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Physics Grade 10 — Chapter 3

Waves

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Independent practice MCQs from the supplied Class 10 Physics DeepSeek notes PDF. Total: 47 questions.

A. Important / Main Topics

1. A wave is a disturbance that transfers:

(A) Energy
(B) Matter
(C) Both matter and energy
(D) Neither matter nor energy

Correct Answer: A

Explanation: A wave is a disturbance that transfers Energy.

2. Which of the following waves requires a material medium to propagate?

(A) Light waves
(B) Sound waves
(C) Radio waves
(D) X-rays

Correct Answer: B

Explanation: Sound waves are mechanical waves and require a material medium.

3. Which of the following waves does NOT require a medium?

(A) Sound waves
(B) Water waves
(C) Electromagnetic waves
(D) Seismic waves

Correct Answer: C

Explanation: Electromagnetic waves can travel through a vacuum without a medium.

4. In a transverse wave, the particles of the medium oscillate:

(A) Parallel to the wave direction
(B) In a circular path
(C) In random directions
(D) Perpendicular to the wave direction

Correct Answer: D

Explanation: In a transverse wave, the particles of the medium oscillate Perpendicular to the wave direction.

5. In a longitudinal wave, the particles of the medium oscillate:

(A) Parallel to the wave direction
(B) Perpendicular to the wave direction
(C) In a circular path
(D) Not at all

Correct Answer: A

Explanation: In a longitudinal wave, the particles of the medium oscillate Parallel to the wave direction.

6. The distance between two successive crests of a wave is called:

(A) Amplitude
(B) Wavelength
(C) Frequency
(D) Time period

Correct Answer: B

Explanation: Wavelength is the distance between two successive crests or troughs.

7. The maximum displacement of a particle from its mean position is called:

(A) Displacement
(B) Wavelength
(C) Amplitude
(D) Wavefront

Correct Answer: C

Explanation: Amplitude is the maximum displacement from the mean position.

8. The number of wave cycles passing a point per second is called:

(A) Time period
(B) Wavelength
(C) Amplitude
(D) Frequency

Correct Answer: D

Explanation: Frequency is the number of cycles per second, measured in hertz.

9. The time required for one complete wave cycle to pass a point is called:

(A) Time period
(B) Frequency
(C) Amplitude
(D) Wavelength

Correct Answer: A

Explanation: Time period is the time for one complete cycle.

10. The lowest point of a wave is called:

(A) Crest
(B) Trough
(C) Amplitude
(D) Displacement

Correct Answer: B

Explanation: A trough is the minimum or lowest point in a wave cycle.

11. The locus of all points that vibrate in unison is called a:

(A) Crest
(B) Trough
(C) Wavefront
(D) Amplitude

Correct Answer: C

Explanation: A wavefront is the locus of points that vibrate in unison.

12. The unit of frequency is:

(A) Meter
(B) Second
(C) Newton
(D) Hertz

Correct Answer: D

Explanation: Frequency is measured in hertz (Hz), which is cycles per second.

13. Which type of wave is a sound wave?

(A) Longitudinal wave
(B) Transverse wave
(C) Electromagnetic wave
(D) Light wave

Correct Answer: A

Explanation: Sound waves are longitudinal; they consist of compressions and rarefactions.

14. When a stone is thrown into a pond, a floating cork bobs up and down as waves pass. This demonstrates that:

(A) Water moves with the wave
(B) Energy is transferred without net movement of water
(C) The cork is carried away by the wave
(D) Waves do not carry energy

Correct Answer: B

Explanation: When a stone is thrown into a pond, a floating cork bobs up and down as waves pass. This demonstrates that Energy is transferred without net movement of water.

15. Which of the following is an example of a longitudinal wave?

(A) Light wave
(B) Water wave
(C) Sound wave
(D) Rope wave

Correct Answer: C

Explanation: Sound waves are longitudinal; the other options are transverse.

16. Which of the following is an example of a transverse wave?

(A) Sound wave
(B) P-wave
(C) Compression wave
(D) Light wave

Correct Answer: D

Explanation: Light is an electromagnetic transverse wave.

17. If a wave has a frequency of 10 Hz, its time period is:

(A) 0.1 s
(B) 10 s
(C) 1 s
(D) 0.01 s

Correct Answer: A

Explanation: If a wave has a frequency of 10 Hz, its time period is 0.1 s.

18. When water waves travel from deep to shallow water:

(A) Speed increases, wavelength increases
(B) Speed decreases, wavelength decreases
(C) Speed decreases, wavelength increases
(D) Speed increases, wavelength decreases

Correct Answer: B

Explanation: When water waves travel from deep to shallow water Speed decreases, wavelength decreases.

19. The bouncing back of waves from a barrier is called: T = 1/f = 1/10 = 0.1 s

(A) Refraction
(B) Diffraction
(C) Reflection
(D) Interference

Correct Answer: C

Explanation: Reflection is the bouncing back of waves from a barrier.

20. The bending of waves due to a change in speed when entering a new medium is called:

(A) Reflection
(B) Diffraction
(C) Dispersion

(D) Refraction

Correct Answer: D

Explanation: Refraction is the bending of waves due to a change in speed.

21. The spreading out of waves through a narrow opening is called:

(A) Diffraction
(B) Reflection
(C) Refraction
(D) Interference

Correct Answer: A

Explanation: Diffraction is the spreading out of waves around obstacles or through openings.

22. Diffraction is greatest when the gap size is:

(A) Much larger than the wavelength
(B) Comparable to or smaller than the wavelength
(C) Equal to zero
(D) Much larger than the amplitude

Correct Answer: B

Explanation: Maximum diffraction occurs when the gap size is similar to or smaller than the wavelength.

23. Which of the following waves diffracts more?

(A) A wave with a shorter wavelength
(B) A wave with a higher frequency
(C) A wave with a longer wavelength
(D) A wave with a smaller amplitude

Correct Answer: C

Explanation: A wave with a longer wavelength — this correctly answers the question.

B. Less Important / Secondary Topics

24. During refraction, which quantity remains constant?

(A) Frequency
(B) Speed
(C) Wavelength
(D) Direction

Correct Answer: A

Explanation: Frequency is determined by the source and remains constant during refraction.

25. The ripple tank is used to study:

(A) Only reflection
(B) Reflection, refraction, and diffraction
(C) Only refraction
(D) Only diffraction

Correct Answer: B

Explanation: The ripple tank is used to study all three wave behaviors.

26. Diffraction of waves does NOT change the:

(A) Direction of the wave
(B) Spread of the wave
(C) Wavelength and speed of the wave
(D) Shape of the wavefront

Correct Answer: C

Explanation: Diffraction of waves does NOT change the Wavelength and speed of the wave.

27. Why can sound be heard around corners more easily than light can be seen around corners?

(A) Sound travels faster than light

(B) Sound is a transverse wave
(C) Light is a longitudinal wave
(D) Sound has a longer wavelength and diffracts more

Correct Answer: D

Explanation: Sound has a longer wavelength than light, so it diffracts more around obstacles.

28. Tsunamis are most commonly caused by:

(A) Underwater earthquakes
(B) Strong winds
(C) Heavy rainfall
(D) Tides

Correct Answer: A

Explanation: Underwater earthquakes are the most common cause of tsunamis.

29. In deep water, tsunami waves are:

(A) Very tall and slow
(B) Low in height and fast
(C) Tall and fast
(D) Low in height and slow

Correct Answer: B

Explanation: In deep water, tsunamis are fast (500–800 km/h) but not very high.

30. As a tsunami approaches the shore, its speed:

(A) Increases and height decreases
(B) Remains the same
(C) Decreases and height increases
(D) Decreases and height decreases

Correct Answer: C

Explanation: As a tsunami approaches the shore, its speed Decreases and height increases.

31. The largest recorded tsunami wave occurred at:

(A) Indian Ocean
(B) Japan
(C) Hawaii
(D) Lituya Bay, Alaska

Correct Answer: D

Explanation: The largest recorded tsunami wave occurred at Lituya Bay, Alaska.

32. Which of the following is NOT a cause of tsunamis?

(A) Strong winds
(B) Underwater earthquakes
(C) Volcanic eruptions
(D) Underwater landslides

Correct Answer: A

Explanation: Strong winds — this correctly answers the question.

33. A tsunami is:

(A) A single giant wave
(B) A series of large ocean waves
(C) A type of tide
(D) A wind-driven wave

Correct Answer: B

Explanation: A tsunami is a series of waves, not a single wave.

34. An athlete moves one end of a rope up and down with a speed of 2.5 m/s, producing oscillations of wavelength 0.5 m. Calculate the frequency of waves generated in the rope.

(A) 2.5 Hz
(B) 10 Hz
(C) 5 Hz
(D) 1.25 Hz

Correct Answer: C

Explanation: "5 Hz" is correct: it matches the idea asked in the question ("An athlete moves one end of a rope up and down with a speed of 2.5 m/s, producing oscillations of wavelength 0.5 m. Calculate the frequency of waves generated in the rope"), while the other choices do not.

35. Find the wavelength of the lowest frequency sound that humans can hear (20 Hz), travelling at 343 m/s in air.

(A) 8.575 m
(B) 34.3 m
(C) 1.715 m
(D) 17.15 m

Correct Answer: D

Explanation: "17.15 m" is correct: it matches the idea asked in the question ("Find the wavelength of the lowest frequency sound that humans can hear (20 Hz), travelling at 343 m/s in air"), while the other choices do not.

36. Find the wavelength of the highest frequency sound that humans can hear (20,000 Hz), travelling at 343 m/s in air.

(A) 0.017 m
(B) 0.034 m
(C) 0.0085 m
(D) 0.17 m

Correct Answer: A

Explanation: "0.017 m" is correct: it matches the idea asked in the question ("Find the wavelength of the highest frequency sound that humans can hear (20,000 Hz), travelling at 343 m/s in air"), while the other choices do not.

37. If 10 waves are produced on a long-stretched string of length 20 m, what is the wavelength of the waves?

(A) 1 m
(B) 2 m
(C) 4 m
(D) 0.5 m f = v/λ = 2.5/0.5 = 5 Hz λ = v/f = 343/20 = 17.15 m λ = v/f = 343/20,000 = 0.017 m

Correct Answer: B

Explanation: 2 m — this correctly answers the question.

38. If 10 waves are produced on a 20 m string and the speed of waves is 12 m/s, what is the frequency?

(A) 12 Hz
(B) 3 Hz
(C) 6 Hz
(D) 24 Hz

Correct Answer: C

Explanation: 6 Hz — this correctly answers the question.

39. In a ripple tank of length 1.5 m, waves cover this length in 2 seconds. If the distance between two successive crest and trough is 10 cm, find the number of waves.

(A) 15 waves
(B) 3.75 waves
(C) 1.5 waves
(D) 7.5 waves

Correct Answer: D

Explanation: Distance between crest and trough = half wavelength = 10 cm, so . Number of waves =.

40. A wooden bar vibrating into the water surface in a ripple tank has a frequency of 12 Hz. The resulting wave has a wavelength of 3 cm. What is the speed of the wave?

(A) 0.36 m/s
(B) 36 m/s
(C) 4 m/s
(D) 0.04 m/s

Correct Answer: A

Explanation: 0.36 m/s — this correctly answers the question.

41. What is the wavelength of radio waves transmitted by an FM station at 90 MHz? λ = length/number of waves = 20/10 = 2 m λ = 2 m f = v/λ = 12/2 = 6 Hz λ = 20 cm = 0.2 m 1.5/0.2 = 7.5 v = fλ = (12)(0.03) = 0.36 m/s

(A) 33.3 m
(B) 3.33 m
(C) 0.333 m
(D) 333 m

Correct Answer: B

Explanation: "3.33 m" is correct: it matches the idea asked in the question ("What is the wavelength of radio waves transmitted by an FM station at 90 MHz? λ = length/number of waves = 20/10 = 2 m λ = 2 m f = v/λ = 12/2 = 6 Hz λ = 20 cm = 0.2 m 1.5/0.2 = 7.5 v = fλ = (12)(0.03) = 0.36 m/s"), while the other choices do not.

42. Which of the following statements best explains why a tsunami wave grows taller near the coast?

(A) The water is warmer
(B) The wind pushes the waves higher
(C) Wave energy gets compressed in shallow water
(D) The Moon's gravity pulls the waves

Correct Answer: C

Explanation: In shallow water, the wave slows down and energy is compressed, increasing the height.

43. In the open ocean, a tsunami is hard to spot because:

(A) It is very tall
(B) It moves very slowly
(C) It is underwater
(D) It has a low height and long wavelength

Correct Answer: D

Explanation: In the open ocean, a tsunami is hard to spot because It has a low height and long wavelength.

44. What happens to the wavelength of a tsunami as it approaches the shore?

(A) It decreases
(B) It increases
(C) It remains the same
(D) It becomes zero

Correct Answer: A

Explanation: It decreases — this correctly answers the question.

45. Which of the following can trigger a tsunami?

(A) Underwater landslide
(B) All of the above
(C) Volcanic eruption
(D) Underwater earthquake

Correct Answer: B

Explanation: All of these can displace water and generate a tsunami.

46. Two students are talking in a corridor. You can hear them in your classroom but cannot see them. This is primarily due to:

(A) Reflection
(B) Refraction
(C) Diffraction
(D) Dispersion

Correct Answer: C

Explanation: Two students are talking in a corridor. You can hear them in your classroom but cannot see them. This is primarily due to Diffraction.

47. Listening to radio transmission in deep valleys of mountain areas is due to:

(A) Reflection of waves
(B) Refraction of waves
(C) Interference of waves
(D) Diffraction of waves

Correct Answer: D

Explanation: Listening to radio transmission in deep valleys of mountain areas is due to Diffraction of waves.