SUN BLOCKER

TEACHER GUIDE

WONDER

PLANNING

Here's a suggested schedule for this kit! The activities should be completed in order, but you can choose when the lessons take place over time.

ACTIVITY INFORMATION	SECTION (S)	TIME REQUIRED	DAY/ LESSON
ACTIVITY 1: MAKING SUN ART Using only light from the sun, print a design on special paper. **Time required: 45 min**	☐ Use the Sun to "Draw"	45 minutes	Day 1
ACTIVITY 2: SUN BASICS Find out what the sun is, what it's made of, and how it provides the earth with light and heat. **Time required: 1 h 45 min**	☐ What Is the Sun, Really?	30 minutes	Day 2
	☐ The Sun Is Helpful ☐ The Sun is Harmful	45 minutes	Day 3
	☐ Show What you Know	30 minutes	Day 4
ACTIVITY 3: MELTING MAYHEM Do an experiment to find out how different surfaces heat up from the sun at different rates. **Time required: 1 h 30 m**	☐ Read		

THINK ABOUT IT!

Question 1: What made the design on the sunprint paper? How do you know?
Answer: The energy from the sun made the design (light is also correct).
How to Help: *The parts of the paper that were in the sun look different than the parts that were not in the sun. This must mean sunlight caused the design to appear.*

Question 2: What would happen if you put sunprint paper in the sun with nothing on top of it? Why?
Answer: The entire paper would turn white in the sun, then blue after rinsing.
How to Help: *Remind the student what happened to the parts that were exposed to the sun. Any areas exposed to the sun, even if they make up the whole paper, would turn white in the sun and then blue in water.*

Question 3: What would happen if you put sunprint paper in the sun with clay covering the entire paper? Why?
Answer: The entire paper would stay blue when covered and put in the sun, and then colorless or white after rinsing.
How to Help: *Remind the student what happened to the parts that were not exposed to the sun. Any areas not exposed to sunlight, even if they make up the whole paper, would stay blue when shielded from sunlight, and then colorless/white when rinsed with water.*

2 SUN BASICS

In this reading and writing section, your student will find out what the sun is, what it's made of, and how it provides the earth with light and heat.

activity 2

LEARNING GOALS:
I can observe what happens when sunlight reaches Earth's surface.

WHAT IS THE SUN, REALLY?

The Sun and You
• Your student will start by responding to prompts that will help them activate their prior knowledge about the sun.
• There are no right or wrong answers in this first part. Just make sure that they are being thorough and are taking it seriously.
• It's important that they answer these questions so they can feel like the sun is relevant to them.

Questions:
What do you know about the sun? Write or draw 3 or more things.
Write about a time when the sun was helpful to you.
Write about a time when the sun was harmful to you.
What do you think is the best thing about the sun?
What do you think is the worst thing about the sun?
What are some things you want to know about the sun? Write 3 or more questions.
Answer:
• Answers will vary and will depend on the student's personal experiences.
How to Help: *You can remind them of their experiences with the sun, or ask them about situations where they would have been likely to have an experience with the sun (like asking if they have ever been to the beach or seen a solar cell).*

THINK ABOUT IT!

Question: What would happen if we no longer could get light energy from the sun?
Answer: Answers will vary, but may include ideas that plants would not grow, it would be hard to see, or we wouldn't be able to use solar energy cells.
How to Help: *Point the student to the text and to examples in everyday life to remind them of the ways Earth and the living things on it use sunlight.*

Helpful Thermal Energy
• This part discusses how solar radiation changes to thermal energy (including a definition of thermal energy). Temperature is also defined.
• The greenhouse effect is explained but not named, and the student learns its importance in allowing for life on Earth.
• A data table showing how the distance from the sun compares to average temperatures for the planets is shown.
• A diagram of Earth's unequal heating based on angle of sunlight is shown to explain why the equator is warmer than the poles.
• The reason for ocean and wind currents is provided (unequal heating by the sun); however, the Coriolis Effect (the effect of Earth's rotation on wind and water) is not discussed.

THINK ABOUT IT!

Question: What have you done, or what have you seen or heard other people do, to use thermal energy from the sun?
Answer: Answers will vary based on personal experiences.
How to Help:
• People use thermal energy to warm things up (like buildings), to travel by sea, and to affect weather and climate.
• We often don't think about how important the sun's warmth is, but without it, water would freeze and living things wouldn't survive.

4 THE SUN IS HARMFUL

Think About Thermal Energy
• Your student was just thinking about what would happen without thermal energy from solar radiation. In this section, they will consider what happens if there is too much thermal energy.
• If the air is too warm, this could affect the survival of living things, including humans. Humans in many places on Earth struggle with too-warm temperatures.
• Emphasize that the amount of thermal energy Earth experiences is not a result of changing amounts of energy from the sun, but from changing amounts of energy bouncing off the Earth and getting trapped by the atmosphere.

Hidden Harmful Energy
• The student is reminded that radiation from the sun has light energy, infrared energy, and ultraviolet (UV) energy.
• The dangers of UV energy are outlined, and the ozone layer is shown using a map.

Wacky Weather
• Extreme weather is mentioned as a possible consequence of unequal heating by the sun.
• Students should understand that unequal heating by the sun can be good or bad depending on the extremes of the variation and the ability to predict changes.

WONDER

SCIENCE UNLOCKED

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Kit	SU-SUNBLK
Instructions	IN-SUNBLKT
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