

Diffraction in Action [Activity]

Light wave interference is simplest when it results from monochromatic light passing through a pair of thin slits. In this activity, students observe single-slit diffraction patterns, which are still the result of light wave interference. The bright areas of the fringe patterns still arise due to constructive interference and dark zones are still the result of destructive interference.

Answers to Procedure Questions

Question 1. The dandelion of light is in your eye. Rotating the point source has no effect on the dandelion, but rotating your head causes the dandelion to rotate the same way.

Step 2. A pattern of light and dark zones appears to the left and right of the point source.

Step 3. The pattern gets wider (more spread out) as the gap gets narrower.

Step 4. Bands of color appear to the left and right of the point source.

Question 2. From least diffracted to most diffracted: violet, blue, green, yellow, orange, red.

Step 5. Images of the CFL appear to the left and right of the actual CFL. The images are in different colors from one another.

Going Further. The LED light is like the CFL; it produces distinct dots of color instead of a continuous spectrum of colors.

Answers to Summing Up Questions

1. As the wavelength of light increases, the amount of diffraction it undergoes decreases. The longest wavelengths (red) diffract the most; the shortest wavelengths (violet) diffract the least.

2. A fluorescent light produces distinct bands of color; an incandescent light produces a smooth, continuous spectrum of colors.
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