Sun Rays

Students will see evidence of the Sun's radiant energy through solar beads and sun print paper. Through these activities students will learn all living things need the Sun's energy, what happens when people get too much of the Sun's energy, and how to protect themselves during hot days.

Grade Level: Kindergarten

Phenomena:
How does the sun provide energy to the Earth?

Objectives:
- Students will identify two ways to protect themselves from the Sun's radiation
- Student will explain reasons why the sun is important.

Materials:
- Laminated pictures of the sun
- UV Sun Beads
- Regular beads
- Sunglasses
- Sunscreen
- Pipe cleaners
- Sun print paper

Appendixes:
- The Sun pg. 5
- Student Coloring Sheets pgs. 6,7

Time Considerations:
- Preparations: 10 minutes
- Activity 1: 5 minutes
- Activity 2: 6 - 8 minutes
- Activity 3: 10 - 12 minutes
- Activity 4: 10 minutes
- Activity 5: 5 minutes
- Conclusion: 3 - 4 minutes

Related Lesson Plans:
Life Box (PLT), Plants and the Sun, Solar Matters

Nevada Outdoor School . org

Next Generation Science Standards

K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.

Science and Engineering Practices (SEP):
Planning and carrying out investigations.

Disciplinary Core Ideas:
PS3.B: Conservation of Energy and Energy Transfer.

Cross Cutting Concepts:
Cause and Effect

Excellence in Environmental Education Guidelines

Strand 1-Questioning, Analysis and Interpretation Skills (A, B, C, G): Learners are able to develop questions that help them learn about the environment, design simple investigations, locate and collect information about the environment and environmental topics and develop simple explanations that address their questions about the environment.

Background

Exploring science is a wonderful way for children to develop problem-solving, observation, and critical-thinking skills. Where better to do this than outside in the sun? In fact, a great topic to explore is the sun itself!

The sun is the biggest, brightest, and hottest source of energy available to life on Earth. Did you know the sun is actually a star? The sun is a giant ball of gas. These gases undergo a process called nuclear fusion.

Nuclear fusion produces a tremendous amount of energy much of which comes to us in the form of light, which then produces heat in objects on Earth. The energy from the sun heats our world and makes life possible.

Did you know the sun is so bright it will damage your eyes if you look directly at it? The light from the sun can also hurt your skin. Have you ever had a sunburn? Although sun rays can hurt our bodies if we aren't careful, nothing would be able to live on the Earth without the energy we get from the sun!

Preparation

Using small cups, count out approximately seven regular beads and six solar beads to each cup. These cups will be given to each student during the craft.

Cut enough pipe cleaners in half so each students can

have one to make their solar bracelet.

Doing the Activity

Activity 1 - What is the Sun?

Begin by sharing with students the theme for this lesson. Today the class will study something that is huge, extremely hot, and millions of miles away from Earth!

The Sun! Allow students to share what the Sun is and why it is important to Earth. This pre-assessment will help to determine the group's previous knowledge is and to correct misconceptions.

During this introduction, explain what the Sun is, how it moves, what it provides to Earth (light and warmth), what uses the Sun's energy, and correct any misconceptions. During this share with the class a variety of pictures of the Sun (page 3 & 5). Then direct students' thoughts towards what it might be like if there were no sun.

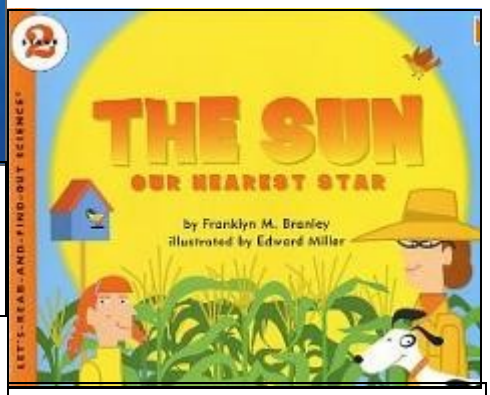
Activity 2 - Sun Prints

Continue with the thoughts from above and ask students if people can see the Sun's energy? Many students will answer yes, so challenge them to explain how. Explain that sometimes people can indeed see the Sun's energy when light is reflected or refracted by objects (or bounced off of shiny things) However, people feel the Sun's energy by the heat that is created in objects.
Explain that students will do an experiment to capture the Sun's energy, using solar paper. The goal of this experiment is to observe the change visually and see if objects on the paper will absorb the Sun's energy and if we can also block it .
Place various wooden shapes on a piece of solar paper before class and set it outside or inside near a window if necessary. Set up a duplicate experiment inside, to demonstrate how the experiment was set up and check for understanding. Ask students what they think will happen to the paper. Will the objects on the paper do something to the Sun's energy? Allow students to share their ideas, then encourage to continue keep thinking about their experiments while you read a story about the Sun. *For 1/2 hour lessons, omit solar paper activity*

Solar Print on Solar Paper
http://www.myriadonline.co.uk/products.php?id=4452&name=Solar%20Paper

Activity 3 - How does the sun affect you?

Choose any story that illustrates the importance of the Sun to living things. *"The Sun: Our Closet Star, by Franklyn M. Branley* is a great read for this audience and meets the goals for this lesson.
When finished, ask students if they feel living things need the Sun's energy to live each day? YES! Next pose the following question to the class: "Is it possible for living things to get too much energy from the Sun?" YES! When people receive too much of the Sun's energy we call this a sunburn!



Branley, F. M. (2002). *The Sun, our nearest star.* New York, New York: *HarperCollinsPublishers.*

Activity 4 - Solar Bracelets

Explain to students that in the next experiment they will use special beads that soak up the Sun's energy somewhat like we do!

Show the students the UV sun beads and ask them what color they are? Explain that the reason these are so special is because they are able to soak in the Sun's energy and when they do something amazing happens! *The UV-sensitive beads contain a pigment that changes color when exposed to ultraviolet radiation from the sun.*

Students when dismissed back to their tables, will construct a solar bead bracelet (regular

beads may be used if the group size is larger than the number of solar beads). Demonstrate to the class how to assembler their bracelets by sliding a bead on to a pipe cleaner. When finished, students hold their pipe cleaner above their head, so the instructor can pinch the ends together to finish the bracelets.

Activity 5 - UV Test

Have students stay at their desks and put their bracelets at the top of their desk. Explain to the class that in a few moments we'll take our bracelets outside and see what happens to the beads when they soak up the Sun's energy.

Before moving outdoors to test the bracelets, ask the class if there are ways for people to protect themselves from getting too much sun? *Sunscreen, hats, long sleeves, umbrellas, etc…* Explain to the group were going to test these types of sun protection looking at the experiments that are set up outside. They are 1) a bead beneath sunglasses, 2) a bead covered in sunscreen (it may be necessary to apply sunscreen to the bead 1/2 hour before class) and 3) a bead beneath the shade of a hat. Students will look at the beads and decide if the types of protection works or does not.

After the students see how the beads change color ask them these questions:

- Can the sun cause their own skin to change color? *Yes, sun tan or sunburn.*
- Can too much of the Sun's energy be harmful to us? *Yes, it can be harmful to both your skin and eyes.*
- What can we do to help protect our bodies from the sun's UV radiation? *Wear sunscreen, sunglasses, a hat, etc.*

Conclusion

Activity 6 - Sun Prints *Revisited*

Bring students back indoors. As students move indoors, using a spray bottle, spray each sun print with water to "fix" image. How does it work? *The sun print paper is coated with light-sensitive chemicals, which react to light waves and particles when exposed to light. When you place objects on the paper, they block the light and turn white, while the paper around them remains blue. Water stops the process and fixes your images on the paper.*
Let the prints dry in the sun while you conclude the class inside. When the lesson is finished, collect the prints and give them to the classroom teacher to post in the classroom.

Our Solar System
http://www.dailymail.co.uk/sciencetech/article-2148631/The-hunt-Planet-X-Noted-astronomer-calculates-planet-times-size-Earth-exist-fringe-solar-system.html

Assessment

Assess the students on how well they can answer these questions:

1. What is the Sun?
2. Why is the Sun important to plants, animals, and people?
3. How does the sun affect you?
4. What would life be like without the sun?

Extensions

Summer Time Poster!

- Have the students draw a picture of their favorite thing to do during the summer time.

Amazing Sun Facts!

- This activity helps students to grasp the size difference and distance between the Sun and Earth. Our sun is about 870,000 miles in diameter (across its middle)! That is 109 times as big as earth. To visually demonstrate this, have students count out 109 cheerios. Place the Cheerios, side by side each other on the floor, to create a line. Explain that if Earth were the size of one Cheerio, the Sun's would be as big across its middle as the line of 109 Cheerios.

- Be safe in the Sun coloring page (p.6)
- How can I protect myself from the sun's energy? Matching color page (pg.5)

Vocabulary

Brightness: light or color that is strong and can be seen clearly

Color: a property of an object that reflects light of a certain wave length

Energy: power from coal, electricity, sun, or other sources that makes machines work and produces heat

Heat: great warmth

Plant: a living organism with a green pigment called chlorophyll that allows the organism to make food from the energy of the sun

Star: a ball of burning gases in space

Ultraviolet (UV) Light: is the invisible radiation that creates sunburns and can injure the eyes.

Sources

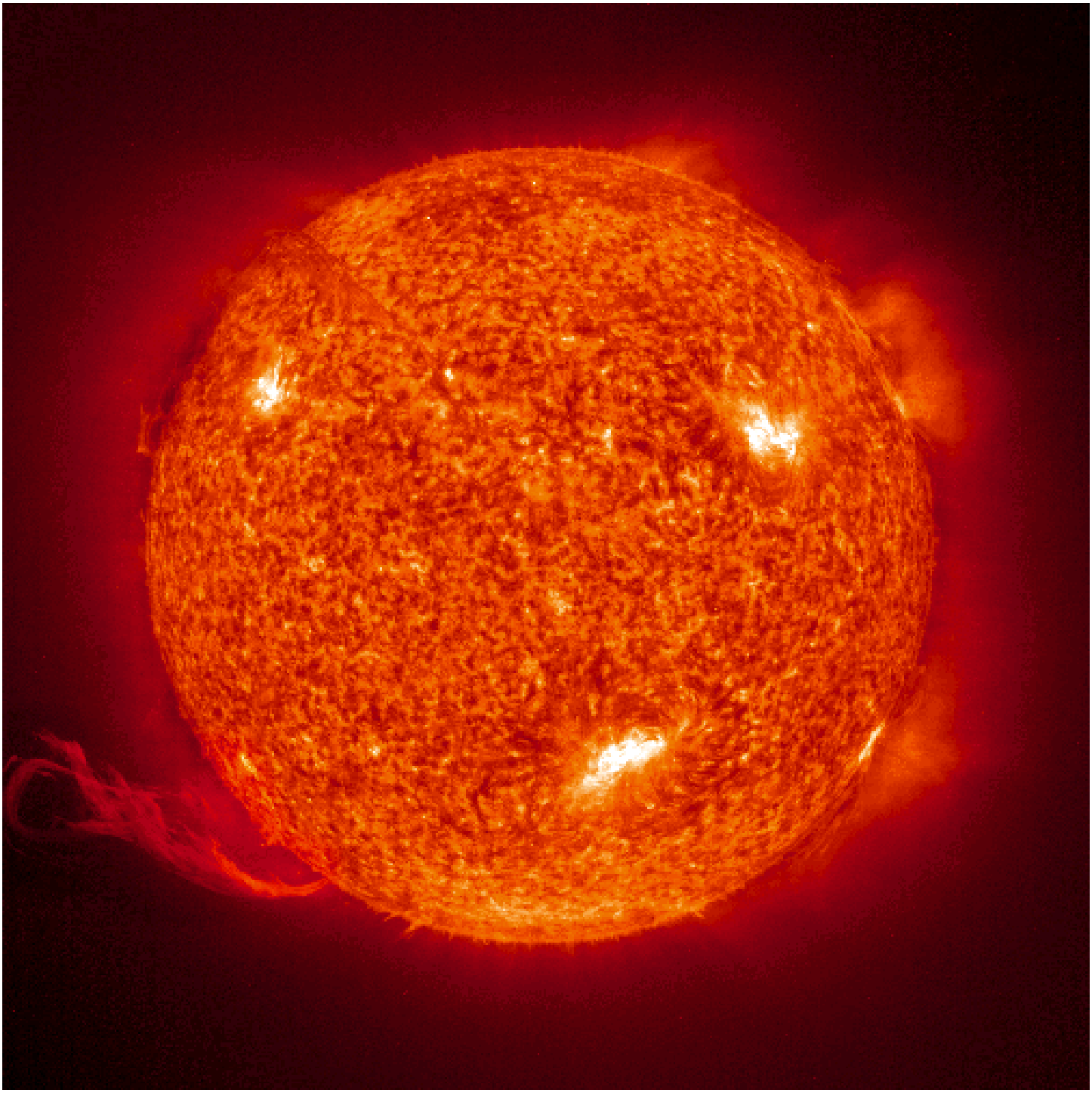
The American Heritage® Dictionary of the English Language, Fourth Edition Copyright © 2000 by Houghton Mifflin Company. Published by Houghton Mifflin Company.

Steve Spangler Science. "UV Beads and Sun Print Paper." http://www.stevespanglerscience.com (28 July, 2008).

Greene, Carol. *Shine, Sun!* Gene Sharp, Illus. Chicago: Children's Press, 1983.

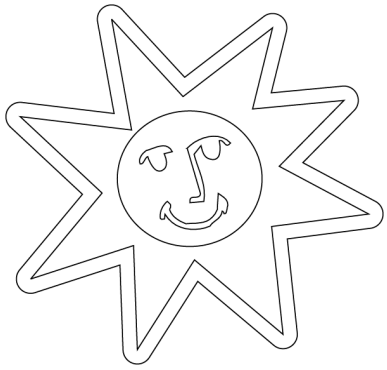
Branley, F. M. (2002). *The Sun, our nearest star*. New York, New York: HarperCollinsPublishers. *(Image: http://www.amazon.com/s/ref=nb_sb_noss?url=search-alias%3Dstripbooks&field-keywords=The+sun+our+nearest+star).*

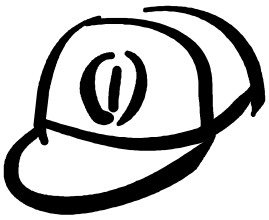
THE SUN

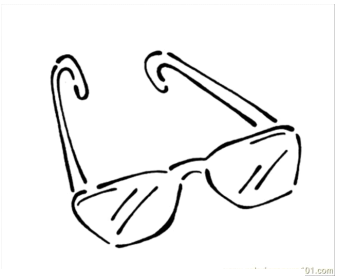


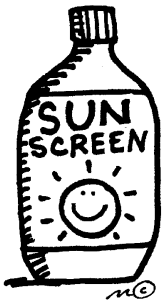
http://curious.astro.cornell.edu/sun.php

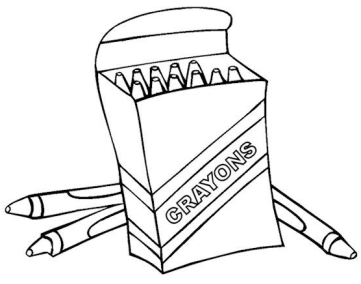
How can you protect yourself from the Sun's Energy?

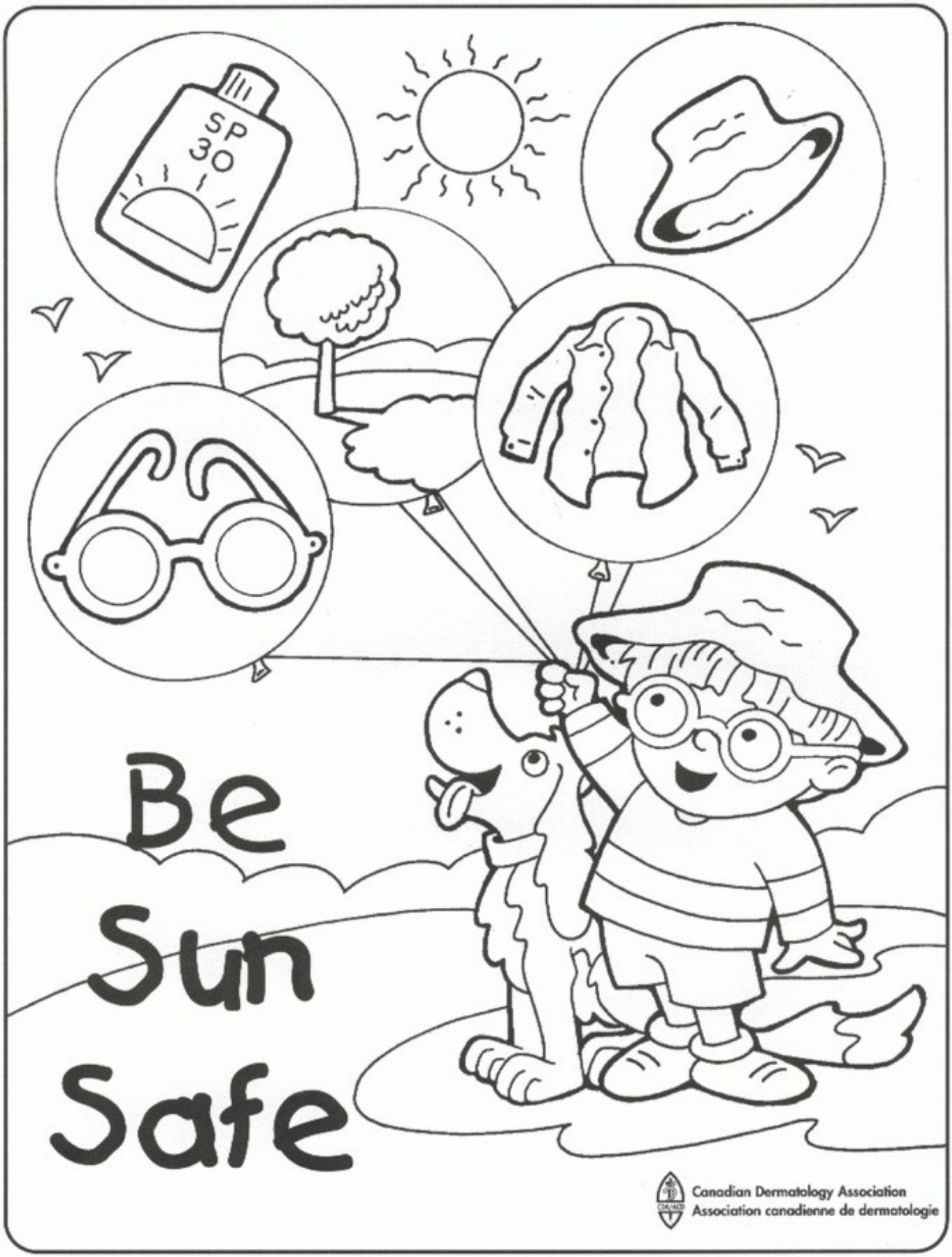








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