Stage Light Paths

Model how light interacts with set materials

MS-PS4-2 "Develop and use a model to describe how waves are reflected, absorbed, or transmitted through various materials. (SEP:2; DCI: PS4.A, PS4.B; CCC: Structure and Function)"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the four tested materials. Circle the words that tell how light travels or where its energy goes when it reaches each material.

Testing the Stage Set

1. At a school play, the crew tests a flashlight against materials for a set. The beam is light, a wave that carries energy. To plan the set, they use a model: arrows show the direction light travels before and after it reaches a surface. An arrow that turns back represents reflected light. An arrow that continues through represents transmitted light. If light is absorbed, its energy goes into the material, often warming it slightly. A model can show several paths at once.

2. First, the crew holds a clear plastic sheet in front of the flashlight. Most of the light passes through, so an actor behind it can see the beam. A small amount bounces off its front surface. Next, they test a smooth foil panel. Much of the light bounces back from the foil, and very little passes through the metal. Finally, they test thick black felt. It absorbs much of the light and may warm slightly; only a small amount of light bounces back, and almost none passes through.

3. The crew also tries a thin white fabric screen. Some light reflects from it, but much of the light passes through and spreads in many directions. An actor behind the screen sees a broad glow instead of a sharp bright spot. The screen does not act like clear plastic, which lets light travel through with less spreading. No tested material sends every bit of light down just one path. In a useful arrow model, thicker arrows can stand for larger amounts of light, while thin arrows stand for smaller amounts.

2 ANSWER WITH EVIDENCE

Use the passage

1. How would you use thick and thin arrows to model light hitting the clear plastic sheet?

2. Compare an arrow model of the foil panel with one of the black felt. Where does most of the light go at each material?

3. How would the arrows passing through the fabric screen differ from arrows passing through clear plastic? Explain what an actor behind each material would see.

4. A flashlight shines through the fabric screen onto black felt. Describe an arrow model showing what happens at both materials.

3 YOUR TURN

Your own words

Draw and label a model of a flashlight shining through a clear plastic sheet onto a foil panel. Show light passing through or reflecting at each material, then write one sentence explaining the main path.

ANSWER KEY

Stage Light Paths

GRADES 6-8 · MS-PS4-2

PART 1 · READ AND MARK

Underline the four tested materials. Circle the words that tell how light travels or where its energy goes when it reaches each material. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How would you use thick and thin arrows to model light hitting the clear plastic sheet?	**Draw a thick arrow passing through the sheet and a thin arrow turning back from its front surface.**
2	Compare an arrow model of the foil panel with one of the black felt. Where does most of the light go at each material?	**At the foil, a thick arrow turns back to show reflection. At the felt, most light is absorbed, transferring energy to the felt; only a thin arrow turns back.**
3	How would the arrows passing through the fabric screen differ from arrows passing through clear plastic? Explain what an actor behind each material would see.	**Draw arrows spreading in many directions after the fabric, but continuing with less spreading after the plastic. The actor sees a broad glow through the fabric and a clearer beam through the plastic.**
4	A flashlight shines through the fabric screen onto black felt. Describe an arrow model showing what happens at both materials.	**At the screen, arrows pass through and spread out, while some turn back. At the felt, most incoming light is absorbed, with only a small amount reflected.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Drawing: A thick arrow passes through the labeled plastic sheet toward the labeled foil panel, and a thin arrow turns back from the plastic. At the foil, a thick arrow turns back and passes through the plastic toward the flashlight. Sentence: Much of the light crosses the plastic, reflects from the foil, and crosses the plastic again.

Accept models that show relative amounts without exact numbers. Students may show additional small reflected or absorbed portions if their arrows remain consistent with the passage.