<u>Class XI</u>

Oscillations and waves worksheet 3

1.	Explosions on other planets are not heard on earth. Why?	1
Ans.	This is because no material medium is present over a long distance between earth and planets and is absence of material medium for propagation, sound waves cannot travel.	
2.	Why longitudinal waves are called pressure waves?	1
Ans.	Because propagation of longitudinal waves through a medium, involves changes in pressure and volume of air, when compressions and rarefactions are formed.	
3.	Why do tuning forks have two prongs?	1
Ans.	The two prongs of a tuning fork set each other is resonant vibrations and help to maintain the vibrations for a longer time.	
4.	A pipe 20 cm long is closed at one end. Which harmonic mode of the pipe is resonantly excited by a 430 Hz source? Will this source be in resonance with the pipe if both the ends are open?	2
Ans.	L = 20 cm	
	$v_n = 430 Hz$	
	$v = 340 m s^{-1}$	
	Now, for a closed pipe	
	$v_n = \frac{(2n-1)v}{4L}$	
	$430 = \frac{(2n-1)340}{4 \times 0.2}$	
	2n - 1 = 1.02	
	<i>n</i> = 1.01	
	Hence it will be the first normal mod e of vibration.	
	Now, for a pipe open at both ends	
	$v_n = \frac{nv}{2L}$	
	$430 = \frac{n \times 340}{2 \times 0.2}$	
	n = 0.5	
	As n has to be an integer, open organ pipe cannot be in resonance with the source.	
5.	Can beats be produced in two light sources of nearly equal frequencies?	1
Ans.	No, because the emission of light is a random and rapid phenomenon and instead of beats we get	
	uniform intensity.	~
6.	If the splash is heard 4.23 seconds after a stone is dropped into a well. 78.4m deep, find the velocity of sound in air?	3

t = 4.23s s = 78.4m $t_1 - time taken by stone to hit water surface$ $t_2 - time taken by splash to reach top of well$ For downward journey of motion

$$s = ut_{1} + \frac{1}{2}at_{1}^{2}$$

$$78.4 = 0 \times t_{1} + \frac{1}{2} \times 9.8t_{1}^{2}$$

$$t_{1}^{2} = 16$$

$$t_{1} = 4 \sec$$
Now, $t = t_{1} + t_{2}$

$$4.23 = 4 + t_{2}$$

$$t_{2} = 0.23s$$

$$v = \frac{s}{t_{2}} = \frac{78.4}{0.23} = 340.87ms^{-1}$$

- 7. How roar of a lion can be differentiated from bucking of a mosquito?
- Ans. Roaring of a lion produces a sound of low pitch and high intensity whereas buzzing of mosquitoes produces a sound of high pitch and low intensity and hence the two sounds can be differentiated.

1

3

2

8. Explain briefly the analytical method of formation of beats?

Ans.

Ans.

9. Give two cases in which there is no Doppler effect in sound?

Ans. The following are the two cases in which there is no Doppler effect in sound (i.e no change in frequency):-

When the source of sound as well as the listener moves in the same direction with the same speed.
 When one of source | listener is at the centre of the circle and the other is moving on the circle with uniform speed.