The Day the Crayons Quit and **The Day the Crayons Came Home by Drew Daywalt**

(***The Day the Crayons Came Home***: melted yellow & orange crayons page…)
Concept: sun gives us light, heat, ultra violet (UV) radiation

Lesson duration: 60 minutes with Read Aloud
Suggested Age Range: 7-12

STEM Activity: ***Activity choices (Choose one or create stations for children with parent volunteer leaders):***

- Reflect light with mirrors to investigate how light moves (straight line and challenge children to work with another set of partners to make light turn or go around a corner)
- Experiment with black and white construction paper mittens in direct sunlight to investigate that darker colors absorb sunlight, feeling warmer and lighter colors reflect sunlight, feeling cooler
    - Shine sunlight reflected from a mirror onto a partner's hand behind their back to feel the radiant heat of sunlight
- Experiment with sunglasses and protection from sunlight and UV rays
    - Each child puts a lens on colorful paper and waits a period of time to see if there is a change (fades around sunglass lens)
    - Investigate a melting crayon that might occur in direct sunlight, in a shaded area outside and in direct light in a room and measure the temperatures with thermometers

***Objective*:** Children will demonstrate and explain how the sun's light and/or energy behaves and affects living and nonliving things on Earth.

***Supplies/Resources/Tech*:**

- mirrors, one per every 2 children
- yarn
- meter sticks or other measuring tape
- black and white construction paper half sheets - 81/2 x 11" pages cut in half, one color sheet for each child
- classroom, scientific thermometers, *optional*
- *Donated scratched or broken sunglasses, one single lens per child or partners
- lightly colored construction paper half sheets
  OR sunlight sensitive paper (Nature Print or Sun Art paper - prices & sizes vary)
- Image of sunglasses with UV protection rating
    - sample https://blog.alwayscarebenefits.com/preserve-eyesight-sunglasses-protect/

Read Aloud: ***The Day the Crayons Came Home***: stop to discuss at talking points and point out any parts that will support understanding and empathy and/or the chosen STEM challenges, especially on the page with the melting crayons

***Introduction*:** After reading both books, revisit the melting crayons page and ask children what might make crayons melt. Have children turn-and-tell-a friend, then if time, have a few partners share.

***Science Essential Question*:** "How does light work and why is sunlight so important?" Share the question with children. Have children turn-and-tell-a friend any ideas they

have, then have partners share. Do not answer any questions or give answers. Be open to any preconceptions. Try not to show any facial expressions or body language that might "tell" a child they have a misconception.

Children Ask Questions*:* Encourage children to ask questions. Answer procedure questions directly but not creating questions. Record these, if able, to revisit later. (Some questions may be answered today and others another visit. You might have to read to find out an answer to your questions. You might look on the Internet or find a YouTube video answer. Some questions just can't be answered and that's okay.)

***Guided Practice*:**
For mirrors: Have children use mirrors to shine a small light on a surface. Then "trace" its path with yarn or measuring tools. Encourage children to talk to each other, collaborate, to make a plan. Do not show them how, but help as little as possible.
For temperature changes: Ask children to lay dark and light paper in direct sunlight and check how they feel in about 5-10 minutes. Have them shine sunlight on hands behind a partners back and describe how it feels.
For sunglass lenses: Have children put a half sheet of colorful construction paper or small piece of sunlight sensitive paper in direct sunlight and wait for 10 minutes or more. Have them try out another activity while time passes. After time has passed, have children feel the paper and set a thermometer on each paper to compare temperatures.

***Independent Practice*:**
For mirrors: Have children describe what they discovered about how light moves. Help guide children to notice that light travels in a straight line. Then have another set of partners join up, to make groups of four with two mirrors. Challenge the group to try to find a way light can "turn" or "go around a corner." Have children "trace" the path of light again.
For temperature changes: Have children describe what they discovered. Ask them to think about how the sun, so far away - almost 93 million miles!, can make us feel warm here on Earth. Ask, "Why would warm sunlight be important for living things on Earth?" Have children discuss. Lead and nudge, with questions and prompts, for children to talk about what would happen if there were no heat at all on Earth, no sunlight. What kinds of plants or animals need sunlight and why? {It's okay to directly state that plants use sunlight (water, clean air and vitamins from soil) to make their own food - they don't have a mouth - and both animals and people need plants for food.} How do humans need sunlight? If age appropriate, ask children how the heat from sunlight could help cause weather and fresh water rain.
For sunglass lenses: Have children describe what they discovered. Ask them why they think sunglasses can do this. Accept any answers. Show them a picture of sunglasses with UV (UVA/UVB) protection ratings. Explain that there is invisible ultraviolet radiation waves in sunlight that is what causes burns on your skin. Imagine getting sunburned in your eyes! Pause for reactions. Ask, why do people where sunglasses for safety? Encourage children to discuss so their eyes won't be damaged or burned. So they won't go blind. So they will have healthy eyes to see for their whole lives. Explain that sunglasses have both gray/brownish/amber-yellow colors in the plastic lenses but also other thin layers of plastic that block out the dangerous, invisible rays from the sun. Wear sunglasses when outside!

***Children answer questions posed as able or researched*:** Return to the large group meeting area. Have children answer questions they asked, as possible.

***Children Share/Present*:** Have children share what they observed and learned. Ask the Science Essential Question, again. Have children turn-and-tell-a-friend. If time, have partnerships share ideas, or some partnerships share their answers.

- Have everyone applaud for each presentation.

Science and technology concepts background information:
Notice how heating and cooling can cause changes in matter
Explore and describe how light as energy can cause changes
Explore temperature changes that occur from the result of the addition or removal of heat energy
Recognize that light from the sun provides energy for living things on Earth to survive (heat, weather/water cycle for fresh water and plant growth for food)
Technology can support and improve quality of life

***Have follow-up books available for the science topics and concepts about sunlight and its role for life on Earth.**

Developed by: Original idea shared by Meredith Fraysure, Literacy Coalition of Palm Beach County: Boynton Beach, FL. "Stories and STEM: Integrating Literacy and STEM in Early Childhood." NSTA STEM Forum & EXPO. Summer 2017.

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