Medieval Science:
Telling Time with Medieval Timepieces:
Sundials, Candle Clocks, and Water Clocks

Connect Science with Medieval History
Close Reading and Hands-on Learning
How did people tell time in Medieval Times?

1. Why would ancient people need to synchronize time with one another?

2. What is a sundial?

3. What is another name for the hand of a clock?

4. What is a candle clock?

5. What is a sundial clock?

6. How does a water clock work?

How did people tell time in Medieval Times?

"The passing of time has always been valuable to the people of the world. Just as in modern times, ancient people would need some sort of timekeeping device in order to know what time of day it was at any given moment. It would be nearly impossible for people to gather together at a certain time during the day unless there was a way to synchronize time. There were three main timekeeping methods used during the medieval times: the sundial, the candle clock, and the water clock."

The Egyptians used their sundials. This should not be a surprise since they worshipped the sun. A sundial can measure the hours of the day with impressive accuracy. A sundial marked time by measuring the position of the sun. Basically, a shadow stick marked where a person would cast a shadow on the sundial, and the hours could be measured by the direction of the shadow. Sundials also needed to be placed in the center of the sun.

Candle clocks used candles to show the passing of time. The candles had evenly spaced lines on them that were usually marked with numbers for each hour. When the candle burned down to one of the numbers, it showed what time it was. Sometimes the candle just had the lines and no numbers. In this case, the observer would have to know how long it took for the candle to burn from one line to the next. For example, if they knew it took exactly 6 minutes for the candle to burn from one line to the next, they could say it was 6 o’clock.

```
Make Your Own Candle Clock

Since candles burn at a constant rate, they mark time passing very accurately!
```

### Needed
- Candles
- Need to calibrate (set) your candles. How many minutes you light the candle to ask of 5, 15, or 30 minutes.
- Candles side by side. Candles as you start the experiment.
- Sundial marked with numbers on the candle. The candle marked the minute intervals. You can mark the 5, 15, or 30 minutes you want to track with markers.
- Use the candle as a ruler to mark future candles, or burn it to track time as it passes.

### Water Clock

```
Make Your Own Water Clock
```

**Needed**
- A measuring cup
- Water
- A measuring cup
- A piece of string
- A pencil
- A ruler
- A protractor

**Procedure**

1. Fill a cup water 1/3 of the way up. Mark the top of the cup with a piece of string.
2. Using the pencil, draw a line across the cup at the mark.
3. Place the string in the cup 1/3 of the way up. Place the cup in the sun. The marks on the cup will move to the left as the sun moves.

```
Own Sundial
```

```
Make a sundial of cardboard. Place a stick in the ground so it stands perpendicular to the ground.
```

```
To make a sundial:
```

1. Cut a piece of cardboard the same size as the sundial.
2. Place the sundial on the ground. The shadow will be cast on the sundial.
3. Adjust the sundial until the shadow is cast in the correct direction.
4. Mark the time on the sundial.

```
Paper clock:
```

```
Using a paper plate, place a pencil up through the center of the plate.
```

```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
```
How did people tell time in Medieval Times?

The passing of time has always been valuable to the people of the world. Just like in modern times, ancient peoples would need some sort of timekeeping devices in order to know what time of day it was at any given moment. It would be nearly impossible for people to gather together at a certain point during the day, unless there was a way to "synchronize time". There were three main timekeeping methods used during the medieval times: the sundial, the candle, and the water clock.

The Egyptians loved their sundials. This should not be a surprise since they worshipped the sun. A sundial can measure the hours of the day with impressive accuracy. A sundial marked time by measuring the position of the sun. Basically a shadow stick, called a gnomon, which projects a shadow on the sundial and the hours can be measured by the direction of the shadow. Sundials do need to factor in the axis of the sun.

Candle clocks used tall candles to show the passing of time. The candles had evenly spaced lines on them that were usually marked with numbers for each hour. When the candle burned down to one of the numbers, it showed what time it was. Sometimes the candle just had the lines and no numbers. In this case, the observer would have to know how long it took for the candle to burn from one line to the next. For example, if they knew it took exactly 15 minutes for the candle to burn from one line to the next line beneath it, then after 2 lines, they would know that 30 minutes had passed.

A water clock, also known as a clepsydra, uses a flow of water to measure time. There are two types of water clocks: inflow and outflow. In an outflow water clock, a container is filled with water, and the water is drained slowly and evenly out of the container. This container has markings that are used to show the passage of time. As the water leaves the container, an observer can see where the water is level with the lines and tell how much time has passed. An inflow water clock works in basically the same way, except instead of flowing out of the container, the water is filling up the marked container. As the container fills, the observer can see where the water meets the lines and tell how much time has passed.

Key Words:
- synchronize—adjust (a clock or watch) to show the same time as another.
- clepsydra—water clock
How did people tell time in Medieval Times?

1. Why would ancient people need to synchronize time with one another?

2. What is a sundial?

3. What is another name for the hand of the sundial?

4. What is a candle clock?

5. What is a clepsydra?

6. How does a water clock work?
Make your Own Sundial

**Sundial**

**Materials needed:**
- Sidewalk chalk and a space of concrete (like a driveway or playground)
- A watch

*Remember*: Sundials need the sun to be shining!

**Procedure:**
You will create your sundial on a sunny day.
Begin at 9:00am and set a timer for one hour. You will add to your clock every hour.
Stand in the center of the space with your back to the sun.
Draw an X in chalk to mark where you are standing.
Put a mark at the tip of your shadow and label 9.

Every hour from 9-6pm, go to the same spot and repeat the procedure.

At the end of the day, you will have an accurate sundial.

**Variations:**
**Sticks and stones!**
You can make this a more permanent sundial by finding an area where there is little or no foot traffic. Place a stick in the ground so it stands pointing straight up to the sky (perpendicular to the ground).
Each hour mark the end of the sticks shadow with a rock. You may want to paint or draw numbers on the rocks for fun.
Again, mark the sticks shadow every hour, on the hour.
At the end of the day, you will have a semi-permanent sundial.

**Paper plate:**
Using a paper place, place a pencil up through the center of the plate.
Place the plate outside in the sun at 9am. mark the shadow of the pencil with 9.
Again, mark the sticks shadow every hour, on the hour.
At the end of the day, you will have a paper plate sundial.
(Important- because the plate itself can move, you need to make sure you have the plate pointing in the same direction as you make the marks every hour. You will need to make sure the plate is facing the same direction every time you use it so you can tell time accurately!)
Make your Own Candle Clock

Since candles burn at a constant rate, they mark time passing very accurately!

Candle Clock
materials needed:
2 pillar candles
matches
pen
timer

Procedure:
First you need to calibrate (set) your candles.
Decide how many minutes you want the candle to keep track of: 5, 15 or 30 minutes.
Stand the candles side by side.
light one candle as you start a stopwatch.
Every minute, mark the unburned candle at the level of the burned candle.
After you have marked the minute intervals you can mark the 5, 15, or 30 minutes you want to track with marker.
you can use this candle as a ruler to mark future candles, or burn it to keep track of time as it passes.

Variations:
A Keepsake Candle Clock
You will need a candle stand that has a wooden back drop.
instead of marking the candle, you will make the markings directly on the wood.
As long as you use the same size and type of candle, you can use your Keepsake Candle Clock to keep track of the passing of time.

This candle clock uses a metal holder.

***Safety first***
Adult supervision is needed whenever using matches!
Make Your Own Water Clock

Water Clock

Materials:
- Mason Jar (see through)
- Paper Cup
- Pencil/pen
- Large needle
- Timer/stopwatch

Procedure:
- Using the needle, poke a hole in the paper cup large enough for water to trickle out at a steady rate.
- Mark the inside of the paper cup with your "full line". You will always put this much water in your clock.
- This is a team job: one person will watch the water, the other will watch the stopwatch.
- Fill up the cup with water and place it in the mouth of the mason jar (so the water drips into the jar).
- Watch the time closely, and mark the water level on the mason jar at given intervals (like every 1-3 minutes).

To use Water Clock:
- Simply fill up the paper cup and let it run out into the jar. As the water reaches each interval you will know how much time has gone by.

**Note: Remember, the water will leave the cup faster at first, due to the greater amount of water pressure when the cup is full, opposed to when it is empty, so your lines will get closer together as more time passes.
Choose your favorite Ancient method of telling time (sundial, candle clock, water clock)

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

Do research on your favorite time telling method.
Explain its history.
Describe how it works in easy to understand language.

http://www.teacherspayteachers.com/Store/Rebekah-Sayler
There were three main timekeeping methods used during the medieval times: the sundial, the candle, and the water clock.

http://www.teacherspayteachers.com/Store/Rebekah-Sayler
The passing of time has always been valuable to the people of the world. Just like in modern times, ancient peoples would need some sort of timekeeping devices in order to know what time of day it was at any given moment. It would be nearly impossible for people to gather together at a certain point during the day, unless there was a way to "synchronize" time. There were three main timekeeping methods used during the medieval times: the sundial, the candle, and the water clock.
The passing of time has always been valuable to the people of the world. Just like in modern times, ancient peoples would need some sort of timekeeping devices in order to know what time of day it was at any given moment. It would be nearly impossible for people to gather together at a certain point during the day, unless there was a way to “synchronize time”. There were three main timekeeping methods used during the medieval times: the sundial, the candle, and the water clock.
name: _____________________________

Copywork: Cursive

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

http://www.teacherspayteachers.com/Store/Rebekah-Sayler
Thank you for your business!
You can find me at
www.teacherspayteachers.com/store/Rebekah-Sayler
www.abetterwaytohomeschool.com
https://www.facebook.com/ABetterWayToHomeschool
http://www.youtube.com/user/BetterWay2Homeschool

Research and Image Sources:

Almost Unschoolers
http://www.buzzle.com/articles/ancient-egyptian-inventions.html
http://exchange.smarttech.com/details.html?id=cc188c11-b5e8-4583-aa45-ba7bc2dff32b

Graphics by: