UV DEFENDER

TEACHER GUIDE

LAUNCH

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: COMING INTO COLOR Explore light outside the visible spectrum. Total time: 1 h	☐ Location, Location, Location	60 minutes	Day 1
ACTIVITY 2: DOES IT REALLY PROVIDE PROTECTION? Test methods of protection to determine how to protect yourself from UV radiation. Total time: 3 h 30 min	☐ Skin Protection	45 minutes	Day 2
	☐ The Impact of Radiant Energy	45 minutes	Day 3
	☐ Don't Look at the Sun!	45 minutes	Day 4
	☐ Why Things Work	45 minutes	Day 5
	☐ Show What You Know	30 minutes	Day 6
ACTIVITY 3: THE DUAL NATURE OF LIGHT Explore light as both a wave and a particle. Total time: 2 h	☐ Double-s…		Day 7
	☐		
ACTIVITY 4: SANITIZING WI…			

15+ hours

activity 2

DOES IT REALLY PROVIDE PROTECTION?

In Activity 1, your student likely observed that beads changed color when they were placed in light but didn't when they were in the dark. Depending on how and where they conducted the experiment, they may have noticed that the biggest changes occurred when the beads were exposed to sunlight. What is it about sunlight that causes a color change? Let's find out!

LEARNING GOALS:

- **I can use mathematics to show the relationships between frequency, wavelength, and speed of waves.**
- **I can use evidence to evaluate claims about the effects of different types of electromagnetic radiation when being absorbed by matter.**

2 SKIN PROTECTION

☑ PREPARATION AND SUPERVISION

- Help your student to coat all beads evenly with both sunscreens. Make sure they do not glob on the sunscreen; it should be applied evenly.

MULTIPLE AGES AND ABILITIES:

If your student struggles with dexterity, they may struggle to effectively coat the beads. You can either encourage them to advocate for the assistance they need, or use hand over hand assistance so they can still fully participate in this experiment.

THINK ABOUT IT!

? Question 1: Which sets of beads changed color, and how much did they change color? Include intensity information from the bead color spectrum sheet.

Answer: The beads without sunscreen changed to the darkest color possible because they had the greatest intensity of UV radiation hitting them. The beads with the sunscreen may or may not have changed color slightly, but if so, the color change was significantly reduced indicating that they were hit with less UV radiation.

How to Help: *The sunscreen you provide may demonstrate different results than the sunscreen provided in the kit. However, it should result in a lesser color change than the beads without any sunscreen on them.*

Question 2: Solve for the missing variable.
a. Frequency of 20.7 Hz and a wavelength of 12.0 m.
Answer: 248.4 m•s
How to Help:

$$v=\lambda \cdot f$$
$$v=12.0\ m \cdot 20.7\ Hz$$
$$v=248.4\ m \cdot s$$

b. Frequency of 6.2 Hz and speed of 12.3 m•s.
Answer: 2.0 m
How to Help:

$$v=\lambda \cdot f$$
$$12.3\ m \cdot s=\lambda \cdot 6.2\ Hz$$
$$\lambda=(12.3\ m \cdot s)/(6.2\ Hz)$$
$$\lambda=1.984\ m$$
$$\lambda=2.0\ m$$

c. Speed of 7.3 m•s and a wavelength of 3.6 m.
Answer: 2.0 Hz
How to Help:

$$v=\lambda \cdot f$$
$$7.3\ m \cdot s=3.6\ m \cdot f$$
$$f=(7.3\ m \cdot s)/(3.6\ m)$$
$$f=2.028\ Hz$$
$$f=2.0\ Hz$$

6 SHOW WHAT YOU KNOW

Question 1: Indicate (1) a scenario in which the beads would change color, (2) a scenario in which the beads would not change color, and (3) explain why for each situation.
Answer:
• A scenario in which the bead would change color is would be when they are placed outside in sunlight.
  − The reason the beads change color in sunlight is because sunlight contains UV radiation. The beads are sensitive the UV radiation and change color only when exposed to it.
• A scenario in which the beads would not change color is if they were placed in a drawer.
  − There is no UV radiation in the drawer, so the beads are not going to react and change color.
How to Help:
• Your student may provide different scenarios so long as one provides UV radiation while the other doesn't. Additionally, they must indicate that the UV light is causing the beads to change color, not visible light.
• Note: Cloud cover does not remove UV light from impacting the beads if they are set outside. However, they do reduce infrared radiation (IR), which we feel as heat on our skin. Your student will learn more about IR in a future section.

LAUNCH

Science Unlocked

Contact us at: www.homesciencetools.com/customer-service/

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Kit	SU-UVDEFS
Instructions	IN-UVDEFNST
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