W 1201

LIGHT IT UP!

CREATING SOLAR LANTERNS

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Creating Solar Lanterns

Skill Level:
Beginner (3rd-5th graders)

Learner Outcomes:
The learner will be able to:

- Demonstrate understanding of design and engineering principles
- Construct a solar light that effectively balances design and usability

Tag(s):
4-H STEM
Electric
Engineering and Safety
Science

Time Needed:
50-60 minutes

Materials Needed:

- Paper
- Pencils
- Color Pencils
- Erasers
- Solar LED light (jar lid type)
- Jars (mason jar style)
- Assorted glass stains (paint)
- Newsprint or plastic to cover tables
- Student Handout (one per student to take home)
- Sun Word Web Worksheet (one per student)

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Introduction to Content

Humans need light. It doesn't matter where the light comes from, but to see, we must have it. The brightest light known to man comes from the sun, which is constantly blazing at 10,000 degrees F. It burns so brightly that, even though it is 93 million miles away from planet Earth, we see and feel its glow.

Introduction to Methodology

This lesson can be used on its own or for STEM purposes but also can be used in conjunction with a basic solar lesson. Students will learn about solar energy and then create a solar lantern made from mason jars.

Terms/Concepts

Elements of art – They are the building blocks of artwork: color, line, shape, form, value, texture and space. They are the tools that artists use when creating a piece of artwork.

Principles of design – They are how those building blocks are arranged: contrast, rhythm, proportion, balance, unity, emphasis, movement and variety.

Setting the Stage/Opening Question

Tell students to look into the sky. Ask: "What is that bright thing shining down on us?" Let them answer. THE SUN

Say: "Of course it's the sun. But what does the sun do for us?" Let them answer.

Say: "The sun is the most powerful light source we have. But did you know that we can harness the energy from the sun to use later? What kind of energy can we capture from the sun?" SOLAR

Say: "Today we are going to learn more about solar energy and then create a small solar-powered light to keep with us in case of a power outage."

Say: "Before we move to our activity, let's do a web activity." Use the Sun Word Web Worksheet (page 6). Encourage students to write SUN in the middle and then write any words they think of that have to do with the sun.

After a few minutes, ask students to share what they have written.

Strategies to Increase Student Engagement

Use the hand lamp with a solar bug and solar car to grab their attention. Explain that solar power is instant and talk about the need to store the energy to use as needed.

Their solar light has three major parts: a solar cell, a battery and a light. The sun will charge the battery and the stored energy powers the light, so they can use it when desired. This would be a great time to introduce AC/DC current.

The only difference between their lamp and solar power in their homes would be an inverter.

Experience

Say: "Let's talk about some of the elements of art and principles of design. The elements of art are the building blocks of artwork. They include color, line, shape, form, value, texture and space. They are the tools that artists use when creating a work of art. The principles of design are how those building blocks are arranged. They include contrast (meaning the difference in colors), rhythm, proportion, balance, unity, emphasis, movement and variety."

Encourage students to brainstorm why decorative designs would be important to a functional lantern.

Ask: "What kinds of designs would be adequate for a lamp?" A dark background would black out the light.

Encourage the class to compare ideas.

Explain that materials are provided to create their own designs and stress the importance of designs that are appealing and functional, allowing a suitable

amount of light to shine through.

Say: "We are trying to design something that will lend a lot of light. So, do we want to cover every piece of the jar with dark shapes or paper?" No.

Invite the students to begin sketching ideas of how they can decorate their jars.

The class will be divided into peer groups to discuss the effectiveness of the designs shown. The leader will approve designs as they are ready. Students will then begin collecting materials and executing their designs on their jars. The leader will continue to direct and help students with execution.

Step-by-Step Instructions for Creating the Solar Lantern

Step 1 – Draw a design on a plain white sheet of paper.

Step 2 – Trace or paint the design onto the outside of the jar.

Step 3 – Let the jar dry completely.

Step 4 – Attach the LED light to the jar lid.

Share

Ask: "Why did the designs in terms of elements of art and principles of design make a difference in this project?"

Notes

Process

Allow students to discuss which designs are the most effective in decoration and which ones allowed the maximum amount of light.

Generalize

Ask: "Why is the design important to the light jar? What would have happened if you had done a different design?"

Ask: "Which designs allow for the most light to shine in?"

Apply

Ask: "How do these designs relate to the elements of art and principles of design?"

Students are encouraged to take their lanterns home to see their projects in action.

Additional or Supplemental Activities

Students may make a short presentation or written report about how/if their design was successful.

Students could bring materials from home.

The project could also be taken home and done as a family project.

TIPPS
Life Skills

Head - Learning

Heart - Feeling, Giving

Hands - Working

Health

References

Spectrum and TN Score Lesson Plan

National Energy Educational Development (NEED) Project Website: need.org

Supplemental Information
Educational Standards Met

PHYS.PS3: Energy
15) Compare and contrast the process, design and performance of numerous next-generation energy sources (hydropower, wind power, solar power, geothermal power, biomass power, etc.).

SCRE.ETS2: Links Among Engineering, Technology, Science and Society
8) Engage in the peer-review process by giving and receiving detailed feedback throughout the process of planning and carrying out investigations.

Sun Word Web Worksheet

Instructions: As quickly as possible, write down any words you can think of that have something to do with the sun.

Example Pictures to Share with Students

Student Handout

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