

# Part 1) Chapter 1 , Reflection and Refraction.

$$N = 1$$

1- The frequency of the second hand is equal to

Ⓐ 1 Hz

Ⓑ 60 Hz

Ⓒ  $\frac{1}{360}$  Hz

Ⓓ  $\frac{1}{60}$  Hz

$$t = 60$$

$$v = \frac{N}{t}$$



2- The opposite figure shows the motion of an object in a circular pass, if the frequency of object is 50Hz. The time from point A to point C is .....

Ⓐ 0.02 s

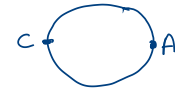
Ⓑ 0.01 s

Ⓒ 0.1 s

Ⓓ 0.2 s

$$N = \frac{1}{2}$$

$$T = \frac{1}{N} = \frac{1}{50} s$$



3- The product of the frequency and half the amplitude of the oscillation is ...

Ⓐ  $\frac{1}{2}$

Ⓑ  $\frac{1}{4}$

Ⓒ  $\frac{1}{8}$

Ⓓ 1

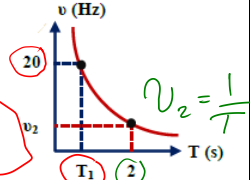
$$v \times \frac{A}{2}$$

4- The graph is a relation between the periodic time and the frequency of a vibrating object.

Find  $T_1$  and  $v_2$

$$\frac{1}{4A} \times \frac{A}{2}$$

$$T_1 = \frac{1}{20} s$$



5- A vibrating body whose frequency equal 9 times its periodic time, its periodic time = .....

Ⓐ  $\frac{1}{3}$

Ⓑ  $\frac{1}{9}$

Ⓒ  $\frac{1}{81}$

Ⓓ 1

$$v = 9T \quad \sqrt{T^2} = \sqrt{\frac{1}{9}} = \frac{1}{3}$$

6- Which of the following objects has the greatest periodic time?

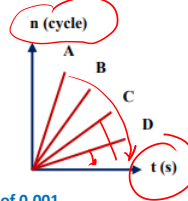
Ⓐ A

Ⓑ B

Ⓒ C

Ⓓ D

$$\theta_A \quad v \quad T$$



$$\text{Slope} = \frac{n}{t} = v$$

$$\text{Slope} = \tan \theta$$

$$\uparrow v = \tan \theta \uparrow$$

7- A string vibrates such that the maximum displacement it makes takes a time period of 0.001 seconds. calculate the frequency?

$$250 \text{ Hz} = v = \frac{1}{T} = \frac{1}{4 \times 0.001} \quad t_A = 0.001$$

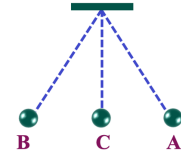
8- ( Test yourself واقفكر اني قولنك مستعجلش )

The opposite figure represents a simple pendulum moving in a vibrating motion with

a frequency of 1.25 Hz. The time taken by the body from (A) to (C) is equal to .....

(A) 0.25 ms (B) 20 ms (C) 200 ms (D) 100 ms

$$T = \frac{1}{1.25} = 0.8 s \times 10^3 = 800$$



$$\pm R = R, \theta$$

9-When a person listens to the radio sound, then: Mention the type of the received wave by the radio

Electro magnetic

The produced wave : Mechanical wave

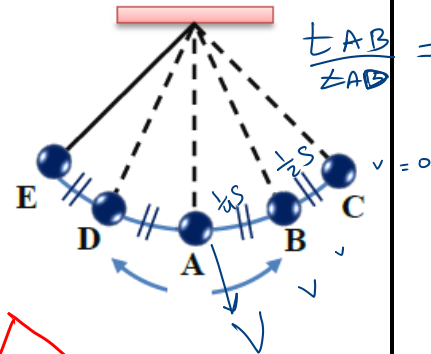
10- A simple pendulum oscillates passing through points A, B, C, D, and E as shown in the figure. The ratio of the time taken (BC) to the time taken (AB)

- (A) more than 1 (B) less than 1 (C) equal 1 (D) 0

$$\frac{t_{BC}}{t_{AB}} = \frac{1/2}{1/4} = \frac{1}{2}$$

$$x = \lambda \cdot N$$

$$\lambda = 6 \text{ cm}$$



11-If the distance between a successive crest and trough of a transverse wave is equal to 3 cm, so the distance between the first and sixth crests of this wave is equal to .....

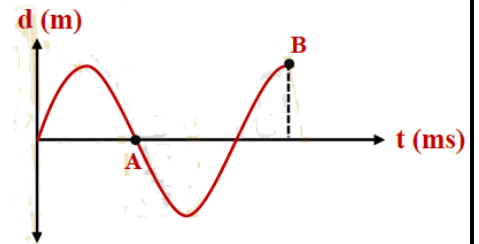
- (A) 18 cm (B) 30 cm (C) 36 cm (D) 15 cm

$$N = 5$$

$$\frac{x}{\lambda \cdot N}$$

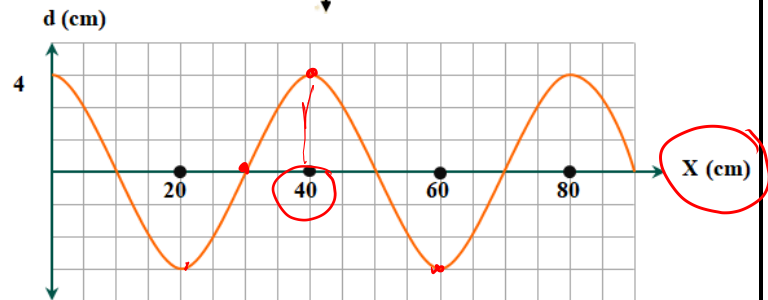
12- In the figure shown, the wave has a frequency of 50 Hz. The time required for the wave to pass through points A and B is .....

- (A) 25 ms (B) 30 ms (C) 15 ms (D) 20 ms



13- From the opposite diagram, calculate

- (a) The amplitude of this wave  
(b) The wavelength  
(c) The speed of wave propagation, if it has a frequency of 8 Hz.



14- Two sound waves (A and B) propagate through the air with frequencies of 512 Hz and 256 Hz, respectively. The wavelength of one wave increases by 30 cm from the wavelength of the other. Calculate the wavelength of wave B.

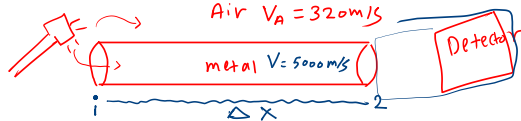
$$\lambda_2 = \lambda_1 + 0.3$$

15- If the ratio between the frequency of a man's voice and the frequency of a girl's voice is 3/4, then the ratio between the speed of the man's voice and the speed of the girl's voice in the air is equal to

- (A) 3/4 (B) 4/3 (C) 1/1 (D) 9/16

$$\frac{v_{\text{man}}}{v_{\text{girl}}} = \frac{3}{4}$$

$$\frac{dx}{v \cdot dt}$$



$$\Delta t = x \left( \frac{1}{v_1} - \frac{1}{v_2} \right)$$

slower      faster

$$\Delta t = 2 = t_{\text{air}} - t_{\text{metal}} = \frac{x}{v_A} - \frac{x}{v_{\text{metal}}} = x \left( \frac{1}{v_A} - \frac{1}{v_m} \right) = 2$$

16- A hammer strikes one end of a very long tube. There is a **detector** at the other end of the tube that picks up two sounds separated by a time period of 2 s. If the speed of sound in air is 320 m/s and the speed of sound in metal is 5000 m/s, then the length of the metal tube is.....

- (A) 177.78 m (B) 342.65 m (C) 490.24 (D) 683.76 m

H.W

17 (Essay) A fisherman noticed while fishing from a boat that there was a wave crest passing every 5s. He calculated the distance between the first crest and the second crest is 1.5m. He also calculated the vertical distance between the crest and the trough of the wave is 0.5m. Using this data, calculate

- (a) the periodic time (b) the frequency (c) the wavelength (d) the amplitude of this wave  
(e) the speed of wave propagation (5s - 0.2 Hz - 1.5m - 0.25m - 0.3m/s)

18) A light ray falls and makes an angle of 30° with the water surface, if the absolute refractive index of water is 1.33, hence the angle of refraction equals .....

$$\theta = 40 \quad n_w = 1.33 = \frac{\sin \theta_o}{\sin(\theta)}$$

19) **بدايتها متبشش نهايتها متخشرش** A glass slab of thickness 16 cm, a light ray fell on its upper surface with an angle of incidence equals 40°, if the absolute refractive index of the slab' glass equals 1.67 then, the angle of emergence of the light ray from the lower surface of the slab equals .....

$$n \quad n$$

20) When a light ray transfers from water to air then, Its velocity .....

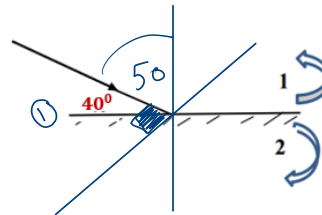
Wave length ..... , frequency ..... Constant

H.W

21) Two media A and B, if the velocity of light in the two media is  $2.5 \times 10^8$  m/s and  $2 \times 10^8$  m/s respectively and the angle of incidence in medium A equals 40° then the angle of refraction in medium B equals..... A) 56° B) 23° C) 31° D) 64°

22) In the opposite figure, what is the angle that the mirror rotates until the ray reflects on itself and determine the direction of rotation

- A) Angle of rotation 40° and in direction 1  
B) Angle of rotation 50° and in direction 1  
C) Angle of rotation 40° and in direction 2  
D) Angle of rotation 50° and in direction 2



23) A light ray fell in air on a transparent surface of glass with a refractive index of 1.6, so a part was reflected and another part was refracted so that the angle between the incident ray and the separating surface was equal to  $25^\circ$ . Calculate the Confined angle between the reflected and refracted rays.

24) A light wave of frequency ( $\nu$ ), wavelength ( $\lambda$ ), and speed ( $v$ ) propagates through a medium. Calculate the wavelength of the wave when it travels to another medium with a velocity of  $0.667v$

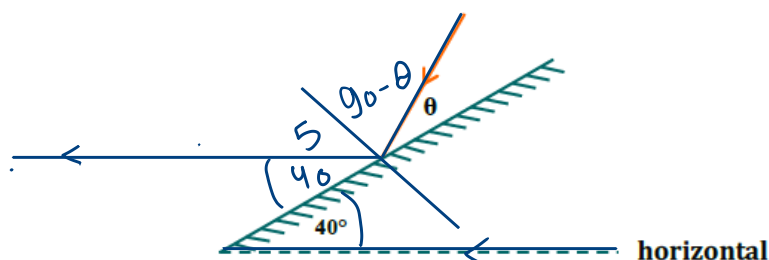
$$V_{air} = C \quad \rightarrow \quad \frac{3}{4}C = V_g$$

25) When light moves from air to glass its speed decreases by 25%. Calculate the absolute refractive index of glass.

$$n_g = \frac{c}{V_g} = \frac{C}{\frac{3}{4}C} = \frac{4}{3}$$

26) The figure shows a mirror tilted to the horizontal at an angle of  $40^\circ$ . If a light beam falls on the mirror, and the reflected beam is parallel to the horizontal, then the angle of reflection is equal to .....

- (A)  $20^\circ$  (B)  $40^\circ$  (C)  $60^\circ$  (D)  $50^\circ$

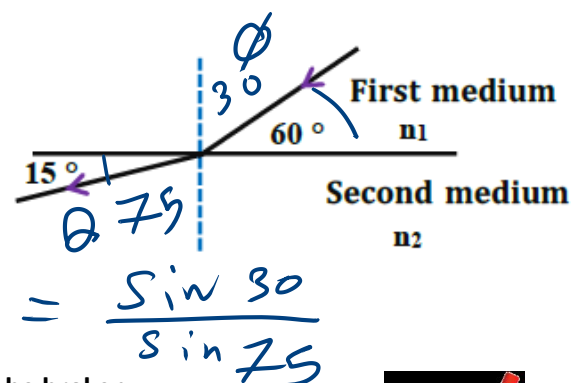


27) The figure shows the transmission of a light beam between the first medium and the

second medium. The relative refractive index from the second medium to the first

medium = .....

$$2 \quad n_1 = \frac{\sin \phi_1}{\sin \theta}$$



28) A student noticed that the pen in the cup appeared to him to be broken.

This is due to the difference in .... (Choose TWO answers)

- (A) The speed of light in the two media (B) The frequency of light in the two media  
(C) The intensity of light in the two media (D) The density of light in the two media

