

Eratosthenes in 1st Kindergarten of Pylos (Greece)

Since 2015, 24 students aged 4-6 years old of the 1st Kindergarten of Pylos are participating to the Eratosthenes project. The school is located in the southern part of Greece, Messinia in the charming and historic Pylos of King Nestor.

The students experiment by themselves about sources of light, the rectilinear propagation of light and the formation of shadows.



They use those observations to make a shadow theatre



Like all the students of the project, they can experiment in the courtyard, observing apparent movement of the sun from east to west during the day and the solar noon when the shadow is the shortest and the sun at its higher point.



Comparing their observations during the year, they observe that the shadows are the shortest in summer and longest in winter.



The students are proud to learn that those observations are related to the oldest scientific experiment made by a Greek scientist 2200 years

About 2200 years ago in a city far from us, Alexandria lived a great scientist, Eratosthenes



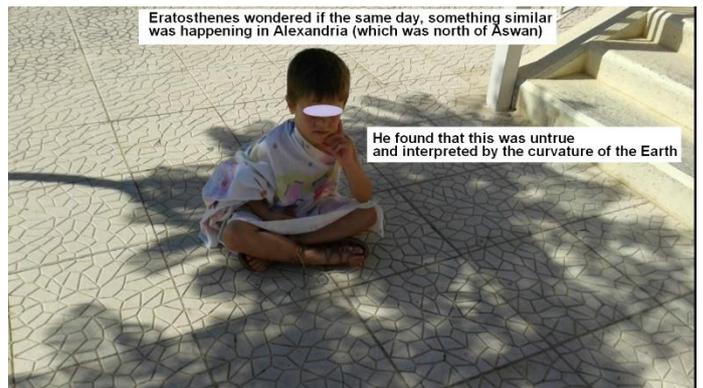
In Alexandria there was a very large library where manager was Eratosthenes



He read that in summer solstice at noon, all objects that were in the region of Aswan, had no shade. Then the rays of the sun are reflected in the water of a well.



Eratosthenes wondered if the same day, something similar was happening in Alexandria (which was north of Aswan)



He found that this was untrue and interpreted by the curvature of the Earth

The Earth is round, confirmed (If it was flat, assuming that the rays of the sun fall vertically, should happen something similar in Alexandria)



For this purpose enlists, what we know



- Accepts the assumption that the Earth is round (ball)
- Searches the Library of Alexandria knowledge of the time, related to the problem that concerns him
- Recollect again geometry

The Earth is not flat but comprehensive and i will measure the circumference of the Earth



Remarkd, thought, and concluded ...



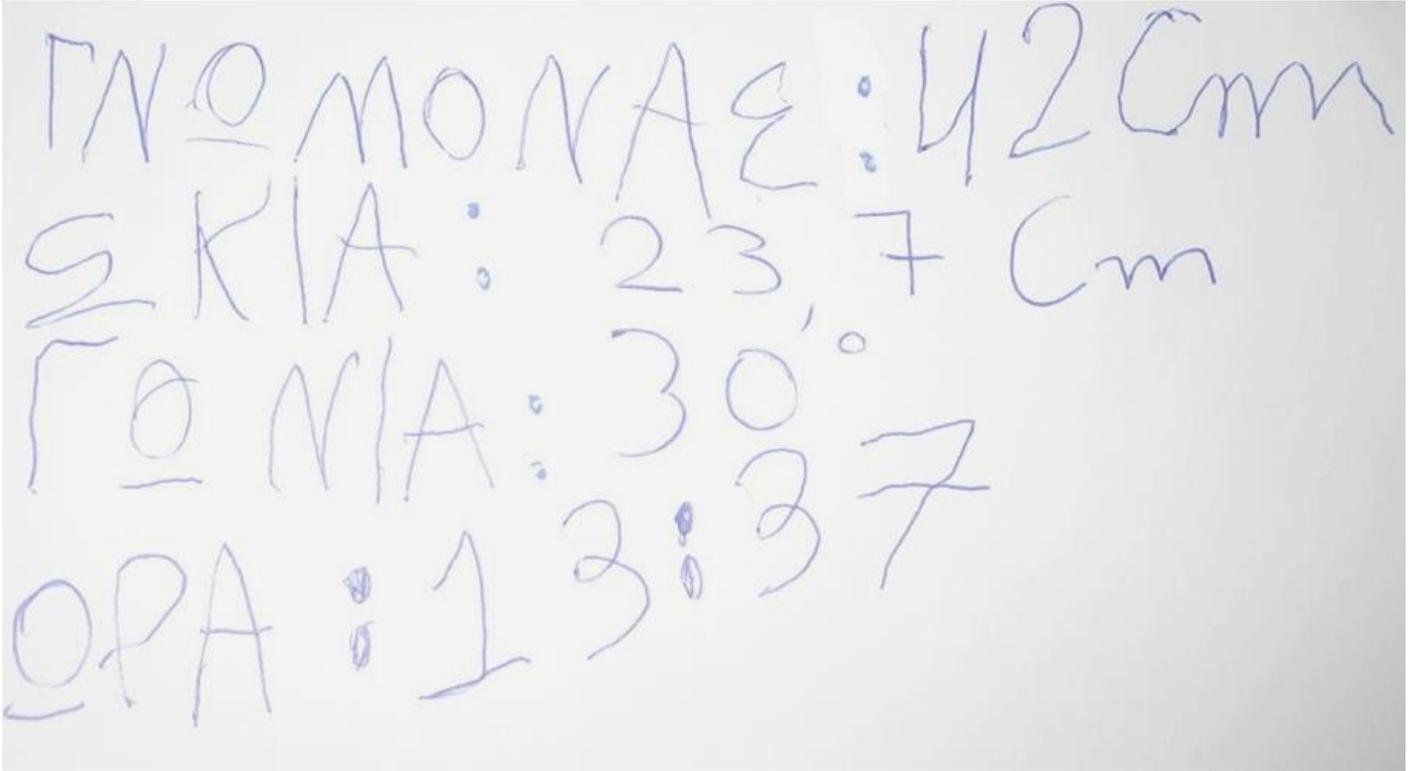
Afterwards announced his observations to other scientists



and showed them the measurements of the Earth circumference



Of course, no question of algebraic calculations or geometry constuctions for students of this age.



The results are posted in real time on social network to the partners by the teacher The students learn about geography and realize that they are part of a network of more than one hundred schools all over the world.



The students are pleased to see that another kintergarden in Argentina is also in the project

Eratosthenes in Pedagogico kindergarten "Vicente Lopez y Planes" Anisacate (Argentina)



After we received the invitation teachers of the rooms of 5 by Professor José Luis Cabrera, Esc. Quintana Mining of Eratosthenes to participate in the project, where the radius of the earth is calculated but after much reading reaches to the conclusion that the issue is too complex for children 5 years old.

Thus was born the project and taking children naturally show a fascination and curiosity about the moon, stars, spaceships and everything that has to do with the Universe. It is also found in their immediate environment as both the sun and the moon are characters that appear every day in their lives.

Although the subject is particularly complex to be understood by children, it can carry out an approach to the key ideas of time and space; motion and regularity, as well as significant influence in all of us. How well the fact of participating in a worldwide project. To close fascinating subject take a trip to the observatory of the city of Córdoba



FIELD OF KNOWLEDGE	OBJECTIVES	CONTENT AND LEARNING	WORDS
SOCIAL, NATURAL SCIENCE AND TECHNOLOGY	Strengthen the construction process of spatial concepts,	Understanding the spatial differentiation from proximity (near-far)	He has participated in experiences and conversations about what we do during the day and at night, what are the needs of living things.
	Strengthening the construction process of the spatial, temporal notions.	Exploration, observation, comparison and communication of environmental information in the lived space	Features of the sun, moon and stars, experiences that have allowed him to observe and hypothesize about eg Why is day? Why it gets dark? Because the moon changes shape? Why the sun shines and shines luna.¿ why Why the stars we see at night?
	Strengthen the exploration and observation of the nearby environment.	Recognition of the natural phenomena of the atmosphere (days and nights, changing appearance of the Moon, the significant movement of the sun and moon, the apparent stillness of the stars, the motion of a cloud, a whirlpool, the simultaneous presence the sun and the moon.	Features of the sun, moon and stars, experiences that have allowed him to observe and hypothesize about eg Why is day? Why it gets dark? Because the moon changes shape? Why the sun shines and shines luna.¿ why Why the stars we see at night?
	Started in the recognition of ICT and its use.	Initiation in the use of ICT.	He has used technological elements like computers as a tool to implement the acquired knowledge through games, pictures, drawings, information search.
	Initiated in recognition of ICT and useful.		
FIELD OF KNOWLEDGE	OBJECTIVES	CONTENT AND LEARNING	WORDS
MATH	Explore the use of spatial references to solve problems in which it is required to communicate its own location, the location of objects and people in a family or everyday space, without pointing.	Use and interpretation of drawings, etc. communicating displacements. Communication and description of spatial references, positions and movements, incorporating specific vocabulary.	Does represent the movements of the earth, moon what way? Only with the help, not interested. Can identify the movements of the earth how rotation. In what way? Only with the help, not interested. Fails to identify the course of hours with the position of the earth relative to the sun, morning-afternoon-evening nap. In what way? Only with the help, not interested.
		Scan time measurement through various social tools and equipment associated with durations that are intended to represent (calendars, clocks, etc.).	Fails to recognize the calendar duration of the lunar rotation in what way? Only with the help, not interested.
ARTISTIC	Explore and recognize their potential for physical and theatrical expression. explore the	Exploring possibilities of movement in connection with objects, costumes, etc. their everyday environment real or imaginary,	Achieve expressed bodily, participating through the various proposals dramatizations.



Problematizing questions:

On day and night:

- 1) What happens to the sun during the day?
- 2) Can you tell me how the night comes?
- 3) What happens to the sun at night?
- 4) What happens to the sun at night?
- 5) What about the moon during the day?
- 6) The moon always has the same shape?

INITIAL ACTIVITIES:

We recorded the responses on the bulletin board. Make a drawing showing the dialogue and the response we got, reflecting watching all the drawings.

DEVELOPMENT:

What are the differences between day and night? Recorded in the bulletin board, look for the main differences between day and night, with drawings showing what happens during the day, in a part of the leaf; and what happens during the night, on the other side.

They help saying to paint what happens in the street, on the life of animals, plants and the sky. When they have done so, their ideas are discussed in pairs and then exposed group.

We ended the activity by telling a story about night or showing pictures of people working at night animals.

How are things at night? We created the corner of the night dedicated to life at night. We can place a network that nocturnal animals hanging, tree-nesting animals, Draw Stars and Moon in Black fiselina as background.

He will ask for cooperation popes to place lights to illuminate the corner with lights displayed at night.

About the shape and size of the Earth, Sun and Moon:

- 1) What shape is the Earth?
- 2) What shape is the sun?
- 3) What shape is the moon?

-How will the Moon, Earth and Sun from a spaceship? schedule on the bulletin board.

-We are astronauts: helmeted brown paper bags with a viewer type cut, traveled in a spaceship with special music through a text encouraging imagination, wondering how they believe will be the space that will be heaven.

-which would draw from his spaceship.

-We can show a video about a spaceship, travel, "Apollo", so they can see the Earth and Moon from space.

The sun is always in the same place? path along the day makes the sun.

-observed very early where the sun is when we got the garden.

-Children can predict where the sunlight at other times will be: Where will it be later?

-Does the sun always rises and hits the same place? Are all the same day last year?

-We analyzed the relationship between output and sunset and day length.

-A similar work to be done with help from their parents, could be watching the sunrise and sunset. I checked into the research notebook. Also register with photos giving references of place and time taking photo Sunrise or Sunset.



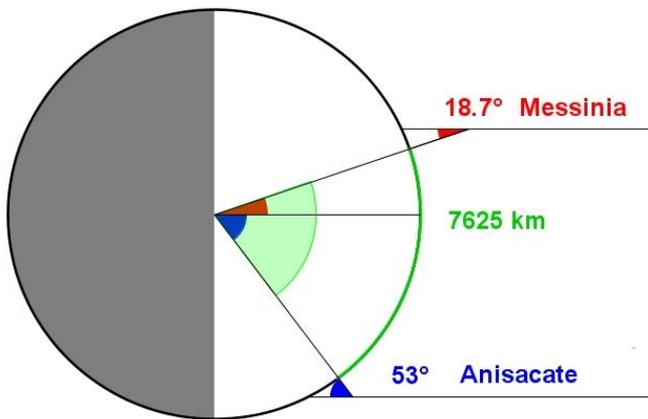
Games of light and shadow

- Let's look how the shadows shadows are formed ?, what ?, believe the cause is there in the living shadows ?, how can we make them appear ?, where ?, why ?, why not have color?
- playing in the yard shadow racing to see who wins: the shadow or running?
- In the room with a flashlight, a lantern or a nightstand light is sufficient, make shadows on a wall.
- of Day, a ray of sun coming through the window caught a ray of sunshine with a mirror.
- In the room: As the shadows lengthen or shrink depending on time of day, and if the light comes from above? And if it comes down how things will be?
Behind a white cloth with a light;
- Hands: Let's start with one, then with both ... and what happens if you add other hands?
- Put your body: After trying different positions of statues and various ways to pass in front of the light (crawling, jumping, making slow and large movement, moving at high speed), you can play to change body shapes putting papers balloons or fabric underneath clothing. This can make or muscle bellies.
- Strange characters: You can invent the rarest characters by simply holding the body in order that comes to mind.
What if we hold a duster head or a stool, with the legs pointing forward, subject in the back?

Coordinated measures between the 2 kindergarden of Greece and Argentina

28 May 2015 (Messinia-GREECE)

27 May 2015 (Anisacate-ARGENTINA)



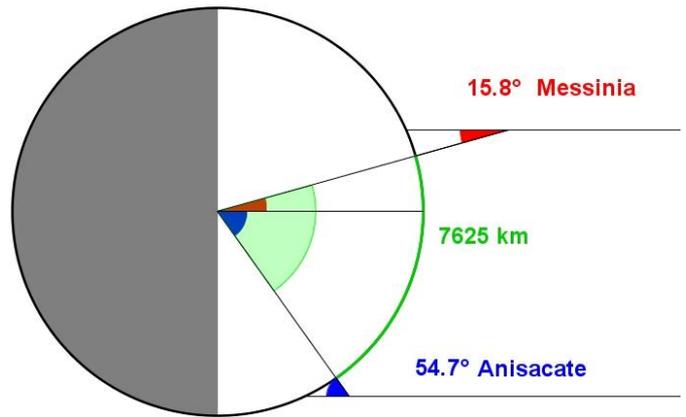
$$\text{circumference} = \frac{360^\circ \times 7625 \text{ km}}{18.7^\circ + 53^\circ} = 38285 \text{ km}$$

15 April 2016 (Pylos-GREECE) Latitude: 36.911 °

15 April 2016 (Anisacate-ARGENTINA) Latitude: -31.717 °

11 June 2015 (Messinia-GREECE) Latitude: 36.91°

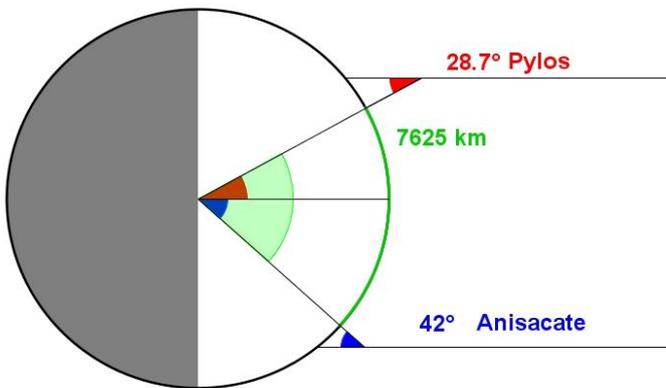
11 June 2015 (Anisacate-ARGENTINA) Latitude: -31.72°



$$\text{circumference} = \frac{360^\circ \times 7625 \text{ km}}{15.8^\circ + 54.7^\circ} = 38936 \text{ km}$$

29 March 2016 (Pylos-GREECE) Latitude: 36.911

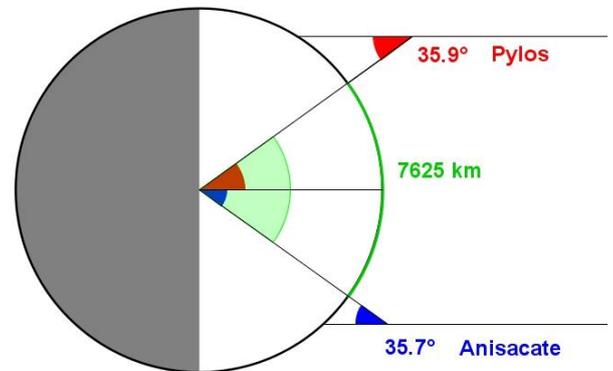
29 March 2016 (Anisacate-ARGENTINA) Latitude: -31.717



$$\text{circumference} = \frac{360^\circ \times 7625 \text{ km}}{28.7^\circ + 42^\circ} = 38826 \text{ km}$$

25 May 2016 (Pylos-GREECE) Latitude: 36.911

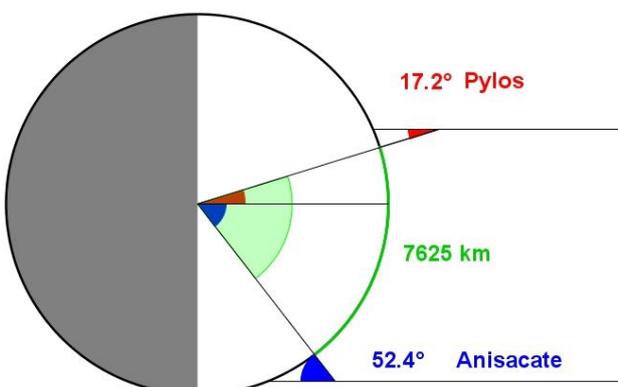
24 May 2016 (Anisacate-ARGENTINA) Latitude: -31.717



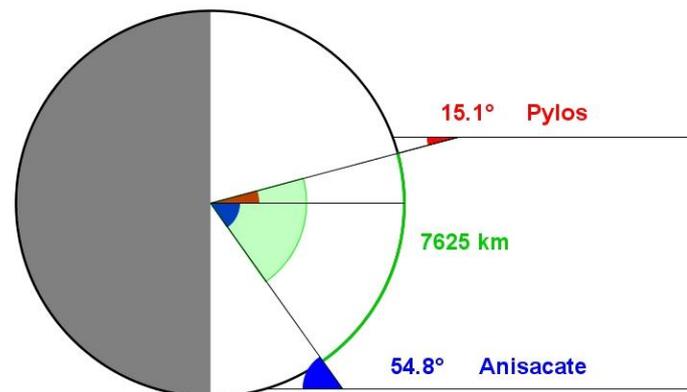
$$\text{circumference} = \frac{360^\circ \times 7625 \text{ km}}{35.9^\circ + 35.7^\circ} = 38338 \text{ km}$$

09 June 2016 (Pylos-GREECE) Latitude: 36.911

09 June 2016 (Anisacate-ARGENTINA) Latitude: -31.717



$$\text{circumference} = \frac{360^\circ \times 7625 \text{ km}}{17.2^\circ + 52.4^\circ} = 39440 \text{ km}$$



$$\text{circumference} = \frac{360^\circ \times 7625 \text{ km}}{15.1^\circ + 54.8^\circ} = 39270 \text{ km}$$

Congratulations to the 2 kindergarden teachers Olga Keramida (Pylos-Messinia, Greece) and Adriana Baez (Anisacate, Argentina) for this amazing collaboration!