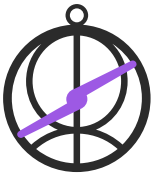
SPACE awareness

BUILD A BABYLONIAN SUNDIAL

Learn how the ancient Babylonians measured time

, Haus der Astronomie



Curriculum topic
Sun

Big idea of science

Keywords
Islamic Heritage, sundial

Age range
8 - 14

Education level
Primary School, Middle School

Време
2h

Group size
Group

Supervised for safety
Supervised

Cost
Low (< ~5 EUR)

Location
Outdoors

Core skills
Asking questions, Developing and using models

Type of learning activity
Partial enquiry

BRIEF DESCRIPTION

Through this activity children observe the apparent motion of the Sun in the sky and build a Sundial to measure the length of the day just like the Babylonians did thousands of years ago. Children learn how to measure time by building a Sundial, observing the projected shadow on it and writing numbers to indicate the hours.

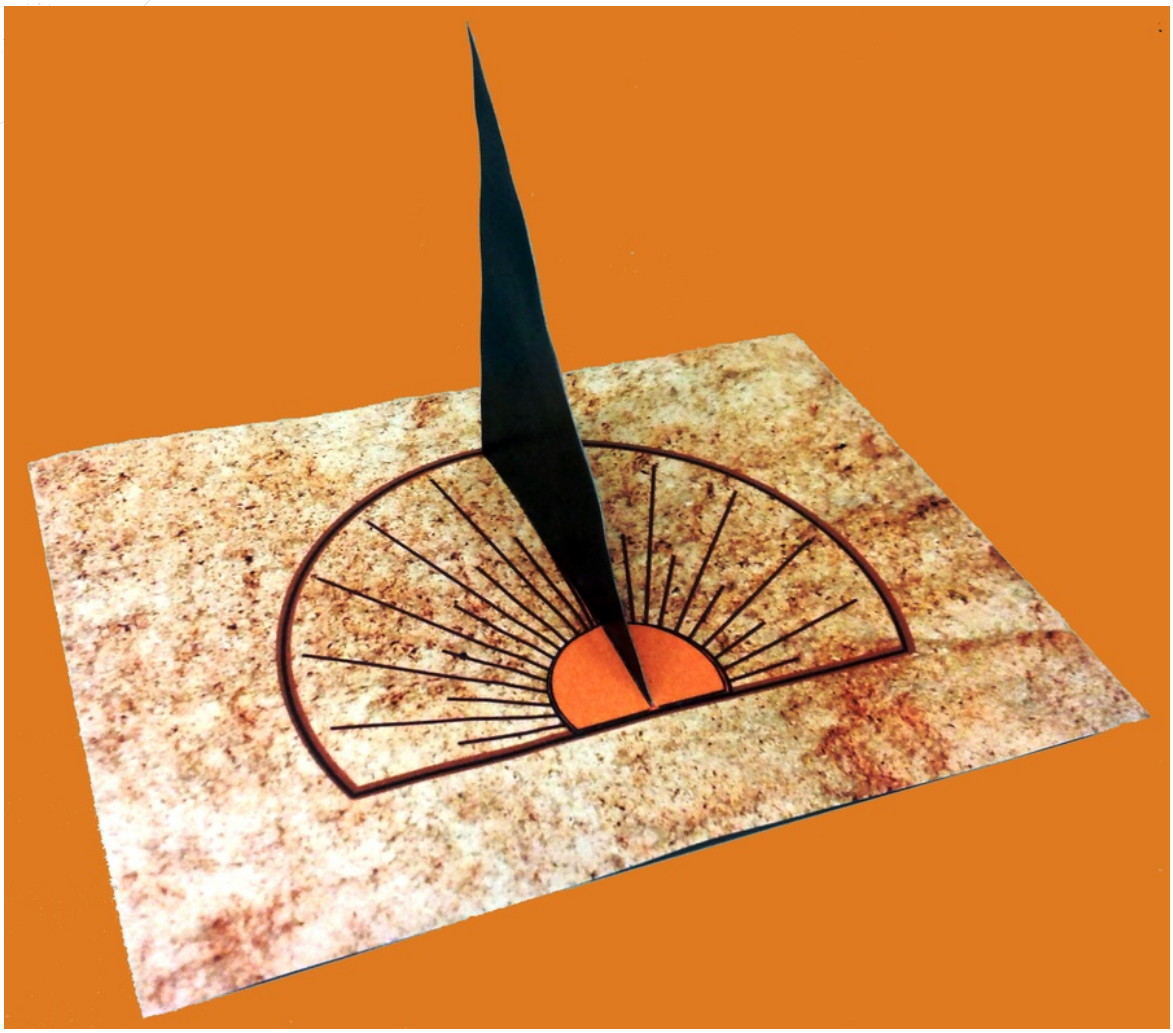


Fig. 5 Model of Babylonian sundial (Credits: Scorza)

GOALS

With this activity, the children will learn that measuring time is related to the periods and cycles of celestial objects like the Sun as they move across the sky. They will also realise that this concept has been utilised as a way to track time for millennia.

LEARNING OBJECTIVES

After carrying out this activity, the children will be able to:

- use a sundial to measure time.
- describe how a sundial works.
- explain the relation between the position of the Sun and the shadow on a sundial.
- describe that the Babylonians defined the duration of the day taking 24 hours.

EVALUATION

The teacher can check the correct usage of a sundial by comparing the result with a watch. The teacher should ask the children, why a sundial is such a good way to track the passing of a day. The children should be able to explain that the apparent motion of the Sun in the sky in fact is a result of the Earth's rotation. When discussing the functionality of a sundial with the children, they should figure out how the shadow cast by the gnomon is related to the position of the Sun in the sky. For this purpose, one could first experiment a bit with a lamp and observe how the shadow changes.

MATERIALS

- Set to build a Sundial (see below)
- Scissors and glue
- A flashlight
- A sunny day

BACKGROUND INFORMATION

The Babylonians, who lived 5000 years ago in today's Iraq southern region, were the first to record astronomical phenomena that were periodic, which means that they repeat. Driven by a huge curiosity, they made observations over long periods of time of the Moon, planets and the stars, and were also the first to apply mathematics to predict their motions. To better measure the position and movement of the celestial bodies, the Babylonians developed instruments, some of them to be used by night, others to be used during day time. This allowed them to perform time measurements.

Babylonians observed the periodic movement of the Sun and constructed the Sundial, which was the first version of a Wall clock or a hand watch. Using the Sundial the Babylonians divided the day into twenty-four hours. From there on we know what time it is and organise daily life together.

FULL ACTIVITY DESCRIPTION

You can follow in the footsteps of the first Babylonian astronomers by building a Babylonian Sundial. The black part of the sundial that casts the shadow was called "Gnomon" by the Greeks which means "indicator".

To build the Sundial, cut the basis with the picture of the Sun and the two triangles with the yellow slopes (see below). Be careful not to separate the slopes from the triangles: they are the feet of the Gnomon and need to be glued on the yellow circle! Glue the triangles together to construct a thick and strong Gnomon.

Look at the basis of the Sundial: you will find the number 12 written on the middle. At noon, take the Sundial outside and orientate the South part of the Sundial towards the Southern direction of your location (you can use the compass of the kit). Now carefully turn the Sundial so that the shadow of the Gnomon falls along the line to the number 12.

One hour later, at one o'clock, check the position of the shadow of the Gnomon and write the number 1 on that position. Estimate (or measure) the distance between 12 and 1 and continue marking each hour in cuneiform with a pencil. Cross check every hour with the shadow of the Gnomon. After completing you will be able to read the hour directly from the Sundial anytime on a sunny day.

You will see the Gnomon project a shadow that will move from the left to the right according to the position of the Sun at the sky. How many hours in total did you manage to measure before sunset? Can you deduce how the Babylonian came to a division of the day into 24 hours?

Did you know?

The shadow projected by the Gnomon in a Sundial moves from left to right according to the path of the Sun at the sky from East to West. The direction of this movement was kept centuries later when mechanical clocks were developed: for this reason the hands of the wall clocks or in our hand watches also move from left to right!

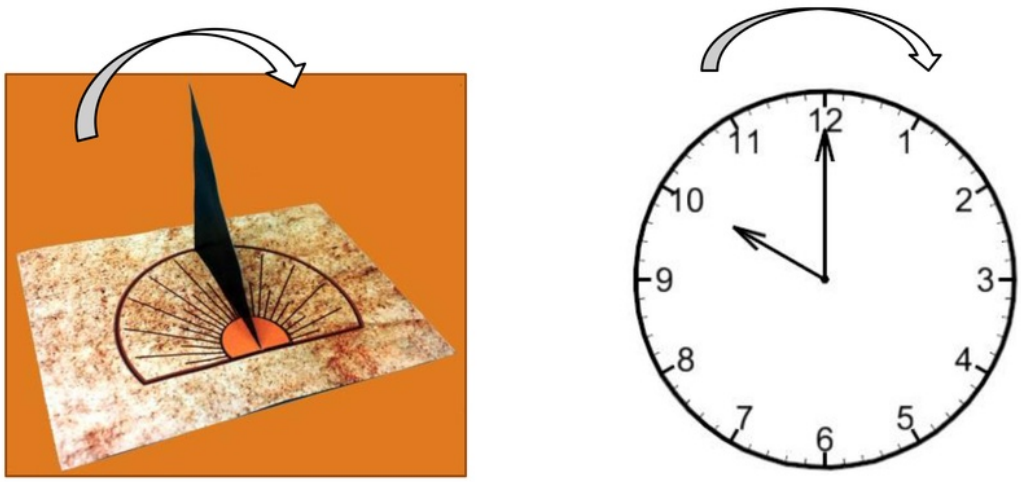
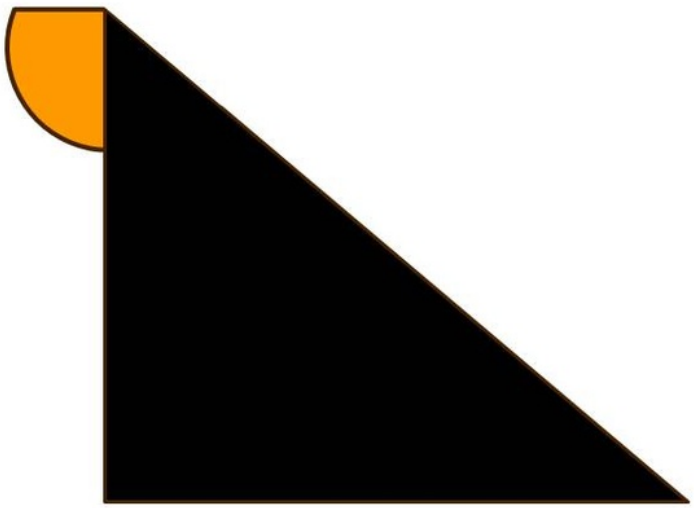


Fig. 6 The link between the Sundial and a modern clock (Credits: Scorza)



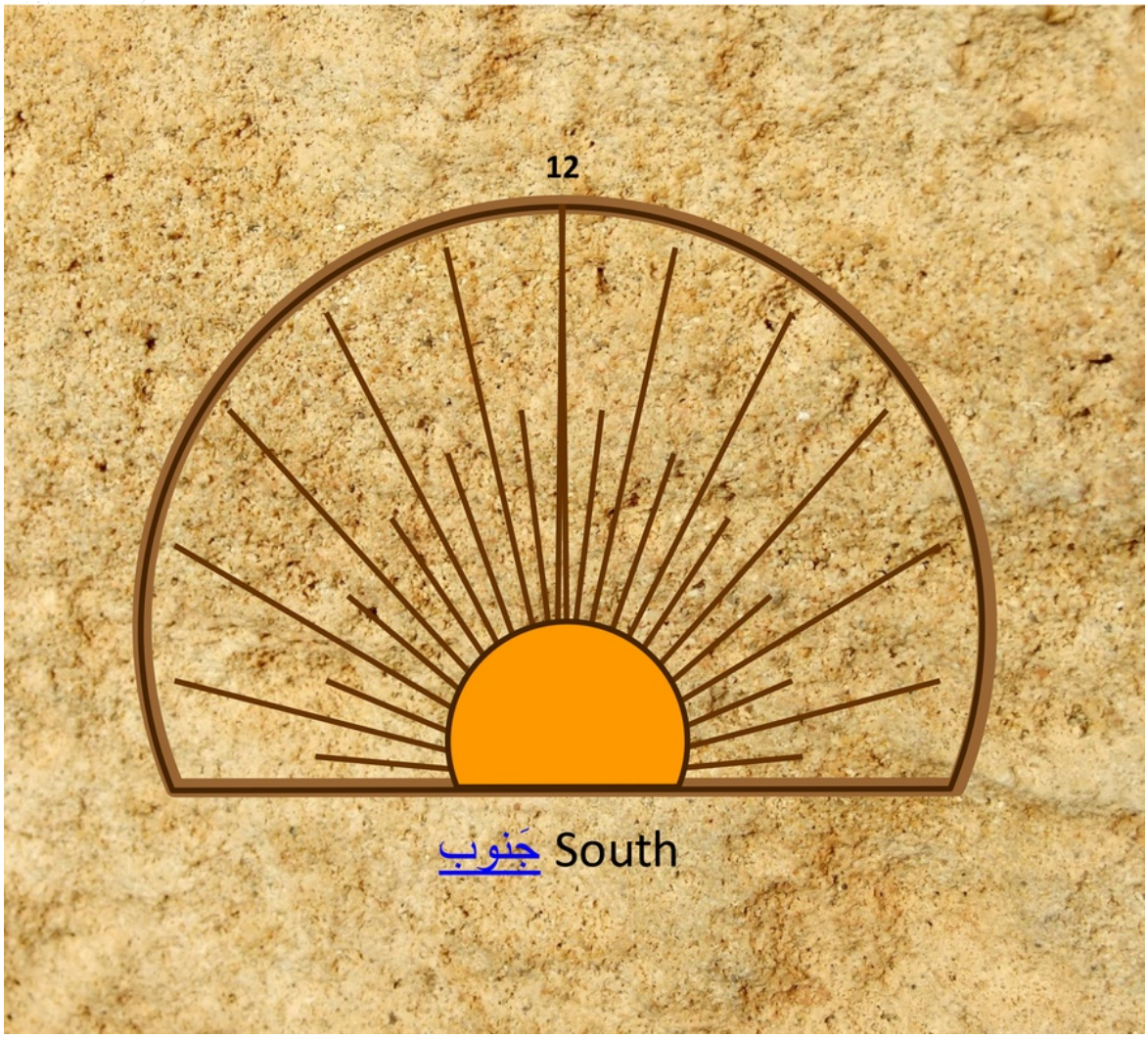


Fig. 7 Forms to cut and glue and build a Babylonian Sundial (Credits: Scorza)

CURRICULUM

Space Awareness curricula topics (EU and South Africa)

The journey of ideas, Sun

CONCLUSION

This activity illustrates the origin of timekeeping and shows the relation between modern clocks and sundials that use the Earth's rotation around its axis as a periodic process to measure time. The children build their own paper version of a sundial and use it to measure time. As a result, the children get a feeling and an understanding for natural cycles and how they can be used.

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