

General

1. What type of waves do not need a medium to travel through?
(Electromagnetic waves)
2. What is the difference between transverse and longitudinal waves?
(Transverse waves oscillate perpendicular to the direction that the wave is moving, while longitudinal waves oscillate parallel to the wave's direction.)
3. What is the principle of superposition?
(The result of multiple waves interfering is the sum of each individual wave)
4. How are standing waves created?
(Identical waves traveling in opposite directions)
5. Noise-canceling headphones reduce certain noises by emitting sound waves that are out of phase with those noises. What type of interference is this?
(Destructive interference)
6. A wave has a period of 40 ms. What is its frequency, in hertz?
(250 Hz)
7. A wave is traveling at 48 m/s, and has a wavelength of 1.5 m. What is its frequency, in hertz?
(32 Hz)
8. What is $\sin \pi$?
(0)
9. Know the definition of frequency (number of waves per second)
10. Know the definition of period (number of seconds per wave)
11. What is the relationship between wavelength and frequency of a wave (inverse)
12. What is Huygens' Principle? (Every point on a wavefront is a source of waves itself)

Sound Waves

1. What is the speed of sound in air?
(343 m/s)
2. How is the amplitude of a sound wave in air measured?
(maximum pressure or displacement)
3. What property of a sound wave determines pitch?
(Frequency)
4. What property of a sound wave determines loudness?
(Amplitude)
5. What are nodes and antinodes in standing waves?
(Nodes are points where the wave has 0 amplitude, and antinodes are where the wave has maximum amplitude)
6. What are the three parts of the human ear?
(Inner ear, middle ear, and outer ear)
7. What is the beat frequency heard when a 300 Hz and 500 Hz are heard at the same time?

(200 Hz)

8. In a standing sound wave, what is the maximum displacement of particles at a point of maximum pressure amplitude?

(0; an antinode of pressure corresponds to a node of displacement)

9. What is the fundamental frequency of a string with length 40 cm, where waves on the string travel at 300 m/s?

(375 Hz)

10. What is the frequency of the third harmonic of the string in the previous question?

(1125 Hz)

11. What is the fundamental frequency of an air column, closed at one end, with a length of 80 cm?

(107.2 Hz)

12. What is the frequency of the first overtone of the air column in the previous question?

(321.6 Hz)

13. If you are moving towards a stationary source of sound, will you hear a higher or lower frequency than the actual frequency of the sound?

(higher)

Light Waves

1. What is light an oscillation of?

(Electric and magnetic fields)

2. What is the speed of light in a vacuum?

(300,000,000 m/s)

3. What is the angle of incidence when light hits a surface?

(The angle the light makes with the normal, which is the line perpendicular to the surface)

4. What is the angle of reflection equal to?

(The angle of incidence)

5. What does the angle of refraction depend on?

(Angle of incidence, and speeds of light in each medium)

6. How is the index of refraction of a medium calculated?

(The speed of light in a vacuum divided by the speed of light in that medium)

7. What is the angle of refraction of light traveling from a vacuum into a substance that has a refractive index of 1.5, if the angle of incidence is 40 degrees?

(25.4 degrees)

8. What is the difference between a real and virtual image?

(A real image occurs when the light rays from an object intersect at a point, while a virtual image occurs when the light rays seem to intersect, but don't)

9. Does a plane mirror create real or virtual images?

(virtual)

10. When does a convex lens create real images, and when does it create virtual images?

(A convex lens creates real images when the object is outside the focal length, and virtual images when the object is inside the focal length)

11. How does the diffraction of light through multiple slits create bright and dark fringes?

(The distance between each slit and a certain point is different, so constructive and destructive interference occurs at different angles)