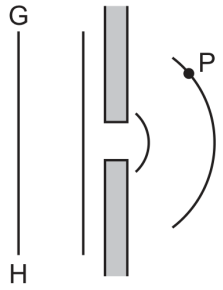
Unit 8: Superposition:

Subunit 8.2: Diffraction:

Topical Question No: 1

28 A monochromatic plane wave of speed c and wavelength λ is diffracted at a small aperture.

The diagram illustrates successive wavefronts.



After what time will some portion of the wavefront GH reach point P?

A $\frac{3\lambda}{2c}$ **B** $\frac{2\lambda}{c}$ **C** $\frac{3\lambda}{c}$ **D** $\frac{4\lambda}{c}$

Topical Question No: 2

29 Which statement gives a condition that enables diffraction to occur?

A A source of waves moves towards a stationary observer.

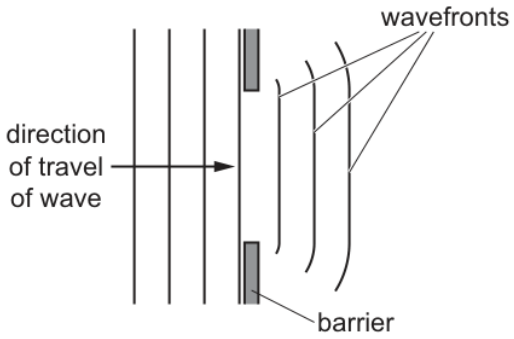
B A wave is partially blocked by an obstacle.

C Two coherent waves are superposed.

D Two waves of equal speed and frequency are travelling through the same part of a medium in opposite directions.

Topical Question No: 3

27 A water wave passes through a gap between two barriers. The wavefronts spread out as shown.



What is the name of this phenomenon?

A coherence

B diffraction

C interference

D superposition

Topical Question No: 4

27 A water wave is diffracted as it passes through a gap between two barriers in a ripple tank. The wave is observed to 'spread out' as it moves through the gap.

Which two factors both affect the amount of diffraction observed?

A the amplitude and frequency of the incident wave

B the amplitude of the incident wave and the width of the gap

C the wavelength and amplitude of the incident wave

D the wavelength of the incident wave and the width of the gap

Topical Question No: 5

23 Diagram 1 shows a ripple tank experiment in which plane waves are diffracted through a narrow slit in a metal sheet.

Diagram 2 shows the same tank with a slit of greater width.

In each case, the pattern of the waves incident on the slit and the emergent pattern are shown.

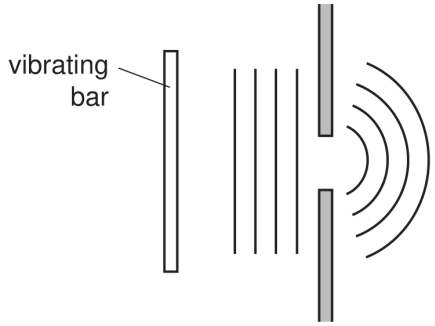


diagram 1

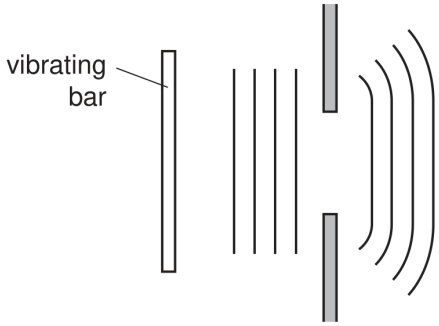


diagram 2

Which action would cause the waves in diagram 1 to be diffracted less and so produce an emergent pattern closer to that shown in diagram 2?

A increasing the frequency of vibration of the bar

B increasing the speed of the waves by making the water in the tank deeper

C reducing the amplitude of vibration of the bar

D reducing the length of the vibrating bar

Topical Question No: 6

26 Which statement is an example of the diffraction of light?

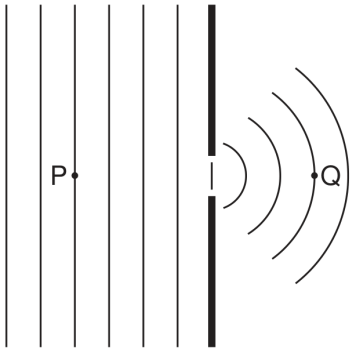
A the addition of the amplitudes of two beams of light which are in phase

B the change in direction of a beam of light when passing from air into water

C the separation of a beam of white light into a spectrum of colours using a prism

D the spreading of a beam of light as it passes through a small hole

28 Plane wavefronts in a ripple tank pass through a gap as shown.



Which property of the wave will be different at Q compared with P?

A velocity

B frequency

C amplitude

D wavelength

Space for working

Answer Key

1. N/A
2. N/A
3. B
4. D
5. N/A
6. N/A
7. N/A