Experiment 41

AIM

To study the effect of mass on the time period of a simple pendulum.

THEORY

A simple pendulum consists of a small object of heavy mass, called the pendulum bob, suspended by a light thread from a fixed and rigid support [Fig. 41.1(a)]. When the bob CP is released after taking its free end P slightly to one side (say to point R), it begins to oscillate about its mean position O [Fig. 41.1(b)]. The time taken by the pendulum to complete one oscillation is called its time period. The force responsible for maintaning the oscillations in the simple pendulum is the restoring force which involve mass of the bob. In this experiment we shall study the effect of mass of the pendulum bob on its time period.

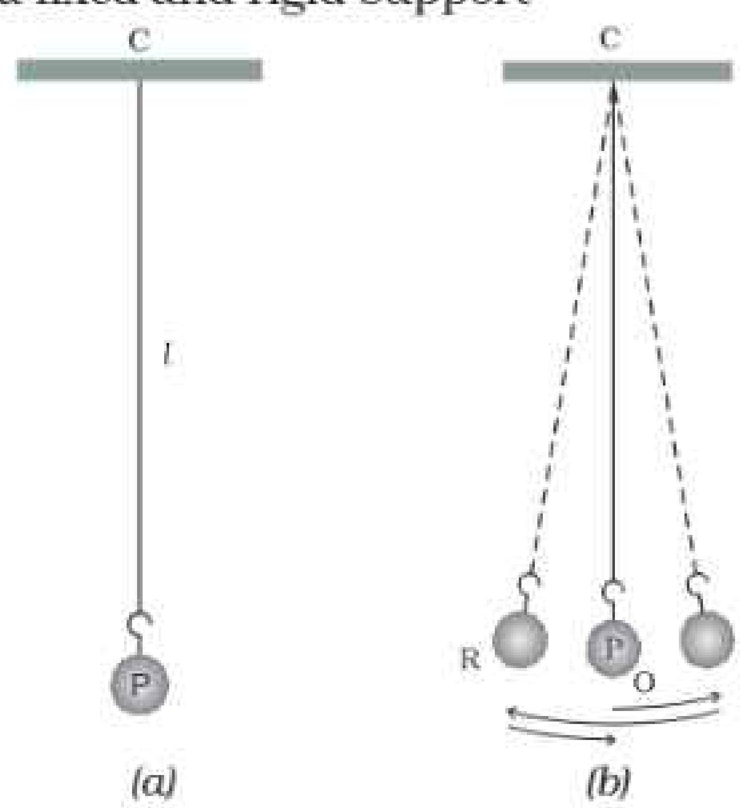

Fig. 41.1 : *(a) A simple pendulum; and (b) Different positions of the bob of an oscillating simple pendulum and a complete oscillation*

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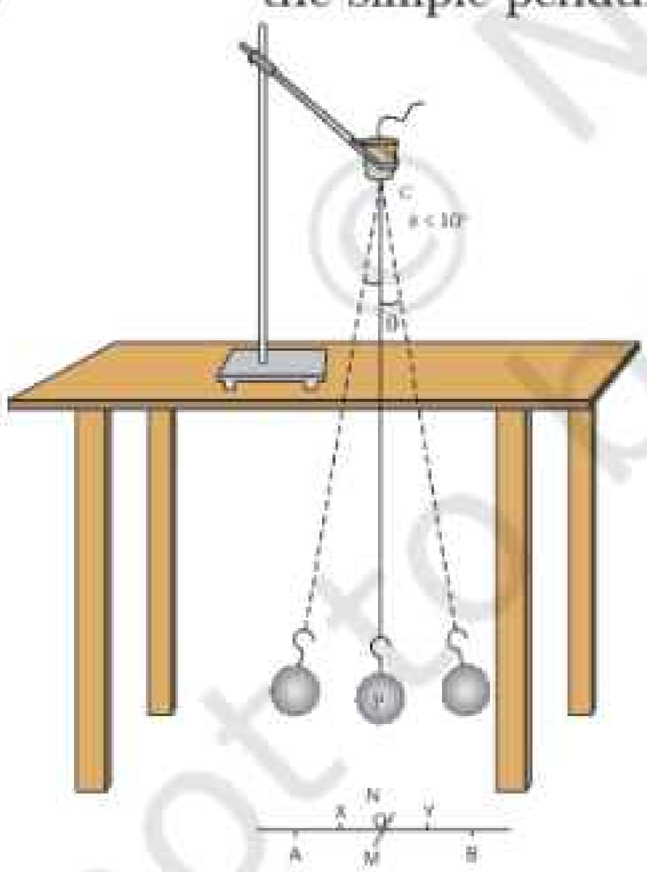
MATERIALS REQUIRED

A heavy iron stand, a cork (split along length through middle), an inextensible thread of about 1.5 m length, three different metallic spherical bobs of known masses and diameters, a stop-watch or a stop clock, a large size protractor, and a meter scale.

PROCEDURE

(a)

1. Find the least count of the given stop-watch or stop-clock.
2. Tie one end of an inextensible thread of nearly 1.5 m with the metallic bob of first pendulum having mass m_1 and diameter d_1 and pass the other end of thread through the split cork as shown in Fig. 41.2(a).
3. Clamp the cork firmly to a heavy iron stand and place it on a horizontal table. The pendulum must be over-hanging.
4. Adjust the effective length of the pendulum, *L*, to any desired length (say 1 m). The effective length of pendulum is measured from the point of suspension (the lowest point on the split cork from which the bob suspends freely) to the centre of mass of the pendulum bob (which in the case of a spherical object is at its geometric centre), that is, length CP in Fig. 41.2(a). The length of the pendulum can be increased (or decreased) by pulling down (or up) the thread through the split cork after slightly loosening the grip of the clamp. Keep the length of the simple pendulum fixed through out.
5. Draw two lines on the surface, one parallel to the edge of table (AB) and other perpendicular to it (MN) such that the two intersect at the point O [Fig. 41.2(b)].
6. Adjust the position of the laboratory stand and the height of the clamp such that the point of intersection, O, of lines AB and MN lies exactly below and very close to the centre of bob in its rest or mean position.
7. Gently hold the pendulum bob P just above the point O. Keeping the thread stretched, displace the bob to either side, say to point X or point Y, along the line AB (the displacement of the bob should be around 10 cm from its mean position so that the angular displacement does not exceed 10°). Release the bob so that begins to oscillate about its mean position. Also check the angular displacement of the bob on the protector attached at the top of pendulum C, with the clamp.



(b)

Fig. 41.2 : *(a) A simple pendulum fixed in a split cork; and (b) Experimental set-up for studying the variation in the time period of pendulum with a change in its mass*

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8. Observe the time taken for appreciable number of oscillations n (say, 10 oscillations) with the help of a stop-watch (or stop-clock). Record the time taken for n oscillations in the observation table.
9. Bring the pendulum at rest in its mean position. Repeat step 8 again for the same metallic pendulum bob. Record the total time taken in n oscillations.
10. Replace the metallic pendulum bob of the pendulum with the second bob of known mass (m_2) and diameter (d_2). Using the method given in step 4, adjust the total length of the simple pendulum same, that is L. Repeat steps 8 and 9 to again record the total time taken in completeing n oscillations.
11. Repeat step 10 for the third given metallic bob.

Observations and Calculations

(i) Least count of the stop-watch or stop-clock = ___ s

(ii) Specifications of the three given metallic bobs.

Bob	Mass m (g)	Diameter d (cm)	Radius r (cm)	length of the hook attached, h (cm)
First	m_1 =	d_1 =	r_1 =	h_1 =
Second	m_2 =	d_2 =	r_2 =	h_2 =
Third	m_3 =	d_3 =	r_3 =	h_3 =

(iii) Total length of the simple pendulum, L = length of thread + r + h = ___ cm = ___ m

(iv) Number of oscillations, n = ___ .

Sl. No.	Mass of the bob, m	Length of the thread, l	Total length of the pendulum, $= l + r + h$	Time taken n oscillations, t	Time period $T = t/n$	Mean time period
	(g)	(cm)	(cm)	(s)	(s)	(s)
1.	m_1	—	L	—	—	—
2.			L	—	—	
3.	m_2	—	L	—	—	—
4.			L	—	—	
5.	m_3	—	L	—	—	—
6.			L	—	—	

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Results and Discussion

From the observations, infer the effect of the mass of the simple pendulum on its time period. You are likely to see that the time period of a simple pendulum does not depend on its mass. (You will be studying about this independence in detail in higher classes.)

Precautions

- Total length of the simple pendulum must be kept same throughout the experiment.
- Thread used must be strong and inextensible. An extension (which may depend on the mass of the bob) in the thread will increase the effective length of the pendulum. There should be no kink or twist in the thread.
- The pendulum support (laboratory stand) should be rigid.
- The split cork should be clamped keeping its lower face horizontal.
- During oscillations the pendulum should not touch the edge of the table or the surface below.
- The displacement of pendulum bob from its mean position must be small.
- The bob must be released from its displaced position very gently and without a push otherwise it may not move along the straight line AB. In case you notice that the oscillations are elliptical or the bob is spinning, stop the pendulum and displace it again.
- At the place of experiment, no air disturbance should be there. So switch off all fans while taking the observations.
- Counting of oscillations should begin when the bob of the pendulum passes its mean position while it is oscillating.

Note for the Teacher

- In order to avoid unnecessary emphasis on measuring skills, the value of diameters or radii of the pendulum bobs, their masses, and their lengths of hooks may be provided to students. It is not necessary that the metallic bobs are made up same material. These can be different.
- Practically the amplitude may decrease in each swing of the pendulum with time. Thus the pendulum will not keep on oscillating for a long time. Therefore counting of the number of oscillations for measuring the time taken should be stopped before the amplitude of oscillation becomes too small. It is therefore advised that number of oscillation (n) for which time is noted should be small (say n = 10).

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- The masses of the metallic bobs must not be very large. Otherwise the thread may break. Moreover, the amplitude of the swinging pendulum may die out quickly (friction at the point of suspension of the pendulum!).
- To ensure a constant length is pretty difficult. A small bowl may be used as pendulum bob whose mass may be altered by filling it with different materials.

Questions

- Does the time period of a simple pendulum depend on the mass of the pendulum bob?
- Does the time period of a simple pendulum depend on the size of the bob? Does it depend on the shape of the bob?
- You are provided with two simple pendulums of same length but of different masses. The two pendulums are displaced by the same amount and then released to oscillate freely about their mean positions. If the air resistance is same for both the simple pendulums, compare their time periods of oscillation?

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Experiment 42

Aim

To determine the speed of a transverse pulse propagated through a stretched string.

Theory

A pulse is a small disturbance in a medium that usually lasts for a short time. The motion of a pulse can be observed on a long stretched string or in a stretched slinky. A pulse can be classified by the direction in which it disturbs the medium. A transverse pulse is a disturbance that moves the medium at the right angles to the direction in which the pulse travels. If the disturbance is in the direction of motion of the pulse then the pulse is longitudinal.

The motion of a transverse pulse can be observed on a long stretched string that is fixed at one end. A hump created at one end of the string by giving it a jerk, is an example of a transverse pulse. A sudden pulse created at the end, held in hand moves, to the other end along the string where it dies out. However, if the string is fixed at both the ends the pulse may reflect back and forth a few times before it dies out [Fig. 42.1(a-g)]. The speed of a pulse along the string can be determined by measuring the time taken T by it to travel through a known length of the string l. The length of the string divided by the time gives the speed of the pulse in the string. That is,

$$v = \frac{l}{T}.$$

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MATERIALS REQUIRED

A 10 m long tightly knitted cotton string or rope of about 0.5 cm diameter, a stop-watch or a stop clock, and a meter scale.

PROCEDURE

1. Find the least count of the stop-watch or the stop-clock.
2. Fix one end of the tightly knit cotton string (the type of the one used in skipping) or rope by tying its one end to a door handle or to a window grill or to a hook on a wall. Stretch a known length of the string (say l_1) while holding the other end firmly with your hands. The other end of the string can also be tied to another door handle, or a hook. The string might sag in the middle due to its weight. However, a little sagging do not affect your observations.
3. Give a small transverse horizontal jerk to the string at one end to create a pulse. Let the pulse travel along the string. It may require some practice to create a single pulse that moves smoothly along the string.

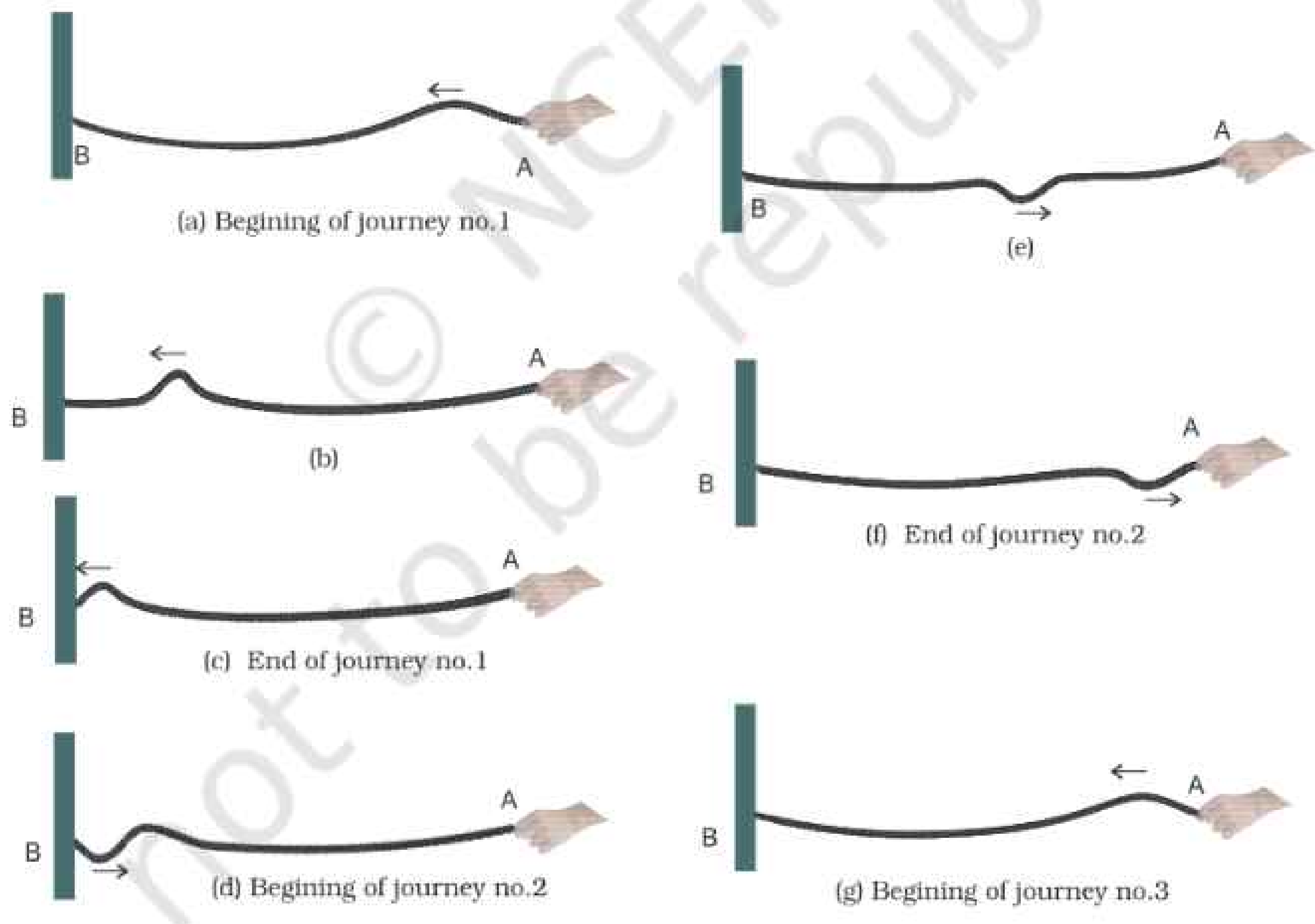

Fig. 42.1(a-g) : *A pulse moves back and forth along a string fixed at both ends before it dies out*

4. Observe the pulse as it moves along the string and note what happens when the pulse reaches at the other end of the string. Does it get reflected back? Does the same phenomena occur when it reaches the end where the pulse originated?
5. Holding one end of the stretched string give it a jerk to create a pulse. Ask one of your friends to switch on the stop-watch or clock as soon as you give a jerk to the stretched string. Measure the time taken by the pulse to make n number of journeys along the entire length of the string between its two ends [Figs. 42.1(a-g)]. This could be possible if the pulse moves back and forth along the string a few times before it dies out. The starting and closing of the stop-watch or stop-clock must be simultaneous with the creation of the pulse and its arrival at the end up to which the measurement are to be taken. Care should also be taken in counting the number of times the pulse travels through the entire length of the string.
6. Repeat the experiment with different lengths of the same string (say l_2 and l_3) by changing the distance between the two ends to which it is tied. Note the time taken by a pulse for making n journeys through different lengths of the string.

Observations and Calculations

(i) Least count of the stop-watch or stop-clock = _____ s

Sl. No.	Length of the string between two ends	Time taken by the pulse in making n	Time taken by the pulse in making one	Speed of the pulse in string
	l	journeys, t	journey, T $(= t/n)$	$v = l/T$
	(m)	(s)	(s)	(m/s)
1.	l_1 =			v_1 =
2.	l_2 =			v_2 =
3.	l_3 =			v_3 =

Results and Discussion

The speed of pulse in the string at different lengths are given in table above. In this experiment you probably find different values of speeds of the transverse pulse for different values of lengths of the string. Discuss and state the factors which affect the speed of the pulse with your friends and teacher.

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PRECAUTIONS

- The string should not be too tight (large tension) when it is tied at the two ends otherwise the velocity of pulse may be high to observe and to measure time of its travel. Some sagging due to the weight of the string is helpful in creating the pulse and observing its motion.
- The string should not be placed on a rigid surface (in contact with) as in such a situation the pulse would die out quickly making observations difficult.
- It must be ensured that no part of the stretched string, except the two ends, touches any surface. Why?
- The string should not have any knots or kinks at any point along its length.
- The counting of pulse journeys must start from zero (and not from one). That is, the creation of pulse and pressing of the knob of stop-watch must be simultaneous.
- The efforts should be made to keep the amplitude of pulse appreciably high so that it can get reflected sufficient number of times from the fixed ends of the string.

NOTE FOR THE TEACHER

- This experiment requires a good amount of practice and therefore should be performed in a group of two or three students.
- Strings or ropes made of jute or plastic or some other material may also be tried instead of cotton.
- This experiment should preferably be performed in a hall or in a gallery.
- In this experiment, the speed of pulse changes for different string lengths. It is suggested that students may try to repeat the observations for the same length of string say l_1. They will probably find different values of speed the pulse. Encourage the students to find the reasoning.
- It is advised that this experiment be performed at a place where external effects such as air are minimal. Switch off the fan while performing this experiment.
- The speed of a pulse (or a wave) in a string is found to be proportional to the square root of tension in the string and inversely proportional to the square root of mass per unit length of the string. In order to keep the time measurements recordable, it is suggested to make a judicious choice of the string and of stretching it.

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QUESTIONS

- What is the difference between a pulse and a wave?
- State the nature of pulse generated in a stretched string. Is it transverse or longitudinal? Can a longitudinal pulse be generated in a string or a thread (an amateur's telephone!)?
- Why we prefer a longer string to perform the obove experiment?
- In this experiment, you must have noticed that while expressing the result for the speed of a pulse in a string, it is not suggested to take the average value of speeds determined with different lengths of the string. Why?

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Experiment 43

AIM

To determine the speed of a longitudinal pulse propagated through a stretched slinky.

THEORY

A pulse is a small disturbance in a medium that usually lasts for a short time. The motion of a pulse can be observed on a long stretched string or in a stretched slinky. A pulse can be classified by the direction in which it disturbs the medium. A longitudinal pulse is a disturbance that causes the particles of the medium oscillate parallel to the direction of motion of the pulse. If the disturbance moves the particles of the medium at the right angles to the direction of motion of the pulse then the pulse is transverse.

A longitudinal pulse can be created in a metallic slinky if the slinky is stretched out in a horizontal direction and the first few coils of the slinky are compressed and then released horizontally. In such a case, each individual coil of the medium (slinky) is set into vibrational motion in directions parallel to the direction of motion of the pulse. A traveling longitudinal pulse in a slinky is composed of *compression*, where the parts of the medium (coils of the Slinky) are closer together

Fig. 43.1 : *A longitudinal pulse in a metallic slinky*

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than normal, or *rarefaction*, where the parts of the medium are farther apart than normal. The compression or rarefaction (pulse) travel along the length of the slinky. If the two ends of the stretched slinky are rigidly fixed, the pulse may reflect back and forth a few times before it dies out. The speed of the pulse in the metallic slinky can be determined by measuring the time taken (T) by the pulse to travel through a '*known length*' (l) of the stretched slinky. The speed of the pulse v is

$$v = \frac{l}{T}$$

Materials Required

A long metal slinky, an inextensible thread, a meter scale (or a measuring tape), and a stop-watch or a stop-clock.

Procedure

1. Find the least count of the given stop-watch (or the slop clock).
2. Fix one end of the metal slinky to a rigid support such as a door handle, or a window grill or a hook on a wall.
3. Firmly hold the other end of the slinky and stretch it to a known length l_1 (Fig. 43.2). Stretch the slinky until its coils are nearly 1 cm apart. The slinky might sag in the middle due to its weight. However, a little sagging may not effect the observations. Here the known length of the slinky means the length of the stretched-sagged slinky

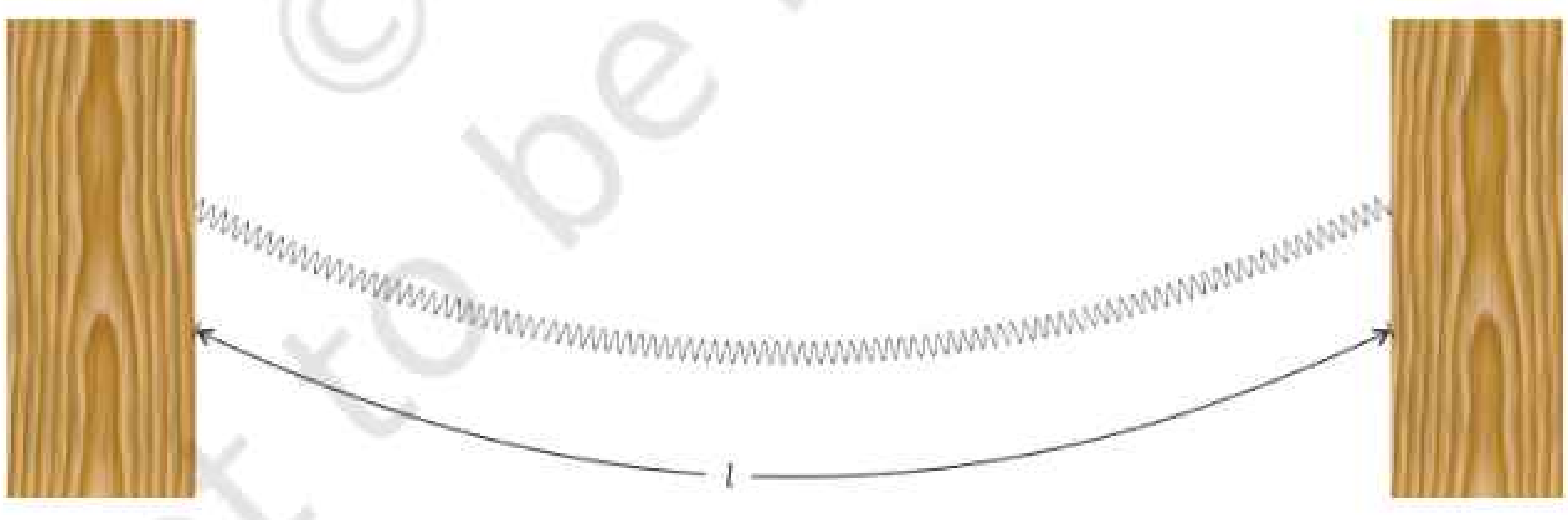

Fig. 43.2 : *A stretched slinky of known length l*

as shown in Fig. 43.2. For measuring this length use a measuring tape along the sagged path of the stretched spring. You can alternatively use a thread and meter scale to measure the length l of the stretched slinky.

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4. What do you observe? The slinky is vibrating! Allow the slinky to come to rest and stable position. For this the purpose ask your friend to gently hold the stretched slinky somewhere in between for some time. This will help the slinky to come to rest quickly.
5. At the end where you are holding the slinky, gather a few slinky coils towards you. Quickly release them. Observe the direction in which the pulse move and the direction in which the coils of the stretched

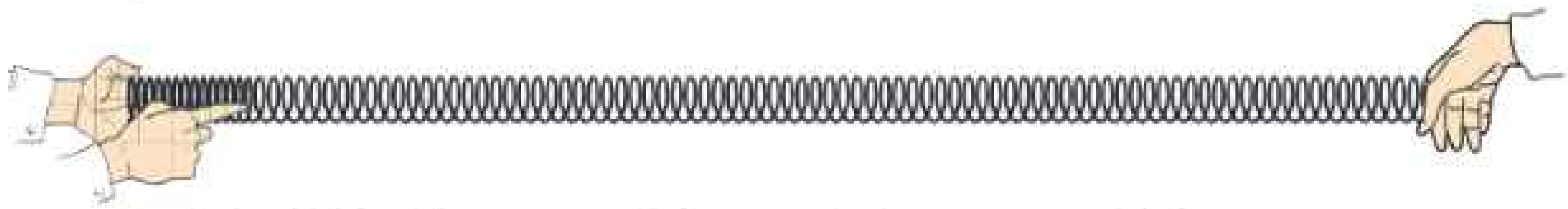

Fig. 43.3 : *Formation of a longitudinal pulse in a slinky*

slinky (the medium) move. Are the two motions in the same direction? Is the pulse a transverse or longitudinal?

6. In this case the slinky coils do not move at right angles to the direction of the disturbance. The coils rather bunch up in an area and the bunch appears to move forward in the slinky. The slinky coils move back and forth. Thus the pulse created is longitudinal (Fig. 43.3).

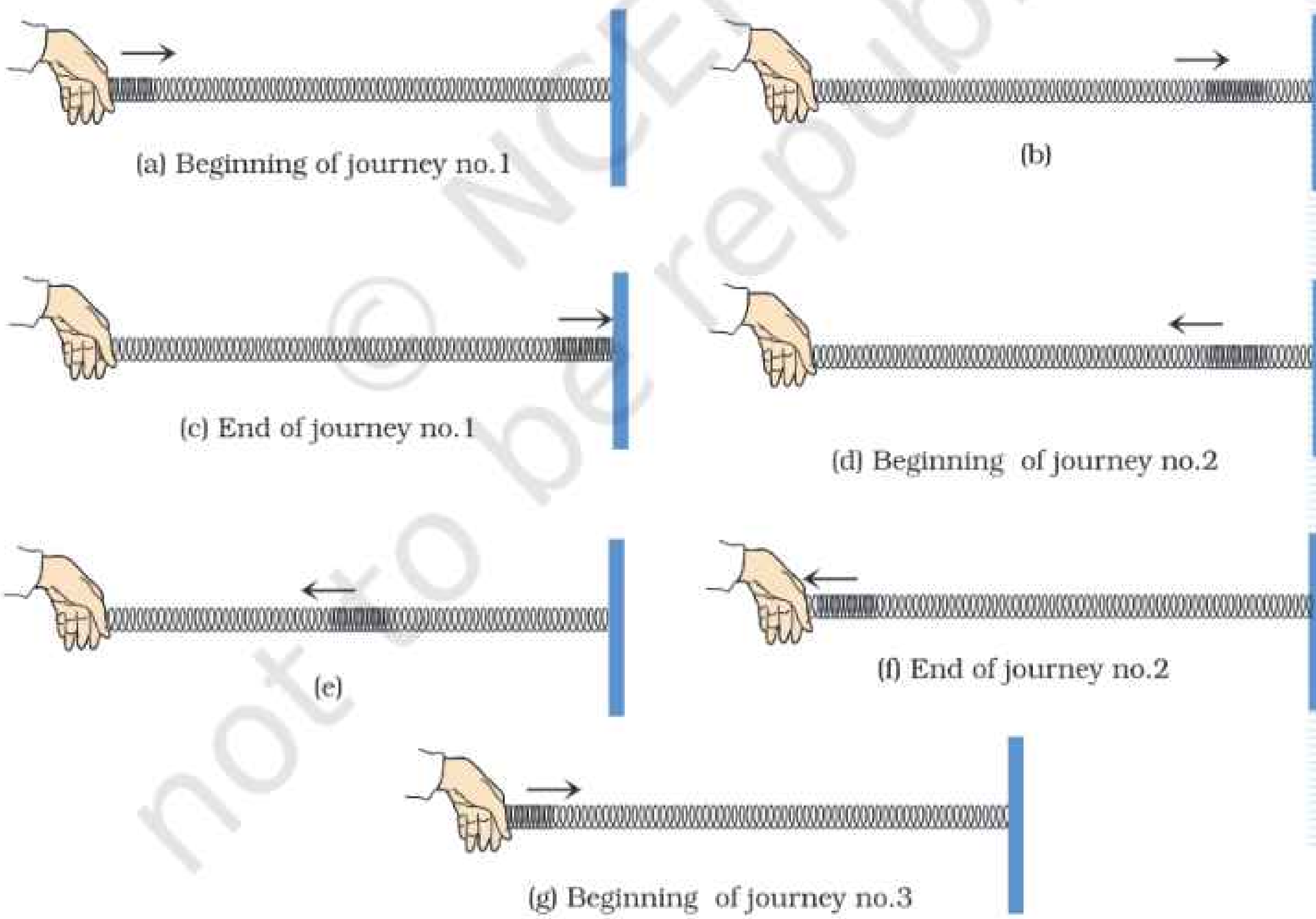

Fig. 43.4 (a-g) : *A longitudinal pulse moves back and forth along a slinky fixed at both ends before it dies out*

7. Again bring the slinky to rest as done in step 4.
8. Holding one end of the stretched slinky gather a few slinky coils towards you and quickly release them. Ask one of your friends to be ready to switch on the stop watch simultaneously as you release the coils. Measure the time taken by the pulse to make n number of journeys along the entire slinky between its two ends as shown in Fig. 43.4(a–g). This could be possible if the created pulse moves back and forth in the slinky a few times before it dies out. The starting and closing of the stop watch or clock must be simultaneous with the creation and its arrival at the end up to which the measurements are to be taken (after n number of journeys). Care should also be taken in counting the number of times the pulse travels through the entire length l_1 of the stretched slinky.

   In fact your fingers holding one end of the stretched slinky can also very well feel the pulse reflections reaching after completing two, four, six, eight, ... journeys in the slinky. Every time the pulse reaches your fingers exerts a pressure on your fingers.
9. Repeat the experiment with different lengths of the same slinky, say l_2 and l_3. For this you may change the position of your hand holding one end of the slinky (or changing your position) while keeping the other end fixed at the same place. Record your observations in the table.

Observations and Calculations

Least count of the stop watch or clock = _______ s.

Sl. No.	Length of the stretched slinky between two ends, l	Time taken by the pulse making n journeys, t	Time taken by the puse in making 1 journey, $T = t/n$	Speed of the pulse in the slinky, v $v = l/T$
	(m)	(s)	(s)	(m s^{-1})
1.	l_1 =			v_1 =
2.	l_2 =			v_2 =
3.	l_3 =			v_3 =

Results and Discussion

The speed of the longitudinal pulse in the stretched slinky at different lengths are given in the table above.

In this experiment you probably find different values of speed of a

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longitudinal pulse for different values of known lengths of the stretched slinky. Discuss and state the factors which affect the speed of the pulse with your friends and teacher.

PRECAUTIONS

- Do not over-stretch the slinky while performing this experiment. Over-stretching of the slinky will destroy its spring nature.
- It must be ensured that no part of the stretched slinky touches surface. Why? Any contact of coils of the stretched slinky with any surface leads to the absorption of pulse energy in the medium in contact and you may not be able to observe appreciable number of pulse journeys in the slinky.
- While creating the longitudinal pulse in the slinky, the release of compressed slinky coils must be gentle and quick. No force must be applied on the slinky while releasing the gathered coils.
- The slinky should not have any knot or any kink at any point along its length. The slinky coils must also not be entangled.
- At the time of creation of the pulse the counting must start from zero and the stop watch should be started at the same time.
- The efforts should be made to keep the amplitude of the pulse appreciably large so that it can get reflected sufficient number of time at the fixed ends of the slinky. By trial one can find the amplitude that produces best result.

NOTE FOR THE TEACHER

- This experiment requires a good amount of practice and therefore should be performed in a group of two or three students.
- In this experiment, a metallic slinky is suggested to use. However this experiment may also be performed with a plastic slinky. But you may not be able to observe (or feel) the persistence of the pulse in the slinky for appreciable time.
- It is advised that this experiment be performed at a place where external effects such as air, are minimal. (Switch off the fan while performing the experiment.)
- The speed of a longitudinal pulse in the stretched slinky is sufficiently high to measure the time taken by the pulse in a single journey. It is therefore advised to take the number of journeys for the measurement of time as large as possible.

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- If the set-up of this experiment has a larger amount of sagging in the slinky, the slinky may be provided a few supports with the help of light threads as shown in Fig. 43.5.

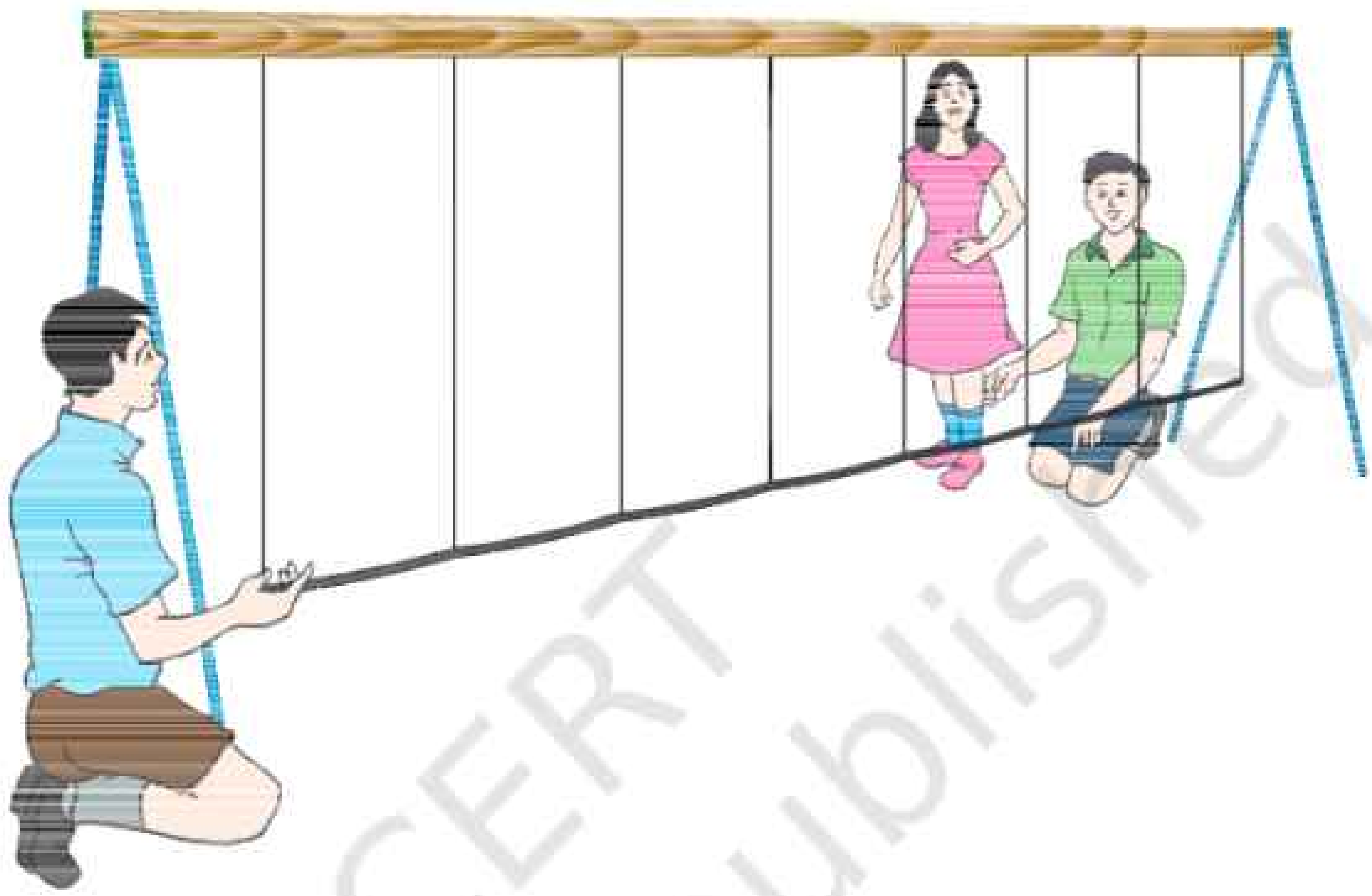

Fig. 43.5 : *A large slinky is supported with several elastic threads*

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QUESTIONS

- In this experiment you are suggested to find the least count of the stop-watch or the stop-clock. At the same time you are also using a meter scale or a measuring tape. But you are not suggested to find the least count of this length measuring equipment. Why?
- Why the release of gathered slinky coils be quick at the time of creation of a longitudinal pulse in the slinky?
- How a longitudinal pulse travels in a slinky?
- Why should you take a long slinky in this experiment?
- What will happen if the middle portion of the stretched slinky touches a surface while a longitudinal pulse is traveling through it?
- While creating a longitudinal pulse in the slinky instead of quickly and gently releasing the gathered coils, a student happens to move his hand, holding one end of the slinky, sideways. What kind of pulse will be created in the slinky? Explain your answer.

- In this experiment you probably find different values of speed of a longitudinal pulse for different values of lengths of the stretched slinky. Why?
- Why do we measure time for larger number of pulse journeys in the stretched slinky in this experiment?

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Experiment 44

AIM

To study the reflection of sound.

THEORY

Sound is reflected following the same laws as followed by light rays. That is, the reflected ray lies in the same plane of incidence (in which the incident ray and normal to the reflecting surface at the point of incidence lies), and the angle of reflection ($\angle r$) is equal to the angle of incidence ($\angle i$).

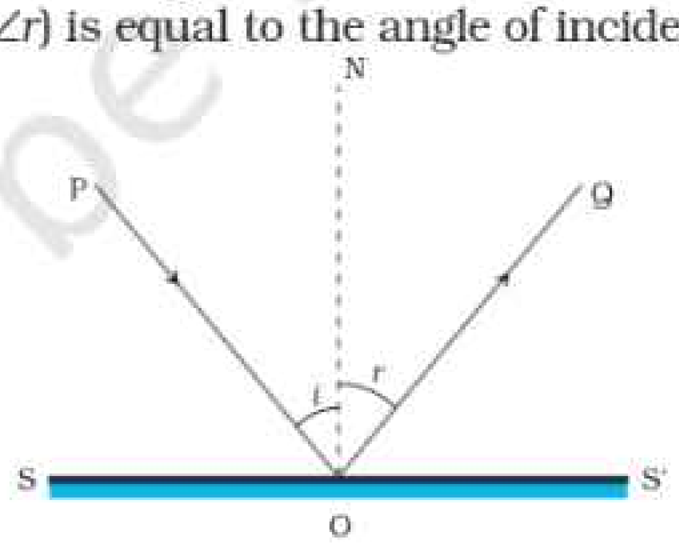

***Fig. 44.1** : Reflection of sound*

MATERIALS REQUIRED

Two identical plastic pipes of length approximately 1 m and of diameter approximately 10 cm or less, a protractor (preferably of big size), a meter scale, and a source of low-amplitude sound such as a table-clock.

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Procedure

1. In this experiment, you are required to hear very low-amplitude sound waves, it is therefore important to have a peaceful atmosphere. To hear such sounds clearly, it is further advised to put the fan off.
2. Using a chalk piece or a pencil, draw a line ON on the table (as shown in Fig. 44.2) normal to the wall surface.
3. Now draw a line OC making an $\angle i_1$ (say 30°) with the line ON.
4. Put one of the two plastic pipes (say PQ) along this line OC such that the end P of the plastic pipe is very close to point O on the wall. Now the axis of pipe PQ lies over the line OC (Fig. 44.2).
5. Now put the second plastic pipe RS on the table, keeping its end R towards the wall on the other side of the normal ON. Mark the position of end R on the table.
6. Keep the table-clock close to the open end Q of pipe PQ.
7. Bring your ear close to the end S of pipe RS. Try to hear the sound of the table-clock through this pipe. Do you hear any sound? Keeping the position of the end R, adjust the position of pipe RS on the table to hear the sound of the table-clock. Mark the position of end S of the pipe RS where you hear the maximum sound.

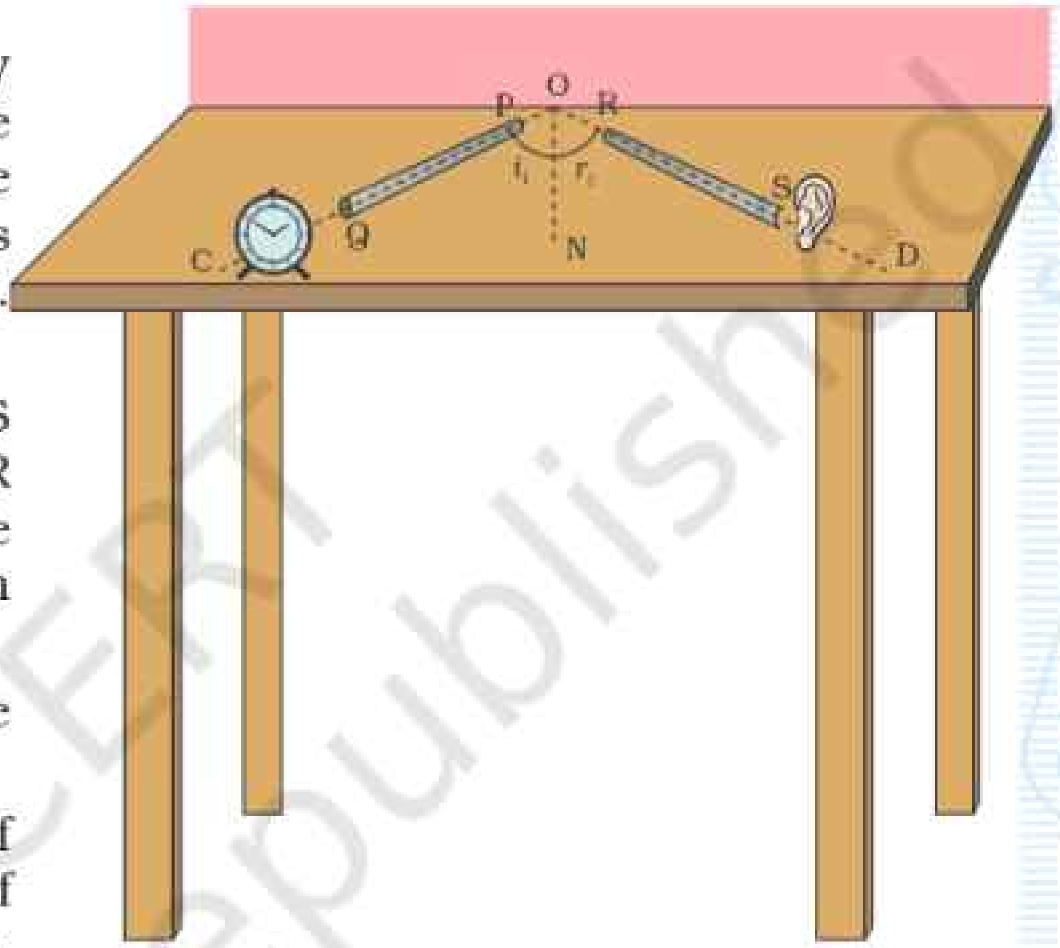

Fig. 44.2 : *The experimental set-up*

8. Draw a line OD joining the point O on the wall, the point representing the position of end R, and the point representing the position of end S.
9. Measure $\angle NOD$. This is the angle of reflection (say $\angle r_1$) for angle of incidence $\angle i_1$. Record observations.
10. Keeping the position of the end R fixed, lift the end S of pipe RS vertically to a small height. Are you able to hear the sound of the table-clock through the pipe RS? If yes, lift end S pipe vertically to some more height. Do you still hear any sound? You will observe that on raising the height of end S, the sound of the table-clock either weakens or completely diminishes.
11. Repeat step 2 onwards for three different values of angle of incidence $\angle i$ and find the corresponding values of angle of reflection $\angle r$.

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12. You might have drawn several lines on the table. As courtesy to the students coming to perform this experiment next, it is advised to remove all the lines drawn on the table.

Observations and Calculations

Sl. No.	Angle of incidence, $\angle i$ (°)	Angle of reflection, $\angle r$ (°)	$\angle i \sim \angle r$ (°)
1.			
2.			
3.			
4.			

Results and Discussion

1. The angle of reflection is equal to angle of incidence in all cases.
2. When the pipe through which the sound is heard, is lifted vertically the sound of the table-clock is either weakened or diminishes completely. It shows that the reflected ray lies in the same plane of incidence.

   These observations verify that the sound reflects at the surface of a solid and follows the same laws of reflection as in case of light. In case if your observations are different from what are expected, discuss the reasons.

Precautions

- It is obvious that to hear a clear reflected sound, the incident sound must be clear and smooth.
- When sound falls on any surface, it is not only reflected but a part of it is also absorbed by the surface of the wall. Hence the sound that you hear through the pipe depends on the nature of the wall. For a smooth reflecting wall, the reflection will be more. It is thus important to have a smooth reflecting surface.
- If we take a larger-amplitude sound source, then you may hear the sound of the source directly (that is the waves coming reaching directly to your ear and not after traveling through pipe QP, reflection from the wall, and through the pipe RS). It is therefore important to have low-amplitude sound source. And for the reasons mentioned here, it is advised to close your other ear while taking observations.
- In this experiment it is assumed that the table-clock produces a ray of sound that is incident on the wall along the path QPO and reflected

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along the path ORSD (Fig. P44.2). That is, the sound source is directional. In reality it is not so. Because of unwanted sound, it is advised to take the pipes of larger length and smaller diameter.

- Measurements of angles should be done taking the axis of the pipes as incident and reflected rays. Take utmost care and precaution in placing the two pipes and in drawing the lines OC and OD.
- Since you are dealing with relatively larger dimensions, it is suggested to use a bigger protractor to measure angles

NOTE FOR THE TEACHER

- In this experiment, two identical plastic pipes are recommended to use. In case plastic pipes are not available, pipes can be prepared using chart papers or news papers.
- In order to absorb all unwanted sound rays (as explained in point 4 in the Precautions and Sources of Errors), the inner surfaces of the two pipes may be painted black and kept rough. In case of plastic pipes, a layer of news papers may be inserted into these pipes. A rough paper is a good absorber of sound. This way the sound reaching to the ear of an observer will become clear and distinct.
- In place of a table-clock, a mobile phone may also be used in its vibratory mode. Some other sources of low-amplitude sound may also be explored and used.
- A cardboard (or a wooden partition) along the normal ON may help to avoid direct sound from the source.

QUESTIONS

- While performing this experiment why do we prefer to use pipes of larger length but of smaller diameter?
- How the experiment of reflection of sound is different from the experiment on laws of reflection of light?
- Which sheet will you choose as sound reflecting surface for this experiment: (a) a smooth wooden board, or (b) a thermo-cole sheet. Why?
- Suppose the whole experimental set up of this experiment is submerged in water. What changes do you expect in observations?
- Why do we require a low-amplitude sound source in this experiment?
- What alterations can be made in the pipes to make the reflected sound more distinct and clear?

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