Coal and Its Impact on US

CEDAR Coal Grant Report
2018-2019

INTRODUCTION:

This year our we asked our students two questions. "Do your family or friends have any connections to coal? How does coal impact our area?" Students went home and interviewed their families and friends. Then they reported back to the whole class what they had learned. The reports and discussions were interesting. From these discussions the students decided they wanted to know more about how coal has and does impact our area and they wanted to know more about how coal is made into energy.

Our unit centered around reading and activities related to a novel, ***Saving Wonder*** by Mary Knight. This novel focuses on coal mining production as an energy source, an income source, and a way of life. The novel also brings to light the environmentalist view of coal production damage to the earth/physical features (mountaintop removal, strip mining, deep earth mining) and the lasting effects of those types of energy retrieval. ***Saving Wonder*** also looks at the other side of the issue---loss of income, families moving away, and a subculture/way of life being lost, etc. The book is relevant to our students because of the shared vocabulary, shared backgrounds and experiences, and an in depth look at the social issues faced by those who are coming of age here in Eastern Kentucky.

Activities for the unit were designed and implemented that focused on the development of reading, writing, speaking, listening, and communicating skills and strategies that can be applied to everyday situations. These skills include making predictions, using comprehension strategies, information gathering, and applying vocabulary. The goal of the unit was to provide culturally relevant learning experiences relating to coal while developing reading and writing skills. Through active participation in this unit, students explored/developed a deeper understanding concerning the relationship and cultural impact that coal has/had on Appalachia. The rationale behind the teaching of this unit was a focus on students understanding the world around them.

Summary of novel;

Saving Wonder is novel about a boy named Curly who lives in Wonder Gap, KY. The novel is set in the Appalachian Mountains and the coal fields of Appalachia. The main character, Curly has lost nearly all his family members to some type of mining accident, and he hates the coal mining production company. The catch is that Curly, who now lives with his grandfather, subsists on a monetary settlement from the coal mining company due to such accidents. Curly is caught between wanting to stop the mining company from clear-cutting and strip mining his beloved mountain and needing

the monetary assistance from the mining company to live. If Curly wins his battle, his mountain is saved but people lose their jobs and Curly loses the settlement money. If he loses, his mountain will be forever altered.

Cross-Curricular Field Trip

To begin our cross-curricular journey this year, the students went on a field trip to the Van Lear Coal Museum. Students were able to see equipment, models photographs, and dioramas, among other things that related to coal history in our area. In addition to viewing the exhibits, the students were able to experience some "oral storytelling" as the tour guide gave brief histories and anecdotal recountings of the rich coal history of our area. Students were amazed that this area was once major coal producing area and that it had changed so much as situations evolved. This experience gave the students new background knowledge leading into the unit for all subjects. We, as teachers, were able to relate certain topics and ideas to this trip. Students gained knowledge of family history and Johnson County heritage related to the coal industry. Our students thoroughly enjoy this trip and what they learned there came up many times during our unit.

Language Arts Activities:

1. Pre-reading Activity --

Our students watched a short video: **Coal People: *A Century of Pride*** ***(https://youtube/8RMomXUfWHc).*** Next students answered the following prompt. Discussions followed as students shared their thoughts and impressions.

Prompt: You have viewed the video, **Coal People: A Century of Pride.** Discuss two details/things that you observed in the video. Why did those two details stand out to you? Be specific and relate your observations to information you learned from the video.

2. Reading *Saving Wonder* by Mary Knight

Students read daily from the novel; independent reading, buddy reading, small group reading, whole group reading. Students regrouped into discussion circles to discuss the components of the story.

3. Journaling

Students kept a daily log/journal while reading the book. Journal entries will include a brief summary of the chapter read, a list of Curley's words (vocabulary) and their definitions, and reflections/text connections that the reader makes with the text

(text to text, text to self, text to world). *Again the students thoroughly enjoyed their journals.*

4. You Be The Teacher Activity Multiple Choice (Discussion Springboard Activity)

Students were placed in groups and given the following instructions: Your group of "teachers" are to read Chapter _____ (assign a chapter) again and develop 10 multiple choice questions. Write out the questions, the answer choices, and make an answer key. Exchange questions with another group of "teachers" who have developed questions for different chapter and answer that set of questions as a group. As they finished, students got answer key and checked their answers.

5. You Be The Teacher Activity Short Answer (Discussion Springboard Activity)

Students were placed in groups and given the following instructions: Your group of "teachers" are to read Chapter _____ (assign a chapter) again and develop 5 Short Answer questions. Write out the questions and make an answer key using the RACE strategy. Exchange questions with another group of "teachers" who have developed questions for different chapter and answer that set of questions as a group. As they finished, students got the answer key and checked their answers.

6. Creative Writing

Students were asked to write a story in which they were the main character--either a coal miner or a member of a coal mining family--in the past or the present. They were to write about the hardships and joys of being a coal miner or coal mining family. They wrote a handwritten story that had to be checked/edited by at least two other people. This lead to very interesting discussions and even an occasional argument about accuracy. The final draft had to be typed and be a total of 2-4 pages with 15 to 20 paragraphs. After much moaning and groaning most of the students were proud of their writings and enjoyed sharing them.

7. Research Paper/Essay

Students were asked to pick a topic relating to coal that they were interested in learning more about. Students were given the list of suggested topics, but many had their own ideas. Students were encouraged to be original and not plagiarize. Essays had to be 3-4 pages (12-15 paragraphs) and had to include a Bibliography. Essays were read and edited by at least 2 other students. We have included an example of the research projects in our report.

8. What I Learned/Reflection Paper

Students wrote a 3.5-3.8 essay detailing what they had learned during the process of working on their Coal Fair Projects. The essay had to address what the

students had learned, how that knowledge changed their perspective or point of view, etc. Students made a rough draft which was checked/edited by at least two other people, then a final draft was typed.

9. Character Portraits

This was one of the more successful activities. The students were to choose one of the main characters of the book and create a visual representation (a portrait/drawing) of that character based on the description in the novel. We hung these drawings in the hall. Everyone, even 4th and 5th graders passing by stopped to check out the pictures and ask questions. Many discussions followed.

10. Graffiti Wall & Parking Lot Reader Response Activities

Several times as they read the novel the students participated in the Graffiti Wall and Parking Lot Activity. Each student had to choose two or more passages from the assigned chapters they felt were "worthy of being read out loud". After each student read their passage, discussion followed. During these times the students told of stories from their own families. It was here that we feel they began to be aware of how our culture has been and is now impacted by the coal. Students were given sticky notes on which they wrote their reactions to the discussion. They wrote questions about the selection, feelings that the discussion or selection evoked, or a fact or detail that appealed to them. Check out our pictures of the Graffiti wall.

11. Reading Strategy Task Cards

Through active participation in the reading task card activity the students practiced and developed the following skills/focus areas: author's purpose, summarizing, prediction, inference, character, setting, point of view, tone, theme, compare and contrast, conflict and resolution, cause and effect, describing, and main idea. Many interesting discussions were heard as the students worked together to describe the problems and joys of this coal family described in the novel.

12. Assessments

Students completed pre-assessments, mid-unit assessments and post assessments about Saving Wonder, Reading Strategies, and Vocabulary.

Science of Energy Stations

During the science class, students participated in six laboratory stations that allowed them to investigate the science of energy. These lessons were selected from the National Energy Education Development (NEED) Project.

Station 1-Potential and Kinetic Energy
Students investigated the questions

What forms of energy are demonstrated when you bounce a ball?
What energy transformations occur?

During this station students used a variety of materials to see the changes from potential to kinetic energy. Students worked with the vocabulary absorb, collision, gravitational potential energy, kinetic energy, potential energy, rebound, and thermal energy. Students measured what happened to rubber bouncy balls (happy and sad spheres) when put in hot, cold and room temperature water. They also measured what happened when balloons are blown up and released, wind up cars being wound and released, and a yo-yo being dropped.

Station 2 -Endothermic and Exothermic Process

Students investigated the questions

How is the temperature of vinegar affected when it is combined with baking soda?
How is the temperature of water affected when combined with calcium chloride?
What energy transformation(s) occur?

During this station students used calcium chloride and water, baking soda and vinegar and measured the reaction temperatures. Students used vocabulary words such as chemical energy, chemical reaction, endothermic, exothermic, and thermal energy. Students also learned about the reactions within hand warmers and oxygen.

Station 3 - Radiant Energy Transformations

Students investigated the questions

How does direct light affect the temperature of an object?
How does light affect a radiometer?
How does the angle of the light affect the amount of electricity produced by a solar panel?
What energy transformation(s) occur?

During this stations students learned how direct sun (heat lamp) could affect a thermometers temperature, make a radiometer spin, and see how a solar panel could run a fan. Students used vocabulary words such as radiant energy, motion energy, electrical energy. Students talked about the potential and kinetic energies within the transformations that occurred.

Station 4 - Thermal Energy and Motion Energy

Students investigated the questions

How does bending the hanger affect it temperature?
How does temperature affect the live wire?
How does temperature affect the bi-metal bar?
What energy transformations) occur?

During this station students worked with a variety of metal materials found that thermal energy can could motion energy of some metal objects. Students used vocabulary words such as thermal energy, molecules, expand, contract, and absorb.

Station 5 - Chemical Energy

Students investigated the questions

How does the temperature affect the rate of the chemical reaction in a glow stick?
How do metal combinations affect the electric current produced by an apple?

What energy transformation(s) occur?

Students investigated and measured chemical energy changing within a glow stick to create radiant energy and chemical energy transforming into electrical energy within an apple. Students used vocabulary such as chemical reaction, chemical energy, radiant energy, thermal energy, molecules, conduct, and direct current.

Station 6 - Electrical Energy

Students investigated the questions

How does electric current affect the needle of a compass?

How does a motor compare to a hand generated flashlight?

What energy transformation(s) occur?

Students investigated different effects of electrical energy. They learned that an electrical current affects magnetic fields when they created an electromagnet. They learned that motors have magnets within and copper coils that allow the energy to be created. They learned that for our devices to work it takes several energy transformations to occur.

Through these labs our students learned apply a variety of potential and kinetic energies to everyday activities. They learned that overall to create electrical energy, thermal energy, radiant energy, motion energy, and sound energy it takes a lot of potential energy. We applied these transformations to our coal fired plant producing energy and moving energy into our homes to run the devices that we use on a daily basis.

Station 7 - Whole Group Energy Transfer Simulation

Students will demonstrate the flow of energy to produce electricity using props. The teacher will read "A Cool Coal Story" while students act the energy transformations from the sun to turning on a light in the house. We will adapt to talk about differences between coal energy, biodiesel, ethanol and natural gas.

Students will then go through information about the sources of energy. They will work in groups to pick out specific facts about their source of energy. Students will present their energy source to each other. We will have an emphasis on comparing each source to fossil fuels (coal).

Math

In Math class, several of the students volunteered to read their research papers they had written. This triggered many questions. Students went on the internet to find out how coal is made into energy. Groups researched different websites and reported to the class what they had learned. Students displayed on the Smartboard what they learned and explained in their own terms. During these reports, we discussed the careers and the math and science involved in all we had uncovered. From this we did an activity we called "Where's the MATH?! (in this concept, skill or fact). We related this back to the steps of math we are learning this year.

Gifted and Talented

Our gifted and talented students decided to research how much energy - whether electric, coal, solar, or other - is required for a 100-watt light bulb to run for one year, 24 hours a day. The students used a variety of websites to research solar energy, coal, and natural gas and then used ratios, rates, and converted measurement units. The students calculated that a kilowatt-hour is equal to exactly 1,000 watts of energy and a 100-watt light bulb, if left on, uses 0.1 kWh of energy an hour. Given that there are 8760 hours in one year, when you multiply this by 0.1 kWh it gives you 876 which is how many kWh a 100-watt light bulb uses in one year.

The students chose to report their findings by creating posters with the researched information on natural gas, coal, and solar power. These posters were hung in the halls and students explained their findings to others.

Cross-Curricular

After we finished our Coal Study unit, students participated in the coal fair. Students took what they had researched about coal, personal experiences with coal in their families and the science content to apply to their projects. Students began to choose projects from the seven categories: math, science, social studies, technology, music, art, and language arts. Everyone had ideas on how to express what they had learned. Students were excited to be able to express their work in a personal way. Each category allowed students to have any opportunity they wanted to show their learning.

Conclusion:

This was the second consecutive year our doing a coal study unit. With our students help, we did a lot of collaborative crossover between our classes. Subjects and projects were worked on in all four classes. Parents reported students were discussing our activities. At the end of our unit, we asked our students to write about the benefits of the coal study unit. Most of the comments were favorable. Our favorite comments from the unit reflections were, *"Throughout this study, I have altered my perspective on coal. Being able to see everyone else's view on coal made me realize that coal is more important than I thought it was. This study has also opened my mind to think about the many uses of coal and how is affects our everyday lives."* Another student wrote, *"In conclusion, coal mining improves everyday and will continue to. This coal mining unit has taught me many things. Before this unit I didn't understand our area's changing relationship with coal, my family's relationship with coal and my perspective on coal. Now I do."* These comments sum up well our unit's purpose.

Thank you, CEDAR, for your encouragement and incentives for doing this unit with our six graders. We have all enjoyed it and learned much for the experience.

Van Lear Coal Museum Field Trip

During this field trip students were led on a tour by President of Van Lear Historical Society. She showed students of variety of historical coal mining equipment and tools as well as some current equipment and tools. Students were able to look at a 30 foot diorama of Van Lear, Kentucky when it was a very active coal mining town. The students gained local history knowledge as well as coal mining history knowledge.

Beginning Activity – KWL

What did we already know about coal?
What did we learn at the museum?
What do we still want to learn about coal?

Saving Wonder

Students read daily from the novel; independent reading, buddy reading, small group reading, whole group reading. Students regrouped into discussion circles to discuss the components of the story.

Students kept a daily log/journal while reading the book. Journal entries will include a brief summary of the chapter read, a list of Curley's words (vocabulary) and their definitions, and reflections/text connections that the reader makes with the text (text to text, text to self, text to world). When we asked for a volunteer to let us put a journal in grant report every one refused unless they could have the journal back before the end of the school year. Their journals had more meaning to them then we had anticipated.

Saving Wonder Task Cards

Through active participation in the reading task card activity the students practiced and developed the following skills/focus areas: author's purpose, summarizing, prediction, inference, character, setting, point of view, tone, theme, compare and contrast, conflict and resolution, cause and effect, describing, and main idea. Many interesting discussions were heard as the students worked together to describe the problems and joys of this coal family described in the novel.

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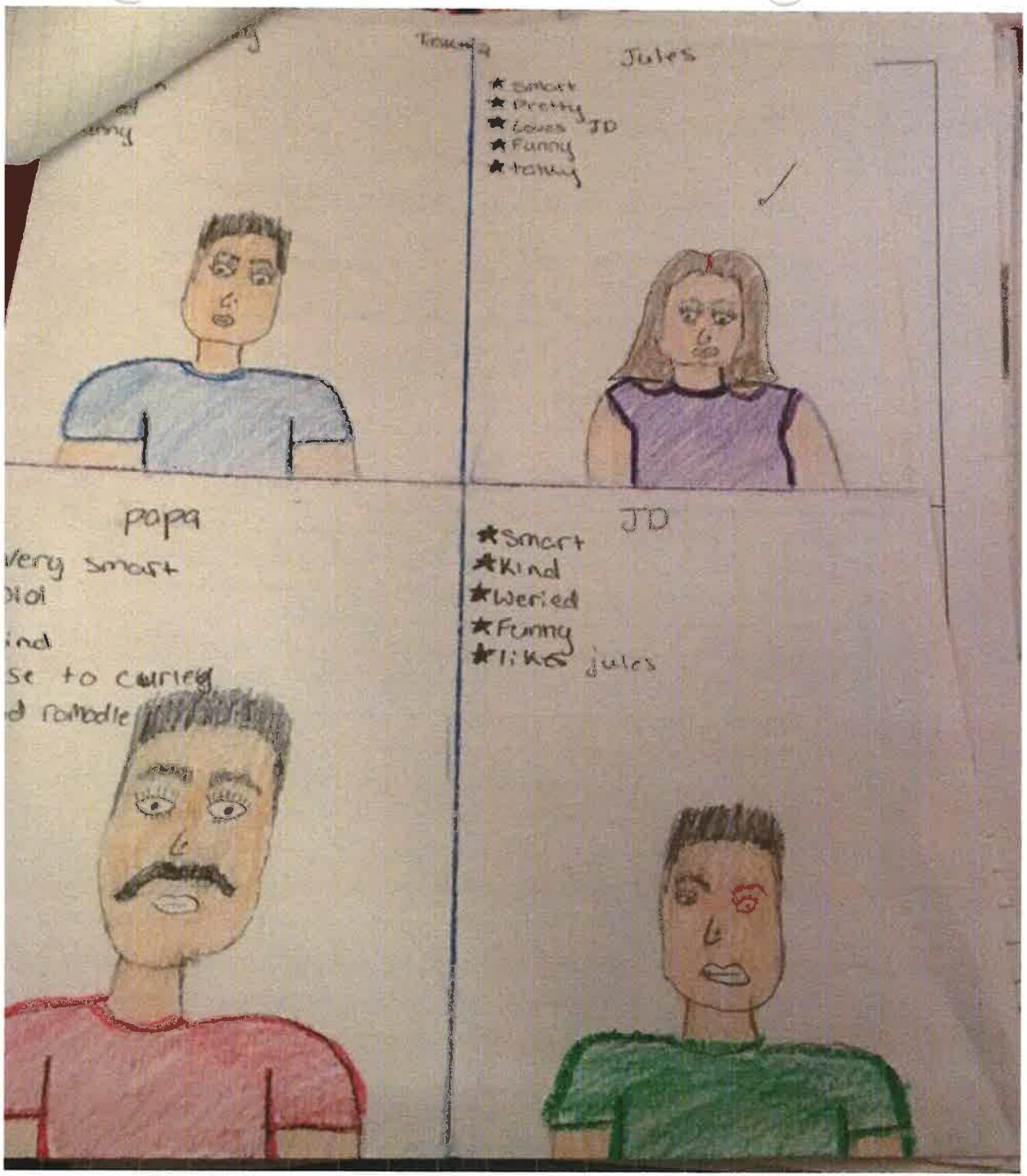
Saving Wonder Study Guide

Be able to:

- Summarize the book (story)
- Identify and correctly write dialogue
- Complete character profiles
- Identify any and discuss protagonist/antagonist
- Identify and find figurative language within the book.
- Identify and describe the setting of the book
- Identify and describe the main characters of the book
- Be able to discuss traits and motivations of the characters (in writing)
- Know how events affect the plot, or characters, of the story
- Be able to discuss changes in plot, character, tone, mood of the book
- Make connections (text to self, text to text, text to world) of the book to other books, experiences, community or world happenings, etc.
- Answer an extended response question using Introduction, RACE, Conclusion
- Answer a short answer question using RACE



Character Protraits

from Saving Wonder

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SAVING WONDER TASK CARDS

NAME _____ DATE_____ TRAVEL GROUP_____

TASK # 1: SUMMARY

WRITE A BRIEF (100 WORDS OR LESS) SUMMARY OF THE NOVEL, SAVING WONDER
CONSIDER ANSWERING THE FOLLOWING QUESTIONS IN YOUR SUMMARY--WHAT ARE THE MOST IMPORTANT EVENTS IN THIS BOOK? WHAT MAKES THESE EVENTS IMPORTANT. WHAT EFFECT DO THESE EVENTS HAVE ON THE PLOT OR THE CHARACTERS. WHAT CHANGES--IN PLOT, CHARACTER, OR TONE OCCURRED IN THE BOOK? BE SPECIFIC WHEN ANSWERING.

TASK # 2: CHARACTER PROFILE

TAKE A PIECE OF COPY PAPER (WHITE PAPER) AND FOLD IT INTO FOUR SQUARES, COMPLETE A CHARACTER PROFILE FOR EACH CHARACTER (ONE PER SQUARE). DRAW A PICTURE OF HOW THE BOOK DESCRIBES THE CHARACTER AND THEN AROUND THE CHARACTERS WRITE DETAILS THAT YOU HAVE LEARNED ABOUT THE CHARACTERS BASED ON YOUR READING.

TASK # 3 DIALOGUE

FIND FIVE EXAMPLES OF DIALOGUE IN THE BOOK AND WRITE THEM DOWN. DON'T FORGET TO PUT THE QUOTATION MARKS.
PUT PAGE NUMBERS WHERE THE DIALOGUE WAS FOUND.

TASK # 4 PROTAGONIST

WHO IS THE PROTAGONIST OF THE STORY? WHAT ARE THE TRAITS AND MOTIVATIONS OF THE PROTAGONIST? WRITE AT LEAST ONE PARAGRAPH DISCUSSING THIS.

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Task # 5 Antagonist

Who/what is the antagonist of the story? What are the traits and motivations of the antagonist? Write at least one paragraph discussing this.

Task # 6 Words

Create a list of at least 10 words from reading that are worth knowing and understanding. The words should be words that were unfamiliar before, are interesting, or are familiar words used in unfamiliar ways.

Task # 7 Figurative Language

Find at least 5 examples of figurative language in the book: Write the example (please put page number where found) and explain which type of figurative language the example is.

Task # 8 Setting

What is/are the settings of the book? Describe the setting in detail.

Task # 9 Main Characters

List the characters of the book and tell something about each one (at least one sentence per character and at least 6 characters).

Task # 10 Connections

Find connections between the book and yourself, the book and another story, and / or between the book and the wider world. Connect the assigned book to your own past experiences, to happenings in school / community, to stories in the news, to similar events at other times / places, or between this book and other writings on the same topic, or by the same author. This should be a 3.5 essay at least!!!!!

Task # 11 Extended Response: Use format of introduction, RACE, conclusion

prompt: In the novel. Saving Wonder, the focus of the novel is the character, Curley Hines. Curley's papaw gives Curley a new word each week.

a. Why does Curley's papaw give Curley these words? What does papaw say these words are to Curley?
b. What does papaw mean when hes says "it's as if the calendar folks and the alphabet folks planned it that way?

Task # 12 Short answer: use the format RACE:

Prompt: "yes is the most powerful word in the English language, " says Papaw. Why did he say this? Explain your answer. Do you agree that yes is the most powerful word? Why or why not? What difference does "yes" make in the plot?

CSU #
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A Life as a Coal Miner's Daughter

Written By:Emma Keeton

Every night I pray I hope to see my family the next day. Pa is a coal miner, but working for the coal mines isn't easy. Its difficult, risky, and takes hard work. Being a coal miner also takes time away from your family, and trust me I know. I barely ever see Pa, he leaves for work at sunlight and comes home at sunset, and I'm most of the time asleep by then. Ma on the other hand has to work hard to give the family food and to take care of us. You might think that's easy, but its not. Taking care of three kids takes a lot of patience, kindness, love, and especially hard work.

My siblings and I also have to help a lot. We work in the garden and house mostly. Caroline my youngest sibling can't do much because she's only 3 ,but she tries. My oldest sibling Andy who is 16 (almost 17) has to work in the coal mines with my father. The second youngest in my family Kaylyn who is 10 helps me pick crops, take care of Caroline, and help Ma do other household things.

I don't attend school currently. Right now it is more important to help my family. Besides, I hated school because all the rich kids would always bully me, and of course the rich kids dads were always the bosses of Pa. I thought I was pretty smart, well at least smart enough to make it through life, so it wasn't really necessary to go.

I was in the backyard picking the crops from the garden and suddenly Kaylyn started running at me and screaming to come inside. She said that Ma was sick. I came in the house to Ma on the floor. It looked like she was dead. Now I ,15 years old and the oldest sibling home will

take her to the hospital. I grabbed Caroline out of bed. I make Caroline carry the medicine bag just in case something happened. Kaylyn helps me put Ma in a wagon and pull her to the hospital. The hospital is only two blocks away I keep saying to myself. It is a struggle pulling Ma.

We finally arrive to the hospital. They take Ma to the back to check on her. Me, Caroline,and Kaylyn wait outside till they say what's wrong with her. Caroline didn't understand what was happening and was whining because she was bored. So,me and Kaylyn played with her to calm her down.

The doctor came out he said it was bad news. He asked where our father was. We told him that Pa was at work,which was true.The doctor said "At the coal mines?" I said "Yes." He said "I know the owner of the mines near here, so maybe I can talk him into letting your Pa skip work and spend time with your Ma." "Your Ma could die soon",the doctor stuttered. My heart suddenly felt empty. It is hard to think about life without Ma. I started crying, this is the saddest moment of my life. The doctor said "She had a massive heart attack and that's why she passed out. This is not just a normal heart attack, it's a kind that can kill you.

The doctor did what he promised and got Pa off work to spend time with Ma. Pa was filled with sadness because of this tragedy. Pa told us as we were waiting to see Ma that " Ma is my life long love and I don't know what I'll do without her." This instantly makes me cry, it makes the whole family cry, even Andy. He doesn't ever cry. The doctor comes in the room and says your Ma has an estimate of two days left to live. When filled with sadness we look past this and enjoy the time we have with her as we wait for her time to come.

Sadly, Ma's time finally comes. It was a very sad and tragic time. As the day came, I put my on my black flowered dress because flowers were Ma's favorite. While at the funeral I start thinking. I then realize that I would be taking care of Kaylyn and Caroline, while Pa and Andy are working.

The next day, Pa and Andy go back to work,while I talk to Kaylyn and Caroline. I tell them that we have to step it up and do more things. Now that Ma died we have to grow and pick the crops. We also have to care for ourselves and each other.

Today I'm out picking the crops and planting more. After I'm done with that I fix dinner for the family,while Kaylyn and Caroline are cleaning and doing other household work. I talk to the girls and tell them that they are doing an awesome job handling this situation. After they are done eating I clean up their messes and wait for Andy and Pa to come home. Finally, they arrive. I serve them dinner, then put their work clothes in the wash. Then finally,I get to go to sleep.

The next day while I was in the garden working, Caroline came outside and says that someone is at our door. I go answer the door. It was the coal mining company. The guy said that there was a coal mining accident. He said that some died and some were just majorly hurt. He said he saw Andy outside of the mines crying and he looked like he was severely hurt. I asked about my father and he said that he couldn't find him. With enough of my coal mining knowledge I know that means he's probably dead. My heart felt empty again just like when Ma died.

Filled with sorrow I get ready to go to the mines to find Andy. I tell Kaylyn to stay here and take care of Caroline. They both wine and say that they want to go , but i don't let them. I tell them that I will bring Andy here, and that they need to stay here and watch the house.

I arrive to the mines and talk to Andy. Andy tells me that he is so scared and hurt. He has blood all down his legs. He looks awful. He told me that he saw behind him trying to get out of the mines. He said that Pa said "I don't think I'll make it. Tell the girls that it's okay that they can do this and *I LOVE THEM!* Besides I'll be in a better place with your Ma."

We go home and tell Caroline and Kaylyn what happened. We all cry together and hug. We couldn't afford a doctor for Andy's leg, so I bandage it up to heal. Then I tell them to go to bed and get some rest.

In the morning we all decide that I should go to the coal mines to get us money because we are desperate, actually everyone is desperate theses days. Well mostly I think I should go to the coal mines. Besides with Andy hurt and the others to young who else would go to get money for the family. I go to the coal mines to get a job. The manager says " Since there are only children left in your family we will give you money to help your family survive. Besides your father was an amazing worker." I tell him THANK YOU! Then I go home and tell the others the awesome news. That moment changed our lives and we lived healthy grieving lives after that moment.

Coal Narrative

Students were asked to write a story in which they were the main character--either a coal miner or a member of a coal mining family--in the past or the present. They were to write about the hardships and joys of being a coal miner or coal mining family. They wrote a handwritten story that had to be checked/edited by at least two other people. This lead to very interesting discussions and even an occasional argument about accuracy. The final draft had to be typed and be a total of 2-4 pages with 15 to 20 paragraphs. After much moaning and groaning most of the students were proud of their writings and enjoyed sharing them.

5 paragraphs IN ALL

CSU #
02-01-19

3.5
essay

Coal essay

Bailee
Tigers

Some people in the united states want to learn more about coal. One of our presidents wanted coal miners to quit there job while working with coal. People through the united States offered there kid to join the coal companies (and adults). Here are some things about our relationship with coal.

One reason why our areas changing relationship with coal is now a days coal companies can get less people to work for coal. Some of our coal companies make less money than they used too.

My family's connection with coal is very important. My Uncle Stewart loved working for coal until one day he was diagnosed with lung cancer. It was important too my Uncle Tiny as well. He had got hit with a mack and suddenly passed away. My family loves to go to adventures with coal.

My perspective about coal is Coal is good. It's good because it's used to make electricty. Some people think coal is bad because it gets pepole sick and gets people killed. Our president Donald Trump is going for coal. Thats why some people dislike our president. About 50% like coal and 50 % dislike coal for so

Many reasons.

In conclusion Coal is important world wide. Some people love it and some people hate coal. Many people want Presidents that take down coal and completely shut it down. Also many people want Coal to keep on working hard. How do you feel about Coal?

CSU #
02-01-19

Into the Mines

Written By : Delaney Pham

1825, a year coal mining had skyrocketed. 1825, the year I am a young teenager. Coal mining had now been a big source of money making. Even small children worked in the mines as families started getting desperate. Coal mining had now become a last resort for many. Saying that in my head sounded less harsh than it really did, but besides that this is my story.

My name is Delaney, Delaney Pham. I am currently sixteen years old, close to being seventeen but not too close. I have a very small amount of family members as of current status. I only have a mother and little sister. My sister is about ten years younger than me, making her seven years old. Mom had been sick for years, not letting her work as her body was very weak. She had a sickness called Malaria. Malaria damaged your insides very slowly, indicating why Mom is so weak by now. If you're wondering about the rest of my family, they're either dead or far away. My grandparents on my mom's side had moved away before I was born because of how much they disapproved of her having a child with my father. They never did like my father too much. My grandparents on my dad's side had passed away when traveling to Ohio. Dad and my little brother, Devin, died by each other. They had died in the coal mines somehow. It may sound like I don't care, but I really do. It's just a topic that I don't like talking about.

I do carry on my studies in school, just not all the time. School wasn't an important necessity to me. I wasn't bad at studying at all. I wasn't the best either. I was right in between, you could call it average. Although I am average in the studying department, I like to think of myself smart in other ways, like street smart. Not bragging or anything, just stating my opinion. I never liked talking a lot, just to my remaining family and coworkers. Well just the coworkers that I'm closest to, though. I am considered the mysterious type in school, and not in a good way. That's considered too weird here. It doesn't help the fact that my weird last name gets me made fun of, not that I pay attention to their rude comments. That just gives them more reason to make fun of me, at least I don't go to school often to hear the comments everyday.

Besides my opinion on myself, you must be wondering about how my small family stabilizes in basic daily life right? Well that's what's interesting about my story. Myself, a sixteen year old *girl*, is a coal miner. As I said before, families have grown desperate at time like this. That is what my family is going through currently, and let me tell you it's not looking too pretty. I work with the mindset of keeping my little sister and mother healthy with what we have. That is the only thing I care about as of now. When someone tells me that it is an unhealthy lifestyle, to take care of my family and only worry about that, I usually ignore their judgement. Majority of those people don't understand what I have been through to be living like this.

I don't show up to school often because of this captivating job. School had been my main priority before my dad and brother had died. Now the mines take up most of my time in the day. I work for about twelve hours each day, sometimes even more. If you aren't willing to work in the mines when the boss needs you to, you simply lose your job. Some are given second chances but not all the time. My boss, Mr, Hartley had taken me into the mines for this job as he saw I was insanely desperate for a way to live. The men in the mines aren't too nice though, only a few of them are nice enough and respect my reason to be working in the mines. Being mistreated in the mines include me being too "fragile" and "useless". It makes me upset that the men that work in the mines say this as if I can't hear them when I'm right in front of them. It upsets me even more that I'm not able to say anything as men have more power here.

As much as I work around the people I do, there are still some nice qualities about working in the mines, not to mention the few polite people that understand me. When in the mines, you are usually sent down with a partner depending on the position you work. The miners had to switch partners a little bit sooner than expected. This is because my partner, Alex Kimbler, had died not too long ago. He was a boy around my age, maybe a few months younger. His body wasn't found until later, everyone had thought he ran away due to the fact that he had family issues. Not like m family issues though, more like family fighting issues. It really is a shame that the poor boy had to leave at such a young age, he was a good person as well. He would let me rant about the little time I spent at school, he didn't judge me as

others did. Besides the fact of his passing, it really is nice to have a partner that understands you in those deep mines. It really is lonely and terrifying being in those mines alone. Especially being sent down with a dangerous job or position.

My new partner, Jase Kinner, was a real pain. He was insanely arrogant and stubborn. He hated being wrong and wouldn't end the conversation unless he got the last word. He didn't like working with me as I didn't like working with him. He only really called for me when he didn't know how to do something or just needing a helping hand. Sometimes he would just call me over to aggravate me. We ignored each other most of the time, though. I think he's about a year older than me, hard to believe I know. He has the maturity of a two-year old. Mr. Hartley has tried to make us get along countless amounts of times. I don't know why he bothers, I don't think we'd get along even if we were the last two people on Earth. I liked the idea of trying to get along but Jase, being the *amazing* person he is just declined the offer and walked off without saying a word more.

Aside from news on my new partner, everything seemed to be fine at home and I had tried showing up to school more often than usual, we were reviewing writing pieces for an upcoming test but that's about it. Mom had been saying that she was getting and feeling better, but I know she wasn't. She often said this in order to make my little sister, Emma, feel better. Anyone who was closer to my mom could tell when she was lying. Of course Emma couldn't as she was too little and oblivious to the world. She had been asking me recently to play and spend time with her since we never spent a lot of time together. It made my mood drop when I saw the deep frown on Emma's face when I had to say no to the poor girl. I needed to try and pick myself up in school and still had mining to do. It's as if I had no time due to my endless time working whether it be in the mines, at school, or even at home.

I knew my short break from hectic work days wouldn't last very long as it never did. It was nice to have a break but it was time to get back to work as the mines had been insanely busy. It was strange because the mines were already pretty busy but now it's even more busy. Everyone's shifts had been increased. Some shifts were increased by only a half hour but my shift had been increased by an hour. This meaning Jase's shift had been increased by an hour as well. Times like this is when everything got stressful.

The afternoon was very peaceful in the mines today. The weather had been cooler, thank goodness, Jase and I had been working in different places today, something about Mine no.2 needing more workers. Everyone had been tired, too tired to be working in that case. I stopped going to school again since the mines were busy. I was supposed to take the test I studied so hard for today but instead I'm at work. Sometimes I really wish I had a more normal life than just working. I want a normal life that a sixteen year old is supposed to have. Life can really be unfair sometimes, though.

Everything was pretty much the same for two weeks, what feeled like endless hours of work and barely any time at home. I hadn't seen Jase in the mine we usually work in for a while. He must still be working in the other mine. I think Mr. Hartley told me he had been moving around all the mines since all of the mines needed more help but not all could get that help. I didn't hear Mr. Hartley correctly since it was so late at night, way too late for my brain to be functioning correctly. My body just worked on it's own like it new what to do. With busy work days I spaced out often, not that I didn't work correctly. Just spacing out for small periods of time without realizing. At this point, I don't know whether these days will lighten up. If I don't get the sleep I want and need, I feel as if I'll go insane.

It was finally time to go home. The best and happiest time of day, well practically night but whatever. I was walking home as usual. I analyzed the marks and pigment that was on my skin caused from coal. I really needed to bathe as of now. It had bothered me when I looked at myself and had lots of coal on my skin. When I stopped analyzing myself, I liked to clear my head while walking home. I had been walking for about ten minutes while in my own world, my thoughts were interrupted as I realized I was home but that's not what caught my attention. I had seen Mom's good friend, Cheryll, standing outside of the house holding Emma tight as she cried into her shoulder. When Emma had looked up to look at me I could see Cheryll's shoulder was soaked. I stopped staring when Emma had tugged on my sleeve that was at my wrist. I crouched down and held her as she cried. After staying in this position for about five minutes, I pulled away from Emma and slowly walked over to a still Cheryll who kept staring at the ground. I tapped on her shoulder, snapping her out of what seemed like a trance that the ground was casting on her. She

looked up at me slowly, eyes filled with tears that were bloodshot red and then smiling softly at me. I tilted my head signifying that I was curious of what had happened, she got the memo and slowly wrapped her arms around me while apologizing over and over again. She pulled away from me and what came out of her mouth was like it was in slow motion. My whole world had come crashing down when I fully understood what Cheryll was telling. I quickly ran inside the house with Cheryll calling after me. I searched the house with tears brimming the edge of my eyes.

It was Wednesday, Mom's favorite day of the week. That's why we held her funeral today. It had been three days since that horrid disease killed Mom. Everyone around me, wearing black, cried out loudly as the speeches were being said. Cheryll was now speaking, her speech was more emotional as she knew my mom the best after me. It was as if I endlessly wiped my tears off of my face, not that there was any benefit from it. Tears just ket falling after each other. I stood looking down how I realized, I never got to say *goodbye*.

It had now been about three months since Mom passed away. I took a break from coal mining for about two of those three months to be with Emma and grieve. After taking a break I got back to work so I could put food on the table to Emma and I. While I was at work, Cheryll took care of Emma as she wanted to help me the most she could. I was pitied at work constantly being apologized to for my mother's death. I always wondered, why do people apologize for something they didn't do or couldn't have prevented? Kind of stupid in my opinion but people can do whatever they want to do. It didn't help that everywhere I walked people always mentioned my mom and how sweet she always was. These comments made about my mom really don't help that I'm trying to keep my mind off of that while I'm working as it distracts me. Since I've gotten back to work, everything was now normal. Jase was my partner and we went back to boring endless days. Jase stopped making a lot of snarky remarks while we were working, he must feel bad for me or something. While working, Jase and I heard a man screaming. We didn't pay much attention to it until we felt the ground below us shaking. We quickly looked up when the ground above us started to fall in small pieces. Jase and I looked at each other before bigger

rocks started falling, bigger rocks turning into giant rocks. Before I knew it I was trapped, I had then looked at Jase for help but he was already gone. I screamed for help. I needed anything, anybody. There was no one. The only thing I could think about was if Emma was going to be left alone. After screaming for long, I had felt as light as a feather. As if i was floating, I felt free. Everything was dark, darker than the **darkest** parts of these mines.

Coal Research Paper

Students were asked to pick a topic relating to coal that they were interested in learning more about. Students were given the list of suggested topics, but many had their own ideas. Students were encouraged to be original and not plagiarize. Essays had to be 3-4 pages (12-15 paragraphs) and had to include a Bibliography. Essays were read and edited by at least 2 other students. We have included an example of the research projects in our report.

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02-01-19

Coal vs Natural Gas: Advantages and Disadvantages

By: Luke Snider

6th Grade

Paintsville

There are many energy sources in the world. Each with their own advantages and disadvantages. Two example of major energy sources are coal and natural gas. These energy sources are used all around the world. But why should they be, and why should they not.

One of these resources is coal, one of coal's advantages is how reliable it is. Coal is very good at persisting through intense situation that require a lot of energy and depend on it not cutting out. An example of coal's reliability is when it is lighting up a large city or town. In a situation such as this one, the town blacking out is very unlikely.

Another advantage of coal is how cheap it is. In fact, in 2017 the average cost of coal per short ton was only $33.72! And to transport the coal is even less, at a price of $5.37. This is a huge advantage because this means coal can be used to light up less fortunate countries. And coal is already very abundant so this makes it available almost everywhere

The final advantage of coal that is going to be mentioned is how many job opportunities it can open up. In fact, there are 174,000 full time jobs relating to coal in the United States alone. This makes up 0.12% of all jobs in the United states. This may not seem like a lot, but it is when you consider there are 153.34 million people working in the U.S. And these jobs are going to continue to open up, especially with coal estimated to last another 300 years.

Although coal has many advantages, that doesn't mean it's perfect. Coal has many disadvantages too. An example of one is the greenhouse gas emissions that can cause pollution. And as everyone already know that's not good for anyone. Pollution can mutate and animals and possibly even kill them. It also destroys plant life on land, and cause habitats to be

destroyed underwater. And it doesn't stop there. Just when you think you might be okay another form of pollution, air pollution, can cause potential sickness in anyone who happens to breathe it in. Sicknesses caused by air pollution include heart disease, strokes, lung cancer, and respiratory infections in children and that's not even all of them. And with a con as big as this it's hard to look at coal the same way again after learning all the damage it causes.

Another disadvantage of coal is that it can destroy habitats. There are many types of mining that involve potentially destroying habitats of many different animals. These involve miners destroying mountains, cutting down trees, and destroying forests. This can cause animals to have to relocate and if they don't they may die. Mining is also a cause of climate change. Climate change causes the globe to heat up meaning animals have to to find new places to stay because the area around them is continuously heating up. Take a brown bear for an example an animal with a big fur coat that sleeps through winter. If the globe heats up the brown bear would most likely overheat due to its fur.

The final disadvantage of coal that is going to be mentioned is that mining it can be dangerous. Although coal mining used to be a lot more dangerous in the past than it is now, that doesn't mean it isn't without risks. The surplus of machines that are now found in mines add new dangers and risks to look out for. This machinery can malfunction, people could get stuck, or it could hit someone and injure them. And although it's a lot less common you can never really be sure that a cave won't collapse on top of you. Also exploding open mountains can also cause injuries if not far away from the explosions.

The other energy source mentioned was natural gas. Like coal, natural gas also has advantages and disadvantages. And one of natural gasses advantages is its abundance. Natural gas can be found almost everywhere on Earth. So this means there is a large supply

Another advantage of natural gas is it can be easily transported. Unlike coal which needs trucks, natural gas can be transferred from power plants to residential areas by pipelines and small tanks.

The next advantage of natural gas is a multi use fuel. Natural gas can be used for many household tasks such as cooking on a stove or oven, heating up a furnace or oven. Drying clothes in a dryer, and lots of other things too.

The final advantage of natural gas is that it does not pollute ground or underground water. It also emits 45% less carbon dioxide than coal. This means it is better for the environment than coal.

Like coal natural gas is not perfect and has disadvantages. One of these is that natural gas is nonrenewable. This means once natural gas is gone it won't come back, and if it does it will be in millions of years. This means it can't be expected to last forever.

Another disadvantage of natural gas is how expensive it can be. Building the pipes to transport the gas can he expensive. This is one of the biggest reasons it can't be used as widely as it could be.

The final disadvantage of natural gas is it's highly toxic and flammable. Since the gas is toxic if there is a leak in the pipes it could possibly kill someone or cause them to get really ill. Also if the gas interacts with something like a lighter it would cause a massive explosion followed by a fire.

There are both good and bad reasons to use either natural gas or coal. For instance if you were worried about the environment you would probably want to use natural gas. And if you were on a lower budget you would want to use coal.

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02-01-19

Technology in the Coal Industry

By
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Sixth grade

Paintsville Elementary School

The mining industry is among the top ten industries nation wide with high occupational injury and fatality rates. Mine rescue response is one of the most dangerous jobs related to the mines. The rescuers face dangerous situations every day and they are also involved in fighting fires, rescue trapped miners, test atmospheric conditions, investegate causes of the accident, they may even recover the dead. Rescuer response can not only be tough for the workers, but think about the sorrow that some of the families are going through, knowing that one day their loved one may never come home. Studies have shown that at least 10% of mine rescuers die each year , due to either leaks of gas, dust explosions, flooding or malfunctions in the technology they use.

Some rescuers even develop a common disease called Black Lung that they get from inhaling coal dust. Doctors have diagnosed over 1,500 cases of black lung in the time span of eight years. Black Lung disease begins when the body's immune system tries to get rid of small particles of coal dust lodged in the lungs, but the white blood cells can get overwhelmed and release enzymes that may damage the lungs and creates scar tissue. This tissue shrinks the volume of the lungs, but why is it called Black Lung? Well, the name comes from the looks of the suffers' lung. The lungs develops dark spots and can eventually turn black, but it is not only called black lung. This common disease can also be called anthracosis and coal miners pneumoconiosis.

Even though miners may still use axes in some areas, their technology has improved from shovels to bulldozers and even cranes. A bulldozer is a powerful tractor with a broad upright blade at the front for clearing ground. A crane is a large, tall machine used for moving heavy objects by suspending them from a projecting arm or beam. These machines help the coal

industry by providing a faster way to produce coal, but they are not the only machines in the coal industry that will improve.

Technologists and scientists are trying to improve automation in the coal field. In fact, even an expert said, "All the experts seemed to agree that in the next 20 years, coal mining will become a cleaner, safer, more efficient and more automated operation than it is currently." Although this may seem impossible, some of the companies such as Atlas Copco, and Detwiler & Associates have made autonomous load-haul-dump vehicles a viable reality, and Joy Global is attempting to develop remotely operated shearers using automated cutting systems and CCTV also known as a closed-circuit television, which is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors.

To retrieve coal, miners use technology, but like the miners, the rescuers also have to use technology. They can use bulldozers and cranes, but they are most likely to use ropes, and some even use a type of signal location to find the injured miners. The rescuers also use special helmets with a light on them that helps them find miners deep underground.

Not only do the mining helmets help the rescuers find injured workers they can also protect them from falling rocks or collapsing mines, and may even save their lives, but if the smallest malfunction were to happen with the helmets than everything would go wrong. If the light went out on the helmet than the rescuers are less likely to see and save other miners from harm. They can even be exposed to fatal gas that would kill them.

Technology doesn't always impact our environment in a positive way. Think about the new technology that helps to burn coal and other fossil fuels that are non-renewable resources. Coal and burning gas can pollute our water and even kills some of the species of fish and other

sea creatures. As we know the burning fossil fuels also pollutes the air. Coal and gas may release sulfur and other dangerous elements such as lead, and mercury. Even though it gives off these elements it is also used to power our cars and the electricity. Fossil fuels also gives off carbon dioxide which the trees consume to grow.

January 2nd, 2005. This date may not seem familiar to you, but it is very important. On that day 13 men died 260 feet underground. They were trying to retrieve coal for a company. It happened in Sago mine in Upshur county 11 men were dead by the time rescuers reached them which was 41 hours later. The others were taken to the nearest hospital where they died later. There were only 12 that survived that day. Imagine how the coal miners' family must have felt when their loved one passed because of the coal industry.

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CSU # 02-01-19

Quizizz

Saving Wonder Quiz Ch. C-M

Name : _____

Class : _____

Date : _____

1. Who is the protagonist in Saving Wonder?

- ☐ a) Curley Hines
- ☐ b) Papaw Hines
- ☐ c) Jules
- ☐ d) JD

2. What happened to Curley's father?

- ☐ a) He died in a mining accident.
- ☐ b) He drowned in the lake.
- ☐ c) He divorced Curley's mother and left town.
- ☐ d) He lives with Curley.

3. What is Curley's real name?

- ☐ a) Napoleon Bridger Leap
- ☐ b) Shan Shelton
- ☐ c) Bobby Buchea
- ☐ d) Michael Weaver Hines

4. What was Curley's little brother's name?

- ☐ a) Napoleon
- ☐ b) Cody
- ☐ c) John
- ☐ d) Zeb

5. What is Curley's papaw's real name?

- ☐ a) John Weaver
- ☐ b) Michael Weaver
- ☐ c) John Hines
- ☐ d) Michael Hines

6. How did Curley's mother and little brother die?

- ☐ a) They died in a coal mine while looking for Curley's dad
- ☐ b) They died when their house was flooded by the river.
- ☐ c) They were killed when the slurry pond broke its walls and a river of sludge covered them.
- ☐ d) They aren't dead, they are just visiting relatives.

7. Who is Curley's best friend?

- ☐ a) Jules
- ☐ b) JD
- ☐ c) Roy
- ☐ d) Beatrice

8. What does Papaw give to Curley each week?

- ☐ a) an allowance
- ☐ b) a new word to learn
- ☐ c) a list of chores
- ☐ d) new books

9. What does the word "conundrum" mean?

- ☐ a) to loiter or trifle; to waste time
- ☐ b) a puzzling question of which the answer is or involves a pun
- ☐ c) to root out or destroy
- ☐ d) liable to fail

10. What was in the envelope that Curley found on Papaw's dresser?

- ☐ a) Curley's report card
- ☐ b) money
- ☐ c) a bill for Papaw's medicine
- ☐ d) the envelope was empty

11. What does the word eradicate mean?

- ☐ a) to destroy
- ☐ b) to waste time
- ☐ c) to complain
- ☐ d) to own something

12. Who is Mr. Amons?

- ☐ a) The owner of the coal mine
- ☐ b) Curley's real father
- ☐ c) Curley's science teacher
- ☐ d) Curley's uncle

13. What was the name of the student who asked Curley what planet he was from?

- ☐ a) JD Tiverton
- ☐ b) Carl Jenkins
- ☐ c) Dana Matherson
- ☐ d) Damien Amons

14. What is JD's real name?

- ☐ a) Justin Damien Tiverton
- ☐ b) Jonathan Douglas Tiverton III
- ☐ c) Jerimiah Dustin Tiverton II
- ☐ d) James David Tiverton III

15. What assignment were the students given by Mr. Amons?

- ☐ a) To team up with another person and develop a presentation on an extinct animal.
- ☐ b) To team up with another person and develop a presentation on coal mining
- ☐ c) to team up with another person and develop a presentation on plants native to Kentucky
- ☐ d) To team up with another person and develop a presentation on birds

16. What is Curley's problem with the new boy?

- [ ] a) The new kid is a bully.
- [ ] b) Curley has no problem with the new kid.
- [ ] c) Curley doe not like the new kid because he is rich and Curley is poor.
- [ ] d) He is jealous and worried that Jules will like the new kid as a boyfriend.

17. What does Curley find out about the money on his Papaw's dresser?

- [ ] a) Curley's grandfather is running drugs and the money is a pay off
- [ ] b) Papaw won the lottery and didn't want Curley to know
- [ ] c) The money is being paid as an out of court settlement in relation to the deaths of Curly's mother and brother.
- [ ] d) The money is from Papaw's wood working job.

18. Who is the author of Saving Wonder?

- [ ] a) Stephen King
- [ ] b) Jesse Stuart
- [ ] c) Mary Knight
- [ ] d) Sherri Woods

19. What doe Curley and Jules see while they are sitting in the tree waiting for the school bus?

- [ ] a) deer
- [ ] b) turkeys
- [ ] c) the mountains
- [ ] d) elk

20. Why do Jules and Curley go to JD's house to work on their science project?

- [ ] a) Curley is embarrassed of his house and doesn't want anyone to visit.
- [ ] b) JD wanted to show off because he lives in a mansion.
- [ ] c) JD's internet connection is better and they can do the research.
- [ ] d) Jules wanted to date JD.

21. What was the name of the Ranger that led the elk tour?

- [ ] a) Ranger Rusty
- [ ] b) Calhoun Brown
- [ ] c) Whitney Calhoun
- [ ] d) Ranger Betty

22. Where does Curley Hines live?

- [ ] a) Wonder Gap, Appalachia
- [ ] b) Red Hawk Holler
- [ ] c) Wonder Gap, Kentucky
- [ ] d) Red Hawk, Alabama

23. What is the name of the creek with the sludge run-off?

- [ ] a) Coal Creek
- [ ] b) Tyler Creek
- [ ] c) Wonder Creek
- [ ] d) Sludge Creek

24. What kind of tree is Ol' Charley?

- [ ] a) Oak
- [ ] b) Aspen
- [ ] c) Spruce
- [ ] d) Sycamore

25. What is a noggin' knocker?

- [ ] a) A question to make you think
- [ ] b) A surprise punch in the face
- [ ] c) The same as a conundrum
- [ ] d) A homework assignment

26. Which animal is NOT extinct?

- [ ] a) Carolina parakeet
- [ ] b) The Western Elk
- [ ] c) Ivory-billed woodpecker
- [ ] d) Eastern bison

27. What state did JD move from?

- [ ] a) Ohio
- [ ] b) Indiana
- [ ] c) Missouri
- [ ] d) Minnesota

28. What is the name of Curley's harmonica?

- [ ] a) Old Charley
- [ ] b) Old Glory
- [ ] c) Old Gloria
- [ ] d) Old Jules

29. What Papaw's word for Chapter A?

- [ ] a) Absent-minded
- [ ] b) Abstract
- [ ] c) Academic
- [ ] d) None of These

30. Papaw filed a million dollar lawsuit with Barkley Coal.

- [ ] a) True
- [ ] b) False

31. Curley is relieved now that he knows the truth about the money.

- [ ] a) True
- [ ] b) False

32. Because the agreement was handled with a signed document, the new company must honor it.

☐ a) True ☐ b) False

33. Curley and Papaw are unsure if the agreement will continue since the coal mine is changing hands.

☐ a) True ☐ b) False

34. Jules and JD are in a relationship now.

☐ a) True ☐ b) False

35. Curley is sitting in between JD and Jules on the elk tour.

☐ a) True ☐ b) False

36. Reclaimed land is a process that involves resurfacing the mining site after it's been stripped of coal, filling in some of the valleys with the leftover rock and debris and then planting new vegetation.

☐ a) True ☐ b) False

37. Male elk grow to about 850 pounds.

☐ a) true ☐ b) false

38. Ranger Whit (the park ranger on the elk tour) tries to see the good in everything, even coal mining.

☐ a) true ☐ b) false

39. A dragline is a digging machine that is 12 stories tall.

☐ a) true ☐ b) false

40. Curley has seen a lot of mountaintop removal sites.

☐ a) true ☐ b) false

41. It will take years before the elk population is the number that it needs to be.

☐ a) true ☐ b) false

42. The elk seen on the elk tour are elk that have always lived in Appalachia.

☐ a) true ☐ b) false

43. Curley points out to Ranger Whit that to refer to mountaintop reclamation is misleading since the top of the mountain is not replaced but is transformed into a plain.

☐ a) true ☐ b) false

44. What is the definition of climax?

- ☐ a) the turning point of the story
- ☐ b) the struggle between two characters
- ☐ c) the beginning of the story
- ☐ d) the point when the conflict is resolved

45. Which list shows the plot elements in the correct order?

- ☐ a) exposition, falling action, climax, rising action, resolution
- ☐ b) exposition, falling action, rising action, climax, resolution
- ☐ c) exposition, rising action, climax, falling action, resolution
- ☐ d) rising action, falling action, exposition, climax, resolution

46. The sequence of events in a story or novel is called the _____.

- ☐ a) action
- ☐ b) conflict
- ☐ c) setting
- ☐ d) plot

47. What takes place after the climax that prepares the story for its resolution?

- ☐ a) resolution
- ☐ b) rising action
- ☐ c) falling action
- ☐ d) exposition

48. What is the synonym we use to describe the beginning of the story where the main characters, setting, and problem are introduced?

- ☐ a) exposition
- ☐ b) rising action
- ☐ c) introduction
- ☐ d) resolution

49. What is the synonym we use to describe the part of the story where the loose ends are tied up and the conflict is resolved?

- ☐ a) conclusion
- ☐ b) resolution
- ☐ c) exposition
- ☐ d) introduction

50. Interest and suspense are built during which part of the story?

- ☐ a) exposition
- ☐ b) rising action
- ☐ c) climax
- ☐ d) falling action

Answer Key

1. a
2. a
3. d
4. d
5. a
6. c
7. a
8. b
9. b
10. b
11. a
12. c
13. b
14. d
15. a
16. b
17. c
18. c
19. d
20. c
21. c
22. c
23. b
24. d
25. a
26. b
27. b
28. c
29. d
30. b
31. a
32. b
33. a
34. a
35. a
36. a
37. a
38. a
39. b
40. b
41. b
42. b
43. a
44. a
45. c
46. d
47. c
48. a
49. b
50. b

CSU #
02-01-19

Biochar

by ReadWorks

When researchers at the Virginia Polytechnic Institute Agriculture Program, also known as Virginia Tech, started work on a soil enhancement research project, they kept their minds open. The project was focused on the possible uses of biochar, charcoal used specifically for agricultural and other environmental applications.

Biochar has been in use for centuries. Pre-Columbian Amazonians used it as a means to revive nutrient-depleted soil. They burned agricultural waste under a cover of soil in order to create a layer of biochar in the ground. The resulting product is called "terra preta", or dark earth. Applying terra preta to this soil increased the agricultural yield of the land and enriched previously poor tribes and communities.

These Native Americans had discovered the benefits of using biochar as a soil amendment. When used in this way it doesn't only improve crop yield. It also improves water quality and reduces soil emissions of greenhouse gases, nutrients leaching, soil acidity, and irrigation and fertilizer requirements.

Biochar is still in use in South America. Scientists have learned that it is particularly good as a soil enhancement in areas with acidic clay soils and sandy soils. Biochar increases the soil's ability to attract and retain water. As a result, nutrients, phosphorus and agrochemicals are retained for the plant's benefit. Plants are therefore healthier and fertilizers leach less into surface or groundwater. Biochar is a useful carbon sequestration tool. The hope is that rural farmers in Brazil will switch from traditional slash and burn farming to slash and char.

So what does an ancient agricultural technology have to do with the scientists at Virginia Tech?

The researchers at Virginia Tech work in environmental science. Many of them also live in central Appalachia. Central Appalachia is mining country. For generations, the area has been mined for coal. More recently, mining companies have been using a technique called mountaintop removal. This means they take layers of rock and mineral off the top of the mountain in order to get access to the coal seams inside. The removed mountaintop, called overburden, is replaced on the ridge and compacted to replicate the original mountain shape. Energy and environmental industry officials call these areas post-mined land.

Post-mining sites are difficult to reclaim. The resulting soil is highly acidic and infertile. The post-mined compacted soil proves more difficult to seed. The soil needs to be loose and open in order for seed to get into the soil. In post-mined land, the ground is too compact. Post-mining sites, therefore, typically look very different from the surrounding area. These sites are more likely to be home to invasive botanical species. Residents and environmental activists complain the landscape is ruined, that the mountain terrain is scarred.

Even if no new permits for mountaintop removal mines are issued, the problem of how to reclaim the post-mined sites remains. Researchers at Virginia Tech decided to try using biochar to help reforest the post-mining site soil. They got permission to apply a layer of biochar to a post-mining site before it was reseeded and replanted. What the team found was that the biochar worked, but not as well as they had hoped. Soil samples showed the biochar had improved the chemistry of the soil. But not enough biochar had been added to make a serious difference. Researchers learned they would have to seriously up the amount of biochar they applied to the site. The kind of biochar the team used, however, was expensive. It cost about $1,000 a ton. Ten tons per acre, the amount the researchers applied, wasn't enough biochar to make a significant improvement to the soil conditions across the site.

The research project had a practical constraint. The team was looking for a solution to the problem of post-mining land. If the biochar was going to cost a small fortune, it would not be feasible for local government or nonprofit groups to use in such large amounts.

The team went back to the drawing board. They redesigned the biochar tests by increasing the concentration of biochar in specific locations. In other words, the team created "planting cells" of biochar-enhanced soil on the post-mining site. Within these "cells" the soil recomposed itself quickly and well. The team had created healthy soil in which saplings could grow. Many trees die on post-mining sites, so improving the chances for individual trees to survive was a good result.

The team would have rather seen the same results with a small amount of biochar spread across the post-mining site. But getting some improvements, given the financial constraint, was better than nothing.

Happily, researchers working with biochar learned that its physical properties would make it ideal for working with other environmental problems. They hypothesized that the material would be useful in treating the biosolids that come from municipal waste, in other words, the sewage of urban areas. Urban waste is, in many areas, dumped into fields outside the municipality, creating zones that smell bad and can't be used for other purposes. The municipal waste is very wet and the biochar is very dry. Researchers hypothesized that biochar can be added to coat the waste to create a product that can be spread as fertilizer. In the process, the biochar reduces the smell of the waste and helps reduce greenhouse gases. Early studies show they are correct; biochar can be used in this way.

agriculture ag · ri · cul · ture

Definition

noun

1. the science or activity of farming. Agriculture includes raising crops and animals for food.

Advanced Definition

noun

1. the raising of crops and livestock, or the science connected with improving the processes involved.

With improved methods of farming, agriculture flourished in the area.

With little industry or technology, the country relies on agriculture for its primary means of support for its people.

Spanish cognate

agricultura: The Spanish word *agricultura* means agriculture.

These are some examples of how the word or forms of the word are used:

1. The research on improving cows' digestion might have other benefits too. Jess Miner, an animal nutritionist at the University of Nebraska, says it could help the animals get more energy from their food. That would mean cows wouldn't have to eat as much. "We could produce more cows with the same amount of feed," Miner told WR News. "**Agriculture** will be made more efficient."
2. As soon as Florida became a state in 1845, its legislature asked permission from Congress to drain the Everglades. Canals were dug to remove or redirect the water. Land that dried out was Pythons Invade the Florida Everglades reclaimed for **agriculture** or building purposes. This reclamation allowed for significant development in south Florida. Sugar farmers moved into the area and prospered. The city of Miami took root.
3. In 1933, the United States began the Central Valley Project with the goal of directing water from sources in the northern parts of the state-where there was a lot of rainfall and flooding from time-to-time-to the Central Valley, which, in certain parts, was even considered a desert and didn't have enough water for **agriculture.** Water would be brought in from other states like Colorado, home to the lengthy Colorado River. A tremendous series of aqueducts, canals and pump plants were built. Manmade reservoirs as big as large lakes were constructed; new rivers were dug too. This project went on through six different decades. All of this water now helps to irrigate over 3 million acres of farmland.
4. Frey and Freyja were twins. Frey was the god of **agriculture**. Freyja was the goddess of love and fertility. Vikings worshipped Frey for a good harvest. They worshipped Freyja to bless a marriage and for help with child bearing.

concentration con · cen · tra · tion

Definition

noun

1. close attention.

This problem is difficult and requires concentration.

Advanced Definition

noun

1. the act or process of concentrating, or the state of being concentrated.
2. a purer, more intense, or more essential mixture.
3. intensely focused mental energy.
4. something grouped closely together.

a concentration of people

5. a card game that requires a keen memory for location of cards that have been revealed only once.

Spanish cognate

concentración: The Spanish word *concentración* means concentration.

These are some examples of how the word or forms of the word are used:

1. Where do humans get their drinking water from if over 96 percent of Earth's water is not potable? We get it from one of the many freshwater sources that have a lower **concentration** of salt and other dissolved solids than seawater.
2. Few places are more treacherous than the Democratic Republic of the Congo (DRC) in Africa. For two decades, near-steady warfare has claimed millions of lives in the area. The DRC is also the site of Lake Kivu. Its cold depths hold a huge **concentration** of dissolved methane and carbon dioxide. A geologic disturbance, such as an earthquake or a volcanic eruption, could stir up the lake.
3. Germany invaded and occupied many countries during World War II. One European country worked as a whole to keep the Nazis from removing its Jewish people. That country was Denmark. In September 1943, the Danes learned of Nazi plans to capture the country's Jews and ship them to **concentration** camps. The Danes organized themselves quickly. People from every walk of life were involved. Doctors, shop owners, farmers, and civil workers all helped Denmark's 8,000 Jews find hiding places. One hospital hid hundreds of Jews by

pretending they were patients.

4. Rescue attempts only made matters worse. In 1934, concrete was injected into the porous stone foundations to strengthen them, but some of the concrete seeped under the foundations, shifting the tower off-kilter by another centimeter. A total of 15 committees scratched their collective heads over the situation, rejecting some loopy schemes such as attaching helium balloons to the tower to hold it up. Meanwhile, the tilt was accelerating. The marble masonry on the south side of the tower was under increasing stress and starting to crack. Stress is the **concentration** of forces in an object, which tend to distort or deform it.

5. Molecules move at different speeds within different states of matter. We have been able to determine that molecules move slower in solids than they do in liquids. That's because atoms in solids are tightly packed and there is less space to move around freely. The molecules in gas move the fastest. Since the molecules move more freely in liquids and gases, they can undergo a process called diffusion. (Solids can diffuse as well, although it's a much longer process.) Diffusion is the movement of particles from a higher **concentration** to a lower concentration. That's why, when you spray perfume in the corner of a room, you will eventually smell it on the other side of the room.

nutrient nu · tri · ent

Advanced Definition

adjective

1. providing or being food; having nourishing qualities.

noun

1. a nourishing substance in a food.

Spanish cognate

nutriente: The Spanish word *nutriente* means nutrient.

These are some examples of how the word or forms of the word are used:

1. The research team discovered that water from the melted icebergs had **nutrients**. Nutrients are the parts of food that help animals and plants grow.
2. Fit kids eat a variety of foods to get different **nutrients**. Nutrients help the body grow and stay healthy.
3. What's better for you-water or juice? They're both good for different reasons. "Water is calorie-free and also vitamin-and mineral-free ... it quenches your thirst well," Tanner-Blasiar explains. "Juice, on the other hand, doesn't quench your thirst. The naturally high sugar content can actually make you more thirsty. So drink water first to quench your thirst, and then enjoy a half a cup of juice for the **nutrients**."
4. Digestion is a complicated process, and most of the time, we aren't even aware that it's going on. As food moves through an animal's body-from the very first chew to the stomach and intestines-enzymes help transform the food matter so that its **nutrients** are absorbed into the cells. That means that even when you are sitting on the couch watching television after dinner, your body is doing hard work.
5. Carnivores, or meat eating animals, still gain the benefit from plants as the meat they eat comes from herbivores. Carnivores acquire their energy and **nutrients** through eating animal tissue, which they find through either hunting animals, or scavenging dead animals. An example of a carnivore is a lion. Carnivores sit on the top of the food chain. It may be surprising to find out that not only animals are carnivores. Plants can be carnivorous too. These plants get their nutrients by trapping and consuming animals or insects. One of the best known of these plants is called Venus flytrap.
6. Another important piece to the growth of many plants is soil. Using their roots, plants take in **nutrients** from the soil that help them grow. Giving a plant a spot in clean soil is important to make sure it doesn't absorb anything harmful from the dirt.
7. Laboratory work at Cornell University in Ithaca, New York, found that certain **nutrients** in apples slow the growth of colon and liver cancer cells. And researchers in Hawaii studied lung cancer patients and another group that was cancer-free. They found that eating apples kept the risk of lung cancer low.

Name: _____ Date: _____

1. What is biochar?

A. a specific type of municipal waste

B. an ancient agricultural technique that was recently discovered

C. charcoal that is used for agricultural and other environmental applications

D. a mining technique that removes layers of rock and mineral from mountaintops

2. What does the author describe in the passage?

A. past and present uses of biochar

B. pre-Columbian Amazonian social customs

C. famous research projects at Virginia Tech

D. protests against mountaintop removal mining

3. Plants are healthier when seeded in soil that has been treated with biochar. What evidence from the text supports this conclusion?

A. "Scientists have learned that it is particularly good as a soil enhancement in areas with acidic clay soils and sandy soils."

B. "Biochar increases the soil's ability to attract and retain water. As a result, nutrients, phosphorus and agrochemicals are retained for the plant's benefit."

C. "Biochar is a useful carbon sequestration tool."

D. "The hope is that rural farmers in Brazil will switch from traditional slash and burn farming to slash and char."

4. Why are post-mining sites likely to be home to invasive botanical species?

A. because the soil has been imported from a foreign site

B. because the act of mining introduces invasive plants to the soil

C. because the post-mined soil is too loose for native plants to seed

D. because the original acidity and density of the soil has been altered

5. What is this passage mainly about?

A. mountaintop removal mining in central Appalachia

B. a soil enhancement research project using biochar

C. the use of biochar in South America

D. the problems of urban sewage removal

6. Read the following sentences: "If the biochar was going to cost a small fortune, it would not be feasible for local government or nonprofit groups to use in such large amounts. The team went **back to the drawing board**. They redesigned the biochar tests by increasing the biochar in specific locations."

What does it mean to "**go back to the drawing board**" in this context?

A. continue with the same experiment

B. change the current experiment

C. design a new experiment

D. give up on the experiment altogether

7. Choose the answer that best completes the sentence below.

Pre-Columbian Amazonians applied terra preta to the soil before planting crops; _____, they were able to increase the agricultural yield of the land.

A. consequently

B. moreover

C. even though

D. for instance

8. What is mountaintop removal mining?

9. What problem did the researchers from Virginia Tech encounter during their attempt to reforest post-mined soil using biochar?

10. Was the Virginia Tech soil enhancement research project a success? Why or why not? Support your argument with examples from the text.

Forms of Energy vs. Sources of Energy

For students to fully understand the sources of energy, they have to first understand the forms of energy. Students completed a series of science labs that led them through the different forms of energy and the transformations that can occur from one form to another.

Potential and Kinetic Energy

Students were able to use balloons, toy cars, and rubber bands to observe different types of potential energy transforming into kinetic energy.

Students also were able to observe different types of rubber bouncy balls and the different reactions that they had when hitting the floor. This helped them hear and see a sound energy transformation.

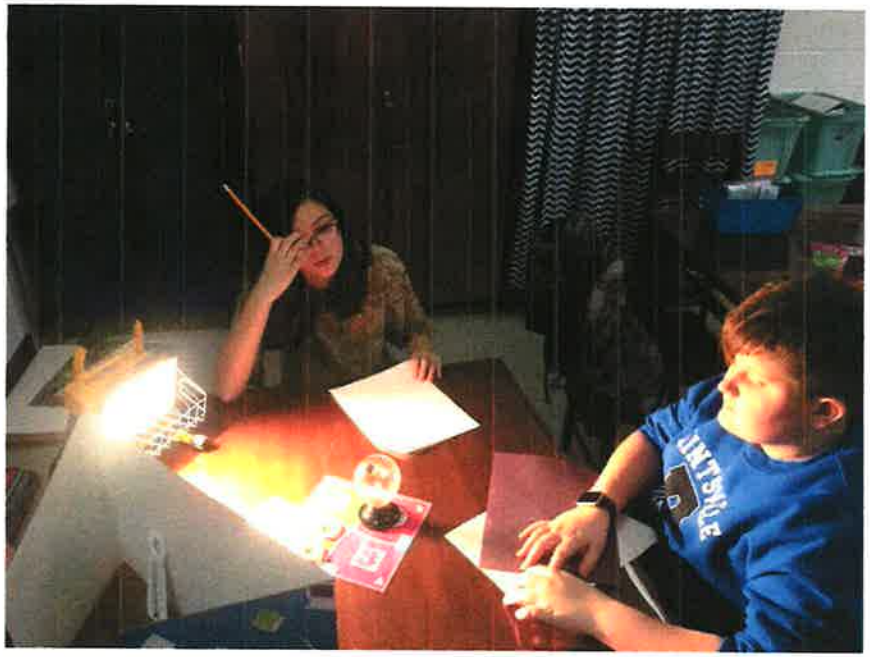
Endothermic and Exothermic Reactions

During this station students used calcium chloride and water, baking soda and vinegar and measured the reaction temperatures. Students used vocabulary words such as chemical energy, chemical reaction, endothermic, exothermic, and thermal energy. Students also learned about the reactions within hand warmers and oxygen.

Thermal Energy

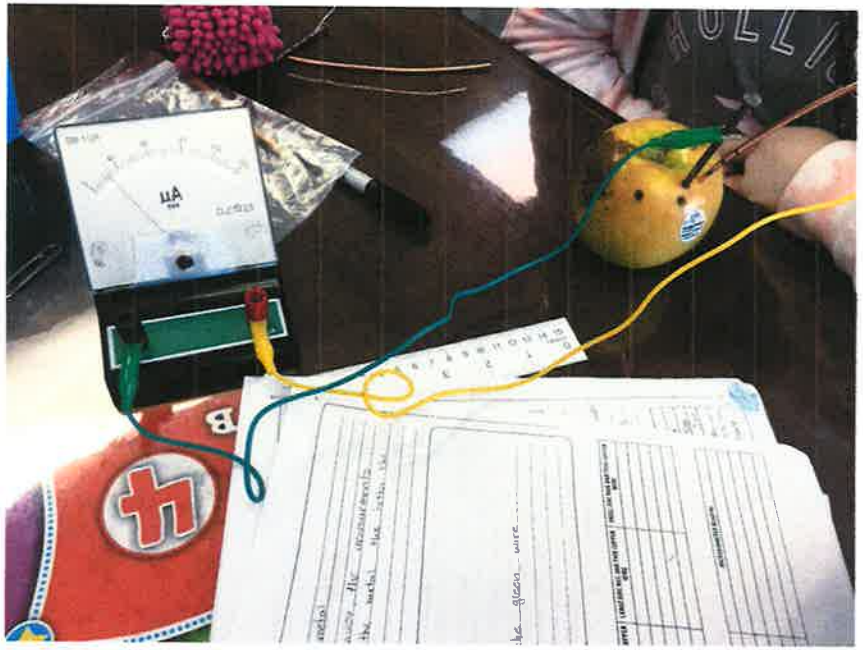
During this station students worked with a variety of metal materials found that thermal energy can could motion energy of some metal objects. Students used vocabulary words such as thermal energy, molecules, expand, contract, and absorb.

Radiant Energy



During this stations students learned how direct sun (heat lamp) could affect a thermometers temperature, make a radiometer spin, and see how a solar panel could run a fan. Students used vocabulary words such as radiant energy, motion energy, electrical energy. Students talked about the potential and kinetic energies within the transformations that occurred.

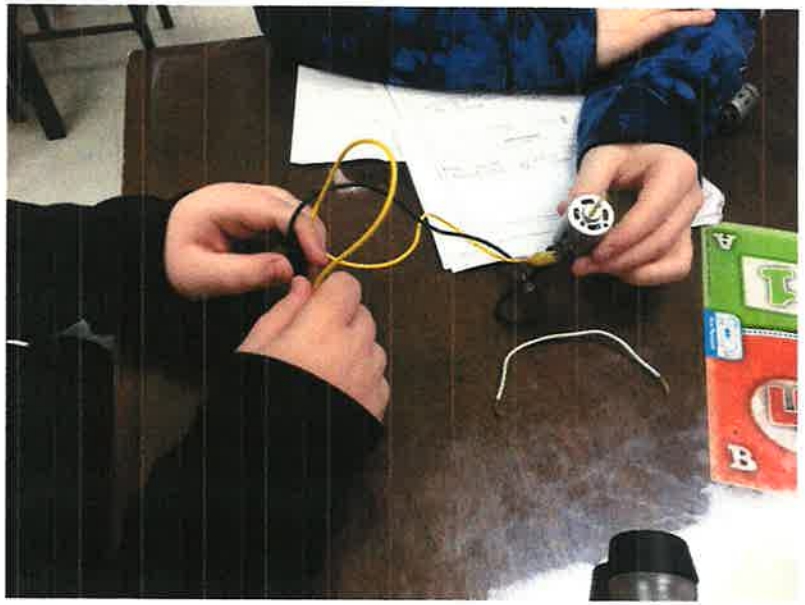
Chemical Energy



Students investigated and measured chemical energy changing within a glow stick to create radiant energy and chemical energy transforming into electrical energy within an apple. Students used vocabulary such as chemical reaction, chemical energy, radiant energy, thermal energy, molecules, conduct, and direct current.

Electrical Energy

Students investigated different effects of electrical energy. They learned that an electrical current affects magnetic fields when they created an electromagnet. They learned that motors have magnets within and copper coils that allow the energy to be created. They learned that for our devices to work it takes several energy transformations to occur.



Libby, Emma, Delaney

Paws
190218

CSU #
02-01-19

Station One Reporting Form

PART ONE: SPHERES

Independent Variables (IV): the types of spheres

Dependent Variables (DV): bounce height

Constants: dropping each sphere from the three of one meter

Hypothesis: The smaller black spheres will most likely differentiate in the height after being bounced since there is two, so we assume they are diverse in bounce height.

Data and Observations:

	TRIAL 1	TRIAL 2	TRIAL 3	AVERAGE
SUPERBALL	71cm	74cm	75cm	$73.\overline{3}$cm
BLACK SPHERE 1	62cm	62cm	60cm	$61.\overline{3}$cm
BLACK SPHERE 2	0cm	1cm	1cm	0.666666666667cm

OBSERVATIONS The yellow "superball" bounced the highest out of the 3 spheres. Black sphere #2 seemed to barely bounce, regarding the minimal bounce height.

PART TWO: SPHERES IN HOT WATER

Independent Variables (IV):

Dependent Variables (DV):

Constants:

Hypothesis: The hot water will effect the spheres' physical abilities to make each sphere capable of bouncing higher because the hot water will expand the amount of volume it currently has.

Data and Observations:

	HOT WATER			
	TRIAL 1	TRIAL 2	TRIAL 3	AVERAGE
BLACK SPHERE 1	70	72	71	71
BLACK SPHERE 2	2	3	2	$2.\overline{33}$
SUPERBALL	70	75	72	$72.\overline{3}$

OBSERVATIONS The hot water made the spheres bounce, but the smaller spheres bounced

CSU #
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Delaney, Libby, Emma

Station Two Reporting Form

PART ONE: BAKING SODA AND VINEGAR

Data and Observations:

	TEMPERATURE	OBSERVATIONS
VINEGAR	21°F	when poured from the bottle the vinegar warmed up.
VINEGAR AND BAKING SODA	63°F	The baking soda and the vinegar made the substance warmer.

PART ONE CONCLUSION: BAKING SODA AND VINEGAR

In conclusion, when the vinegar sat in the bag it warmed up and mixed with the baking soda, made it even warmer.

Energy Transformation(s)

chemical energy to thermal energy.

PART TWO: CALCIUM CHLORIDE AND WATER

Data and Observations:

	TEMPERATURE	OBSERVATIONS
WATER	70°F	The water was room temperature.
WATER AND CALCIUM CHLORIDE	104°F	Mixing with the calcium chloride, the water heated up.

PART TWO CONCLUSION: CALCIUM CHLORIDE AND WATER

The water had already been warm from sitting in the room but the calcium chloride made it even warmer.

Energy Transformation(s)

chemical energy to thermal energy

Emma, Delaney, Libby

PANS 2/19

CSU # 02-01-19

Station Three Reporting Form

PART ONE: SUNLIGHT AND SHADE

Independent Variables (IV): shade of light

Dependent Variables (DV): how high the temperature gets

Constants: measured in the same scale and controling which light we use

Hypothesis: When the thermometer is in light the temperature will rise, but when in shade it will drop.

Data and Observations:

	STARTING TEMPERATURE	5 MINUTES TEMPERATURE	10 MINUTES TEMPERATURE	15 MINUTES TEMPERATURE	OVERALL CHANGE IN TEMPERATURE
THERMOMETER IN SUN OR DIRECT LIGHT	60°F	85°F	86°F	85°F	≈20°F
THERMOMETER IN THE SHADE OR OUT OF DIRECT LIGHT	60°F	75°F	74°F	78°F	≈15°F

PART THREE: SOLAR PANEL

Independent Variable (IV): How I when change the measurements

Dependent Variable (DV): What we measure

Constants: motor, fan

Hypothesis: When being tilted back the fan will go slower.

Data and Observations:

PV CELL DEGREES FROM VERTICAL	OBSERVATIONS
0°	there are no signs of movement
15°	the fan is now spinning at a steady pace.
30°	the fan is still spinning steadily.
45°	the fan got faster.
60°	at 60° the fan keeps rising in speed.
75°	at 75° the fan rises in speed
90°	at 90° the fan rises in speed to its highest point

PART THREE CONCLUSION: SOLAR PANEL Each time the solar panel advanced in height by being tilted. This caused the motor to spin its' fan component gradually each time during recording. The higher up it was being tilted, the faster the fan spun.

Energy Transformation(s)

Chemical → radiant → chemical → electrical → motion → sound
→ thermal
→ electrical

STATION THREE CONCLUSIONS When expirementing with the thermometer, radiometer, and solar panels, they all had involvement with light. First, with the thermometers, one remained in shade whilst other was exposed to light.

QUESTIONS FOR FURTHER INVESTIGATION

PART TWO CONCLUSION: THE RUBBER BAND

when being stretched fastly, the rubberband expanded in size but when contracting it the rubberband went to a smaller size

Energy Transformation(s)

elastic → motion
chemica →

PART THREE: THE LIVE WIRE

Independent Variable (IV): temperature of water

Dependent Variable (DV): shape changes

Constants: the original shape of the live wire

Hypothesis: the live wire will change shape depending on the temperature of the water.

Data and Observations:

WATER	SHAPE BEFORE	SHAPE AFTER
ICE WATER 32 °F		
HOT WATER 130 °F		
ROOM TEMPERATURE WATER 63 °F		

PART THREE CONCLUSION: THE LIVE WIRE

After being in the cold water the wire kept in but being in the hot water spread it out into a line. Room temperature water kept the wire the same.

Energy Transformation(s)

thermal → motion

Delaney, Libby, Emma

Paws 2/19

PART FOUR CONCLUSION: THE BI-METAL BAR The metal bar was put through two opposite temperature-wise expiriments and reacted in two ways. In the candle flame, the bar bent and scorched. In the ice water, it cooled down and de-scorched.

Energy Transformation(s)

thermal energy -> motion energy

STATION FOUR CONCLUSIONS The shape of an object changes when a substance is put in. Shape will also start changing if a type of energy is dejected on to that shape of item.

QUESTIONS FOR FURTHER INVESTIGATION

- What would happen if a paperclip would go in the water?
- what would happen if the water was hotter or colder?
- If another material besides the live wire was used, would it result the same?

PART TWO: THE APPLE BATTERY

Independent Variables (IV): placement of metals

Dependent Variables (DV): the microammeter's conductivity (ampers)

Constants: the apple, the depth of each nail

Hypothesis: The microammeter's amper scale will get higher as more metals are stuck in to the apple

APPLE BATTERY DIAGRAM

OBSERVATIONS

As we test the current variables puncutured in the apple, the conductivity level is pretty low

DATA TABLE 1

	LARGE ZINC NAIL AND THICK COPPER WIRE	LARGE ZINC NAIL AND THIN COPPER WIRE	SMALL ZINC NAIL AND THIN COPPER WIRE
1 cm	64	20	10
2 cm	85	40	21
3 cm	122	60	40
4 cm	200+	100	50
METALS TOUCHING	0	0	0

DATA TABLE 2

COMBINATION OF METALS	MICROAMMETER READING
2 COPPER WIRES (4cm)	0
2 nails (4cm)	0
small nail and thick wire	below 0
large nail and thick wire (9cm)	0

Station Six Reporting Form

PART ONE: BATTERY AND COMPASS

OBSERVATIONS

HEAVY-GAUGE WIRE PARALLEL TO COMPASS NEEDLE The needle shakes, while slowly moving forward and backwards whe the heavy-gauge wire is parallel to the compass needle

HEAVY-GAUGE WIRE PERPENDICULAR TO COMPASS NEEDLE The needle goes back and forth repeatly faster than when it was parallel, but gets slower.

HEAVY-GAUGE WIRE WITH ELECTRIC CURRENT PARALLEL TO COMPASS NEEDLE When placed parallel it moved more north and south or clockwise.

HEAVY-GAUGE WIRE WITH ELECTRIC CURRENT PERPENDICULAR TO COMPASS NEEDLE When placed perpendicular it went east and south.

PART ONE CONCLUSION: BATTERY AND COMPASS When using electrical power the compasses needle moves faster, while with the heavy gauge wire itself above the needle didn't move as much.

Energy Transformation(s)

Chemical → electrical → motion

Delaney, Emma, Libby

Station 6 Conclusions and questions Paws 2/19

Station 6 conclusions

Most things we used to generate energy had copper wire. This proves that copper wire can help release motion and radiant energy.

Questions

- What other wires could you use to gerate energy.
- Why does copper energy generate energy.
- Would it work the same with a disembled moter.

Electricity Production Simulation (Coal Fired)

Students will demonstrate the flow of energy to produce electricity using props. The teacher will read "A Cool Coal Story" while students act the energy transformations from the sun to turning on a light in the house. We will adapt to talk about differences between coal energy, biodiesel, ethanol and natural gas.

Students will then go through information about the sources of energy. They will work in groups to pick out specific facts about their source of energy. Students will present their energy source to each other. We will have an emphasis on comparing each source to fossil fuels (coal).

CSU #
02-01-19

Intermediate Science of Energy Assessment

Name: Braley H. Paws Date: 3/5/19

1. When you drop a basketball from eye level, the ball will not return to its original height. Explain the energy transformations that cause this to happen.

If you drop a basketball from eye level it starts of with two potential energys elastic and gravitional. Then when it hits the floor it goes to the kinetic energys of motion it won't have as high because some of the energy was converted into sound.

2. Give an example of potential energy transforming into kinetic energy.

An example of potential energy transforms into kinetic energy is a girl jumping off a diving board. She went from the potential energy of gravity to the kinetic energy of motion.

3. When iron rusts, is an endothermic or an exothermic process taking place? What energy transformation causes this process?

When iron rusts it is a exothermic process, The iron absorbs the heat. This causes the iron to rust. The energy transformation goes from chemical energy to thermal energy.

4. Describe the energy transformations that are taking place in a radiometer.

The energy transformations that took place in the radiometer are the light energy changed into heat, then the heat into motion. So Radiant energy to thermal energy into motion.

5. Describe the energy transformations that occur with a PV cell?

The energy transformations that ocurin a Pv cell are the Radiant energy is turned into an electrical energy current then it changed to motion.

6. Compare and/or contrast the energy transformation in a bi-metal bar and a nitinol wire.

The energy transformation in the live wire was heat energy into Motion. The Bi-metal bars transformations was The heat caused motion to occur

Energy Scramble

Unscramble the five words that describe what energy does, then use the letters with the dots underneath to figure out the mystery word.

Y L I T E C R E C I T → Electricity

A H T E → Heat

T O O M I N → motion

H I L T G → Light

R W O G → Grow

Mystery Word: Energy

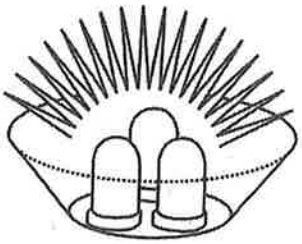
Energy Transformations

Fill in the blanks to show the energy transformations made by each object. ***One point for each blank—38 points total***

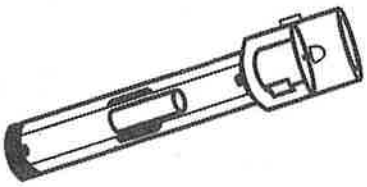
1. PV Cell ___Radiant___ energy to ___Electrical___ energy
2. Battery ___Electrical___ energy to ___motion___ energy
3. Bicycle ___Elastic___ energy to ___motion___ energy
4. Wind Turbine ___Motion___ energy to ___Electrical___ energy
5. Hand Warmer ___Chemical___ energy to ___Thermal___ energy
6. Glow Stick ___Chemical___ energy to ___radiant___ energy
7. Flashlight ___Chemical___ energy to ___motion___ and ___Radiant___ energy
8. Radiometer ___light___ energy to ___heat___ and ___motion___ energy
9. BBQ Grill ___Chemical___ energy to ___Thermal___ and ___Radiant___ energy
10. Sun ___Chemical___ energy to ___thermal___ and ___Radiant___ energy
11. Firefly ___Chemical___ energy to ___motion___ and ___Radiant___ energy
12. Athlete ___Chemical___ energy to ___motion___ and ___thermal___ energy
13. Car Engine ___Electrical___ energy to ___motion___ and ___thermal___ and ___Sound___ energy.
14. Firecracker ___Chemical___ energy to ___Radiant___ and ___thermal___ and ___Sound___ energy

Energy Flow

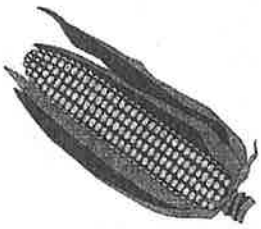
Unscramble the energy flow so that the forms of energy are in the proper order. Number the pictures from 1 to 8 on the lines to the right of the pictures, with number one as the beginning of the flow.



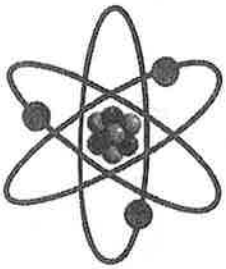
Radiant (light) Energy 8



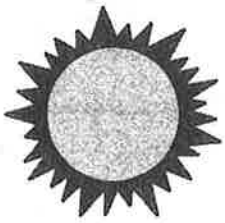
Motion Energy 5



Chemical Energy 3



Nuclear Energy 1



Radiant Energy 2

Electrical Energy 7

Chemical Energy 4

Electrical Energy 6

Coal Reflection

Students wrote a 3.5-3.8 essay detailing what they had learned during the process of working on their Coal Fair Projects. The essay had to address what the students had learned, how that knowledge changed their perspective or point of view, etc. Students made a rough draft which was checked/edited by at least two other people, then a final draft was typed.

CSU #
02-01-19

Coal Unit Reflection

Emma 3/7/19 paws

Within our coal mining unit there was a lot of new and suprising information. The coal unit helped us realize not only what coal is and how it turned into electricity, but how coal miners worked to make electricity even with the risk of having severe injuries, or death. Before this unit I didn't realize our area's changing relationship with coal, my families relationship with coal, and my perspective on coal.

Our area's changing relationship with coal is health. Health for coal mining is changing sufficiently in our area. It wouldn't keep getting safer without new technology. Technology has lifted some weight off of coal miners and their families shoulders. Health of coal miners isn't well. There are many risks when being a coal miner. You could get many diseses and injuries. With technology improving these risk will continue to decrease.

My family has many relationships with coal. One relationship we have is my papaw and my uncle both work or worked for the coal mines. My papaw did from lung diseses from the coal mines. My family has another relationship with coal and that is electricity.

CSU #
02-01-19

Coal

Reflection

Ilana

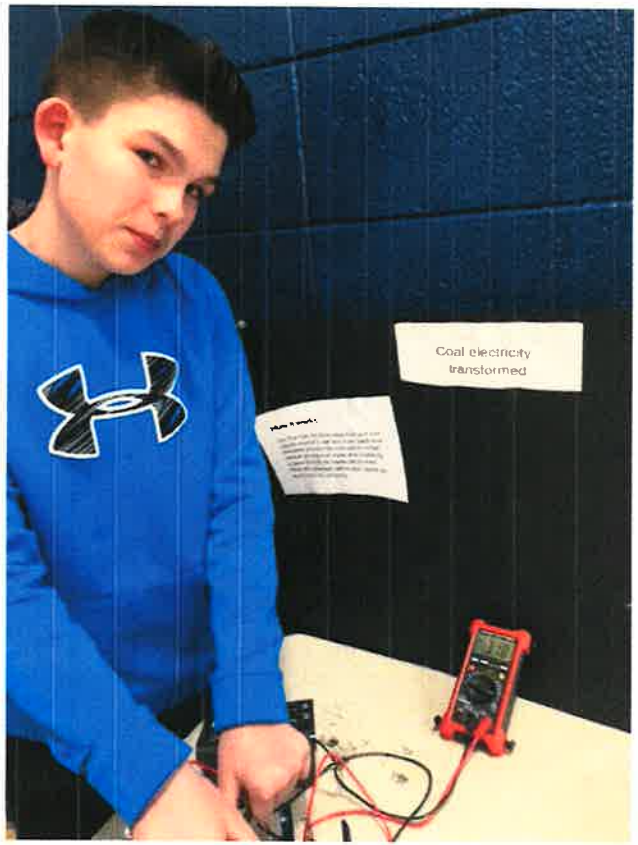
Throughout this study I have altered my pespective on coal. Being able to see all everyone else's view on coal made me relize that coal is more important than I thought it was. This study has also opened my mind to think about the many uses we have for coal and how coal affects our everyday lives.

Before this study coal didn't matter to me. It was as we were working on this project that I began to relize how much the environment and myself depend on coal. I believed that coal only harmed our environment and ourselves, by creating pollution, but then I discovered that coal is also good for many reasons. Coal provides many jobs for coal workers. It also provides us with electricity. Although coal can be good, I could argue against that claim.

For example, coal provides jobs, but those jobs can also be taken away, by new technology. As we know coal is a limited and a non-renewable resourse, this means that we don't have the ability to create coal. The amount of coal we have now is the only amout we can get. Coal also provides us with electricity, but there are other ways to produce electricity other than coal.

These ways could be the use of solar energy to create electricity, hydropower, and we may even use wind to produce electricity. Therefore, even though coal provides us with

Cedar Coal Fair



Students culminated the unit by completing a CEDAR Coal Fair Project. Students worked individually or with a partner in one of seven categories. (Art, Music, Technology, Science, Social Studies, Math, or English/Language Arts)

This project took all components that students had learned about coal and allowed them to display their information in a variety of medias.

Libby, Emma, Delaney

Paws
190218

CSU #
02-01-19

Station One Reporting Form

PART ONE: SPHERES

Independent Variables (IV): the types of spheres

Dependent Variables (DV): bounce height

Constants: dropping each sphere from the three of one meter

Hypothesis: The smaller black spheres will most likely differentiate in the height after being bounced since there is two, so we assume they are diverse in bounce height.

Data and Observations:

	TRIAL 1	TRIAL 2	TRIAL 3	AVERAGE
SUPERBALL	71cm	74cm	75cm	73.$\overline{3}$cm
BLACK SPHERE 1	62cm	62cm	60cm	61.$\overline{3}$cm
BLACK SPHERE 2	0cm	1cm	1cm	0.$\overline{6}$cm

OBSERVATIONS The yellow "superball" bounced the highest out of the 3 spheres. Black sphere #2 seemed to barely bounce, regarding the minimal bounce height.

PART TWO: SPHERES IN HOT WATER

Independent Variables (IV):

Dependent Variables (DV):

Constants:

Hypothesis: The hot water will effect the spheres' physical abilities to make each sphere capable of bouncing higher because the hot water will expand the amount of volume it currently has.

Data and Observations:

	HOT WATER			
	TRIAL 1	TRIAL 2	TRIAL 3	AVERAGE
BLACK SPHERE 1	70	72	71	71
BLACK SPHERE 2	2	3	2	2.$\overline{3}$
SUPERBALL	70	75	72	72.$\overline{3}$

OBSERVATIONS The hot water made the spheres bounce, but the smaller spheres bounced

PART ONE AND TWO CONCLUSIONS: SPHERES The spheres that were recorded all bounced (even if the bounce was very slight) in both expiriements. In the 1st instance, we recorded the bounce height of the spheres and in the second instance after the spheres were dropped after being put in hot water for 2 mins, then the bounce height was measured. In the second instance, the small spheres bounced higher in additional height regarding Gravitional→Motion→Elastic→Motion

Energy Transformation(s)

Thermal energy caused a vibration in the raber of the ball which caused the balls to bounce higher.

PART THREE: TOYS

Hypothesis: They each get different energies when moved. Some may move farther than others.

TOY	ENERGY TRANSFORMATION
car	elastic → motion → thermal + sound
yo-yo	gravitation → motion → thermal + sound
balloon	elastic → motion → gravational → motion + sound

PART THREE CONCLUSION: TOYS Each toy has a different energy transformation. which shows that determing energy depends on the energy and the surroundings.

Energy Transformation(s)

STATION ONE CONCLUSIONS When we affect an atoms energy change we get an energy change. We have lots and lots of energy changes.

QUESTIONS FOR FURTHER INVESTIGATION Why is it communitive? Are there any unknown energies? How many posible energy transformations happen in one motion?

CSU #
02-01-19

Delaney, Libby, Emma

Station Two Reporting Form

PART ONE: BAKING SODA AND VINEGAR

Data and Observations:

	TEMPERATURE	OBSERVATIONS
VINEGAR	21°F	when poured from the bottle the vinegar warmed up.
VINEGAR AND BAKING SODA	63°F	The baking soda and the vinegar made the substance warmer.

PART ONE CONCLUSION: BAKING SODA AND VINEGAR

In conclusion, when the vinegar sat in the bag it warmed up and mixed with the baking soda, made it even warmer.

Energy Transformation(s)

chemical energy to thermal energy.

PART TWO: CALCIUM CHLORIDE AND WATER

Data and Observations:

	TEMPERATURE	OBSERVATIONS
WATER	70°F	The water was room temperature.
WATER AND CALCIUM CHLORIDE	104°F	Mixing with the calcium chloride, the water heated up.

PART TWO CONCLUSION: CALCIUM CHLORIDE AND WATER

The water had already been warm from sitting in the room but the calcium chloride made it even warmer.

Energy Transformation(s)

chemical energy to thermal energy

PART THREE: HAND WARMERS

	TEMPERATURE			OBSERVATIONS
	INITIAL	AFTER 3 MINUTES	3 MINUTES AFTER SEALING	
NEW PACKET	84°F	96°F	86°F	when exposed to air, the substance warms.
OLD PACKET	72°F	74°F	74°F	Only changed a few degrees as the substance is older.

PART THREE CONCLUSION: HAND WARMERS

The newer the substance the more it changes in degrees. when exposed to air both substances become warmer even if the changes are minor.

Energy Transformation(s)

Chemical energy to thermal energy

STATION TWO CONCLUSIONS

When most substances sat on the table they warmed from being in room temperature. When being mixed with another substance, they warmed even more. The heating packs were not mixed with another substance but with air which warmed the substance. Our explanation relates from getting most of the same solutions and energy transformations.

QUESTIONS FOR FURTHER INVESTIGATION

- would water and baking soda return thermal energy?
- would vinegare and calcium chloride return thermal energy?
- what would happen if different substances were used?

Emma, Delaney, Libby

Paws 2/19

CSU # 02-01-19

Station Three Reporting Form

PART ONE: SUNLIGHT AND SHADE

Independent Variables (IV): shade of light

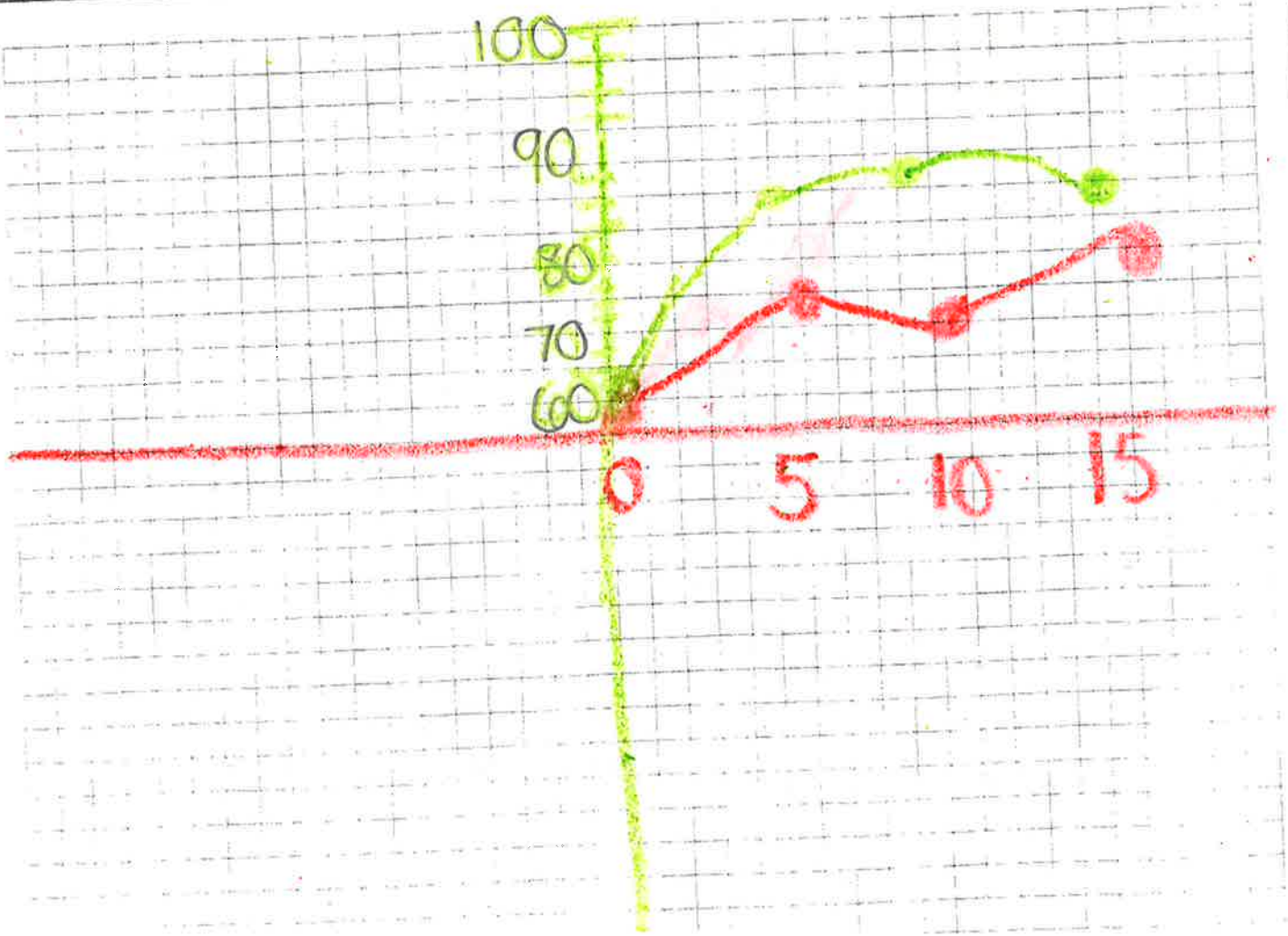
Dependent Variables (DV): how high the temperature gets

Constants: measured in the same scale and controling which light we use

Hypothesis: When the thermometer is in light the temperature will rise, but when in shade it will drop.

Data and Observations:

	STARTING TEMPERATURE	5 MINUTES TEMPERATURE	10 MINUTES TEMPERATURE	15 MINUTES TEMPERATURE	OVERALL CHANGE IN TEMPERATURE
THERMOMETER IN SUN OR DIRECT LIGHT	60°F	85°F	86°F	85°F	≈20°F
THERMOMETER IN THE SHADE OR OUT OF DIRECT LIGHT	60°F	75°F	74°F	78°F	≈15°F



PART ONE CONCLUSION: SUNLIGHT AND SHADE When we first began, both thermometers started at the temperature of 60°F. After placing one thermometer fully exposed to the heat source, it heated up and changed in temperature by almost 20°F. However, the other thermometer was placed in the shade and only increased about 15°F in temperature.

Energy Transformation(s)

Chemical → thermal → motion
Chemical → radiant
Chemical → Electrical

PART TWO: RADIOMETER

RADIOMETER DIAGRAM

Data and Observations:

AMOUNT OF LIGHT	RADIOMETER OBSERVATIONS
direct	the radio meter is spining clockwise very quickly
15cm away	still going fast but got a little slower
30cm away	going slower
45cm away	very slowly turning

PART TWO CONCLUSION: RADIOMETER Each time the radiometer gets slower and slower. This told us that it gets colder as the farther it got. It went clockwise because the black absorbed light.

Energy Transformation(s)

Chemical → radiant → motion → sound
Chemical → thermal
Chemical → electrical

PART THREE: SOLAR PANEL

Independent Variable (IV): How I when change the measurements

Dependent Variable (DV): What we measure

Constants: motor, fan

Hypothesis: When being tilted back the fan will go slower.

Data and Observations:

PV CELL DEGREES FROM VERTICAL	OBSERVATIONS
0°	there are no signs of movement
15°	the fan is now spinning at a steady pace.
30°	the fan is still spinning steadily.
45°	the fan got faster.
60°	at 60° the fan keeps rising in speed.
75°	at 75° the fan rises in speed
90°	at 90° the fan rises in speed to its highest point

PART THREE CONCLUSION: SOLAR PANEL Each time the solar panel advanced in height by being tilted. This caused the motor to spin its' fan component gradually each time during recording. The higher up it was being tilted, the faster the fan spun.

Energy Transformation(s)

Chemical → radiant → thermal
→ electrical → chemical → electrical → motion
→ sound

STATION THREE CONCLUSIONS When expirementing with the thermometer, radiometer, and solar panels, they all had involvement with light. First, with the thermometers, one remained in shade whilst other was exposed to light.

QUESTIONS FOR FURTHER INVESTIGATION

Libby, Delaney, Hanah and Emma

Station Four Reporting Form

PART ONE: THE HANGER

HANGER OBSERVATIONS When observing the hanger and it's material, it seems very bendable and flimsy. When we bent our hanger back and forth, the material ended up snapping and detatching sometimes even before we got to the fifth bend.

PART ONE CONCLUSION: THE HANGER When bent accordingly as instructed, the hanger material seemed to completely detach.

Energy Transformation(s)

motion → thermal

PART TWO: THE RUBBER BAND

RUBBER BAND OBSERVATIONS

STRETCHED - When being stretched over the forehead multiple times, the rubber band became easy to stretch and expanded in size.

CONTRACTED When being contracted the rubberband only changed size slightly.

PART TWO CONCLUSION: THE RUBBER BAND

when being stretched fastly, the rubberband expanded in size but when contracting it the rubberband went to a smaller size.

Energy Transformation(s)

elastic → motion
chemica →

PART THREE: THE LIVE WIRE

Independent Variable (IV): temperature of water

Dependent Variable (DV): shape changes

Constants: the original shape of the live wire

Hypothesis: the live wire will change shape depending on the temperature of the water.

Data and Observations:

WATER	SHAPE BEFORE	SHAPE AFTER
ICE WATER 32 °F		
HOT WATER 130 °F		
ROOM TEMPERATURE WATER 63 °F		

PART THREE CONCLUSION: THE LIVE WIRE

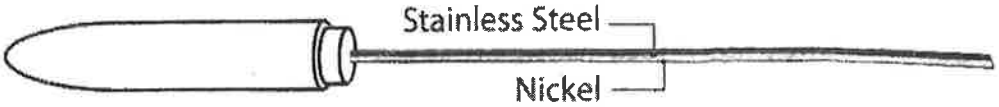
After being in the cold water the wire beat in but being in the hot water spread it out into a line. Room temperature water kept the wire the same.

Energy Transformation(s)

thermal → motion

PART FOUR: THE BI-METAL BAR

BI-METAL BAR DIAGRAM



COMPARE DIAGRAM AND ACTUAL BAR They are similar in visuality and composure, yet the actual bar is considerably more bent and flimsy.

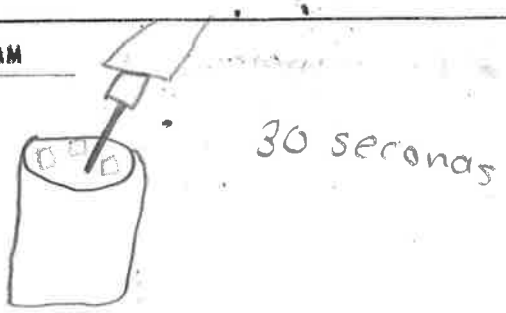
BI-METAL BAR AND CANDLE DIAGRAM

30 seconds

OBSERVATIONS

The metal will start to heat up progressively as it is held over the small flame. As the metal bar got heated it started to bend.

BI-METAL BAR AND ICE WATER DIAGRAM



30 seconds

OBSERVATIONS

When being placed into the cold water, the metal bar will become colder at a fast pace creating a sizzle sound. When the bar hit the water it slowly turned straighter.

Delaney, Libby, Emma

Paws 2/19

PART FOUR CONCLUSION: THE BI-METAL BAR The metal bar was put through two opposite temperature-wise expiriments and reacted in two ways. In the candle flame, the bar bent and scorched. In the ice water, it cooled down and de-scorched.

Energy Transformation(s)

thermal energy -> motion energy

STATION FOUR CONCLUSIONS The shape of an object changes when a substance is put in. Shape will also start changing if a type of energy is dejected on to that shape of item.

QUESTIONS FOR FURTHER INVESTIGATION

- What would happen if a paperclip would go in the water?
- what would happen if the water was hotter or colder?
- If another material besides the live wire was used, would it result the same?

Station Five Reporting Form

PART ONE: GLOW STICKS

Independent Variables (IV): Changes in the temperature

Dependent Variables (DV): The glow/brightness

Constants: The glowstick container

Hypothesis: The glowsticks will all vary in the brightness after put in 3 different expirermental procedures.

GLOW STICK DIAGRAM

HOW IT WORKS

The glowstick glows upon friction created by the dictator of the object

Data and Observations:

	OBSERVATIONS	BRIGHTNESS RANK
GLOW STICK IN COLD H_2O	less than modevate glow; dull	3
GLOW STICK IN HOT H_2O	significantly brighter than the others; neon-colored glow	1
GLOW STICK AT ROOM TEMPERATURE	moderate glow	2

PART ONE CONCLUSION: GLOW STICKS It seems that the glow sticks that were in the hotter temperatures increased in brightness/glow than the glowsticks in colder temperatures.

Energy Transformation(s)

thermal ⟶ radiant

PART TWO: THE APPLE BATTERY

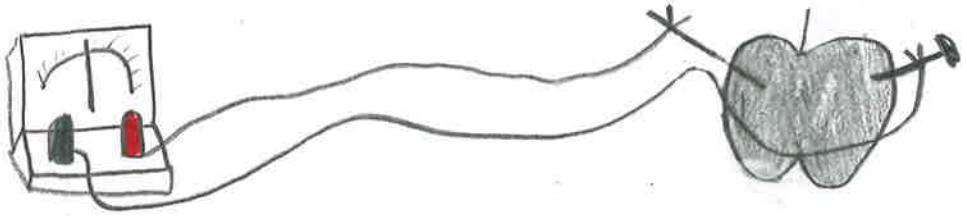
Independent Variables (IV): placement of metals

Dependent Variables (DV): the microammeter's conductivity (ampers)

Constants: the apple, the depth of each nail

Hypothesis: The microammeter's amper scale will get higher as more metals are stuck in to the apple

APPLE BATTERY DIAGRAM



OBSERVATIONS

As we test the current variables punctured in the apple, the conductivity level is pretty low

DATA TABLE 1

	LARGE ZINC NAIL AND THICK COPPER WIRE	LARGE ZINC NAIL AND THIN COPPER WIRE	SMALL ZINC NAIL AND THIN COPPER WIRE
1 cm	64	20	10
2 cm	85	40	21
3 cm	122	60	40
4 cm	200+	100	50
METALS TOUCHING	0	0	0

DATA TABLE 2

COMBINATION OF METALS	MICROAMMETER READING
2 COPPER WIRES (4cm)	0
2 nails (4cm)	0
small nail and thick wire	below 0
large nail and thick wire (9cm)	0

PART TWO CONCLUSION: THE APPLE BATTERY The apple battery conducted more ampers whilst being stuck in further, however, when the 2 materials made contact, the conductivity rebounded to 0.

Energy Transformation(s)

motion -> electric

STATION FIVE CONCLUSIONS

In the first station the glowsticks activated with when being cracked. the warmth of the warm water let the light brighten. In the second station, the further the different combinations went into the appt the farther the amper stick went, but the same metals together don't have reaction and stay at 0.

QUESTIONS FOR FURTHER INVESTIGATION

- Could a apple generate with different metals
- could the glowsticks generate without cracking
- how bright can a glowstick work

Station Six Reporting Form

PART ONE: BATTERY AND COMPASS

OBSERVATIONS

HEAVY-GAUGE WIRE PARALLEL TO COMPASS NEEDLE The needle shakes, while slowly moving forward and backwards whe the heavy-gauge wire is parallel to the compass needle.

HEAVY-GAUGE WIRE PERPENDICULAR TO COMPASS NEEDLE The needle goes back and forth repeatly faster than when it was parallel, but gets slower.

HEAVY-GAUGE WIRE WITH ELECTRIC CURRENT PARALLEL TO COMPASS NEEDLE When placed parallel it moved more north and south or clockwise.

HEAVY-GAUGE WIRE WITH ELECTRIC CURRENT PERPENDICULAR TO COMPASS NEEDLE When placed perpendicular it went east and south.

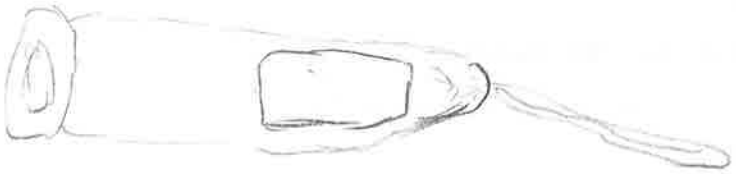
PART ONE CONCLUSION: BATTERY AND COMPASS When using electrical power the compasses needle moves faster, while with the heavy gauge wire itself above the needle didn't move as much.

Energy Transformation(s)

Chemical → electrical → motion

PART TWO: HAND GENERATED FLASHLIGHT AND MOTORS

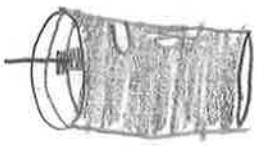
HAND GENERATED FLASHLIGHT DIAGRAM



HOW IT WORKS AND OBSERVATIONS

When the flashlight is shook it goes through many chemical energy and turns into a light source.

DISASSEMBLED MOTOR DIAGRAM



ASSEMBLED MOTOR DIAGRAM

OBSERVATIONS The moters use copper wires to generate power and start working.

PART TWO CONCLUSION: HAND GENERATED FLASHLIGHT AND MOTORS

When being generatered both the flashlight and moter need copper wires or a battery. The flash light is already assembled, while the motter needs the alligator clips to connect and work.

Energy Transformation(s)

electrical → radiant
→ motion

Delaney, Emma, Libby

Station 6 Conclusions and questions Paws 2/19

Station 6 conclusions

Most things we used to generate energy had copper wire. This proves that copper wire can help release motion and radiant energy.

Questions

- What other wires could you use to gerate energy.
- Why does copper energy generate energy.
- Would it work the same with a disembled moter.

Electricity Production Simulation (Coal Fired)

Students will demonstrate the flow of energy to produce electricity using props. The teacher will read "A Cool Coal Story" while students act the energy transformations from the sun to turning on a light in the house. We will adapt to talk about differences between coal energy, biodiesel, ethanol and natural gas.

Students will then go through information about the sources of energy. They will work in groups to pick out specific facts about their source of energy. Students will present their energy source to each other. We will have an emphasis on comparing each source to fossil fuels (coal).

CSU #
02-01-19

Intermediate Science of Energy Assessment

Name: Braley H. Paws Date: 3/5/19

1. When you drop a basketball from eye level, the ball will not return to its original height. Explain the energy transformations that cause this to happen.

If you drop a basketball from eye level it starts of with two potential energys elastic and Gravitional. Then when it hits the floor it goes to the kinetic energys of motion it won't have as high because some of the energy was converted into sound.

2. Give an example of potential energy transforming into kinetic energy.

An example of potential energy transforming into kinetic energy is a girl jumping off a diving board. She went from the potential energy of gravitional to the kinetic energy of motion.

3. When iron rusts, is an endothermic or an exothermic process taking place? What energy transformation causes this process?

When iron rusts it is a exothermic process. The iron absorbs the heat. This causes the iron to rust. The energy transformation goes from Chemical energy to thermal energy.

4. Describe the energy transformations that are taking place in a radiometer.

The energy transformations that take place in the radiometer are the light energy changed into heat, then the heat into motion. So Radiant energy to thimal energy into motion.

5. Describe the energy transformations that occur with a PV cell?

The energy transforming that occurin a Pv cell are the Radiant energy is turned into an Electrical energy current then it changed to motion.

6. Compare and/or contrast the energy transformation in a bi-metal bar and a nitinol wire.

The energy transformation in the live wire was heat energy into Motion. The Bi-metal bars transformations was the heat caused motion to occur

7. How does temperature affect the rate at which the chemical reaction occurs in a glow stick? What energy transformations occur during this reaction?

If the glow stick is placed in cold water the cold water absorbs the glow sticks energy, but if it was placed in hot water the glow stick absorbs the thermal energy from the hot water. The energy transformations are chemical energy into radiant energy.

8. What energy transformation(s) occur in an apple battery? What variables affect the transformation(s).

Chemical energy in the apple transferred to electrical energy. The variables that affects this was the different types of wires and how the LED were arranged.

9. How does a hand generated flashlight transform motion into light?

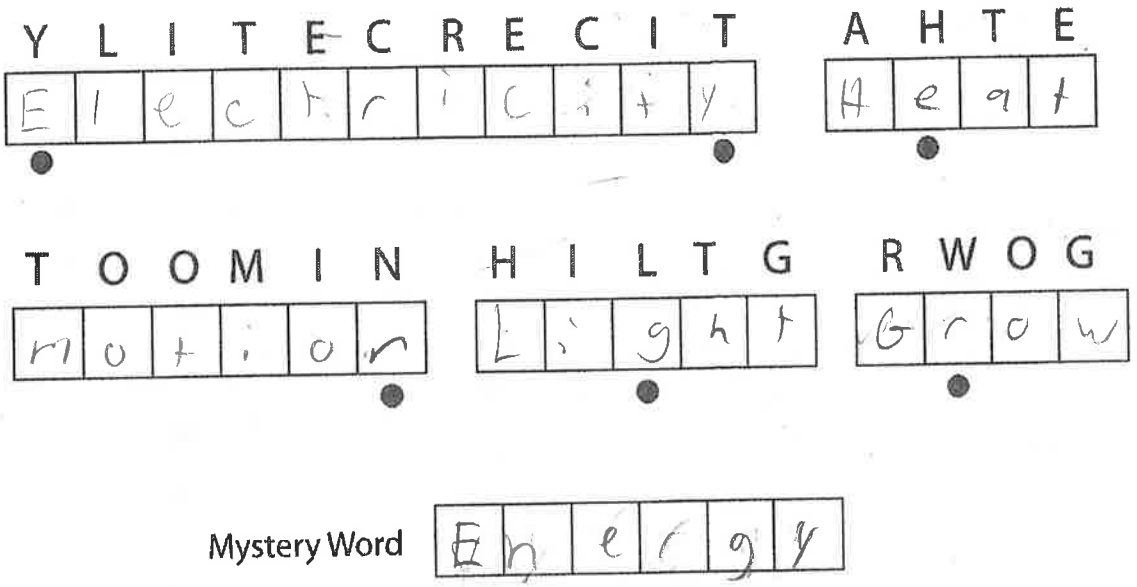
When you shook the flashlight the magnet through the coil wire produced electricity which went to the bulb.

10. Starting with the sun, trace the energy flow needed to ride a bike.

the Sun sent thermal energy

Energy Scramble

Unscramble the five words that describe what energy does, then use the letters with the dots underneath to figure out the mystery word.



Energy Transformations

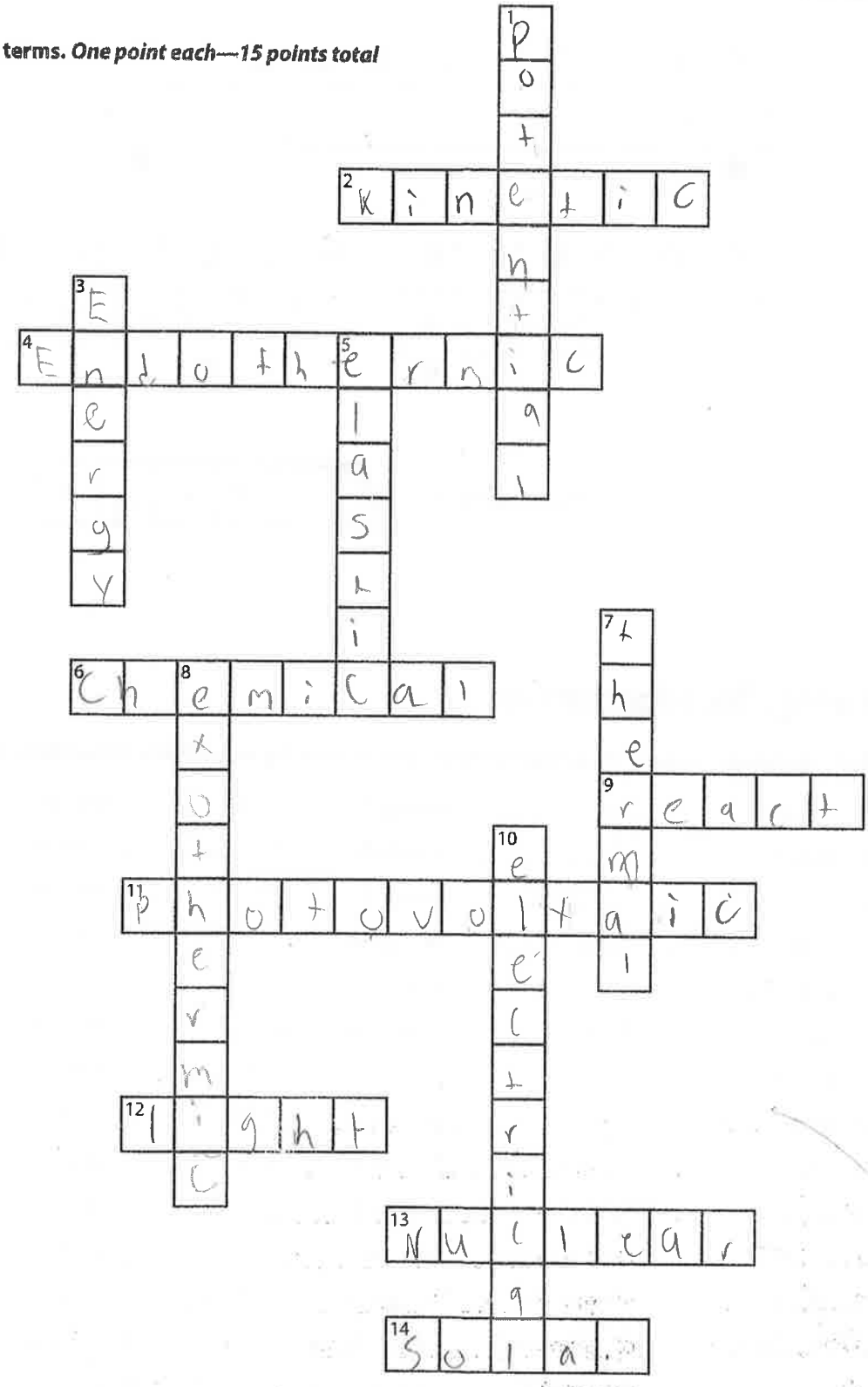
Fill in the blanks to show the energy transformations made by each object. ***One point for each blank—38 points total***

1. PV Cell ___Radiant___ energy to ___Electrical___ energy
2. Battery ___Electrical___ energy to ___motion___ energy
3. Bicycle ___Elastic___ energy to ___Motion___ energy
4. Wind Turbine ___Motion___ energy to ___Electrical___ energy
5. Hand Warmer ___Chemical___ energy to ___Thermal___ energy
6. Glow Stick ___Chemical___ energy to ___radiant___ energy
7. Flashlight ___Chemical___ energy to ___mution___ and ___Radiant___ energy
8. Radiometer ___light___ energy to ___heat___ and ___motion___ energy
9. BBQ Grill ___Chemical___ energy to ___thermal___ and ___Radiant___ energy
10. Sun ___Chemica___ energy to ___thermal___ and ___Radiant___ energy
11. Firefly ___Chemical___ energy to ___motion___ and ___Radiant___ energy
12. Athlete ___Chemical___ energy to ___motion___ and ___thermal___ energy
13. Car Engine ___Electrical___ energy to ___motion___ and ___thermal___ and ___Sound___ energy.
14. Firecracker ___Chemical___ energy to ___Radiant___ and ___thermal___ and ___Sound___ energy

Forms of Energy Fun

Energy Crossword

Fill in the boxes with forms of energy terms. ***One point each—15 points total***



Across ▶

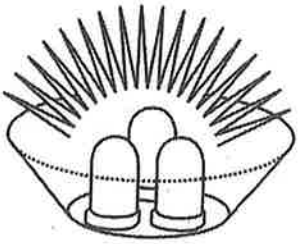
2. The energy of moving things
4. A chemical reaction that absorbs heat
6. The energy stored in the bonds of molecules
9. Chemicals _____ to produce energy
11. A cell that converts solar energy to electricity
12. Radiant energy
13. Energy locked in the nucleus of an atom
14. From the sun

Down ▼

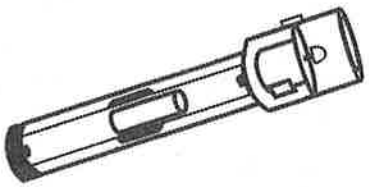
1. Energy of position
3. The ability to do work
5. _____ energy has the potential to move after stretching
7. Heat
8. Chemical reaction that releases heat
10. Energy of moving electrons

Energy Flow

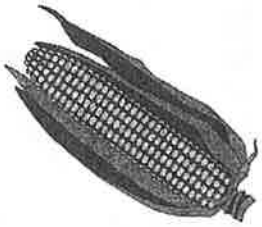
Unscramble the energy flow so that the forms of energy are in the proper order. Number the pictures from 1 to 8 on the lines to the right of the pictures, with number one as the beginning of the flow.



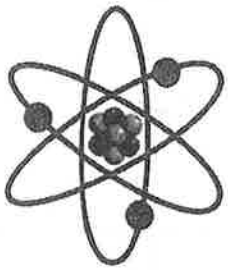
Radiant (light) Energy 8



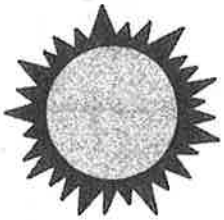
Motion Energy 5



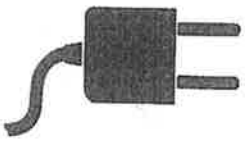
Chemical Energy 3



Nuclear Energy 1



Radiant Energy 2



Electrical Energy 7

Chemical Energy 4

Electrical Energy 6

SCIENCE OF ENERGY BINGO

A. Knows what type of reaction releases thermal energy

B. Knows the form of energy that comes from the sun

C. Knows one way to store energy

D. Knows the form in which our bodies store energy

E. Knows the force responsible for the attraction between the Earth and nearby masses

F. Knows why rubbing your hands together makes them warm

G. Can name a form of kinetic energy

H. Has visited a thermal power plant

I. Knows where most energy on Earth originates

J. Knows what type of reaction absorbs thermal energy

K. Has used a radiant clothes dryer

L. Knows what form of energy is stored in most energy sources

M. Knows how an electric generator works

N. Knows what device turns energy from the sun directly into electricity

O. Can name a form of potential energy

P. Knows what energy can be transformed into

A NAME	B NAME	C NAME	D NAME
E NAME	F NAME	G NAME	H NAME
I NAME	J NAME	K NAME	L NAME
M NAME	N NAME	O NAME	P NAME

Coal Reflection

Students wrote a 3.5-3.8 essay detailing what they had learned during the process of working on their Coal Fair Projects. The essay had to address what the students had learned, how that knowledge changed their perspective or point of view, etc. Students made a rough draft which was checked/edited by at least two other people, then a final draft was typed.

CSU #
02-01-19

Coal Unit Reflection

Emma 3/7/19 paws

Witin our coal mining unit there was a lot of new and suprising information. The coal unit helped us realize not only what coal is and how it turned into electricity, but how coal miners worked to make electricity even with the risk of having severe injuries, or death. Before this unit I didn't realize our area's changing relationship with coal, my families relationship with coal, and my perspective on coal.

Our area's changing relationship with coal is health. Health for coal mining is changing sufficiently in our area. It wouldn't keep getting safer without new technology. Technology has lifted some weight off of coal miners and their families shoulders. Health of coal miners isn't well. There are many risks when being a coal miner. You could get many diseses and injuries. With technology improving these risk will continue to decrease.

My family has many relationships with coal. One relationship we have is my papaw and my uncle both work or worked for the coal mines. My papaw did from lung diseses from the coal mines. My family has another relationship with coal and that is electricity.

Electricity is powered by coal. In other words coal keeps the lights on!

My perspective on coal is that it is very important to our community. It keeps electricity running. Technology continues to improve and so does the coal mines.

In conclusion, coal mining improves everyday and will continue to. This coal mining unit has taught me many things. Before this unit I didn't understand our areas changing relationship with coal, my families relationship with coal, and my perspective on coal.

CSU #
02-01-19

Coal

Reflection

Ilana

Throughout this study I have altered my pespective on coal. Being able to see everyone else's view on coal made me relize that coal is more important than I thought it was. This study has also opened my mind to think about the many uses we have for coal and how coal affects our everyday lives.

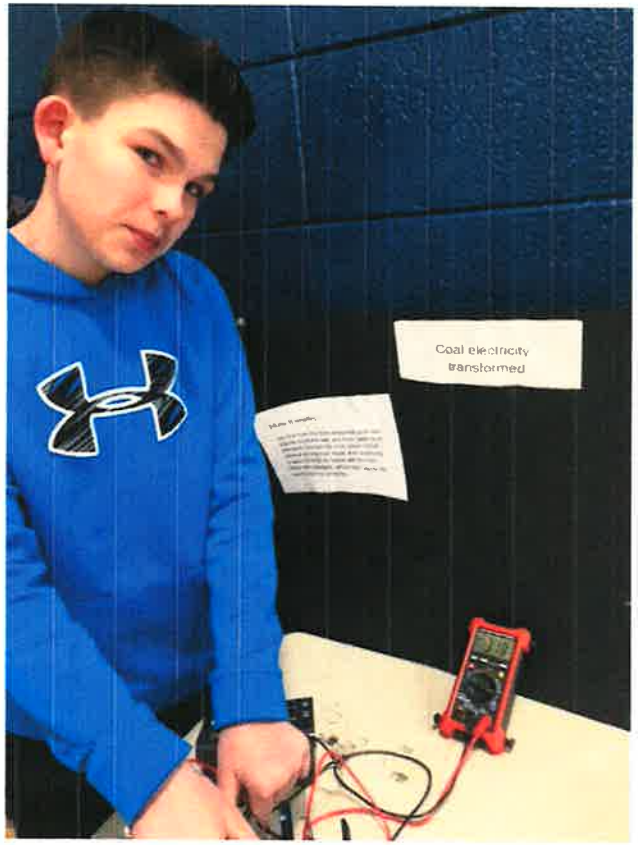
Before this study coal didn't matter to me. It was as we were working on this project that I began to relize how much the enviroment and myself depend on coal. I believed that coal only harmed our environment and ourselves, by creating pollution, but then I discovered that coal is also good for many reasons. Coal provides many jobs for coal workers. It also provides us with electricity. Although coal can be good, I could argue bgainst that claim.

For example, coal provides jobs, but those jobs can also be taken away, by new technology. As we know coal is a limited and a non-renewable resourse, this means that we don't have the ability to create coal. The amount of coal we have now is the only amout we can get. Coal also provides us with electricity, but there are other ways to produce electricity other than coal.

These ways could be the use of solar energy to create electricity, hydropower, and we may even use wind to produce electricity. Therefore, even though coal provides us with

some needs, there is always another way to improve with the use of other resources. That way we would be positively affecting our environment by decreasing the pollution rates in our environment.

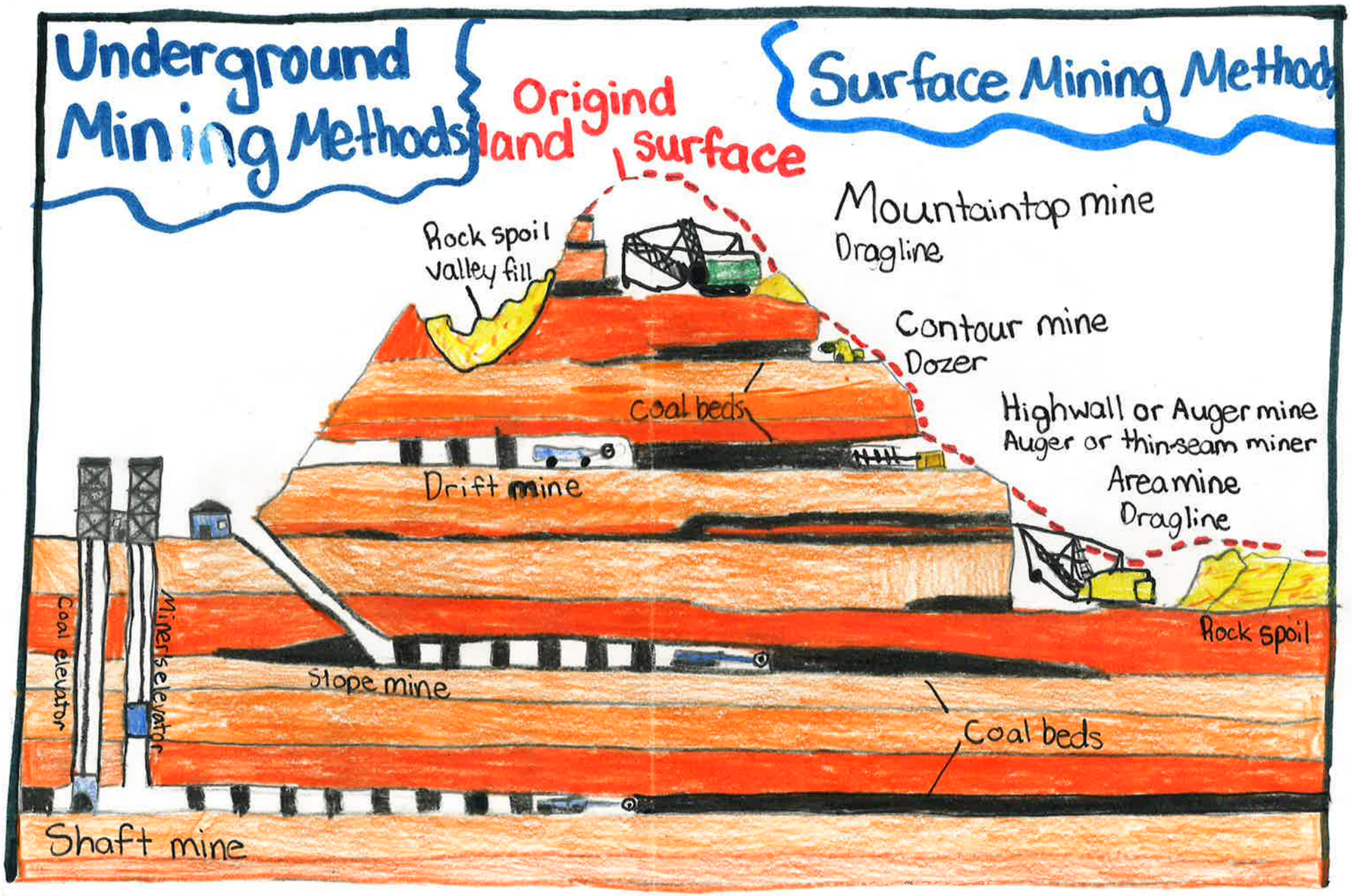
Cedar Coal Fair



Students culminated the unit by completing a CEDAR Coal Fair Project. Students worked individually or with a partner in one of seven categories. (Art, Music, Technology, Science, Social Studies, Math, or English/Language Arts)

This project took all components that students had learned about coal and allowed them to display their information in a variety of medias.

CSU #
02-01-19



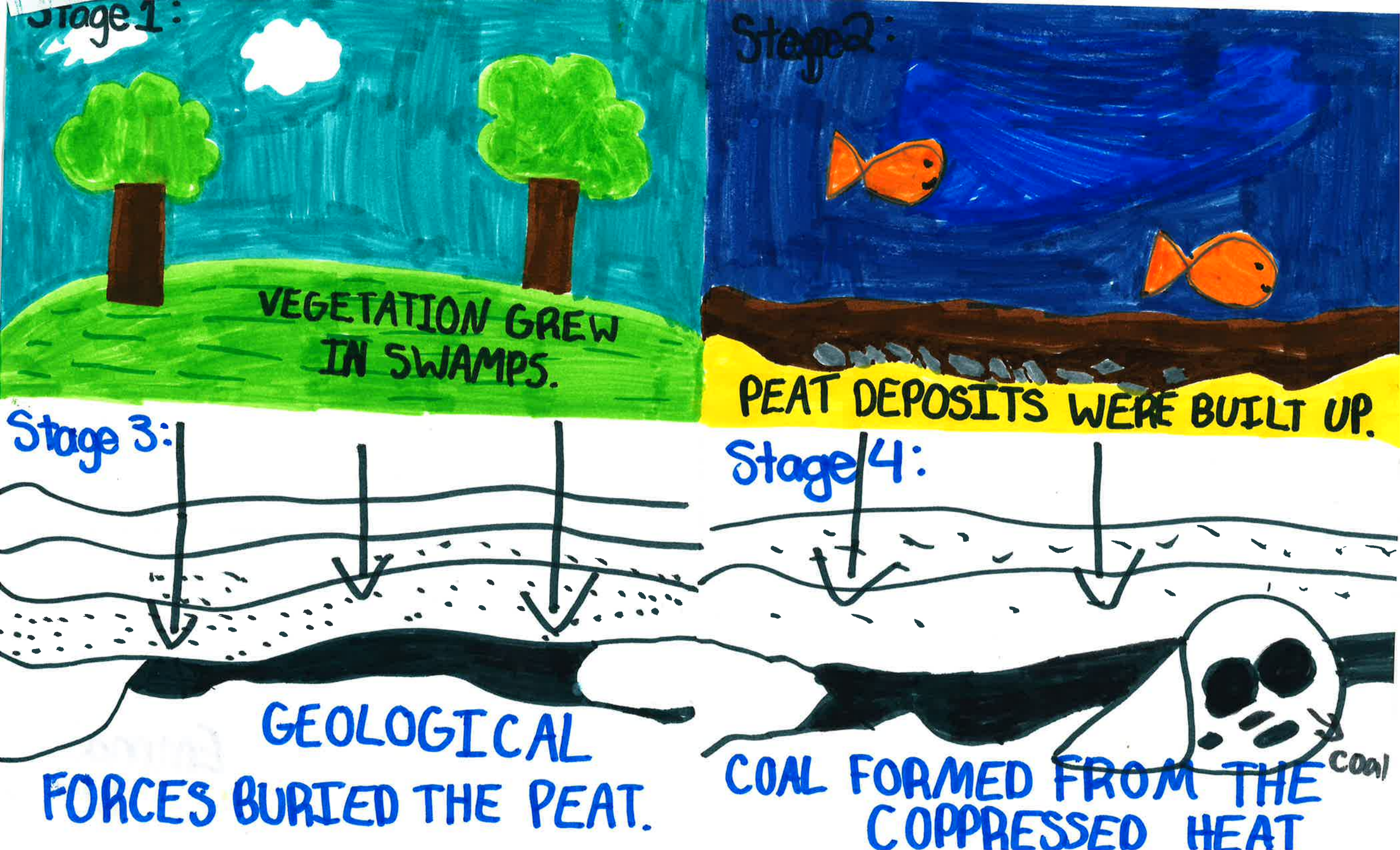
Emma K.

Braley S.

A Anthracite
B Bituminous
C Coal
D Dependence
For E Expert
F Fly Ash
G Good alternative
H Helpful to us
I Industrial
J Japan
coal is Broken
L Lignite
M Mining
clea N ed
O re
coal is P ower
Q uaked
U.S coal Reserves
S ub-Bituminous
T ransportational
coal is U ncovered
V egetation grew
W ater
X eremental
P-Y rite
minimi Zes effects

Emma
1/22/19

Anthracite
Bituminous
Coal
Dependence
Coal is Exported to different places.
Fly ash and sludge controls.
Gas emission controls.
Coal means more than Heat.
Coal is for Industry.
Coal is taken to Japan
Coal is taKen to many places.
Lignite
Coal is good for Making steel.
CLEANED
Coal is a gOod alternative.
Coal is good for electric Power.
Quaky
U.S. coal Reserves.
Sub-Bituminous
Coal is Transported.
Coal is Uncovered.
Vegetation grew in swamps.
Water
Xeremental
pYrite
minimiZes affects on the environment


Stage 1:
VEGETATION GREW IN SWAMPS.
Stage 2:
PEAT DEPOSITS WERE BUILT UP.
Stage 3:
GEOLOGICAL FORCES BURIED THE PEAT.
Stage 4:
COAL FORMED FROM THE COPPRESSED HEAT
Coal

How COAL was formed

Stage 1: VEGETATION GREW IN Swamps.

which covered many parts of America about 300 million years ago. The vegetation absorbed and stored the sun's energy.

Stage 2: PEAT DEPOSITS WERE BUILT UP

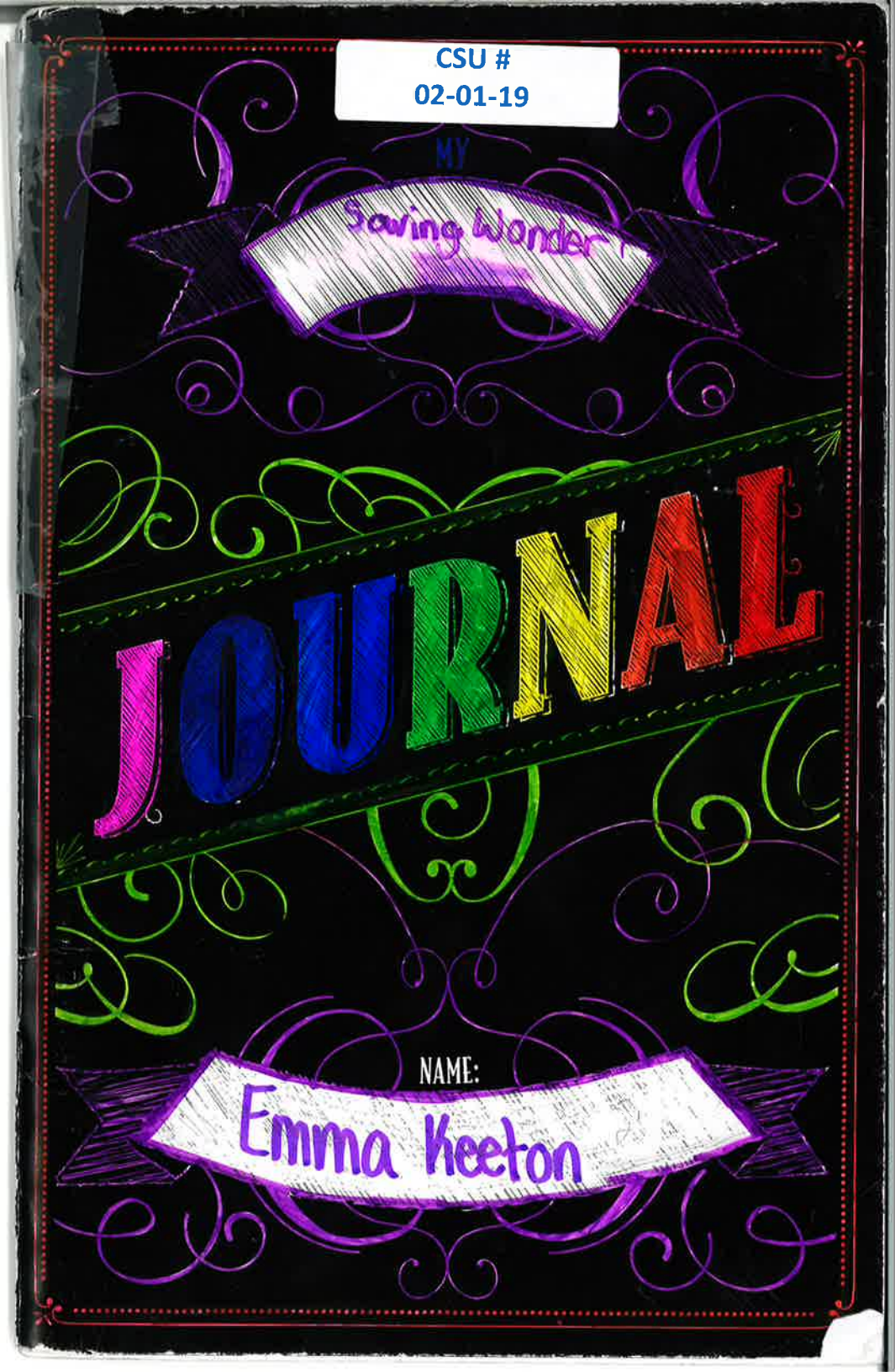
as vast amounts of vegetation died and accumulated at the bottoms of swamps to form this spongy, brown material.

Stage 3: GEOLOGICAL FORCES BURIED THE PEAT

deep under the surface of the earth. There, the layers of peat were further compacted by pressure and heat.

Stage 4: COAL FORMED FROM THE COMPRESSED PEAT

after millions of years under the earth's surface. The greater the heat and pressure, the harder the coal.


CSU #
02-01-19
MY
Saving Wonder
JOURNAL
NAME:
Emma Keeton