

Didactic Scenario

1. Title

Sun-Based Sundial Design

2. Keywords

Coding game, technology, programming, gamification, logical

3. Basic Information

STEAM Subject: Engineering

Typical interaction time with the instructional scenario in teaching hours for in-school work:
120 minutes

General description of the scenario:

Phases	Stage	Time
1	Introduction	10 minutes
2	Observation and Data Collection	30 minutes
3	Design Process	30 minutes

Age group: 8 – 11 years old

Estimated difficulty level:

Very Easy	Easy	Moderate	Challenging	Very Challenging
			X	

Teaching resources

Material:

Sunny day
Suitable outdoor area or open space
Long straight stick (e.g., wooden or plastic stick)
Small rectangular board or cardboard piece
Thumbtack or adhesive
Labels indicating hour and minute marks
Colored pencils or paint
Observation notebooks and pens

School infrastructure: Not required.

Additional material from external sources/online tools:

<https://www.britannica.com/technology/sundial>

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4. Educational Problem

This activity aims to teach students how to measure time and design a sundial by observing the movement of the sun and the formation of shadows. Students combine their scientific, mathematical, and design skills by creating a sundial that operates based on the movement of the sun. The activity focuses on direct observation, data collection, and analysis. It also helps students understand the basic concepts of the sun's movement and the angle of sunlight, fostering their interest in the sciences.

5. Learning Objective (-s)

1. Students will learn how to observe and analyze the movement of the sun to measure time.
2. They will develop skills in data collection, recording observations, and measuring shadow lengths.
3. Students will understand the relationship between the position of the sun, shadow formation, and the concept of time.
4. They will gain knowledge about the design and functioning of a sundial, including the use of regular polygons and the alignment of the gnomon.
5. Students will enhance their problem-solving and critical thinking abilities by overcoming challenges during the design process.

6. The activity promotes an interdisciplinary approach, integrating science, mathematics, and art, and encourages creativity and innovation.

6. Phases of the Scenario

Phase 1

Title: Introduction

Indoor	Outdoor	Mixed
	X	

Phase duration in minutes: 10 minutes

Detailed description of the scenario phase:

Provide a brief explanation to the students about the movement of the sun and the formation of shadows.

Identify the outdoor area where they will go to observe the sun's movement.

Activity sheets:

Phase 2

Title: Observation and Data Collection

Indoor	Outdoor	Mixed
X		

Phase duration in minutes: 30 minutes

Detailed description of the scenario phase:

Encourage students to observe and record the sun's movement throughout the day. At each hour, have them measure the length of shadows to determine the position of the sun. Record the time, minute, sun's elevation, and shadow length in their observation notebooks.

Activity sheets:

Phase 3

Title: Design Process

Indoor	Outdoor	Mixed
X		

Phase duration in minutes: 30 minutes

Detailed description of the scenario phase:

Instruct students to design a sundial based on the movement of the sun.
Place the long straight stick upright and attach hour and minute marks using adhesive or thumbtacks.
Secure the small board on top of the stick and draw or attach hour marks corresponding to the sun's movement.
Allow students to color and personalize their designs.

Activity sheets:

7. Evaluation Methodology

10 minutes

Provide an opportunity for students to present their designs to their classmates in the classroom or outdoor area.
Allocate time for each student to showcase their design and explain how it works.
Evaluate the designs as a group and ask students what they have learned and what challenges they encountered during the design process.

This activity helps students learn how to measure time based on the sun's movement and design a sundial according to the sun's position. It also enhances their skills in data collection through observation, design thinking, and presentation. Additionally, it aids in understanding fundamental concepts related to the movement of the sun and how a sundial functions.

Note: The duration and steps of the activity can be adjusted according to the student age group and time allocation. It is important to have suitable weather conditions for students to observe the sun's movement.

