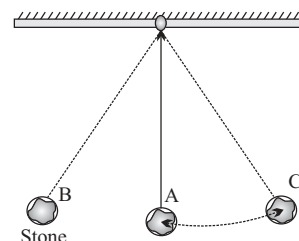


Tie a small stone to one end of a long string and hang it with the help of the other end to a firm support. This may be used as **simple pendulum**. Pull stone gently to one side and let it go. The stone begins move to and fro, i.e. oscillates (Fig. 1.12). Make sure does not move in circles.



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When the pendulum was at rest, it was at A. This position is called the **mean position**. When it swings, it moves from A to B, back to A, from A to C and back to A. In this way it completes one full swing. Each swing is called one **oscillation**. The distance from A to B or from A to C is called **amplitude** of the oscillation. *Amplitude of a pendulum is the maximum distance the pendulum moves away from the mean position while it is oscillating. The time taken for one oscillation is called the **time period** of the pendulum.*

Fig. 1.12 A simple pendulum

Once your pendulum has started swinging steadily you can use your stopwatch or a wristwatch with seconds hand to find out your pendulum's time period. For this, you may count how long your pendulum takes to make 20 oscillations and then from it, the time for one oscillation can be calculated.

### Pendulum clock

The pendulum was used as a time controller in clocks. 1656, **Christian Huygens**, a Dutch scientist, made first pendulum clock, which was regulated by a mechanism using a 'natural' period of oscillation. Although, **Galileo** had invented the pendulum and noticed that the time taken by the weights hanging from a chain or rod to swing back and forth is exactly same amount of time. The whole system was enclosed in a case and thus became the grandfather clock. The length of pendulum and the acceleration to gravity at a place determined the time taken in oscillation.

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Fig. 1.13 A pendulum clock

Though with the discovery of pendulum clocks, time keeping became almost accurate, but it had certain limitations like acquiring large space, and difficulty in movement from one place to the other. Therefore, spring watches were discovered. Such watches have a flat steel-bound spring, which is coiled tight by winding the spring. As the time passes the spring uncoils moving the hour and minutes hands attached to it. Thus, it tells us the time.

With the advancement of science and technology and to meet the need of more accurate time measurement, quartz clocks and atomic clocks came into existence.



(a) Stop Watch



(b) Electronic Watch



(c) Quartz Clock