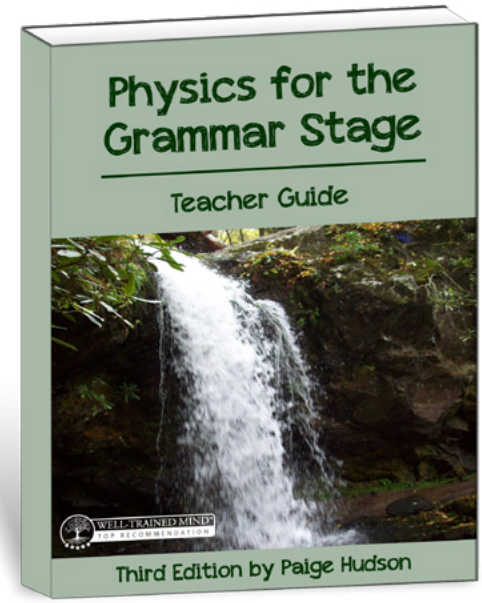
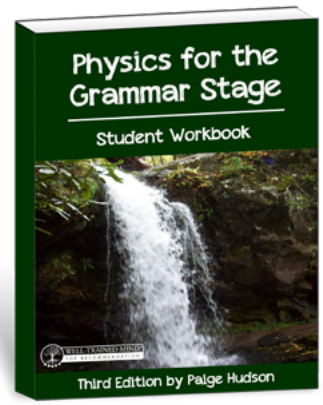
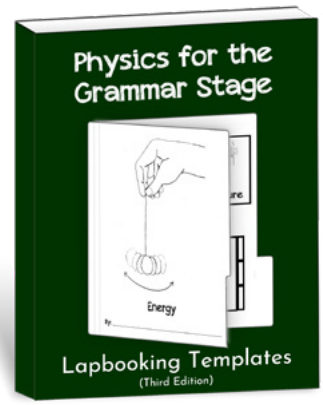
Physics for the Grammar Stage
Sample Packet

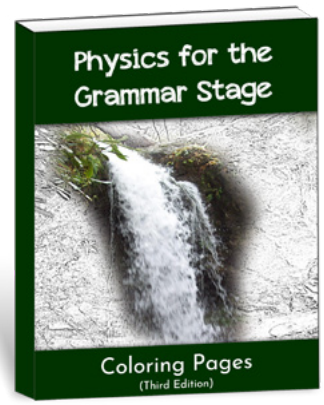


The following sample packet includes the first two weeks from the *Physics for the Grammar Stage Teacher Guide* (*beginning on pg. 7*) materials, plus the three student options:

- ✓ The Student Workbook (*beginning on p. 33*)
- ✓ The Lapbooking Templates (*beginning on p. 51*)
- ✓ The Coloring Pages (*beginning on p. 60*)







You do not need all of these materials to complete this program. You do need the teacher guide, plus one of the student options. You can get more information and make your purchase here:

https://elementalscience.com/collections/physics-for-the-grammar-stage

elementalscience.com

A Peek Inside the Grammar Stage Teacher Guide

The teacher guide is your go-to resource for creating memorable science lessons!

1. Weekly Topic

Focus on one main idea, with several subtopics, throughout the week. You will learn about these ideas by doing scientific demonstrations, by reading from visually appealing encyclopedias, by recording what the students learned, and by adding other optional activities.

2. Two Scheduling Options

Know what to do when with the two grid-style scheduling options. There are a 2-day-a-week and a 5-day-a-week schedules. These schedules break down the essential work and the optional activities into manageable chunks so that you can proceed with confidence.

3. Reading Assignments

Find the week's reading assignments, plus discussion questions for you to use with your students.

4. Memory work

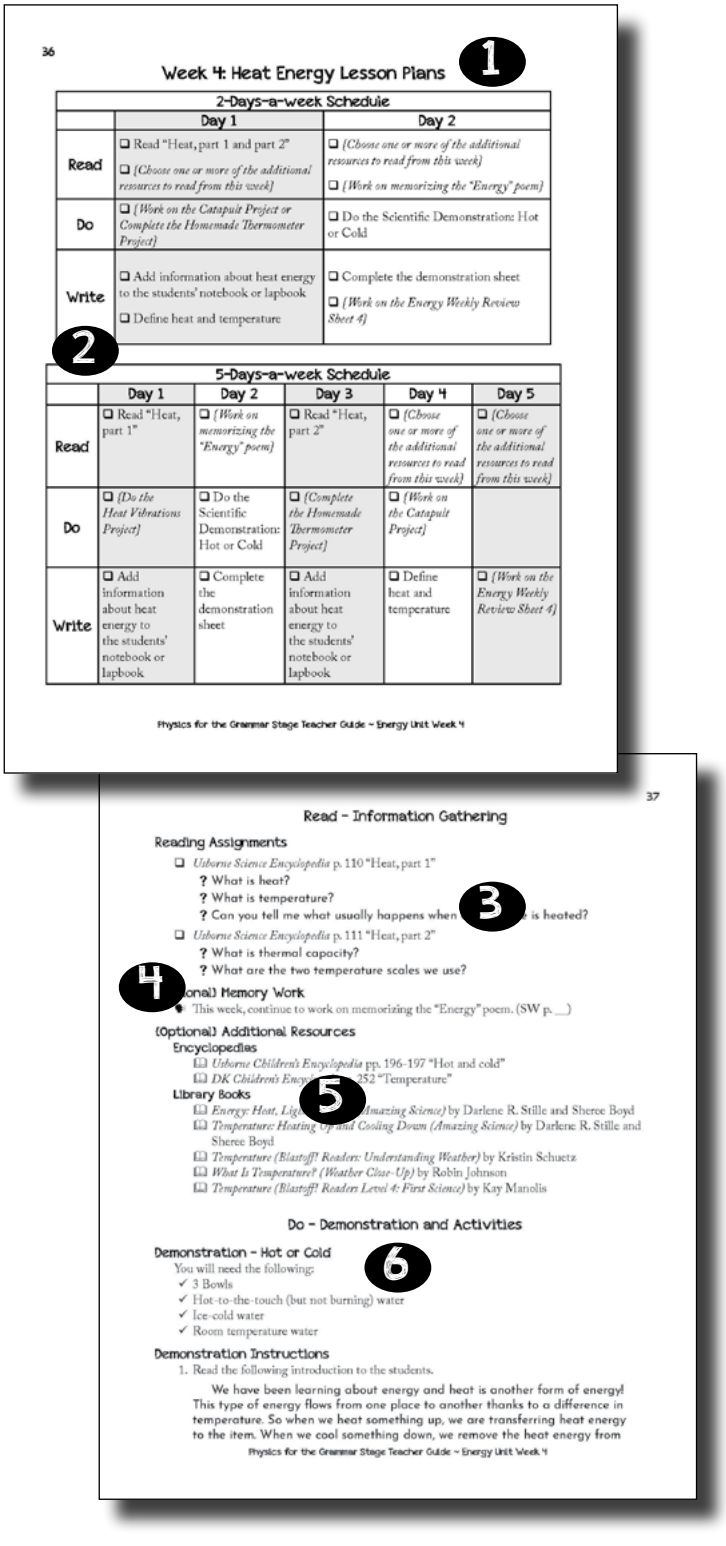
Boost your students' memory of what they have studied with a hallmark of classical education—memory work. These catchy poems share the key facts to remember about the unit's topics.

5. Additional Resources

See options for adding in more information about the weekly topic through children's encyclopedias and library books.

6. Related Scientific Demonstrations

Know what you will need to do a weekly hands-on science activity that coordinates with the topic. This section includes the



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Week 4: Heat Energy Lesson Plans 1

2-Days-a-week Schedule

	Day 1	Day 2
Read	❑ Read "Heat, part 1 and part 2" ❑ *{Choose one or more of the additional resources to read from this week}*	❑ *{Choose one or more of the additional resources to read from this week}* ❑ *{Work on memorizing the "Energy" poem}*
Do	❑ *{Work on the Catapult Project or Complete the Homemade Thermometer Project}*	❑ Do the Scientific Demonstration: Hot or Cold
Write	❑ Add information about heat energy to the students' notebook or lapbook ❑ Define heat and temperature	❑ Complete the demonstration sheet ❑ *{Work on the Energy Weekly Review Sheet 4}*

2

5-Days-a-week Schedule

	Day 1	Day 2	Day 3	Day 4	Day 5
Read	❑ Read "Heat, part 1"	❑ *{Work on memorizing the "Energy" poem}*	❑ Read "Heat, part 2"	❑ *{Choose one or more of the additional resources to read from this week}*	❑ *{Choose one or more of the additional resources to read from this week}*
Do	❑ *{Do the Heat Vibrations Project}*	❑ Do the Scientific Demonstration: Hot or Cold	❑ *{Complete the Homemade Thermometer Project}*	❑ *{Work on the Catapult Project}*	
Write	❑ Add information about heat energy to the students' notebook or lapbook	❑ Complete the demonstration sheet	❑ Add information about heat energy to the students' notebook or lapbook	❑ Define heat and temperature	❑ *{Work on the Energy Weekly Review Sheet 4}*

Physics for the Grammar Stage Teacher Guide ~ Energy Unit Week 4

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Read - Information Gathering

Reading Assignments

❑ *Usborne Science Encyclopedia* p. 110 "Heat, part 1"
- ? What is heat?
- ? What is temperature?
- ? Can you tell me what usually happens when [illegible] is heated? 3

❑ *Usborne Science Encyclopedia* p. 111 "Heat, part 2"
- ? What is thermal capacity?
- ? What are the two temperature scales we use?

4 [illegible]onal) Memory Work
- This week, continue to work on memorizing the "Energy" poem. (SW p. ___)

(Optional) Additional Resources

Encyclopedias
- *Usborne Children's Encyclopedia* pp. 196-197 "Hot and cold"
- *DK Children's Encyc[illegible]* 252 "Temperature"

Library Books 5
- *Energy: Heat, Lig[illegible]Amazing Science)* by Darlene R. Stille and Sheree Boyd
- *Temperature: Heating Up and Cooling Down (Amazing Science)* by Darlene R. Stille and Sheree Boyd
- *Temperature (Blastoff! Readers: Understanding Weather)* by Kristin Schuetz
- *What Is Temperature? (Weather Close-Up)* by Robin Johnson
- *Temperature (Blastoff! Readers Level 4: First Science)* by Kay Manolis

Do - Demonstration and Activities

Demonstration - Hot or Cold 6

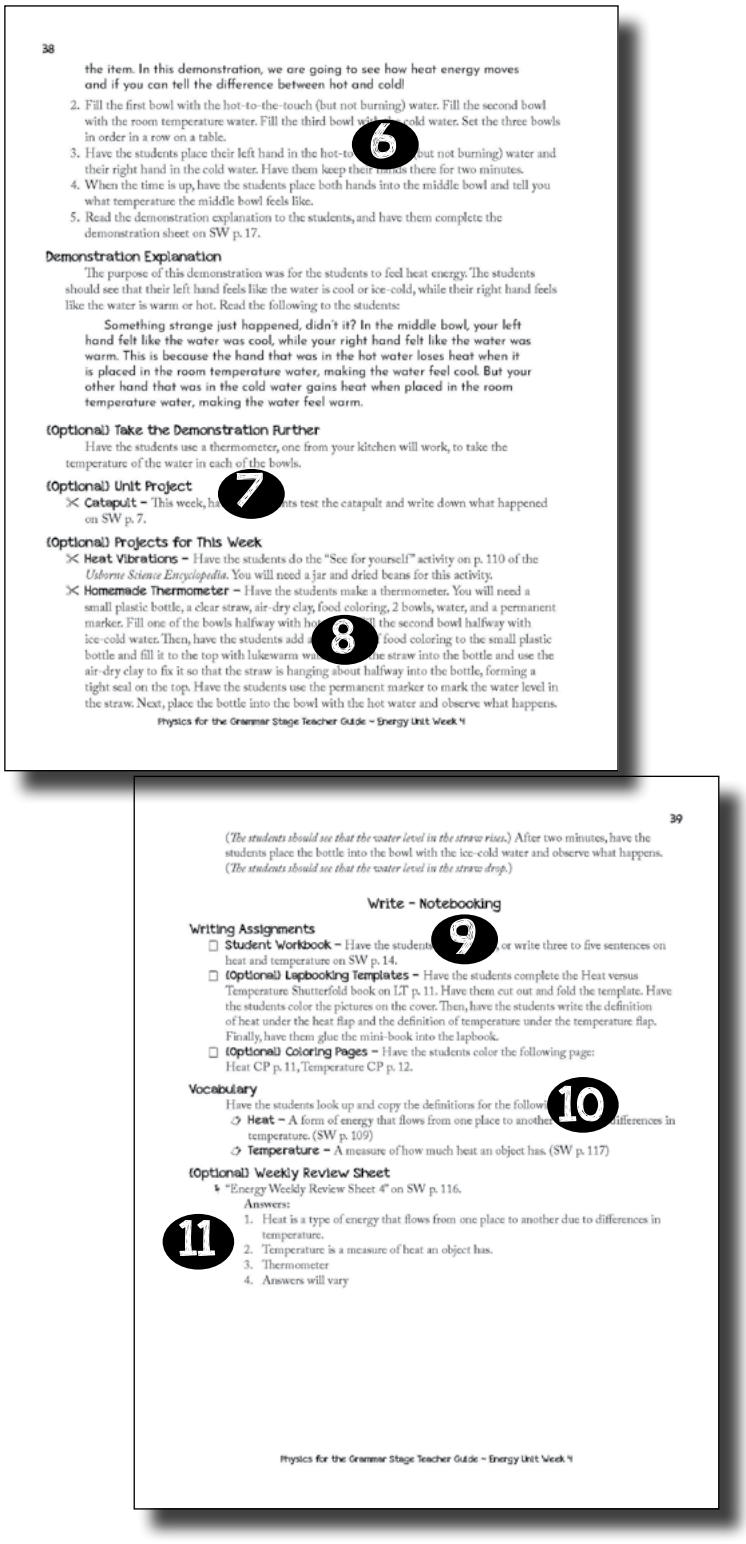
You will need the following:
- ✓ 3 Bowls
- ✓ Hot-to-the-touch (but not burning) water
- ✓ Ice-cold water
- ✓ Room temperature water

Demonstration Instructions

1. Read the following introduction to the students.

We have been learning about energy and heat is another form of energy! This type of energy flows from one place to another thanks to a difference in temperature. So when we heat something up, we are transferring heat energy to the item. When we cool something down, we remove the heat energy from

Physics for the Grammar Stage Teacher Guide ~ Energy Unit Week 4



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the item. In this demonstration, we are going to see how heat energy moves and if you can tell the difference between hot and cold!

2. Fill the first bowl with the hot-to-the-touch (but not burning) water. Fill the second bowl with the room temperature water. Fill the third bowl with cold water. Set the three bowls in order in a row on a table.
3. Have the students place their left hand in the hot-to-the-touch (but not burning) water and their right hand in the cold water. Have them keep their hands there for two minutes.
4. When the time is up, have the students place both hands into the middle bowl and tell you what temperature the middle bowl feels like.
5. Read the demonstration explanation to the students, and have them complete the demonstration sheet on SW p. 17.

Demonstration Explanation

The purpose of this demonstration was for the students to feel heat energy. The students should see that their left hand feels like the water is cool or ice-cold, while their right hand feels like the water is warm or hot. Read the following to the students:

> Something strange just happened, didn't it? In the middle bowl, your left hand felt like the water was cool, while your right hand felt like the water was warm. This is because the hand that was in the hot water loses heat when it is placed in the room temperature water, making the water feel cool. But your other hand that was in the cold water gains heat when placed in the room temperature water, making the water feel warm.

(Optional) Take the Demonstration Further

Have the students use a thermometer, one from your kitchen will work, to take the temperature of the water in each of the bowls.

(Optional) Unit Project

- **Catapult –** This week, h… …ents test the catapult and write down what happened on SW p. 7.

(Optional) Projects for This Week

- **Heat Vibrations –** Have the students do the "See for yourself" activity on p. 110 of the *Usborne Science Encyclopedia*. You will need a jar and dried beans for this activity.
- **Homemade Thermometer –** Have the students make a thermometer. You will need a small plastic bottle, a clear straw, air-dry clay, food coloring, 2 bowls, water, and a permanent marker. Fill one of the bowls halfway with h… …l the second bowl halfway with ice-cold water. Then, have the students add … food coloring to the small plastic bottle and fill it to the top with lukewarm w… …e straw into the bottle and use the air-dry clay to fix it so that the straw is hanging about halfway into the bottle, forming a tight seal on the top. Have the students use the permanent marker to mark the water level in the straw. Next, place the bottle into the bowl with the hot water and observe what happens.

Physics for the Grammar Stage Teacher Guide ~ Energy Unit Week 4

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(*The students should see that the water level in the straw rises.*) After two minutes, have the students place the bottle into the bowl with the ice-cold water and observe what happens. (*The students should see that the water level in the straw drop.*)

Write ~ Notebooking

Writing Assignments

- ☐ **Student Workbook –** Have the student… …or write three to five sentences on heat and temperature on SW p. 14.
- ☐ **(Optional) Lapbooking Templates –** Have the students complete the Heat versus Temperature Shutterfold book on LT p. 11. Have them cut out and fold the template. Have the students color the pictures on the cover. Then, have the students write the definition of heat under the heat flap and the definition of temperature under the temperature flap. Finally, have them glue the mini-book into the lapbook.
- ☐ **(Optional) Coloring Pages –** Have the students color the following page: Heat CP p. 11, Temperature CP p. 12.

Vocabulary

Have the students look up and copy the definitions for the follow…

- **Heat –** A form of energy that flows from one place to another… …differences in temperature. (SW p. 109)
- **Temperature –** A measure of how much heat an object has. (SW p. 117)

(Optional) Weekly Review Sheet

- "Energy Weekly Review Sheet 4" on SW p. 116.

Answers:

1. Heat is a type of energy that flows from one place to another due to differences in temperature.
2. Temperature is a measure of heat an object has.
3. Thermometer
4. Answers will vary

Physics for the Grammar Stage Teacher Guide ~ Energy Unit Week 4

supplies you will need, along with scripted introductions. The easy-to-follow steps and scripted explanations make it a snap to complete the scientific demonstration. And if your kiddos want more, we have you covered with a related idea to take the science-learning fun even further.

7. Coordinated Unit Projects

Add in a bit of fun with these optional project ideas for the whole unit.

8. Optional STEAM Ideas

Get ideas for additional STEAM activities that relate to the week's topic.

9. Notebooking Assignments

Record what your students have learned with either the student workbook or the optional lapbook. The directions for these options are included for your convenience in the guide. Plus, see which coloring pages coordinate with the week's lesson in this section.

10. Relevant Vocabulary

Build your students' science vocabulary with words relevant to the weekly topic.

11. Review Sheets

See which review sheet to assign —these are found at the back of the student workbook—along with the answers. These sheets can be used as review or as quizzes.

A Peek Inside the Grammar Stage Student Materials

The Student Workbook

Harness the benefits of notebooking with the student workbook.

1. Weekly Notebooking Pages

Record what your students found interesting about the weekly subtopics using a hallmark of classical education—narration. Each of these customized notebooking pages has spaces to write and simple black-line illustrations for the students to color.

2. Simple Demonstration Sheets

Document the hands-on scientific demonstrations you do with simple lab sheets. These include sections for your materials, a simple procedure, your outcome, and the students' insights from the demonstration.

3. Glossary of Terms

Find a student glossary of terms following the weekly sheets. The terms are listed alphabetically with pictures to help your students remember their vocabulary.

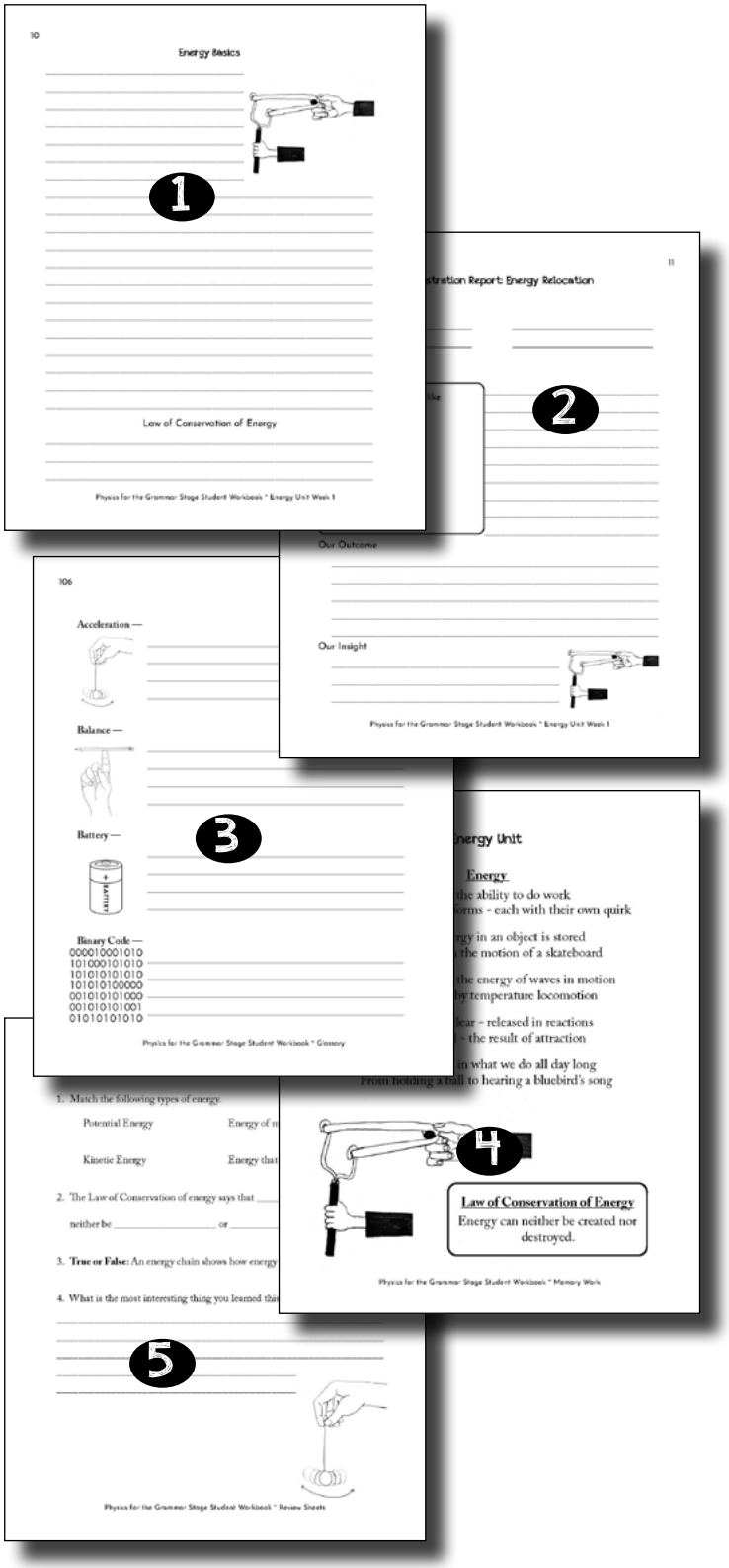
4. Memory Work Posters

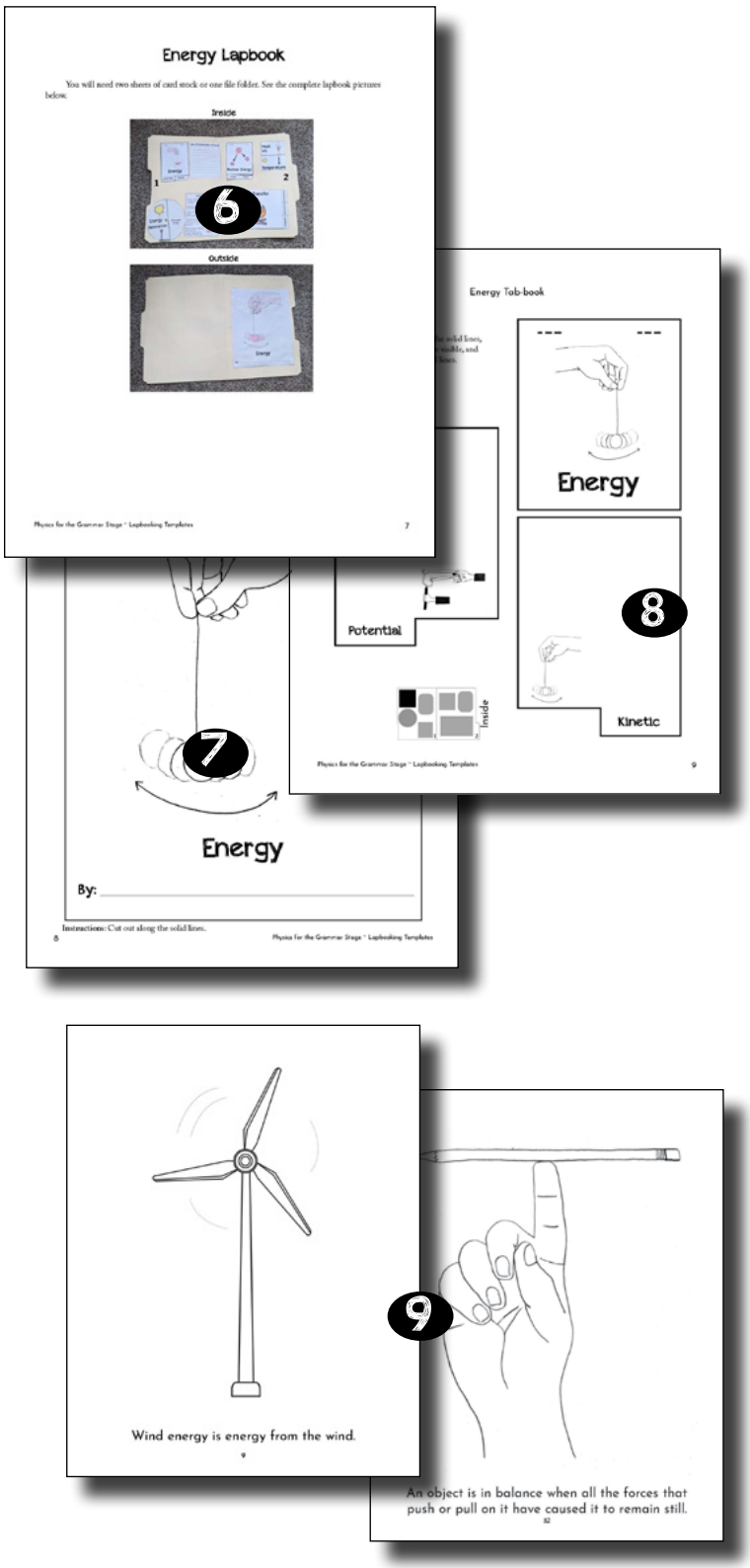
Help the students work on their memory work with these poster-style sheets. Each poem is in a large, readable font with illustrations related to the information in the poem.

5. Review Sheets

Review what the students have learned with the review sheets found at the back of the student workbook. These can be used as review or quizzes.

Add in the optional lapbooking templates and coloring pages for more fun!





The Lapbooking Templates

Use the lapbooking templates to review the concepts learned, or you can have the student create each one in lieu of completing the student workbook.

6. Lapbook Overview Sheets

Know where to place the mini-books in the lapbook with these overview sheets. You will also find overall directions for completing the lapbook. The specific directions for completing each mini-book are found in the teacher guide.

7. Lapbook Cover

Find a unique cover for each of the suggested lapbooks.

8. Mini-book Templates

Get all the mini-books you will need to complete the suggested lapbooks, along with an exact placement guide. The templates include black-line illustrations and space for narrations.

The Coloring Pages

Use the coloring pages to add a bit of art to your science plans or to engage younger students.

9. Simple Coloring Pages

Color your way through learning about science with these coloring pages. Each page has a large, black-line illustration along with a key fact sentence for the students to learn about the topic. The specific directions for when to use these coloring pages are found in the teacher guide.

Physics for the Grammar Stage

Teacher Guide

Third Edition by Paige Hudson

In a Nutshell

Students will learn about motion, forces, energy, and more in the following ways:

- ✓ Listening to (or reading) **scientific information** from visually appealing encyclopedias.
- ✓ Watching (and doing) **hands-on science** through demonstrations and activities.
- ✓ Dictating (or writing down) what they have learned and seen using **notebooking**.

See p. 10 for a list of the topics explored in this program.

What You Need

In addition to this guide, you will need the following:

1. **The student materials** - You can purchase either the *Physics for the Grammar Stage Student Workbook* or the *Physics for the Grammar Stage Lapbooking Templates*. (Get a glimpse of these options on pp. 8-9.)
2. **The two spines** - You will need the following books, plus the 2 scientist biographies:
   - 🕮 *The Usborne Science Encyclopedia* (2015 Edition)
   - 🕮 *Basher Science Engineering: The Riveting World of Buildings and Machines* (2017 Edition)

   You can also purchase *Who Was Thomas Alva Edison?* and *Who Was Isaac Newton?* for the scientist biography reports in the Light Unit and Motion Unit, or check a biography out from your local library. Get links to these books here:
   - https://elementalscience.com/blogs/resources/pgs
3. **The demonstration supplies** - See a full list starting on p. 16 or save yourself the time and purchase the *Physics for the Grammar Stage Experiment Kit*.

How It Works

Each week you and your early elementary student will do the following

- **Read** the assigned pages with your students and use the included questions to discuss what was read.
- **Do** the weekly demonstration with the students using the scripted introduction, directions, and scripted explanation found in this guide.
- **Write** down what the students have learned and seen in a way that is appropriate for their skills.

You can also add in the optional memory work, library books, and STEAM activities if you want to dig deeper into a topic. For a more detailed explanation of the components in each lesson, we highly recommend checking out the peek inside this program on pp. 6-7 and reading the introduction starting on p. 11. Otherwise, the first lesson begins on p. 22.

Physics for the Grammar Stage
Teacher Guide Table of Contents

List of Topics Covered in This Program

Energy Unit
- ✓ Energy
- ✓ Energy Resources (Renewable and Nonrenewable)
- ✓ Nuclear Energy
- ✓ Heat Energy
- ✓ Heat Transfer

Light Unit
- ✓ Light
- ✓ Colors
- ✓ Light Behavior
- ✓ Lenses
- ✓ Mirrors
- ✓ Thomas Edison

Sound Unit
- ✓ Sound
- ✓ Waves
- ✓ Wave Behavior
- ✓ Musical Instruments

Electricity Unit
- ✓ Electricity
- ✓ Circuits
- ✓ Batteries
- ✓ Magnets
- ✓ Electronics
- ✓ Computers
- ✓ Coding

Forces Unit
- ✓ Forces
- ✓ Balance
- ✓ Gravity
- ✓ Friction
- ✓ Floating

Motion Unit
- ✓ Dynamics (Three Laws of Motion)
- ✓ Speed (Velocity and Acceleration)
- ✓ Circular Motion
- ✓ Isaac Newton

Engineering Unit
- ✓ Simple Machines (Ramps, Levers, Screws, Wheels, Gears, and Pulleys)
- ✓ Turbines
- ✓ Pumps
- ✓ Hydraulics
- ✓ Engineering Design
- ✓ Buidling Materials
- ✓ Bridges
- ✓ Arches
- ✓ Modern Machines
- ✓ Digital Machines

Quick Links

The following page contains quick access to the activity links suggested in this guide along with several helpful downloads:

https://elementalscience.com/blogs/resources/pgs

Introduction to the Third Edition

It has been more than 10 years since the first edition of *Physics for the Grammar Stage* was released. With each edition, the format has been refined, but the method has always been based on the same three keys to teaching science:

1. Read about science.
2. Do, or rather play with, science.
3. Write about science.

If you want to learn more about these keys, check out this free conference session:

- *The 3 Keys to Teaching Science* - https://elementalscience.com/blogs/news/3-keys

In this guide are the tools you need to teach science using the Classic Method found in *Success in Science: A Manual for Excellence in Science Education*. This method is loosely based on the ideas for classical science education that are laid out in *The Well-Trained Mind: A Guide to Classical Education at Home* by Jessie Wise and Susan Wise Bauer.

In *Success in Science*, the elementary student is compared to an empty bucket that is waiting to be filled with meaningful information. As such, the goal of this program is to give your elementary student exposure to age-appropriate topics of within the fields of physics, building a knowledge base for future studies. The tools you are going to use are weekly scientific demonstrations, reading suggestions, notebooking assignments, additional activities, and more.

Let's take a closer took at what you will find in this guide.

Unit Overview Sheets

Each unit will begin with an overview sheet that shows the resources you will need for the unit, the list of topics, the supplies you will need, the memory work you can use, and the vocabulary you will cover. These are meant to give you a snapshot of the unit. Please feel free to swap the units around, but do keep the weeks within the unit in order as you work through this program.

Weekly Lesson Schedules

Each week's lesson will begin with a breakdown of what your week could look like. There are two potential schedules for you to give an idea of how you could schedule each week—one that breaks the assignments over 2 days, and one that breaks these assignments over 5 days. Each of these schedules has three sections to reflect the three keys to teaching science—read, do, and write (more about these in a moment). Optional assignments are in italics so you can easily see what is required and what can be used as gravy on the week's science meal.

You can choose to use these schedules as your guide or create your own using the two schedule templates on pp. 192-193 of the appendix of this guide. You could also create a list schedule or mark the lesson plans with a checkmark or date when you do the assignment.

In other words, you, the teacher, have complete freedom in what you would like to use to present and explore the concepts each week. Please treat the schedules and information in this guide as tools to teach science, not as weekly task masters.

Read - Information Gathering

Reading Assignments

The first things you will see in the "Read" section are the reading assignments. These come from the following two encyclopedias:

- 🕮 *The Usborne Science Encyclopedia* (2015 Edition)
- 🕮 *Basher Science Engineering: The Riveting World of Buildings and Machines* (2017 Edition)

These resources are essential for completing this program. You can often use older editions because they are virtually the same on the inside. (**Note -** *At this point, the idea is that you read the assigned pages to your students. Here is a helpful podcast to determine if your students can handle reading science on their own: Should I read science aloud or not? https://elementalscience.com/blogs/podcast/79*)

After the assigned pages, you will find questions to ask your students after you have finished the reading selections. Here is an example:

- **?** What is the point of these questions?

The point is to get your students to think about the information that was read to them. This seems like an extra, unnecessary step, but please don't skip these questions as they are designed to help your students get ready for the writing portion. Here is another helpful podcast about discussion times:

- 🖱 Don't skip that science discussion time: https://elementalscience.com/blogs/podcast/53

{Optional} Memory Work

Next up in the "Read" section is the unit's optional memory work. An elementary student is capable of memorizing information and you can use this spongelike ability to have the students memorize basics facts related to physics through simple poems. Remember that these poems are included as a resource for you to augment students' learning experiences and are not required to use this program successfully.

{Optional} Additional Resources

The final item in the "Read" section is a list of optional additional resources. First are several alternative encyclopedias, in case your student has a hard time (or an easy time) with the one from the reading assignments. Here is a list of all of the ***optional*** encyclopedias that are scheduled:

- 🕮 *The Usborne Children's Encyclopedia* (2014 Edition)
- 🕮 *The DK Children's Encyclopedia* (2017 Edition)
- 🕮 *Basher Science Physics: Why Matter Matters!* (2016 Edition)

You ***do not*** need to purchase these encyclopedias to complete this program. They are there as options to explore the topics deeper or to use as alternatives.

Finally, you will see a list of potential library books. These books are meant to be checked out from the library in case you decide that you would like to dig a little deeper into the topics. They are not necessary to the success of this program. Because every library is different, the books listed may not be available in your area. If that is the case, simply look up the topic in your local library's system. A complete list of all the suggested books can be found in the appendix pp. 203-208.

Do - Demonstration and Activities

Scientific Demonstrations

The bulk of the items in the "Do" section have to relate to the week's scientific demonstration. These generally use easy-to-find materials and tie into what is being studied. At this age, you will be the driving force behind these demonstrations, meaning that you will be the one in control, and the students will be watching and participating when necessary. (**Note -** *If you want to read more about the differences between demonstrations and experiments, check out the following article: https://elementalscience.com/blogs/news/89905795-scientific-demonstrations-or-experiments*)

You will find several sections for the scientific demonstration:

- ❑ The Demonstration Title and Supplies
- ❑ The Instructions (*including a scripted introduction and detailed instructions*)
- ❑ The Explanation (*including the expected results and a scripted explanation*)

  All scripted text, introductions, and explanations will look be in this font.
- ❑ Ideas to Take the Demonstration Further

These demonstrations are designed to provide a beginner's look at the scientific method and how scientific tests work. Even so, it is not necessary to ask the students to predict the outcome of the demonstration because they have no knowledge base to determine what the answer should be. However, if your students enjoy predicting or they are able to tell you what will happen, please feel free to let them do so.

{Optional} Unit Projects and Weekly Activities

The final two items in the "Do" section are packed with STEAM activities that coordinate with each lesson. These are definitely optional, but they can be used to add in fun and deepen understanding. Here is a podcast to help you decide if you should use these activities:

- Do you need to bother with the "extras" for science? https://elementalscience.com/blogs/podcast/22

The pages and pictures needed for the unit projects are included in the student workbook, whereas the directions for creating the projects are found in this guide. The weekly activities include crafts and other activities that can enhance the students' learning time. There are no sheets to record these additional activities in the student workbook. However, I have included a project record sheet template, p. 191 of the appendix of this guide.

Write - Notebooking

Writing Assignments

In the first part of the "Write" section, you will be asking the students to narrate and record what they have learned from the reading assignments in a student workbook. (**Note -** *We have put together a complete workbook for your students to record what they did—the Physics for the Grammar Stage Student Workbook, which you can peek inside on p. 8 of this guide. It contains all the pages you will need to complete the narrations, demonstration reports, and multi-week projects, along with memory work posters, alphabetical sheets for the student glossary, and review sheets. The student workbook gives the students the ability to create a lasting memory of their first journey through physics.*)

For younger students, you can have them dictate what they have learned to you, and then they can copy their narration into the workbook or you can have them write the narrations on their own. You should expect only three to four sentences from a 3rd- or 4th-grade student. Here is a sample of what the students could write for week one of the energy unit:

Energy can take different forms, such as heat, light, and sound.
Potential energy is energy that is stored in a thing. Kinetic energy is energy of movement.
An energy chain is a way of showing how energy changes.
AND
Law of Conservation of Energy—Energy can neither be created nor destroyed.

When you are done writing, you can have the students color the provided picture on the narration page.

Here are a podcast and a video that will help you understand a bit more about how this process works:

- How do we narrate and what to expect - https://elementalscience.com/blogs/podcast/78
- Writing in Science: The Elementary Years - https://youtu.be/BrunFyeHhlQ

We also offer two other consumable options for the students—lapbooking templates and coloring pages. These are optional, but they can be used as review or in place of the student workbook.

- *Physics for the Grammar Stage Lapbooking Templates*
- *Physics for the Grammar Stage Coloring Pages*

Both of these are also scheduled in under the "Writing Assignments" section. You can peek inside these two resources on p. 9 of this guide.

Demonstration Reports

The demonstration reports are assigned in the "Do" section, but because they include writing, the explanation for how to use them is here. Each one of the scientific demonstrations has a corresponding report in the student workbook.

These demonstration reports include four sections:

1. The "Our Tools" section is for the materials that were used during the demonstration.
2. The "Our Method" section is for a brief description of what was done during the scientific demonstration. This should be in the students' words.
3. The "Our Outcome" section is for what the students observed during the demonstration.
4. The "Our Insight" section is for what the students learned from the scientific demonstration.

Any time you see a box for a picture on the lab report, you can have the students draw what happened, or you can take a picture of the demonstration and glue it in the box. For younger students, you can do the writing for them on the demonstration reports.

Vocabulary

Next in the "Write" section, you will find the week's vocabulary. You can go over these words orally or have the students copy the definitions into the glossary at the rear of the student workbook. If you want to have the students practice looking up the definitions, you can use the included glossary of the terms on pp. 197-200 of this guide.

{Optional} Review Sheets

The last part of the "Write" section assigns a weekly review sheet. These sheets are found at the back of the student workbook. Although these review sheets are not essential, they are helpful in assessing how much the students are retaining. You can also use these review sheets as quizzes. The correct answers for the review sheets are found at the end of the lesson's materials.

Final Thoughts

Our goal at Elemental Science is to provide you with the information you need to be successful in your quest to educate your students in the sciences at home, which is why I encourage you to contact us with any questions or problems that you might have concerning this program at support@elementalscience.com. I, or a member of our team, will be more than happy to answer them as soon as we are able. I hope that you enjoy this year with *Physics for the Grammar Stage*!

- Paige Hudson

Supplies Needed by Week

Energy Unit

Week	Supplies needed
1	String (3 ft.), Tape, 2 Small Bouncy balls
2	Pinwheel template from appendix p. 189, Chopstick or thin dowel rock, Straight pin, Bead
3	A twistable tube-shaped balloon, Scissors, A small marble or ball, Large box or plastic storage bin
4	3 Bowls, Hot-to-the-touch (but not burning) water, Ice-cold water, Room temperature water
5	Bowl, Water, Thermometer
Unit Project	Plastic spoon, Marshmallow or Small, light bead, Other materials will vary based on design

Light Unit

Week	Supplies needed
1	Small nail or screw, Box with a lid, Small objects (such as a ball, a pencil, or a toy car), Flashlight
2	Poster board or thin cardboard, Template from appendix p. 190, Red and blue paint (or markers), Pencil, Scissors
3	Straw, Clear glass, Water
4	Round, clear, glass cup or jar, Water, Pencil, Index card
5	*No supplies needed.*
Unit Project	Clear, flat plastic tote, such as the one used to store things under a bed, Wax paper, String of fluorescent rope lights, Container of salt, Squares of tissue paper in a variety of colors, Clear dish, Several different clear liquids (water, alcohol, or corn syrup), Hand mirror, Old glasses or other lenses

Sound Unit

Week	Supplies needed
1	Tuning fork, Water, Bowl
2	Tuning fork, Bowl, Salt (or sand), Plastic wrap
3	Tuning fork, Thick cardboard, Styrofoam (or plastic) cup, Scissors (or knife)

Supplies Needed by Week

Sound Unit (Continued)

Week	Supplies needed
4	Jar with lid, Several different thicknesses of rubberbands
Unit Project	*Materials will vary based on the instrument you choose to make.*

Electricity Unit

Week	Supplies needed
1	Tissue paper, Balloon, Scissors
2	Watch battery, Thin cardboard, Tape, LED light bulb
3	Several types of magnets (bar magnets, horseshoe magnets, or neodymium magnets), Several types of objects (marbles, paper clips, paper, pins, plastic spoons, and more)
4	Old electronic device, Screwdriver, Newspaper
5	Computer, Access to the Internet
Unit Project	Snap Circuits Jr. SC-100 Electronics Discovery Kit or a comparable circuit kit

Forces Unit

Week	Supplies needed
1	Toy car, String, Tape, Several books, Cardboard sheet
2	Bag of gumdrops, Toothpicks, Plate
3	Pencil, Cardboard sheet (or hardcover book), Flat surface
4	Marble, Cookie sheet (or smooth cutting board), Paper, Felt, Book
5	Balloon, Old CD, 2-L soda bottle lid, Thin nail, Glue
Unit Project	Washer, Box, Several shock-absorbing materials (e.g., newspaper, foam, cotton balls, or packing peanuts), String, Parachute materials (e.g., paper, fabric, or plastic wrap), 1 Qt container, Raw egg

Motion Unit

Week	Supplies needed
1	Straw, String (5 feet), Scissors, Large balloon, 2 Chairs, Tape

Supplies Needed by Week

Motion Unit (Continued)

Week	Supplies needed
2	Toy car, Ramp
3	Balloon, Penny
4	*No supplies needed.*
Unit Project	Build-a-rocket kit

Engineering Unit

Week	Supplies needed
1	Thick cardboard, Nail, Screw, String
2	10 Round pencils, Heavy book
3	Plastic tubing (about 2 feet), 2 Syringes, Tape, Water
4	LEGO bricks, including several wheels, Balloon
5	Cornstarch, Water, Vegetable Oil, Plastic baggie, Food coloring
6	10 Straws, Tape, 2 Cups or plastic bins, Small paper cup, Pennies
7	Aluminum foil, Pennies, Plastic tub
8	Smartphone or GPS device, Geo-caching app
Unit Project	K'nex Gears Kit, Paper, Masking tape, Several newspapers

Physics for the Grammar Stage

Energy Unit

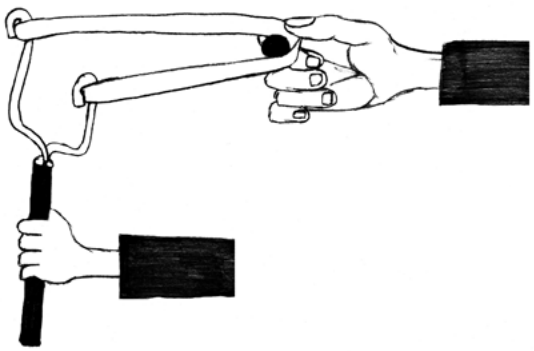
Energy Unit Overview
(5 weeks)

Books Scheduled

- 🕮 *Usborne Science Encyclopedia*

{Optional Encyclopedias}

- 🕮 *Basher Science Physics*
- 🕮 *Usborne Children's Encyclopedia*
- 🕮 *DK Children's Encyclopedia*



Sequence for Study

- **Week 1:** Energy Basics
- **Week 2:** Energy Resources
- **Week 3:** Nuclear Energy
- **Week 4:** Heat Energy
- **Week 5:** Heat Transfer

Energy Unit Memory Work

Energy
Energy is the ability to do work
It comes in different forms - each with their own quirk
Potential energy in an object is stored
Kinetic found in the motion of a skateboard
Light and sound - the energy of waves in motion
Heat is caused by temperature locomotion
Chemical, nuclear - released in reactions
Gravitational - the result of attraction
We use energy in what we do all day long
From holding a ball to hearing a bluebird's song

Law of Conservation of Energy
Energy can neither be created nor destroyed.

Supplies Needed for the Unit

Week	Supplies needed
1	String (3 ft.), Tape, 2 Small Bouncy balls
2	Pinwheel template from appendix p. 189, Chopstick or thin dowel rock, Straight pin, Bead
3	A twistable tube-shaped balloon, Scissors, A small marble or ball, Large box or plastic storage bin
4	3 Bowls, Hot-to-the-touch (but not burning) water, Ice-cold water, Room temperature water
5	Bowl, Water, Thermometer
Unit Project	Plastic spoon, Marshmallow or Small, light bead, Other materials will vary based on design

Unit Vocabulary

1. **Energy** – The ability to do work.
2. **Energy Chain** – A way of showing how energy changes into different forms.
3. **Solar energy** – Energy from the sun.
4. **Wind energy** – Energy from the wind.
5. **Nuclear fission** – The splitting apart of atomic particles to create energy.
6. **Nuclear fusion** – The joining of atomic particles to create energy.
7. **Heat** – A form of energy that flows from one place to another because of differences in temperature.
8. **Temperature** – A measure of how much heat an object has.
9. **Conduction** – The transfer of heat through direct contact.
10. **Convection** – The transfer of heat through the movement of a liquid and gas.
11. **Radiation** – The transfer of heat through indirect contact.

Week 1: Energy Basics Lesson Plans

2-Days-a-week Schedule		
	Day 1	**Day 2**
Read	❑ Read "Energy, part 1 and part 2" ❑ *{Choose one or more of the additional resources to read from this week}*	❑ *{Choose one or more of the additional resources to read from this week}* ❑ *{Work on memorizing the "Energy" poem}*
Do	❑ *{Work on the Catapult Project or Complete the Energy Chain Project}*	❑ Do the Scientific Demonstration: Energy Relocation
Write	❑ Add information about energy to the students' notebook or lapbook ❑ Define energy and energy chain	❑ Complete the demonstration sheet ❑ *{Work on the Energy Weekly Review Sheet 1}*

5-Days-a-week Schedule					
	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Read	❑ Read "Energy, part 1"	❑ Read "Energy, part 2"	❑ *{Work on memorizing the "Energy" poem}*	❑ *{Choose one or more of the additional resources to read from this week}*	❑ *{Choose one or more of the additional resources to read from this week}*
Do	❑ *{Do the Energy Boat Project}*	❑ *{Complete the Energy Chain Project}*	❑ Do the Scientific Demonstration: Energy Relocation	❑ *{Work on the Catapult Project}*	
Write	❑ Add information about energy to the students' notebook or lapbook	❑ Add information about energy to the students' notebook or lapbook	❑ Complete the demonstration sheet	❑ Define energy and energy chain	❑ *{Work on the Energy Weekly Review Sheet 1}*

{These assignments are optional.}

Read - Information Gathering

Reading Assignments

- ❑ *Usborne Science Encyclopedia* p. 106 "Energy, part 1"
  - ? Do you remember several of the different forms of energy?
  - ? What is chemical energy?
  - ? What is potential energy?
  - ? What is kinetic energy?
- ❑ *Usborne Science Encyclopedia* p. 107 "Energy, part 2"
  - ? What is the Law of Conservation of Energy?
  - ? Can you describe an energy chain?

{Optional} Memory Work

🗣 This week, memorize the "Law of Conservation of Energy" poem. (SW p. 122)

{Optional} Additional Resources

Encyclopedias

- 🕮 *Basher Science Physics* p. 30 "Energy," p. 32 "Potential Energy," p. 34 "Kinetic Energy"
- 🕮 *Usborne Children's Encyclopedia* pp. 192-193 "Energy"
- 🕮 *DK Children's Encyclopedia* pp. 88-89 "The Story of Energy"

Library Books

- 🕮 *Energy (Science Readers)* by Suzanne I. Barchers
- 🕮 *Energy (True Books: Physical Science)* by Matt Mullins
- 🕮 *Energy Makes Things Happen (Let's-Read-and-Find-Out Science 2)* by Kimberly Brubaker Bradley and Paul Meisel

Do - Demonstration and Activities

Demonstration - Energy Relocation

You will need the following:

- ✓ String (3 ft.)
- ✓ Tape
- ✓ 2 Small bouncy balls

Demonstration Instructions

1. Read the following introduction to the students.

   Energy is an amazing thing! It allows us to move, to see stuff, and to get warm. Energy exists in several different forms, such as light, heat, and sound. We will learn about these types of energy in the coming weeks, but the important part to remember for now is that energy can't be created or destroyed. It just changes forms! We call this principle the Law of

Conservation of Energy. In today's demonstration, we are going to use a pair of bouncy balls to see this law in action!

2. Have the students begin by cutting the string in half. Then, have them tape the end of one string to one of the bouncy balls and the end of the second string to the second bouncy ball. (**Note -** *If the tape doesn't stick to your bouncy ball, tie the string around the ball instead.*)
3. Place the other ends of the two strings on a counter or on the edge of a table so that the two balls are the same height and just barely touching each other. Use tape to secure the string onto the surface.
4. Have the students pull one of the balls away from the other and then let go so that it collides into the other stationary ball. Have them observe what happens and write it down on the chart on the demonstration sheet on SW p. 11.
5. Then, have the students pull both of the balls away from each other and then release so that they collide into each other. Have them observe what happens and write it down on the chart on the demonstration sheet.
6. Read the demonstration explanation to the students, and have them complete the demonstration sheet.

Demonstration Explanation

The purpose of this demonstration was for the students to see what happens to energy. The students should see that every time the bouncy balls collided, they would move. Read the following to the students:

Every time the bouncy balls hit one another, they cause each other to move in the opposite direction. This is the Law of Conservation of Energy in action! The energy to raise the ball to a high position comes from us and is changed into stored, or potential, energy in the ball. Then, when we release the ball, this potential energy changes into energy of motion, which is called kinetic energy. When the balls collide, they swap this energy of motion, plus a bit of heat energy from the collision. Eventually, the two balls stop moving as all of the energy of motion has changed into heat energy.

{Optional} Take the Demonstration Further

Have the students compete to see who can transfer the most energy to a rubber band. You will need several people, a rubber band for each person, and a measuring tape. Draw a line at one end of a room or outside. Give each player a rubber band, and have them stand on the line. Call out "potential," at which point the players will stretch their rubber bands. Then, call out "kinetic," at which point the players will let go. Measure the distance each rubber band has traveled. The player whose rubber band has traveled the farthest wins the race! (*You can also have several trials and add up the distances to see who is the energy winner.*)

{Optional} Unit Project

✂ **Catapult -** During this unit, the students will design and build a catapult, which will help

them to learn more about potential and kinetic energy. Each week, they will add a bit of what they have learned in their catapult diary on SW p. 8. For this week, the students will test out a simple spoon catapult. To do this, you will need a plastic spoon and a small, light object, such as a marshmallow or a bead. Begin by sharing with the students that every catapult needs three key components—an arm to hurl the material, an elastic component to store energy, and a base to hold the catapult in place. Have the students hold the spoon handle (the arm and the elastic component) in one hand (the base) so that it is parallel to the ground and the cup of the spoon is closest to them. Place the object in the cup of the spoon, and have the students pull it gently back with two fingers to create a bit of potential energy. Have them let go and watch what happens to the object. (*The students should see that the object takes flight as the potential energy transfers into kinetic energy of motion.*) You can have them repeat this, varying the angle of the spoon and the amount of force used to pull back on the spoon cup. After the students are done with their testing, have them write down what they have learned in their catapult diary.

{Optional} Projects for This Week

- ✂ **Energy Boat** – Have the students do the "See for Yourself" activity on p. 107 of the *Usborne Science Encyclopedia*. You will need a matchbox, a cardboard, two used matches, and a rubber band for this activity.
- ✂ **Energy Chain** – Have the students create an energy chain poster. You can have them use the one found on p. 107 of the *Usborne Science Encyclopedia* for inspiration.

Write – Notebooking

Writing Assignments

- ☐ **Student Workbook** – Have the students dictate, copy, or write three to five sentences about energy on *Physics for the Grammar Stage Student Workbook* (SW) p. 10.
- ☐ **{Optional} Lapbooking Templates** – Have the students complete the Energy Tab-book on p. 9 of *Physics for the Grammar Stage Lapbooking Templates* (LT). Have them cut out the pages for the tab-book and color the pictures. Then, have the students add a sentence about potential energy on the potential page and a sentence about kinetic energy on the kinetic page. Assemble the tab-book, and staple it together on the dashed lines. Finally, have the students glue the tab-book into the lapbook.
- ☐ **{Optional} Lapbooking Templates** – Have the students begin the Energy lapbook by cutting out and coloring the cover on LT p. 8. Then, have the students glue the sheet onto the front of the lapbook.
- ☐ **{Optional} Lapbooking Templates** – Have the students complete the Law of Conservation of Energy Sheet on LT p. 15. Have them cut out the sheet and copy the Law of Conservation of Energy in the space provided. Then, have the students glue the sheet into the lapbook.
- ☐ **{Optional} Coloring Pages** – Have the students color the following pages from *Physics for*

the Grammar Stage Coloring Pages (CP): Potential Energy CP p. 6, Kinetic Energy CP p. 7.

Vocabulary

Have the students look up and copy the definitions for the following words:

- **Energy** – The ability to do work. (SW p. 109)
- **Energy Chain** – A way of showing how energy changes into different forms. (SW p. 109)

{Optional} Weekly Review Sheet

- "Energy Weekly Review Sheet 1" on SW p. 133.

Answers:

1. Potential energy - energy that is stored, kinetic energy - energy of motion
2. Energy, created, destroyed
3. True
4. Answers will vary.

Week 2: Energy Resources Lesson Plans

2-Days-a-week Schedule		
	Day 1	**Day 2**
Read	❑ Read "Energy Resources, part 1 and part 2" ❑ *{Choose one or more of the additional resources to read from this week}*	❑ *{Choose one or more of the additional resources to read from this week}* ❑ *{Work on memorizing the "Energy" poem}*
Do	❑ *{Work on the Catapult Project or Complete the Solar Oven Project}*	❑ Do the Scientific Demonstration: Wind Energy
Write	❑ Add information about energy resources to the students' notebook or lapbook ❑ Define solar energy and wind energy	❑ Complete the demonstration sheet ❑ *{Work on the Energy Weekly Review Sheet 2}*

5-Days-a-week Schedule					
	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
Read	❑ Read "Energy Resources, part 1"	❑ *{Work on memorizing the "Energy" poem}*	❑ Read "Energy Resources, part 2"	❑ *{Choose one or more of the additional resources to read from this week}*	❑ *{Choose one or more of the additional resources to read from this week}*
Do	❑ *{Complete the Solar Oven Project}*	❑ Do the Scientific Demonstration: Wind Energy	❑ *{Do the Wind Turbine Project}*	❑ *{Work on the Catapult Project}*	❑ *{Complete the Renewable Heat Project}*
Write	❑ Add information about energy resources to the students' notebook or lapbook	❑ Complete the demonstration sheet	❑ Add information about energy resources to the students' notebook or lapbook	❑ Define solar energy and wind energy	❑ *{Work on the Energy Weekly Review Sheet 2}*

Read - Information Gathering

Reading Assignments

- ❑ *Usborne Science Encyclopedia* p. 108 "Energy Resources, part 1"
  - ? What is a nonrenewable energy source?
  - ? What is a renewable energy source?
- ❑ *Usborne Science Encyclopedia* p. 109 "Energy Resources, part 2"
  - ? Do you remember how solar energy works?
  - ? What does a machine do?

{Optional} Memory Work

🗣 This week, begin memorizing the "Energy" poem. (SW p. 122)

{Optional} Additional Resources

Encyclopedias

- 🕮 *Basher Science Physics* p. 30 "Generator"
- 🕮 *DK Children's Encyclopedia* pp. 88-89 "Energy," p. 110 "Fossil Fuels "

Library Books

- 🕮 *Sun Power: A Book about Renewable Energy (Earth Matters)* by Esther Porter
- 🕮 *Wind Energy: Blown Away! (Powering Our World)* by Amy S. Hansen
- 🕮 *Solar Energy: Running on Sunshine (Powering Our World)* by Amy S. Hansen
- 🕮 *Energy from the Sun (Rookie Read-About Science)* by Allan Fowler
- 🕮 *Biomass Power (Let's Discuss Energy Resources)* by Richard Spilsbury
- 🕮 *Fossil Fuel Power (Let's Discuss Energy Resources)* by Richard Spilsbury

Do - Demonstration and Activities

Demonstration - Wind Energy

You will need the following:

- ✓ Pinwheel template from appendix p. 189
- ✓ Chopstick or thin dowel rod
- ✓ Straight pin
- ✓ Bead

Demonstration Instructions

1. Read the following introduction to the students.

   Last week, we learned about energy! We also talked about how energy comes in different forms. The Law of conservation of Energy says that energy is not created or destroyed. In other words, energy changes forms. As humans we can take advatage of this! We can use the kinetic energy of water to turn a turbine, which turns that energy into electrical energy that we can use in our

homes. There are many different resources we can use for energy. In today's demonstration, we are going to see one of those energy resources—wind—in action!

2. Begin by making a pinwheel. Cut out the pinwheel template found on p. 189 of the appendix. (Cut on the dashed lines, not the solid ones.) Then, bring every other corner to the center and pin them in place with a straight pin. Roll the pin around a bit to enlarge the hole so that the pinwheel can spin freely. Next, add a bead to the pin on the opposite side of the pin head and push the tip of the pin into the top of the chopstick to create a pinwheel.
3. Now, have the students face the blades of the pinwheel toward themselves and blow on it, and observe what happens. Does the pinwheel spin? Which way does it spin?
4. Next, have the students face the front of the pinwheel toward themselves and blow on it, and observe what happens. Does the pinwheel spin? Which way does it spin?
5. Finally, have the students angle the pinwheel slightly away from them so that they will blow halfway between the front and the blades. Have them blow on the pinwheel and observe what happens. Does the pinwheel spin? Which way does it spin?
6. Read the demonstration explanation to the students, and have them complete the demonstration sheet on SW p. 13.

Demonstration Explanation

The purpose of this demonstration was for the students to see wind energy in action. The students should see that when they blew directly on the blades of the pinwheel from the side, it turned in a clockwise motion following their breath. Then, the students should see that the when they blew direction on the front of the pinwheel, it did not turn. Finally, the students should see that when they blew partway between the front and the blades, the pinwheel turned a bit, but the action was jerky and not as efficient as the first time. Read the following to the students:

> We saw that when we blew on the blades of the pinwheel from the side, the pinwheel turned quickly. When we blew at the pinwheel from other directions, it didn't move nearly as well. A pinwheel is a simple look at how we can harness wind energy. In general, wind blows, and the blades are positioned to capture the wind, causing the wheel to turn. A windmill or wind turbine work the same way as the pinwheel, except these devices harness wind energy and turn it into electrical energy.

{Optional} Take the Demonstration Further

Have the students watch the following video to learn more about wind energy:

https://www.youtube.com/watch?v=SQpbTTGe_gk

{Optional} Unit Project

✂ **Catapult** – This week, have the students plan out their catapult design based on what they learned from the previous week's simple catapult. As they plan their design, make sure that the catapult has the following three components—an arm to hurl the material, an elastic

component to store energy, and base to hold the catapult in place. Here are a few ideas:

- Popsicle Stick Catapult (easy): https://littlebinsforlittlehands.com/popsicle-stick-catapult-kids-stem-activity/
- Dowel Rod Catapult (medium): https://frugalfun4boys.com/2013/06/06/how-to-build-a-catapult-out-of-dowel-rods-and-rubber-bands/
- PVC Catapult (medium): https://www.youtube.com/watch?v=beQsWlc0UDc
- Wood Catapult (hard): https://www.youtube.com/watch?v=Y0e2VzLW5fE

After they decide on a design, have them sketch it on SW p. 8.

{Optional} Projects for This Week

- ✂ **Solar Oven** – Have the students build their own solar oven out of an old pizza box. You will need scissors, plastic wrap, aluminum foil, tape, an old pizza box, black construction paper, a glass or metal pie plate, and a few marshmallows or a piece of buttered toast. Use the scissors to make a flap out of the top of the pizza box by cutting three sides, leaving about an inch away from the sides. Then, fold the flap back, and cover the flap with aluminum foil. Next, cover the open hole in the top with plastic wrap. After that, line the bottom of the box with black construction paper. Now, place your marshmallows or piece of buttered toast on the pie plate, set the plate inside the oven, and take the oven outside. Finally, position the box and flap so that the sun's rays are directed toward the plastic-wrap-covered opening. Check the oven every 10 to 15 minutes to see when the food is done. Use a hot mitt to remove the food, and enjoy the solar-powered meal!
- ✂ **Wind Turbine** – Have the students make their own wind turbine at home! You will need PVC pipe, a propeller blade, a DC motor, electrical tape, and wire. This is a bit of an ambitious project, but you can see how to build your own here:
  - https://www.youtube.com/watch?v=YY1oCNhD8_0
- ✂ **Renewable Heat** – Have the students do the "See for Yourself" activity on p. 109 of the *Usborne Science Encyclopedia*. You will need a hose and a cork for this activity.

Write – Notebooking

Writing Assignments

- ☐ **Student Workbook** – Have the students dictate, copy, or write three to five sentences on energy resources on SW p. 12.
- ☐ **{Optional} Lapbooking Templates** – Have the students complete the Energy Resources Wheel-book on LT p. 10. Have them cut out the wheels. On one half of the wheel, have the students add the definition of renewable resources along with several examples of renewable energy. On the other half, have the students add the definition of nonrenewable resources along with several examples of nonrenewable energy. Then, use a brad to attach the two pages together so that the cover spins to reveal one half at a time. Finally, have them glue the mini-book into the lapbook.

- ☐ **{Optional} Coloring Pages –** Have the students color the following pages: Energy Resources CP p. 8, Wind Energy CP p. 9.

Vocabulary

Have the students look up and copy the definitions for the following words:

- **Solar energy –** Energy from the sun. (SW p. 118)
- **Wind energy –** Energy from the wind. (SW p. 120)

{Optional} Weekly Review Sheet

- "Energy Weekly Review Sheet 2" on SW p. 134.

  Answers:

  1. A renewable source of energy can generate power without being used up. (*Students can also include examples, such as the Sun, wind, or water, for their answer.*)
  2. A nonrenewable source of energy can be use only once to generate power. (*Students can also include examples, such as coal, oil, or gas, for their answer.*)
  3. False
  4. Answers will vary.

Physics for the Grammar Stage

Student Workbook

Third Edition by Paige Hudson

Classical SCIENCE

A Quick Welcome from the Author

Dear Student,

Welcome to physics! This workbook will serve as a scrapbook of sorts for you to share what you have learned about the principles of physics. You will be learning about forces, motion, energy, and so much more.

Each week you and your teacher will do the following:

- **Read** the assigned pages together. Your teacher will then ask you a few questions as you discuss what was read. Be sure to share what you found interesting.
- **Do** the weekly demonstration with your teacher. This is the super fun part of science, plus you get to exercise your observation muscles. Be sure to pay close attention and help out when your teachers ask you to do so.
- **Write** down what you have learned and seen. Your teacher may help you with the actual writing, but be sure to record the facts that you want to remember.

Your teacher has the tools to add in more each week, things like memory work, library books, and extra activities. Be sure to let them know if you want to dig deeper into a topic.

And, if you have a question or want to share your work with me, please have your teacher send us an email (support@elementalscience.com) or tag us (@elementalscience) in a photo you share online. I would love to see what you have learned!

I hope that you enjoy learning about physics this year!

Paige Hudson

Table of Contents

Physics for the Grammar Stage

Energy Unit

Catapult Diary

Week 1: Simple Marshmallow Catapult

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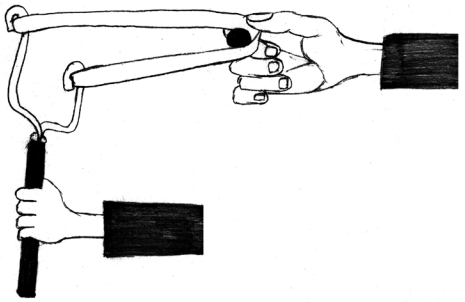
Week 2: My Catapult Design

Week 3 and 4: Building and Testing My Catapult

Week 5: Changes I Would Make

Energy Basics



Law of Conservation of Energy

Demonstration Report: Energy Relocation

Our Tools

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_____ _____

Our Method

What it looked like

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Our Outcome

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Our Insight

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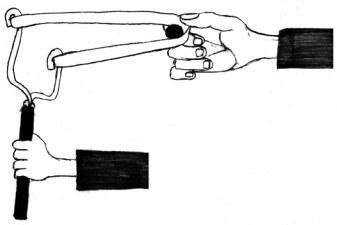
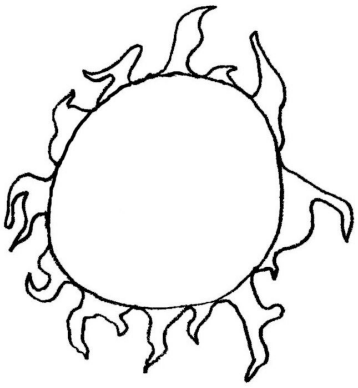
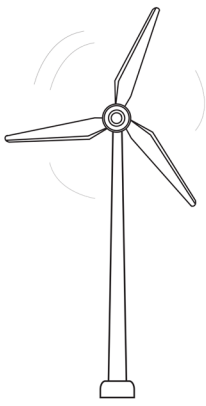
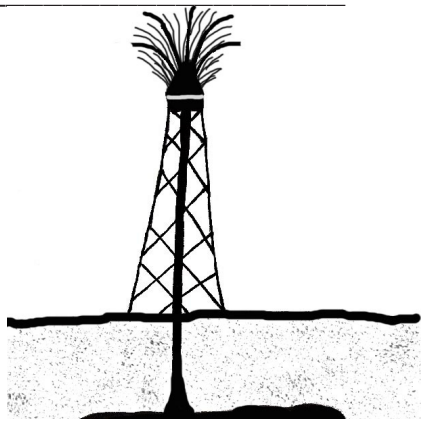


Energy Resources







Demonstration Report: Wind Energy

Our Tools

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_____ _____

Our Method

What it looked like

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Our Outcome

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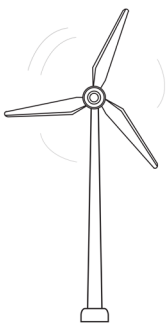
Our Insight

_____

_____

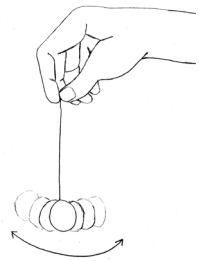
_____



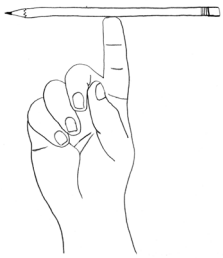
Physics for the Grammar Stage

Glossary

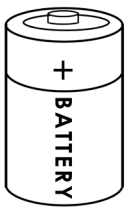
Acceleration —



Balance —



Battery —



Binary Code —

000010001010
101000101010
101010101010
101010100000
001010101000
001010101001
01010101010

Physics for the Grammar Stage

Memory Work

Energy Unit

Energy

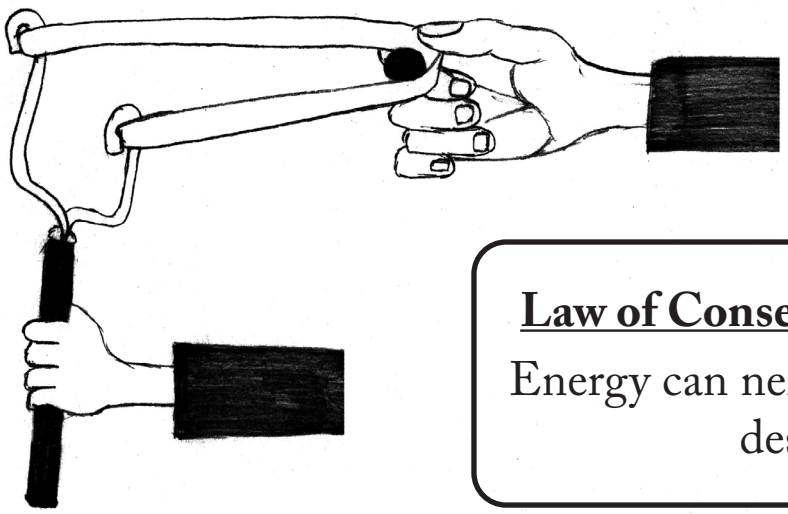
Energy is the ability to do work
It comes in different forms - each with their own quirk

Potential energy in an object is stored
Kinetic found in the motion of a skateboard

Light and sound - the energy of waves in motion
Heat is caused by temperature locomotion

Chemical, nuclear - released in reactions
Gravitational - the result of attraction

We use energy in what we do all day long
From holding a ball to hearing a bluebird's song



Law of Conservation of Energy

Energy can neither be created nor destroyed.

Physics for the Grammar Stage

Review Sheets

Energy Weekly Review Sheet 1

1. Match the following types of energy.

Potential Energy	Energy of motion
Kinetic Energy	Energy that is stored

2. The Law of Conservation of energy says that _____ can neither be _____ or _____.

3. **True or False:** An energy chain shows how energy changes forms.

4. What is the most interesting thing you learned this week?

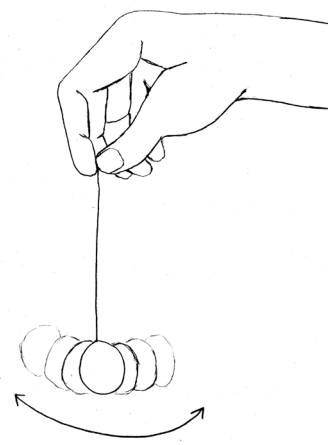
_____

_____

_____

_____

_____



Energy Weekly Review Sheet 2

1. What is a renewable source of energy?

_____

_____

_____

1. What is a nonrenewable source of energy?

_____

_____

_____

2. **True or False:** Fossil fuels are examples of renewable sources of energy. The wind and sun are examples of nonrenewable sources of energy.

4. What is the most interesting thing you learned this week?

_____

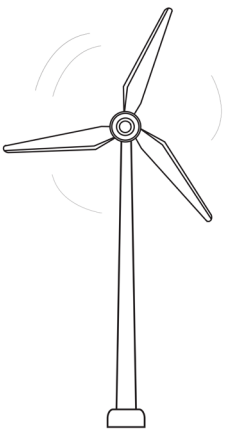
_____

_____

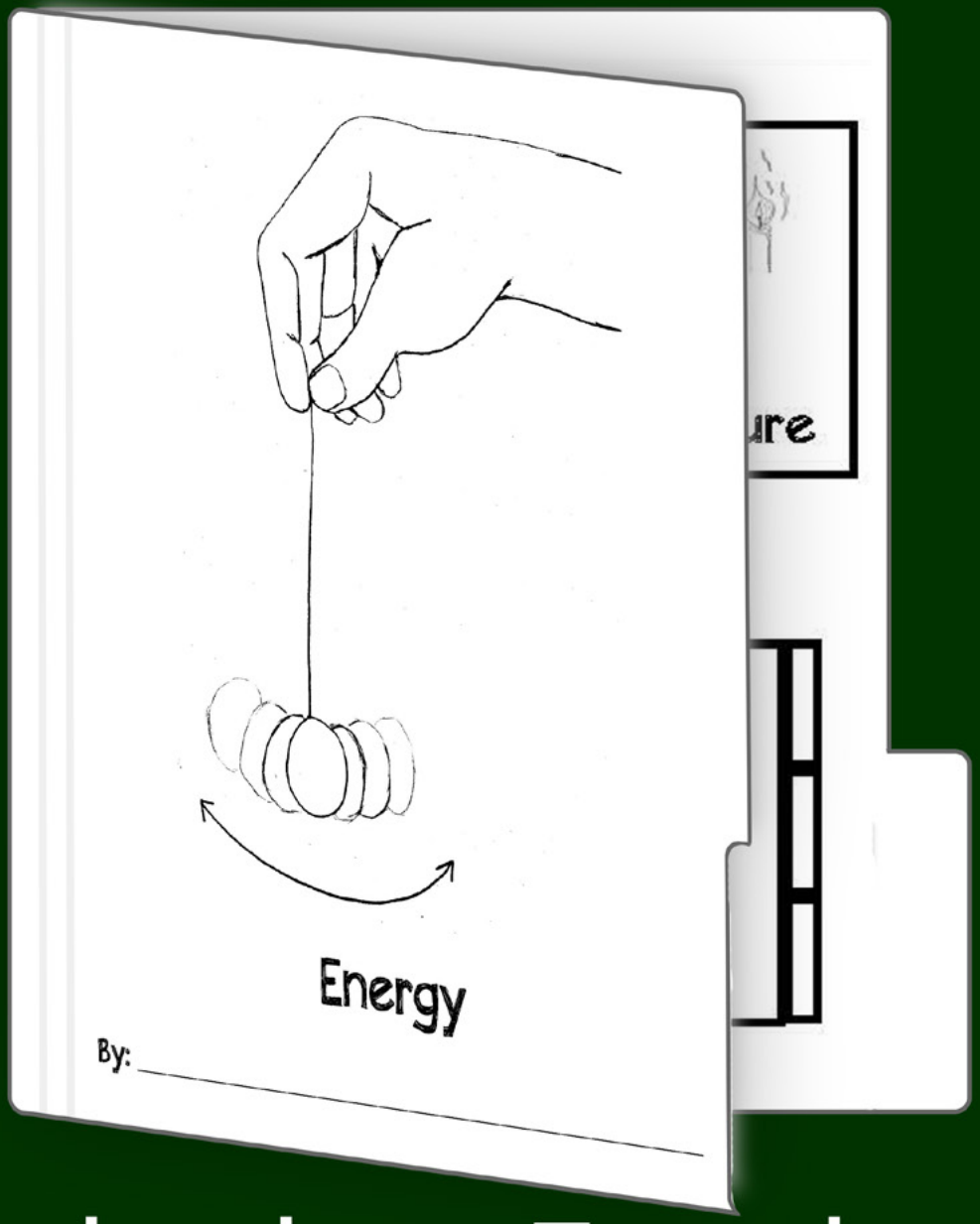
_____

_____

_____



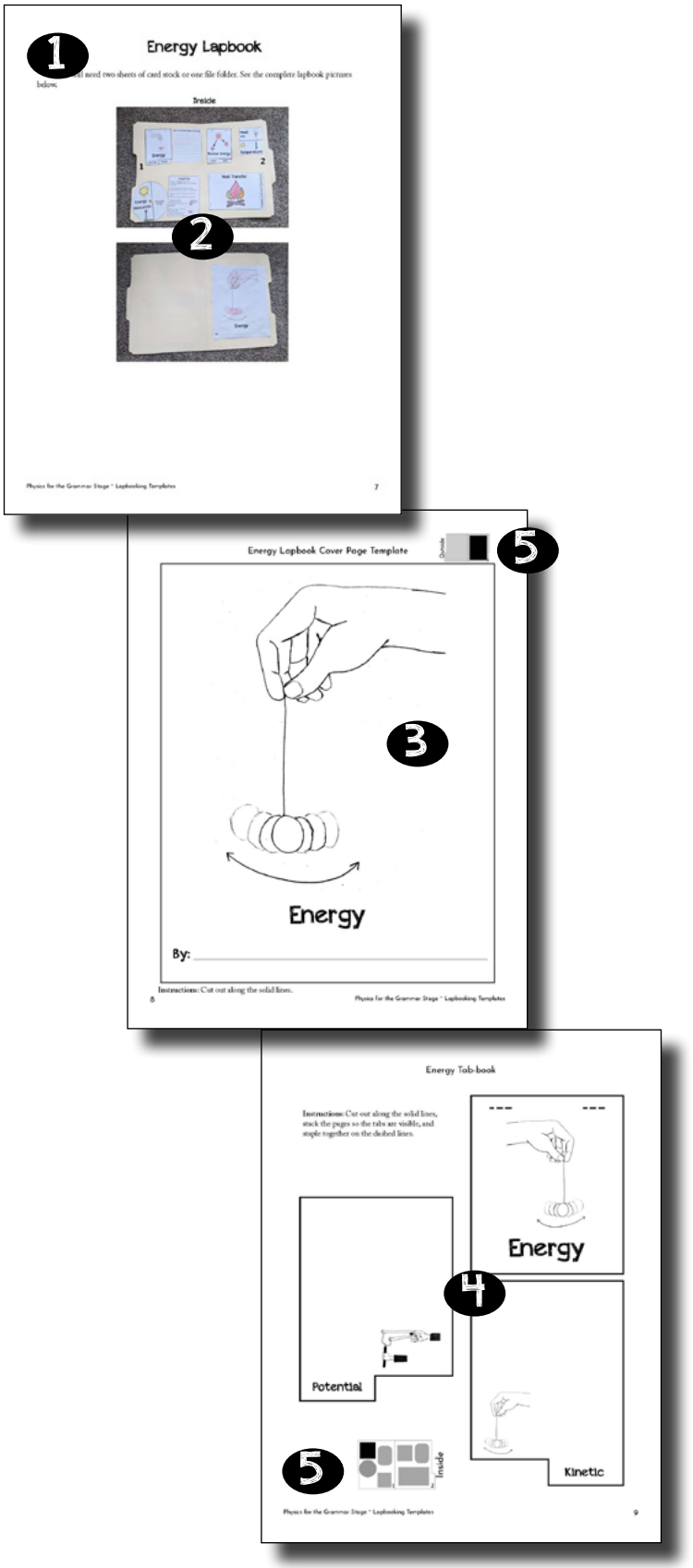
Physics for the Grammar Stage



Lapbooking Templates

(Third Edition)

A Peek Inside These Lapbooking Materials



Use the lapbooking templates to review the concepts learned, or you can have the student create each one in lieu of completing the student workbook.

1. Lapbook Overview

Know what each lapbook should look like with these overview sheets. You will also find overall directions for putting the lapbook together on this sheet. (**Note -** *The specific directions for completing each mini-book are found in the teacher guide.*)

2. Completed Lapbook Pictures

See a picture of the actual lapbook put together so you get an overall idea of where to place each mini-book.

3. Lapbook Cover

Find a unique cover for each of the suggested lapbooks.

4. Mini-book Templates

Get all the mini-books you will need to complete the suggested lapbooks. These templates include black-line illustrations and space for narrations.

5. Mini-book Placement

Know exactly where each mini-book goes with the placement pictures.

The Teacher Guide

Get the coordinating teacher guide with directions for the mini-books, plus so much more here:

https://elementalscience.com/collections/physics-for-the-grammar-stage

Table of Contents

Introduction

The lapbooking templates provided in this eBook are meant to coordinate with *Physics for the Grammar Stage*. They are ***not*** designed to be used independently because you need the coordinating teacher guide to know how to complete each mini-book. See more about the features of these templates on p. 3.

What is Included

There are templates for five lapbooks contained in this eBook:

1. Energy (begins on p. 7)
2. Light and Sound (begins on p. 16)
3. Electricity (begins on p. 27)
4. Forces and Motion (begins on p. 35)
5. Engineering (begins on p. 45)

You can have your students create five separate lapbooks or combine them to create one larger lapbook. (**Note -** *If you decide to create the larger complete lapbook, we have included a different cover page for you to use on p. 55.*)

The directions for assembling the overall lapbook are found on the overview page. However, the directions for completing each of the mini-books in this document are included in the *Physics for the Grammar Stage Teacher Guide.*

How to Use the Lapbooking Templates

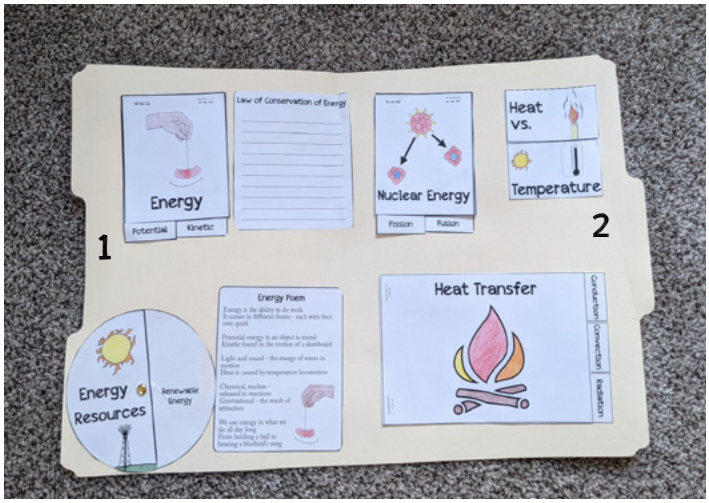
You can use the lapbook templates to review the concepts learned. Alternatively, you can have the student create a lapbook for each unit in lieu of completing the *Physics for the Grammar Stage Student Workbook*.

However you choose to use these lapbooking templates, please let us know if you have questions or would like to share feedback by emailing support@elementalscience.com.

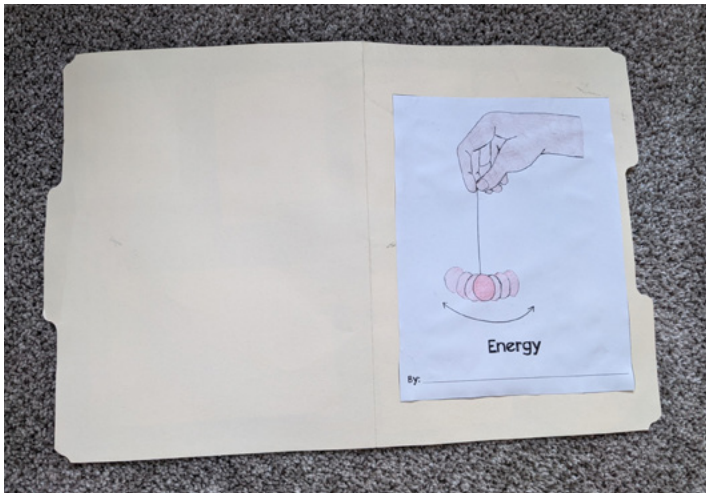
Energy Lapbook

You will need two sheets of card stock or one file folder. See the complete lapbook pictures below.

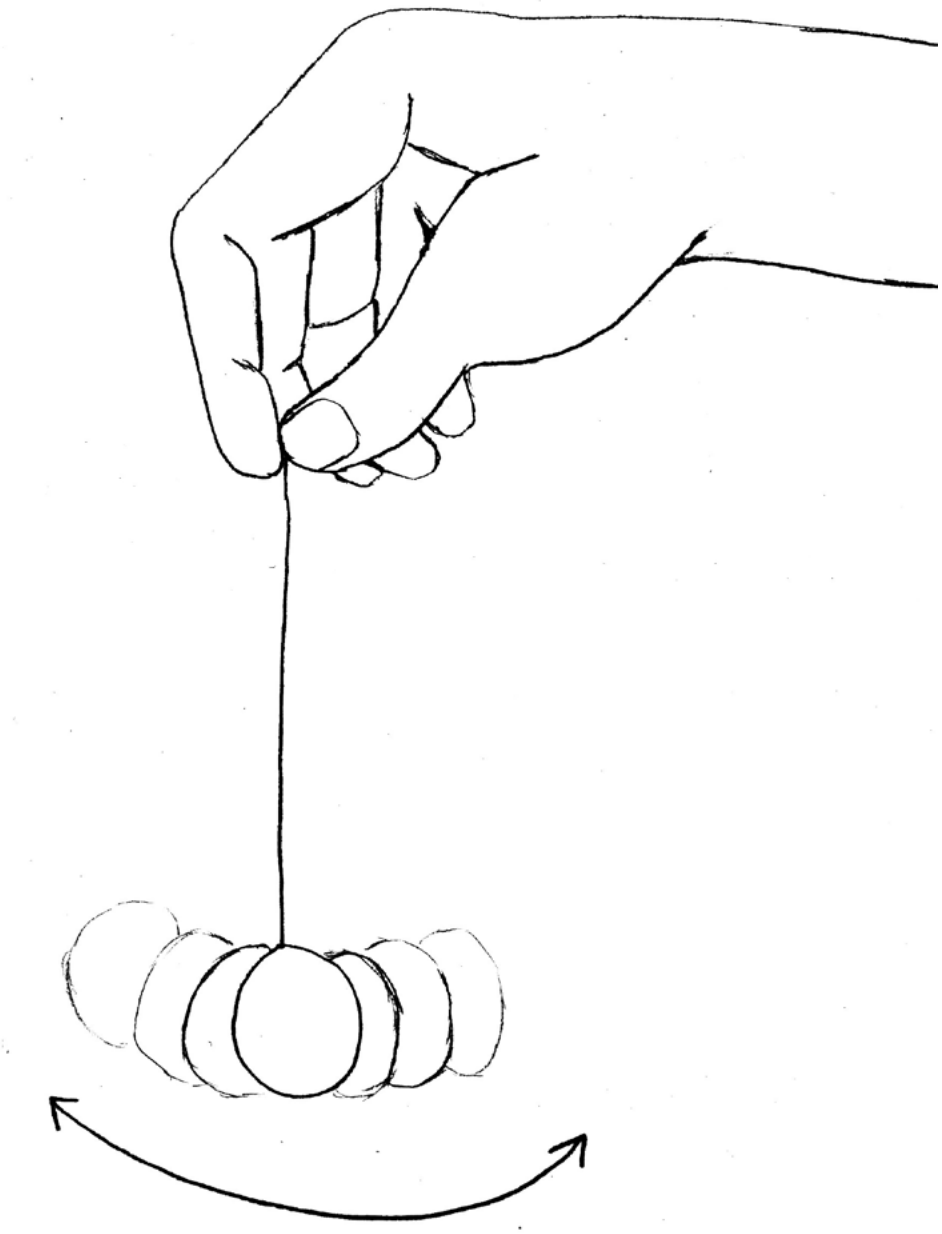
Inside



Outside



Energy Lapbook Cover Page Template



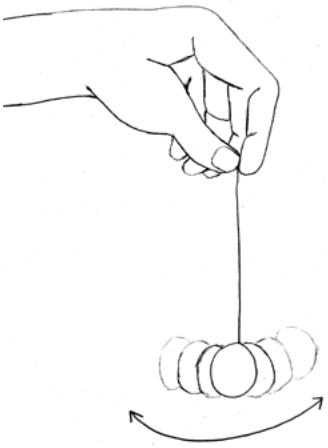
Energy

By: _____

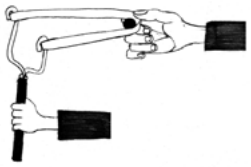
Instructions: Cut out along the solid lines.

Energy Tab-book

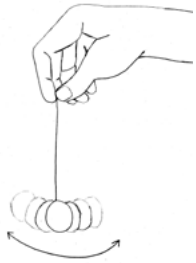
Instructions: Cut out along the solid lines, stack the pages so the tabs are visible, and staple together on the dashed lines.



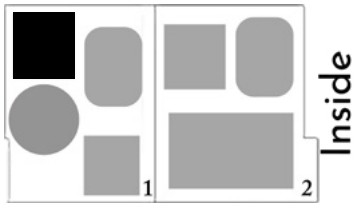
Energy



Potential

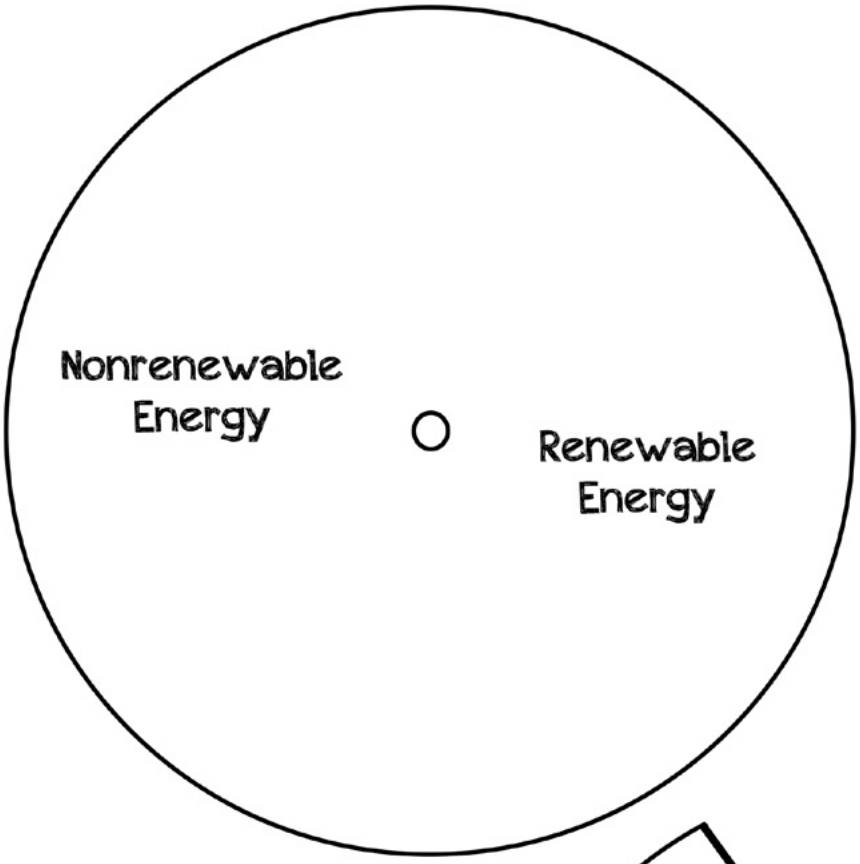


Kinetic

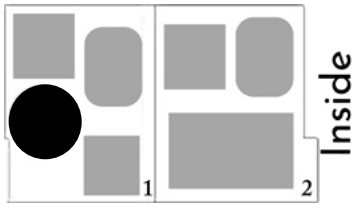


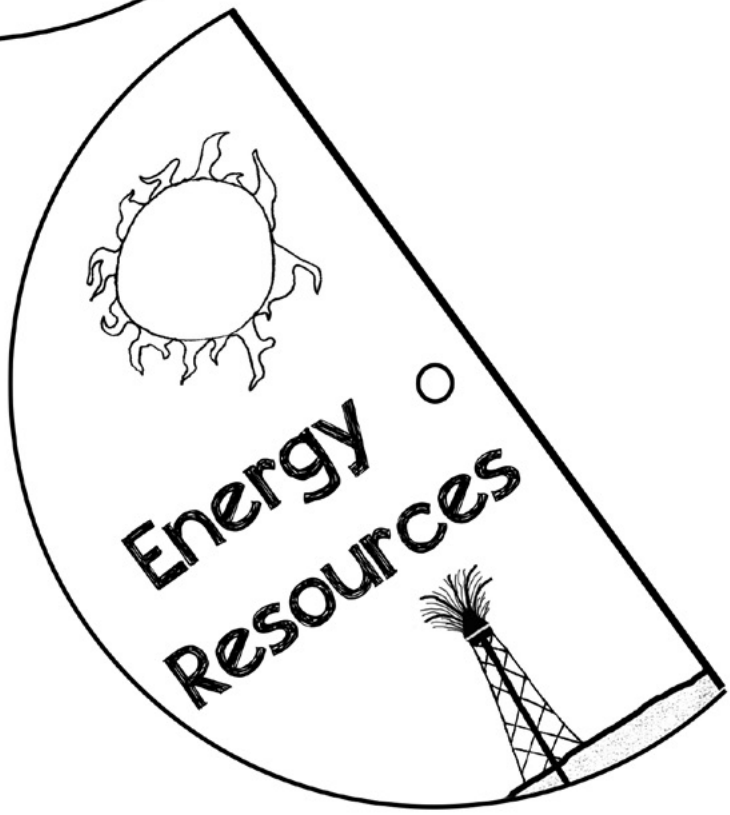
Inside

Energy Wheel-book



Instructions: Cut out along the outer solid lines and punch a hole where the holes are in the center. Stack the pages with the cover on top, insert a brad faster into the hole and secure it on the underside so that the cover can freely move around the bottom page.



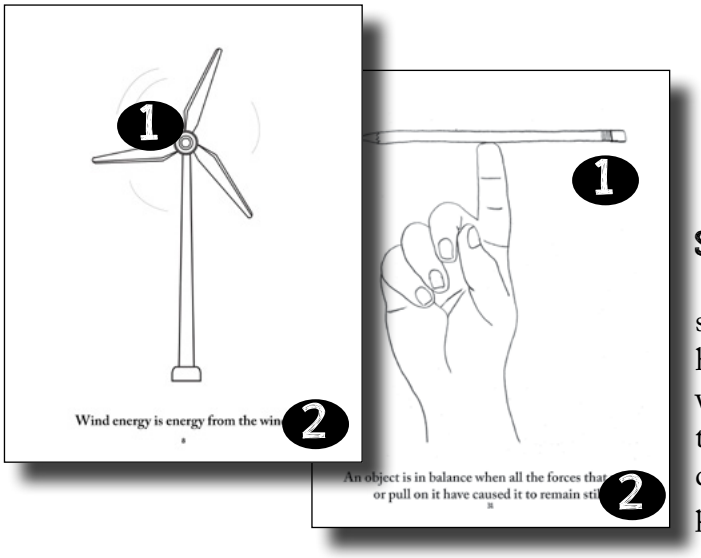


Physics for the Grammar Stage

Coloring Pages

(Third Edition)

Physics for the Grammar Stage Coloring Pages



Use the coloring pages to add a bit of art to your science plans or to engage younger students.

Simple Coloring Pages

Color your way through learning about science with these coloring pages. Each page has a large, black-line illustration (1) along with a key fact sentence (2) for the students to learn about the topic. The specific directions for when to use these coloring pages are found in the teacher guide.

Introduction

The coloring pages provided in this eBook are meant to coordinate with *Physics for the Grammar Stage*. There is one coloring page for almost every narration topic assigned in the program.

Each page has a large, black line illustration along a key fact sentence for the students to learn about the topic. Simply have the students color the picture as they desire using crayons, colored pencils, or watercolor paints. As they work, you can read the fact out loud several times.

You can use these pages with your younger "follow-along" students, with students who love to color, or with reluctant writers. We have scheduled these pages under the "Writing Assignments" section in the *Physics for the Grammar Stage Teacher Guide*.

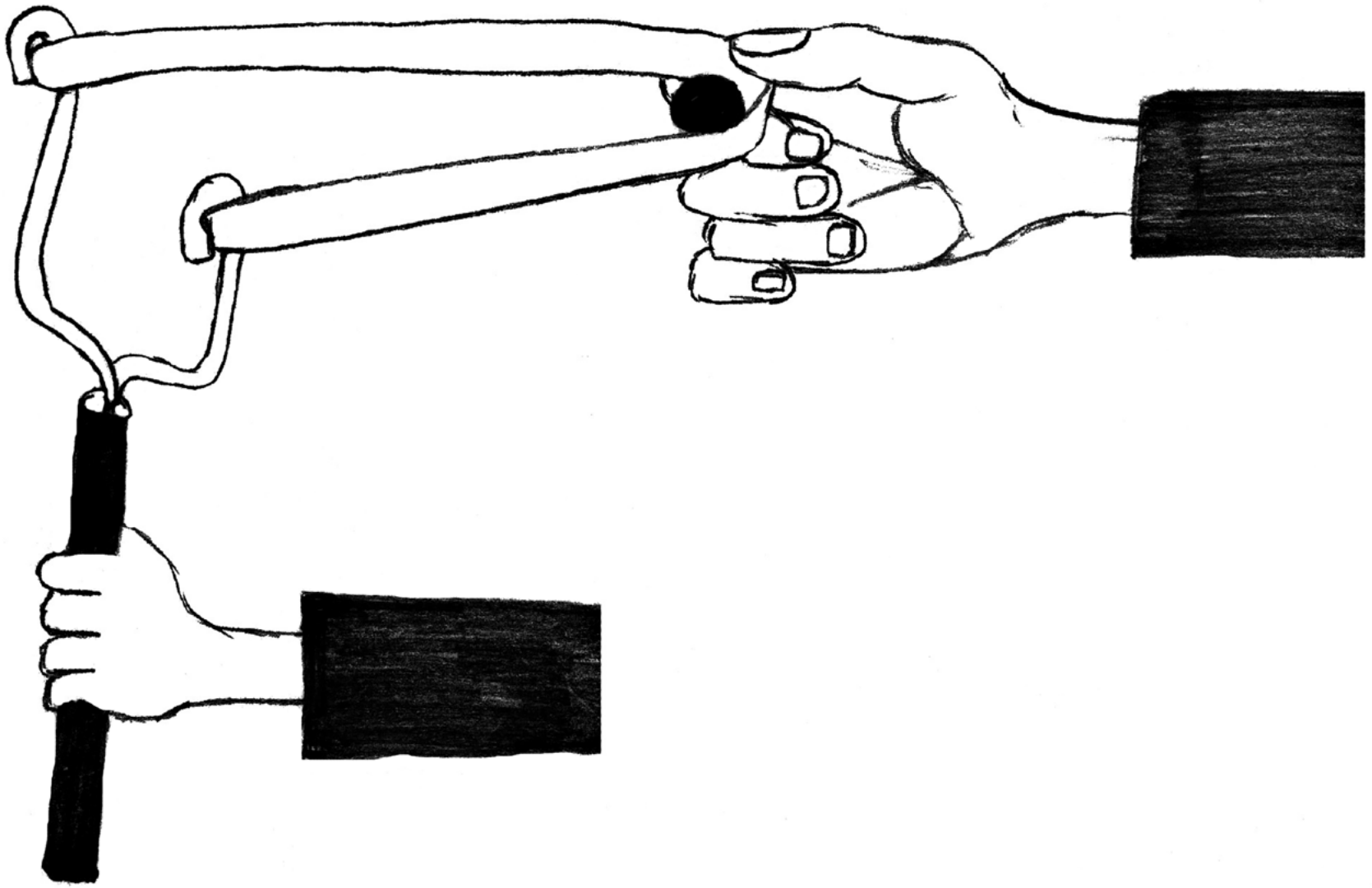
Our goal at Elemental Science is to provide you with the information you need to be successful in your quest to educate your students in the sciences at home, which is why I encourage you to contact us with any questions or problems that you might have concerning this program at support@elemental-science.com. I, or a member of our team, will be more than happy to answer them as soon as we are able. I hope that you enjoy these coloring pages!

- Paige Hudson

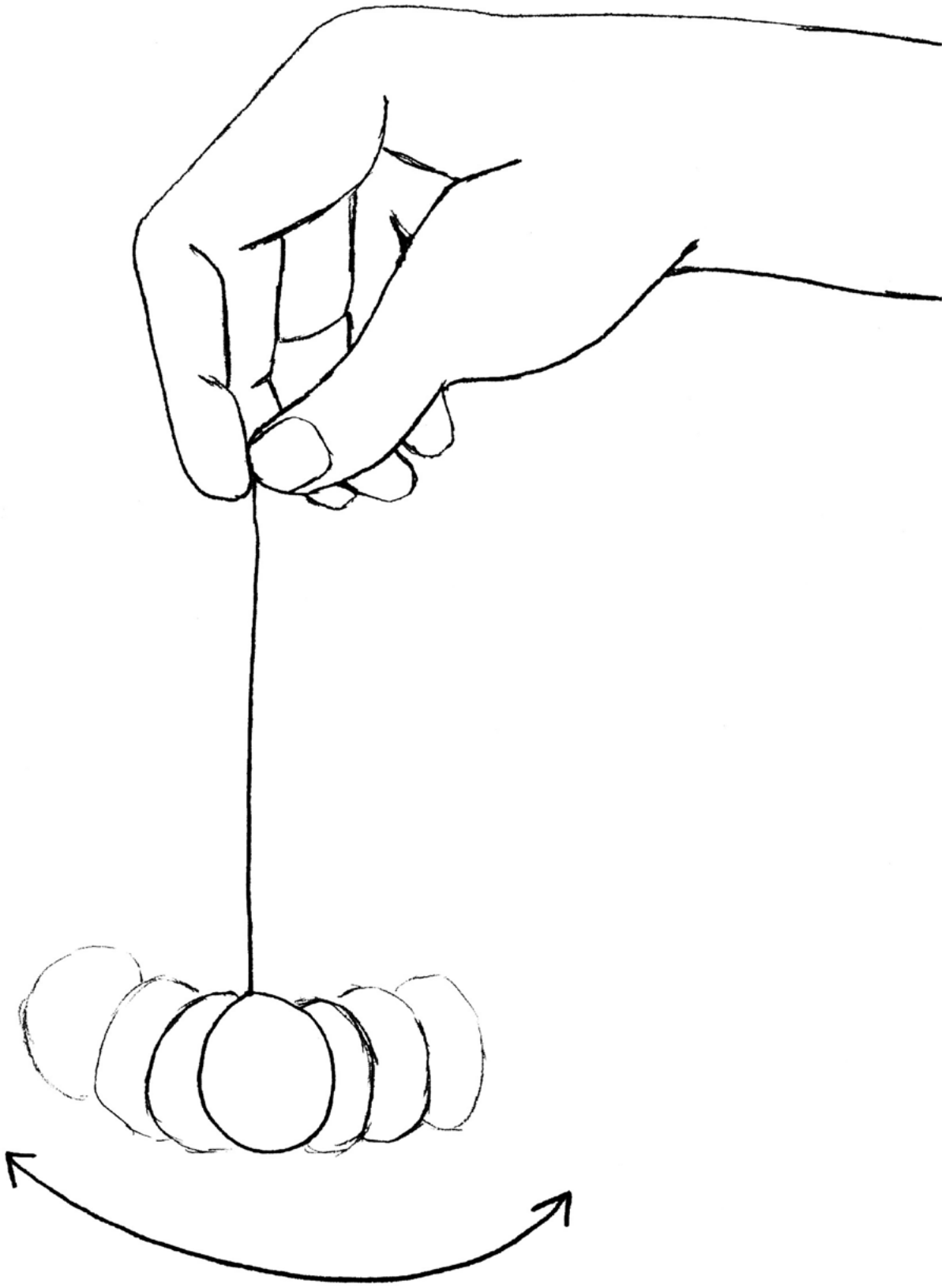
Table of Contents

Motion Unit

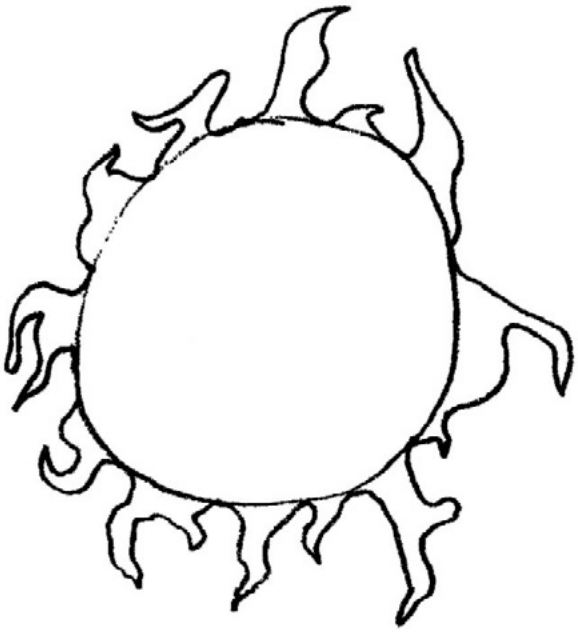
Engineering Unit

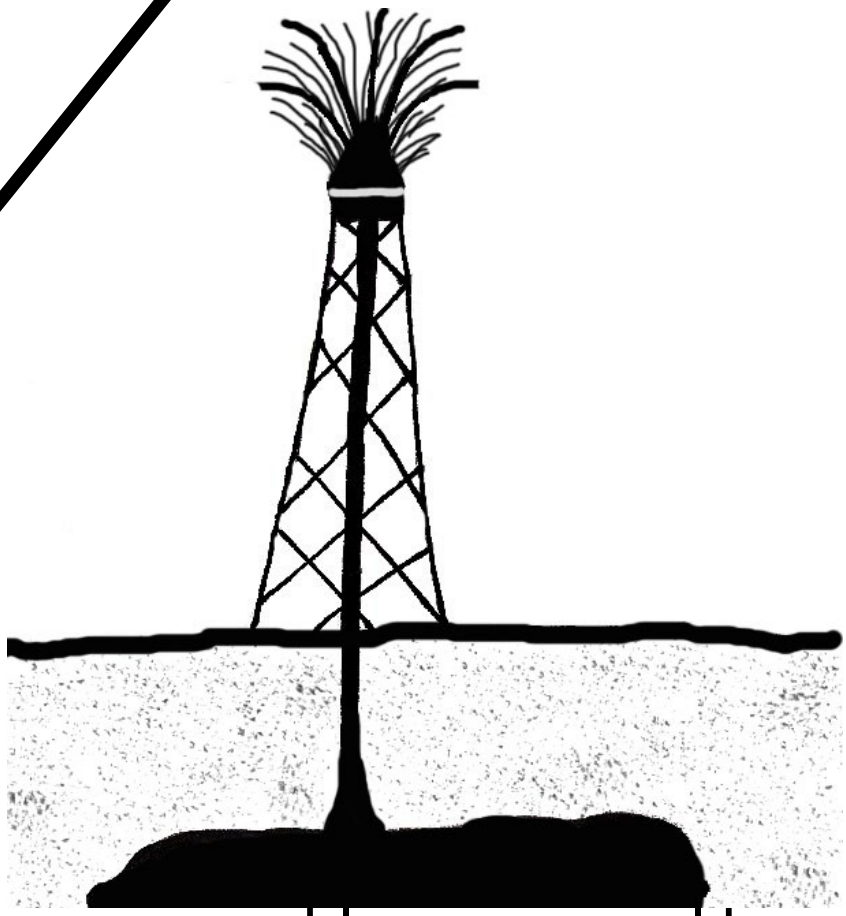


Potential energy is energy that is stored in an object.

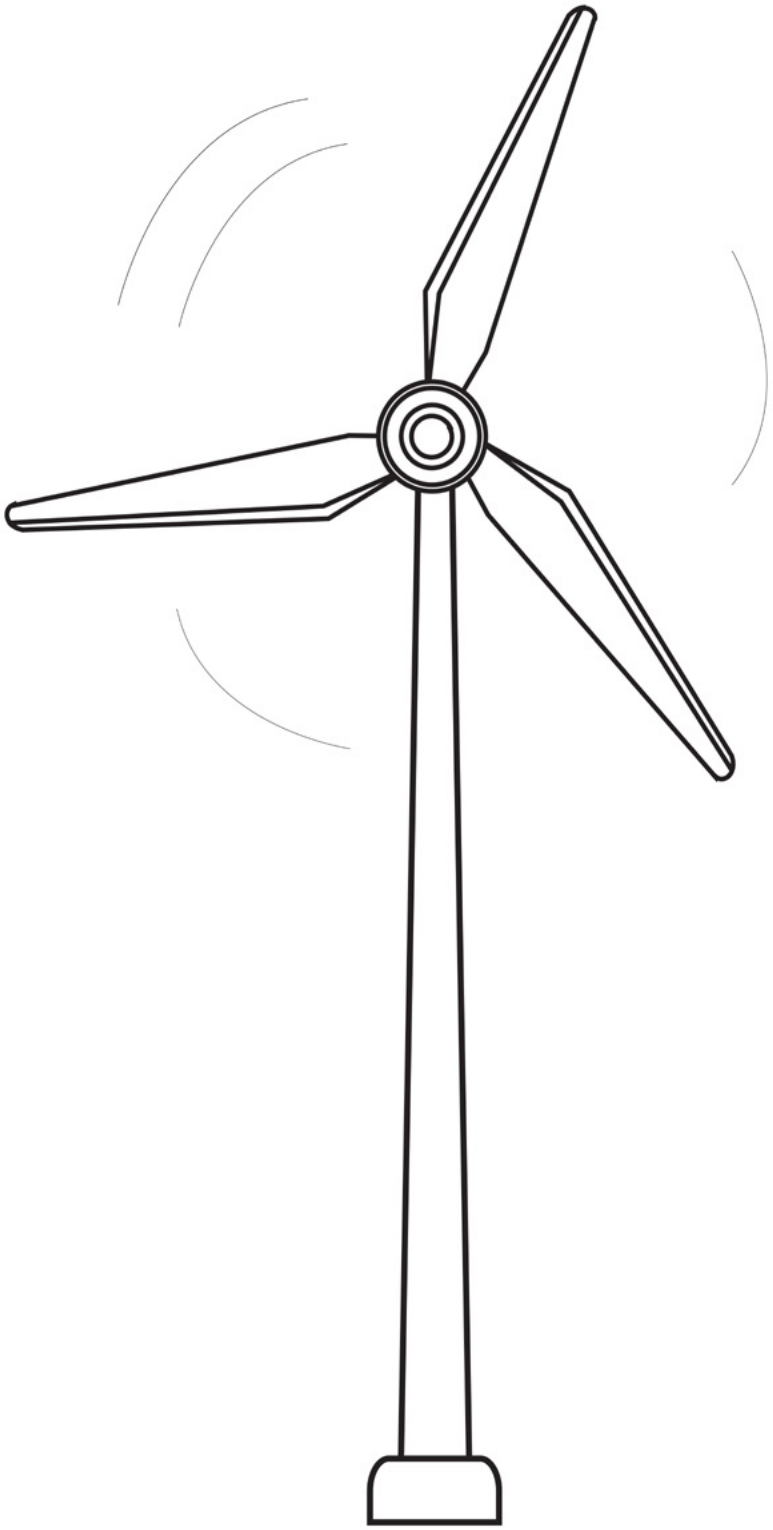


Kinetic energy is energy of movement.

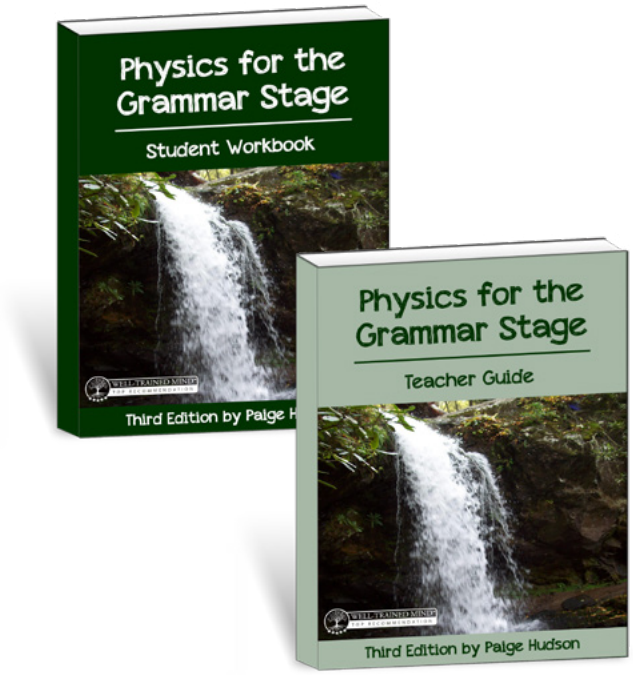




Energy can come from renewable resources, like the sun, or from nonrenewable resources, like oil.



Wind energy is energy from the wind.



Are you ready to start?

Learn about the forces, energy, simple machines, and more by purchasing *Physics for the Grammar Stage* here:

- https://elementalscience.com/collections/physics-for-the-grammar-stage

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