ALLEN IntelliBrain®

Experiential Experimental Edutaining

PHYSICS

SAMPLE BOOK

8 GRADE

PHYSICS

I'm the

Intelli Kid

.....

and

I'm becoming the

Best Version

of myself with

ALLEN Intelli Brain®

Experiential Experimental Edutaining

INDEX

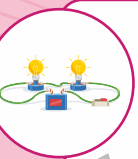
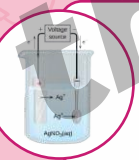
GRADE-8

ALLEN Intelli Brain®

Experiential Experimental Edutaining

I AM PROGRESSING

(Tick mark the columns after achieving the Learning Milestones)

TOPIC	1st Learning	Exercise Solving	1st Revision	2nd Revision
 Force & Pressure				
 Newton's Law of Motion & Friction				
 Waves & Sound				
 Current Electricity				
 Chemical Effects of Current				
 Light				
 Universe				

ALLEN IntelliBrain®

Experiential Experimental Edutaining

PHYSICS

SAMPLE THEORY

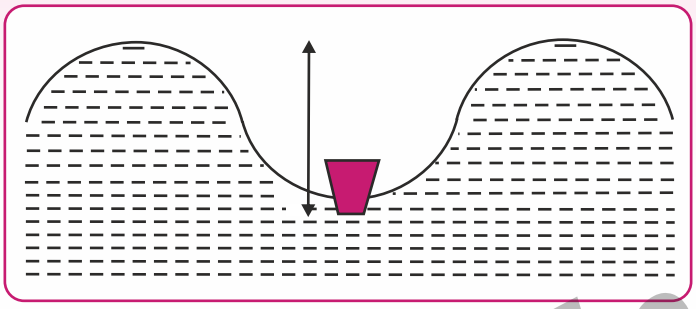
CHAPTER 3

WAVES & SOUND

WAVES

A wave is a repeating disturbance or movement that transfers energy through matter or space.

- As the wave moves across the surface of water, an individual particle of water oscillates up and down with the wave but remains in the same place.
- Waves transfer energy, momentum and pattern of disturbances from one place to another.



- A floating piece of cork on water moves up and down in about the same place as the wave moves under it i.e. the energy moves through the water causing the surface to oscillate up and down as the wave energy passes through. Thus, a wave is a travelling form of energy.
- For waves, there is no net displacement of the particles, but there is a net displacement of wave.
- There are two different motions : the motion of the particles of the medium and the motion of the wave.

TYPES OF WAVES

Mechanical waves

Require a medium for their propagation.
Eg. Sound waves travel through air to reach our ears.

Non-Mechanical waves

Do not require any medium for their propagation.
Eg. Light waves, Radio waves, X-rays etc.

Longitudinal (Compressional) waves

In these waves, particles in the medium move parallel to the direction of propagation of the wave.
Eg. Sound waves

Transverse waves

In these waves, particles in the medium move perpendicular to the direction of propagation of the wave.
Eg. Floating cork in water

Transverse waves

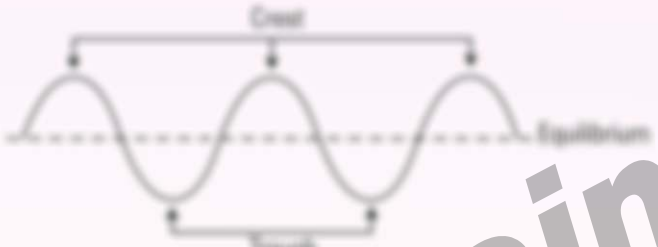
In these waves, particles in the medium move perpendicular to the direction of propagation of the wave.
Eg. Light wave

TRANSVERSE WAVES

- A transverse wave is a wave where the movement of the particles of the medium is perpendicular to the direction of propagation of the wave.

A transverse wave

- **Line of zero disturbance** : It is the line at which the net force on the particles of the medium is zero. That is, when an oscillating particle reaches this line, it achieves its equilibrium position.
- **Crest and trough** : Transverse waves consist of moving crests and troughs. A crest is the part of the transverse wave which is above the line of zero disturbance. A trough is the part of transverse wave which is below the line of zero disturbance.



Crests and troughs in a transverse wave

- **Amplitude** : The amplitude is the maximum displacement of a particle from its equilibrium position.

Amplitude of a transverse wave

- Transverse waves can be formed in solids and on the surfaces of liquids only.
- When a transverse wave propagates, there is no pressure changes in the medium.

LONGITUDINAL WAVES

- A longitudinal wave is a wave where the particles in the medium move parallel to the direction of propagation of the wave. For example, if a long spring is given jerk along its length, a longitudinal wave is produced in it which is shown in fig. Sound is also a longitudinal wave.

- **Compression (or condensation)** : A compression is a region in a longitudinal wave where the particles are closer together than their normal separations.

ALLEN IntelliBrain®

Experiential Experimental Edutaining

PHYSICS

SAMPLE EXERCISE

Directions: Solve each of the following multiple choice questions by choosing the most appropriate option.

1. The transfer of energy in a material medium due to the periodic motion of its particles is called_____.

(1) stream
(2) wave motion
(3) pulse
(4) None of the above

2. The crack of thunder is heard few seconds after the lightning flash, because

(1) crack of thunder and lightning are not produced at same time.
(2) light travels extremely fast as compared to sound.
(3) sound waves slow down on passing through air.
(4) None of the above

3. Match column-I with column-II and mark the correct option from the codes given below.

	Column-I	Column-II	
(a)	String vibration	(i)	Tabla
(b)	Membrane vibration	(ii)	Bicycle bell
(c)	Vibration of air	(iii)	Sitar
(d)	Vibration of plate	(iv)	Flute

(1) a-(i) ; b-(iv) ; c-(ii) ; d-(iii)
(2) a-(iii) ; b-(i) ; c-(iv) ; d-(ii)
(3) a-(iv) ; b-(ii) ; c-(iii) ; d-(i)
(4) a-(ii) ; b-(iii) ; c-(i) ; d-(iv)

4. The sound waves in a medium are characterised by the

(1) linear motion of particles in the medium.
(2) rotatory motion of particles in the medium.
(3) oscillatory motion of particles in the medium.
(4) None of the above

5. The sound waves which travel in the air are called

(1) transverse waves
(2) longitudinal waves
(3) electromagnetic waves
(4) None of the above

6. **In case of longitudinal waves, the particles of medium vibrate**

(1) in the direction of wave propagation.

(2) opposite to the direction of wave propagation.

(3) at right angles to the direction of wave propagation.

(4) None of the above

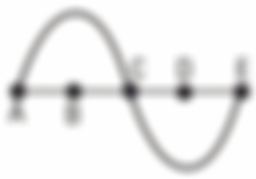
7. **In the curve (see fig.) half the wavelength is**

(1) A B

(2) B D

(3) D E

(4) A E



8. **Let f be the frequency, v the speed, and T the period of a sinusoidal travelling wave. The correct relationship is**

(1) f = 1/T (2) f = v ÷ T (3) f = vT (4) f = v/T

9. **Water waves in the sea are observed to have a wavelength of 300m and a frequency of 0.07 Hz. The speed of these waves is**

(1) 0.00021 m/s (2) 2.1 m/s

(3) 21 m/s (4) 210 m/s

10. **A sound wave has a wavelength of 3.0 m. The distance from a compression center to the adjacent rarefaction center is**

(1) 0.75 m (2) 1.5 m

(3) 3.0 m (4) need to know wave speed

11. **During a time interval of exactly one period of vibration of a tuning fork, the emitted sound travels a distance**

(1) equal to the length of the tuning fork.

(2) of about 330 m.

(3) of one wavelength in air.

(4) equal to twice the length of the tuning fork.

12. **Which of the following properties of a sound wave determine its "pitch" ?**

(1) Amplitude

(2) Distance from source to detector

(3) Frequency

(4) Phase

13. **To raise the pitch of a certain piano string, the piano tuner**

(1) loosens the string. (2) tightens the string.

(3) shortens the string. (4) lengthens the string.