

## **TUTORIAL QUESTIONS WAVES**

### **Question 1**

A sound wave of amplitude 0.20 mm has an intensity of  $3.0 \text{ Wm}^{-2}$ . What will be the intensity of a sound wave of the same frequency which has an amplitude of 0.40 mm?

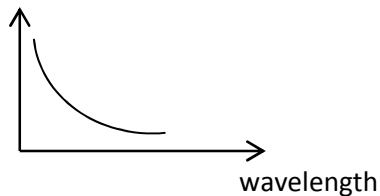
### **Question 2**

Which of the following quantities will decrease, increase or remain constant as the electromagnetic spectrum goes from infra-red to X-rays?

- a.) Frequency
- b.) Wavelength
- c.) Speed (in vacuum)

### **Question 3**

energy



The diagram shows the relationship between the energy of electromagnetic radiation and the wavelength of the waves. Which of the following has the lowest energy?

- a.) infra-red
- b.) microwaves
- c.) ultra-violet
- d.) X-rays

### **Question 4**

A point source emits energy equally in all directions at a constant rate and a person 8 m from the source listens. After a while, the intensity of the source is halved. If the person wishes the sound to seem as loud as before, how far should he be now from the source?

- a.)  $\sqrt{2}$  m
- b.)  $2\sqrt{2}$  m
- c.)  $3\sqrt{2}$  m
- d.)  $4\sqrt{2}$  m

### **Question 5**

A sound wave of frequency 400 Hz is travelling in a gas at a speed of  $320 \text{ ms}^{-1}$ . What is the phase difference between two points 0.2 m apart in the direction of travel?

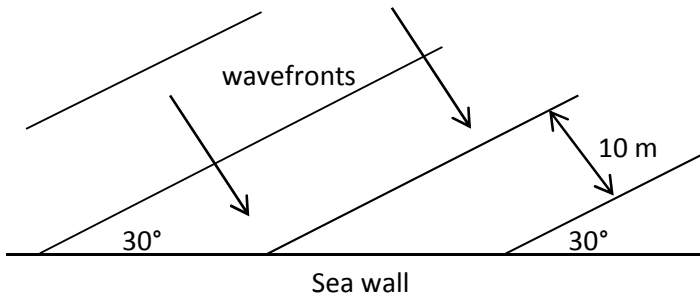
- a.)  $\pi/4$  rad
- b.)  $\pi/2$  rad
- c.)  $2\pi/5$  rad
- d.)  $4\pi/5$  rad

### **Question 6**

Data transmitted along the glass-fibre cables is in the form of pulses of monochromatic red light each of duration 2.5 ns. Which of the following is the best estimate of the number of wavelengths in each pulse?

- a.)  $10^3$
- b.)  $10^6$
- c.)  $10^9$
- d.)  $10^{12}$

### Question 7



Parallel water waves of wavelength 10 m strike a straight sea wall. The wavefronts make an angle of  $30^\circ$  with the wall as shown above. What is the phase difference at any instant between the waves at two points 5 m apart along the sea wall?

- a.)  $45^\circ$                                       b.)  $55^\circ$                                       c.)  $90^\circ$                                       d.)  $180^\circ$

### Question 8

Transverse progressive sinusoidal waves of wavelength  $\lambda$  are passing vertically along a horizontal rope. P and Q are points on the rope  $5\lambda / 4$  apart and the waves are travelling from P to Q. Which one of the following correctly describes Q at an instant when P is displaced upwards but is moving downwards?

	Displacement of Q	Movement of Q
a.)	Upwards	Downwards
b.)	Upwards	Upwards
c.)	Downwards	Upwards
d.)	Downwards	Downwards
e.)	Downwards	Stationary

### Question 9

A small source of sound radiates energy equally in all directions. At a particular frequency, the intensity of the sound at 1.0 m from the source is  $1.0 \times 10^{-5} \text{ W m}^{-2}$ , corresponding to an amplitude of oscillation of the air molecules of  $70 \times 10^{-6} \text{ m}$ . Assuming the sound propagates without energy loss, what will be

- a.) the intensity of the sound  
b.) the amplitude of oscillation of the air molecules, at a distance of 5.0 m from the source?

### Question 10

A point source of sound radiates energy equally in all directions. At a distance 3.0 m from the source, the amplitude of vibration of air molecules are  $1.0 \times 10^{-7} \text{ m}$ . Assuming that the sound propagates without energy loss, calculate the amplitude of vibration 5.0 m from the source.