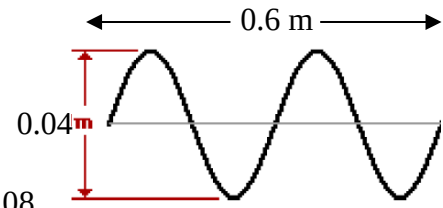


1- What is the amplitude of the wave in the diagram below in m?



- a) 0.03 m **b) 0.02 m** c) 0.04 d) 0.08

m

2- Referring Q.1, The wavelength of the wave in m is:

- a) 0.6 **b) 0.3** c) 62.8 d) 0.1

3- A wire of length 3 m and mass 120 g is under a tension of 100 N. What is the speed of a wave in this wire in m/s:

- a) 3 b) 84.5 **c) 50** d) 59.8

4- A block has temperature of -20°C . What is its temperature in the Kelvin?

- a) 303 **b) 253** c) 32 d) 293

5- A concrete section of a bridge has a length of 10 m at 20°C . By how much will the length of the section increase, in mm, if its temperature increases to 40°C ? (α of concrete = $2.5 \times 10^{-5} \text{ K}^{-1}$)

- a) 2.5 b) 7.5 **c) 5** d) 10

1) Two objects, A at 60°C and B at 63°C , are in contact. The heat will transfer from

Answer:

B to A

2) The pressure produced by a force of magnitude 2000 N acting on an area of 4 m^2 in Pa is

Answer:

$$p = \frac{F}{A} = \frac{2000}{4} = 500\text{Pa}$$

3) The force produces due to a pressure of magnitude 200 Pa acting on an area of 0.2 m^2 in N is

Answer:

$$F = p A = 200 (0.2) = 40\text{ N}$$

4) A solid has a mass of 0.5 kg and a volume of 2 cm^3 and, its density in kg/m^3 is

Answer:

$$\rho = \frac{m}{V} = \frac{0.5}{2 \times 10^{-6}} = 2.5 \times 10^5 \text{ kg} / \text{m}^3$$

5) A solid has a volume of 2 cm^3 and density of $2.5 \times 10^5 \text{ kg}/\text{m}^3$, its mass in kg is

Answer:

$$m = \rho V = 2.5 \times 10^5 \times 2 \times 10^{-6} = 0.5\text{kg}$$

6) If the pressure from water at a depth h is $19.6 \times 10^4 \text{ Pa}$ and the density of water is $10^3 \text{ kg}/\text{m}^3$, the depth h value will be in m is

Answer:

$$p = \rho gh$$

$$h = \frac{p}{\rho g} = \frac{19.6 \times 10^4}{10^3 \times 9.8} = 20\text{m}$$

7) Find the pressure on a scuba diver, in Pa, when he is 20 m below the surface of the ocean. Suppose the density of salt water is $1029 \text{ kg}/\text{m}^3$ and $P_0 = 1.013 \times 10^5 \text{ Pa}$.

Answer:

$$p = p_0 + \rho gh$$

$$p = 1.013 \times 10^5 + (1029 \times 9.8 \times 20)$$

$$p = 3.03 \times 10^5 \text{ Pa}$$

8) A wave on a string is given by $y(x, t) = (0.2 \text{ m}) \sin(40x - 800t + \pi/3)$, where y and x in m and t in s. The amplitude of the wave in m is

Answer:

$$A = 0.2 \text{ m}$$

9) Referring Q. 8, the angular frequency in rad/s is

Answer:

$$\omega = 800 \text{ rad / s}$$

10) Referring Q. 8, the wavelength in m is

Answer:

$$\lambda = \frac{2\pi}{K} = \frac{2(3.14)}{40} = 0.157 \text{ m}$$

11) Referring Q. 8, the period in s is

Answer:

$$T = \frac{2\pi}{\omega} = \frac{2(3.14)}{800} = 7.85 \times 10^{-3} \text{ s}$$

12) Referring Q.8, the velocity of the wave in m/s is

Answer:

$$v = \frac{\omega}{K} = \frac{800}{40} = 20 \text{ m / s}$$

13) Referring Q.8, the direction that wave traveling to

Answer:

positive x-axis

14) Referring Q. 8, the frequency for this wave Hz is

Answer:

$$f = \frac{\omega}{2\pi} = \frac{800}{2(3.14)} = 127.39 \text{ Hz}$$

15) Referring Q. 8, the phase difference of this wave is

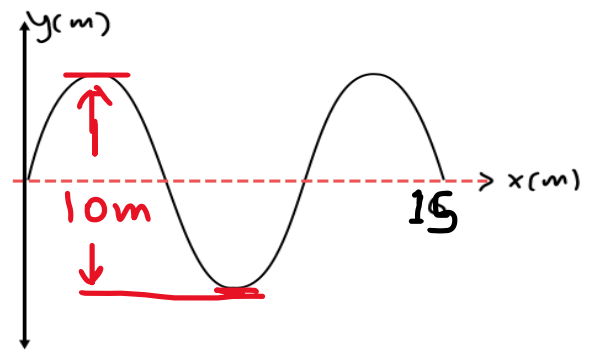
Answer:

$$\phi = \pi/3$$

16) The figure shows the wave in wire. Based on the figure, the wavelength in m is

Answer:

$$\lambda = \frac{15}{1.5} = 10\text{m}$$



17) Referring Q.16, The amplitude of the wave in m is

Answer:

$$A = 10 / 2 = 5 \text{ m}$$

18) A wire of length 6 m and mass 0.4 kg is under a tension of 500 N. What is the speed of a wave in this wire in m/s?

Answer:

$$v = \sqrt{\frac{TL}{m}} = \sqrt{\frac{500 \times 6}{0.4}} = 86.6 \text{ m/s}$$

19) If the wavelength of the source is 0.4 m and the frequency of the source is 50 Hz, then the speed of the source in m/s is

Answer:

$$v = \lambda f = 0.4 \times 50 = 20 \text{ m/s}$$

20) A block has a temperature of 40 C. What is the temperature in Kelvin?

Answer:

$$T(K) = T(C) + 273$$

$$T(K) = 40 + 273 = 313\text{K}$$

21) A block has a temperature of 41 F. What is its temperature in Celsius?

Answer:

$$T(C) = \frac{5}{9}(T(F) - 32)$$

$$T(C) = \frac{5}{9}(41 - 32) = 5\text{C}$$

22) A metallic wire that 5 m long at 20 °C is heated to 220 °C. Compute the length increase (ΔL) in m if $\alpha = 1.5 \times 10^{-5} \text{ K}^{-1}$

Answer:

$$\Delta L = \alpha L_0 \Delta T$$

$$\Delta L = (1.5 \times 10^{-5})(5)(220 - 20) = 0.015 \text{ m}$$

23) How much thermal energy is needed to raise the temperature of a 3 kg solid block from 60 °C to 180 °C in J if the specific heat $c_v = 390 \text{ J/(kg } ^\circ\text{C)}$

Answer:

$$Q = mc_v \Delta T$$

$$Q = 3 \times 390 \times (180 - 60) = 1.404 \times 10^5 \text{ J}$$

24) Referring Q.23, the heat capacity (in J/°C) is

Answer:

$$C = mc_v = 3 \times 390 = 1170 \text{ J / } ^\circ\text{C}$$

25) A 2.0 kg metal object with a temperature of 200 °C is submerged in 4.0 kg of liquid at 10 °C. Find the equilibrium temperature of the mixed system if $c_{\text{liquid}} = 4000 \text{ J/kg } ^\circ\text{C}$ and $c_{\text{metal}} = 400 \text{ J/kg } ^\circ\text{C}$

Answer:

$$c_{\text{metal}} m_{\text{metal}} (T_f - T_{0-\text{metal}}) = c_{\text{liquid}} m_{\text{liquid}} (T_{0-\text{liquid}} - T_f)$$

$$400(2)(T_f - 200) = 4000(4)(10 - T_f)$$

$$T_f - 200 = 200 - 20T_f$$

$$21T_f = 400$$

$$T_f = 19.05^\circ\text{C}$$

28) How much heat, Q in kJ, is required to convert 4 kg of ice (frozen water) at 0 °C to liquid at 0 °C if the latent heat of fusion of the ice is $L_f = 334 \text{ kJ/kg}$

Answer:

$$Q = m L_f = 1336 \text{ kJ}$$

29) The **transverse wave** is the wave that travels through a medium in the form of crests and troughs, while the **longitudinal wave** is the wave that travels through a medium in the form of compression and reflection.