



Research Unit

Activity Book

Grade 4

Energy: Past, Present, and Future

English

Grade 4

Research Unit

Energy: Past, Present, and Future

Activity Book

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Research Unit

Energy: Past, Present, and Future

Activity Book

This Activity Book contains activity pages that accompany many of the lessons from the Teacher Guide for the Research Unit. The activity pages are organized and numbered according to the lesson number and the order in which they are used within the lesson. For example, if there are two activity pages for Lesson 4, the first will be numbered 4.1 and the second 4.2. The activity pages in this book do not always include written instructions for students because the instructions would have words that are not decodable. Teachers will explain these activity pages to the students orally, using the instructions in the Teacher Guide. The Activity Book is a student component, which means each student should have an Activity Book.

NAME: _____

DATE: _____

Modern Inventions Make Life Easier

Directions: Think about the machines and inventions you use every day to make your life easier. List as many as you can in the chart below. Use the examples to get you started.

Communication	Health and Medicine	Food	Transportation
<i>telephone</i>	<i>x-ray machine</i>	<i>stove</i>	<i>trains</i>
Other			

NAME: _____

DATE: _____

Vocabulary

oil, n. slippery liquid made from petroleum used for fuel

fuel, n. substances that can be burned as a source of energy

fuel, n. substances, such as food, that are used to give the body energy

fuel, v. to supply power or energy

Example: fuel an argument

energy, n. power needed to run a machine

energy, n. power needed for physical activity

Directions: Connect the sentence on the left to the definition on the right that matches the way the word is being used.

The mechanic added oil to the car's engine.	<ul style="list-style-type: none">• fuel, v. to supply power or energy Example: fuel an argument
Make sure we have enough fuel in the tank before the big trip.	<ul style="list-style-type: none">• fuel, n. substances that can be burned as a source of energy
Breakfast is your fuel for the day.	<ul style="list-style-type: none">• oil, n. slippery liquid made from petroleum used for fuel
My first goal fueled my victory.	<ul style="list-style-type: none">• energy, n. power needed for physical activity
The battery was too low on energy to turn on the toy.	<ul style="list-style-type: none">• fuel, n. substances, such as food, that are used to give the body energy
By the end of the day my body is out of energy .	<ul style="list-style-type: none">• energy, n. power needed to run a machine

“Banana Bread and the Story of Oil”



Banana Shopping

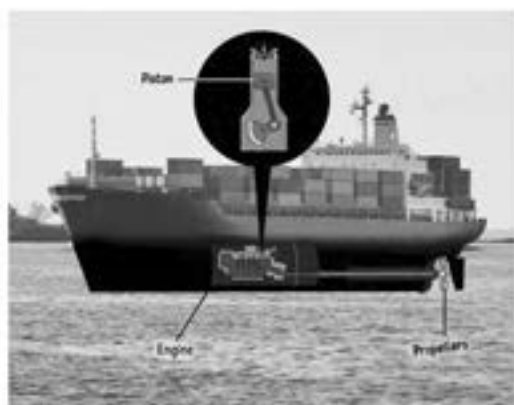
Suppose you’re watching a cooking show you really love. There’s a recipe for banana bread. “Hmm,” you think. “I’d like to try cooking that!”

So you and your grandmother get on the bus, and you go to the supermarket. All kinds of fruits are on sale there, including bananas. You pick up a bunch, along with flour, butter, and eggs. Then you take the bus home, and you make your banana bread.



Banana Travels

What does baking banana bread have to do with the story of oil? Well, have you ever asked yourself where bananas come from? In much of the United States, the answer is: somewhere else! We grow a few bananas in the United States, but most of them come to us from Asia and South America. It’s a long way from there to here. If we didn’t have boats that could make the trip fast enough, all the bananas would spoil, or become unhealthy to eat. There’d be no banana bread for anyone.



Ship Diagram

To get the speed they need, the people who make boat engines use a special source of fuel. Fuel is any kind of material that releases energy when you burn it. (For example, when you make a campfire, the wood you burn is the campfire’s fuel.) One kind of fuel in boat engines—and in many kinds of engines, in fact!—is called oil. (There are other kinds of oils besides the kind we burn in

engines, like olive oil or vegetable oil. The kind of oil in engines is based on a fluid based on petroleum.) Engine oil is very easy to set on fire! When it burns inside an engine, it releases gas that pushes up and down on a part called a piston. When the piston pumps, it starts to turn the gears of the engine very fast. And those gears turn a boat's propellers fast enough to get the bananas to a port, where a truck drives them to your supermarket.



World Without Gas

Our world would be very different without oil. In the days before oil, it really was very different! People ate different foods, and traveled less, and worked in different ways. Before oil, you might never meet anyone from outside your hometown, unless you made a very special effort. Now people travel the world. We know more about one another than we ever did. And in many ways, that's because of oil.



Gasoline Pump

Oil is a big part of the story of our world. But what's the story of oil? Where did it come from? How did we come to start using it? Will we keep using it forever? And if not, what's going to come next?

In this unit, we'll answer some of these questions. We'll look at how far back the story of oil goes: all the way to prehistoric times and the age of the dinosaurs! Oil began with living beings, especially prehistoric animals and plants. Over time, these living creatures died and

were sealed underground. There, their bodies broke down and were slowly transformed into the oil we burn. (One reason oil burns so well is that it's made up of carbon, a key part of the cells of all living beings.)



“Spindletop”

We’ll also look at one of the most important discoveries of oil in modern times. That discovery happened in Texas with an oil well, a hole dug in the ground to extract oil, called Spindletop, in a city called Beaumont. People had discovered oil before in many places around the world, but the Spindletop well was just the start of a huge supply of oil, and all of it was coming from Texas. Oil was useful to many businesses for all the reasons we talked about, and that made it valuable, or something people wanted to pay a lot of money for. Soon lots of oil was flowing out of the United States, and lots of money was flowing back into it.



The Oil Industry

The oil business made Texas one of the richest states in the United States and created many jobs. Oil was important to the world economy, or the way goods and services are bought and sold around the world. Over time, the oil industry developed more technology and machines for oil extraction. The oil industry also attracted many immigrants to the United States from countries like Cambodia, Vietnam, India, Pakistan, and Iran.



Scientists

That's all part of the story of oil. And the story is still being written: no one knows yet exactly how it's going to end! Remember, oil is formed from prehistoric living creatures. But there are only so many of those creatures who ever lived, which means there's only so much oil to find. Once it runs out, it's gone. So scientists are exploring how to use sources of renewable energy that will do everything oil did, but without running out. We'll look at some of the ideas they've had. And then we'll each become a scientist and decide which of those ideas seems like the best choice for the start of the next story our society tells.



Looking to the Future

So listen carefully as we explore the story of oil! After all, one of you may be the person who writes the end of it.

NAME: _____

DATE: _____

Sorting Organizer

Directions:

Brainstorm with your group, “What inventions in everyday life need fuel to run?” Write your group’s ideas in the space below.

Sort your ideas by type of fuel. Rewrite the ideas in the box above into the chart below using the categories listed. Use the blank column for a type of fuel not already listed, if needed.

Fossil Fuels (gasoline, heating oil, propane)	Batteries	Wind Power	Solar Power	

NAME: _____

DATE: _____

1.5

Lesson 1: Think About It

Directions: Using what you learned in this lesson, answer the prompt below in complete sentences.

Name three important uses of energy in your daily life.

NAME: _____

DATE: _____

T-Chart Notes

Buried Sunlight

Main Idea	Details
The Sun's Energy	
Where does the sun's energy come from?	
Cycle of Life	
Fossil Fuels	

NAME: _____

DATE: _____

“The Beginnings of Oil in the United States” Comprehension Questions

1. What are some ways people used oil in the past?

2. What was the problem with using whale oil for light in the nineteenth century?

3. What solution was found to solve the problem with affordable lighting fuel?

4. After Edwin Drake drilled an oil well in 1859, why were hundreds more wells drilled throughout the country?

5. Why did Patillo Higgins suspect that he would find oil in the small hill outside of Beaumont, Texas?

6. What problem was Jim Hamill hired to solve? How did he solve it?

7. Why was the rotary drill a successful tool at Spindletop?

Retell the events at Spindletop by placing them on the timeline below. Include the page number where the event occurs below the event.



NAME: _____

DATE: _____

Make a Claim

Example:

I claim that chocolate ice cream is the best flavor ever. It is the best because chocolate and ice cream are two great desserts and together make the best ice cream choice.

Directions: Make two claims about the events in the text you read. Defend your claim with evidence from the text.

1. I claim that _____

because _____

_____.

2. I claim that _____

because _____

_____.

NAME: _____

DATE: _____

“A New Fuel”

Directions: Read “A New Fuel” and consider the challenges being faced for the new oil industry. Using the chart below, record how the problems occurred and the solutions that solved them. Use the example to help you.

Problem		Solution
Cause	Effect	Claim
<i>A large amount of oil gushed from the ground.</i>	<i>Oil flooded the area and caused hazardous conditions.</i>	<i>The workers created a pipe with a valve to cap the oil well.</i>

Think About It

After discovering such a large amount of oil at Spindletop, how were the lives of everyday people across the country impacted?

NAME: _____

DATE: _____

4.2

Activity Page

Opinion Essay Model

I Scream for Chocolate Ice Cream

On a hot day, there is nothing like an ice cream cone covered in your favorite toppings. When you step up to the counter, the choice is clear. The best flavor of ice cream is chocolate.

To start, chocolate is one of the most popular flavors, not just of ice cream, but all kinds of desserts. Every restaurant has a chocolate treat. Stores are filled with chocolate on holidays like Halloween and Valentine's Day. Chocolate is even known to have some health benefits!

Some people might say that chocolate ice cream has its downsides. For instance, it can stain your clothing. On the other hand, who doesn't want to see the wonderful memory of that chocolate banana split sundae the next time you wear those shorts? There is no downside to chocolate ice cream that isn't made better by that delicious flavor melting over your tongue.

Ice cream is great and chocolate is great, so why don't we put them together? Chocolate ice cream is popular for good reason. It is the best. Chocolate can even be good for your health when added to your diet in small amounts. So the next time the scooper asks what flavor, say chocolate.

NAME: _____

DATE: _____

Label the Opinion Essay

Directions: Read the opinion essay below. Label each paragraph with the correct part of the essay. Use the model on Activity Page 4.2 to help you.

Getting a pet is a big decision. Which kind of animal to get is an easy decision. Dogs make the best pets for anyone who wants an animal pal.

Dogs come in many sizes, shapes, and personalities. There is a dog for every person. Not only will they give you endless love and companionship, they are fun! Dogs can learn all kinds of tricks. Having a dog will also make you healthier because you will exercise each time they need a walk.

Lots of parents try to say that a dog is not a good idea for a pet. They say that it is too big. Well, good news. Some dog breeds are so small they can fit in a purse. Allergies are another worry. There are breeds of dogs that have hair instead of fur and are great for people who get the sniffles from other furry pets like cats.

If you want to be happy and healthy you should get a dog. You will take plenty of walks and get a ton of cuddles everyday. Dogs are by far the best pets.

NAME: _____

DATE: _____

Using Diagrams to Make Inferences

Directions:

Part 1: Listen as your teacher reads the text. Imagine what you are hearing as pictures in your mind. At each pause in the text, stop and sketch a diagram of what you visualized.

Part 2: Write at least one sentence to add evidence from the text below each diagram to support your work.

Sketch 1	Sketch 2	Sketch 3
Text Evidence:	Text Evidence:	Text Evidence:

Part 3: Using a sentence, explain an inference you can make about the sun's energy based on the diagrams you drew.

NAME: _____

DATE: _____

7.1

Research Guide

Your Claim: A fuel of the future is _____

What do you need to learn to support your claim?

Research Questions:

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

To turn your research into an essay you need to change your notes into sentences. Use the chart below to help you.

Facts from Research	Sentence Form
Example: <ul style="list-style-type: none">• <u>Moisture wicking fabric</u> patented in 1998• <u>Speakers sewn into headband</u> for exercising• Baby <u>monitors in socks</u> to watch oxygen and breathing	Some clothing has more advanced technology, like <u>special materials that wick away moisture</u> or contain high-tech features such as <u>speakers</u> or <u>oxygen monitors</u> .

NAME: _____

DATE: _____

Innovation Challenges

Comparing Early Oil Innovators to the Energy Innovators of Today

1. Answer each question in both columns. Remember to support your answer.

	Spindletop Workers	Modern Energy Workers
Where do energy workers do their job?		
How is energy extracted from its source?		
What are the dangers of working with energy?		

2. What else did you learn about modern energy workers and innovators that you did not include above? Share at least three more pieces of information. Remember to use your research notes to help you.

- _____
- _____
- _____
- _____

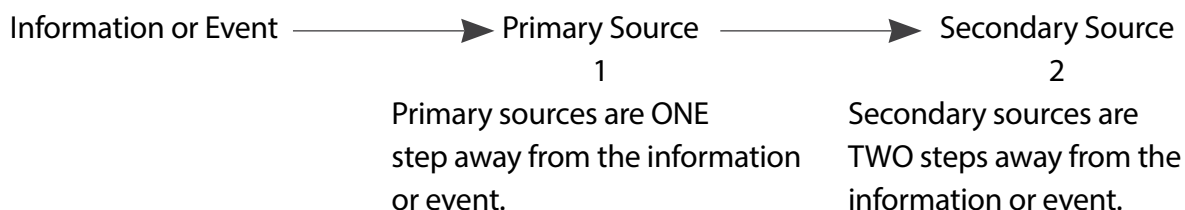
NAME: _____

DATE: _____

Primary and Secondary Sources

When researchers are collecting information they often use primary sources. A primary source is a person who knows about a topic firsthand. They are either an expert on a subject or a witness to an event. These sources are useful because they are very accurate.

Secondary sources are created using information from a primary source, like books and articles. These sources are useful because they are easy to find.



Practice

Show whether a source is primary or secondary by circling the correct term.

Encyclopedia	Primary Source / Secondary Source
Blog	Primary Source / Secondary Source
News website	Primary Source / Secondary Source
Journal entry	Primary Source / Secondary Source
Interview	Primary Source / Secondary Source
Photograph	Primary Source / Secondary Source

Try it out!

One method to collect primary source information is through interviews. Think about who may know about the topic you are researching. Write your interview questions below.

1. _____
2. _____
3. _____

NAME: _____

DATE: _____

Conduct an Interview

Directions:

1. Write your questions from Activity Page 8.2 on the lines below.
2. Pick a person to interview. This can be a classmate or an adult.
3. Ask your questions one at a time. Remember to speak slowly and clearly.
4. Write down your subject's answers beside the question. It is fine to ask your subject to repeat something or add more details to help you understand.

<p>Question 1:</p> <hr/> <hr/> <hr/>	<p>Answer:</p>
<p>Question 2:</p> <hr/> <hr/> <hr/>	<p>Answer:</p>
<p>Question 3:</p> <hr/> <hr/> <hr/>	<p>Answer:</p>

NAME: _____

DATE: _____

Comparing Energy Sources

Directions: Complete the chart below with information from the article.

	Pros	Cons
Fossil Fuels		
Solar Energy		
Wind Energy		
Hydropower		

NAME: _____

DATE: _____

9.2

Activity Page

Presentation Checklist

- All details match the main idea or topic.
- Text is clear and easy to read.
- Images match the details on the page.
- Images add information.
- Design is neat and visually appealing.
- Error free

NAME: _____

DATE: _____

9.3

Activity Page

Lesson 9 Exit Ticket

1. How many different sources have you used to take notes, so far? _____

2. Do you find certain types of sources more useful than others? (circle one) Yes / No
What makes a source useful for your research? _____

3. How many facts from your notes have been included in your essay
so far? _____

NAME: _____

DATE: _____

Energy Island

Directions: After reading *Energy Island*, pages 1–12, complete the chart and answer the question below.

Problem		Solution	
Cause	Effect	Claim	Counterclaim
<ul style="list-style-type: none">• Oil tankers have to travel to deliver oil to the island.•	<ul style="list-style-type: none">• The Ministry of Environment and Energy selects Samsø to become independent of nonrenewable energy.		<ul style="list-style-type: none">• too expensive•••• too old for change

• Who is the audience the author of *Energy Island* is writing for? How can you tell?

NAME: _____

DATE: _____

10.2

Activity Page

Write a Counterclaim

Example:

Claim: I claim that *chocolate ice cream is the best flavor ever.*

Negative about the claim: Creates stains

Counterclaim: *Chocolate cannot be the best flavor ice cream because it may stain your clothes.*

Directions: Rename your claim and negatives about that claim (even if you do not agree). Rewrite those negative counterclaims into sentence form.

Claim: _____

Negative about the claim: _____

Counterclaim Sentence: _____

Transfer your counterclaim sentence above to your essay. Add details from your research explaining why that counterclaim is wrong.

NAME: _____

DATE: _____

10.3

Write Your Opinion Essay

Checklist	Completed?
Introduction: State the claim.	
Body Paragraph: Defend the claim.	
Body Paragraph: Defend against a counterclaim.	
Conclusion: Restate the claim.	

NAME: _____

DATE: _____

Revising and Editing Checklists

Revising Checklist	After checking for each item, place a checkmark here.
The main idea and details in each paragraph match.	
There are a variety of short, medium, and long sentences.	
The words were carefully chosen for the essay's purpose.	
Transition words are used between ideas and paragraphs.	

Editing Checklist	After checking for each item, place a checkmark here.
Correct grammar	
Correct capitalization	
Correct spelling	
Correct punctuation	

NAME: _____

DATE: _____

“Clean Energy”

Directions: Use the T-chart below to take notes as you read “Clean Energy.”

Main Idea	Details

Ask Yourself

Does any of the information in this article support your essay’s claim or connect to your essay’s counterclaim? Why or why not?

NAME: _____

DATE: _____

Partner Checklist

Your Name: _____ Your Partner's Name _____

Directions: Check the boxes and fill in the spaces below based on your partner's essay.

Claim: _____

Evidence to support the claim:

- _____
- _____
- _____

Counterclaim: _____

Evidence to defend against the counterclaim:

- _____
- _____
- _____

Revision	
<input type="checkbox"/>	The main idea and details in each paragraph match.
<input type="checkbox"/>	There are a variety of short, medium, and long sentences.
<input type="checkbox"/>	The words were carefully chosen for the essay's purpose.
Editing	
<input type="checkbox"/>	Correct grammar
<input type="checkbox"/>	Correct capitalization
<input type="checkbox"/>	Correct spelling
<input type="checkbox"/>	Correct punctuation

Give a Compliment

Tell your partner which piece of evidence convinced you the most to agree with the claim and why.

NAME: _____

DATE: _____

“Houston Affects the Earth”: Analysis Activity

Directions: Answer the questions below for the article “Houston Affects the Earth.” Remember to support your answer with details from the text.

1. What is the main idea or claim the article is making?

2. What are some changes that Houston put in place?

3. Did the changes have the impact the mayor hoped for? Why or why not?

4. How are Houston’s efforts the same or different from the efforts for change on the island of Samsø? Explain.

NAME: _____

DATE: _____

Opinion Essay

	Exceeding	Meeting	Developing
Introduction	The claim is stated clearly in a manner that gains the reader’s attention.	The claim is stated clearly.	The claim is missing or unclear.
Body	The body paragraphs contain facts that support the claim and dispute a counterclaim.	The body paragraphs contain facts that support the claim.	The body paragraphs contain no facts that support the claim.
Conclusion	The conclusion restates the claim in a compelling way that uses craft, such as the writer’s voice and style.	The conclusion contains a restated claim that engages the reader.	The conclusion is missing the restated claim or does not engage the reader.
Structure	The essay is carefully organized using an attention-grabbing introduction, consistently used transitions, and an effective conclusion.	The essay is organized using an introduction, transitions, and conclusion.	The essay is disorganized and missing one or more of the following: an introduction, transitions, or conclusion.
Development	The essay uses specific facts and details to develop an engaging idea reflecting depth of thought.	The essay uses relevant details to develop a main idea.	The essay does not use relevant details to develop a main idea.

NAME: _____

DATE: _____

The Boy Who Harnessed the Wind

Directions: Explore the challenge faced by William in his village. Complete the chart below by answering the questions in each box.

Problem: What problem does the village face?	
Cause: What caused this problem?	Effect: What effects does this have on the village?
Claim: What does William believe will fix the problem?	What challenges does he face?
Solution: How is the problem solved?	
Think About It: How does a wind turbine work? Can any be found where you live? Use your research skills to find out!	

NAME: _____

DATE: _____

My Presentation Checklist

	To Do <i>Add checkmark when complete</i>
<input type="checkbox"/> All details match the main idea or topic. <input type="checkbox"/> Text is clear and easy to read. <input type="checkbox"/> Images match the details on the page. <input type="checkbox"/> Images add information. <input type="checkbox"/> Design is neat and visually appealing. <input type="checkbox"/> Error Free	
Partner Checklist	Positive Comments:
<input type="checkbox"/> All details match the main idea or topic. <input type="checkbox"/> Text is clear and easy to read. <input type="checkbox"/> Images match the details on the page. <input type="checkbox"/> Images add information. <input type="checkbox"/> Design is neat and visually appealing. <input type="checkbox"/> Error Free	
Ideas for Improvement: 	

NAME: _____

DATE: _____

Audience Feedback

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

NAME: _____

DATE: _____

Reflection

Name three new things you learned in this unit.

1. _____
2. _____
3. _____

Name one thing you learned that surprised you.

- _____

Name an activity that you were able to do easily.

- _____

Name an activity that was challenging for you.

- _____

What else would you like to share about your work that hasn't been asked?

Final Claim Statement: Imagine you are fifty years old. Use your knowledge to make a claim about the future of energy sources.

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