



## EduTrend Contents

W4C · ASTRONOMY & SPACE SCIENCE · PRIMARY

# Shadow Clock

How do shadows change during the day?

Ages 7–10

Level: Foundation

60 minutes + short checks

Groups of 3 · up to 30

Activity 01

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 pupil worksheets · assessment checklist

## ACTIVITY 01 · AT A GLANCE

# Shadow Clock

Pupils investigate how shadows change as the Sun appears to move across the sky. They set up a shadow stick in the playground, mark the shadow every hour, measure its length and direction, and use the pattern to build a simple sundial. The activity links light, shadows and the Earth's rotation.

## Learning outcomes

By the end of the session pupils can:

- explain that shadows form when an object blocks light;
- measure and record shadow length at different times;
- describe how shadow length and direction change through the day;
- explain the pattern using the Earth's spin.

**KEY WORDS**

shadow · light · opaque · Sun · rotation · noon · sundial

**CURRICULUM LINKS**

Science: light and shadows, Earth and space. Maths: measuring, time, line graphs. Geography: compass directions.

**1****QUESTION**

What do we want to know?

**2****OBSERVE**

Watch the sky

**3****MODEL**

Build a model

**4****MEASURE**

Take readings

**5****COMPARE**

Model vs reality

**6****EXPLAIN**

Use evidence

## Materials (per group)

- Shadow stick (1 m cane in a flowerpot or taped upright)
- Chalk, tape measure, compass
- Watch or clock
- Worksheets 1, 2 and 3

## Before the session

- Check the weather forecast for a sunny day.
- Choose an open playground spot free from building shadows all day.
- Mark north with chalk using a compass.
- Plan short hourly visits (5 minutes each).

**SAFETY**

Never look directly at the Sun. Wear hats and sun cream in strong sun. Keep canes upright and away from faces.

## ACTIVITY 01 · SESSION PLAN

# Step by step

The first session takes 60 minutes. Then visit the stick for 5 minutes each hour. Finish with a 20-minute review.

| Time                 | What happens                                                                                      | Say or ask                                              |
|----------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 0–10 min<br>Hook     | Pupils make shadows with their hands and a torch. How do you make a long shadow?                  | <i>"Where must the light be to make a long shadow?"</i> |
| 10–20 min<br>Predict | Groups predict how the stick's shadow will change from morning to afternoon.                      | <i>"Will it get longer or shorter by lunchtime?"</i>    |
| 20–40 min<br>Set up  | Groups set up the stick, mark the first shadow tip with chalk, write the time and measure length. | <i>"How will we keep it fair all day?"</i>              |
| 40–60 min<br>Model   | Indoors, model with a torch moving over a pencil in modelling clay.                               | <i>"What happens when the torch is high?"</i>           |
| Every hour<br>Record | Groups mark, time and measure the shadow.                                                         | <i>"Which direction is the shadow pointing now?"</i>    |
| Review<br>Explain    | Groups draw a line graph and explain the pattern.                                                 | <i>"Is the Sun moving, or are we?"</i>                  |

## CHALLENGE CARD (print or copy onto the board)

Use your shadow marks to make a sundial. Tomorrow, can you tell the time from the shadow to within 30 minutes?

## ACTIVITY 01 · FACILITATOR NOTES

# The astronomy in brief

A shadow forms when an opaque object blocks light. In the morning the Sun is low in the east, so shadows are long and point west. Around midday the Sun is highest, so shadows are shortest and, in the northern hemisphere, point roughly north. In the afternoon the Sun sinks in the west and shadows lengthen again, pointing east.

The Sun is not really moving across the sky: the Earth spins once every 24 hours, making the Sun appear to rise, cross the sky and set. People used this pattern for thousands of years to tell the time with sundials.

## Common ideas to listen for

- “The Sun moves round the Earth.” The Earth rotates, making the Sun appear to move.
- “Shadows are shortest at 12:00 exactly.” The shortest shadow is at solar noon, which may differ from clock time.
- “Shadows are the same all year.” They are longer in winter when the Sun is lower.

## Adapting the activity

### Support

Record only in the morning, at midday and in the afternoon, and use a ready-made table.

### Stretch

Plot shadow length against time and find the time of the shortest shadow. Compare with the clock time.

**WORKSHEET 1**

# Shadow record

Name: \_\_\_\_\_

Class: \_\_\_\_\_ Date: \_\_\_\_\_

Mark the shadow tip with chalk each hour. Measure its length.

## Results

| Time  | Shadow length (cm) | Direction |
|-------|--------------------|-----------|
| 9:00  |                    |           |
| 10:00 |                    |           |
| 11:00 |                    |           |
| 12:00 |                    |           |
| 13:00 |                    |           |
| 14:00 |                    |           |
| 15:00 |                    |           |

## Prediction check

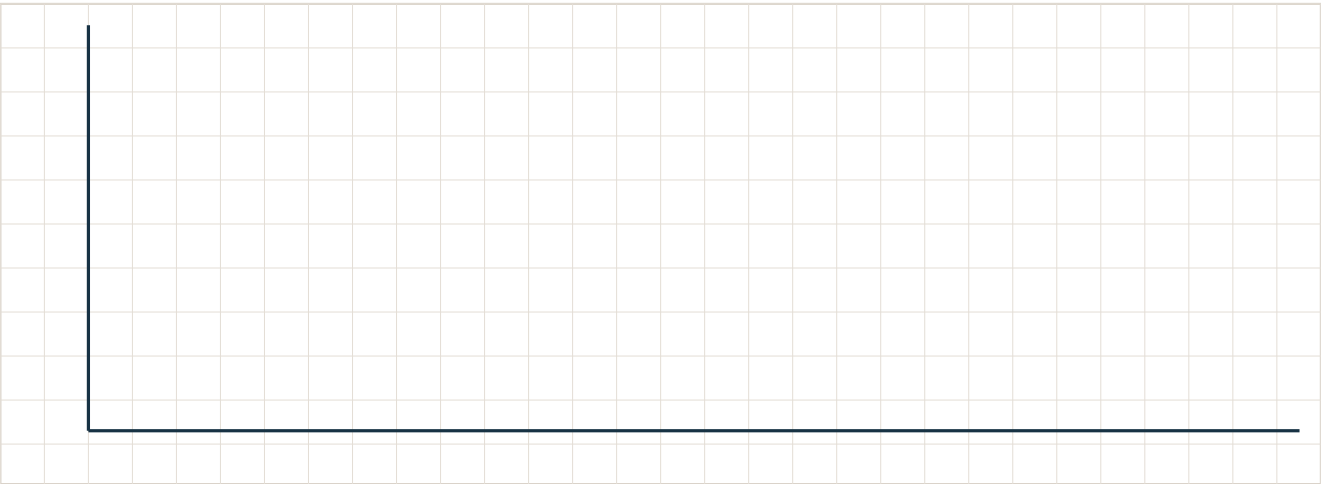
My prediction was right / wrong because

**WORKSHEET 2**

# Shadow graph

Plot shadow length against time.

## Line graph



y-axis: shadow length (cm)

x-axis: time of day

**When was the shadow shortest? Why?**

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**WORKSHEET 3**

# Astronomer’s log

Colour the box that is true for you.

**What I can do**

| I can...                           | Not yet | Nearly | Yes! |
|------------------------------------|---------|--------|------|
| explain how a shadow forms         |         |        |      |
| measure a shadow                   |         |        |      |
| describe the pattern               |         |        |      |
| explain it with the spinning Earth |         |        |      |

**Draw the Sun and the shadow at morning, noon and afternoon**

FOR THE TEACHER

# Assessment checklist

Use during the session. One sheet covers up to eight pupils; copy as needed.

| Pupil | Measures accurately | Describes the pattern | Explains with rotation |
|-------|---------------------|-----------------------|------------------------|
|       |                     |                       |                        |
|       |                     |                       |                        |
|       |                     |                       |                        |
|       |                     |                       |                        |
|       |                     |                       |                        |
|       |                     |                       |                        |
|       |                     |                       |                        |
|       |                     |                       |                        |

Suggested codes: W = working towards · E = expected · G = greater depth

**ABOUT THIS ACTIVITY**

Shadow Clock is a sample activity from the EduTrend Contents W4C Astronomy & Space Science programme (primary, level: foundation). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at [edutrend.org](https://edutrend.org).

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