Activity 1

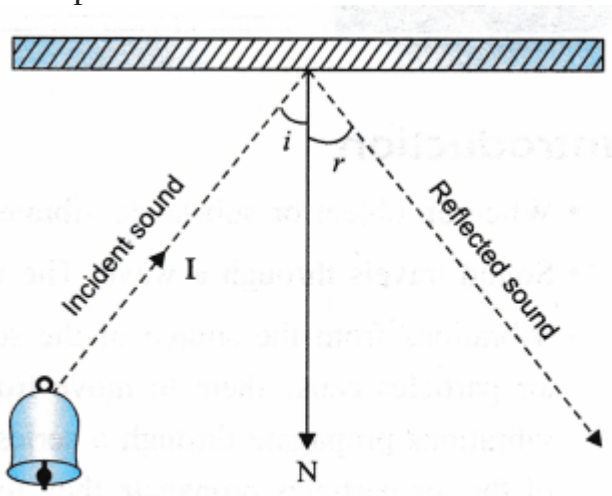
Aim
To verify the laws of reflection of sound.

Theory

1. **Sound:** It is a form of energy produced by vibration and it needs medium to propagate.
2. **Reflection of sound:** As light reflects when it strikes any hard object (opaque), sound also gets reflected when it strikes any object.

Laws of Reflection of sound

1. The angle of incidence is always equal to the angle of reflection.
2. The incident sound wave, the normal and the reflected sound wave lie in the same plane.

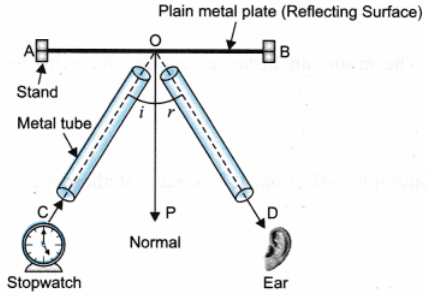


Reflection of Sound
$\angle i = \angle r$

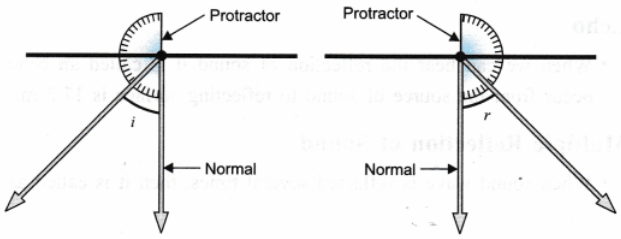
Materials Required
Two highly polished metal tubes made up of stainless steel or aluminium of length 25 cm and diameter 2 cm, a drawing sheet, metal plate, a geometrical set, thumb pins, drawing board/table, stopwatch, metal stand.

Procedure

1. Fix the white sheet on drawing board with thumb pin.
2. Draw a line AB to place the metal plate as reflecting surface with the help of metal stand, and draw normal OP to this line as shown in the figure.
3. Now draw a line OC making an angle of 30° with the line OP.
4. Place one metal tube near to the point O of normal and metal plate on the line OC.
5. Place the ticking watch closer to one end of this metal tube.
6. Now place the second tube so that its one end is near to the point O. Bring your ear close to the other end and adjust its position such that it collects the maximum reflected sound.
7. Mark the position of the tube when it collects the clear and maximum reflected sound.
8. Draw an extended line of reflected sound wave and mark it as OD.
9. Measure the angle of incidence and the angle of reflection.
10. Follow the above procedure and record your observation thrice.



Reflection of Sound



Measurement of ∠i and ∠r

Observation Table

S.No.	Angle of Incidence ∠*i*	Angle of Reflection ∠*r*
1.	30°	30°
2.	35°	35°
3.	40°	40°

Result

1. The angle of incidence is equal to the angle of reflection.
2. The incident, normal and reflected sound waves lie in the same plane

ACTIVITY 2

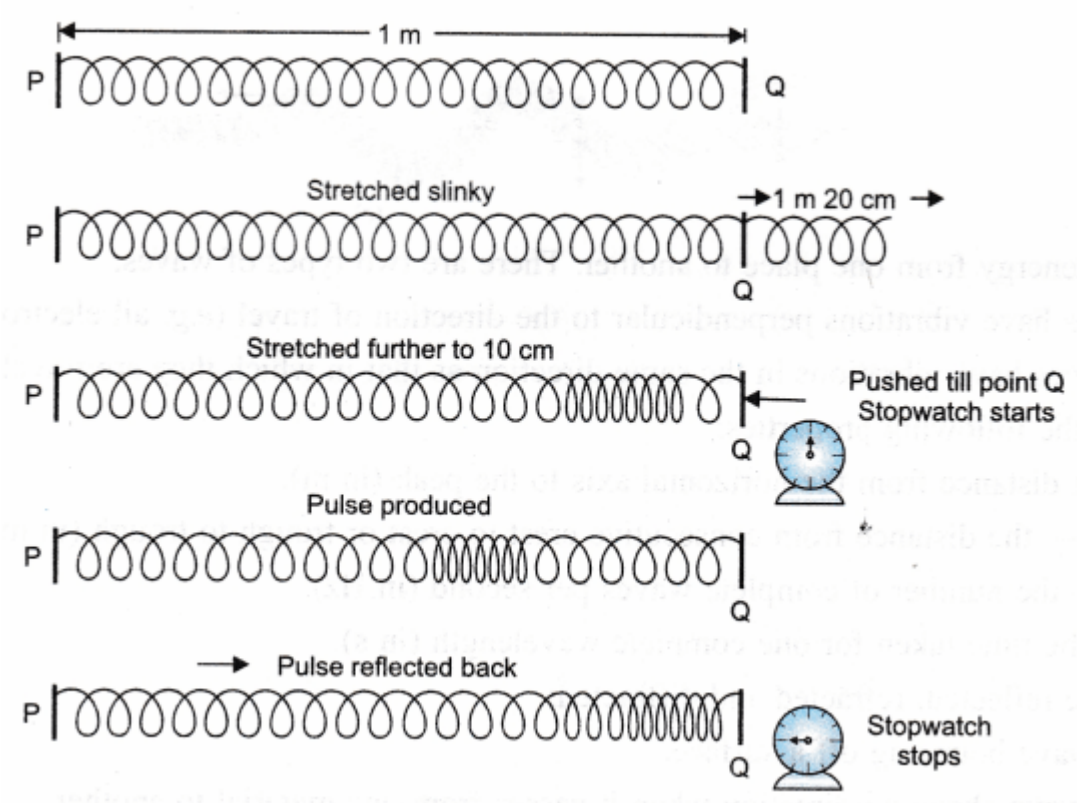
Aim
To determine the velocity of a pulse propagated through a stretched string/slinky.

Theory

1. **Wave:** A wave is a disturbance that moves through a medium when the particles of the medium set neighbouring particles into motion by transfer of energy.
2. **Slinky:** A slinky is a long spring which is flexible and has appreciable elasticity.
3. **Pulse:** A wave produced by a single disturbance in a medium is known as pulse.
   Velocity of pulse $= \frac{Total\ \ distance\ \ travelled\ \ by\ \ pulse}{Total\ \ time\ \ taken}$

Materials Required
A slinky with flat wire made up of metal/plastic should be atleast 1 m long, a metre scale, a stop-watch, a marker/ chalk.

Procedure
1. Mark a point on the floor of a long corridor. Let this point be P.



2. From point P measure the distance of 1 m with the help of metre scale, mark this point as Q.
3. Allow one student to hold one end of slinky at point P.
4. Let another student stretch the slinky and bring it at point Q.
5. Let third student hold the stopwatch.
6. The student who has stretched the slinky will stretch it beyond point Q and then give a sharp push towards pointQ. The push should stop at point Q.
7. A pulse is produced in the slinky which travels towards the point P and it gets reflected backtowards point Q.
8. Record the time from push at Q to the pulse travelling towards P and back at Q.
9. Follow the above procedure 56 times and record your observation
10. Calculate the velocity of pulse by the formula

Velocity of pulse = $\frac{Total\ \ distance\ \ travelled\ \ by\ \ pulse}{Total\ \ time\ \ taken} = \frac{2d}{t}$

Observation Table

S.No.	Length of stretched slinky	Total distance travelled by Pulse 2(d)	Time taken (t)	Velocity of pulse $v = \frac{2d}{t}$
1.	1 m	2 × 1 m = 2 m	11.34	0.176
2.	1 m	2 × 1 m = 2 m	10.08	0.198
3.	1 m	2 × 1 m = 2 m	10.56	0.189
4.	1 m	2 × 1 m = 2 m	11.46	0.174
5.	1 m	2 × 1 m = 2 m	10.86	0.184

Average velocity of pulse = $\frac{0.176+0.198+0.189+0.174+0184}{5}$ = 0.1842

Result

The velocity of pulse = 0.1842 m/s.

ACITIVITY 3

Aim

To identify transverse and longitudinal waves in a slinky.

Theory

If the particles of the medium vibrates parallel to direction of wave motion it is longitudinal wave.

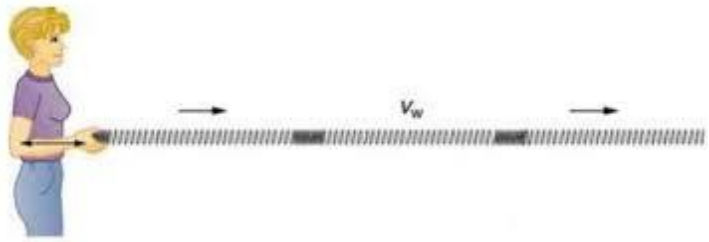
If the particles of the medium vibrates perpendicular to the direction of wave motion it is transverse wave.

Materials Required

A slinky with flat wire made up of metal/plastic should be atleast 1 m long, a marker.

Procedure

One of the students can be asked to push a slinky from one end which is fixed at the other end. The students can observe compressions and rarefactions in the slinky. Hence they identify longitudinal wave on the slinky.



Next, the student can move the free end of the slinky up and down to have wave like pattern on the slinky. Here the slinky moves up and down or perpendicular to wave motion. Thus, students can identify transverse wave on the slinky.