Propagation of Sound Waves

Solution 1.a:

Experiment to show that a medium is necessary for the propagation of sound:

- 1. Take a round-bottom flask with some water in it.
- 2. Take a two-holed rubber stopper.
- 3. Pass a glass rod or wire through one hole and tie a bell to one end of the rod and fit the stopper to the flask with the bell inside the flask.
- 4. Now, pass a glass tube through the other hole.
- 5. Attach a piece of rubber tubing to its outer end, fit it with a clamp and close it.
- 6. Shake the flask.
- 7. The ringing of the bell is clearly heard.
- 8. Now, open the clamp and heat the flask till the water boils and steam comes out through the rubber tube.
- 9. Stop heating the flask and clamp the rubber tube shut.
- 10. Allow the flask to cool. Pour cold water on it to cool. The steam inside cools and condenses.
- 11. Now shake the flask again.
- 12. The ringing sound of the bell will not be heard.
- 13. This shows that a medium is necessary for the propagation of sound.



Solution 1.b:

Drums have a stretched membrane which vibrates when struck to produce sound.

Solution 1.c:

Any intolerable and irritating sound is called noise. It is an unpleasant sound whose frequency changes constantly and loudness changes irregularly.

Solution 2.a:

A tabla player tightens or loosens the bands tying down the membrane to vary the tension in the membrane and get the desired frequency of sound. If the membrane is struck, the tensed membrane produces good sound.

Solution 2.b:

Sound travels at the speed of 340 m/sec and light travels at the speed of $3 \times 10^{\circ}$. Light travels faster than sound, i.e. it travels about 10° faster times than that of sound. Hence, we hear thunder long after we have seen the flash of lightning.

Solution 2.c:

An echo is the reflection of sound, so it needs a surface for the reflection of sound to be heard.

Solution 3:

Group 'A'	Group 'B'
(a) Reflection of sound	echo-point
(b) Pollution of sound	noise
(c) Medium of sound	water
(d) Frequency of sound	the pegs on a sitar

Solution 4:

- A flautist can place fingers on the proper holes and produce vibrations of the **air column**.
- Sound is heard more clearly through water as compared to air.
- In drums, **membrane** vibrates to produce sound.
- The speed of light is **10**⁶ times that of sound.
- When temperature increases, the speed of sound increases.