

Class X, Physics, chapter 7

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1. Speed = 24 m/s
Wavelength = 10cm = 0.1m
Frequency=?

$$\text{frequency} = \frac{\text{speed}}{\text{wavelength}}$$

$$\text{frequency} = \frac{24}{0.1} = 240\text{Hz}$$

$$\text{time period} = \frac{1}{\text{frequency}}$$

$$\text{time period} = \frac{1}{240} \text{sec}$$

2. Let the gap between observer and obstacle = d
Time = 0.1 sec
V= 330m/s

We know $d = \frac{v \times t}{2}$

So, $d = \frac{330 \times 0.1}{2}$

$$d = 16.5\text{m}$$

3. Distance d= 4.5 x 10² m
Speed of signal = 3 x 10⁸ m/s
Using

$$t = \frac{2d}{v}$$

$$t = \frac{2 \times 4.5 \times 10^2}{3 \times 10^8}$$

$$t = 3 \times 10^6 \text{sec}$$

4. Time = 4 sec
V=1450 m/s

We know $2d = v \times t$

$$d = \frac{vt}{2}$$

$$d = \frac{1450 \times 4}{2}$$

$$D = 2.9 \times 10^3 \text{ m}$$

5. T= 2 claps per second
Time for 1 clap = ½ sec = 0.5 sec

$$d = 100\text{m}$$

$$v = ?$$

$$\text{so, } v = \frac{2d}{t}$$

$$v = \frac{2 \times 100}{0.5}$$

$$V = 400 \text{ m/s}$$

6. Time taken to hear the sound = 2 sec

Velocity of sound in air = 330 m/s

Height (distance) of clouds = ?

Distance = $v \times t$

$$= 330 \times 2$$

$$= 660 \text{ m}$$

7. Time taken to hear the echo = 5 sec

Distance of cliff from person = ?

Velocity of sound in air = 340 m/s

$$2d = v \times t$$
$$d = \frac{340 \times 5}{2}$$
$$d = 850\text{m}$$

8. Given time = 0.02 millisecond

$$= 0.02 \times 10^{-3} \text{ sec}$$

$$\text{Or } = 2 \times 10^{-5} \text{ sec}$$

$$\text{Speed (v)} = 3 \times 10^8 \text{ m/s}$$

$$d = ?$$

$$d = v \times t$$

$$= 2 \times 10^{-5} \times 3 \times 10^8$$

$$= 6 \times 10^3 \text{m}$$

$$\text{Or } 6 \text{ km}$$

9. Let distance be equal to 'x'

Then the total distance to travel = 2x

Time = 5 sec

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{speed} = \frac{2x}{5} \dots\dots (1)$$

Case 2

$$\text{Distance} = x - 300$$

$$= 2(x - 300)$$

$$= 2x - 600$$

$$\text{Time} = 3 \text{ sec}$$

$$\text{speed} = \frac{2x-600}{3} \dots\dots(2)$$

From equation 1 and equation 2

$$\frac{2x}{5} = \frac{2x - 600}{3}$$

Solving the above equation for x

$$X = 750\text{m}$$

$$\text{Now speed} = 2x/5$$

$$\text{Speed} = \frac{2 \times 750}{5}$$

$$\text{Speed} = 300\text{m/s}$$

10. For cliff 1

$$\text{Let distance} = d_1$$

$$T_1 = 3 \text{ sec}$$

$$V = 320\text{m/s}$$

$$2d_1 = v \times t$$

$$d_1 = \frac{320 \times 3}{2}$$

$$d_1 = 480\text{m}$$

for cliff 2

$$\text{let the distance} = d_2$$

$$t_2 = 5 \text{ sec}$$

$$v = 320 \text{ m/s}$$

$$2d_2 = v \times t$$

Solving for d we get,

$$d_2 = 800\text{m}$$

$$\text{now total distance} = d_1 + d_2$$

$$= 480 + 800$$

$$= 1280 \text{ m}$$