



ACTIVITY

Create an Umbra and Penumbra

SUPPLY LIST

- Dark room
- Small ball (like a ping-pong ball, golf ball, etc.)
- String
- Tape
- Lamp
- Small portable white surface (piece of paper, small white board, etc.)

INSTRUCTIONS

1. Go into a dark area. Tape the string to the ball and the other end of the string to the ceiling, or the top of a door frame, or anywhere that allows the ball to hang in mid-air without support.
2. Turn on the lamp, remove the shade, and place the light from the lamp on the same level as the ball, about 2 feet away.
3. Place the white surface about 6 inches from the ball in line with the light. Notice the shadow of the ball on the surface is crisp and easy to see.
4. Move the white surface away from the ball slowly until it is about 2-4 feet away. You'll start to notice the edges of the shadow become blurred.
5. That blurred area of the ball's shadow is the penumbra. This is the area of the shadow where some of the bulb's light is blocked, but not all of it. The area in the middle of the shadow is the umbra, where all of the light is blocked.
6. Notice the further away the surface is, the bigger the penumbra is.