



# Minds in Motion

## Keeping Time with the Sun

### Activity Rundown:

If you didn't have a clock handy, how would you tell the time? Before the invention of mechanical clocks, people have been accurately telling time for thousands of years. But how?! Thanks to the constant and consistent rotation of the Earth around the Sun, a simple tool called a sundial can be used to tell the time of day depending on the apparent position of the Sun in the sky. In this activity, you'll be tasked with making your very own sundial!

### You will need:

- + Paper plate
- + 3 Push pins
- + Pencil
- + Crayons
- + Ruler
- + Sunlight

### Let's do it!

1. Using a ruler, determine the exact center of your paper plate. Then, using a sharp pencil, poke a hole through the center of the plate.
2. Turn the paper plate upside down. Using a crayon or marker, write the number 12 on the edge of the plate. Using a ruler, trace a straight line from the 12 down to the center of the plate.
3. Stick a pencil or straw into the hole you made in the plate center.



4. During a sunny morning, take your paper plate sundial outside and secure it into place using your push pins. This works best in an open patch of grass. You don't want any other shadows from your house or shed interfering with your sundial!



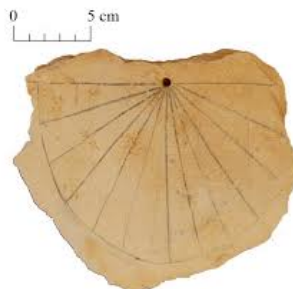
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5. At noon, return to your sundial and notice where the pencil's shadow has been cast. Rotate and edit your sundial placement until the shadow of the pencil lines up perfectly with the line connecting the 12 to the center of the plate.
6. Wait an hour until 1:00 pm comes around and return to your sundial. Mark the shadow's position on the paper plate and label it as 1 for 1 o'clock.
7. Using the placement of 12 and 1, predict where the rest of the numbers (2 through 11) will fall on the plate. Mark them and make sure to double check if your placements were correct when that specific time comes around!



## Background:

- Sundials are the oldest known devices that are used to measure time! It depends on the rotation and movement of the sun. As the sun moves from east to west, the shadows formed predict the time of the day.
- The Egyptians were the first to use the sundials. They used a stick or pillar called the gnomon. Time was calculated depending on the length of the shadow.



*Ancient Egyptian Sundial!*

How does a sundial work?

- When the Earth rotates about its axis, the Sun appears to move across the sky, causing objects to cast shadows. As the sun changes relative positions over the

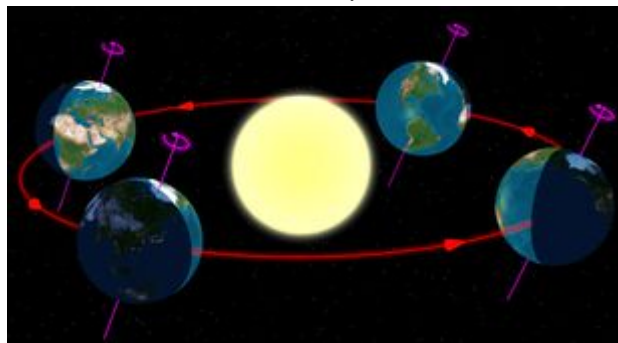


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course of a day, the rod's shadows change as well, therefore reflecting the change in time.

## Earth's Orbit and Rotation:

- The Earth moves in two different ways. Earth **orbits** the sun once a year and **rotates** on its axis once a day. The Earth's orbit makes a circle around the sun. At the same time the Earth orbits around the sun, it also spins.



- As Earth rotates, it seems like the sun is moving across the sky, but it's really the Earth that is spinning! It takes 24 hours to complete one rotation, which is why there are 24 hours in one day.
- It takes a little more than 365 days for the Earth to make a complete trip (otherwise known as an orbit) around the sun.

## Science behind Shadows:

- A shadow is an **absence of light**. If light cannot get through an object then the surface on the other side of that object (for example, the ground or a wall) will have less light reaching it.
- The shape of the object determines the shape of the shadow.
- The size and shape of a shadow can change. These changes are caused by the position of the light source.
- The Sun's position in the sky affects the length of the shadow! When the Sun is low on the horizon, the shadows are long. When the Sun is high in the sky, the shadows are much shorter.
- Nighttime is caused by the shadow made when our side of the Earth completely blocks the light coming from the Sun!

## Resources:

<https://www.greenkidcrafts.com/sundial-craft/>



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## Reach out!

We would love to hear from you about all the amazing STEM projects you are doing at home! Show us your finished products on any of the following social media platforms by tagging us or by using the following hashtags. We hope these projects have brought some excitement to your day during these difficult times.

Let us know how we did! Please [click here](#) to fill out a short survey on how well we did and what you would like to see more of in the future. Thank you!

Twitter: **@MyMindsInMotion**

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**#ucalgarycamps #ucalgarytogether**