BitWith Bite

PHYSICS WORKSHEET

Interference

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

SCORE ___ / 20

Name _____ Class _____ Date _____

AFTER THIS WORKSHEET YOU CAN

- ✓ Understand: The Principle of Superposition
- ✓ Understand: Constructive Interference
- ✓ Understand: Destructive Interference
- ✓ Understand: Path Difference and Interference Type

Section A · Concept Check • BEGINNER 4 × 1 = 4

1. Two waves with amplitude 3 and amplitude 5 meet perfectly in phase. Find the resulting amplitude.

2. Two waves with amplitude 5 and amplitude 5 meet perfectly out of phase. Find the resulting amplitude.

3. Two waves with amplitude 7 and amplitude 3 meet perfectly out of phase. Find the resulting amplitude.

4. What produces the bright and dark bands (fringes) seen in Young's double-slit experiment?

Section B · Problem Solving • INTERMEDIATE 4 × 3 = 12

5. Why do noise-canceling headphones work best for consistent, low-frequency background noise (like engine hum) rather than sudden sharp sounds?

6. Two identical light waves from different paths arrive at a screen with a path difference equal to exactly one wavelength. Is this constructive or destructive interference?

7. Two identical light waves arrive with a path difference of exactly half a wavelength. Is this constructive or destructive interference?

8. Why does interference provide strong evidence that light behaves as a wave?

Section C · Challenge • CHALLENGE 2 × 2 = 4

9. If two speakers play the same tone perfectly in sync, why might you hear louder and quieter spots as you walk around a room?

10. What does the 'principle of superposition' fundamentally state about overlapping waves?

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 = 8 (3+5, constructive interference) 2 = 0 (5-5, complete destructive interference) 3 = 4 (7-3, partial destructive interference) 4 = Alternating regions of constructive interference (bright) and destructive interference (dark) | 5 = Consistent, predictable waveforms are easier to detect and invert accurately in real time, allowing more effective destructive interference 6 = Constructive (a whole-wavelength path difference keeps the waves in phase) 7 = Destructive (a half-wavelength difference puts the waves out of phase) 8 = Interference patterns (constructive and destructive combination) are a defining, unique behavior of waves, not something particles alone would produce | 9 = Constructive and destructive interference occur at different locations depending on the path difference from each speaker to your ear 10 = Their displacements simply add together algebraically at every point of overlap