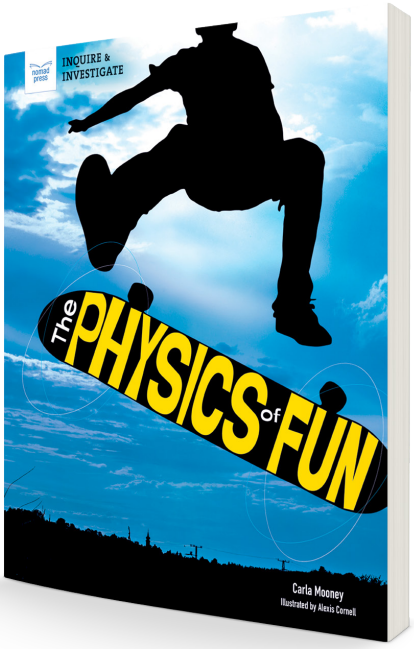
Nomad Press
CLASSROOM GUIDE



Why are you able to jump higher from a trampoline than from the ground? What forces are at work when you do an ollie on a skateboard?

The answer is: physics! In ***The Physics of Fun***, kids ages 12 to 15 explore the science behind awesome activities that kids love. From Newton's laws of motion to the behavior of electrons, the science of physics is an integral part of any amusement park, play center, video arcade, or home gaming center.

Links to online media, discussion questions, and career connections offer middle schoolers the chance to do some real, hands-on science around fun activities they already enjoy!

Try these STEM activities!

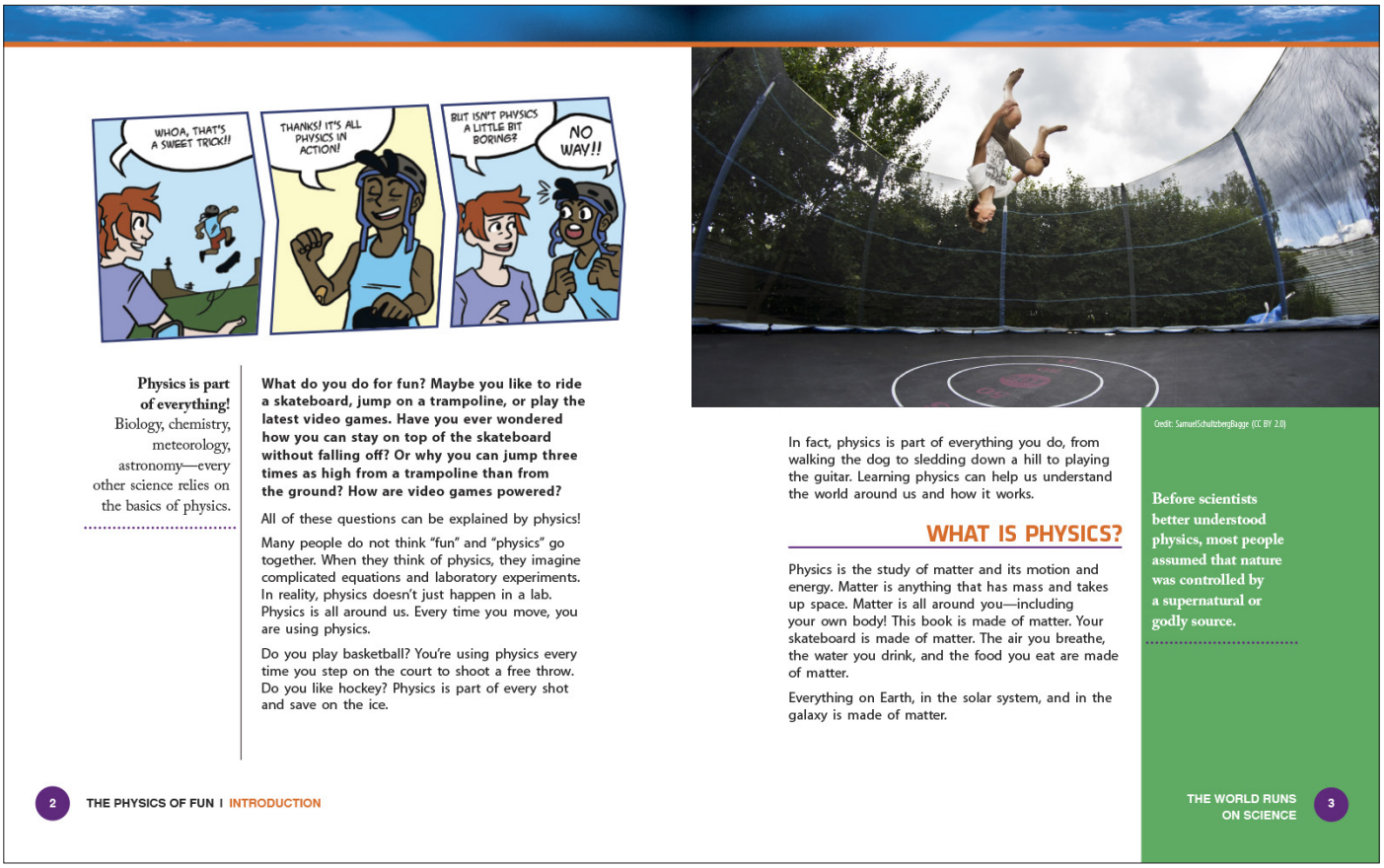
- Use a skateboard to demonstrate inertia
- Investigate the transfer and conservation of energy on a trampoline
- Build a guitar to explore sound waves

Learn more at nomadpress.net/nomadpress-books/physics-of-fun

Softcover: 9781647410346, $17.95
Hardcover: 9781647410315, $22.95
eBook: all formats available, $12.99
Specs: 8 x 10, 128 pages, color interior

Reading Level: Ages 12–15
Interest Level: Grades 7–10
Focus: Physics
GRL: Z

LOOK Inside



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SAMPLE GLOSSARY

astronomy: the science of the universe in which the stars, planets, and other astronomical bodies are studied.

atom: a very small piece of matter. Atoms are the tiny building blocks that make up everything in the universe. An atom is made up of a nucleus of protons and neutrons, surrounded by a cloud of electrons.

BCE: put after a date, BCE stands for Before Common Era and counts down to zero. CE stands for Common Era and counts up from zero. These non-religious terms correspond to BC and AD. This book was printed in 2021 CE.

biology: the science of life and living things

chemistry: the science of how atoms and molecules combine to form substances and how those substances interact, combine, and change.

circa (c.): around that year.

electromagnetic: one of the fundamental forces of the universe that is responsible for magnetic attraction and electrical charges.

energy: the ability to do work or cause change.

force: a push or a pull that causes a change of motion in an object.

friction: the resistance that one surface or object encounters when moving over another.

fundamental science: a branch of science that is central to many other branches of science.

galaxy: a collection of star systems held together by gravity. The earth is in a galaxy called the Milky Way.

gravity: the force of attraction between two objects with mass.

mass: the amount of physical matter in an object.

matter: any substance that has mass and takes up space.

meteorology: the science of atmospheres, including weather and climate.

microscopic: something so small it can be seen only with a microscope.

nuclear: energy produced when the nucleus of an atom is split apart.

particles: tiny pieces of matter.

phenomena: an observed event.

physicist: a scientist who studies physical forces, including matter, energy, and motion, and how these forces interact with each other.

physics: the study of matter, energy, and motion, and how they interact with each other.

quantum physics: an area of physics founded on the idea that light energy is made of different packets of energy.

radiation: a form of electromagnetic energy, some forms of which can cause harm to living things.

resistance: a force that slows down another force. The slowing of a flow of charge through an electric circuit.

Scientific Revolution: a time during the sixteenth and seventeenth centuries when a series of discoveries in mathematics, physics, astronomy, biology, and chemistry caused whole societies to think differently about the nature of the universe.

solar system: the collection of eight planets, moons, and other celestial bodies that orbit the sun.

subatomic particles: the group of particles that make atoms, such as neutrons, protons, and electrons.

supernatural: something that cannot be explained using the laws of science.

sustainable: a process or resource that can be used without being completely used up or destroyed.

switch: a device that controls the flow of electricity through a circuit.

system: an organized collection of parts that work together to achieve a goal.

technology: the tools, methods, and systems used to solve a problem or do work.

telecommunications: technology concerned with communication across a distance.

universal gravitation: Sir Isaac Newton's theory of gravity, which says that gravity is a force that pulls all matter together and depends on each object's mass and distance.

universe: everything that exists, everywhere.

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ESSENTIAL QUESTIONS

BEFORE READING:

Establish Background Knowledge

- What do you already know about the connections between sports and science? Music and science?
- Is it important to know the science behind the things you like to do? Why or why not?
- How might our knowledge of science help us be better at sports, cooking, playing instruments, doing schoolwork, or driving?

Skill Introduction

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

CCSS.ELA-Literacy.L.8.4a 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.

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).

DURING READING:

Check for Understanding

- How do activities and experiments offer a different way of learning?
- Have you ever watched a sports game, either live or by video? How do the athletes move differently when practicing their sport?
- What role might food and sleep play in an athlete's ability to perform?

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.

CCSS.ELA-Literacy.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.

AFTER READING:

Summary and Expansion

- What are some things that you do that involves physics. How do you know?
- Why are the studies of different kinds of science interrelated? Can you have chemistry without physics? Physics without astronomy? Why or why not?
- What is the scientific process and why is it important?
- How are all different sports related? What are some of the connections between snowboarding and skateboarding? Trampolining and vaulting?
- What are some of the ways athletes use different kinds of tools to improve their performance?
- How does gravity affect sports? How does it affect different sports in different ways?
- Why is it useful to know about how energy transfers? How might this help you be a better athlete?
- What are some connections between light and sound?
- Do you play an istrument? How does knowledge about physics make you a better player?
- How are physics connected to video games?

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.

CCSS.ELA-Literacy.RST.6-8.4 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.

CCSS.ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CCSS.ELA-Literacy.SL.8.2 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.

CCSS.ELA-Literacy.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.

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UPS AND DOWNS OF KINETIC AND POTENTIAL ENERGY

Snowboarders rely on gravitational potential energy and kinetic energy to race down the mountain! These work together to result in motion that is beautiful and fun. In this activity, you will investigate the relationship between kinetic and potential energy by building a marble roller coaster.

- **Carefully cut the pipe insulation in half lengthwise so that you have two long, U-shaped pieces.** Use the pipe insulation to create a roller coaster track. Get creative with the track and incorporate hills, turns, and a loop.
- **Tape one end of the track to a tabletop to create a large downward slope leading to the rest of the course.** Take a marble or small heavy ball and place it a few inches above the bottom of the first slope. When you let it go, how far does it make it through the course?
- **Move the marble a few inches higher on the first slope and release it.** Now how far does it go through the track? Record your observations in your science journal.
- **Repeat this process until you are releasing the marble at the tabletop.** Can the marble make it all the way through the track? How high does the initial slope need to be for the marble to make it through the entire track? If you start the marble from a higher point, what does that mean about its energy? Where does the marble move the fastest on the course? Where does it move the slowest? Can you explain why this happens? How is energy changing as the marble moves through the track?

Ideas for Supplies

- foam pipe insulation about 1½ inches in diameter and at least 6 feet long
- marble or small heavy ball

To investigate more, add another piece of pipe insulation at the end of the course that is level and straight. How far does the marble roll before it stops? What causes the marble to stop?

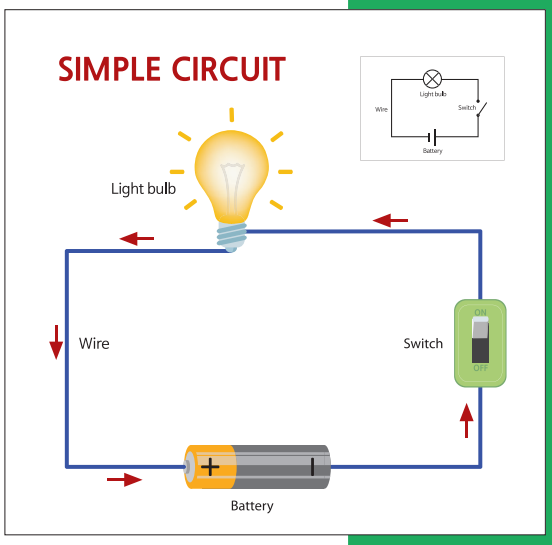
BUILD AN ELECTRICAL CIRCUIT

All electronics today, including computers and gaming consoles, are based on electrical circuits. A simple circuit contains at least three basic components: a path for electrons to travel, a power source, and a load, or something that needs electricity to operate. In this activity, you'll build a simple circuit and see how it works.

Ideas for Supplies

- 1 to 2 feet insulated copper wire
- scissors or wire cutters
- D battery
- small flashlight bulb with socket
- switch
- electrical tape

- **Cut the copper wire into three pieces.** Carefully remove about a quarter of an inch of insulation from both ends of each piece.
- **Use tape to attach the exposed part of one wire to the positive side of the battery.** Attach the other end of this wire to the left side of the light bulb.
- **Tape one end of the second wire to the negative side of the battery.** Attach the other end of the wire to one side of the switch.
- **With the final piece of wire, attach one end to the other side of the switch.** Attach the other end to the right side of the bulb.
- **Figure out how to open and close the circuit.** How do you do this? Why does the bulb turn on and off? What happens if you disconnect one of the wires in the circuit? Will the light turn on? Why or why not? What happens to the flow of electricity if part of the circuit is missing?



To investigate more, what happens if you add a second battery to the circuit?

AUTHOR INTERVIEW

WHAT'S YOUR FAVORITE PART ABOUT WRITING A KIDS' BOOK?

Honestly, my favorite part is the research. I love learning new things and discovering new facts. When I'm researching, I read books, articles, scientific studies and more. I visit museum and historical sites online and in-person. And I also like to watch college professor and expert lectures on my subject, when I can find them!

WHAT DO YOU DO WHEN YOU GET STUCK WITH THE WRITING?

If I get stuck, I'll put a placeholder in capital letters in the text for the part that is giving me trouble. Something like "ADD REAL LIFE EXAMPLE HERE". Then, I just move on writing the next section. That way, I can keep moving forward and making progress on the book. Later, I circle back to the placeholders and add them.

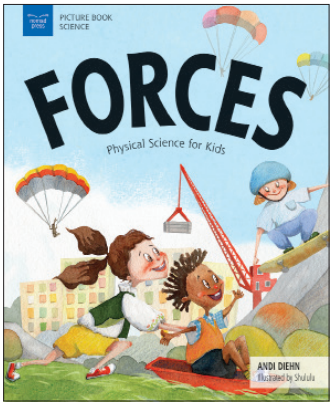
HOW DO YOU TACKLE THE REVISION PROCESS?

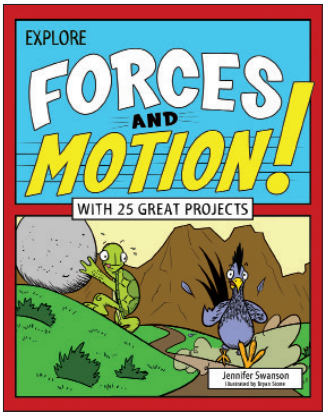
I write a full draft of the manuscript before I start any revision. Then I go back and revise one chapter at a time. I generally go through several revisions. The first revision, I'm mainly looking at the structure of each chapter and the order of the concepts. I'm also looking for repetition – where have I said the same thing over and over! Are there any concepts that I missed? In subsequent revisions, I look more closely at word choice, sentence structure, etc.

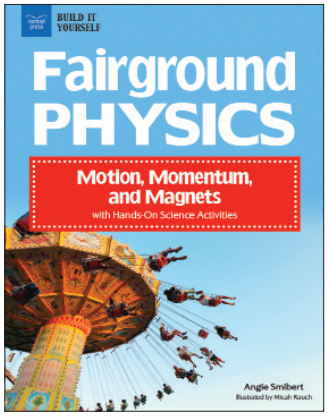
HAVE YOU TRIED ALL THE SPORTS IN THIS BOOK?!

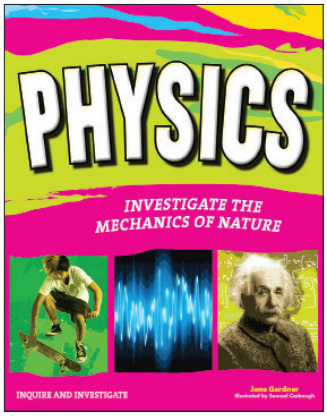
I'm 4 out of 5. However, you didn't ask if I was good at all of them – lol! I've attempted skateboarding and trampolining, but only at a very beginner level. I've never been on a snowboard. I've tried skiing and honestly, I was terrible! I have a bit more experience in the music activities – growing up I played piano, clarinet, violin and also sang in the school choir. And while I'm not an expert gamer, I've played my share of video games over the years!

More physics titles from Nomad Press









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