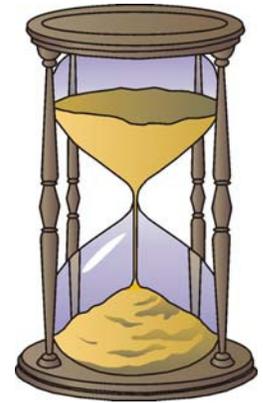




Time Before Clocks: Sand Clocks

Background: Hourglasses have many different names including sand glasses and sand clocks. Although it is not known when and by whom the hourglass was invented, it is possible that it was used in both Ancient Greece and Rome. The hourglass first appeared in Europe in the eighth century and was used at sea well into the nineteenth century. The hourglass follows exactly the same principle as the clepsydra. Two globes (also called phials or ampules) of glass are connected by a narrow throat so that sand (with relatively uniform grain size) flows from the upper globe to the lower. Some hourglasses are still used today as kitchen timers. In this activity, participants create their own hourglass from recycled materials.



Materials:

Two glass or plastic bottles of the same size (e.g., soda bottles)
Piece of cardstock
Hole punch
Masking tape
Sand or salt
Scissors
Stopwatch
Sand timers (5)
Sand timer sample

Instructions for Activity:

1. Use the demonstration sand timers to discuss how each timer can represent a different amount of time. Discuss how sand timers are still used today.
2. Pour very dry sand or salt into a clean, dry bottle.
3. Use scissors to cut a piece of cardstock in a circular shape that will cover the opening of the bottles.
4. Make a hole in the center of the cardstock with a hole punch. Cover the mouth of the bottle with the circle.
5. Set the other bottle on top of the first one that holds the sand or salt.
6. Use tape to tape the mouths of the jars firmly together.
7. Turn the jars over and watch the sand fall into the lower jar.

Questions:

1. Use the stopwatch to time how long it takes for your sand clock to empty. Does it always measure the same time?
2. How can you change it to measure a different amount of time?
3. What advantages does this type of clock have over the sundial? Are there any disadvantages?
4. Would this be a good clock to try to keep the time of day?

Reasons for fluctuations in timing for sand clocks:

The amount or volume of sand used.

The size and angle of the glass bulbs.

The quality of the sand or granular material. It must be fine, dry, and consistently formed so it can flow smoothly.

The width of the neck.

A tight seal so no moisture can get into the chambers. Moisture can add weight to the sand and clog up the neck.

A flat and level surface on which to rest the hourglass.