

Hickory Dickory Dock ~ Building a Sundial

Objective(s)

Students will investigate the concepts of time and sound through hands-on activities.

Students will create a sundial to develop an understanding of the passage of time.

Activity that involves problem-solving and strategic thinking:

- Students will construct a functional sundial using new or recycled materials and explain how it works.
- Students will observe and describe how the position of the sun affects the length and direction of shadows throughout the day.
- Students will explain how a sundial functions as a tool for measuring time based on the position of the sun.
- Students will measure the lengths of shadows at different times of the day and compare their findings.
- Students will practice telling time using their sundials and relate it to reading time on analog clocks.

Standards/Objectives addressed:

- **Early Learning Standards (Head Start Early Learning Outcomes Framework):**
 - **Science:** Demonstrates curiosity and a willingness to explore the natural world.
 - **Mathematics:** Understands and uses concepts of time; recognizes and describes patterns.
 - **Creative Expression:** Engages in creative expression through artistic activities.
- **K-ESS2-1:** Use and share observations of local weather conditions to describe patterns over time.
- **K-PS3-1:** Make observations to determine the effect of sunlight on Earth's surface.
- **1-ESS1-1:** Use observations of the sun, moon, and stars to describe patterns that can be predicted.
- **2-ESS1-1:** Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
- **K.MD.A.1:** Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
- **K.MD.B.3:** Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.
- **1.MD.A.1:** Order three objects by length; compare the lengths of two objects indirectly by using a third object.
- **1.MD.B.3:** Tell and write time in hours and half-hours using analog and digital clocks.
- **2.MD.C.7:** Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
- **2.MD.A.1:** Measure the lengths of objects using appropriate tools.

- **CCSS.ELA-LITERACY.W.K.2:** Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.
- **CCSS.ELA-LITERACY.W.1.2:** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- **CCSS.ELA-LITERACY.W.2.2:** Write informative/explanatory texts to help others understand a concept or process.
- **D2.His.1.K-2:** Identify the ways in which we learn about the past.

Background knowledge needed:

- Basic Concepts of Time
- Clocks
- Light Sources
- Shadow Formation
- Using Measurement Tools
- Comparing Measurements
- Understanding Angles
- Shapes
- Introduction to Sundials

Materials:

- Cardboard, paper plate, or a round piece of cardboard can work as a base.
- A straight stick, straw, or pencil (approximately 6-12 inches long)
- Markers or pens (to label the hours on the sundial)
- Ruler (to measure and evenly space hour markings)
- Protractor (to help understand angles, if applicable)
- Measuring tape or ruler (to measure shadow lengths)
- Colored markers, crayons, or paints (for decorating the sundial)
- Stickers or decorative materials (to personalize the sundial)
- Glitter or sequins (for fun embellishments)
- Notebooks or sheets of paper (for students to record observations)
- Clipboards (to hold observation sheets outdoors)
- Clocks for Comparison

Prompts – questions or statements to elicit engagement:

- How does the shadow change?
- What do you notice about the length and position of the shadow at different times of the day?
- Can you explain how the shadow changes as the sun moves?
- Do you notice any patterns?
- What happens at different times?
- How does the shadow look at noon compared to the morning or late afternoon?
- Why do you think that is?

- What if we change the gnomon?
- What do you think would happen if we used a taller or shorter gnomon?
- How would it affect the shadow?"
- What if it's cloudy?
- How would we tell time using our sundial on a cloudy day?
- What is the relationship between time and shadows?
- How do you think the position of the sun relates to time? Can we use the sundial to tell time just like a clock?
- Can we predict the shadow?
- If we know what time it is now, can we predict where the shadow will be in an hour? Why or why not?"

Vocabulary:

Sundial, gnomon, shadow, time, light, measurement, angle, hour, minute, clock, reflection, observation, pattern, compare, record, rotate, position

Reflection prompts:

- How did it feel to create your sundial? Was it easy or challenging?
- What was your favorite part of making your sundial?
- What challenges did you face while creating it?
- What did you learn today?
- What is one new thing you learned about time or shadows while working on your sundial project?

Extensions:

- **Clock Creation:** Students can create their own paper plate clocks using craft materials. They can color the plates, add numbers, and use moveable hands (made from cardstock or brads) to show different times. They can practice setting the clock to different times based on the story or their daily routines.
- **Clock Collage:** Have students create a large collage using magazine cutouts, drawings, and stickers that represent different activities done at various times of the day. They can categorize them into morning, afternoon, and evening.
- **Time-Themed Art:** Create a mural or collage that represents different times of the day, incorporating drawings or photos of activities they do at those times.
- **Time Capsule:** Collect items from the classroom that represent different times of the day or week, and create a time capsule to open later in the school year.
- **Time Measurement Stations:** Set up different stations where students can measure time using various tools (e.g., sand timers, stopwatches). They can engage in timed activities like races or building challenges.

- **Time Olympics:** Organize a "Time Olympics" event where students participate in timed challenges (e.g., relay races, timed puzzles) and learn about measuring time for each activity. They can keep score and discuss how timing affects performance.
- **"A Day in My Life" Timelines:** Students create a visual timeline of their typical day, illustrating what they do at specific times. They can use drawings, photographs, or even digital tools to create their timelines.
- **Seasonal Clock:** Students can create a seasonal clock that showcases activities associated with different seasons (e.g., summer swimming, winter sledding). Each hour can represent a different season or activity.