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Green Dreamers Power Up Using Wind Energy

Green Dreamers Power-Up Using Wind Energy

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Green Dreamers Power-Up Using Wind Energy

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Green Dreamers Powers-Up Using Wind Energy

Goals and Objectives

The main goal of Green Dreamers Power-Up Using Wind Energy is to introduce 4th grade students to the study of the wind, the potential energy and how it is being used and can be used for clean energy. The lesson and activities involves a review in the practice of science, review the different forms of energy, to describe wind energy and how it can be transferred; research the uses of wind energy around the globe and engineering a design a model of an instrument that captures this energy.

Students will participate in the following activities and lesson study activities in order to produce a device that respond to and transfers wind energy:

- What do you know about energy pre and post assessments
- Review the forms of energy
- Review how energy can be transformed?
- Overview of what wind energy is
- Design and engineer a wind device that can be powered by the wind

The following are the ongoing Florida State Standards to be reviewed and practice during the Green Dreamers Take on Wind Energy Challenge:

The Practice of Science

A: Scientific inquiry is a multifaceted activity; The processes of science include the formulation of scientifically investigable questions, construction of investigations into those questions, the collection of appropriate data, the evaluation of the meaning of those data, and the communication of this evaluation.
C: Scientific argumentation is a necessary part of scientific inquiry and plays an important role in the generation and validation of scientific knowledge.
D: Scientific knowledge is based on observation and inference; it is important to recognize that these are very different things. Not only does science require creativity in its methods and processes, but also in its questions and explanations.

The Characteristics of Scientific Knowledge

A: Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, or religion.
B: Scientific knowledge is durable and robust, but open to change.
C: Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery.

Forms of Energy

Energy Transfer and Transformation Big Idea 12: Motion of Objects IV. SC.4.P.10.1 Forms of Energy SC.4.P.10.2 Energy SC.4.P.10.3 Sound SC.4.P.10.4 Uses of Energy SC.4.P.11.1 Transfer of Heat Energy SC.4.P.11.2 Materials that Conduct Heat SC.4.P.12.1 Objects in Motion V. SC.4.P.12.2 Speed VI,Human Uses of Energy SC.4.P.10.1 - Forms of Energy SC.4.P.10.2 Energy SC.4.P.10.4 Uses of Energy

Ongoing Reading/Writing standards to be reviewed and practiced during the Green Dreamers Take on Wind Energy Challenge

KEY IDEAS AND DETAILS - LAFS.4.RL.1.1
Evidence: Reading Directions: provide details and examples in a text and explain what the text says explicitly and when drawing inferences from the text.
VOCABULARY - LAFS.4.L.3.4
Vocabulary Strategy: Determine or clarify the meaning of unknown words and based on grade 4 reading and content, choosing flexibly from an array of strategies.
(2) a. Use context clues to the meaning of a word or phrase.
INTEGRATION OF KNOWLEDGE AND IDEAS - LAFS.4.RI.3.7
Interpret Information * Genre: Expository Text Interpret information presented visually, orally, or quantitatively and through interactive elementary on Web pages.
WRITING
LAFS.4.W.1.2
Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
b. Develop the topic with facts, definitions, concrete details, or other information and examples related to the topic.
c. Linking ideas within categories of information using words. d. Provide a concluding statement or section related to the information or explanation presented

Green Dreamers Power-Up Using Wind Energy

LESSON PLAN TEMPLATE

Teacher name_____ Grade _____ Date _____

Title of Lesson:

Essential Question?	
Florida Standards	
Goals and Objectives	• •
Key Vocabulary	
ACTIVITIES	
Steps to deliver content	o *Students* o *Tell students* o *Introduce* o *Students* o *Lead a class discussion by*
Assessment: Evidence Goals met	o *Have students* o *Students* o *The class comes* o *Repeat ASSESSMENT*
Supplies: *Homework:* *References:*	
ESOL/ESE Strategies: (Add in as needed) 1.cueing, (visuals, words, gestures) 2. Repetition 3. Substitution 4 Completion/ Cloze technique 5. Question/Answer technique 6. Role Playing 7. Verbalize using chunking, chain drill, 8. Rephrasing/Simplifying 9. Using vocabulary in context 10. Using simple words, develop word bank. 11. Interpret/expand 12. Simplify work/worksheet 13. Whole group first, then individual response 14. Hands-on activities 15. Peer teaching/buddy partner 16. Individual help	

Pre/Post Assessments:

Begin with Energy pre-assessment worksheet on page 27. Students will complete daily practice energy review and questions each day as a review and/or warm-up activity while they are participating in other activities. This assessment will be revisited and reviewed before completing the post-assessment on page 28. Answer key is provided.

Green Dreamers Power-Up Using Wind Energy
LESSON PLAN TEMPLATE

Teacher name_____ Grade _____ Date _____ Duration_____5 Days

Title of Lesson: "What Do You Know about Energy?" Pre & Post assessment.

Essential Question (s)? *Can energy be lost or destroyed? Why or why not? Can energy be transformed?*	
Florida Standards	*Practice of Science A; Forms of Energy S.C.4.P.10.2,Energy 4,Uses of Energy 11.1, Transfer of Heat Energy, 11.2, Human Uses of Energy 10.1.*
Goals and Objectives	• *Energy* • *Energy Transformation*
Key Vocabulary	*Energy, chemical, electrical, mechanical, destroyed, transformation, pendulum*
ACTIVITIES	
Steps to deliver content	*Students read through and preview daily questions before beginning on Day 1.* o *Introduce lesson objectives, goals, essential question and Energy Transformation worksheet.* o *Instruct students to answer questions each day beginning with Day 1. Do answer more than 1 each day and do not share your answers with other students.* o *Inform students that this is a pre-assessment and they will learn the correct answers on Day 5 before completing the post – assessment.* o *Students will answer Day 1-4 each day of the week. Complete daily's and Post-assessment.* o *Students will share out their answers to questions and complete Post-assessment review with correct answers.*
Assessment: Evidence Goals met	o *Students complete Pre-assessment questions in complete sentences.* o *Students will show their work and complete math equation on # 3.* o *The class comes together in full-circle mode at the end of the Post-assessment to revisit their Pre-assessment and share what they learned about energy.*
	Supplies: Energy Transformation worksheet, pages 27/28. Pencils. *Homework: * Energy Survey worksheet (extra-credit, optional).* *References: Carson –Dellosa Publishing Group, NC. (2014) ISBN: 978-1--7-11274838*

Day 1: Can energy be lost or destroyed? Why or why not?

Day 2: Energy vocabulary match.

Day 3: How does energy change when you turn on a lamp or eat food?

Day 4: A pendulum shows the transformation of energy from potential to kinetic and back. Friction from the air slows the pendulum until it stops. In her experiment, Rebecca found that when the pendulum's first swing creates an angle of 100 degrees, it loses 5 degrees with each swing. How many times should the pendulum swing before it stops? For some students, they will need help calculating this because it is a division problem.

*Optional - extra credit home learning activity: Scavenger Hunt energy survey. Students will preview each electronic to see how much energy they think they use each year. You will need to explain what a KWh is and how they can find out "how much" by looking at their electric bill with their parents. Then, they will predict which electronic they think uses the most energy. Revisit after one month to see if they predicted correctly. This is just one activity to help them understand energy usage and which electronics may use the most. Some students may not have access to their parents electric bill so this is why this would be an optional activity.

KWh: The **kilowatt hour** (symbol **kWh**, **kW·h** or **kW h**) is a unit of energy equal to 3.6 megajoules. If energy is transmitted or used at a constant rate (power) over a period of time, the total energy in kilowatt hours is equal to the power in kilowatts multiplied by the time in hours. The kilowatt hour is commonly used as a billing unit for energy delivered to consumers by electric utilities.

The kilowatt hour (symbolized kW·h as per SI) is a composite unit of energy equivalent to one kilowatt (1 kW) of power sustained for one hour. One watt is equal to 1 J/s. One kilowatt hour is 3.6 megajoules,[1][2] which is the amount of energy converted if work is done at an average rate of one thousand watts for one hour.

Megajoules: the base unit of energy within the International System of Units (SI) is the joule.

https://en.wikipedia.org/wiki/Kilowatt_hour

Name_____

Week #10

Energy Transformation

Day 1

1. Can energy be lost or destroyed? Why or why not?

_____

_____

_____

_____

_____

_____

Day 2

Draw a line to match the type of energy transformation to its example.

1.	chemical to mechanical	using an electric hot plate
2.	electrical to radiant	rubbing hands together to warm them
3.	electrical to thermal	using batteries to power a laptop
4.	mechanical to thermal	a car burning gasoline to move
5.	chemical to electrical	turning on a lamp

Day 3

1. How does energy change when you turn on a lamp?

_____

_____

_____

2. How does energy change when you eat food?

_____

_____

_____

Day 4

1. A pendulum shows the transformation of energy from potential to kinetic and back. Friction from the air slows the pendulum until it eventually stops. In her experiment with a pendulum, Rebecca found that when the pendulum's first swing creates an angle of 100°, it loses 5° with each swing. How many times should the pendulum swing before it stops?

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Name_____

Week #10 Assessment

Energy Transformation

Answer the questions.

1. Give three examples of energy transformation in your home.

_____

_____

_____

_____

_____

2. Prepare a short statement you would give in a discussion about how energy transformation affects someone's daily life.

_____

_____

_____

_____

_____

3. Kade and his father were hitting baseballs. His father's baseball went 185 feet. Kade's swing had $\frac{3}{5}$ the potential energy of his father's swing. How far did Kade's baseball travel?

Circle the best answer.

4. How does a battery-operated watch change energy?
   A. electrical to nuclear
   B. mechanical to electrical
   C. chemical to mechanical
   D. thermal to electrical

 4.SL.1, 4.L.6, 4.NBT.B.6, 4.NF.B.4, 4.MD.C.7

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Activity one: Basic Forms of Energy Concept Review

View PPT presentation and students will take notes and complete the Types of Energy review worksheet. Link to PPT: https://www.lcps.org/Page/141391

Green Dreamers Power-Up Using Wind Energy
LESSON PLAN TEMPLATE

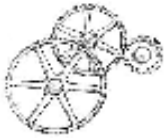
Teacher name_____ Grade _____ Date _____

Title of Lesson: What are the forms of energy?

Essential Question? *What are the forms of energy?*	
Florida Standards	*Practice of Science A; Forms of Energy S.C.4.P.10.2,Energy 4,Uses of Energy 11.1, Transfer of Heat Energy, 11.2, Human Uses of Energy 10.1*
Goals and Objectives	• *Review energy, and the forms of energy* • *Complete Forms on Energy worksheet with 80% accuracy*
Key Vocabulary	*Energy, Heat, thermal, light, radiant, mechanical, sound, electrical, chemical*
ACTIVITIES	
Steps to deliver content	o *Students will discuss and brainstorm examples of forms of energy* o *Tell students that they will be viewing a Power point presentation on Forms of Energy to review* o *Instruct students to take notes on the worksheet provided.* o *Students will lead a class discussion by reflecting on the presentation*
Assessment: Evidence Goals met	o *Have students complete the Forms of Energy worksheet* o *Students will Think/Pair/Share with a partner to provide and offer feedback* o *The class follows up as a group to discuss what are the Forms of Energy? Each student can share an example that they provided on the worksheet.* o *ASSESSMENT*
Supplies: Forms of Energy worksheet, Power point Presentation. Upload (see link) before day of lesson and save to the desktop. Tablets, or phone devices that have a QR code scanner. *Homework: students can use their devices to save (QR code) and read the PPT for assessment preparation.* *References:* Types of Energy, Polk County Schools: www.polk.k12.ga.us/userfiles/608/Classes/27187/energy_forms%202017.pptx?id.	
ESOL/ESE Strategies: (Add in as needed) 1.cueing, (visuals, words, gestures) 2. Repetition 3. Substitution 4 Completion/ Cloze technique 5. Question/Answer technique 6. Role Playing 7. Verbalize using chunking, chain drill, 8. Rephrasing/Simplifying 9. Using vocabulary in context 10. Using simple words, develop word bank. 11. Interpret/expand 12. Simplify work/worksheet 13. Whole group first, then individual response 14. Hands-on activities 15. Peer teaching/buddy partner 16. Individual help	

Forms of Energy

Heat (Thermal) Energy



Mechanical Energy

Electrical Energy

Light (Radiant) Energy

Sound Energy

Chemical Energy

Activity two: Energy Conversions and Transformations Vocabulary review

Green Dreamers Power-Up Using Wind Energy
LESSON PLAN TEMPLATE

Teacher name_____ Grade _____ Date _____

Title of Lesson: Energy Conversions and Transformations.

Essential Question? *What are Energy Conversions and transformations?*	
Florida Standards	*Uses of Energy SC.4.P.11.1 Transfer of Heat Energy SC.4.P.11.2 Materials that Conduct Heat SC.4.P.12.1 Objects in Motion V. SC.4.P.12.2 Speed VI.*
Goals and Objectives	• *Understand that energy transforms, transfers and converts* • *Explains different energy sources and transformations, conversions*
Key Vocabulary	*See vocabulary sheet*
ACTIVITIES	
Steps to deliver content	o *Students will complete vocabulary quiz cards on each of the vocabulary words listed.* o *Tell students to write the word on one side and the definition on the other side.* o *Explain that they will work with a group to memorize and quiz each other on the definitions.* o *Students will group up complete quiz cards.* o *Lead students in creating quiz cards and quizzing each other.*
Assessment: Evidence Goals met	o *Have students practice and illicit definitions of Conversion and Transformation vocabulary words* o *Students will partner up and quiz each other on definitions of words.* o *Each group completes Energy Conversions & Transformations quiz sheet.* o *Review ASSESSMENT for 80% accuracy.*

Supplies: 3 x 5 index cards, pencils, markers. Vocabulary worksheet, GIZMOS (Explore Learning) program. Student Exploration booklet. This resources is available to MDCPS teachers. Email link is provided on the curriculum portal.

Homework: Students can access the GIZMO'S portal and complete Energy Conversion activity as extra credit or supplemental activity in classroom.

References: GIZMOS – Explore Learning, Energy Conversions
https://www.explorelearning.com/index.cfm?method=cResource.dspDetail&ResourceID=651

ESOL/ESE Strategies: (Add in as needed) 1.cueing, (visuals, words, gestures) 2. Repetition 3. Substitution 4 Completion/ Cloze technique 5. Question/Answer technique 6. Role Playing 7. Verbalize using chunking, chain drill, 8. Rephrasing/Simplifying 9. Using vocabulary in context 10. Using simple words, develop word bank. 11. Interpret/expand 12. Simplify work/worksheet 13. Whole group first, then individual response 14. Hands-on activities 15. Peer teaching/buddy partner 16. Individual help

Vocabulary: Energy Conversions & Transformations

Review sheet

Students will use this sheet to create 3 x 5 vocabulary cards to quiz each other on the word definitions. Students will write the word on one side and the definition on the flip side. Then, proceed to quiz their group members until they think they are ready for the assessment.

Walk around and watch as the groups complete the cards, then, prompt to note the highlighted (underlined) portions of the assessment take make sure they are aware that these are key points to remember for the assessment.

Vocabulary

- Chemical energy – energy stored in the bonds that hold atoms together.
- Electrical current – energy that results from the movement of charged particles.
- Energy – the ability to cause changes, exert forces or do work. (In other words, energy is the ability to make things happen!)
    - Energy can exist in many forms. It can be stored or expressed actively.
    - Energy can be converted to another form, but can never be created or destroyed.
- Fossil fuel – a fuel formed deep in Earth's crust from the remains of plants and animals.
    - Fossil fuels include coal, oil, and natural gas.
- Global warming – a gradual rise in Earth's average temperature.
- Gravitational potential energy – stored energy that is due to an object's position.
    - The higher an object is, the greater its gravitational potential energy.
- Hydroelectricity – electrical current produced by water flowing through a turbine.
- Kinetic energy – energy of motion. The faster an object moves, the greater its kinetic energy. Kinetic energy also includes sound and thermal energy:
    - Sound – energy of vibrating materials or air molecules.
    - Thermal energy – energy that comes from the movement of tiny particles. As an object heats up its particles move faster, increasing thermal energy.
- Light – a form of *electromagnetic radiation* that is visible to the eye.
    - Other forms of electromagnetic radiation include gamma rays, x-rays, ultraviolet light, infrared radiation, and radio waves.
- Nonrenewable resource – a natural resource that cannot be replaced reasonably soon.
- Nuclear energy – energy released by changes to the nuclei of atoms.
    - In *nuclear fission*, atoms are split apart. It is used in power plants and weapons.
    - In *nuclear fusion*, atoms are joined together. This occurs deep inside the Sun. There is hope that we will soon be able to harness this type of energy, essentially solving the energy supply problem.
- Renewable resource – a natural resource that can be replaced in a reasonable amount of time.

Wind power, solar power, hydroelectricity, and ethanol are renewable resources

Vocabulary: Energy Conversions & Transformations

Vocabulary

- Chemical energy – _____.
- Electrical current – _____.
- Energy – _____.
  - Energy can exist in _____ forms. It can be _____ or expressed _____.
  - Energy can be converted to another _____, but can never be _____ or _____.
- Fossil fuel –_____.
  - Fossil fuels include_____, _____, and _____.
- Global warming – a gradual _____ in Earth's average _____.
- Gravitational potential energy – _____ energy that is due to an object's _____.
  - The _____ an object is, the greater its _____ potential energy.
- Hydroelectricity – electrical current produced by _____flowing through a turbine.
- Kinetic energy – energy of_____. The _____ an object moves, the greater its kinetic energy. Kinetic energy also includes _____and thermal energy:
  - Sound – energy of _____materials or air molecules.
  - Thermal energy – energy that comes from the _____of tiny particles. As an object _____up its particles move faster, increasing thermal energy.
- Light – a form of _____ _____ that is visible to the eye.
  - Other forms of electromagnetic radiation include _____,_____, _____, and _____.
- Nonrenewable resource – a _____resource that _____be replaced reasonably soon.
- Nuclear energy – energy released by changes to the nuclei of_____.
  - In *nuclear* ***fission***, atoms are_____ _____.It is used in _____ _____and _____.
  - In *nuclear* ***fusion***, atoms are_____ _____. This occurs deep inside the_____. There is hope that we will soon be able to harness this type of energy, essentially solving the energy supply problem.
- Renewable resource – a _____ resource that _____ be replaced in a reasonable amount of time.
  - Wind power, solar power, hydroelectricity, and ethanol are renewable resources.

Answer Key

Vocabulary: Energy Conversions & Transformations

Vocabulary

- Chemical energy – **energy stored in the bonds that hold atoms together**.
- Electrical current – **energy that results from the movement of charged particles**.
- Energy – **the ability to cause changes, exert forces or do work**. (In other words, energy is **the ability to make things happen**!)
    - Energy can exist in many **forms**. It can be **stored** or expressed **actively**.
    - Energy can be converted to another **form**, but can never be **created** or **destroyed**.
- Fossil fuel – **a fuel formed deep in Earth's crust from the remains of plants and animals**.
    - Fossil fuels include **coal**, **oil**, and **natural gas**.
- Global warming – a gradual **rise** in Earth's average **temperature**.
- Gravitational potential energy – **stored** energy that is due to an object's **position**.
    - The **higher** an object is, the greater its **gravitational** potential energy.
- Hydroelectricity – electrical current produced by **water** flowing through a turbine.
- Kinetic energy – energy of **motion**. The **faster** an object moves, the greater its kinetic energy. Kinetic energy also includes **sound** and thermal energy:
    - Sound – energy of **vibrating** materials or air molecules.
    - Thermal energy – energy that comes from the **movement** of tiny particles. As an object **heats** up its particles move faster, increasing thermal energy.
- Light – a form of ***electromagnetic radiation*** that is visible to the eye.
    - Other forms of electromagnetic radiation include **gamma rays**, **x-rays**, **ultraviolet light**, **infrared radiation**, and **radio waves**.
- Nonrenewable resource – a **natural** resource that **cannot** be replaced reasonably soon.
- Nuclear energy – energy released by changes to the nuclei of **atoms**.
    - In *nuclear fission*, atoms are **split apart**. It is used in **power plants** and **weapons**.
    - In *nuclear fusion*, atoms are **joined together**. This occurs deep inside the **Sun.** There is hope that we will soon be able to harness this type of energy, essentially solving the energy supply problem.
- Renewable resource – a **natural** resource that **can** be replaced in a reasonable amount of time.

Wind power, solar power, hydroelectricity, and ethanol are renewable resources

Activity three: What is wind energy?

Study Jams is a free online resource available to teachers, students and parents.

http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/air-pressure-and-wind.htm

Preview vocabulary and comprehension questions. Watch video. Tell students to raise their hands when they think they hear an answer to one of the questions. Afterwards, review questions, complete interactive *Test Yourself*. Follow-up with correct yourself.

Green Dreamers Power-Up Using Wind Energy
LESSON PLAN TEMPLATE

Teacher name_____ Grade _____ Date _____

Title of Lesson: What is wind energy?

Essential Question? *What are some ways you could describe wind energy?*	
Florida Standards	*Forms of Energy: Human Uses of Energy SC.4.P.10.1 - Forms of Energy SC.4.P.10.2 Energy SC.4.P.10.4 Uses of Energy* *Objects in Motion V. SC.4.P.12.2 Speed VI.*
Goals and Objectives	• *Students will describe the Coriolis Effect* • Students will give an example of how the wind blows in the northern & southern hemisphere
Key Vocabulary	*Air pressure, mass, molecules, vapor, convection cell, Coriolis Effect, Prevailing Westerlies/Easterlies*
ACTIVITIES	
Steps to deliver content	o *Students will preview comprehension questions before watching video.* o *Tell students raise their hands when they hear an answer to one of the questions.* o *Students will review questions and their answers* o *Lead a class discussion by following up with the correct – yourself. Which ones were missed and why?*
Assessment: Evidenc	o *Students will complete comprehension questions orally with 80% accuracy.* o *The class comes together to discuss which questions were missed and why?*

Supplies: ***StudyJams*** *online resource:* http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/air-pressure-and-wind.htm

Homework: NA

References: StudyJams: Scholastics

ESOL/ESE Strategies: (Add in as needed) 1.cueing, (visuals, words, gestures) 2. Repetition 3. Substitution 4 Completion/ Cloze technique 5. Question/Answer technique 6. Role Playing 7. Verbalize using chunking, chain drill, 8. Rephrasing/Simplifying 9. Using vocabulary in context 10. Using simple words, develop word bank. 11. Interpret/expand 12. Simplify work/worksheet 13. Whole group first, then individual response 14. Hands-on activities 15. Peer teaching/buddy partner 16. Individual help

Study Jams Winds Comprehension Questions

& answer key

1. What role does air pressure play in weather conditions?

A. Its force determines the strength of the winds

2. What gives winds it mass?

A. Air molecules

3. Which three elements affect air pressure?

A. Height above sea level, temperature and amount of water vapor.

4. What is a convection cell?

A. A pattern of rising warm air and cold sinking air

5. Why does air rise above land at the beach?

A. Cold air gets warmer over land, which makes it lighter, so it rises.

6. Which best describes the Coriolis Effect?

A. As it spins on its axis, the Earth pulls on the winds and causes it to blow in a curved path.

7. Which kind of wind blows across most of the United States?

A. Prevailing Westerlies

Activity four: Design and engineer a model of wind energy device

Green Dreamers Power-Up Using Wind Energy
LESSON PLAN TEMPLATE

Teacher name_____ Grade _____ Date _____

Title of Lesson: Designing your own wind power device.

Essential Question? *How can you design and create a model of a device that transfers wind energy?*	
Florida Standards	*Motion of Objects IV. SC.4.P.10.1, Human Uses of Energy SC.4.P.10.1*
Goals and Objectives	• *Students will design and create a model of a wind wheel device* • *Students will evaluate and improve their device to optimize the transfer of energy*
Key Vocabulary	*Wind wheel, model, device, options, diagrams, construction, improve*
ACTIVITIES	
Steps to deliver content	o *Students will gather materials in their groups to begin task.* o *Tell students that they will begin with ?Ask & answer the questions, Imagine & Plan (step by step).* o *Instruct students to show each stage of development on their plans (numbering the stages).* o *Students may use a separate sheet of paper if needed.* o *Lead the class by asking questions and walking around to offer guidance on stages of development.*
Assessment: Evidence Goals met	o *Have students write in complete sentences.* o *Students will check for accuracy of statements and planning out stages in logical steps.* o *The class comes together to share their plans, options and stages with their models.* o *ASSESSMENT students create a model of a Wind Wheel that work in both directions with 80% accuracy.*

Supplies: *Worksheet with supply list.*

Homework: *Students can research various models of wind wheels online*

References: *www.sciencea-z.com Force and Motion*

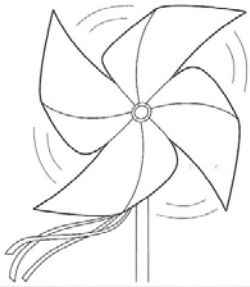
ESOL/ESE Strategies: *(Add in as needed) 1.cueing, (visuals, words, gestures) 2. Repetition 3. Substitution 4 Completion/ Cloze technique 5. Question/Answer technique 6. Role Playing 7. Verbalize using chunking, chain drill, 8. Rephrasing/Simplifying 9. Using vocabulary in context 10. Using simple words, develop word bank. 11. Interpret/expand 12. Simplify work/worksheet 13. Whole group first, then individual response 14. Hands-on activities 15. Peer teaching/buddy partner 16. Individual help*

Name _____

Read the task. Then, follow the steps to complete the task.

Wind Wheel: Combining Design and Wind Power

Create a pinwheel that spins in the wind.



Materials

- stick, such as a pencil, skewer, or wooden dowel
- variety of paper, such as cardboard, card stock, and computer paper
- brass fasteners
- glue
- hole punch
- pushpins
- tape
- scissors

Caution: Before beginning any outdoor activity, ask families' permission and recommend use of sunscreen and/or sun-protective clothing.

Ask

What do you already know? What do you need to know to get started? Where can you find the information you need?

_____

_____

_____

Imagine

What are the possibilities? Come up with several different options.

_____

_____

_____

Plan

Choose an idea. Draw a model and label it. Consider making different models for each stage of construction or separate diagrams of more complex parts.

Plan

What are your steps? Use your drawing to guide your plan. Number your steps and write clearly so that others can understand them.

Create

Follow your plan to create your model. What worked? What didn't? What did you need to change as you went through your plan? Why?

Improve

How could you improve your model? Do you need to start over, or can you redo a single part? If it works, can it work even better?

Communicate

How well did it work? Is the problem solved? Write a statement to describe how your model meets the guidelines of the task and why it is successful.

Reflect

How could you get your pinwheel to spin in the opposite direction?

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Explain/Evaluate:

Conclusion:

1. Write to explain how wind turns your pinwheel.
   The currents of air coming from the wind catches the curved part of the blades, causing them to spin.

2. List four things that wind is useful for.

   Sample answers: moving a sailboat, wind turbines producing electricity, dry clothes, etc.

Real World Connection:

3. What are examples of people using air to make things move?

   Sample answers: moving a sailboat, wind turbines producing electricity, dry clothes, etc.

4. How can we use wind to our advantage?
   Sample answer: a safer, cleaner source of energy.

Reference/Resources:

Applying the Standards STEM

Carsondellosa.com

Wind Wheel: Combining Design and Wind Power

Common Core Science 4 Today Daily Skills Practice

Energy Transformation

Force and Motion

www.sciencea-z.com

GIZMOS – Explore Learning, Energy Conversions

https://www.explorelearning.com/index.cfm?method=cResource.dspDetail&ResourceID=651

Miami Dade County Public Schools Science Pacing Guides:

https://mdcpsportalcollaboration.dadeschools.net/pacingguides

StudyJams: Scholastics

http://studyjams.scholastic.com/studyjams/jams/science/weather-and-climate/air-pressure-and-wind.htm

Types of Energy

Polk County Schools

https://www.lcps.org/Page/141391

www.polk.k12.ga.us/userfiles/608/Classes/27187/energy_forms%202017.pptx?id.

Examples of finished models

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