BitWith Bite

PHYSICS WORKSHEET

Diffraction

Chapter: Waves · Level ★★☆ · Time: 30 min

SCORE ___ / 20

Name _____ Class _____ Date _____

AFTER THIS WORKSHEET YOU CAN

- ✓ Understand: What is Diffraction?
- ✓ Understand: Diffraction and Wavelength
- ✓ Understand: Single-Slit Diffraction Pattern
- ✓ Understand: Why We Can Hear Around Corners but Not See Around Them

Section A · Concept Check

• BEGINNER 4 × 1 = 4

1 Why do radio waves (long wavelength) diffract around hills and buildings more easily than WiFi signals (shorter wavelength)?

2 Why does a doorway act as a 'slit' for sound diffraction, letting sound spread out into an adjacent room?

3 What happens to a single-slit diffraction pattern's spread if the slit is made narrower?

4 Why is diffraction considered strong evidence for the wave nature of light?

Section B · Problem Solving

• INTERMEDIATE 4 × 3 = 12

5 Why can you sometimes see a colorful spread of light when looking at a CD or DVD surface at an angle?

6 Would X-rays (very short wavelength) diffract more or less than visible light when passing through the same-sized slit?

7 Why is diffraction typically not very noticeable for visible light passing through a normal doorway?

8 What does a diffraction grating allow scientists to determine about a light source?

Section C · Challenge

• CHALLENGE 2 × 2 = 4

9 Why does diffraction limit the smallest details a microscope using visible light can resolve?

10 Why might engineers use diffraction principles when designing antennas for specific radio frequencies?

Reflection — the most useful thing I learned:

A ___/4 B ___/12 C ___/4 **Total ___/20**

Teacher's Signature

Parent's Signature

✂ ANSWER KEY — FOLD OR CUT BEFORE HANDING OUT

1 = Longer-wavelength radio waves diffract more readily around obstacles comparable in size to or smaller than their wavelength 2 = The doorway's width is comparable to typical sound wavelengths, causing noticeable diffraction as sound passes through 3 = The pattern spreads out more (wider central band and fringes) 4 = Diffraction (bending around obstacles/through slits) is a distinctly wave-like behavior that simple particle models don't naturally predict | 5 = The closely spaced grooves on the disc act like a diffraction grating, splitting light into its component colors (wavelengths) 6 = Less, since X-rays have an even shorter wavelength relative to the slit size 7 = The doorway is vastly larger than the wavelength of visible light, so diffraction effects are minimal in that situation 8 = Its precise wavelength composition (spectrum), useful for identifying elements or materials | 9 = Light diffracts around structures comparable to or smaller than its wavelength, blurring extremely fine details below that scale 10 = Antenna size relative to the radio wave's wavelength affects how the signal diffracts and propagates, which is critical for effective transmission and reception