The sundial
Use the Sun

52

time
55 minutes, spread across two days

learning outcomes
To:
- know that you can tell the time using a sundial
- tell the time using the Sun
- discover that long ago it was much more difficult to tell the time than it is today

end product
- a small sundial indoors
- a large sundial outdoors

materials needed
- 12 large stones
- scissors
- glue
- a stick around 150 centimetres long
- a large protractor
- a marker pen
- a compass to tell where North is
- optional: extra small stones

Preparation
For the activity **The large sundial** you will need a playing field that is in sunlight most of the day.

What time is it? 5 min.
Ask if any of the children is wearing a watch. Why is it handy to have a watch? Explain that 600 years ago nobody had a watch. Ask how the people back then knew what time it was. Before the mechanical clock was invented, people sometimes used the sun to tell the time. They did this using a sundial.

Have any children ever seen a sundial? Do they know how it works? Explain that a sundial has a stick or pointer that makes a shadow. This is called the gnomon. It is important that in the Northern hemisphere the gnomon always points North, or you will not be able to read the sundial. Explain that the Earth turns on its axis. This means that the position of the Sun with regard to the Earth is always changing. If necessary demonstrate this using a torch and an orange. Explain that the shadow of an object also changes as the Earth rotates. The sundial uses this fact. By looking at the position of the shadow of the gnomon on the sundial, you can tell what time it is.

Tip.
Long ago people also used other devices to tell the time, such as the hourglass. Lesson 50 shows how to make an hourglass and use it to tell the time.

The children make two sundials.

Make a sundial 20 min.

Hand out scissors, glue and the activity sheet. The children complete Task 1 on the worksheet.

Important: to calculate the angle for the gnomon, you need to know the latitude of your town. You can look this up in an atlas or on the internet. For example the latitude of London is 51 degrees N, so the angle needed for a sundial in London is 51 degrees. The instructions are on the worksheet. When their sundial is ready they should put it somewhere with the arrow facing South.

The children read the time shown by the sundial. Can they see what time it is? The children complete Task 1 on the worksheet. Discuss the tasks. Come to the conclusion that today we always know exactly what time it is because there are so many clocks around us. Long ago, when there weren't any watches and clocks, it was much more difficult to tell the time. And of course they could not use a sundial at night!

Good to know.

This sundial is based on GMT+1. If you are making it in Summer Time you will need to change the numbers. Every hour number will need to be one hour later. So the 12 will be a 1, the 1 will be a 2 etc.

The large sundial at least 30 min.

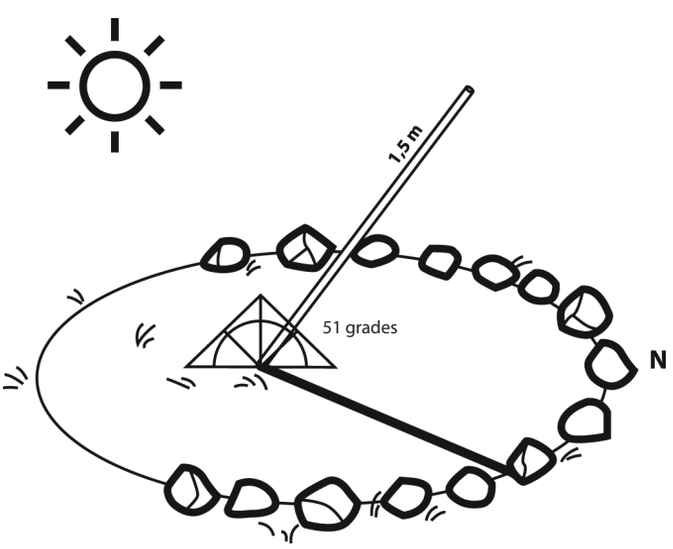
Make a large sundial with the children. Take the children outside to a location where the sun shines most of the day. Mark the direction of North, using a compass if necessary.

Stand the large protractor upright on its long side in the grass. Use it to measure the correct angle to the ground, as described above. Stick the stick firmly in the ground at the chosen angle, facing North. See the picture for how this should be done.

Every hour the children place a large stone on the ground where the shadow of the stick falls. One of the children uses the marker pen to write the number of the hour on the stone. You can use the smaller stones to mark the quarter and half hours.

If you don't want to take the children outside every hour, you can just place two stone markers, one in the morning for example at 9.00) and one in the afternoon (for example at 14.00). Of course your sundial will be less accurate.

To finish the sundial, the rest of the day after school-time needs to be divided using the stones. In the example shown here, five hours have passed and so the time in between needs to be divided into five. Encourage the children to write the numbers of the hours on the stones and place them in the correct position. The next day, take the children outside to see if they can read what time it is. How accurate is their sundial?



Good to know.

When the Sun is due South and the shadow is pointing to the North, it is noon. That means it is exactly 12 o'clock in solar time. Solar time is not always exactly the same as the time shown on your watch. That is because the time we use today is not based on the sun's actual position in the sky.

The sundial

You are going to make a sundial.

1 Make a sundial

What do you need?

• scissors

What do you need to do?

1 Cut out the square on the cut-out sheet.

2 Cut the gnomon at the correct angle for where you live.

3 Fold the gnomon on the dotted lines.

4 Fold the dotted line upwards on the dial base.

5 Paste the lettered tabs A, B, C and D onto the dial base.

6 Place the sundial on the ground with the arrow pointing South.

a What time does your sundial show?

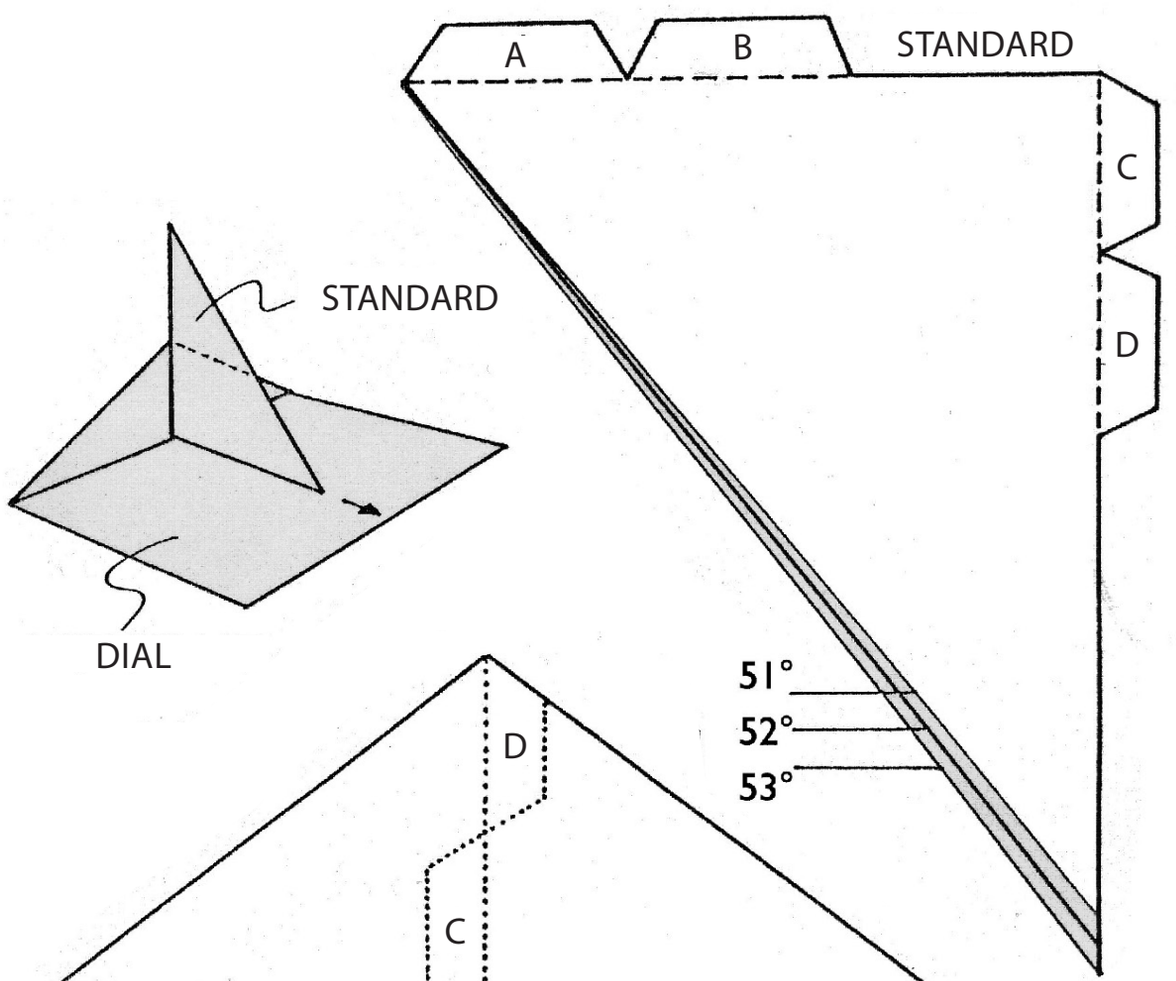
_____ o'clock

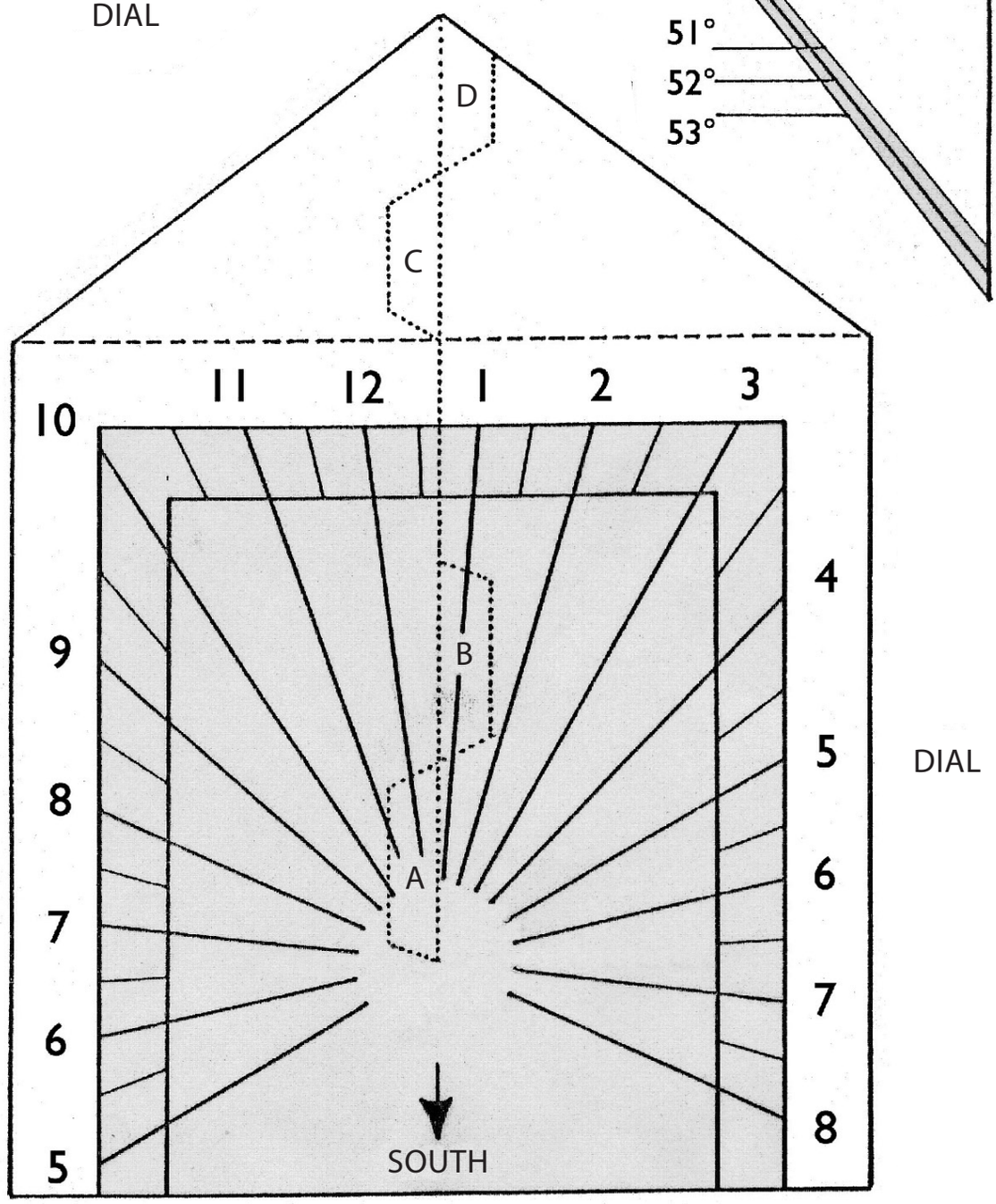
b What time does your watch show?

_____ o'clock

c Why is it handy to have a watch?

d	Did people long ago know what time it was if the Sun wasn't shining?
4	How does a sundial work?


A
B
STANDARD
C
D
STANDARD
DIAL
51°
52°
53°


D
C
11
12
1
2
3
10
9
8
7
6
5
4
5
6
7
8
B
A
SOUTH

DIAL