Support Worksheet – Topic 4, Worksheet 4

1 State two differences between travelling and standing waves. [2]

2 Explain how a standing wave is formed. [2]

3 A string of length 1.5 m has both ends fixed. State the largest wavelength of a standing wave that can be formed on this string. [1]

4 A string has both ends fixed. Calculate the ratio of the frequencies of the second to the first (fundamental) harmonic. [2]

5 A pipe has one end closed and the other open. The length of the pipe is 0.75 m. State the wavelength of the fundamental standing wave that can be formed in the pipe. [1]

6 State what is meant by the **Doppler effect**. [2]

7 A source of sound is moving with constant velocity towards a stationary observer. Explain with the use of a wavefront diagram why the observer will observe a frequency higher than that emitted at the source. [2]

8 A source emitting sound of frequency f, is moving with constant velocity v towards a stationary observer. The speed of sound is c. State expressions, according to the stationary observer, for

   a the speed of sound. [1]

   b the wavelength of sound measured by the observer. [1]

9 A source of sound moves away from a stationary observer with a speed that is 1/10 of the speed of sound. The frequency of the sound emitted by the source is 4200 Hz as measured at the source. Determine the frequency observed by the observer. [2]

10 An observer approaches a stationary source of sound of frequency 680 Hz with a constant speed of 12 m s^{-1}. The speed of sound is 340 m s^{-1}. Calculate the frequency heard by the observer. [2]

11 State two practical applications of the Doppler effect. [2]

12 Sketch a graph to show how the intensity of light varies with diffraction angle when light is incident normally on a single slit. [3]

13 Waves of wavelength 2.4 cm are incident normally on a rectangular slit of width 4.0 cm. Calculate the angle at which the first diffraction minimum is observed. [1]

14 State what is meant by the **Rayleigh criterion**. [1]

15 Two objects are **just** resolved when viewed in blue light. State and explain whether the objects will be resolved in red light. [2]