

interference - practice problems

1. Two small pulses travel toward each other on the same rope. For a moment they occupy the same section of rope, and then each pulse continues on. Why is this different from two carts colliding on a track?

2. At a crowded surf spot, an incoming ocean wave reflects from a wall and overlaps with the next incoming wave. In one place the water suddenly rises higher than either wave by itself. What kind of interference is happening there?

3. Noise-canceling headphones play a sound wave that is carefully timed against the outside noise. What has to be true about the headphone wave near your ear for the outside sound to get quieter?

4. A piano plays several notes at the same time. Your ear receives one combined pressure wave, but you can still hear separate pitches inside the chord. How does this connect to superposition?

5. Two musicians are tuning together. Their notes are close but not exactly the same, and they hear the loudness slowly pulse louder and softer. What wave pattern are they hearing, and what should happen as the tuning improves?

6. You can hear someone talking around a hallway corner even when you cannot see them. Which wave property makes this possible, and why does it work better for sound than for a narrow beam of light?

7. In a double-slit experiment, two openings act like two wave sources. Why does the screen show alternating bright and dark bands instead of just two bright spots behind the openings?

8. An ambulance siren sounds higher pitched as it drives toward you and lower pitched after it passes you. What is changing at your ear, and what is the name of this effect?

9. A distant galaxy has spectral lines shifted toward the red side of the spectrum. What does that redshift suggest about the galaxy's motion relative to us?

10. A child on a swing moves much higher when pushed at just the right time, even if each push is gentle. Why is this an example of resonance?

11. A guitar string is fixed at both ends. When it is played at certain frequencies, some points on the string barely move while other points move a lot. What are those two kinds of points called, and why do they appear?