Human Sundial
Key Stage 2

Topics covered: Earth, Sun, day and night, time, shadows, graphs, measuring distance

Teacher's Notes

In this activity, which must take place in the playground on a sunny day, pupils look at their shadow at different times of the day and measure differences in its size and direction. You can use a compass or an online map to help work out which way is North on the playground before measurements begin. Students record their results in a table and in a bar chart or line graph and discuss why they see what they do.
Note: During British Summer Time the clock is set one hour ahead of Greenwich Mean Time, so that, e.g., 12:00 BST (clock time) is 11:00 GMT (real time relating to the position of the Sun overhead).

Equipment: chalk, metre rulers, graph paper, 30 cm rulers, pencils, colouring pencils, compass (optional)

Questions to ask the class before the activity:

Why do we have shadows?
Answer: A shadow appears when an object blocks a light source such as the Sun.

Do you have a shadow in the classroom? Why?
Answer: Yes, anywhere there is a source of light, you will cast a shadow.

If you are standing outside and the Sun is behind you, where will your shadow be?

Answer: In front of you. Shadows always point away from the source of light which causes them.

Questions to ask the class after the activity:

What did your results show?
Answer: Shadows move regularly from West to East over the day (see images below). They also get shorter towards the middle of the day before growing in length again.

Why do you think this happens?
Answer: The Sun appears to rise in the East, climb upward through midday, and then set in the West. Shadows always point away from the Sun.

When was your shadow shortest?
Answer: Midday.

Why do you think the Sun moves from east to west every day?
Answer: The Earth is spinning on its axis.

In these pictures the shadow cast by the planetarium cone moves during the day due to the Sun's motion from east to west.

Human Sundial: Answers

What do you think will happen to your shadow at different times of the day?
Answer: It will change size – it will be smallest at midday and longest in the morning and late afternoon.

Draw a line graph or bar chart showing the length of your shadow at different times of the day. What happened to your shadow?
Answer: Its length decreased towards midday and then increased at later times.
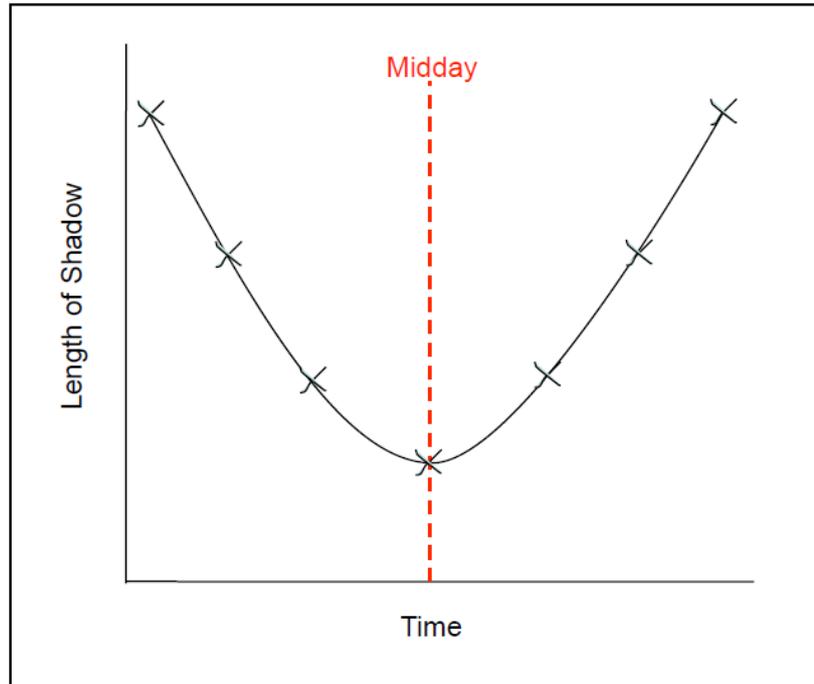
When is the Sun highest in the sky? What happened to your shadow at this time?
Answer: Midday. My shadow was shortest at this time.

Use your sundial to find out the time over the next few days. When will this clock not work?
Answer: When it is cloudy outside and after the Sun has set.

Activity: **Human Sundial**
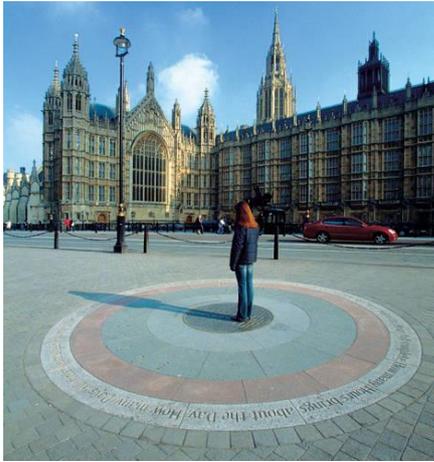
This sundial was placed here in 2002 to mark Queen Elizabeth II's Golden Jubilee (50 years of reign). If you stand on the line closest to the correct date your shadow points to the correct time on the circle.

You can become a sundial in your playground.

1. In pairs find an empty part of the playground and mark the place where you stand with an 'X' in chalk.

2. Ask your partner to draw the outline of your shadow with chalk and write the time next to the shadow.

3. Write down the direction of your shadow in the table below. Your teacher can help you to find out which way is North.

4. Measure the length of your shadow with a metre ruler and write it in the table.

5. Repeat steps 2, 3 and 4 at different times in the day.

What do you think will happen to your shadow at different times of the day?

Time	Direction of Shadow	Length of Shadow (cm)
09:00		
10:00		
11:00		
12:00 (midday)		
13:00 (1:00 pm)		
14:00 (2:00 pm)		
15:00 (3:00 pm)		

Draw a line graph or bar chart below showing the length of your shadow at different times of the day. What happened to your shadow?

_____

When is the Sun highest in the sky? What happened to your shadow at this time?

_____

_____

Use your sundial to find out the time over the next few days. When will this clock not work?

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