?
- h Can you think of a new kind of ride for a fairground? What would it be like?
- i What is a wave and what is the role of a wave at the fairground?

**CCC: CCSS.ELA-Literacy.W.8.2** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

**CCC: CCSS.ELA-Literacy.RST.6-8.9** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

**CCC: CCSS.ELA-Literacy.SL.8.2** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

**CCC: CCSS.ELA-Literacy.WHST.6-8.6** Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.

### COMMON CORE CONNECTIONS

**Grade: 8 Language** CCSS.ELA-Literacy.L.8.3,4,4a,4b,4c,4d,5,5a,5b,6

**Grade: 6-8 Science & Technical Subjects** CCSS.ELA-Literacy.RST.6-8.1,2,3,4,5,6,7,8,9,10

**Grade: 7 Speaking & Listening** CCSS.ELA-Literacy.SL.8.1,1c,1d,2,3,4,5,6

**Grade: 8 Writing** CCSS.ELA-Literacy.W.8.1,2,3,4,6,7,8,9,9a,10



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## COMMON CORE CONNECTIONS

### Grade: 8 Language

**CCSS.ELA-Literacy.L.8.3,4,4a,4b,4c,4d,5,5a,5b,6**

3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.

4 Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on grade 8 reading and content, choosing flexibly from a range of strategies.

4a Use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

4b Use common, grade-appropriate Greek or Latin affixes and roots as clues to the meaning of a word (e.g., precede, recede, secede).

4c Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning or its part of speech.

4d Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

5 Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

5a Interpret figures of speech (e.g. verbal irony, puns) in context.

5b Use the relationship between particular words to better understand each of the words.

6 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

### Grade: 6-8 Science & Technical Subjects

**CCSS.ELA-Literacy.RST.6-8.1,2,3,4,5,6,7,8,9,10**

1 Cite specific textual evidence to support analysis of science and technical texts.

2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.

5 Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.

6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

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).

8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

10 By the end of grade 8, read and comprehend science/technical texts in the grades 6–8 text complexity band independently and proficiently.



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## COMMON CORE CONNECTIONS

### Grade: 7 Speaking & Listening

CCSS.ELA-Literacy.SL.8.1,1c,1d,2,3,4,5,6

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.

1c Pose questions that connect the ideas of several speakers and respond to others' questions and comments with relevant evidence, observations, and ideas.

1d Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

2 Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.

3 Delineate a speaker's argument and specific claims, evaluating the soundness of the reasoning and relevance and sufficiency of the evidence and identifying when irrelevant evidence is introduced.

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.

5 Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 8 Language standards 1 and 3 here for specific expectations.)

### Grade: 8 Writing

CCSS.ELA-Literacy.W.8.1,2,3,4,6,7,8,9,9a,10

1 Write arguments to support claims with clear reasons and relevant evidence

2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

3 Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.

4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

6 Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas efficiently as well as to interact and collaborate with others.

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.

8 Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

9a Apply grade 8 Reading standards to literature (e.g., "Analyze how a modern work of fiction draws on themes, patterns of events, or character types from myths, traditional stories, or religious works such as the Bible, including describing how the material is rendered new").

10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of disciplinespecific tasks, purposes, and audiences.



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## ACTIVITY!

## DIY PENDULUM

Pendulum rides pick up speed as the arm of the ride goes higher and higher. For this activity, we're going to build a simple pendulum and measure its speed.

➤ **Tie a piece of string onto a small weight or object.** This is your pendulum.

➤ **Place two pieces of tape exactly a foot apart.** These can be on the wall or the floor.

➤ **Hold the weight exactly between these two marks.** You may need another person to hold the pendulum or you can tie it to something.

➤ **Bring the weight back** just beyond one of the tape marks.

➤ **Have your timer ready**—and release the weight.

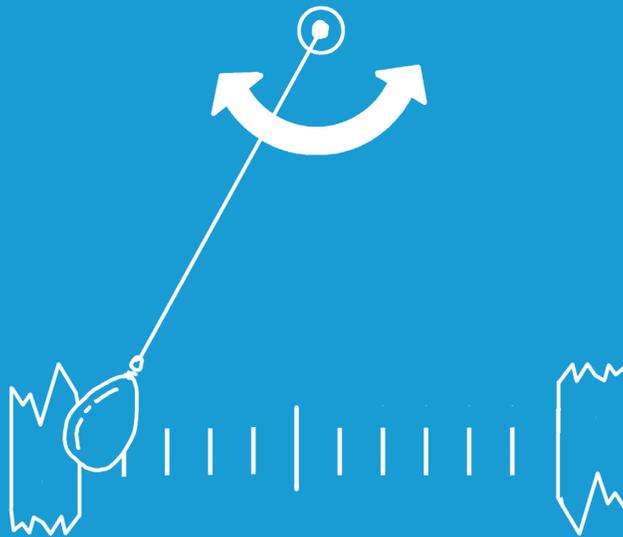
➤ **Time how long it takes for the pendulum** to swing from one piece of tape to the other.

➤ **Calculate its speed by dividing** the time by the distance (speed = distance ÷ time). For instance, if the pendulum took 3 seconds to go 12 inches, its speed would be 4 inches per second.

➤ **Now, experiment with raising the pendulum** higher and higher. Do you think it will go faster? Record your results and observations.

### PHYSICS KIT

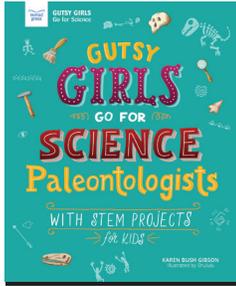
- string
- small weight or object
- tape
- time



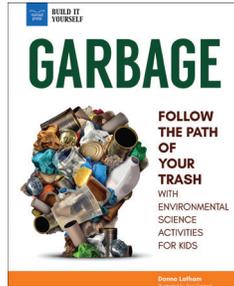
### Try This!

Vary the weight of the object! Do heavier objects move faster? Why?

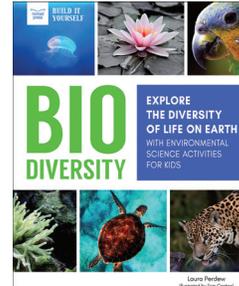
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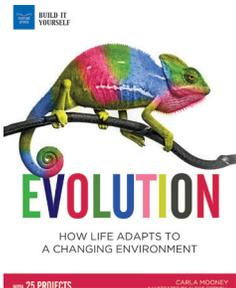
Author: Karen Bush Gibson



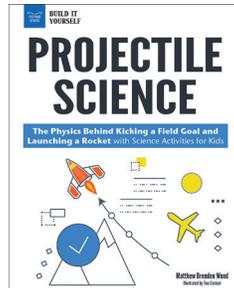
Author: Donna Latham



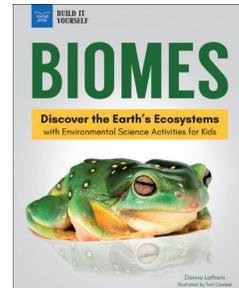
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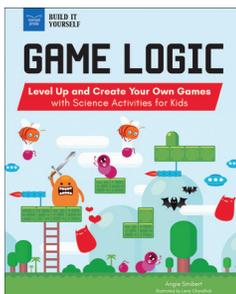
Author: Carla Mooney



Author: Matthew Brenden Wood



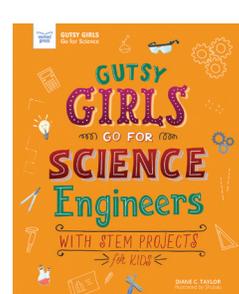
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