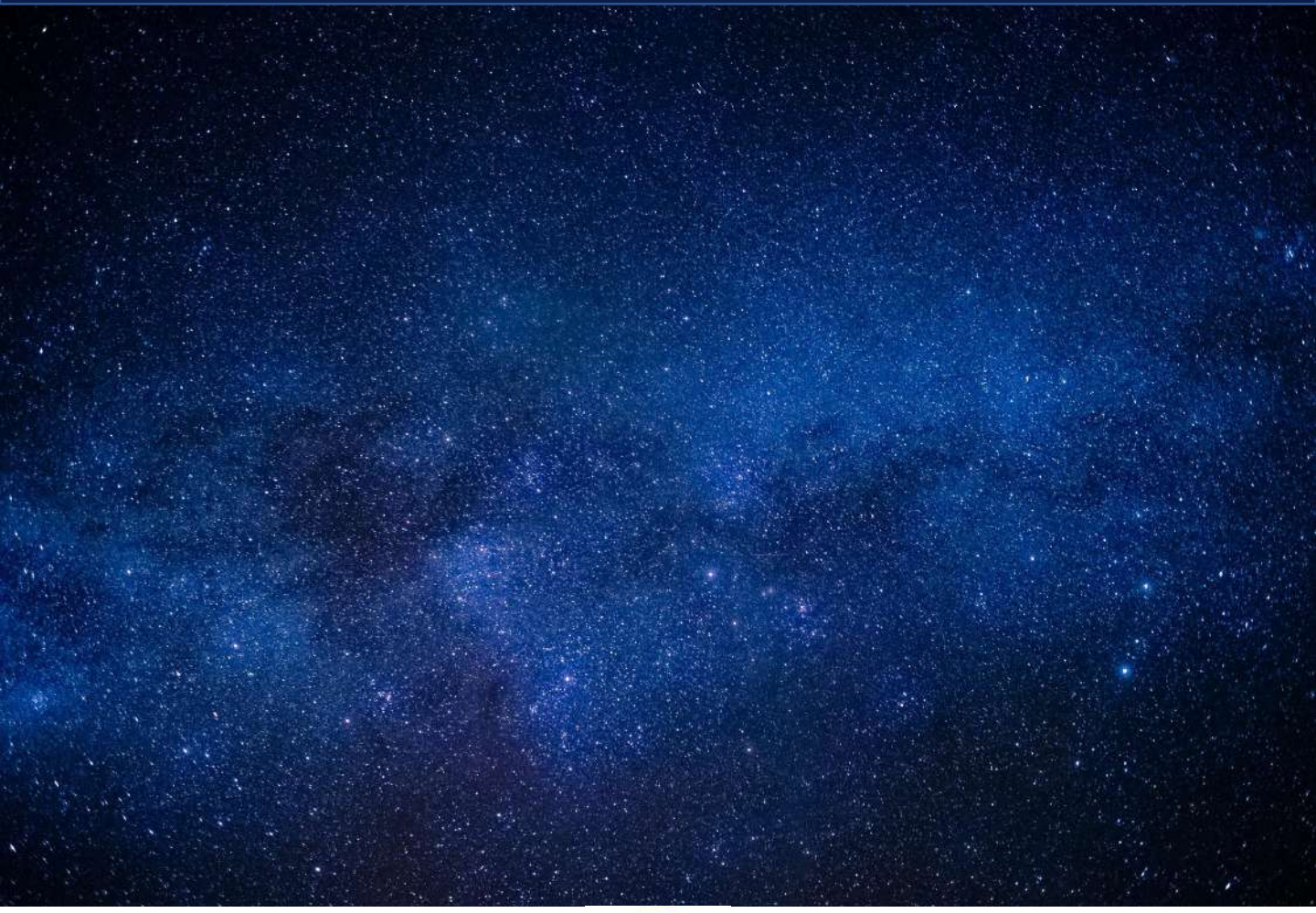
ERASMUS PROJECT KA229

"E QUINDI USCIMMO A RIVEDER LE STELLE "

Archive of good didactic practices

Repository of lesson plans



Erasmus+

Co-funded by the
Erasmus+ Programme
of the European Union

ERASMUS PROJECT KA229
"E QUINDI USCIMMO A RIVEDER LE STELLE
2019-1-IT02-KA229-062397_1

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INTRODUCTION

The Erasmus project "E quindi uscimmo a riveder le stelle" was born from the need to tackle the lack of scientific-mathematical skills in children between the ages of 9 and 13, through an approach to the study of astronomy and observation of the sky. The possibility of carrying out surveys in places located at different latitudes, the direct observation of celestial phenomena, the acquisition of the basic elements of celestial and terrestrial orientation, the exploration of suitable places for the observation of the stars in known or distant territories, the direct collection of data and the study guided in order to formulate hypotheses to be verified in the field, they will all be elements that will bring the students in the scientific method in a very concrete way.
The topics covered during this module will serve to approach the study of the fundamental principles of Astronomy to acquire the basic knowledge necessary for the job.
Students will be introduced and guided to a conscious observation of the sky, collecting information on what surrounds them, starting from personal sensory perceptions (instinctive observation) to arrive at a methodical and conscious observation. They will take note of the data emerging from these activities and make assumptions about similarities/differences with data relating to measurements made in other countries. The comparison with surveys carried out in other countries will be an opportunity to see how at different latitudes “we see different things” and to understand the importance of the relativity of observation with respect to one's own point of view.
These activities therefore involve comparing data with other countries. This action can be implemented, for example, through an eTwinning project or by retrieving the necessary information on the web. It is advisable to identify countries that are located in different latitudes in order to have the most effective data collection possible for this purpose.
The material has been developed for students belonging to the age group between 9 and 13 years but can be adapted, maintaining its structural system, also for other school grades.
All the activities of this work module were initially tested by the teachers during the basic training course in Astronomy which took place during the Kick off meeting under the guidance of Professor Simonetta Ercoli of the *StarLight Association – a handy planetarium*. Subsequently, the materials were reworked and enriched taking into account the experience gained in this area by the schools involved in the project. In fact, the teachers involved have experimented the path in their own classes and have developed a repository of lesson plans that will remain open for future implementations and available to anyone who wants to approach this path.

The first part of the work, dedicated to the base elements of terrestrial orientation, develops knowledge related to diurnal orientation, to our solar system with particular reference to the Earth-Moon system and nocturnal orientation.
The themes are conducted through laboratory activities with the use of different worksheets which, collected in an orderly way, they represent a kind of Astrodiary.
The activities also provide the necessary tools to collect data on the daily and annual arc of the Sun, on the Moon phases and on the annual variation of the position of the constellations in the sky.

The second part of the work is dedicated to the materials for the comparison of the collected data. In this phase, which we have organized into mixed groups by nationality, the collective discussion, the elaboration of the results and their argumentation is very important.
The last part collects a selection of lesson plans that will be implemented over time.

DIGITAL ARCHIVE OF GOOD DIDACTIC PRACTICES ON THE SUBJECT OF THE STUDY OF ASTRONOMY AND SCIENCE WITH A REPOSITORY OF LESSON PLANS.

PLAN OF TRAINING ACTIVITIES RELATED TO THE ERASMUS+ PROJECT KA229
"E QUINDI USCIMMO A RIVEDER LE STELLE"

CROSS-CURRICOLAR MODULE LAND ORIENTATION (LO)			
ACTIVITY	**WHAT TEACHERS DO**	**WHAT STUDENTS DO**	**MATERIALS**
Earth orientation	Using structured materials identify the main cities that are in front, behind, on the right and on the left of the observer that is in the center. Identification of cardinal points.	Students carry out the activity proposed by the teachers using the structured material.	(LO)_1_WHERE AM I https://drive.google.com/file/d/1IQ5hoqwESD6BPTZRIZ5p60Bfex3f2UiI/view
Geographic crosslinking Geographic coordinates	Study of terrestrial geographical grid and terrestrial coordinates using the proposed tools and/or other tools at the discretion of the teacher.	Students work following the teacher's instructions.	(LO)_2A_GEOGRAPHICAL GRID https://drive.google.com/file/d/1v6D1tF240dlY6xAHR9jbMgJ33eynyq-9/view (LO)_2B_GEOGRAPHICAL GRID https://drive.google.com/file/d/15dUMImDzYCC1ndEhk9en0ZEbV7y0KtKs/view
European map Location of all countries with latitude and longitude	Using a map of Europe, highlight the longitude and latitude of your city and other cities considered. Check the accuracy	Guided by the teachers, they take over the coordinates of their city and the other cities and verify their accuracy. They draw a double entry table to systematize the surveys	(LO)_3_ COORDINATES https://drive.google.com/file/d/1MWohjQ1FFNBaUHn26gliP-8YHomSWPwj/view

CROSS-CURRICOLAR MODULE DAYTIME ORIENTATION (DO)			
ACTIVITY	**WHAT TEACHERS DO**	**WHAT STUDENTS DO**	**MATERIALS**
Hindu circles: a. detection of the north-south direction: meridian as symmetry line between morning and afternoon shadows; b. shadow length measurement; c. detection of the position of the shadow in relation to the cardinal points during the seasons at a set time; d. the meridian as the cardinal direction on which the Sun reaches its maximum height every day at noon: the culmination; e. calculation of the Azimuth of the Sun - data to be included in the table of sheet 3A(DO).	Teachers, using the structured materials or creating the Hindu circles' tool with other materials, prepare the activities and explain to the students the objective of these experiences.	Students collaborate in the construction of the tool and make the necessary measurements.	(DO)_1A_HINDU CIRCLES_TEACHERS https://drive.google.com/file/d/1tyuTYenqaK6SDUZtCAC8G2JdeIZqhS-R/view (DO)_1A_HINDU CIRCLES https://drive.google.com/file/d/1pi31v2JEYSEBaK1p8aiTrLbOvDNAr3On/view (DO)_1B_ SHADOWS_TEACHER https://drive.google.com/file/d/18P-KCcD8-8esvV5n9K_jJ-Wtkaz8MyEt/view (DO)_1B_ SHADOWS_STUDENT https://drive.google.com/file/d/1r80WcSQ7umjRJZsSTEiik1g-QP53huh5/view (DO)_1C_TEACHER https://drive.google.com/file/d/1BqM3YrKGh1GKZusamVNv-3af2bRanbhy/view (DO)_1C_STUDENT https://drive.google.com/file/d/1frfwwr-r9SvbcCJigKEb-xtYW0AydrPa/view
Sun Arc detection From the comparison with the students' drawings of the other countries, the differences in time and position of the setting Sun will emerge.	Teachers prepare materials useful for explaining the work (see DO_2_ ARCH OF THE SUN _TEACHER) They prepare a calendar with fixed dates for the surveys	Students, before at school with teacher to experiment and later at home, draw the skyline on the A3 sheet following the instructions of the teachers. Following an established schedule, they carry out the surveys.	DO_2_ ARCH OF THE SUN _TEACHER https://drive.google.com/file/d/1j_JONYopSkxiWwgeZTZhMTkPIa6byE1t/view
Construction of MERINTO: a. to detect elevation of the Sun (height in degrees); b. as Ptolemaic Plinth; c. as Circle of Hipparchus to detect the moment of the equinox; d. as a Sextant to	The teachers build the Merinto and experiment with the activities (see materials).	Students, with the teachers' help, build the Merinto and experiment with the activities.	(DO)_MERINTO INSTRUCTIONS https://drive.google.com/file/d/1_dMJOyEvGSimSR4pqAGW5AW64vivbUyV/view (DO)_MERINTO CONSTRUCTION AND USE https://drive.google.com/file/d/1cbtTFYlU9YBvZcRe__5sy9X7hjeZUWg1/view

detect the elevation of celestial bodies above sea level; e. as a sundial (to find the time).			(DO)_4A_MERINTO STUDENTS https://drive.google.com/file/d/1A3HF6aFuSSKzakfEbuOsJO7WLS7Havkt/view (DO)_4B_MERINTO STUDENTS https://drive.google.com/file/d/1ZvWYFZM7isnjmRBlKhJbX4NX5osMaH_a/view
Summary of the surveys: a. detection of the position of the Sun at sunrise and sunset; b. detection of the Azimuth of the Sun at sunrise and sunset; c. elevation of the Sun at noon; d. detection of light hours.	Teachers report the data obtained in the tables: -the measurements made at school with Hindu circles and Merinto; -the surveys made at home by the children drawing the position of the Sun at sunset (Sun Arch).	They summarize with the teachers the data obtained from the measurements taken at school with the Hindu circles and from the survey carried out from the Arch of Sun.	(DO)_3A_SUMMARY OF THE SURVEYS https://drive.google.com/file/d/1pY8gJXJmtMt6BwM3NFYW4gQeG5lMNq1T/view (DO)_3B_SUMMARY OF THE SURVEYS https://drive.google.com/file/d/1CWDvZphJIMlDnvPyby9vu1B6WGDgOlyu/view

CROSS-CURRICOLAR MODULE NIGHTTIME ORIENTATION (NO)			
DESCRIPTION			**MATERIALS**
The following activities are aimed at introducing students to the study of the sky. Specifically, the focus is on: - observe a map of the sky - recognize the constellations - use the Stellarium software - study about moon phases - use of tools (Star clock) For these activities, if you do not have personal knowledge in these areas, you can also use the materials attached and provided during the basic course in astronomy. On the web, you can also draw on numerous resources			ASTRONOMY COURSE MATERIALS (see from page 22) https://drive.google.com/file/d/1XWGeHxLD452_8zXJlhKiRrNtYQRPaoex/view WEB LINK NASA SPACE PLACE https://spaceplace.nasa.gov/ ESA – European Space Agency https://www.esa.int/ IAU – International Astronomical Union https://www.iau.org/ ASI – Italian Space Agency https://www.asi.it/en/ UAI - Unione Astrofili Italiani https://www.uai.it/sito/
ACTIVITY	**WHAT TEACHERS DO**	**WHAT STUDENTS DO**	**MATERIALS**
The celestial sphere	Teachers use the material to learn more about the topic related to night orientation.	Students, guided by the teachers, learn about the celestial grid and the night orientation.	(NO)_1A_CELESTIAL SPHERE https://drive.google.com/file/d/1PiyActisyCNYgDsAnk5cjLeN4TRc401s/view (NO)_1C_ALTAZIMUTA COORDINATES https://drive.google.com/file/d/1iv16zMuKbvmPLQ6f225-v8GukQQ4dAiS/view (NO)_1D_EQUATORIAL COORDINATES https://drive.google.com/file/d/1tJXoyMtu58bqm8gv9Gnvm9txo6OXddeL/view

Find the costellations	Teachers prepare material to guide students to recognize constellations.	Students work following the teacher's instructions.	(NO)_2A-2B_FIND THE CONSTELLATIONS https://drive.google.com/file/d/1o93G3SGoUAPsMo4ILrYfN-NMEGnVYZfi/view
Find the costellations 2	Teachers work on Stellarium to prepare the necessary material. They learn to trace the constellations and print the maps.	Guided by the teachers, students learn to use Stellarium and to recognize constellations.	LINK TO STELLARIUM USER GUIDE https://www.researchgate.net/publication/354871986_Stellarium_0212_User_Guide (NO)_STELLARIUM WORKSHEETS 1-2 https://drive.google.com/file/d/1hdKbP8wrb3VlUGxBZZ5YgwQqsi3dM7gC/view
Chasing costellations	Teachers use the worksheets and maps downloaded from Stellarium to prepare the students' material for the activity (See also this specific lesson plan)	Students, divided into groups, work with the material prepared by the teachers	(NO)_CHASING COSTELLATIONS_GUIDELINE https://drive.google.com/file/d/1i4WuMtsW_cFlZGf0Tcb1mORx5jaSZ8dQ/view (NO)_a_CHASING CONSTELLATION_STAR CHARTS https://drive.google.com/file/d/1CD5JwRZVsB25tn0_dm7xRCPSNyvLP4Sy/view (NO)_b_CHASING CONSTELLATION https://drive.google.com/file/d/1mB8yuWxE5xzrcM0C-TuI7DBFdMJnlk_6/view (NO)_c_ WINTER EQUATORIALS https://drive.google.com/drive/u/3/folders/1XPFP4PXDebWAq2OwPJ1Ex2glJhxpcCNL (NO)_d_SUMMER EQUATORIALS https://drive.google.com/file/d/11gukj60iNnHpWevqG1G2ALOpcmxUKi0V/view (NO)_e https://drive.google.com/file/d/1h7UBEihG7ewYbxG3rq5IAQvrg9HShssC/view

			(NO)_f_STAR BUTTONS https://drive.google.com/file/d/1hD-bPRWh4uY7mmyDGkn5UjJjF8R8Lrke/view (NO)_3_CHASING CONSTELLATIONS https://drive.google.com/file/d/1h9VJisndk1Civ6xR5-LGBS51U_sfzWGq/view
Moon phases	Teachers deepen topic and work with the students. They carry out surveys on the phases of the Moon and share the observations made in the classroom. They prepare a calendar with fixed dates for the surveys	Students on the established dates, observe the evening sky and complete the table with the requested information. They share the work done with classmates and teachers.	(NO)_5_MOON PHASES https://drive.google.com/file/d/1g5nYtz2enqkNpbjJW3tU8Ulx2vYqNT5n/view
Star clock Determine the time by observing the star clock.	Teachers prepare the material for the construction of the starclock.	Students build the star clock and practice with Stellarium and with direct observation, to track the time.	(NO)_6A_1STAR CLOCK INSTRUCTIONS https://drive.google.com/file/d/1mhlQ2wnwgnHvp6Y5RzA3XedLUfHPoLWG/view (NO)_6B_2STAR CLOCK https://drive.google.com/file/d/1-DCKecEV74E9RgkDI27zL2jg0U38jeIH/view

DATA COMPARISON MATERIALS - GENERAL ORGANIZATION AND ACTIVITIES

Students will be divided into 6 GROUPS

DAYTIME ORIENTATION

GROUP 1 - ARCH OF THE SUN		
MATERIALS	- Drawing of the arc of the Sun (1 for each country involved) - Guiding questions GROUP 1 MATERIALS_ARCH OF THE SUN https://drive.google.com/file/d/1YG1pIhzks31SWKy4vBEQApcljBxeNDqi/view GROUP 1_WORKING INSTRUCTIONS_FINAL DATA COMPARISON WORKSHOP https://drive.google.com/file/d/1BKRUy6ttRnzRfGzgsDiwd2JJJILImuuG/view	
ACTIVITY	**DESCRIPTION**	**WHAT TO EXPECT**
1. OBSERVATION OF THE ARCH OF THE SUN	Observe the drawings of the Arch of the Sun. Check if during the year, starting from the winter solstice until the autumn equinox, the Sun has traveled the same path in all countries	From the comparison with the drawings of the pupils of the partner schools, the differences in the time and position of the sunset will emerge. They will see that the sun moves to the right, returns to the center, goes left and returns to the center
2. MEASUREMENT OF THE AZIMUTH	Measure with a ruler the distance between the 2 Suns at the solstices in the different countries and consider following the guiding questions.	The distance (azimuth) is different

GROUP 2 - THE PATH OF THE SUN_THE REASON OF THE SEASON		
MATERIALS	- (DO) 3B_Path of the Sun format_Final data collection (1 for each country) - 4 transparent PVC sheets - Markers of 5 colours - Ruler GROUP 2 MATERIALS_(DO)3B_PATH OF THE SUN FORMAT_FINAL DATA COLLECTION https://drive.google.com/file/d/10ApsleVCrCJ9XP31EoCaW0arNgVtiYYr/view GROUP 2_WORKING INSTRUCTIONS_FINAL DATA COMPARISON WORKSHOP https://drive.google.com/file/d/1EJJj4NH0_8lGsBTDbTOlNgCloyPPa726/view	
ACTIVITY	**DESCRIPTION**	**WHAT TO EXPECT**
OBSERVATION OF THE PATH OF THE SUN	They will have to make 4 different drawings, one for each season, on the transparent PVC sheets. Go over the path of the Sun in the 5 partner countries with markers of different colours, for example at the spring equinox, on a single sheet of transparent PVC. Do the same for the autumn equinox and for the two solstices. Observations and considerations.	They will see that at different latitudes the path of the Sun is different.

GROUP 3 - THE PATH OF THE SUN_THE REASON OF THE SEASON		
MATERIALS	- (DO) 3B_Path of the Sun format_Final data collection (1 for each country) - 5 transparent PVC sheets - Markers of 5 colours - Ruler GROUP 3 MATERIALS_(DO)3B_PATH OF THE SUN FORMAT_FINAL DATA COLLECTION https://drive.google.com/file/d/1BjCcZ0qLyZd4htLLIqKo_SnPwYCnahkL/view GROUP 3_WORKING INSTRUCTIONS_FINAL DATA COMPARISON WORKSHOP https://drive.google.com/file/d/1Gxs3AApopa0UXjjDHRTLuO6YAvcr3Sd1/view	
ACTIVITY	**DESCRIPTION**	**WHAT TO EXPECT**
OBSERVATION OF THE PATH OF THE SUN	They will have to make 5 different drawings, one for each partner country on the transparent PVC sheets. Review the path of the Sun of format (DO) 3B. For each country, all the arcs present in form (DO) 3B must be traced on a transparent PVC sheet. Example: ITALY On 1 sheet of transparent PVC trace everything that is present in the sheet (DO) 3B of your country. Do the same for SPAIN, FINLAND, GREECE, UK. Overlap the 5 transparencies for comparison. Observations and considerations.	They will see that at different latitudes the path of the Sun is different. The highest arc is that of the summer solstice in Crete because it is located at the latitude closest to the equator.

GROUP 4 - AZIMUTH OF THE SUN		
MATERIALS	- (DO) 3A - AZIMUTH OF THE SUN (1 format for each country prepared by the coordinating school using the comparative data) - 4 transparent PVC sheets - Markers of 5 colour - Ruler, protractor GROUP 4 MATERIALS_ (DO)3A_AZIMUTH OF THE SUN_FINAL DATA COLLECTION https://drive.google.com/file/d/1Y207rs0S5IIWKZvQaBP7vaQA5xu78ydJ/view GROUP 4_WORKING INSTRUCTIONS_FINAL DATA COMPARISON WORKSHOP https://drive.google.com/file/d/1MoXn4Q0EoxICyGgJG4vtJnYEdPD-0OPn/view	
ACTIVITIES	**DESCRIPTION**	**WHAT TO EXPECT**
A) AZIMUTH OF THE SUN OF EACH COUNTRY	For each partner country, using the protractor, on the photocopy given, draw the azimuth of sunset and sunrise for the 4 seasons using the data shown in the table (place the 0 on the NORTH and identify the amplitude by taking the data from the table). You will get 5 sheets, one for each country, in which the azimuth at sunrise and sunset in the 4 seasons is marked.	At different latitudes the point at which the sun sets and rises is different in summer and winter for each country, while it is the same at the equinoxes. The amplitude of the angle between the azimuth of sunrise in SUMMER and that of sunrise in WINTER (also applies to sunset) is different for the various countries. It is greater for countries in

		high latitudes (for eg. LONDON) and less for those in lower latitudes (for eg. CRETE).
B) COMPARISON OF THE AZIMUTH OF THE SUN FOR EACH SEASON	For each season, report the azimuth at sunrise and sunset of all partner countries on a transparent PVC sheet (1 different sheet for each season) (use a different colour for each partner as indicated) Observations and considerations	SPRING AND AUTUMN: the azimuths overlap because the sun rises and sets for everyone in the same point SUMMER AND AUTUMN: the lines are different and the widths of the angles are different because we are at different latitudes The width of the various angles is different for each country

NIGHT TIME ORIENTATION

GROUP 5 - COMPARISON OF THE NORTH SKY		
MATERIALS	- NORTH SKY MAP of all seasons and of all partner countries - 12 transparent PVC sheets - 5-color markers - Ruler GROUP 5 MATERIALS_SKY MAPS ALL COUNTRIES_NORD https://drive.google.com/file/d/1jQGvPiaJAkHtDNdvm28tosgIaNHnzXvU/view GROUP 5_WORKING INSTRUCTIONS_FINAL DATA COMPARISON WORKSHOP https://drive.google.com/file/d/1OmI4-jrCvqeWM6B_rinLDc4uUpj2qPNT/view	
ACTIVITY	**DESCRIPTION**	**WHAT TO EXPECT**
A) IDENTIFICATION OF BIG DIPPER, LITTLE DIPPER + POLARIS AND CASSIOPEIA IN THE 4 SEASONS	Students will have at their disposal the NORTH sky maps of the 5 partner countries for each season. They will have to identify and review, with a different colour for each country, the three constellations + Polaris on each map.	Depending on the latitude, the position and orientation of the constellations is different. The height of Polaris differs depending on the latitude.
B) COMPARISON OF THE POSITION OF THE 3 CONSTELLATIONS	On a transparent PVC sheet they report, with a different colour for each partner, the position of a constellation in the position in which it is found, for example in winter in the 5 partner countries (you get a sheet with 5 drawings of the same constellation in different colours). They do the same thing for spring, summer and autumn as well. The same thing is repeated for all 3 constellations.	

GROUP 6 - COMPARISON OF THE SOUTH SKY		
MATERIALS	- MAPPA DEL CIELO A SUD di tutte le stagioni e di tutti i paesi partner - 8 fogli PVC trasparente - pennarelli di 5 colori - righello GROUP 6 MATERIALS_SKY MAPS ALL COUNTRIES_SUD https://drive.google.com/file/d/1s3LVDBDD4G2DDGYowhKKiSKJlDs-COva/view GROUP 6_WORKING INSTRUCTIONS_FINAL DATA COMPARISON WORKSHOP https://drive.google.com/file/d/1XKO9waYM-CjayEauSnLFbTAevja1QoY5/view	
ACTIVITY	**DESCRIPTION**	**WHAT TO EXPECT**
A) IDENTIFICATION OF ORION, EAGLE AND BULL IN THE 4 SEASONS	Students will have at their disposal the SOUTH sky maps of the 5 partner countries for each season. They will have to identify and review, with a different colour for each country, the two constellations on each map.	Depending on the latitude, the position and orientation of the constellations is different.
B) COMPARISON OF THE POSITION OF THE 3 CONSTELLATIONS	On a transparent PVC sheet they report, with a different colour for each partner, the position of a constellation in the position in which it is found, for example in winter in the 5 partner countries (you get a sheet with 5 drawings of the same constellation in different colours). They do the same thing for spring, summer and autumn as well. The same thing is repeated for all 3 constellations.	

REPOSITORY OF LESSON PLAN

During the Erasmus+ project “E quindi uscimmo a riveder le stelle” the teachers involved had the opportunity to experiment, apply in class and systematize some paths. This repository collects some experiences and constitutes a precious source of materials but it remains an open environment that can always be implemented in the future.

TITLE	SHORT DESCRIPTION
Arch of the Sun	Detect the path of the Sun to verify that the position of the Sun at dawn is symmetrical to that of sunset and calculate the hours of light in a day
Hindu Circles	Construction of an instrument for detecting the north-south direction and the meridian relative to the place of measurement
Detection Tools	Use of the Merinto tool
The sky by day	Use of tool for observation and measurements
The sky by night	Use of Stellarium web tool
Looking around the solar system	Know about the solar system and its characteristics
The solar system	Planets and the space
The Solar System	The order and relative size of the planets
Space travel	The solar system and space travel
Miniature model of Solar System	Solar System
Weight on different planets	How much would I weigh on different planets?
The moon	The moon and its phases
Moon Phases	Name and recognize the different phases of the moon
Globe	Know about the Earth and its motes
Formation of Craters	Factors that cause a crater to be created
Constellations and sky maps	Study astronomy using The Space File
Chasing Constellations	Recognize constellations in the sky
Walking toward the stars	Discover the constellation
Learn a song	Light pollution
Space music theatre	Northern light and constellations
Our friendly countries	Know about the partner countries

LESSON PLAN: ARCH OF THE SUN

LESSON TITLE	ARCH OF THE SUN AND DAY ORIENTATION
TOPIC	ASTRONOMY
SCHOOL LEVEL	GRADE FIVE PRIMARY SCHOOL (BUT IT CAN BE ADAPTED TO OTHER SCHOOL GRADES)
DURATION	2 HOURS FOR PREPARATION, AT LEAST ONE MONTH FOR DETECTIONS, 2 HOURS TO REWORK
SUBJECT/S INVOLVED	SCIENCE – TECHNOLOGY - ENGLISH
NOTE	This lesson plan has been developed with the scientific support of the StarLight Association

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Detect the motion of the Sun by analyzing its path in the sky. • Verify that the position of the Sun at dawn is symmetrical to that of sunset with respect to the North-South axis • Calculate the hours of light in a day
COGNITIVE SKILLS	• Develop attitudes of curiosity and ways of looking at the world that stimulate us to seek explanations in what we see happening. • Explore phenomena with a scientific approach: with the help of the teacher, peers, independently, observe and describe the unfolding of the facts, formulate questions, also on the basis of personal hypotheses, propose and carry out simple experiments. • Identify similarities and differences in phenomena, make measurements, record significant data, identify spatial / temporal relationships. • Identify quantitative and qualitative aspects in phenomena, produce graphic representations and diagrams of an adequate level, elaborate simple models.
OBJECTIVES	• Carry out frequent and regular observations, with the naked eye or with appropriate instruments, with companions and independently, of a portion of the nearby environment; identify the elements that characterize it and their changes over time. • Reconstruct and interpret the movement of different celestial objects

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	PRESENTATION OF TOPIC Brainstorming, questions and answers, discussion. These strategies will stimulate motivation and will activate the students' prior knowledge and focus on content vocabulary.	5/10 minutes
STEP 1	PREPARATION OF THE TOOL TO DETECT THE ARCH OF THE SUN Through observation, the teachers will guide the pupils to create a drawing that reproduces the horizon line. Looking from the window or going out into the courtyard, we will try to make people understand the importance of drawing some details on the horizon that represent important reference points for the surveys. After guiding the students in this activity, they will be given the necessary information for detecting the position of the Sun at sunset, which they will have to carry out at home.	2 hours
STEP 2	PREPARATION OF THE INSTRUMENT FOR DETECTION OF THE ARC OF THE SUN_AT HOME Students will have to identify a point of their home (external or internal with observation from a window) facing west and will have to draw on an A3 card (420 x 297 mm) the skyline of the landscape they see from their observation point at home	30 minutes
STEP 3	DETECTIONS On the predetermined dates for common surveys, students will have to draw the Sun at the point where it sets (i.e. when you can only see half of the sphere) and indicate the date and time of the survey in correspondence with the drawing of the Sun.	5 times in a month at sunset
	DATA TABULATION Sharing and analysis of the surveys made at home and preparation, planning them together, of the tables on which to record the data.	1 hour
STEP 4	ANALYSIS OF THE SURVEYS By comparing the data obtained between the measurements of the position of the Sun at sunset and those in the morning made with other instruments (Hindu circles, Stellarium program), it will be possible to observe the arc of the Sun in a day, and it will be possible to verify that the position of the Sun at sunrise it is symmetrical to that of sunset with respect to the North-South axis (eg Winter solstice: sunrise in the SE and sunset in the SW). From these activities it will also be possible to deduce the hours of light in a day.	1 hour

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Realization of the horizon drawing on A3 sheet Tables with data collection

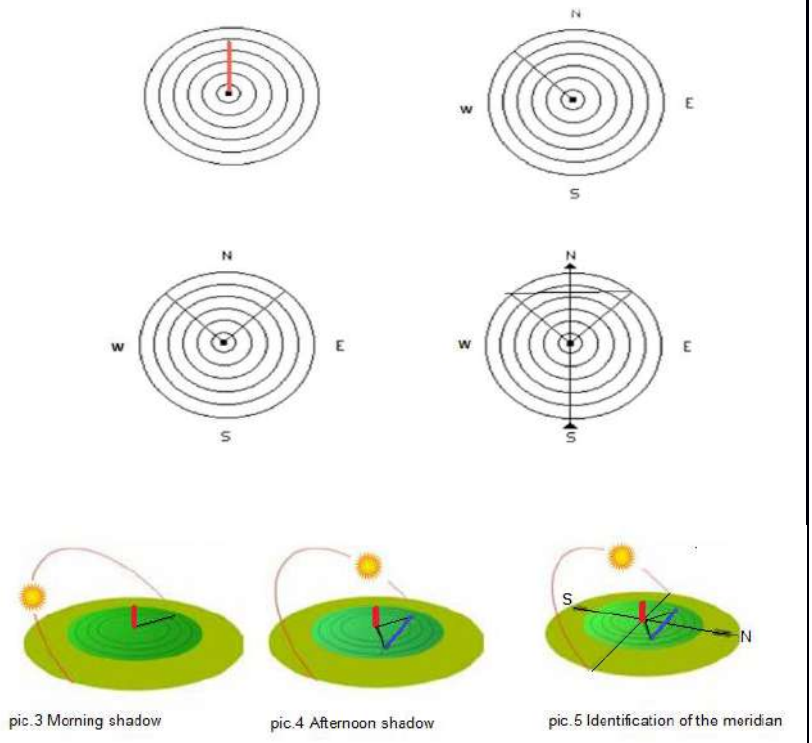
MATERIALS/RESOURCES
A3 sheet Indu Circles Stellarium programme
METHODOLOGIES AND STRATEGIES
Through concrete experiences, with simple tools built in the classroom, it will be possible to bring students closer to the construction of hypotheses, to measurements, to the detection and systematization of the collected data. The possibility of obtaining actual data by applying the experimental scientific method could really be the opportunity to implement skills by putting knowledge and skills into practice. Some of the activities will be proposed through the CLIL methodology
ASSESSMENT
For the evaluation, the teacher will use the final products and the observations made during the activities. The surveys, the way in which they are carried out by the children, some products made by the class, can be considered as verification tests.

LESSON PLAN: HINDU CIRCLES

LESSON TITLE	HINDU CIRCLES
TOPIC	ASTRONOMY
SCHOOL LEVEL	GRADE FIVE PRIMARY SCHOOL (BUT IT CAN BE ADAPTED TO OTHER SCHOOL GRADES)
DURATION	4 HOURS + THE TIME NECESSARY FOR DETECTIONS
SUBJECT/S INVOLVED	SCIENCE – TECHNOLOGY – MATH - ENGLISH
NOTE	This lesson plan has been developed with the scientific support of the StarLight Association

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Construction of an instrument for detecting the north-south direction and the meridian relative to the place of measurement
COGNITIVE SKILLS	• Develop attitudes of curiosity and ways of looking at the world that stimulate us to seek explanations in what we see happening. • Explore phenomena with a scientific approach: with the help of the teacher, peers, independently, observe and describe the unfolding of the facts, formulate questions, also on the basis of personal hypotheses, propose and carry out simple experiments. • Identify similarities and differences in phenomena, make measurements, record significant data, identify spatial / temporal relationships. • Identify quantitative and qualitative aspects in phenomena, produce graphic representations and diagrams of an adequate level, elaborate simple models.
OBJECTIVES	• Learn to detect the north-south direction: meridian as a line of symmetry between the shadows of the morning and those of the afternoon; • Learn to measure the length of the shadow; • Detect the position of the shadow with respect to the cardinal points in the various seasons at a predetermined time; • Identify the meridian as the cardinal direction on which the Sun reaches its maximum height every day at noon

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	PRESENTATION OF TOPIC Brainstorming, questions and answers, discussion. These strategies will stimulate motivation and will activate the students' prior knowledge and focus on content vocabulary.	15 minutes
STEP 1	CONSTRUCTION OF TOOL: teachers work Print the sheet (Annex 1) Prepare the materials Prepare a presentation to tell historical aspects and curiosities about the instrument.	1 hour
STEP 2	CONSTRUCTION OF THE TOOL: students work <u>PORTABLE MODEL</u> Students cut out the card provided by the teacher or make the circles with the compass. Fix the gnomon (toothpick for skewer) in the center of the concentric circles and make sure that it is perpendicular.	1 hour
STEP 3	DETECTION During the morning mark the points where the end of the shadow of the gnomon touches perfectly some circumferences. During the afternoon repeat the same operation and mark the points where the end of the shadow of the gnomon touches the same circles marked in the morning, obviously on the opposite side: infact in the morning the shadows go westward and during the afternoon go eastward. By joining the pairs of points that are on the same circumference we obtain strings that must be parallel to each other. The midpoints of these strings will then be aligned with each other, having the base of the gnomon located at the center of the circumferences: the line that joins them is the **meridian line** and the axis of symmetry of the shadows before and after the solar noon marks the direction of the **meridian of the place.**	

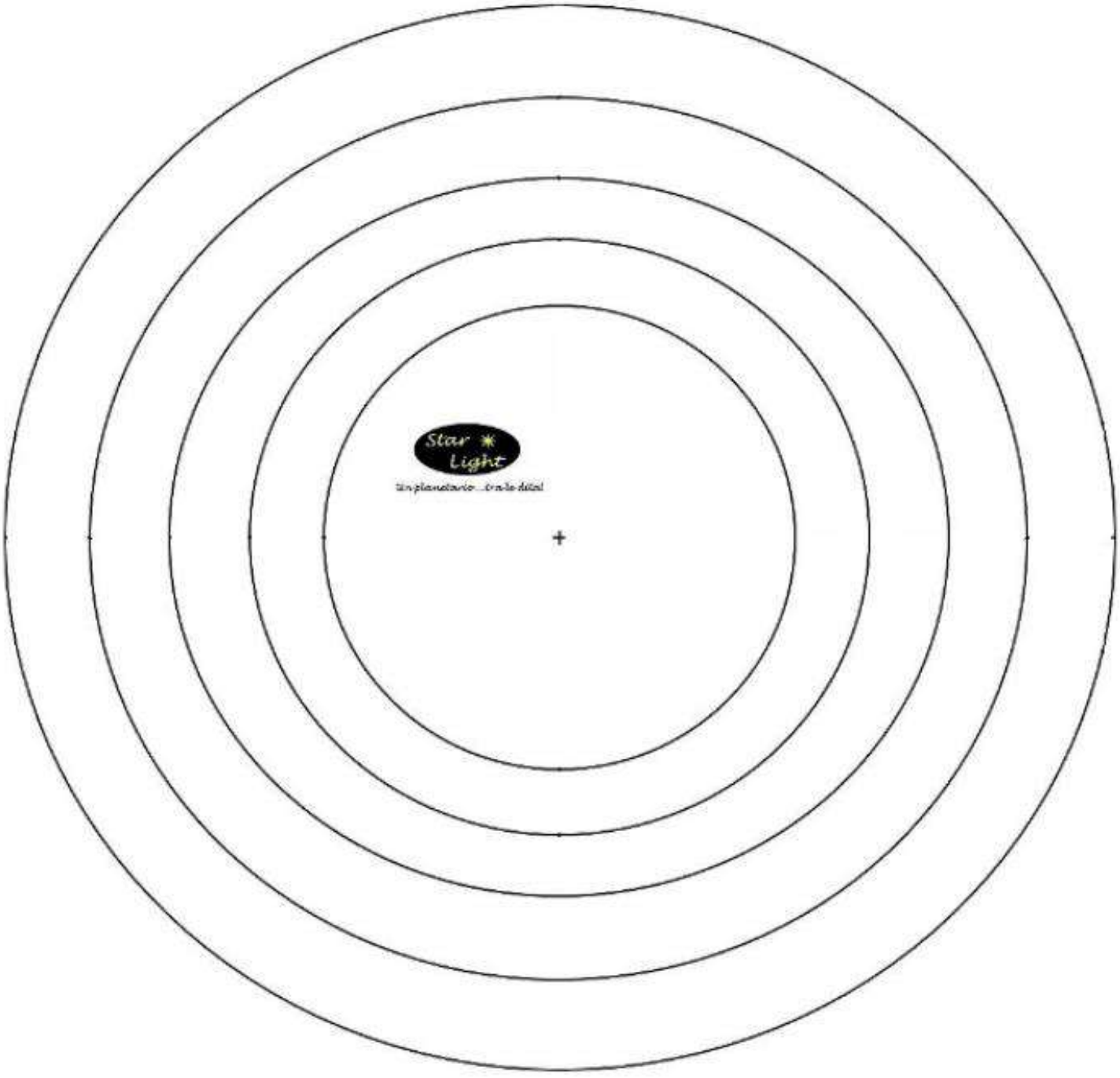
	 pic.3 Morning shadow pic.4 Afternoon shadow pic.5 Identification of the meridian	
STEP 6	COLLECTIVE REWORKING OF THE EXPERIENCE Students after practice in class can use the tool at home. Teachers and students can rework the experience collectively.	2 hour

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Realization of the Hindu circles Moments of collective re-elaboration that lead students to tell and argue

MATERIALS/RESOURCES
- Sheet (Annex 1) printed on cardboard (gr.200); - Compass and card if students are to draw the circles themselves; - Toothpick for skewer (8-10 cm high) with base support (patafix / bluetack or other material that allows the gnomon to remain perpendicular).
METHODOLOGIES AND STRATEGIES
Through concrete experiences, with simple tools built in the classroom, it will be possible to bring students closer to the construction of hypotheses, to measurements, to the detection and systematization of the collected data. The possibility of obtaining actual data by applying the experimental scientific method

could really be the opportunity to implement skills by putting knowledge and skills into practice. Some of the activities will be proposed through the CLIL methodology
ASSESSMENT
For the evaluation the teacher will use the observations made during the activities, for example the way in which the students work and any products made in the class.

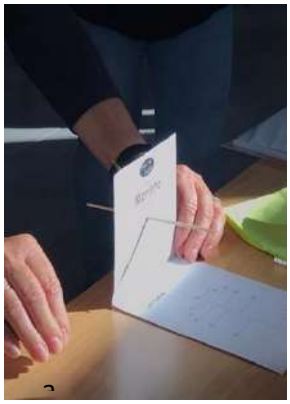
HINDU CIRCLES - ANNEX 1

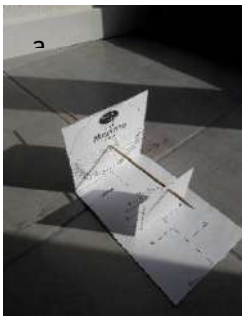
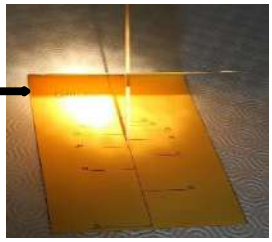
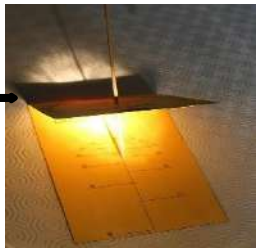
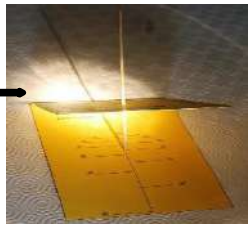


LESSON PLAN: DETECTION TOOLS

LESSON TITLE	DETECTION TOOLS_MERINTO FOR DAY ORIENTATION
TOPIC	ASTRONOMY
SCHOOL LEVEL	GRADE FIVE PRIMARY SCHOOL (BUT IT CAN BE ADAPTED TO OTHER SCHOOL GRADES)
DURATION	THIS ACTIVITY CAN BE DEVELOPED OVER THE COURSE OF AN ENTIRE SCHOOL YEAR
SUBJECT/S INVOLVED	SCIENCE – TECHNOLOGY – MATH - ENGLISH
NOTE	This lesson plan has been developed with the scientific support of the StarLight Association

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Know some detection tools and their history • Detect the elevation of the Sun (height in degrees) or of a celestial object • Identify the equinoxes • Measure the angle of a celestial object (the sun, the moon, a star) with respect to the horizon • Construction of a simple multipurpose measuring instrument: the Merinto
COGNITIVE SKILLS	• Develop attitudes of curiosity and ways of looking at the world that stimulate us to seek explanations in what we see happening. • Explore phenomena with a scientific approach: with the help of the teacher, peers, independently, observe and describe the unfolding of the facts, formulate questions, also on the basis of personal hypotheses, propose and carry out simple experiments. • Identify similarities and differences in phenomena, make measurements, record significant data, identify spatial / temporal relationships. • Identify quantitative and qualitative aspects in phenomena, produce graphic representations and diagrams of an adequate level, elaborate simple models.
OBJECTIVES	• Carry out observations, with the naked eye and instruments; • Reconstruct and interpret the movement of different celestial objects; • Identify, in the observation of concrete experiences, some scientific concepts • Observe, build and use simple measuring instruments

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	PRESENTATION OF TOPIC Brainstorming, questions and answers, discussion. These strategies will stimulate motivation and will activate the students' prior knowledge and focus on content vocabulary.	15 minutes
STEP 1	RESEARCH AND DISCOVERY OF SOME MEASURING INSTRUMENTS Students seek information about some measuring instruments: Ptolemaic Plinth, Circle of Hipparchus, Sextant, Sundial. This activity can be done in small groups and each group can be assigned a topic. After the search, each group can share the information found with the others	1 hour
STEP 2	PREPARATION OF THE INSTRUMENT: MERINTO The students, following the teacher's instructions, build the Merinto (see Annex 1 and 2)	30 minutes
STEP 3	ACTIVITY 1: SIMULATION OF THE EQUATORIAL SUNDIAL Fold the Merinto, insert the toothpick in the center and make sure that the two parts of the Merinto are perpendicular (pic. a.2) The face of the Merinto simulates the equator and the toothpick represents the terrestrial axis that must be perpendicular to it. Place the instrument towards the south: the shadow of the gnomon marks the real local time. 	1 hour
STEP 4	ACTIVITY 2: USE OF MERINTO AS PTOLEMAIC PLINTH The base of the plinth is required for this activity. Position the base of the Ptolemaic Plinth parallel to the Merinto (pic. a.3) and position the instrument as in image a.4 with the upper edge on the North-South Axis. In the morning the gnomon marks a face of the Merinto and you can see how many degrees the Sun is high on the horizon. If you repeat the experiment at different times you can verify that the direction of the shadow changes because the position of the Sun has changed.	1 hour

	  	
STEP 5	ACTIVITY 3: USE OF MERINTO AS CIRCLE OF HIPPARCHUS The Merinto can be used as a Circle of Hipparchus. Fold the Merinto, insert the toothpick in the center and make sure that the tip of the stick matches the latitude of your country. Position the instrument towards the Sun and observe: - In autumn and winter, when the Sun is lower on the horizon, the shadow of the dial is longer and it is located outside the instrument. - In spring and summer the shadow is shorter and it is inside the instrument. - During the equinoxes there is no shadow (the shadow coincides with the bending of the instrument). The shadow of the Merinto during spring and summer  The shadow of the Merinto during autumn and winter  The shadow of the Merinto at the equinox 	
STEP 6	ACTIVITY 4: USE OF MERINTO AS A SEXTANT Insert the string into the plummet and stop it with a knot at the base. Make a cappiola knot at the other end. Prepare the instrument by inserting the string on the toothpick. Hold the Merinto in your right hand between your thumb and forefinger with the bottom side parallel to the floor (pic. a.8). Identify a point of which you want to detect elevation. Rotate the hand so that the upper edge of the instrument is in line with the object taken as reference and the upper vertex, near the fold of the sheet, is at the height of your eye (pic. a.9).	1 hour

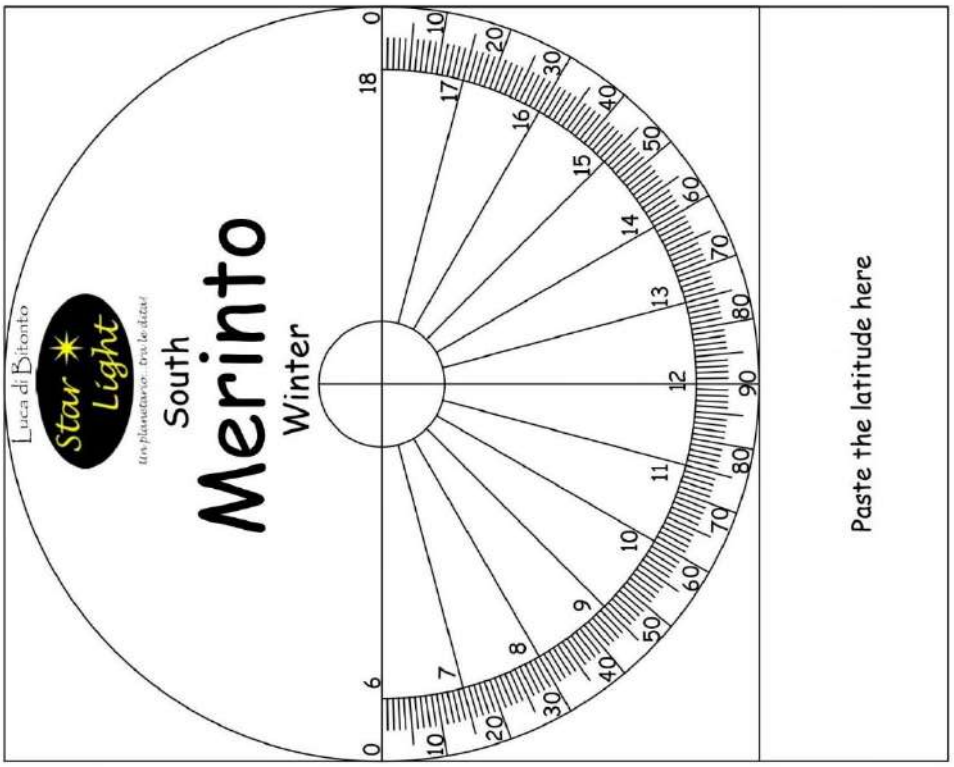
	 The plumb line will indicate the angular measurement of the object from the sea level. 	
STEP 6	ANALYSIS OF THE SURVEYS AND DATA TABULATION Students can practice in the classroom and at home with the tool and can gather information that can be tabulated and compared in the classroom	2 hour

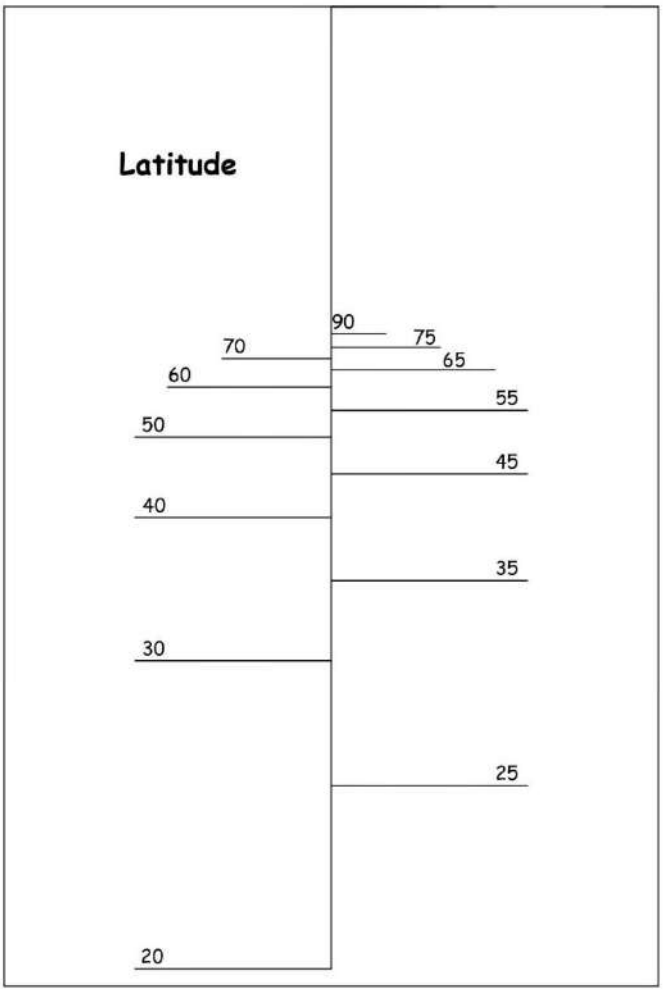
DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Realization of the MERINTO Tables with data collection

MATERIALS/RESOURCES
See ANNEX 1 and 2
METHODOLOGIES AND STRATEGIES
Through concrete experiences, with simple tools built in the classroom, it will be possible to bring students closer to the construction of hypotheses, to measurements, to the detection and systematization of the collected data. The possibility of obtaining actual data by applying the experimental scientific method could really be the opportunity to implement skills by putting knowledge and skills into practice. Some of the activities will be proposed through the CLIL methodology.

ASSESSMENT
For the evaluation, the teacher will use the final products and the observations made during the activities. The surveys, the way in which they are carried out by the children, some products made by the class, can be considered as verification tests.

DETECTION TOOLS - ANNEX 1




Latitude
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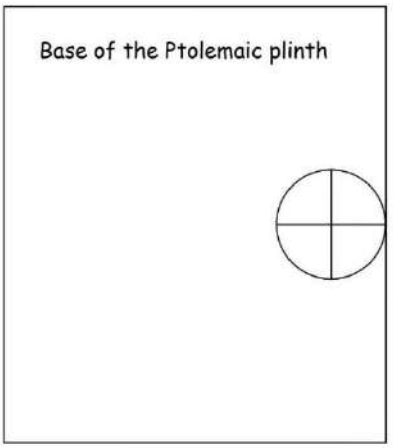

Base of the Ptolemaic plinth

DETECTION TOOLS - ANNEX 2_REALIZATION OF MERINTO

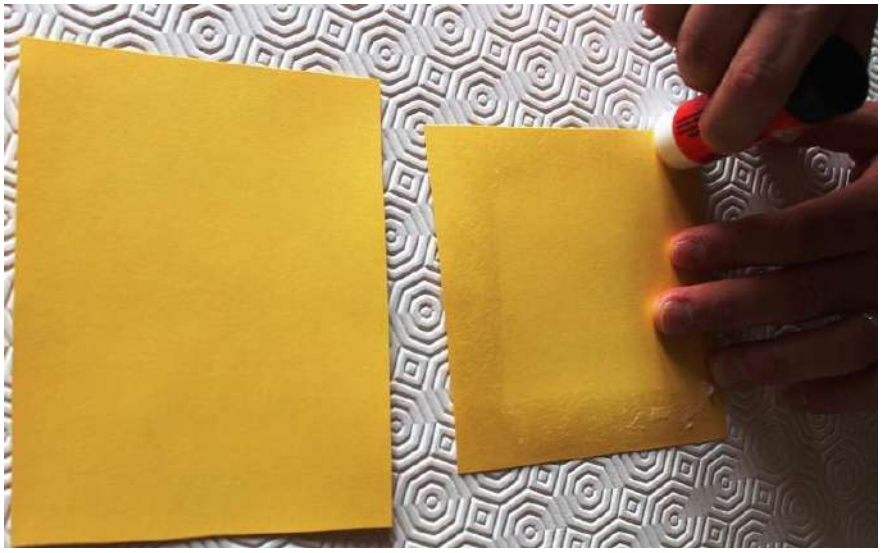
You need:

- Worksheets 4A(DO) and 4B(DO) on heavy cardboard (200gr.);

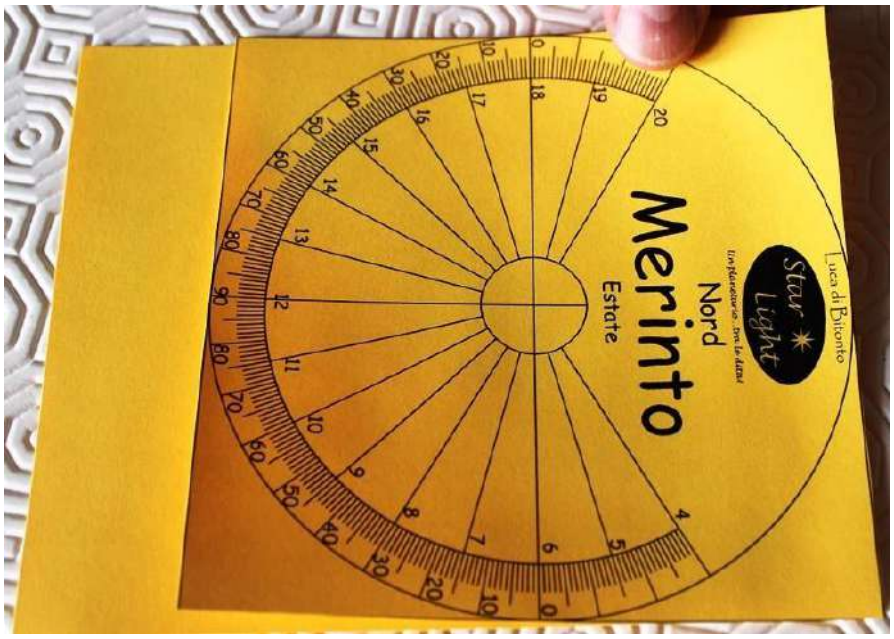
- A toothpick for skewers (the weight of the toothpick must be as equal as possible to the weight of the cardboard used to make the Merinto);

- A fishing plummet;

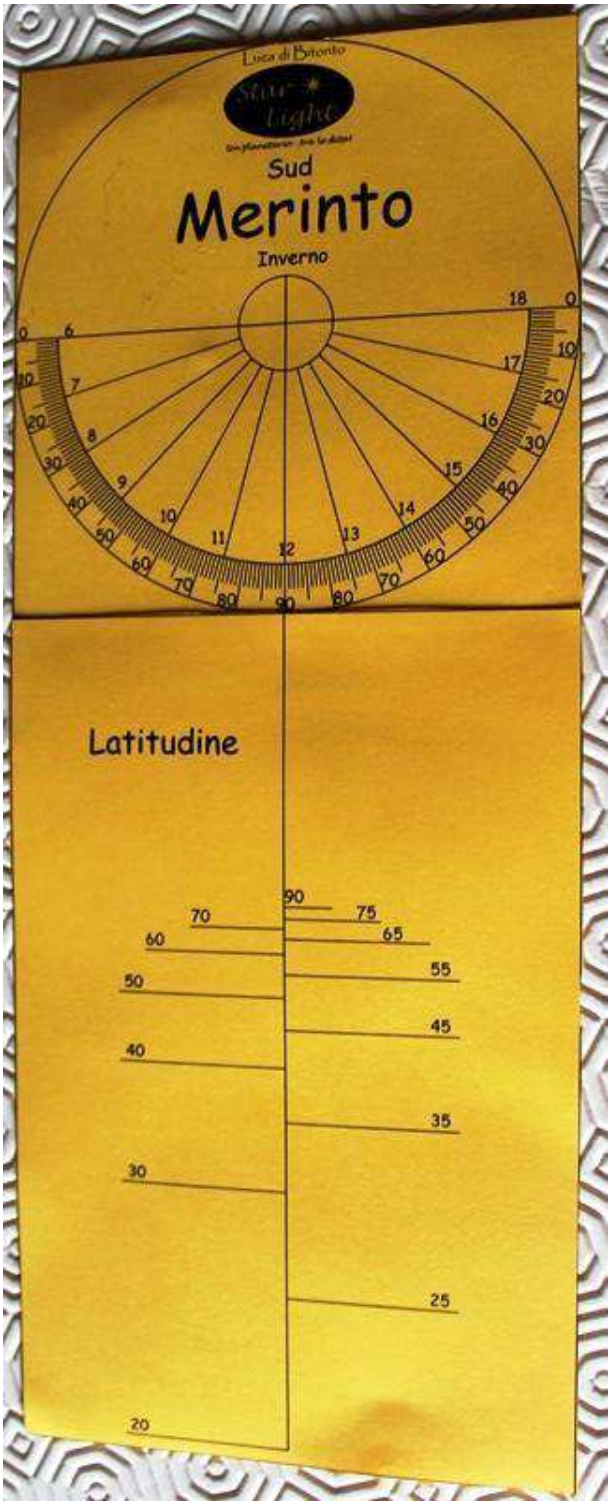
- A piece of string about 20 cm long.



Cut out the two sides of the Merinto from the worksheet and glue them one behind the other.



Cut the box "Latitude" from the worksheet and paste it in the lower part of the Merinto Winter, as shown (Paste the latitude here).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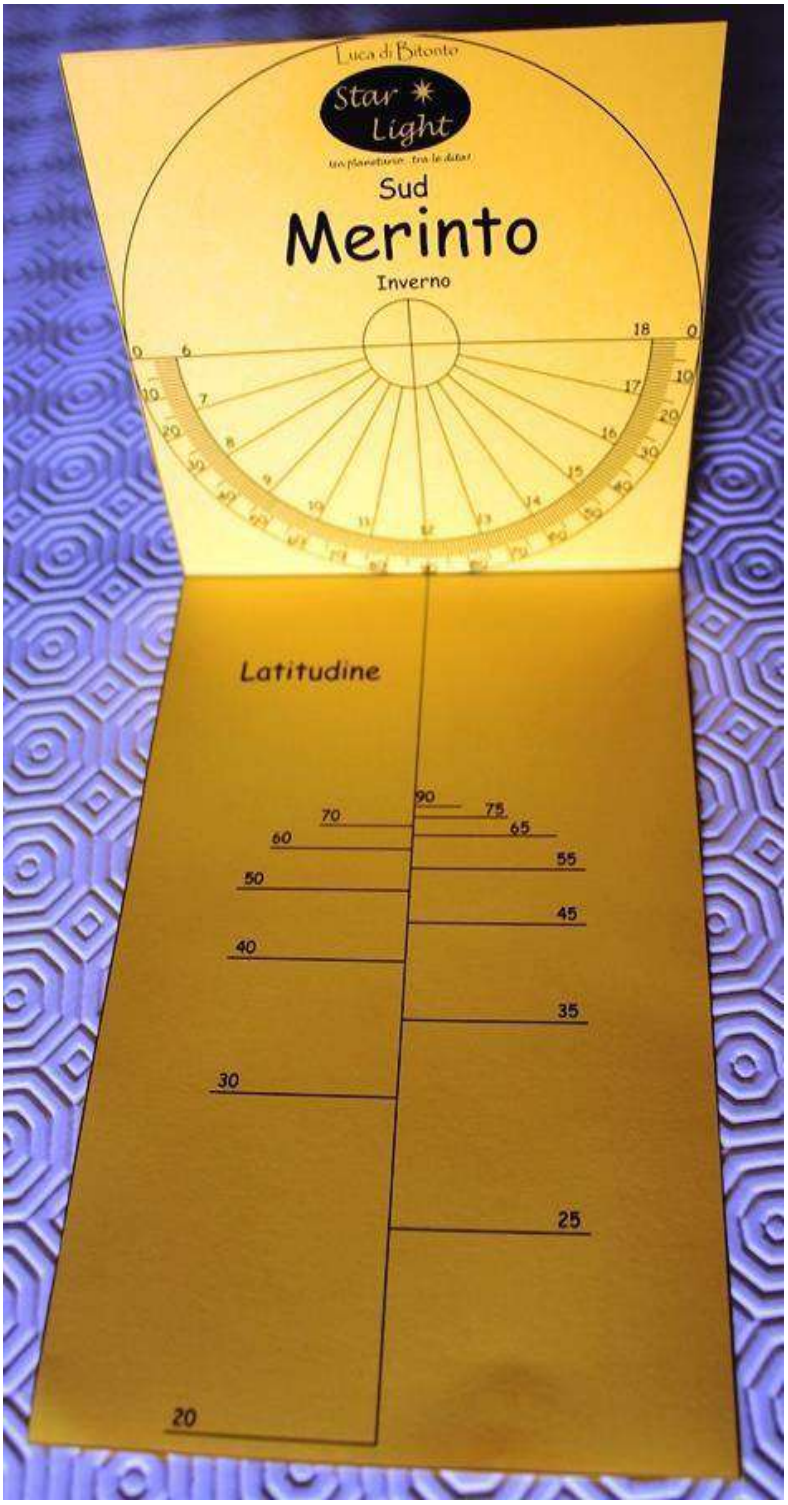
Luca di Bitonto
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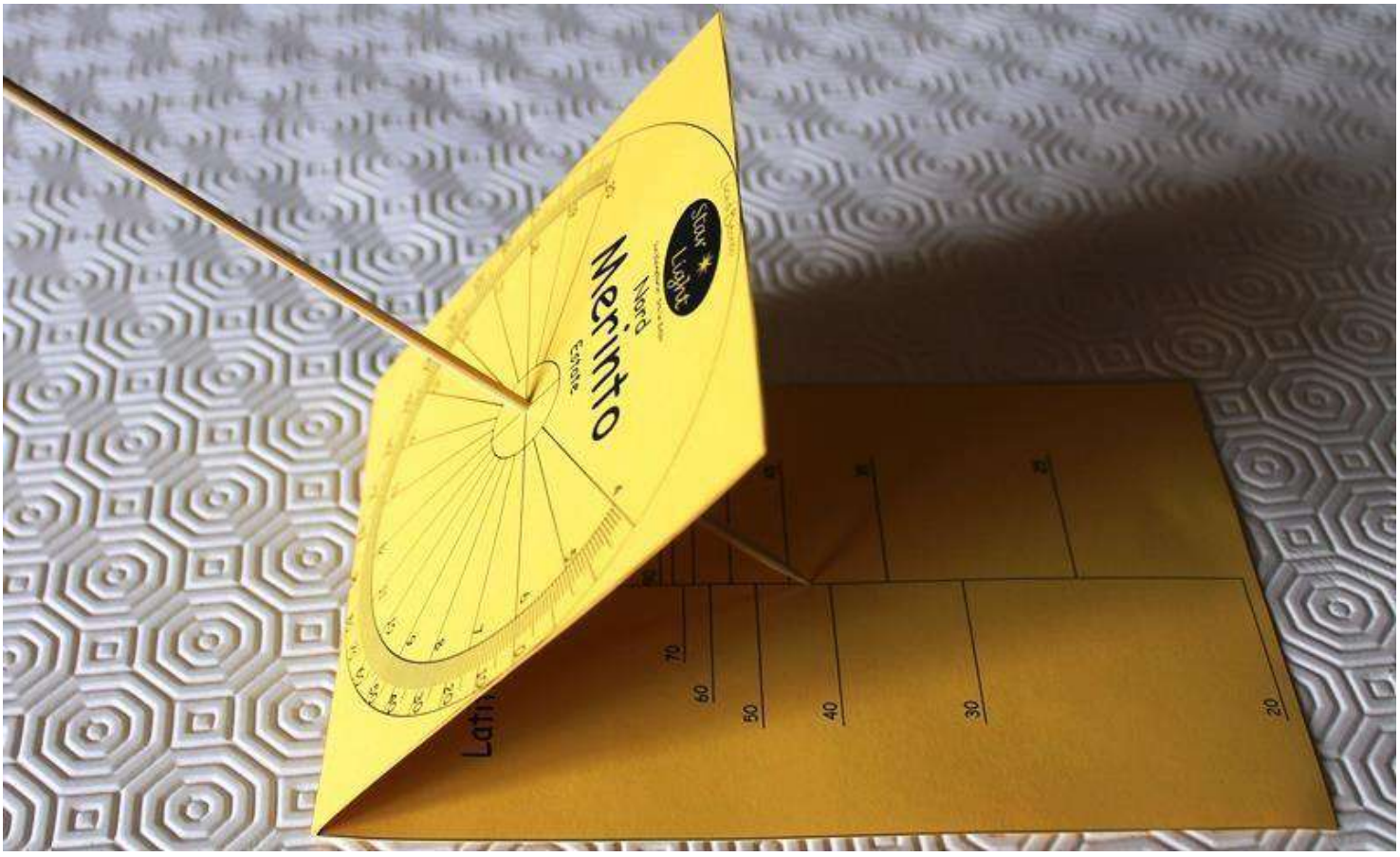
Luca di Bitonto
Star Light
Un planetario tra le dita!
Nord
Merinto
Estate


Star Light
Nord
Merinto
Estate

LESSON PLAN: THE SKY BY DAY

LESSON TITLE	THE SKY BY DAY: OBSERVATIONS AND MEASUREMENTS
TOPIC	ASTRONOMY
SCHOOL LEVEL	GRADE FIVE PRIMARY SCHOOL (BUT IT CAN BE ADAPTED TO OTHER SCHOOL GRADES)
DURATION	9 HOURS
SUBJECT/S INVOLVED	SCIENCE – GEOGRAPHY – MATHS -ENGLISH
NOTE	This lesson plan has been developed with the scientific support of the StarLight Association

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Developing the competence n.3: Mathematical Competence and basic skills in Scientific and Technological Field. • The direct observation of celestial phenomena and the measurements for the collection of data will all be elements that will bring pupils very close to the scientific method. • Promoting the competence n.6: Social and Civic Skills. • Thanks to cooperative learning, the students will be invited to reflect on the fact that different points of view generate different answers and that from the set of these different visions of reality authentic knowledge can be generated. • Developing the competence n.7: Sense of Initiative and Entrepreneurship. Knowing how to collaborate with others in the realization of a common project, activating "planning, organization, management, leadership and delegation, analysis, communication, reporting and assessment skills and registration".
COGNITIVE SKILLS	• Observing • Hypothesizing • Deducing • Comparing and Contrasting • Ordering • Classifying
OBJECTIVES	• Orienting in our territory and in the Planet Earth; geographical coordinates at different latitudes; • using Hindu circles to determine NS direction; • using the gnomon to measure the length of the shadow; • building a Merinto to measure the height of the sun at a certain time; • observe the arch of the sun on the prearranged dates.

ACTIONS	DESCRIPTION
INTRODUCTION	PRESENTATION OF TOPIC Brainstorming, questions and answers, discussion. These strategies will stimulate motivation and will activate the students' prior knowledge and focus on topic.
STEP 1	PRESENTATION CONTENTS Introduction of new concepts, definitions and explanations with the help of imagines, schemes and pictures.
STEP 2	ACTIVATION OF COMMUNICATIVE AND COGNITIVE SKILLS Different kinds of classroom activities involving cognitive skills. In this stage we will prefer laboratory activities, cooperative learning and problem-solving methodology.
STEP 3	SORTING OUT (ACTIVE PRODUCTION) In this stage students will produce: a) the NS meridian in the school courtyard, using Hindu circles. b) The skyline of the view of the sunset (when we can see half of the sun sphere) observed from a spot chosen inside our home on an A3 sheet of paper. c) Building a Merinto to measure the position of the sun at a certain time. d) Using Hindu circles, exercise in the school courtyard to find the direction of the shadows before and after noon in the winter season. e) Measurement of the gnomon shadow at 12.00 a.m. and observation of the sun position by way of the Merinto, in the school courtyard.
STEP 4	REFLECTING

ACTIVITY 1	WHERE AM I?
DURATION	2 HOURS
ACTIVITY DESCRIPTION: WHAT TEACHERS DO: ask questions about directions and orientation in the classroom in relation to cardinal points, latitude and longitude, location of our country on the map. WHAT STUDENTS DO: locate the position of our school in relation to the four cardinal points and individuate the nearest places in their directions. Fill in the form "Where am I?" (annex 1). Find the geographical coordinates.	

ACTIVITY 2	HINDU CIRCLES AND MERINTO
DURATION	5 hours

ACTIVITY DESCRIPTION:

WHAT TEACHERS DO:

- Explain what the Hindu circles are and how to use them.
- Show how to find the direction of the shadows before and after noon.
- Show how to determine the direction of the NS meridian using Hindu circles and the gnomon built on a wooden base.
- Illustrate the Merinto and show how to use it. Give materials and instructions to build it.
- Outdoor, at 12.00, help students in their measurements of the sun's height along the NS direction.

WHAT STUDENTS DO: observing shadows on Hindu circles, drawn on a wooden base, to determine the NS meridian in the school courtyard. In particular:

- Together with the teacher, individuate the position of the shadow on the Hindu circles, half an hour before and after 12.00.
- Sketch the shadows of the gnomon in the NS direction on the outdoor ground, using a waterproof felt pen.
- Build a Merinto.
- Outdoor, along the NS direction, measure the length of the shadow of the gnomon at 12.00 and evaluate the height of the sun with the Merinto.

ACTIVITY 3	THE ARCH OF THE SUN
DURATION	2 HOURS

ACTIVITY DESCRIPTION:

WHAT TEACHERS DO: explain how to measure the arch of the sun on dates set in advance, using Stellarium.

WHAT STUDENTS DO: trace the skyline of the view from their homes at the simulated sunset (from Stellarium) write time and date of the sunset.

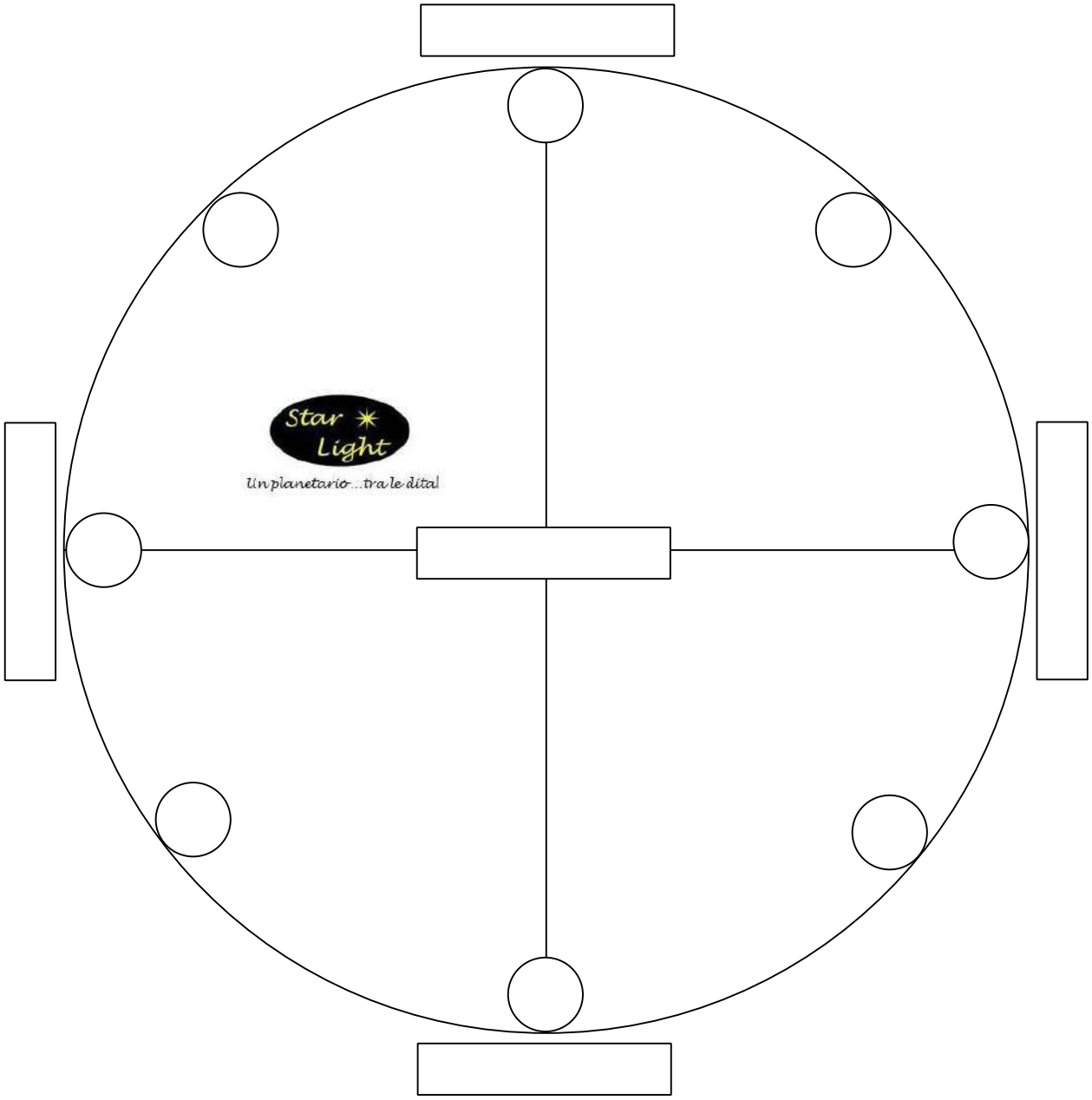
Identify a particular spot inside their homes to observe the sunset.

Draw the skyline of the view observed from the chosen spot on an A3 sheet of paper, in order to indicate the exact point of the sunset (when we can see half of the sun sphere).

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Customised Sky lines Logbook with the activities carried out.

MATERIALS/RESOURCES
A3 sheet Indu Circles
METHODOLOGIES AND STRATEGIES
Through concrete experiences, with simple tools built in the classroom, it will be possible to bring students closer to the construction of hypotheses, to measurements, to the detection and systematization of the collected data. The possibility of obtaining actual data by applying the experimental scientific method could really be the opportunity to implement skills by putting knowledge and skills into practice. Some of the activities will be proposed through the CLIL methodology Dialogue lesson Problem Solving and Brain Storming Peer to Peer Education
ASSESSMENT
For the evaluation, the teacher will use the final products and the observations made during the activities. The surveys, the way in which they are carried out by the children, some products made by the class, can be considered as verification tests.

THE SKY BY DAY - ANNEX 1: WHERE AM I?



LESSON PLAN: THE SKY BY NIGHT

LESSON TITLE	THE SKY BY NIGHT – USE OF STELLARIUM WEB TOOL
TOPIC	ASTRONOMY
SCHOOL LEVEL	GRADE FIVE PRIMARY SCHOOL (BUT IT CAN BE ADAPTED TO OTHER SCHOOL GRADES)
DURATION	4 HOURS
SUBJECT/S INVOLVED	SCIENCE – MATHS - ENGLISH
NOTE	This lesson plan has been developed with the scientific support of the StarLight Association

	COGNITIVE SKILLS AND LESSON OBJECTIVES
AIM/S OF THE PROJECT	• Developing the competence n.3: Mathematical Competence and basic skills in Scientific and Technological Field. • The direct observation of celestial phenomena and the measurements for the collection of data will all be elements that will bring pupils very close to the scientific method. • Promoting the competence n.6: Social and Civic Skills. • Thanks to cooperative learning, the students will be invited to reflect on the fact that different points of view generate different answers and that from the set of these different visions of reality authentic knowledge can be generated. • Developing the competence n.7: Sense of Initiative and Entrepreneurship. Knowing how to collaborate with others in the realization of a common project, activating "planning, organization, management, leadership and delegation, analysis, communication, reporting and assessment skills and registration".
COGNITIVE SKILLS	• Observing • Hypothesizing • Deducing • Comparing and Contrasting • Ordering • Classifying
OBJECTIVES	• Observing the starry sky by night: identification of constellations and Polar Star using Stellarium and with the naked eye.

ACTIONS	DESCRIPTION
INTRODUCTION	PRESENTATION OF TOPIC Brainstorming, questions and answers, discussion. These strategies will stimulate motivation and will activate the students' prior knowledge and focus on topic.
STEP 1	PRESENTATION CONTENTS Introduction of new concepts, definitions and explanations with the help of imagines, schemes and pictures.
STEP 2	ACTIVATION OF COMMUNICATIVE AND COGNITIVE SKILLS Different kinds of classroom activities involving cognitive skills. In this stage we will prefer laboratory activities, cooperative learning and problem-solving methodology.
STEP 3	SORTING OUT (ACTIVE PRODUCTION) • In this stage students will produce: • Observation of the starry sky by night using Stellarium. Detection of constellations and Polar Star.
STEP 4	REFLECTING

ACTIVITY 1	THE STARRY SKY
DURATION	4 HOURS
ACTIVITY DESCRIPTION: WHAT TEACHERS DO: - brainstorm ideas about the concept of constellations; - explain what to observe looking at the starry sky from north to south using Stellarium. - explains how to observe our galaxy and why the starry sky is more crowded with stars in winter. - help students in their observations. WHAT STUDENTS DO - With the help of the teacher, individuate: - the Polar Star, the Big Dipper, Cassiopeia and observe the rotation of constellations around the Polar star, looking north; - Orion, looking South.	

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
No final product; the lesson is aimed at identifying the constellations during the nocturnal observations foreseen by the project.

MATERIALS/RESOURCES
LIM Maps of the sky STELLARIUM Software (https://stellarium-web.org/) Link to Stellarium user guide: https://drive.google.com/file/d/1bNqQqzsYKsue8E8ezOQSLAwVvt4YTdmY/view
METHODOLOGIES AND STRATEGIES
Through concrete experiences, with simple tools built in the classroom, it will be possible to bring students closer to the construction of hypotheses, to measurements, to the detection and systematization of the collected data. The possibility of obtaining actual data by applying the experimental scientific method could really be the opportunity to implement skills by putting knowledge and skills into practice. Some of the activities will be proposed through the CLIL methodology Dialogue lesson Problem Solving and Brain Storming
ASSESSMENT
For the evaluation, the teacher will use the final products and the observations made during the activities. The surveys, the way in which they are carried out by the children, some products made by the class, can be considered as verification tests.

LESSON PLAN: LOOKING AROUND THE SOLAR SYSTEM

LESSON TITLE	LOOKING AROUND THE SOLAR SYSTEM
TOPIC	OUR SOLAR SYSTEM
SCHOOL LEVEL	5TH YEAR OF PRIMARY SCHOOL
DURATION	2 MONTHS
SUBJECT/S INVOLVED	SCIENCE

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Know the Solar System, who composes it and its characteristics
COGNITIVE SKILLS	Comprehension, attention and memory. Relationship capacity
OBJECTIVES	• Know the planets of the Solar System and their positions, dimensions,compositions... • Know the Moons and their lunar phases. • Learn about the Sun and the different solar eclipses. • Learn about comets. • Know what the heavenly bodies are.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Video about Solar System From the visualization of the video, the students comment on what they know, what they know, what concerns they have towards the study of it.	45 minutes
STEP 1	Search for information by students	5 sessions of 45 minutes
STEP 2	Realization of one with each of the planets and their characteristics	1 session of 45 minutes
STEP 3	On a cardboard draw the Moon and its characteristics and at thebottom, draw the phases of the Moon and describe each one.	2 sessions of 45 minutes
STEP 4	Making a scheme about comets and celestial bodies	2 sessions of 45 minutes
STEP 5	Completion of crossword puzzles and alphabet soup about theSolar System Realization of the final product	4 sessions of 45 minutes

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Realization of a mobile planetarium. Reproduction of the Solar System on cardboard. The realization will be done by groups of students of 5 components and each group will choose whichfinal product they want to make.
MATERIALS/RESOURCES
Computers computer science class. Library books on the subject. Consumable material: cardboard, markers, paints...
METHODOLOGIES AND STRATEGIES
Project Based Learning. Cooperative learning
ASSESSMENT
Observation questionnaires. Record scales. Evaluation rubrics

LESSON PLAN: THE SOLAR SYSTEM

LESSON TITLE	THE SOLAR SYSTEM
TOPIC	PLANETS AND THE SPACE
SCHOOL LEVEL	GRADE 5 PRIMARY SCHOOL
DURATION	45 MINUTES
SUBJECT/S INVOLVED	DISCOVERY OF THE WORLD, ENGLISH LII

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• To become more familiar with our solar system and some of the forces which affect it. • To recognise the characteristics of each planet
COGNITIVE SKILLS	Visual processing, sustained attention, logic and reasoning, analysing/concluding, group work
OBJECTIVES	• Define the features of the planets and the nano-planets. • Compare and contrast the planet sizes. • Calculate the distance of the planets from the sun. • Data to find: origin of the name, diameter, how long it takes to revolve about the sun, length of a "day", number of moons, inclination of the axis of rotation to the solar plane.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Example: PRESENTATION OF TOPIC Image of our solar system on interactive white board. Discussion on what keeps the planets revolving around the sun. Brainstorming on how the solar system was created. Strategic questions: Imagine how life would be like on another planet?	5/10 minutes
STEP 1	Online search on the different planets (group work).	15 minutes
STEP 2	Short presentations to report findings.	10 minutes
STEP 3	Create a poster including information about: planet sizes, distance from the sun, diameter, number of moons, etc.	15 minutes
STEP 4	Extension activity- Students work on ''The solar system song'' (https://www.youtube.com/watch?v=F2prtmPEjOc) and produced a theatrical play.	30 minutes (extra activity)

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Creation of a poster with data collection and theatrical play.

MATERIALS/RESOURCES
https://www.musixmatch.com/lyrics/Kids-TV-123/The-Solar-System-Song http://photodentro.edu.gr/v/item/ds/8521/2775 http://photodentro.edu.gr/photodentro/g-hliako_v2.0_pidx0013972/story_html5.html https://www.solarsystemscope.com/ https://atheo.gr/yliko/geost/solar/index.html http://users.sch.gr/pkotsis/4/st-taxi/Geo/games/walle%20%28CD%29/html5.html
METHODOLOGIES AND STRATEGIES
Interaction among teacher and students, completion of group and pair work activities, digital stimuli
ASSESSMENT
A combination of formative and summative assessment: observation of students, degree of participation in the activity, ability to complete the task (calculations), ability to arrive at own interpretations/ conclusions

LESSON PLAN: THE SOLAR SYSTEM

LESSON TITLE	THE SOLAR SYSTEM
TOPIC	SPACE EXPLORERS
SCHOOL LEVEL	GRADE 5
DURATION	90 MINUTES
SUBJECT/S INVOLVED	SCIENCE

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	For children to know the order and relative size of the planets.
COGNITIVE SKILLS	
OBJECTIVES	

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Discuss the solar system and see which planets the children know.Go through information about each planet and discuss its features.	30 minutes
STEP 1	Children have different coloured pieces of paper. They cut out circles for each planet with relative size being the emphasis. Theystick their planets in order, and label.	50 minutes
STEP 2	Children present their solar systems to the class.	5 minutes.
STEP 3	Show website 'if the moon were a pixel' to show distancesbetween planets. https://joshworth.com/dev/pixelspace/pixelspace_solarsystem.html	10 minutes.

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
The child will have an A3 sheet showing all of the planets in the correct order, with relative sizes being somewhat accurate.
MATERIALS/RESOURCES
PowerPoint https://drive.google.com/file/d/1dZnWs9MC8gkXo2NQroI0-2Jo6dXlN0V1/view
Coloured paper, A3 paper
ASSESSMENT
EXAMPLES Questioning throughout the lesson.

LESSON PLAN: SPACE TRAVEL

LESSON TITLE	SPACE TRAVEL
TOPIC	THE SOLAR SYSTEM
SCHOOL LEVEL	S1EL
DURATION	45 MINUTES
SUBJECT/S INVOLVED	ENGLISH LII, MATHEMATICS, INTEGRATED SCIENCES/PHYSICS

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• To become more familiar with our solar system and and space travel. • Familiarise oneself with the solar system. • The Apollo 11 mission.
COGNITIVE SKILLS	Visual processing, sustained attention, logic and reasoning, analysing/concluding, group work
OBJECTIVES	• Define the features of the planets and the nano-planets. • Compare and contrast the planet sizes. • Study the history of space travel. • Mission Highlights

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Example: PRESENTATION OF TOPIC Image of our solar system on interactive white board. Discussion on what keeps the planets revolving around the sun. Brainstorming on how the solar system was created. Strategic questions: How would space travel change in the future?	5/10 minutes
STEP 1	Online search on the different planets (group work).	15 minutes
STEP 2	Short presentations to report findings.	10 minutes
STEP 3	The Apollo Missions https://www.nasa.gov/mission_pages/apollo/missions/index.html	15 minutes
STEP 4	Extension activity- Students work on essay: ''One small step for man, one giant leap for mankind'' (Collect essays for class project)	30 minutes (extra activity)

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Collection of essays for class project.

MATERIALS/RESOURCES
https://www.youtube.com/watch?v=vgJ7qs0x6FY&feature=emb_logo https://www.nasa.gov/mission_pages/apollo/missions/index.html https://www.nasa.gov/mission_pages/apollo/images.html https://www.nasa.gov/mission_pages/apollo/videos
METHODOLOGIES AND STRATEGIES
Interaction among teacher and students, completion of group and pair work activities, digital stimuli
ASSESSMENT
A combination of formative and summative assessment: observation of students, degree of participation in the activity, ability to arrive at own interpretations/ conclusions, develop critical thinking

LESSON PLAN: MINIATURE MODEL OF SOLAR SYSTEM

LESSON TITLE	SOLAR SYSTEM
TOPIC	CONSTRUCTION OF SOLAR SYSTEM
SCHOOL LEVEL	5TH GRADE
DURATION	11 LESSONS (45MIN)
SUBJECT/S INVOLVED	SCIENCE, ART, HANDICRAFTS, MATHEMATICS, FINNISH, ENGLISH

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• To create three-dimensional miniature models of Solar system in real scale into three school aisles • To write information posters in Finnish and English of each part of Solar system • Learning by doing
COGNITIVE SKILLS	Group work, visual processing, sustained attention
OBJECTIVES	• Information retrieval • Calculate the distance from the Sun and the size of the planets • Compare different parts of Solar system

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	PRESENTATION OF TOPIC Discussion, aims and forming groups	10 minutes
STEP 1	Count the size-scale of the parts of the Solar system	20 minutes
STEP 2	Make planets and asteroids in groups using waste paper, balloons, paste and paints	6 hours
STEP 3	Count distances in miniature scale and hang the models on the ceiling	2 hours
STEP 4	Write information posters in Finnish and in English	2 hours
STEP 5	Guide a tour for all other classes	1 hour

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Miniature models of Solar system hanging in each aisle of the school

MATERIALS/RESOURCES
https://www.ursa.fi/tahtitieteesta/tietoa-tahtitieteesta/aurinkokuntamme.html
METHODOLOGIES AND STRATEGIES
Interaction among teachers and students, completion of group work activities
ASSESSMENT
Observation of students, degree of participation in the activity, ability to complete a task

LESSON PLAN: WEIGHT ON DIFFERENT PLANET

LESSON TITLE	HOW MUCH WOULD I WEIGH ON DIFFERENT PLANETS?
TOPIC	SOLAR SYSTEM- GRAVITY AND WEIGHT
SCHOOL LEVEL	PRIMARY 4/ PRIMARY 5
DURATION	45 MINUTES
SUBJECT/S INVOLVED	ENGLISH LANGUAGE 1 (SPEAKING, READING, WRITING), MATHEMATICS (MULTIPLYING WITH DECIMALS, USE OF CALCULATOR)

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• To become more familiar with our solar system and some of the forces which affect it. • To perceive that the other planets in our solar system are very different than Earth, gravitational pull being only one of these differences.
COGNITIVE SKILLS	Visual processing, sustained attention, logic and reasoning, analysing/concluding
OBJECTIVES	• To understand that the size of a planet affects its gravitational pull. • To understand that the larger a planet is, the more gravitational pull it exerts, pulling things towards its center. • Students calculate their own weight on different planets using the formula weight= mass x gravity. (The mass is considered their weight on Earth) • They compare and draw conclusions on the relationship between planet size and weight on each planet.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	PRESENTATION OF TOPIC Image of our solar system on interactive white board. Discussion on what keeps the planets revolving around the sun. Brainstorming on how gravity affects the solar system. <u>Strategic questions</u>: How does gravity affect humans on Earth? Would it affect us differently if we were on another planet?	5/10 minutes
STEP 1	Students read short passage (aloud and in turns to the class) on the comparative size of the planets and the effect of gravity on weight. A short class discussion follows.	15 minutes
STEP 2	Students determine their own approximate weight and proceed in calculating their approximate weight on the various planets using the formula.	10 minutes

STEP 3	Students are asked to draw conclusions from their findings.	5 minutes
STEP 4	Extension activity- Students are asked to consider the extent to which their daily lives would be affected if they lived on a larger or smaller planet than Earth.	5 minutes

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Students record their findings (calculations) on the chart provided by the teacher.

MATERIALS/RESOURCES
http://www.spacecenter.org/docs/Activities-HowMuchDoIWeigh.pdf https://www.superteacherworksheets.com/space/weight-on-planets_WMTZF.pdf https://www.schoolsobservatory.org/discover/sims-cals/weight Weight scale in classroom
METHODOLOGIES AND STRATEGIES
Inquiry based approach- teacher guides students through use of strategic questioning and availability of appropriate materials, while allowing students to arrive at their own interpretations/conclusions at the end to share with their peers
ASSESSMENT
A combination of formative and summative assessment: observation of students, degree of participation in the activity, ability to complete the task (calculations), ability to arrive at own interpretations/ conclusions

LESSON PLAN: THE MOON

LESSON TITLE	THE MOON
TOPIC	THE MOON AND ITS PHASES
SCHOOL LEVEL	P4EL (GREEK SECTION)
DURATION	45 MINUTES
SUBJECT/S INVOLVED	DISCOVERY OF THE WORLD, ENGLISH LII

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Describe the surface of the moon. • Study the different phases of the moon.
COGNITIVE SKILLS	Visual processing, sustained attention, logic and reasoning, analysing/concluding, group work
OBJECTIVES	• Analyse the surface of the moon. • Compare the different phases. • Calculate distance between moon – earth. • Understand the role of the moon in the solar system.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	PRESENTATION OF TOPIC Discussion on scenarios about the creation of the moon. Strategic questions: What can we see on the surface of the moon?	5/10 minutes
STEP 1	Story of the fall of a meteorite (answer questions related to text ANNEX 1).	15 minutes
STEP 2	Study the phases of the moon (related activities). http://system.solaire.free.fr/lunaison.gif	10 minutes
STEP 3	Create poster "The phases of the moon"	15 minutes
STEP 4	Extension activity- Students work on the following link: https://atheo.gr/yliko/geoe/ge/moon/index.html	30 minutes (extra activity)

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Creation of a poster with data collection.

MATERIALS/RESOURCES
https://stellarium.org/ https://atheo.gr/yliko/geoe/ge/moon/index.html http://system.solaire.free.fr/lunaison.gif
METHODOLOGIES AND STRATEGIES
Interaction among teacher and students, completion of group and pair work activities, digital stimuli
ASSESSMENT
A combination of formative and summative assessment: observation of students, degree of participation in the activity, ability to complete the task (calculations), ability to arrive at own interpretations/ conclusions

THE MOON – ANNEX 1

"*In the evening of 14 June 1994, at about 20 h, thousands of people in Quebec and the north of the United States saw a spectacular ball of fire and heard a load supersonic bang.*

The meteorite had exploded at a height of 10 to 20 km above the Earth's surface producing a rain of fragments in the south of Quebec. A few minutes later, Stéphane Forcier collected one of the fragments on the farm of his parents in Saint-Robert de Sorel, to the east of Montreal. The next day the Canadian Geography Commission confirmed that the fragment was a meteorite. As lots of other fragments were found this phenomenon is referred to as the Saint-Robert meteorite shower. It is estimated that thousands of fragments from the meteor fell to earth but only 20 have been found so far.

Stéphane Forcier and his brother Serge found the fragment in a field shortly after hearing something fall close to the family farm. Guided to the spot by the curiosity of a group of cows they found a 15 cm hole from which they dug up a cold black stone the size of a grapefruit weighing 2.3 kg. Stéphane informed the police and Saint-Robert immediately became the centre of media attention."

LESSON PLAN: MOON PHASES

LESSON TITLE	MOON PHASES
TOPIC	SPACE EXPLORERS
SCHOOL LEVEL	YEAR 5
DURATION	90 MINUTES
SUBJECT/S INVOLVED	SCIENCE

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	For children to be able to name and recognize the different phases of the moon.
COGNITIVE SKILLS	
OBJECTIVES	• To identify, label and draw the phases of the moon

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Discuss the moon and the history of knowledge of the moon. Discuss that the moon looks different throughout the month. Talkabout the cycle. Discuss the different phases.	20 minutes
STEP 1	Use Oreo cookies to show the different phases of the moon asshown in the PowerPoint.	45 minutes
STEP 2	Photograph children with their Oreo moons.	10 minutes.
STEP 3	Discuss todays learning and children's questions.	15 minutes.

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
A picture of the child with a sheet with Oreos with cream removed to represent different phases of the moon.

MATERIALS/RESOURCES
PowerPoint presentation https://drive.google.com/file/d/1Vv6VnSCPvuNffKmR5BEyaFTZ4Ks3Rmw6/view Worksheet https://drive.google.com/file/d/17kuUwu0EgixqvTDahmC6aFldWAvWfruv/view Oreos, Camera

ASSESSMENT
Questioning throughout the lesson.

LESSON PLAN: GLOBE

LESSON TITLE	GLOBE
TOPIC	THE EARTH
SCHOOL LEVEL	5TH YEAR OF PRIMARY SCHOOL
DURATION	3 MONTHS
SUBJECT/S INVOLVED	SCIENCE

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Know the incredible world of the Earth
COGNITIVE SKILLS	Comprehension, attention and memory. relationship capacity
OBJECTIVES	• Know the different seasons of the year and their characteristics. • Know the different hemispheres. • Know the movements of the Earth. • Relate the different constellations with the hemisphere in which they are visible.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Videos about the earth and its movements	45 minutes
STEP 1	Search for information by students	3 sessions of 45 minutes
STEP 2	Use of the celestial planisphere	2 sessions of 45 minutes
STEP 3	Interpret the time zone map	2 sessions of 45 minutes
STEP 4	Online activities about the movements of the Earth	2 sessions of 45 minutes
STEP 5	Making a mockup	3 sessions of 45 minutes

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Making a model of the movements of the Earth and the Moon
MATERIALS/RESOURCES
Computers computer science class. Library books on the subject. Consumable material: cardboard, markers, paints...
METHODOLOGIES AND STRATEGIES
Project Based Learning. Cooperative learning
ASSESSMENT
Observation questionnaires. Record scales. Evaluation rubrics

LESSON PLAN: CRATERS

LESSON TITLE	FORMATION OF CRATERS
TOPIC	SPACE EXPLORERS
SCHOOL LEVEL	YEAR 5
DURATION	90 MINUTES
SUBJECT/S INVOLVED	SCIENCE

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• To understand the factors that cause a crater to be created. • To know how craters are formed on Earth and on the Moon
COGNITIVE SKILLS	
OBJECTIVES	• To be able to make systematic and accurate measurements from their observations. • To be able to record and communicate scientific findings using scientific vocabulary.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Discuss craters. Discuss difference between asteroid, meteor and meteorites. Discuss how craters are formed. Predict what makes the biggest craters.	15 minutes.
STEP 1	Have children make different sized balls out of clay.	10 minutes.
STEP 2	Have trays of flour and allow children to drop the balls from different heights to see how that affects the formation of a crater.	30 minutes.
STEP 3	Children complete worksheet.	10 minutes.

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
The child will have a sheet which has their predictions, findings and conclusions on the experiment on it.

MATERIALS/RESOURCES
PowerPoint https://drive.google.com/file/d/15aWVFeI3Itak2kOo5rnFjakvgVc6moUn/view Clay, Tray, Flour, Step ladder Worksheet https://drive.google.com/file/d/1Ydbzp2iK0BRDELyYygXcSvbzRnzsR6BN/view
METHODOLOGIES AND STRATEGIES
Making a hypothesis.

LESSON PLAN: CONSTELLATIONS AND SKY MAP

LESSON TITLE	SKY MAP 14/26
TOPIC	CONSTELLATIONS AND SKY MAPS
SCHOOL LEVEL	6TH GRADE
DURATION	45MIN
SUBJECT/S INVOLVED	MATHEMATICS, PHYSICS, FINNISH, WRITTEN PRODUCTION

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• To become more familiar of sky map • To learn the most common constellations • To understand the difference between the northern and southern sky
COGNITIVE SKILLS	Visual processing, sustained attention, accurate notes, discussion skills
OBJECTIVES	• To learn constellations • To understand the scale (distances and size) of stars • To understand the meaning of the Pole star • To create proper notes based on the tutorial • Be able to discuss about sky map

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Presentation of topic Discussion of knowledge about sky map and constellations beforehand	10 - 15 minutes
STEP 1	Students watch a film about sky map (part 14/26 of serie Space files)	10 minutes
STEP 2	Students write and draw one page-notes of the topic	10 minutes
STEP 3	Discussion of the topic, demonstration of each note	10 minutes

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Space note books

MATERIALS/RESOURCES
https://areena.yle.fi/1-2694842
METHODOLOGIES AND STRATEGIES
Material (film) is provided by the teacher. Students transfer what they have learned into writing and are able to discuss the topic.
ASSESSMENT
Observation of students, their concentration, enthusiasm and responsibility of working. Degree of participation in the debate.

LESSON PLAN: CHASING CONSTELLATIONS

LESSON TITLE	CHASING CONSTELLATIONS
TOPIC	ASTRONOMY
SCHOOL LEVEL	GRADE THREE – FOUR – FIVE PRIMARY SCHOOL (BUT IT CAN BE ADAPTED TO OTHER SCHOOL GRADES)
DURATION	6 HOURS
SUBJECT/S INVOLVED	SCIENCE – TECHNOLOGY – MATH - ENGLISH
NOTE	This lesson plan has been developed with the scientific support of the StarLight Association

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Recognition of the constellations in the sky to arrive at the • Awareness that they are only random alignments of celestial objects located even at a great distance from each other.
COGNITIVE SKILLS	• Develop attitudes of curiosity and ways of looking at the world that stimulate us to seek explanations in what we see happening. • Explore phenomena with a scientific approach: with the help of the teacher, peers, independently, observe and describe the unfolding of the facts, formulate questions, also on the basis of personal hypotheses, propose and carry out simple experiments. • Identify similarities and differences in phenomena, make measurements, record significant data, identify spatial / temporal relationships. • Identify quantitative and qualitative aspects in phenomena, produce graphic representations and diagrams of an adequate level, elaborate simple models.
OBJECTIVES	• Learn to observe maps of the sky • Learn to recognize the constellations and imagine the lines between the stars that define the figure. • Internalize the concept that the constellations are only apparent.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	PRESENTATION OF TOPIC Brainstorming, questions and answers, discussion. These strategies will stimulate motivation and will activate the students' prior knowledge and focus on content vocabulary.	15 minutes
STEP 1	FIND THE CONSTELLATION: teachers work Print some sky maps Using celestial maps draw, on transparent plastic caps or transparent PVC sheets, the star points of some constellations (at least 3 constellations for each group of pupils).	1 hour
STEP 2	FIND THE CONSTELLATION: students work Divide the pupils into groups of 3/4 children and distribute 3 constellations and the related celestial maps to each group. Pupils will have to recognize the constellations by superimposing the cap or transparent PVC sheets on the paper. After the search, each group can share the information found with the others.	1 hour
STEP 3	WHAT DISTANCE? Teachers work Print some sky maps Use transparent plastic caps (equal to the number of stars in each constellation) and draw a point corresponding to a star in a constellation on each cap until the constellation is complete.	1 hour
STEP 4	WHAT DISTANCE? Students work Deliver a constellation (consisting of several caps) to each group and invite the children to overlay the caps in order to rebuild the constellation. Let them see with the maps which constellation it is and make them reflect on the fact that the stars are in the sky on different planes and at different distances even if we see them perfectly aligned.	1 hour
STEP 6	COLLECTIVE REWORKING OF THE EXPERIENCE Students after practice in class with the tools can use the maps to observe the sky. Teachers and students can rework the experience collectively and produce artifacts to fix it	2 hour

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Elaborated that tell the experience. Moments of collective re-elaboration that lead students to tell and argue

MATERIALS/RESOURCES
Maps of the sky Plastic caps Transparent PVC sheets Markers
METHODOLOGIES AND STRATEGIES
Through concrete experiences, with simple tools built in the classroom, it will be possible to bring students closer to the construction of hypotheses, to measurements, to the detection and systematization of the collected data. The possibility of obtaining actual data by applying the experimental scientific method could really be the opportunity to implement skills by putting knowledge and skills into practice. Some of the activities will be proposed through the CLIL methodology.
ASSESSMENT
For the evaluation the teacher will use the observations made during the activities, for example the way in which the students work and any products made in the class.

LESSON PLAN: WALKING TOWARDS THE STARS

LESSON TITLE	WALKING TOWARDS THE STARS
TOPIC	CONSTELLATIONS
SCHOOL LEVEL	5TH YEAR OF PRIMARY SCHOOL
DURATION	2 MONTHS
SUBJECT/S INVOLVED	SCIENCE

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THEPROJECT	• Discover the world of constellations
COGNITIVE SKILLS	Comprehension, attention and memory. Relationship capacity
OBJECTIVES	

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Videos about constellations	45 minutes
STEP 1	Search for information by students	4 sessions of 45 minutes
STEP 2	Know the celestial planisphere: what it is, how it is used	2 sessions of 45 minutes
STEP 3	Use of the Stellarium	3 sessions of 45 minutes
STEP 4	Relationship between mythology and astronomy	3 sessions of 45 minutes
STEP 5	Making a booklet of constellations, where there is a drawing of each one of them, the name and a small explanation of it.	3 sessions of 45 minutes

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Making a booklet of constellations, where there is a drawing of each one of them, the name and a small explanation of it.
MATERIALS/RESOURCES
Computers computer science class. Library books on the subject. Cardboard, markers, paints...
METHODOLOGIES AND STRATEGIES
Project Based Learning. Cooperative learning
ASSESSMENT
Observation questionnaires. Record scales. Evaluation rubrics

LESSON PLAN: LEARN A SONG

LESSON TITLE	LEARNING SONG: INTO THE PURE DARKNESS
TOPIC	LIGHT POLLUTION
SCHOOL LEVEL	5TH GRADE
DURATION	45 MIN
SUBJECT/S INVOLVED	MUSIC, FINNISH

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• To learn about space and light pollution by a song, to enjoy music
COGNITIVE SKILLS	Group work, memory, new skills
OBJECTIVES	• Reading notes, practising external memory, learning about constellation Pleiades

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Presesentation of a song composed by Katri Kittilä, lyrics Johanna Jalkanen	5 minutes
STEP 1	Discussion about the meaning of the lyrics	15 minutes
STEP 2	Learning the melody	10 minutes
STEP 3	Practising the song	15 minutes

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
A song ready for performance

MATERIALS/RESOURCES
https://acrobat.adobe.com/link/review?uri=urn:aaid:scds:US:26849966-118b-3fe1-b159-e9ebca6c6eda
METHODOLOGIES AND STRATEGIES

Interaction among teachers and students, working in a group, goal-oriented training
ASSESSMENT
Observation of students, degree of participation in joint exercise, ability to complete the song, bold performance Systematic Observation/Multiple Choice Test/Poll

LESSON PLAN: SPACE MUSICAL

LESSON TITLE	SPACE MUSICAL
TOPIC	NORTHERN LIGHTS, CONSTELLATIONS
SCHOOL LEVEL	6TH GRADE
DURATION	ONE YEAR
SUBJECT/S INVOLVED	MUSIC, SCIENCE, ART, FINNISH, PERFORMING ARTS, HANDICRAFTS, ENGLISH, STAGE TECHNOLOGY

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THE PROJECT	• Deepening in the Northern Lights phenomenon • Deepening in Ursa Major • Performance skills training
COGNITIVE SKILLS	Sustained attention, group work, perseverance
OBJECTIVES	• Making together the whole process from the first planning meeting until the end of the 8th performance.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Decision to make a musical and bring the wonders of space to the attention of the entire community	
STEP 1	Division of roles and responsibilities	
STEP 2	Intense training piece by piece	
STEP 3	Making sets and costumes	
STEP 4	Advertising	
STEP 5	Musical performances – 8 times	

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Musical theatre "E quindi uscimmo a riveder le stelle" VIDEO https://youtu.be/c9xmnZG5g0o

MATERIALS/RESOURCES
Songs chosen by music teacher - manuscript written by Jaana Nuuttila
METHODOLOGIES AND STRATEGIES
Preliminary work of introduction to the project Text analysis Theatrical activity
ASSESSMENT
Observation of students

LESSON PLAN: OUR FRIENDLY COUNTRIES

LESSON TITLE	OUR FRIENDLY COUNTRIES
TOPIC	STUDY OF FINLAND, ITALY, GREECE, LONDON AND SPAIN
SCHOOL LEVEL	4TH YEAR OF PRIMARY SCHOOL
DURATION	3 MONTHS
SUBJECT/S INVOLVED	GEOGRAPHY – ART – SCIENCE - MATHS

COGNITIVE SKILLS AND LESSON OBJECTIVES	
AIM/S OF THEPROJECT	• Know in depth the countries participating in the project
COGNITIVE SKILLS	Comprehension, attention and memory. relationship capacity
OBJECTIVES	• Know the number of inhabitants of each country. • Know the flag of each country. • Know the coordinates of each country. • Know the language of each country. • Know the distances from Xirivella to each of the countries. • Know places of interest in each country. • Know the typical food of each country.

ACTIONS	DESCRIPTION	TIME
INTRODUCTION	Videos about each one of the countries. From them, the students begin to talk about what they knowabout each one of them, if this is the case, at the same time that there is a motivation to learn, to know, to compare the partner countries of the project.	25 minutes
STEP 1	Search for information by students	6 sessions of 45 minutes
STEP 2	Preparation of bar and line diagrams comparing the number of inhabitants.	1 session of 45 minutes
STEP 3	Make the different flags of each country	2 sessions of 45 minutes

STEP 4	On a map the partner countries and the destination locality arelinked where the Greenwich meridian is marked	1 session of 45 minutes
STEP 5	Realization of the triptych	5 sessions of 45 minutes

DESCRIPTION OF THE FINAL PRODUCT (IF ANY)
Triptych (students in groups of 5 will make a triptych in which they will have to capture everything they have worked on)
MATERIALS/RESOURCES
Computers computer science class. Library books on the subject. Consumable material: cardboard, markers, paints...
METHODOLOGIES AND STRATEGIES
Project Based Learning. Cooperative learning
ASSESSMENT
Observation questionnaires. Record scales. Evaluation rubrics

OTHER USEFUL MATERIALS

SPACE EXPLORERS
An interesting path from St Leonard's Church of England Primary School
https://padlet.com/danielarosati71/5rigq9xobrhj/wish/2351462976

REPOSITORY OF MATERIALS PRODUCED BY STUDENTS
Padlet that collects all the materials produced by the students during the project. There are also useful materials for teachers' work.
https://padlet.com/danielarosati71/5rigq9xobrhj

Thanks to all the teachers who contributed to the realization of this work with great passion and dedication.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