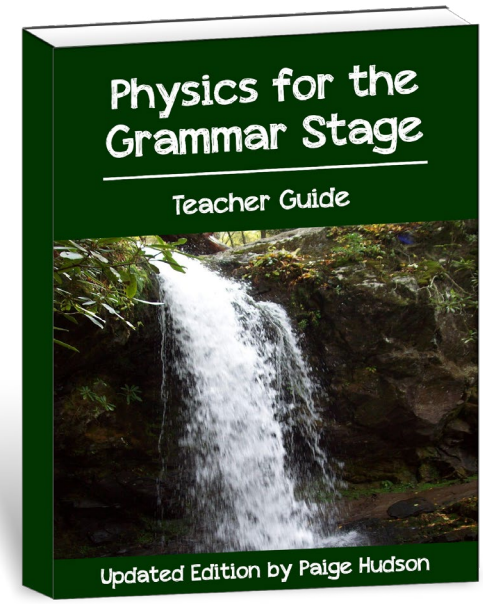
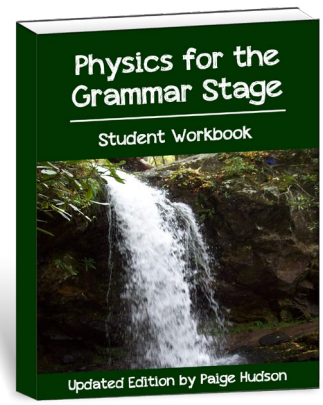


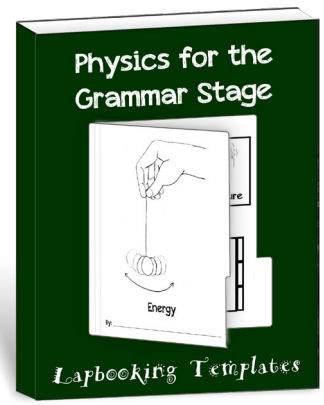
Physics for the Grammar Stage Sample Packet

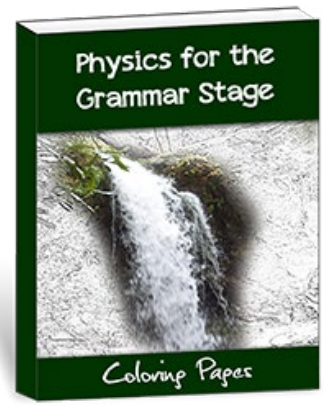
The following sample packet includes the first two weeks of the *Physics for the Grammar Stage* materials. You will see:

You do not need all of these to successfully complete this program. You can get more information and make your purchase here:

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







Physics for the Grammar Stage
Table of Contents

Physics for the Grammar Stage
Introduction to the Updated Edition

Since writing the first edition of *Physics for the Grammar Stage,* I have co-authored *Success in Science: A Manual for Excellence in Science Education* with Bradley Hudson. The purpose of this updated edition was to re-align this program with our research. It now reflects the components of the Classic Method of elementary science instruction suggested in the book. 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*, we compare the elementary student to an empty bucket that is waiting to be filled with meaningful information. My goal in writing this curriculum was to provide you with tools to give your elementary student exposure to the topics of motion, light, heat, and other physical principles, thus building a knowledge base for future studies. For this reason, I have included weekly scientific demonstrations, reading suggestions, notebooking assignments, and additional activities.

This program is designed to be used during the elementary years, specifically 2nd through 5th grade. It includes a buffet of options that can be completed in either two days or five days each. Alternatively, if you desire, you could set aside an hour a week to be your science day in which you do all the readings, narrations, and activities planned for the week. Please feel free to act as the student's scribe as you complete the narration pages and lab reports.

Student Workbook (SW)

This teacher's guide is designed to work in conjunction with the *Physics for the Grammar Stage Student Workbook*. This workbook is sold separately, but it is critical to the success of this program. It contains all the pages you will need to complete the narrations, lab reports, and multi-week projects. The student workbook gives the students the ability to create a lasting memory of their first journey through physics.

Scientific Demonstrations

The scientific demonstrations scheduled in the guide generally use easy-to-find materials and tie into what is being studied. Each one has a corresponding lab report in the student workbook. At this age, you will be the driving force behind these demonstrations, meaning that you will be the one in control, and the student will be watching and participating when necessary. These demonstrations are designed to give them a beginners' look at the scientific method and how scientific tests work. It is not necessary to ask the students to predict the outcome of the demonstration since they have no knowledge base to determine what the answer should be. However, if the students enjoy predicting or they are able to tell you what will happen, please feel free to let them do so.

Each lab report includes 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, I recommend that you do most (if not all) the writing for them on the lab reports.

Science-oriented Books

The science-oriented books section includes reading assignments from encyclopedias, discussion questions, and additional books for every lesson. Each reading assignment should be read with the students, or if they are capable, have them read the assignments on their own. After the reading assignment is completed, discuss the topic with the students using the provided discussion questions. These questions are meant to help the students begin to gather their thoughts in preparation for giving a narration.

In this edition of *Physics for the Grammar Stage,* I have also included a list of additional books for you to choose from each week. They are meant to be checked out from the library, and are not necessary to the success of this program. The list is there in case you decide that you would like to dig a little deeper into the topics. I have done my best to choose in-print, widely available books, but since 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 card catalog.

Notebooking

For the notebooking component, you will ask the students to narrate what they have learned from the science-oriented books. They should add their narration to their student workbook. For younger students, I recommend that you have them dictate what they have learned to you and then you write this into their student workbook. You can also have the students copy their narration into the workbook. You should expect three to four sentences from a third- or fourth- grade student.

Next, have the students color the provided picture on the narration page. All the pages and pictures you need are included in the student workbook. I suggest that you read over these pages monthly so that the students get a review of what they have been learning. I have also included optional lapbook assignments in case your students prefer to use lapbooks over notebooking.

Finally, go over the vocabulary with the students and enter it into their glossary at the rear of the student workbook. You can write this for them, have them copy the definition, or dictate the definition to the students. If you choose to have the students look up the definitions, I have included a glossary of the terms in this program in the Appendix on pp. 194-197.

Multi-week Projects and Activities

This guide includes ideas for multi-week projects and additional activities that coordinate with each lesson. The pages and pictures needed for the multi-week projects are included in the student workbook, while the directions for creating the projects are found in this guide. The additional 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 on pg. 200 of the Appendix of this guide.

Memorization

The elementary student is very capable of receiving and memorizing information. With this in mind, I recommend that you capitalize on this fact by having your students memorize the included vocabulary and basic facts related to physics. A list of simple poems that you can use to help them memorize the characteristics of motion, light, heat, and more is included on the unit overview sheet for each unit. Remember that these poems are included as a resource for you to augment students' learning experience and are not required to use this program successfully.

Possible Schedules

I have written this updated edition to contain a buffet of activities that you can choose from when guiding the students through their first look at physics. This gives you, the teacher, complete freedom in what you would like to utilize to present and explore the concepts each week. However, I have also included two potential schedules for you to give an idea of how you could schedule each week. You can choose to use these as your guide or create your own. I have included two schedule templates on pp. 201-202 of the Appendix of this guide for you to use. Please note that the older spine options are primary on the schedule and younger spine options are in parenthesis.

Quizzes

We have also created a set of weekly quizzes to use with this program, which can be found at the back of the student workbook. Although these quizzes are not essential, they are helpful in assessing how much the students are retaining. You can also use the quizzes as a review of what the students have studied by giving the quiz orally or by having the students fill each quiz out with the assistance of their workbooks. The correct answers for the quizzes are included at the end of each week in this guide.

Coordinating Products

The following products by Elemental Science coordinate with this program. These eBooks are available separately through our website or with a combo package.

- ***Physics for the Grammar Stage Lapbooking Templates*** — We have designed templates for five lapbooks to coordinate with *Physics for the Grammar Stage*. You can use these lapbooks as a means of review or in place of the student workbook. The directions for

using these templates are found in this guide under the notebooking section.

- ***Physics for the Grammar Stage Coloring Pages* —** We have prepared coloring pages to coordinate with almost every *Physics for the Grammar Stage*. Each page has a key fact about the topic along with a large picture to color.

Helpful Articles

Our goal as a company is to provide you with the information you need to be successful in your quest to educate your student in the sciences at home. This is the main reason we share tips and tools for homeschool science education on our blogs. As you prepare to guide your students through this program, you may find the following articles helpful:

- ***Classical Science Curriculum for the Grammar Stage Student* —** This article explains the goals of grammar stage science and demonstrates how classical educators can utilize the tools they have at their disposal to reach these goals.
  - http://elementalblogging.com/classical-science-curriculum-grammar/
- ***Scientific Demonstrations vs. Experiments* —** This article shares about these two types of scientific tests and points out how to use scientific demonstrations or experiments in your homeschool.
  - http://elementalscience.com/blogs/news/89905795-scientific-demonstrations-or-experiments
- ***The Basics of Notebooking* —** This article clarifies what notebooking is and describes how this method can be a beneficial addition to your homeschool.
  - http://sassafrasscience.com/what-is-notebooking/

Additional Resources

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

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

Final Thoughts

As the author and publisher of this curriculum, I encourage you to contact us with any questions or problems that you might have concerning *Physics for the Grammar Stage* at support@elementalscience.com. We will be more than happy to answer them as soon as we are able. You may also get additional help at our yahoo group (http://groups.yahoo.com/group/elemental_science/). I hope that you enjoy *Physics for the Grammar Stage*!

Required Book List

The following books are scheduled for use in this guide. You will need to purchase them or find a suitable substitute to complete this program.

Encyclopedias

First 6 Units (Choose the age-appropriate option.)

- *Usborne Science Encyclopedia (best for 3rd through 5th grade)* **OR**
- *The Usborne Children's Encyclopedia* **AND** *The DK Children's Encyclopedia (best for 1st through 3rd grade)*
- **(Optional Additional Resource)** *Basher Science Physics: Why Matter Matters!*

Engineering Unit (Choose the age-appropriate option.)

- *Basher Science Engineering: The Riveting World of Buildings and Machines (all ages)*
- **(Optional Additional Resource)** *Usborne Science Encyclopedia*

Scientist Studies (You can also choose another option based on what your library offers.)

Thomas Edison (Week 5 of the Light Unit)

- *Who Was Thomas Alva Edison* by Margaret Frith

Issac Newton (Week 4 of the Motion Unit)

- *Who Was Isaac Newton?* by Janet B. Pascal

Scientific Demonstration Books

You will need the following book to complete the scientific demonstrations in this program.

- *Janice VanCleave's Physics for Every Kid*

Additional Books Listed by Week

The books listed below are completely optional! They are not required to complete this program. Instead, this list is merely a suggestion of the additional books that are available to enhance your studies. This list is by no means exhaustive.

Energy Unit

Energy Week 1

- *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

Energy Week 2

- *Sun Power: A Book about Renewable Energy (Earth Matters)* by Esther Porter

Supplies Needed by Week

Energy Unit

Week	Supplies needed
1	Ruler, String (2 ft.), Tape, Heavy book, 2 Rubber balls
2	Pinwheel template, 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	Rubber band
5	Aluminum foil, Small throw rug or towel
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, pencil, or a toy car, Flashlight
2	Poster board, Scissors, Pencil, Ruler, Markers (red, orange, yellow, blue, green, and purple)
3	Cardboard, Flashlight, Scissors, Modeling clay, Ruler, Index card
4	Hand mirror, Pencil, Paper
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	Stemmed glassware, Liquid soap, Vinegar
2	Ruler, Table
3	Cup, Rubberband
4	Straw, Scissors, Ruler, Marking pen
Unit Project	*Materials will vary based on the instrument you choose to make.*

Supplies Needed by Week

Electricity Unit

Week	Supplies needed
1	Comb, Tissue Paper, Scissors, Ruler
2	Clothespin, D-battery, Foil, Flashlight bulb, Tape, Testing materials (e.g., rubber band, paper coins, paper clip, ruler)
3	Straight pin, Thread, Tissue paper, Bar magnet, Scissors
4	Old Electronic, 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	Pin, Index card, Scissors, Straw, 2 Blocks or cups of equal height, Ruler, Pen
3	Paper, Book (same size as the paper, but thicker)
4	String, Rubber band, 2 Large books, 10 round pencils or pens, Ruler
5	Large-mouth jar, Clear plastic tubing, Balloon
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	Ruler, Straw, String, Scissors, Balloon, 2 Chairs, Tape
2	Table, 2 Books with the same thickness, Roll of masking tape, 2 Jar lids, Marble, Helper
3	3 Paper clips, Pencil, Notebook paper, Scissors, Ruler
4	*No supplies needed.*
Unit Project	Build-a-rocket kit

Supplies Needed by Week

Engineering Unit

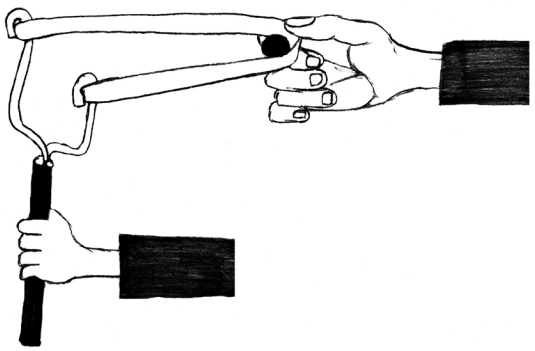
Week	Supplies needed
1	4 Books, 2 Pencils
2	Empty thread spool, 2 Pencils, String, Scissors, 2 Paper cups, 20 Pennies, Pen
3	Eyedropper, Poster board, Toothpick, Scissors
4	Ruler, Pencil, 30 Pennies
5	Cornstarch, Water, Vegetable Oil, Plastic baggie, Food coloring
6	Air dry clay, Pack of pipe cleaners, Plastic cup, Pennies
7	Sheet of paper, Scissors, String, Ruler, Tape
8	Smartphone or GPS device, Geocaching 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



Required Encyclopedia

- *Usborne Science Encyclopedia*

OR

- *Usborne Children's Encyclopedia* and *DK Children's Encyclopedia*

Optional Additional Encyclopedia

- *Basher Science Physics: Why Matter Matters!*

Scientific Demonstrations Book

- *JVC Physics for Every Kid*

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

<u>Energy</u>
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

<u>Law of Conservation of Energy</u>
Energy can neither be created nor destroyed.

Supplies Needed for the Unit

Week	Supplies needed
1	Ruler, String (2 ft.), Tape, Heavy book, 2 Rubber balls
2	Pinwheel template, 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	Rubber band
5	Aluminum foil, Small throw rug or towel
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. **Wind energy** – Energy from the wind.
4. **Solar energy** – Energy from the sun.
5. **Nuclear fusion** – The joining of atomic particles to create energy.
6. **Nuclear fission** – The splitting apart 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

Scientific Demonstration: Bonk!

Supplies Needed

- ✓ Ruler
- ✓ String (2 ft.)
- ✓ Tape
- ✓ Heavy book
- ✓ 2 Rubber balls

Purpose

This demonstration is meant to help the students determine what happens to energy.

Instructions and Explanation

The instructions and explanation for this scientific demonstration are found on pp. 144-145 of *Janice VanCleave's Physics for Every Kid*. Have the students complete the Lab Report on SW pg. 9.

Take it Further

Have the students create an energy chain for this experiment. (*Potential energy in the rubber balls is converted into kinetic energy of movement; kinetic energy of movement is converted into sound energy from the collisions and heat energy from friction, which spread into the environment.*)

Science-Oriented Books

Reading Assignments

- 🕮 *Usborne Science Encyclopedia pp. 106-107 Energy*
  (**Note**—If you find that your student has a difficult time absorbing all the information from these two-page spreads, split it up into sections, read a chunk of the spread each day, and ask the appropriate discussion questions before adding a sentence or two to the narration page.)
- 🕮 *Usborne Children's Encyclopedia pp. 192-193 Energy*

(Optional) Additional topics to explore this week: *Basher Physics pg. 30 Energy, pg. 32 Potential Energy, pg. 34 Kinetic Energy*

Discussion Questions

After reading the selected pages, ask the following questions for your discussion time.

Energy

- **?** Name several forms of energy.
- **?** What is chemical energy?
- **?** What is potential energy?
- **?** What is kinetic energy?
- **?** What is the Law of Conservation of Energy?
- **?** What is an energy chain?

(Optional) Additional 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

Notebooking

Writing Assignments

- **Narration Page** – Have the students dictate, copy, or write three to five sentences about energy on SW pg. 8. For example, this week the students could dictate, copy, or write the following:

  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.

  Then, have the students copy the Law of Conservation of Energy at the bottom of their narration pages.

  Law of Conservation of Energy—Energy can neither be created nor destroyed.
- **(Optional) Lapbook** – Have the students begin the Energy lapbook by cutting out and coloring the cover on pg. 6. Then, have the students glue the sheet onto the front.
- **(Optional) Lapbook** – Have the students complete the Energy Tab-book on pg. 7 of *Physics for the Grammar Stage Lapbooking Templates*. 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 mini-book into the lapbook.
- **(Optional) Lapbook** – Have the students complete the Law of Conservation of Energy Sheet on pg. 13 of *Physics for the Grammar Stage Lapbooking Templates*. 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.

Vocabulary

The following definitions are a guide. The students' definitions do not need to match word for word.

- **Energy** – The ability to do work. (SW pg. 107)
- **Energy Chain** – A way of showing how energy changes into different forms. (SW pg. 107)

Multi-week Projects and Activities

Unit Project

- **Catapult** – Over 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 pg. 6. 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 gently pull it gently back with two of their 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 is transferred into kinetic energy of motion.*) You can have them repeat this over and over, 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 on SW pg. 6.

Projects for this Week

- ✂ **Coloring Pages** – Have the students color the following pages from *Physics for the Grammar Stage Coloring Pages*: Potential Energy pg. 5, Kinetic Energy pg. 6.
- ✂ **Energy Race** – Have the students compete to see who can transfer the most energy to their 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.*)
- ✂ **Energy Boat** – Have the students do the "See for yourself" activity on pg. 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 pg. 107 of the *Usborne Science Encyclopedia* for inspiration.

Memorization

- This week, begin working on memorizing the *Energy* poem. (SW pg. 120)

Quiz

Weekly Quiz

- "Energy Unit Week 1 Quiz" on SW pg. Q-5.

Quiz Answers

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

Possible Schedules for Week 1

Two Days a Week Schedule	
Day 1	**Day 2**
❑ Read the first page from the Energy spread ❑ Add information about energy to the students' Narration Page ❑ Do the Scientific Demonstration: Bonk! ❑ Work on memorizing the *Energy* poem ❑ Define energy and energy chain	❑ Read the second page from the Energy spread ❑ Add information about energy to the students' Narration Page and copy the Law of Conservation of Energy ❑ Work on the Catapult Project ❑ Give Energy Week 1 quiz

Five Days a Week Schedule				
Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
❑ Do the Scientific Demonstration: Bonk! ❑ Define energy ❑ Choose one or more of the additional books to read from this week	❑ Read the first page from the Energy spread ❑ Add information about energy to the students' Narration Page ❑ Complete the Energy Race Project	❑ Read the second page from the Energy spread ❑ Add information about energy to the students' Narration Page ❑ Complete the Energy Boat Project	❑ Copy the Law of Conservation of Energy ❑ Complete the Energy Chain Project ❑ Define energy chain	❑ Give Energy Week 1 quiz ❑ Work on the Catapult Project
All Week Long ❑ Work on memorizing the *Energy* poem				

Week 2: Energy Resources Lesson Plans

Scientific Demonstration: Wind Energy

Supplies Needed

- ✓ Pinwheel template or piece of paper
- ✓ Chopstick or thin dowel rock
- ✓ Straight pin, Bead

Purpose

This demonstration is meant to help the students see wind energy in action.

Instructions

1. Begin by making a pinwheel. Cut out the pinwheel template found on pg. 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.
2. Now, have the students face the blades of the pinwheel towards them and blow on the pinwheel and observe what happens. Does the pinwheel spin? Which way does it spin?
3. Next, have the students face the front of the pinwheel towards them and blow on the pinwheel and observe what happens. Does the pinwheel spin? Which way does it spin?
4. Finally, have the students face the front of 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?
5. Have the students write what they learn on the Lab Report on SW pg. 11.

Results and Explanation

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. Next, 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 part way between the front and the blades, the pinwheel turned a bit, but the action was jerky and not a efficient as the first time. A pinwheel is a very simple look at how we can harness wind energy. In general, wind blows and the blades capture the wind, causing the wheel to turn. A windmill or wind turbine work the same way as the pinwheel, except these devices harness the wind energy to do work.

Science-Oriented Books

Reading Assignments

- *Usborne Science Encyclopedia pp. 108-109 Energy Resources*
- *DK Children's Encyclopedia pp. 88-89 Energy, pg. 110 Fossil Fuels (You can also watch the following video to learn more about wind energy.)*
  - https://www.youtube.com/watch?v=SQpbTTGe_gk

(Optional) Additional topics to explore this week: *Basher Physics pg. 120 (Generator)*

Discussion Questions

After reading the selected pages, ask the following questions for your discussion time.

Energy Resources

- ? What is a non-renewable energy source?
- ? What is a renewable energy source?
- ? Name several types of renewable energy sources?
- ? What does a machine do?

(Optional) Additional 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

Notebooking

Writing Assignments

- ☐ **Narration Page** – Have the students dictate, copy, or write three to five sentences on energy resources on SW pg. 10.
- ☐ **(Optional) Lapbook** – Have the students complete the Energy Resources Wheel-book on pg. 8 of *Physics for the Grammar Stage Lapbooking Templates*. 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 of the wheel, 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.

Vocabulary

The following definitions are a guide. The students' definitions do not need to match word for word.

- **Solar energy** – Energy from the sun. (SW pg. 116)
- **Wind energy** – Energy from the wind. (SW pg. 118)

Multi-week Projects and Activities

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 out 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 pg. 6.

Projects for this Week

- ✂ **Coloring Pages** – Have the students color the following pages from *Physics for the Grammar Stage Coloring Pages*: Energy Resources pg. 7, Wind Energy pg. 8.
- ✂ **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, 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 towards the plastic-wrap covered opening. Check the oven every 10 to 15 minutes to see when your food is done. Use a hot mitt to remove the food and enjoy your solar-powered meal!
- ✂ **Renewable Heat** – Have the students do the "See for yourself" activity on pg. 109 of the *Usborne Science Encyclopedia*. You will need a hose and a cork for this activity.
- ✂ **Wind Turbine** – Have the students make their own wind turbine from 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

Memorization

- This week, continue working on memorizing the *Energy* poem. (SW pg. 120)

Quiz

Weekly Quiz

- "Energy Unit Week 2 Quiz" on SW pg. Q-6.

Quiz 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

Possible Schedules for Week 2

Two Days a Week Schedule	
Day 1	**Day 2**
❑ Read the first page from the Energy Resources spread (Energy) ❑ Add information about energy resources to the students' Narration Page ❑ Do the Scientific Demonstration: Wind Energy ❑ Work on memorizing the *Energy* poem ❑ Define wind energy and solar energy	❑ Read the second page from the Energy Resources spread (Fossil Fuels) ❑ Add information about energy resources to the students' Narration Page ❑ Work on the Catapult Project ❑ Give Energy Week 2 quiz

Five Days a Week Schedule				
Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**
❑ Do the Scientific Demonstration: Wind Energy ❑ Define wind energy ❑ Choose one or more of the additional books to read from this week	❑ Read the first page from the Energy Resources spread (Energy) ❑ Add information about energy resources to the students' Narration Page ❑ Complete the Solar Oven Project	❑ Read the second page from the Energy Resources spread (Fossil Fuels) ❑ Add information about energy resources to the students' Narration Page ❑ Complete the Renewable Heat Project	❑ Complete the Wind Turbine Project ❑ Define solar energy	❑ Give Energy Week 2 quiz ❑ Work on the Catapult Project
All Week Long ❑ Work on memorizing the *Energy* poem				

Physics for the Grammar Stage Student Workbook

Physics for the Grammar Stage

Energy Unit

Catapult Diary

Week 1: Simple Marshmallow Catapult

_____

_____

_____

_____

_____

_____

_____

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_____

_____

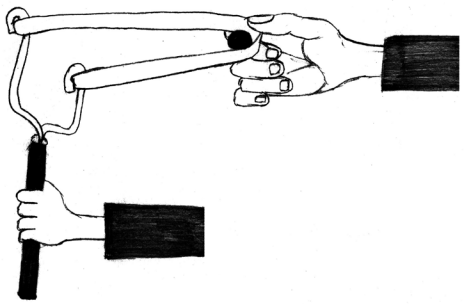
_____

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

Lab Report: Bonk!

Our Tools

_____ _____

_____ _____

Our Method

What it looked like

_____

_____

_____

_____

_____

_____

_____

_____

_____

Our Outcome

_____

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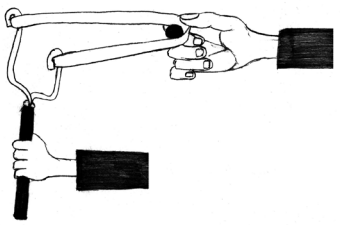
_____

Our Insight

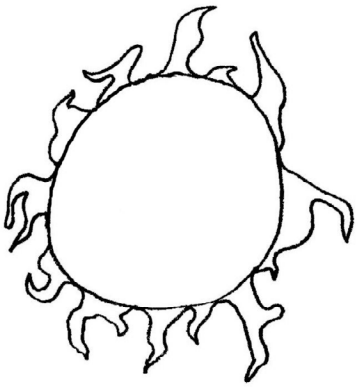
_____

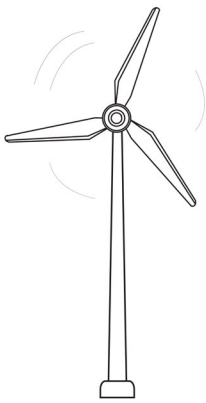
_____

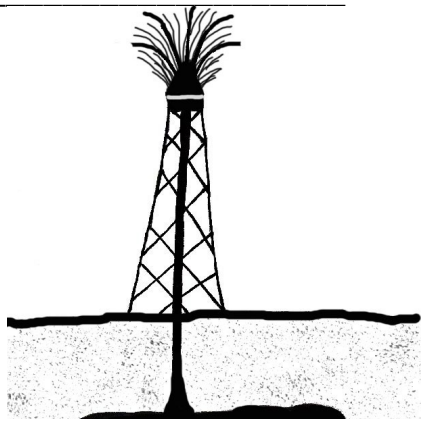
_____



Energy Resources







Lab Report: Wind Energy

Our Tools

_____ _____

_____ _____

Our Method

What it looked like

_____

_____

_____

_____

_____

_____

_____

_____

_____

Our Outcome

_____

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_____

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_____

Our Insight

_____

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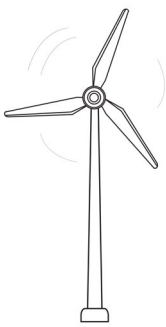
_____

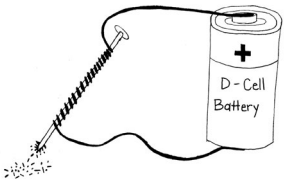


Physics for the Grammar Stage

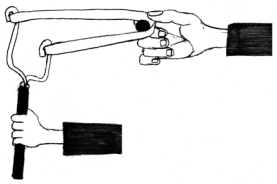
Glossary

Density —

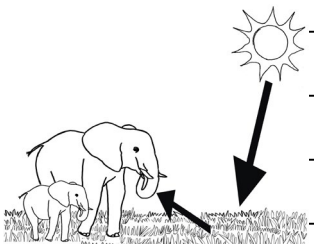
Electricity —



Energy —



Energy Chain —



Physics for the Grammar Stage

Quizzes

Energy Week 1 Quiz

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?

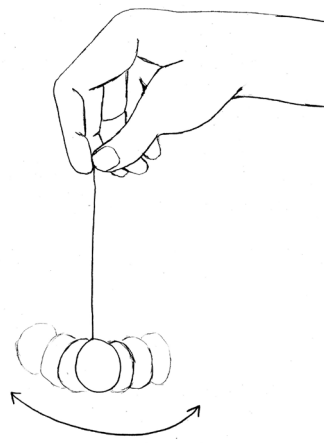
_____

_____

_____

_____

_____



Energy Week 2 Quiz

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?

_____

_____

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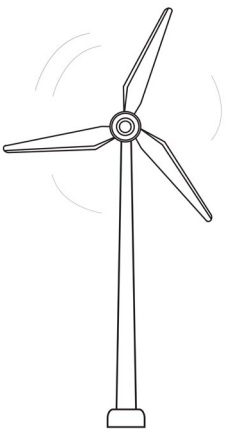


Physics for the Grammar Stage Lapbooking Templates

Introduction

The lapbooking templates provided in this eBook are meant to coordinate with *Physics for the Grammar Stage*. The directions for completing each of the mini-books in this document are included in the *Physics for the Grammar Stage Teacher Guide*. You can use these lapbooks to review the concepts learned or you can have the student create each one in lieu of completing the *Physics for the Grammar Stage Student Workbook*.

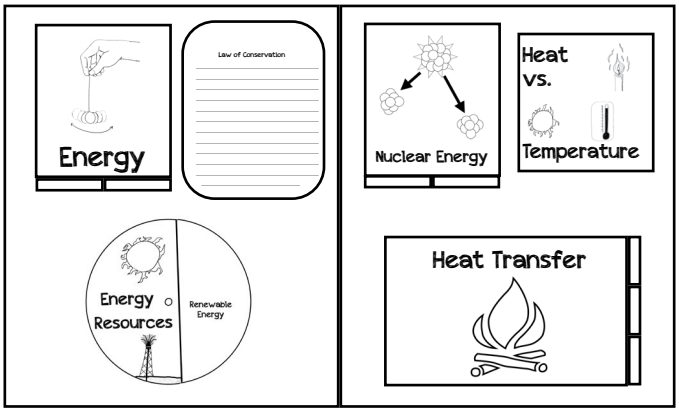
There are templates for 5 lapbooks contained in this eBook, one for energy, one for light and sound, one for electricity, one for forces and motion, and one for engineering. You can have your students create five separate lapbooks or combine them to create a single larger lapbooks on physics. If you decide to create the larger complete lapbook, we have included a different cover page for you to use on pg. 53 of this document.

Table of Contents

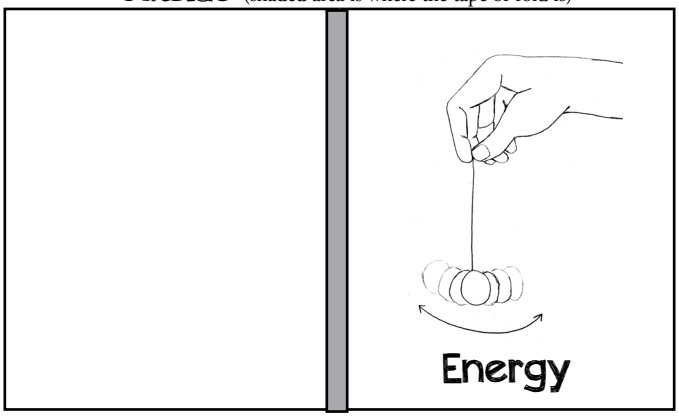
Energy Lapbook

You will need 2 sheets of card-stock or one file folder. Begin by taping the two sheets together on the longest edge, to look like this:

Inside



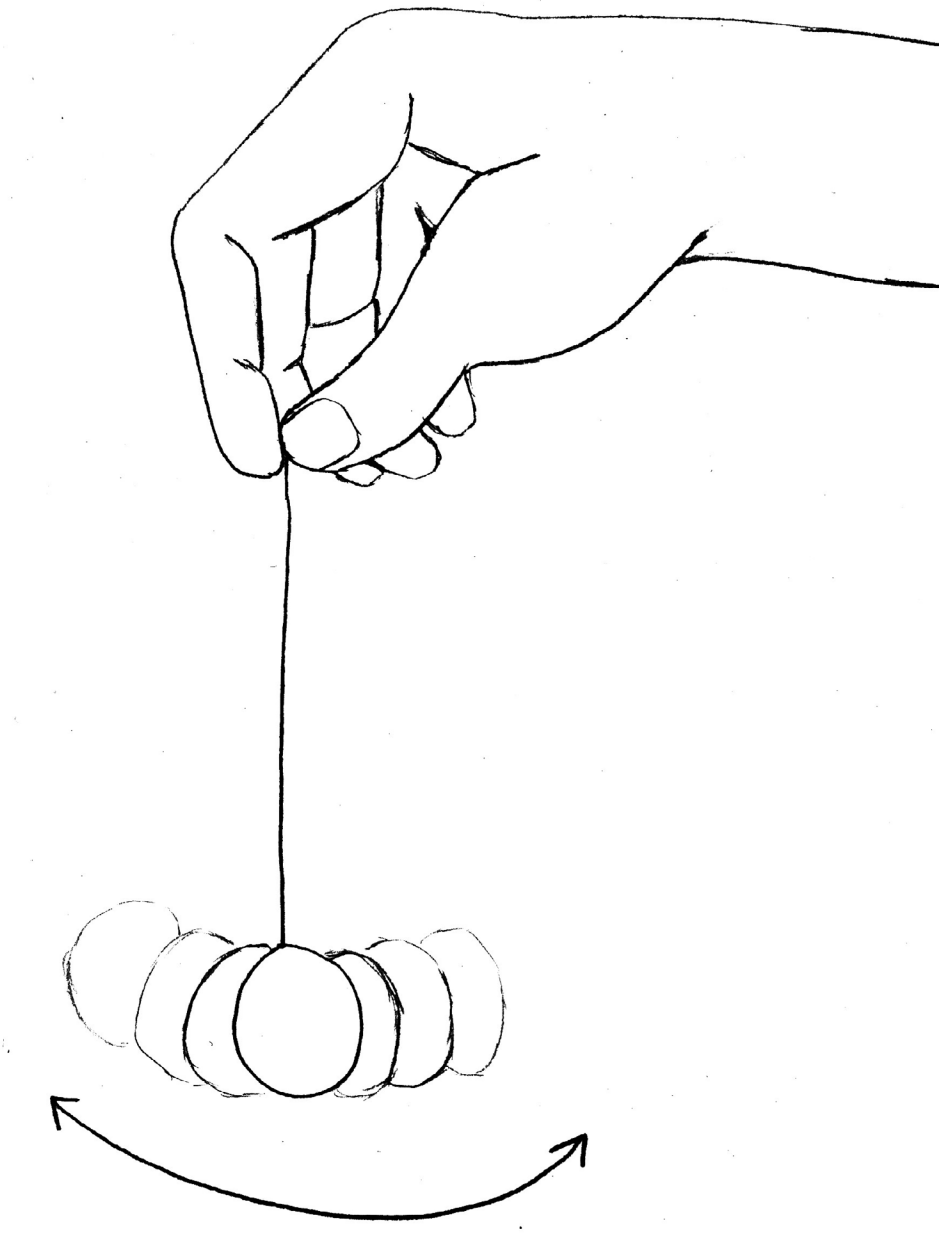
Outside (shaded area is where the tape or fold is)



Overall Directions

For each mini-book have the students color the pictures. Then, write the narration sentences for the students or have them copy the information into the inside of the mini-book. Finally, glue the mini-books and poems onto the lapbook. You can use the cover template provided or allow the students to decorate the cover as they choose.

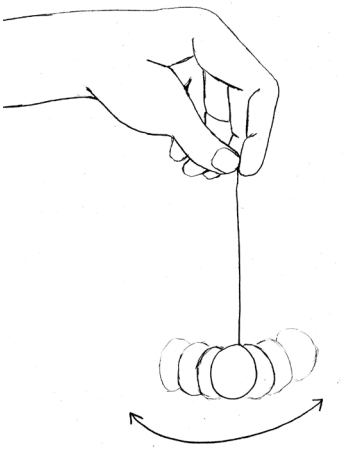
Energy Lapbook Cover Page Template



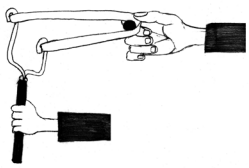
Energy

By: _____

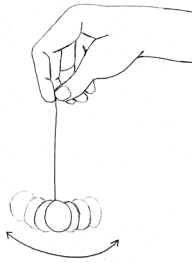
Energy Tab-book



Energy

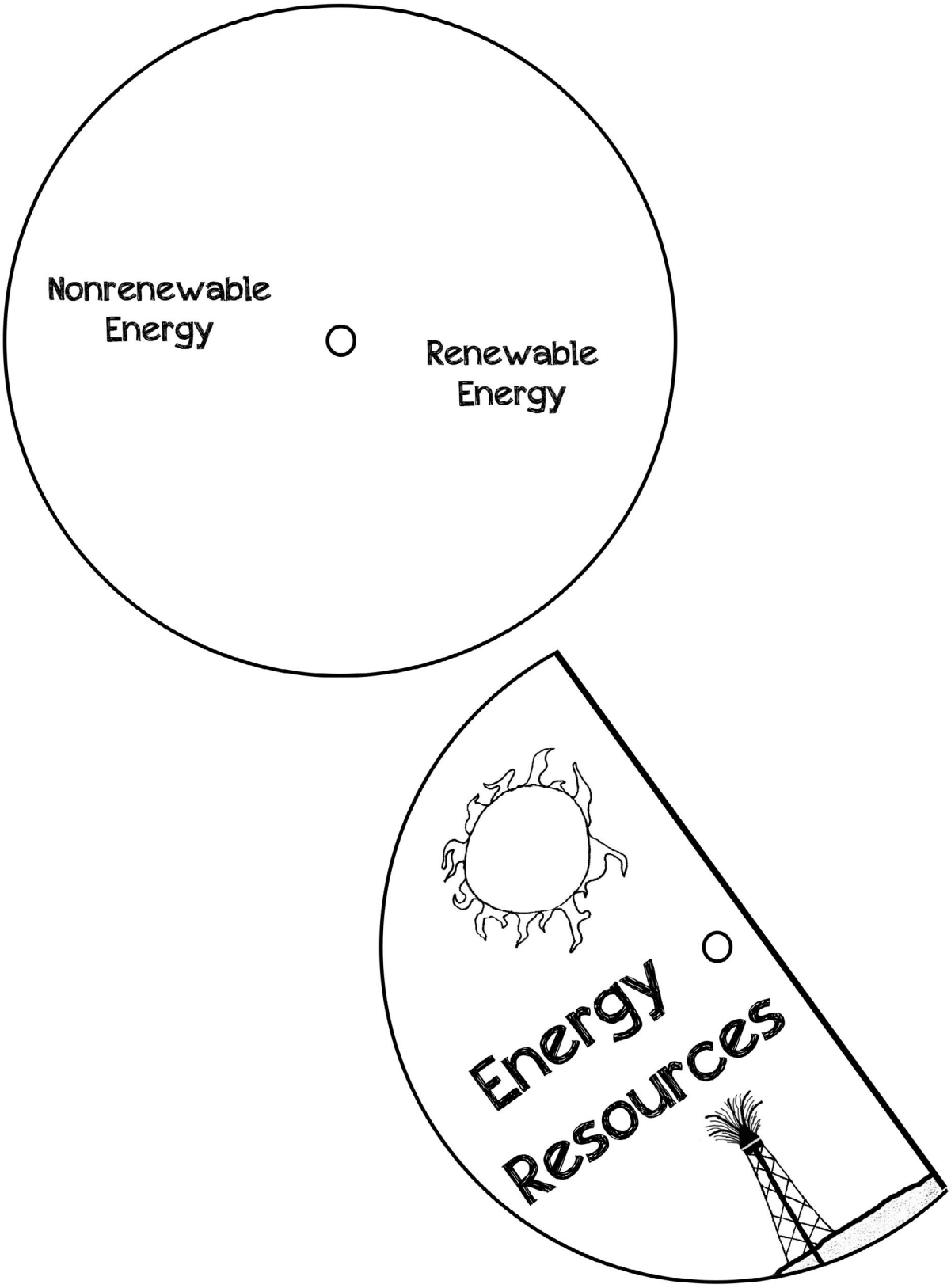


Potential



Kinetic

Energy Wheel-book



Physics for the Grammar Stage Coloring Pages

Introduction

The coloring pages provided in this eBook are meant to coordinate with *Physics for the Grammar Stage*. There is at least one coloring page for every week of 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.

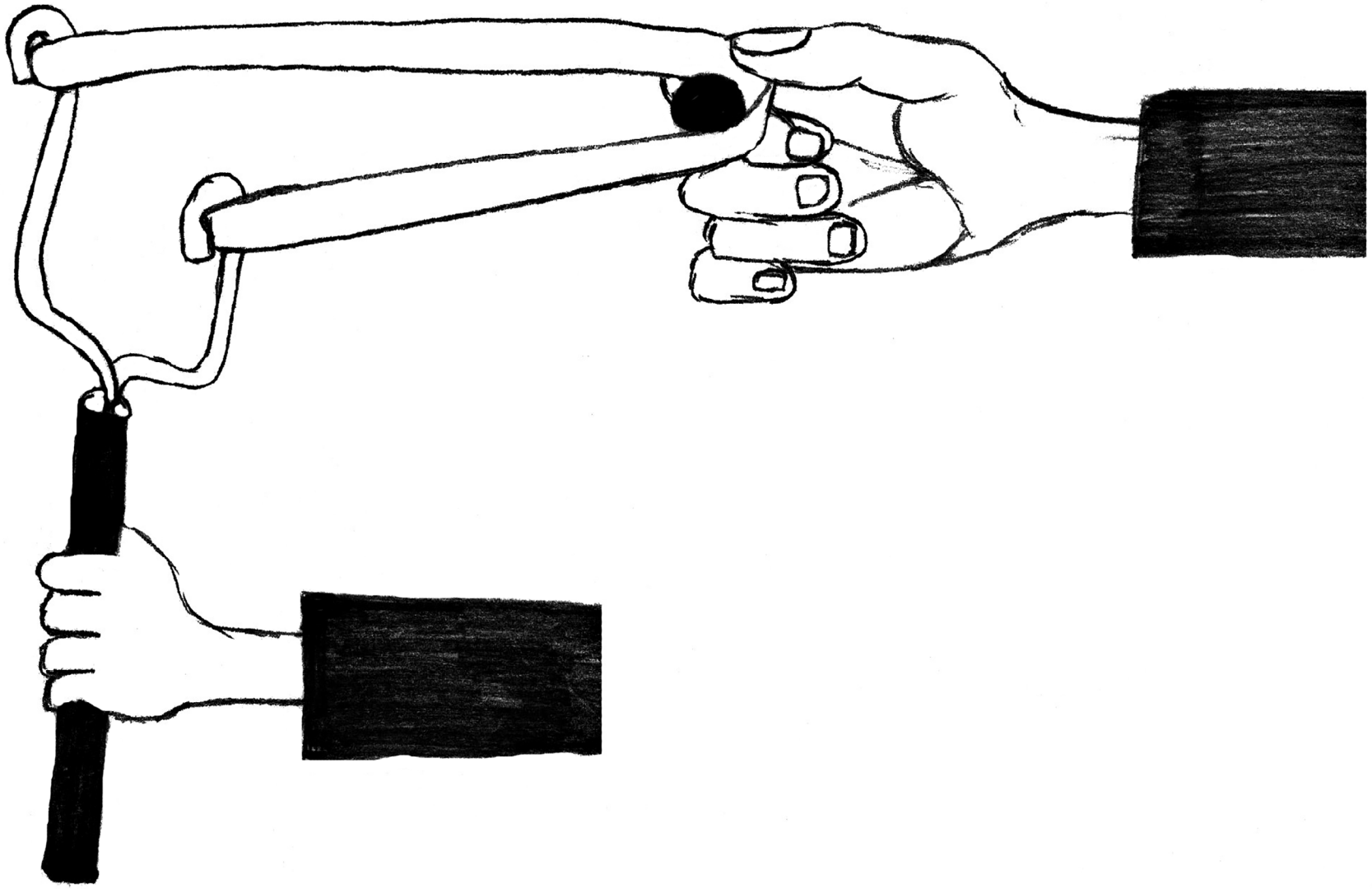
You can use these pages with your younger "follow-along" students, with students who love to color, or with reluctant writers. We have scheduled these pages under the "Projects for the Week" section in the *Physics for the Grammar Stage Teacher Guide*.

Table of Contents

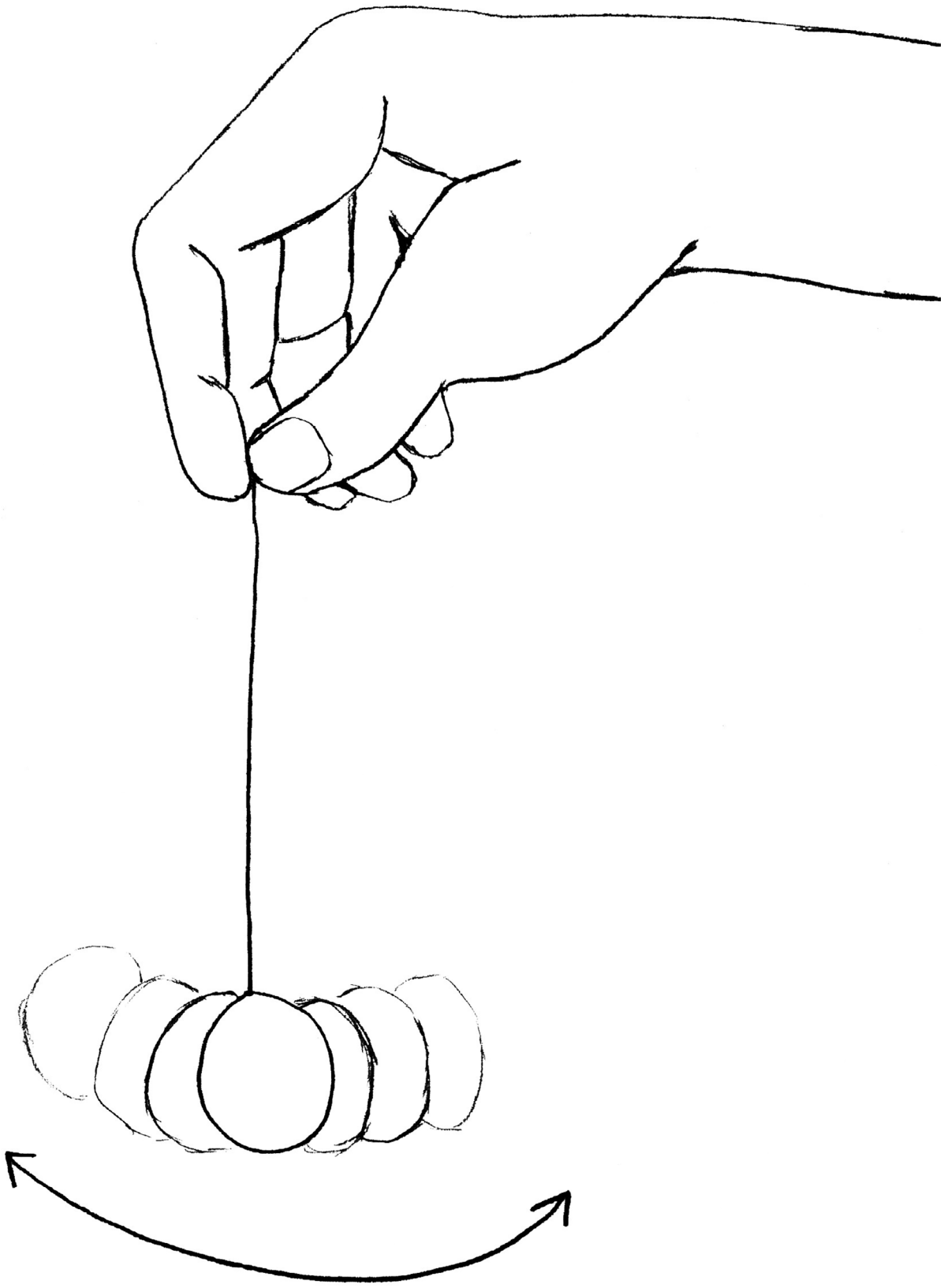
Forces Unit

Motion Unit

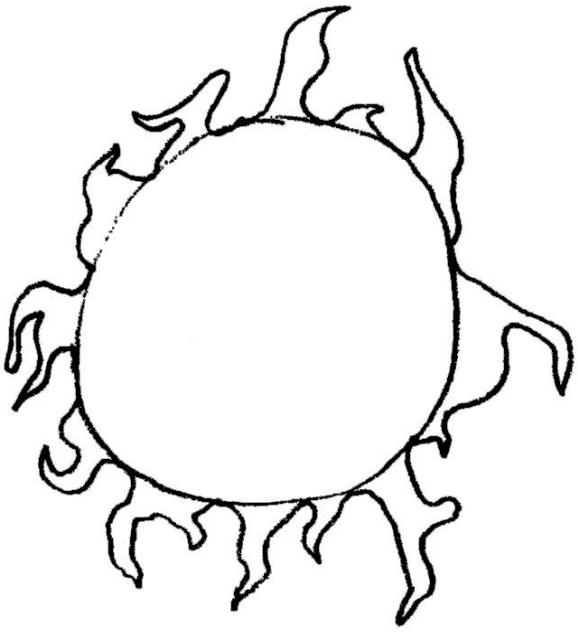
Engineering Unit

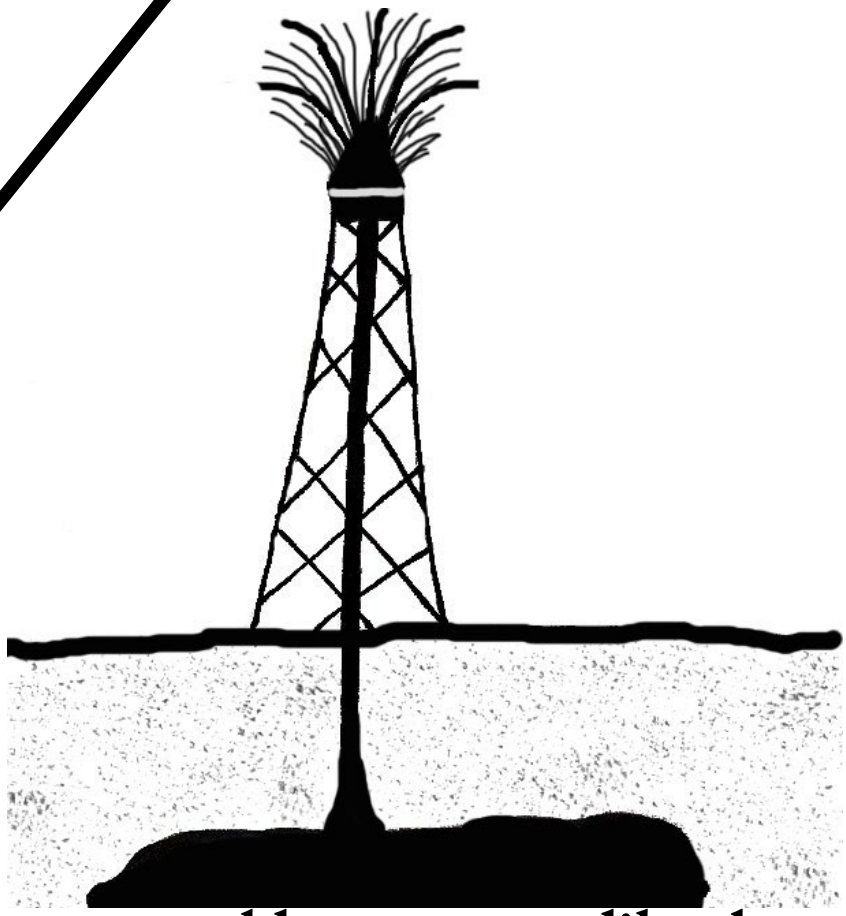


Potential energy is energy that is stored in an object.

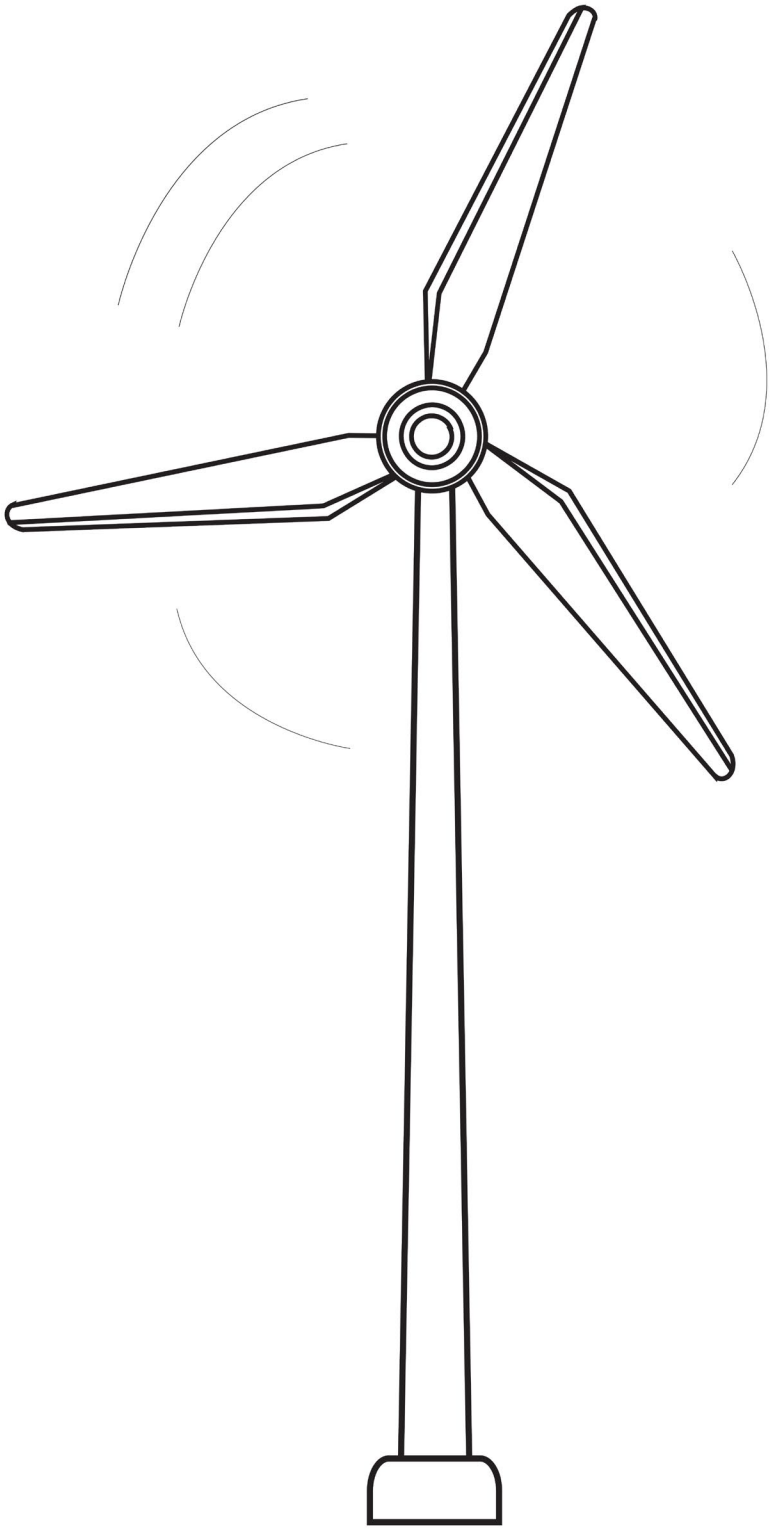


Kinetic energy is energy of movement.





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



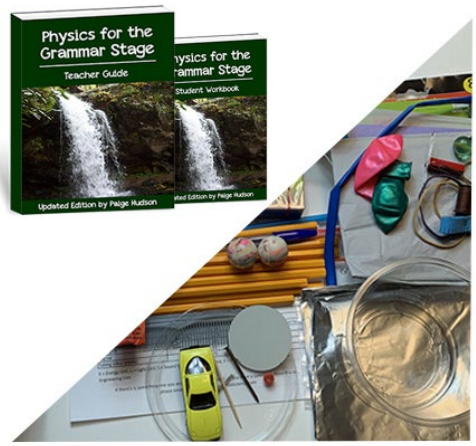
Wind energy is energy from the wind.

elemental science

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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- https://elementalscience.com/collections/classical-science

Classical SCIENCE