

Erasmus Project KA220

„QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM” (QUEST)

No. 2022-1-RO01-KA220-SCH-000088614.

GOOD PRACTICES IN STEM EDUCATION



Partener organisation:

Ibī *Spain*
FUNDACIÓN SAN JUAN Y SAN PABLO

Porto *Portugal*
AGRUPAMENTO DE ESCOLAS
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Cerignola *Italy*
STITUTO COMPRENSIVO DI VITTORIO-PADRE PIO

Applicant organisation

Brăila *România*
ȘCOALA GIMNAZIALĂ "MIHAI VITEAZUL"



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GOOD PRACTICES IN STEM EDUCATION

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QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

Project Summary

Objectives:

To develop and strengthen relationships between the 6 partner schools, 6 headteacher and 30 teachers, by creating a regional and international context of cooperation by sharing and confronting ideas, practices and methods in STEM education, for 2 years;

To improve “basic skills” in science, technology, mathematics, engineering (STEM), language and communication and ICT of 180 pupils from 6 partner, using 6 novels of J. Verne, to increase at least 5% the number of pupils with improved school result.

Implementation:

The implementation of the project took place after 3 stages: search, discovery and application. Six novels were read, six student exchanges and after each exchange, the participating students became ambassadors for their housemates and helped them complete the required tasks. During these meetings, STEM themes were organized innovatively approached in six novels by Jules Verne:

"A Journey to the Center of the Earth novel", "From the earth to the moon", "Five weeks in the balloon", "Twenty Thousand Leagues Under the Sea", "Around the World in 80 Days", "A Day in the Life of an American Journalist in 2889".

Results:

Students will develop transdisciplinary learning, improve their teamwork skills, communication and language skills, international understanding of STEM, be more motivated to learn and improve their school results.

Teachers will improve their lesson design skills and optimize their pedagogical approaches to STEM education

Schools will implement the joint initiative on STEM education through, through mutual learning activities and exchanges of experience at European level with reusable, transferable results

Innovative character

The innovative character of the project is given by the use of literature elements within the STEM subjects but also by the project's potential to improve the STEM level through a European approach. Students worked together to find out exactly what it was like to make great discoveries. Students in mixed teams felt like little explorers and discovered new things through a hands-on approach, learned to use compasses, calculate distances, orient themselves with rudimentary tools, create a map at a given scale, applying everything they read in literature classes or homework sessions. They learned to correlate theoretical notions and their applicability in everyday life, starting from the STEM subjects covered in Jules

Verne's novels, so that learning was easier and more accessible, more enjoyable. Moreover, the students rediscovered themselves

passion for reading. The best practice guide is innovative, unique and together with the lesson plans developed in both English and mother tongue, they will be made available to all partners for multiplication. The innovative character was also given by the mix of teams of explorers, these being composed both of students from disadvantaged categories and students from other social categories. Also, the fact that each work team included students from each partner school ensured a work group with a European character.



QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ȘCOALA GIMNAZIALĂ "MIHAI VITEAZUL"

ACTIVITĂȚI STEM / STEM ACTIVITIES

CRIPTOLOGIA DE IERI ȘI DE AZI / CRYPTOLOGY YESTERDAY AND TODAY

INVENȚIILE LUI JULES VERNE PE CARE LE-A PREVESTIT /

JULES VERNE'S INVENTIONS THAT HE PREDICTED AHEAD OF HIS TIME

PLANURI DE LECȚIE / LESSON'S PLANS

PROFESORI/TEACHERS

BĂJENICĂ GIANINA

MOLDOVEANU GABRIEL

STROE DANIELA

Brăila, 13 Decembrie 2022



QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

DATE: 13th December 2022

TYPE OF LESSON: STEM Lesson within QUEST Erasmus Project

TOPIC: **Cryptology, then and now**

NO. OF STUDENTS: 18 (international group)

METHODS: creative thinking, brainstorming, learning through discovery, the heuristic exercise, the creative journal

RESOURCES: sheets of paper, markers, phones, QR codes printed out, flipchart, ppt material, brochure, worksheets.

BIBLIOGRAPHY:

Lucian Boia, *Jules Verne. Paradoxurile unui mit*. Ed Humanitas, București 2005.

Ion Hobana, *Jules Verne chipuri, obiecturi și peisaje românești*, Ed. Pro, 2005

Dinu Moroianu, *Jules Verne și călătoriile sale*, Ed. Tineretului, București, 1962.

GENERAL AIMS: The purpose of the lesson is to ensure an educational climate suitable for learning through cooperation and interrelationship, applying modern methods and participatory strategies in order to discover Jules Verne's book and bring up to date the discoveries that laid the foundations of modern science.

ACTIVITY 1: Let's get to know each other 😊 Please, introduce yourself!

AIM: to create an enjoyable atmosphere while getting students to know each other

PROCEDURE: Students will use the Phoenician alphabet to write the name, country, school of origin, also state the date of birth, day, month, year and age, using hieroglyphic writing.

ACTIVITY 2: *Journey to the Centre of the Earth*

AIM: to learn about themes addressed in the novel *Journey to the Centre of the Earth*

PROCEDURE: Teacher provides the students a QR Code and they will discover the themes addressed in the novel. Then, they will solve a small exercise using the learningapps.org application.

ACTIVITY 3: Cryptology, then and now!

AIM: the identification of the main types of writing, the time and space framing of the types of writing.

PROCEDURE: students will follow the ppt presentation, they will express their opinion on the types of writing and solve a worksheet.

ACTIVITY 4: Cave paintings, the form of primitive art.

AIM: to find out more information about the cave paintings.

PROCEDURE: Teacher provides the students a QR Code, to watch and read the information and asks them to name a cave in Europe where such paintings can be found.

ACTIVITY 5: Journey to the world of caves in our countries

AIM: to discover information about caves, to collaborate in groups, to develop their communication skills in English.

PROCEDURE: Evaluation/Assessment

Students will work in groups, receive materials with information about the most famous caves in each participating country and solve a puzzle on a flipchart sheet that they will present.

At the end of the activities, students will complete a creative journal.



QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

DATA: 13 Decembrie 2022

TIPUL LECȚIEI: Lecție de tip STEM

TITLUL: **Criptologia de ieri și de azi**

NUMĂRUL DE ELEVI: 18 (grup internațional)

METODE ȘI PROCEDEE: gândirea creativă, brainstorming, învățarea prin descoperire, exercițiul euristic, jurnalul creativ.

RESURSE MATERIALE: coli de hârtie, markere, telefoane, coduri QR tipărite, flipchart, material ppt, broșură, fișe de lucru.

BIBLIOGRAFIE:

Lucian Boia, *Jules Verne. Paradoxurile unui mit*. Ed Humanitas, București 2005.

Ion Hobana, *Jules Verne chipuri, obiceiuri si peisaje românești*, Ed. Pro, 2005

Dinu Moroianu, *Jules Verne și călătoriile sale*, Ed. Tineretului, București, 1962.

SCOPUL GENERAL: Scopul lecției este de a asigura un climat educativ adecvat învățării prin cooperare și prin interrelaționare, aplicând metode moderne și strategii participative în vederea descoperirii cărții lui Jules Verne și aducerii în actualitate a descoperirilor ce au pus bazele științei moderne.

ACTIVITATEA 1: Haideți să ne cunoaștem! ☺ Prezentăți-vă, vă rog frumos!

SCOP: Crearea unei atmosfere plăcute, elevii se vor cunoaște unii cu ceilalți.

DESCRIEREA ACTIVITĂȚII: Elevii vor folosi alfabetul fenician pentru a scrie numele, țara, școala de origine, precum și data nașterii, ziua, luna, anul, vârsta, folosind scrisul hieroglific.

ACTIVITATEA 2: Călătorie spre centrul Pământului

SCOP: Cunoașterea temelor abordate în romanul *Călătorie spre centrul Pământului*.

DESCRIEREA ACTIVITĂȚII: Profesorul pune la dispoziție elevilor un cod QR și aceștia vor descoperi temele abordate în roman. Apoi, vor rezolva un mic exercițiu, folosind aplicația learningapps.org.

ACTIVITATEA 3: Criptologia, atunci și acum!

SCOP: Identificarea principalelor tipuri de scriere, încadrarea în timp și spațiu a tipurilor de scriere.

DESCRIEREA ACTIVITĂȚII: Elevii vor urmări prezentarea ppt, își vor exprima opinia asupra tipurilor de scris și vor rezolva o fișă de lucru.

ACTIVITATEA 4: Picturile rupestre, forma artei primitive.

SCOP: Cunoașterea unor informații despre picturile rupestre.

DESCRIEREA ACTIVITĂȚII: Profesorul pune la dispoziție elevilor un cod QR, pentru a viziona și citi informațiile și le cere să numească o peșteră din Europa unde se găsesc astfel de picturi.

ACTIVITATEA 5: Călătorie în lumea peșterilor din țările noastre

SCOP: Descoperirea unor informații despre peșteri, colaborarea în cadrul grupei, dezvoltarea abilităților de comunicare în limba engleză.

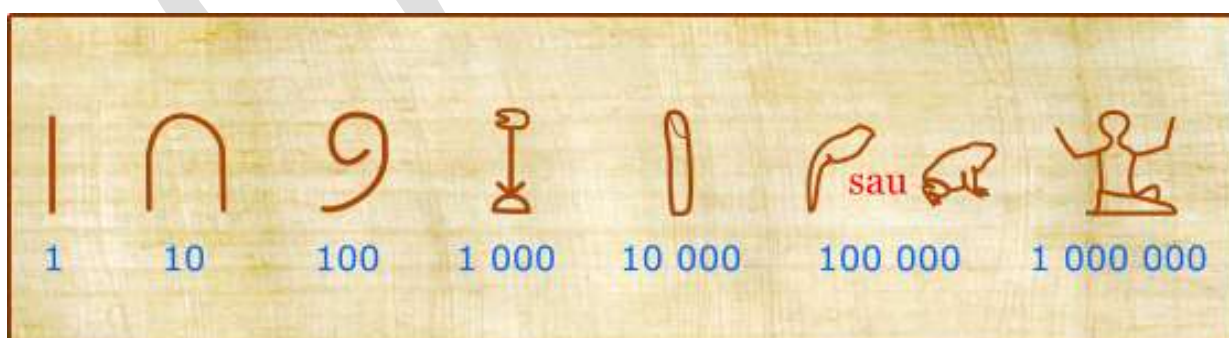
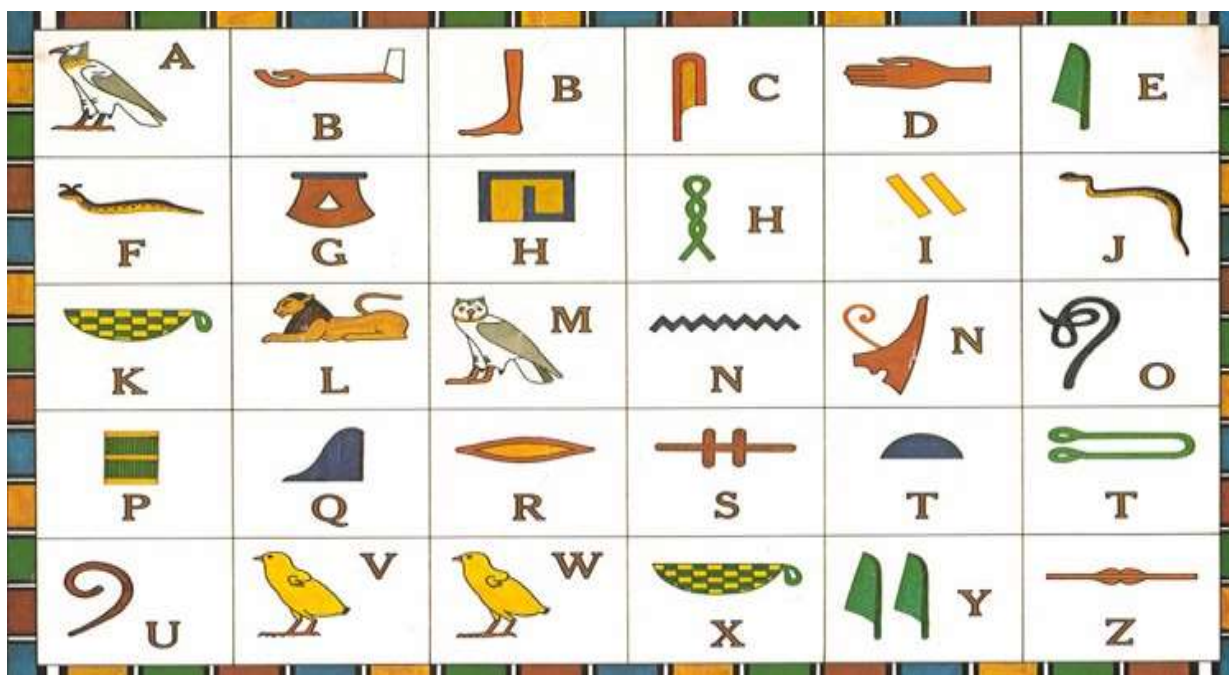
DESCRIEREA ACTIVITĂȚII: Evaluare

Elevii vor lucra pe grupe, vor primi materiale cu informații despre cele mai faimoase peșteri din fiecare țară parteneră și vor rezolva un rebus pe o foaie de flipchart pe care îl vor prezenta celorlalți. La sfârșitul activităților, elevii vor completa un jurnal creativ.

QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITY 1

LET'S HAVE FUN!! SPECIFY THE DATE OF BIRTH (D/M/Y), NAME AND AGE, USING HIEROGLYPHIC WRITING. ☺



USE THE PHOENICIAN ALPHABET TO WRITE YOUR NAME, COUNTRY AND CITY WHERE YOU LIVE. ☺

PHOENICIAN ALPHABET
hand drawn characters

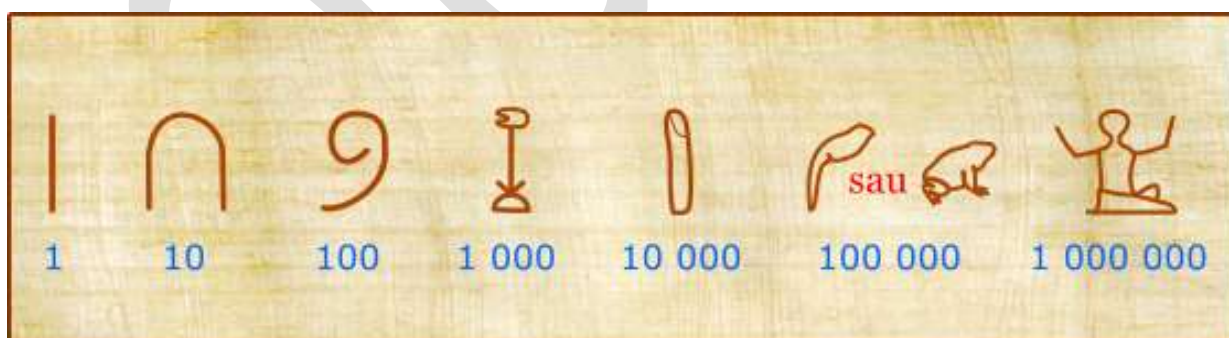
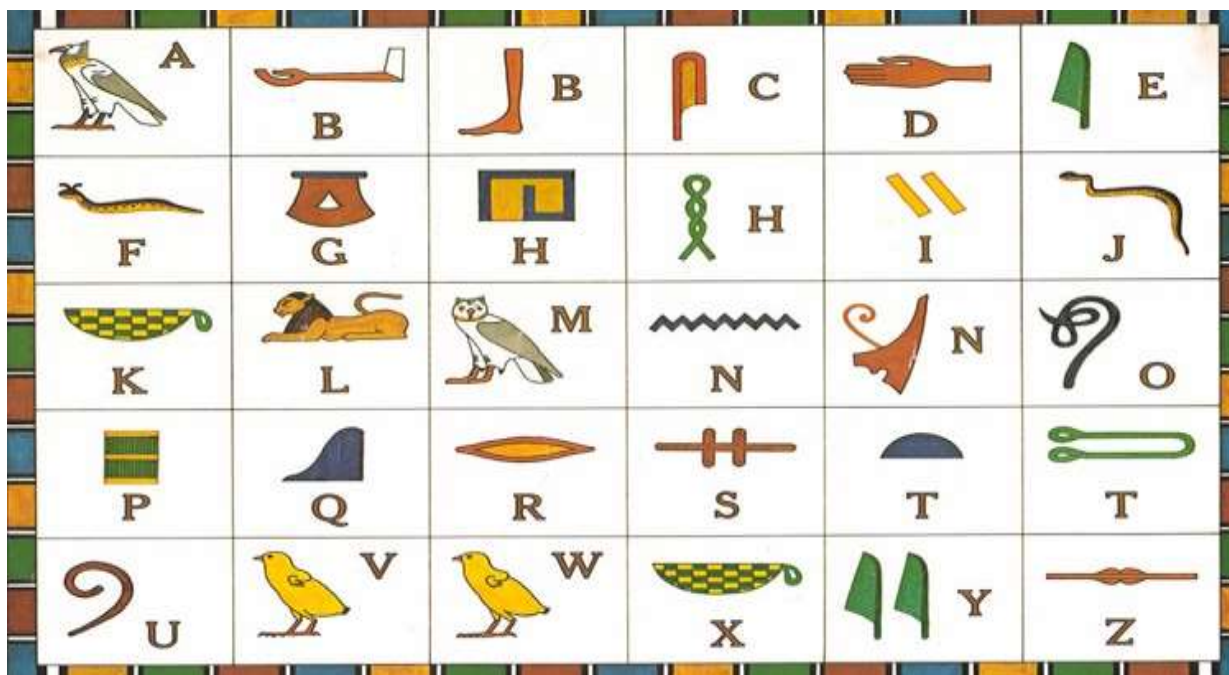
Alpha A	Bet B	Gamma G	Delta D	E E	Waw F U V Y W
Zayin Z	Heth H	Teth -	Yodh I J	Kaph K	Lamedh L
Mem M	Nun N	Samekh X	Ayin O	Pe P	Tsade -
Qoph Q	Resh R	Shin S	Taw T		

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	B		Y		S
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	W		N		T
	Z		S		
	H		'		

QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITATEA 1

Haideți să ne distrăm!! Precizați data nașterii (l/l/a), numele și vârsta, folosind scrierea hieroglică ☺



Utilizați alfabetul fenician pentru a vă scrie numele, țara și orașul în care locuiți. ☺

PHOENICIAN ALPHABET
hand drawn characters

Aleph A	Bet B	Gimel CG	Dallet D	He E	Waw F U V Y W
Zayin Z	Heth H	Teth -	Yodh I J	Kaph K	Lameth L
Mem M	Nun N	Samekh X	Ayin O	Pe P	Tsade -
Qoph Q	Resh R	Shin S	Tav T		

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QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITATEA 2/ ACTIVITY 2

Elevii vor scana codul QR cu telefonul mobil și vor descoperi informații despre romanul "O călătorie spre centrul pământului" / Students will scan the QR code with their mobile phone and discover information about the novel "A journey to the center of the earth"



EVALUARE:

EXERCITIU ☺

Accesează link-ul și găsește soluția corectă!!

<https://learningapps.org/display?v=pvbkqrj4c22>

QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITATEA 2

Elevii vor scana cu telefonul mobil codul QR și vor descoperi informații despre romanul "O călătorie spre centrul pământului"



EVALUARE:

EXERCITIU ☺





















Accesează link-ul și găsește soluția corectă!!

<https://learningapps.org/display?v=pvbkrqj4c22>

FIȘĂ DE ACTIVITATE / ACTIVITY SHEET

Observați tabelul și stabiliți pozițiile fiecărui tip de scriere. Look at the table and determine the positions of each type of writing.

Exemplu: Scrierea pictografică se află la pozițiile A1, B2, D3, C4. / Pictographic writing is at positions A1, B2, D3, C4

	A	B	C	D	E
1.					
2.					
3.					
4.					

Scrierea pictografică: A1, B2, D3, C4.

Scrierea cuneiformă:

Scrierea hieroglifică:

Enigma cu trei rotoare:

Pictographic writing: A1, B2, D3, C4.

Cuneiform writing:

Hieroglyphic writing:

Enigma with three rotors:

ACTIVITATEA 4/ ACTIVITY 4

Elevii vor scana codul QR cu telefonul mobil și vor descoperi informații despre picturi rupestre care se găsesc în unele peșteri din Europa. Apoi, vor căuta, folosind Internetul, peșteri din Europa în care se găsesc astfel de picturi, numind cel puțin una.

Students will scan the QR code with their mobile phone and discover information about cave paintings found in some caves in Europe. They will then search, using the Internet, for caves in Europe where such paintings are found, naming at least one.



QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITATEA 5 CĂLĂTORIE ÎN LUMEA PEȘTERILOR DIN ȚĂRILE NOASTRE

ITALIA

Peșterile Bossea

Grotte di Bossea, din municipiul **Frabosa Soprana**, din **provincia Cuneo**, a fost una dintre primele destinații turistice speologice din țară, deschisă publicului în 1874 și declarată rezervație naturală în 2011. În interiorul acestor peșteri veți găsi o priveliște minunată: **înălțimi amețitoare, stânci, stalactite impunătoare, iazuri și cascade**. Peisajul de basm se desfășoară într-o călătorie de aproximativ trei kilometri, înainte și înapoi, care vă va duce către adâncurile pământului. În timpul vizitei veți avea, de asemenea, ocazia să cunoașteți **Ursus Speleo**, **ursul acestei peșteri preistorice**. Nu vă faceți griji: a rămas doar scheletul.



Grotta Gigante

Pestera Giant este situată în inima orașului **Trieste Karst (Carso)**. Peștera are o lățime de 65 metri și o lungime de 280 de metri, cu un plafon boltit imens. Pe lângă numeroasele stalactite și stalagmite, *Grotta Gigante* este renumită pentru concentrațiile ridicate de calcit care acoperă toate zidurile sale și a fost inclusă în 1995 în Cartea Recordurilor ca "**peștera turistică cu cea mai mare sală din lume**". Traseul prin peșteră vă duce într-un spațiu enorm, unde puteți admira stalactite și stalagmite impresionante, roșiatice datorate oxizilor de fier și impresionanta formațiune de stâncă Colonna Ruggero, de doisprezece metri. Dacă nu suferiți de vertij, există un loc din care vă puteți bucura de o **priveliște impresionantă asupra acestei peșteri magnifice și a minunilor sale, situat la o înălțime de 95 de metri**.



POLONIA

Peștera Dragonului

Lungimea totală a peșterii este de 270 de metri. Înălțimea sălilor din peșteră este de aproximativ 10 metri. Aceasta este o peșteră legendară aflată pe versantul vestic al dealului Wawel. Cea mai veche versiune a legendei despre dragonul din Wawel, legată de începutul mitic al Cracoviei datează de la începutul secolului al XIII-lea. Ajuns la intrare, pășești în peșteră și străbați tunelurile întortocheate aproximativ 150 de metri până când dai de statuia de bronz Smok care suflă foc. Atracția principală o reprezintă sculptura în formă de dragon care suflă flăcări la fiecare trei, patru minute, spre deliciul mulțimii care se adună să admire dragonul.



Peșterile de sare din Wieliczka

Salina Wieliczka se află în orașul cu același nume, în sudul Poloniei, la numai 10 km de centrul Cracoviei. Legenda spune că o prințesă maghiară, pe nume Kinga, în timp ce se afla în voiajul de nuntă cu Conte Boleslaw în Polonia, a aruncat inelul de logodnă într-o mină de sare. Prințesa le-a spus minerilor din Wieliczka să sape un puț. Conform legendei, în primul bulgăre de sare scos din puț se afla inelul prințesei Kinga. Mina este situată la 15 km de Varșovia, are o adâncime de 327m, o lungime de 287 km, conținând 2040 de săli și 9 puțuri. A fost construită în secolul al XIII-lea și a produs sare de masă până în anul 2007, fiind cea mai veche mină în exploatare.



PORTUGALIA

Peștera Benagil

Peștera Benagil este înconjurată de nenumărate plaje de nisip frumoase și curate, așa că nu va fi greu să ne găsim plaja favorită, să vâslim în peșteri, singuri sau în grup, cu ghid. Și de ce este numită una dintre cele mai frumoase peșteri din lume? Stâncile galbene de calcar se ridică din marea turcoaz, astfel încât la prima vedere pare să arate doar ca o faleză oceanică, frumos zimțată, dar când ajungem mai aproape, se dezvăluie peșterile interesante: suntem în același timp în peșteră și pe plajă, iar lumina soarelui este captată de cupola naturală.



Peștera Mira de Aire

Peșterile Mira de Aire sunt cele mai mari din Portugalia și sunt, cu siguranță, o opțiune excelentă pentru cei care caută un alt tip de tur. Cu o întindere de 11 km, din care 600 metri pot fi vizitați, peșterile au fost alese drept una dintre cele 7 minuni naturale ale Portugaliei. Pestera are orientare descendentă, iar turul având 683 de trepte, deși pare mult, nu este greu, pentru că există mai multe niveluri. Pe parcursul traseului se fac mai multe opriri în diverse galerii, unde ghidul oferă explicații inclusiv despre modul în care se formează constant elementele și rocile de acolo. Este o frumusețe unică.



SPANIA

Gruta de las Maravillas

În inima orașului Aracena, în lanțul muntos cu același nume situat în partea de nord a provinciei Huelva, se află un sistem de peșteri descoperit de un cioban al locului în anul 1886. *La Gruta de las Maravillas*, care se traduce ca "Peștera Minunilor" a fost deschisă publicului în 1914, fiind prima peșteră turistică din Spania, iar vizitatorii de astăzi pot vizita 1.200 de metri de peșteră împărțiți pe două nivele. Deși aleile din grotă sunt foarte înguste și întunecate, plimbarea este ușoară și plăcută. Mai mult decât atât, există chiar și câteva lacuri subterane pe care le puteți admira de-a lungul traseului, scurgându-se printre roci.



Grutas del Águila

Situate în valea Tiétar, la sud de provincia Ávila, aceste peșteri au fost descoperite întâmplător în Ajunul Crăciunului din anul 1963. Vânătorii din zonă au intrat printr-un tunel îngust pe versantul sudic al lanțului muntos Sierra de Gredos și au descoperit peștera. Doar 53 de ani au trecut de la descoperirea peșterii, dar se estimează că ar avea aproximativ 12 milioane de ani. Stalactitele atârinate de tavan sunt un adevărat spectacol care merită văzut, mai ales în lunile de toamnă. Este ciudată formarea de bolți naturale frumoase într-o zonă cu atât de mult granit, precum lanțul muntos Sierra de Gredos care, de asemenea, merită explorat.



TURCIA

Peștera Damlataș

A fost descoperită, din întâmplare, în anul 1948. Este situată aproximativ la 100 de metri deasupra mării. Se află lângă Plaja Cleopatra, fiind deschisă publicului. Peștera este plină de stalactite, faimoase pentru puterile sale tămăduitoare, pentru tratarea astmului datorită umidității ridicate de peste 95% a nivelului crescut de dioxid de carbon și a ionizării naturale. Temperatura, în peșteră, ajunge la 22 de grade.



Grotele din Capadocia

Loc de pelerinaj și rugăciune, Capadocia este o provincie din Turcia cunoscută pentru multitudinea de schituri și mănăstiri rupestre, unde primii creștini se ascundeau de romani. Lăsând la o parte componenta religioasă a destinației, Capadocia oferă niște peisaje incredibile, dintre care peșterile prăbușite parțial sunt ireal de frumoase.



ROMÂNIA

Pestera Urșilor

Se află în **judetul Bihor**, în imediata apropiere a localității Chiscau, comuna **Pietroasa**, la o altitudine de 482 m. Interiorul se distinge prin diversitatea formațiunilor de stalactite și stalagmite existente, cât și prin cantitatea impresionantă de urme și fosile ale ursului de cavernă, care a dispărut acum 15.000 de ani.



Pestera Muierii din Oltenia

Peștera Muierii este situată în Baia de Fier, județ Gorj și este prima peșteră electrificată din România. Numele acestei pesteri provine de la faptul că acest spațiu a constituit în vechime o zonă de adăpost în timpul războaielor pentru femei și copii. Dar peștera fusese folosită ca adăpost pentru săteni de mii de ani, deoarece cercetările au dezvăluit existența rămășițelor atât umane, cât și animale care datează din epoca paleolitică. Peștera Muierii este, de asemenea, este faimoasă datorită formațiunilor sale frumoase de stalactite și stalagmite, precum și pentru coloniile sale de lilieci. Localnicii spun că, în interior, se întâmplă minuni și că unele locuri ale peșterii au proprietăți curative deosebite.



QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITY 5: TRIP TO THE WORLD OF CAVES IN OUR COUNTRIES

ITALY

Bossea Caves

Grotte di Bossea, in the municipality of Frabosa Soprana, in the province of Cuneo, was one of the first tourist caves in the country, opened to the public in 1874 and declared a nature reserve in 2011. Inside these caves you will find a wonderful view: dizzy heights, boulders, imposing stalactite columns, streams, and waterfalls. The fairy-tale landscape unfolds in a journey of about three kilometers, back and forth, that will take you to the depths of the earth. While visiting you will also have the chance to meet *Ursus Speleo*, the bear of this prehistoric cave. But don't worry, it's only the skeleton.



Grotta Gigante (Giant Cave)

The Giant Cave is set on the Italian side of the Trieste Karst (Carso). The cavern is 65 meters wide and 280 meters long with an extraordinary high ceiling. In addition to the numerous stalactites and stalagmites, Grotta Gigante is also famous for its rich calcite concretions that cover all its walls. In 1995 the cave was included in the Guinness Book of Records as the world's "largest show cave". As you navigate through the cave, you will encounter an enormous chamber where you can admire astonishing stalactites and stalagmites, including reddish ones due to the presence of different minerals and the impressive twelve-meter rock formation *Colonna Ruggero*. If you don't suffer from vertigo, there is a place where you can enjoy a stunning view of this magnificent cave and its wonders, located at a height of 95 meters.



POLAND

Dragon's Den/Cave

The total length of the cave is 270 meters. The height of the chambers is about 10 meters. This is a legendary cave in the western slope of Wawel Hill. The oldest version of a legend about the dragon of Wawel, related to the mythic beginning of Krakow, comes from the turn of the 13th century. When at the bottom, you enter the cave and follow it through the winding tunnels approximately 150 meters before emerging at the bronze Smok statue that breathes fire. The highlight is watching the dragon sculpture outside blow a flame from its mouth every couple of minutes, to the delight of the crowds which gather to admire the dragon.



The Wieliczka Salt Mine

Salt mine Wieliczka is located in the town of the same name, in southern Poland, only 10 km from the center of Krakow. The legend says that a Hungarian princess named Kinga, while on her wedding trip with Count Boreslaw in Poland, threw her engagement ring into a salt mine. The princess told the miners of Wielicka to dig a pit. According to the legend, in the first lump of salt taken out of the pit was the ring of Princess Kinga. The mine is located 15 km from Warsaw, has a depth of 327m, a length of 287 km, containing 2040 chambers and 9 pits. It was built in the 13th century and produced table salt until 2007, being the oldest operating mine.



PORTUGAL

Benagil Cave

Benagil Cave is surrounded by countless beautiful and clean sandy beaches, so it will not be difficult to find our favorite beach, to paddle in the caves, alone or in a group with a guide. And why is it called one of the most beautiful caves in the world? The yellow limestone cliffs rise from the turquoise sea, so that at first glance it seems to look only like a beautifully jagged ocean cliff, but when we get closer, interesting caves are revealed: we are in the cave and on the beach at the same time, and the sunlight is captured by the natural dome.



Mira de Aire Caves

The Mira de Aire Caves are the largest in Portugal and are certainly a great option for those looking for a different tour. With 11km of extension, of which 600 meters can be visited, the caves were elected as one of the 7 Natural Wonders of Portugal. The tour is going descending, through 683 steps and although it looks a lot, it is not hard because there are several levels. During the route several stops are made in many galleries, where the guide gives explanations including on how the elements in there are constantly formed. It is a unique beauty.



SPAIN

The Gruta de las Maravillas Cave

In the heart of the city of Aracena, in the mountain range of the same name located in the northern part of the province of Huelva, there is a system of caves discovered by a local shepherd in 1886. La Gruta de las Maravillas, which translates as "Cave of Wonders" was opened to the public in 1914, becoming the first tourist cave in Spain, and visitors today can visit 1,200 meters of cave divided over two levels. Although the cave alleys are very narrow and dark, walking is easy and pleasant. Moreover, there are even some underground lakes that you can admire along the route, flowing through the rocks.



Grutas del Águila (The Caves of the Eagle)

Located in the Tiétar valley, south of Ávila province, these caves were discovered by chance on Christmas Eve of 1963. Nearby hunters entered through a narrow tunnel on the southern slope of the Sierra de Gredos Mountain range and discovered the cave. Only 53 years have passed since the discovery of the cave, but it is estimated to be about 12 million years old.

The stalactites hanging from the ceiling are a real spectacle worth seeing, especially in autumn. It is uncommon to see such beautiful natural arcade formed in an area with so much granite, like for example the Sierra de Gredos Mountain range which is worth explor



TURKIYE

Damlataş Cave

The cave was discovered by accident in 1948. It is located approximately 100 meters above the sea. It is located next to Cleopatra Beach and is open to the public. The cave is full of stalactites, famous for its healing powers, for treating asthma due to the high humidity of over 95% of the increased level of carbon dioxide and natural ionization. The temperature in the cave reaches 22 degrees.



The Caves of Cappadocia

A place of pilgrimage and prayer, Cappadocia is a province in Turkey known for its multitude of hermitages and rock monasteries, where the first Christians hid from the Romans. Leaving aside the religious component of the destination, Cappadocia offers some incredible landscapes, among which the partially collapsed caves are unreal beautiful.



ROMANIA

Bears' Cave

It is located in Bihor County, in the immediate vicinity of the town of Chiscau, Pietroasa commune, at an altitude of 482 meters.

The cave's interior is distinguished by the diversity of existing stalactite and stalagmite formations, as well as by the astonishing amount of traces and fossils of the cave bear, which became extinct 15,000 years ago.



The Women's Cave

The Women's Cave is located in the Baia de Fier commune, in Gorj County, and it is the first electrified cave in Romania. The name comes from the fact that during wars and times of need, women and children used the cave as a temporary shelter. But the cave has been used as a shelter for villagers for thousands of years, as research revealed both human and animal remnants that date back to the Paleolithic Age. Women's Cave is also famous due to its beautiful stalactite and stalagmite formations as well as for its bat colonies. The locals say that miracles happen inside and that some places of the cave have special healing properties



QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITY 5: TRIP TO THE WORLD OF CAVES IN OUR COUNTRIES

ITALY

Bossea Caves

Grotte di Bossea, in the municipality of Frabosa Soprana, in the province of Cuneo, was one of the first tourist caves in the country, opened to the public in 1874 and declared a nature reserve in 2011. Inside these caves you will find a wonderful view: dizzy heights, boulders, imposing stalactite columns, streams, and waterfalls. The fairy-tale landscape unfolds in a journey of about three kilometers, back and forth, that will take you to the depths of the earth. While visiting you will also have the chance to meet *Ursus Speleo*, the bear of this prehistoric cave. But don't worry, it's only the skeleton.



Grotta Gigante (Giant Cave)

The Giant Cave is set on the Italian side of the Trieste Karst (Carso). The cavern is 65 meters wide and 280 meters long with an extraordinary high ceiling. In addition to the numerous stalactites and stalagmites, Grotta Gigante is also famous for its rich calcite concretions that cover all its walls. In 1995 the cave was included in the Guinness Book of Records as the world's "largest show cave". As you navigate through the cave, you will encounter an enormous chamber where you can admire astonishing stalactites and stalagmites, including reddish ones due to the presence of different minerals and the impressive twelve-meter rock formation *Colonna Ruggero*. If you don't suffer from vertigo, there is a place where you can enjoy a stunning view of this magnificent cave and its wonders, located at a height of 95 meters.



POLAND

Dragon's Den/Cave

The total length of the cave is 270 meters. The height of the chambers is about 10 meters. This is a legendary cave in the western slope of Wawel Hill. The oldest version of a legend about the dragon of Wawel, related to the mythic beginning of Krakow, comes from the turn of the 13th century. When at the bottom, you enter the cave and follow it through the winding tunnels approximately 150 meters before emerging at the bronze Smok statue that breathes fire. The highlight is watching the dragon sculpture outside blow a flame from its mouth every couple of minutes, to the delight of the crowds which gather to admire the dragon.



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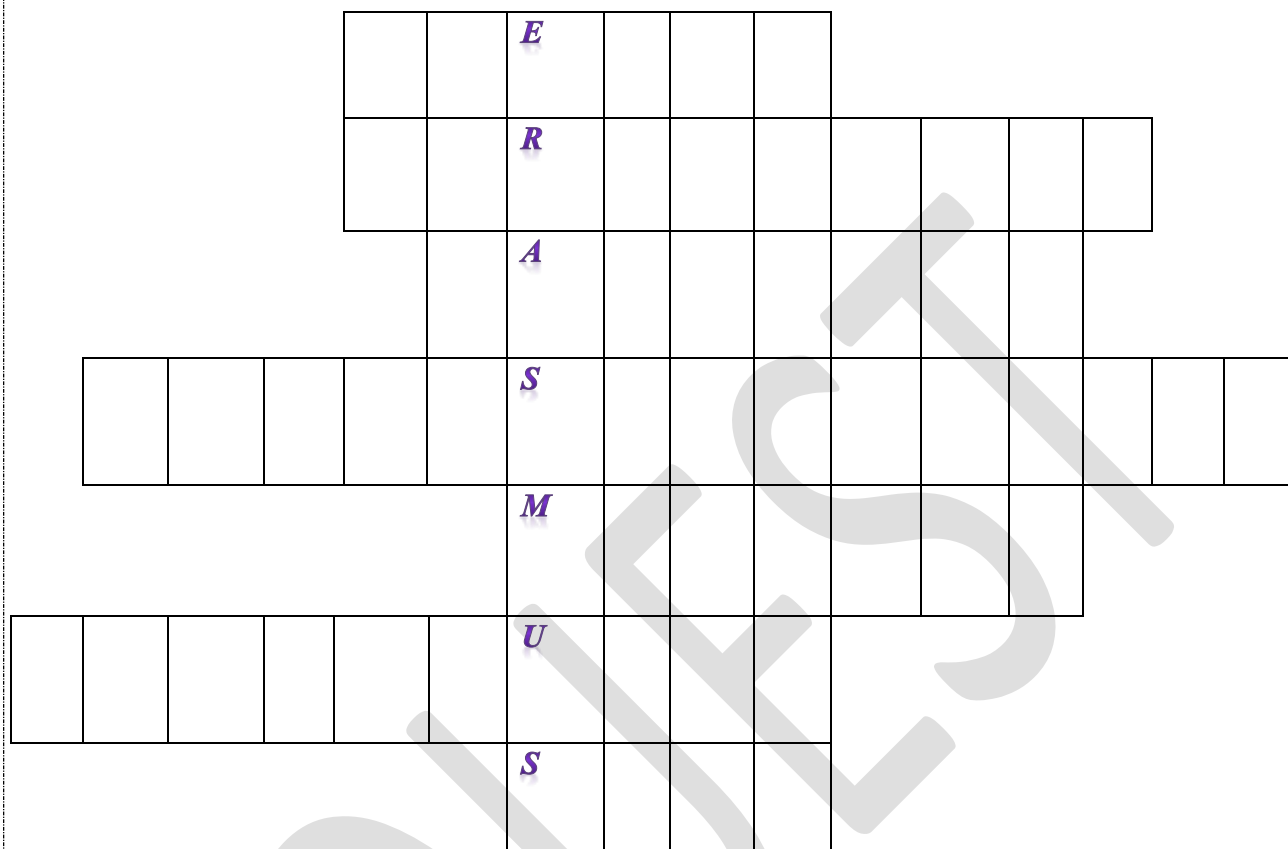
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QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

CROSSWORD PUZZLE



1. IF YOU VISIT THE BOSSEA CAVES, YOU GET THE CHANCE TO MEET URSUS...
2. THE LARGEST CAVES IN PORTUGAL ARE.....
3. CAVE DISCOVERED BY ACCIDENT, IN 1948, BEING LOCATED AT AN ALTITUDE OF APPROXIMATELY 100 M ABOVE SEA.
4. CAVES SITUATED TO THE SOUTH OF THE PROVINCE OF ÁVILA, IN THE TIÉTAR VALLEY, DISCOVERED IN 1963.
5. THE FIRST ELECTRIFIED CAVE IN ROMANIA.
6. CAVE IN THE WESTERN SLOPE OF WAWEL HILL.
7. NATURAL RESOURCE FOUND IN WIELICZKA SALT MINE.

QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

Activitatea 5: JURNAL CREATIV

Peștera Morakot sau Peștera din Smarald, Thailanda. Vizitatorii trebuie să înoate 70 de metri prin întuneric pentru a ajunge la plaja din mijlocul peșterii.



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

Peștera Waitomo Glowworm, Noua Zeelandă.



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

Peștera de cristale din Naica, Mexic



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

Peștera Son Doong, Vietnam



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

Peștera Albastră, Capri, Italia



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

Peștera lui Fingal, din insula Staffa, Scoția



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

Peștera Reed Flute, Guilin, China



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

Peștera Orda din Munții Ural, Rusia



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

Peștera Eisriesenwelt, Austria



ADMIRĂ! STUDIAZĂ! CONTEMPLĂ! CREEAZĂ! COMPLETEAZĂ!

- 1). Peștera mă duce cu gândul la
- 2). Sentimentul dominant este de
- 3). Aș vrea să
- 4). Culoarea predominantă
- 5). Peste ani poate că

QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITY 5: CREATIVE JOURNAL

Morakot Cave or Emerald Cave in Thailand. Visitors must swim 70 meters through the dark to reach the beach situated in the middle of the cave.



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
- 3). I would like to
- 4). Dominant colour
- 5). In a few years' time, maybe

Peștera Waitomo Glowworm, Noua Zeelandă.



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
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- 5). In a few years' time, maybe

Naica Crystal Cave in Mexico



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
- 3). I would like to
- 4). Dominant colour
- 5). In a few years' time, maybe

Son Doong Cave from Vietnam



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
- 3). I would like to
- 4). Dominant colour
- 5). In a few years' time, maybe

The Blue Grotto in Capri, Italy



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
- 3). I would like to
- 4). Dominant colour
- 5). In a few years' time, maybe

Fingal's Cave on Staffa Island, Scotland



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
- 3). I would like to
- 4). Dominant colour
- 5). In a few years' time, maybe

Reed Flute Cave, Guilin, China



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
- 3). I would like to
- 4). Dominant colour
- 5). In a few years' time, maybe

Orda Cave from Ural Mountains, Russia



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
- 3). I would like to
- 4). Dominant colour
- 5). In a few years' time, maybe

Eisriesenwelt Cave, Austria



ADMIRE! ANALYZE! CONTEMPLATE! CREATE! FILL IN!

- 1). The cave makes me think of
- 2). My dominant feeling upon seeing the cave is
- 3). I would like to
- 4). Dominant colour
- 5) In a few years' time, maybe



QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

ACTIVITATEA „PE DRUMUL PEȘTERILOR

Propunator: prof. Urse Cornelia Florena, prof. Dincă Nicoleta

Data: 15 decembrie 2022

SCOP: promovarea activității de parteneriat strategic KA2 Erasmus+, de colaborare internațională

COMPETENȚE CHEIE / OBIECTIVE

C1 : Comunicarea într-o limbă străină de înțelegere interculturală

O1. Dezvoltarea capacității de comunicare constructivă cu ceilalți elevi din țările partenere

C2 : digitală, utilizarea cu încredere și în mod critic a tehnologiei informației

O2. Identificarea a câte 2 peșteri din fiecare țară parteneră utilizând codul QR

O3. Stimularea și antrenarea elevilor utilizând aplicația digitală Learningapps

C3: Sociale și civice

O4. Stimularea capacității de relaționare internațională a elevilor din proiectul european Erasmus cu titlul QUEST

C4: În domeniul științei și matematicii

O5. Învățarea STEAM fără frontiere

Grup țintă: 17 elevi

Desfășurarea activității

Exercițiu de dezgheț: Jocul cu titlul CĂRȚI DE VIZITĂ

Materiale necesare: pixuri, cărți de vizită cu titlu și sigla proiect și sigla Erasmus+

Scopul:

- ✓ cunoaștere și autocunoaștere
- ✓ prezentare
- ✓ autocaracterizare
- ✓ formulare de întrebări și răspunsuri

Cum procedăm: fiecare elev va primi o carte de vizită cu următoarele rubrici în lb. engleză:

- Nume și prenume
- Vârsta
- Țara de unde vine
- Pasiuni.

Elevii vor completa individual cărțile de vizită cu datele personale;

Profesorul strânge fiecare carte de vizită și le redistribuie elevilor, de data aceasta fiecare elev primind cartea de vizită a unui coleg și nu cartea sa de vizită;

Pe rând, elevii vor prezenta cărțile de vizită în fața clasei.

Derularea activității

- ✓ Se formează 3 echipe de elevi astfel:

Prima echipă formată din 1 elev Portugalia, 1 elev Polonia, 1 elev Spania, 3 elevi România;

A doua echipă formată din 1 elev Polonia, 1 elev Spania, 1 elev Turcia, 2 elevi România

A treia echipă formată din 2 elevi Turcia, 1 elev Italia, 3 elevi România

- ✓ Se distribuie celor 3 grupe de elevi câte o hartă a Europei cu țările partenere colorate cu capitalele menționate și punctate și care au lipite câte 2 coduri QR aferente a două peșteri
- ✓ Elevilor li se distribuie fișa nr. 1 cu titlul „Pe drumul peșterilor
- ✓ Elevii primesc fișa nr. 2 cu titlul Scara hărții

SARCINA DE LUCRU 1: *Completarea fișei cu titlul „Pe drumul peșterilor*

- ✓ Elevii vor utiliza aplicația QR cititor și vor scana cu telefonul codurile QR de pe hartă și vor descoperi care sunt peșterile din țările partenere
- ✓ Vor lipi postituri cu numele peșterilor pe hartă
- ✓ Elevii caută pe wikipedia informații sugestive despre peșterile selectate la întrebările din fișă
- ✓ Elevii vor completa pe fișa primită răspunsurile
- ✓ Elevii vor folosi fișele în jocul prin aplicația learningapps

SARCINA DE LUCRU 2: *Calcularea raportului/ scara hărții*

- ✓ Elevii măsoară cu rigla distanța pe hartă dintre capitalele țărilor partenere (ex. București- Ankara, București-Roma, București-Madrid, Lisabona-Ankara, Varșovia-Roma etc)
- ✓ Elevii caută distanța reală dintre capitale utilizând google maps
- ✓ Elevii calculează scara hărții și completează datele în tabelele date
- ✓ Elevii vor utiliza unele informații în aplicația Kahoot la evaluare

RESURSE MATERIALE: hărți cu Europa, simboluri cu stegulețele țărilor partenere, coduri QR, rigle, fișe de lucru nr. 1 și fișe nr. 2, pixuri, carioci, postituri, o colecție de emoji, cărți de vizită.

RESURSE PROCEDURALE: comunicare, descoperire dirijată, observație independentă, brainstorming

FORMA DE ACTIVITATE: individuală, pe echipe, frontală

EVALUARE – Jocul interactiv cu titlul „Curiozități despre peșteri, prin utilizarea aplicației digitale learningapps”

REFLECȚIE : CUM TE-AI SIMȚIT AZI LA ACTIVITATE? : elevii sunt invitați să împărtășească cu ceilalți felul în care s-au simțit la activitate cu ajutorul unui emoji pe care îl aleg de pe catedră și îl prind pe o foaie mare

FIȘA Nr. 1 „PE DRUMUL PEȘTERILOR”

Cu aplicația QR cititor scanați codurile QR și veți:

Veți descoperi numele la două peșteri din fiecare țară din proiect

Veți lipi postituri cu numele peșterilor pe hartă, în țările respective

Veți afla informațiile necesare pentru a alege variantele corecte din fișa nr. 1

Alegeți varianta corectă.

1. In Peștera Urșilor se află o sală/ galerie, numită:

- a. Sala Plantelor
- b. Sala Spaghetelor
- c. Sala Umbrelor
- d. Sala Animalelor

2. În Peștera Scărișoara din România, se află:

- a. Fosile de Ursus spelaeus
- b. Cel mai mare ghețar subteran din țară
- c. Guanoul liliecilor
- d. Fosile de Archaeopteryx

3. Cappadocia este supranumită:

- a. Capela Sixtină a Artei Preistorice
- b. Țara cailor frumoși din Turcia
- c. Peștera Vântului
- d. Peștera de gheață

4. Ce film bazat pe o poveste populară a folosit Peștera Yarimbuzaz, ca decor?

- a. Aladdin
- b. Ali Baba și cei 40 de hoți
- c. Harry Potter
- d. Călătorie spre centrul pământului

5. Stalactitele și stalagmitele din Peștera Candelabrului, au forme de:

- a. Pești, arici de mare
- b. Candelabre, meduze și cactus
- c. Flori de măr, flori de cactus
- d. Oameni

6. Peștera numită și Capela Sixtină, pentru că conține unul dintre cele mai importante seturi picturale ale Preistoriei:

- a. Altamira din Spania
- b. Altamira din Italia
- c. Cuevas de Canelobre
- d. Peștera Urșilor

7. Peștera turistică cu cea mai mare sală din lume, inclusă în Cartea recordurilor este:

- a. Peștera Monezilor din Portugalia
- b. Peștera din inima Cracoviei

- c. Peștera Uriasă din Italia
- d. Peștera primelor mănăstiri din lume

8. Peștera sculptată de forța vântului puternic, cu stalagmite și stalactite de diferite culori:

- a. Vântului din Italia
- b. De sare din Polonia
- c. Marină din Portugalia
- d. Urșilor din România

9. Catedrala de sare subterană Wieliczka, se află, în:

- a. Polonia
- b. România
- c. Portugalia
- d. Turcia

10. Bârlogul Dragonului este denumirea următoarei peșteri din Polonia:

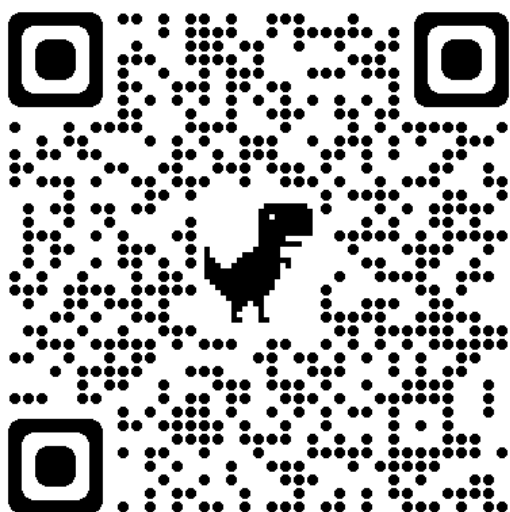
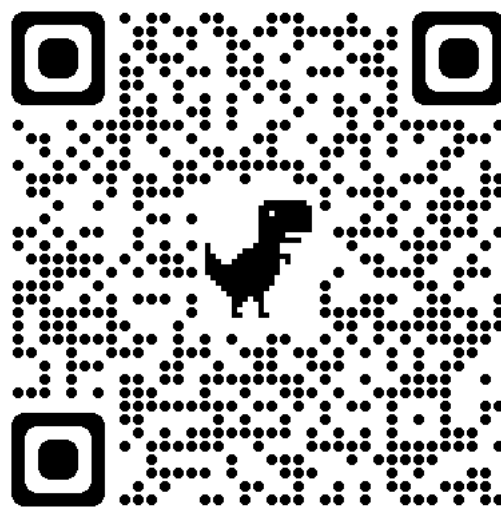
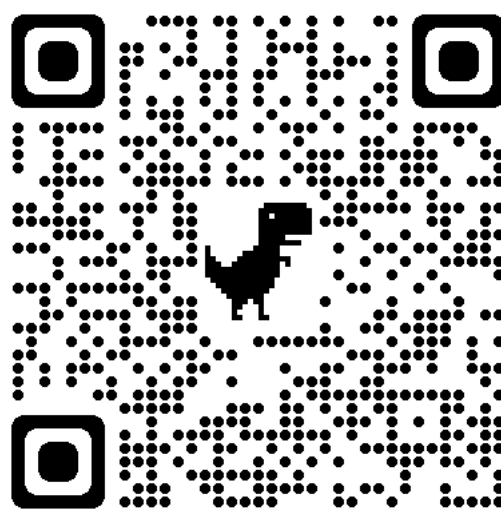
- a. Benagil
- b. Scărișoara
- c. Vântului
- d. Smocza Jama

11. Peștera marină din Portugalia, este:

- a. Peștera Candelabrului
- b. Benagil
- c. Peștera Monezilor
- d. Peștera Wieliczka

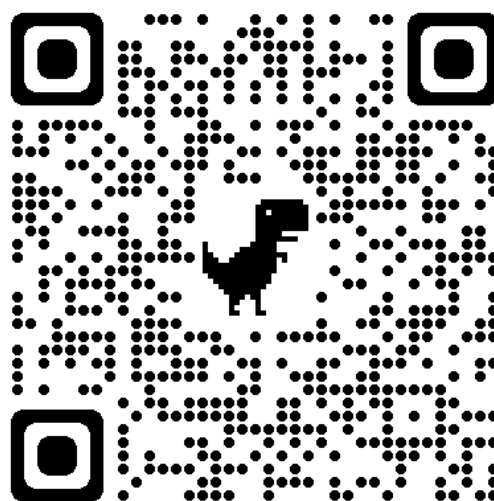
12. Despre Peștera Monezilor, se spune, că:

- a. Are multă sare și gheață
- b. Temperatura este de 18 grade mereu, pentru că nu este aerisită
- c. În interior sunt multe stalactite colorate
- d. Este sculptată de forța vântului

**Canelobre Cave Spain****Cappadocia Turcia****Altamira Spania****Pestera Yarimburgaz Turcia**



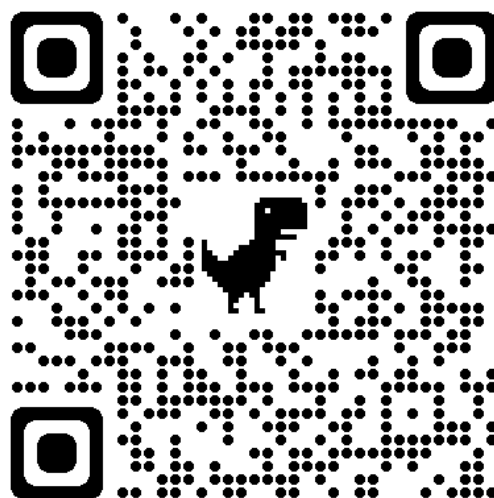
Peștera Vântului, Italia



Peștera Urșilor, România



Peștera Uriasă, Italia



Peștera Scărișoara, România



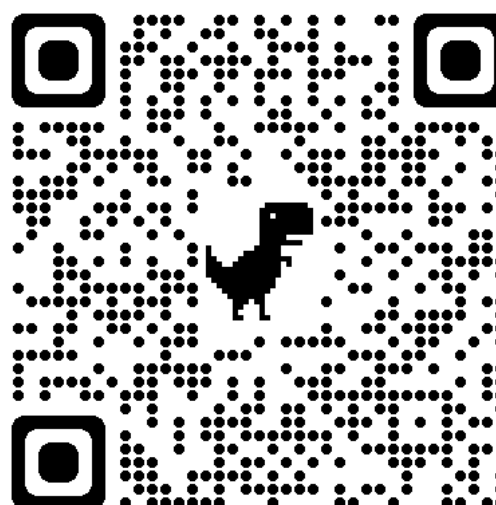
Catedrala de sare subterană, Polonia



Peștera Monezilor, Portugalia



Peștera Smocza Jama, Polonia



Peștera Benagil, Portugalia



FIȘA NR. 2 cu titlul SCARA HĂRȚII

1. Măsurați distanța dintre capitalele date utilizând rigla și harta Europei
2. Aflați distanța reală dintre capitalele menționate în fișă, utilizând google maps
3. Calculați scara hărții

Nr. Crt.	Capitale	Distanța reală dintre capitale	Distanța calculată pe hartă dintre capitale	Scara hărții
1.	București - Roma			
2.	Roma-Madrid			
3.	Ankara - Roma			
4.	Madrid – București			
5.	Lisabona- București			

FIȘA NR. 2 cu titlul SCARA HĂRȚII

1. Măsurați distanța dintre capitalele date utilizând rigla și harta Europei
2. Aflați distanța reală dintre capitalele menționate în fișă, utilizând google maps
3. Calculați scara hărții

Nr. Crt.	Capitale	Distanța reală dintre capitale	Distanța calculată pe hartă dintre capitale	Scara hărții
1.	Lisabona-București			
2.	Lisabona – Roma			
3.	Varșovia- Ankara			
4.	București -Ankara			
5.	Lisabona-Madrid			

FIȘA NR. 2 cu titlul SCARA HĂRȚII

1. Măsurați distanța dintre capitalele date utilizând rigla și harta Europei
2. Aflați distanța reală dintre capitalele menționate în fișă, utilizând google maps
3. Calculați scara hărții

Nr. Crt.	Capitale	Distanța reală dintre capitale	Distanța calculată pe hartă dintre capitale	Scara hărții
1.	București -Ankara			
2.	Lisabona-Madrid			
3.	București – Varșovia			
4.	Roma- Varșovia			
5.	Ankara - Lisabona			

Curiozități despre peșteri

<https://learningapps.org/27988294>





LESSON PLAN

ACTIVITY WITHIN THE ERASMUS+ STRATEGIC PARTNERSHIP PROJECT ENTITLED "QUEST"

THE ACTIVITY "ON THE ROAD TO THE CAVES"

Proponent: Teachers Urse Cornelia Florena and Dincă Nicoleta

Date: December 15th, 2022

PURPOSE: promoting the KA2 Erasmus+ strategic partnership activity, international collaboration

KEY COMPETENCIES / OBJECTIVES

C1 : Communicating in a foreign language for intercultural understanding

O1. Developing the ability to communicate constructively with other students from partner countries

C2: Digital competence, the confident and critical use of information technology

O2. Identification of 2 caves from each partner country using the QR code

O3. Stimulating and training students using the digital application Learningapps

C3: Social and civic competence

O4. Stimulating the international communication skills of students from the European Erasmus project entitled QUEST

C4: In the field of science and mathematics

O5. STEAM learning without borders

Target group: 17 students (2 students from Spain, 2 students from Poland, 3 students from Turkey, 1 student from Italy, 1 student from Portugal, 8 students from Romania)

Carrying out the activity

Warm up exercise: The game with the title BUSINESS CARDS

Required materials: pens, business cards with title and project logo and Erasmus+ logo

The goal:

- ✓ knowledge and self-knowledge
- ✓ presentation
- ✓ self-characterization
- ✓ formulating questions and answers

Method: each student will receive a business card with the following headings in English:

- Name and surname
- Age
- Country of origin
- Passions.

The students will individually fill in the business cards with their personal data;

The teacher collects each business card and redistributes them to the students, this time each student receiving a classmate's business card rather than their own;

Students will take turns presenting their business cards to the class.

Activity development

- ✓ 3 student teams are formed as follows:

The first team consists of 1 student from Portugal, 1 student from Poland, 1 student from Spain, 3 students from Romania;

The second team consists of 1 student from Poland, 1 student from Spain, 1 student from Turkey, 2 students from Romania

The third team consists of 2 students from Turkey, 1 student from Italy, 3 students from Romania

- ✓ The 3 groups of students receive a map of Europe with the partner countries colored with the capitals mentioned and dotted and which have 2 QR codes related to two caves pasted
- ✓ Students are distributed sheet no. 1 with the title "On the way to the caves".
- ✓ Students receive sheet no. 2 with the title Scale of the map

TASK 1: Completing the sheet with the title "On the way to the caves".

- ✓ Students will use the QR reader application and scan the QR codes on the map with their phone and discover which are the caves in the partner countries
- ✓ They will stick post-its with the names of the caves on the map
- ✓ Students search wikipedia for suggestive information about the caves selected for the questions in the handout
- ✓ The students will fill in the answers on the sheet received
- ✓ Students will use the cards in the game through the learningapps application

TASK 2: Calculate the ratio/scale of the map

- ✓ Students measure with a ruler the distance on the map between the capitals of the partner countries (e.g. Bucharest-Ankara, Bucharest-Rome, Bucharest-Madrid, Lisbon-Ankara, Warsaw-Rome, etc.)
- ✓ Students look for the real distance between the capitals using google maps
- ✓ Students calculate the scale of the map and fill in the data in the given tables
- ✓ Students will use some information in the Kahoot app for assessment

MATERIAL RESOURCES: maps of Europe, symbols with the flags of the partner countries, QR codes, rulers, two worksheets, pens, felt-tip pens, post-its, a collection of emojis, business cards.

PROCEDURAL RESOURCES: communication, guided discovery, independent observation, brainstorming

FORM OF ACTIVITY: individual, team, frontal

EVALUATION – The interactive game with the title,, Curiosities about caves, by using the digital application learningapps

REFLECTION: How did you feel while doing the activity today?

Students are invited to share with others how they felt about the activity with the help of an emoji they choose from the teacher's desk and stick it on a large sheet of paper.

SHEET No. 1**„ON THE ROAD TO THE CAVES"**

With the QR reader app scan QR codes and you:

1.You will discover the name at two caves in each country in the project

2.You will stick posts with the names of the caves on the map, in the respective countries

3.You will find the necessary information to choose the correct variants from sheet no. 1

Choose the correct option.

1.In the Cave of the Bears, there is a hall/gallery, called:

- a. Hall of Plants
- b. Spaghetti Hall
- c. Hall of Umbrellas



d. Hall of Animals

2. In the Scărișoara Cave, in Romania, there are:

- a. Fossils of *Ursus spelaeus*
- b. The largest underground glacier in the country
- c. Bat guano
- d. *Archeopteryx* fossils.

3. Cappadocia is nicknamed:

- a. The Sistine Chapel of Prehistoric Art
- b. The land of beautiful horses in Turkey
- c. Cave of the Wind
- d. The ice cave

4. Which film based on a folk tale used the Yarimburgaz Cave as a setting?

- a. Aladdin
- b. Ali Baba and the 40 Thieves
- c. Harry Potter
- d. Journey to the center of the earth

5. The stalactites and stalagmites in Peștera Candelabrului have the following shapes:

- a. Fish, sea urchins
- b. Chandeliers, jellyfish and cactus
- c. Apple flowers, cactus flowers
- d. People

6. The cave also called the Sistine Chapel, because it contains one of the most important pictorial sets of Prehistory:

- a. Altamira from Spain
- b. Altamira from Italy
- c. Cuevas de Canelobre



7. The tourist cave with the largest hall in the world, included in the Book of Records is:

- a. The Cave of Coins in Portugal
- b. The cave in the heart of Krakow
- c. Giant Cave in Italy
- d. The cave of the first monasteries in the world

8. Cave carved by the force of the strong wind, with stalagmites and stalactites of different colors:

- a. The wind from Italy
- b. Salt from Poland
- c. Portuguese Navy
- d. Bears from Romania

9. Wieliczka Underground Salt Cathedral is located in:

- a. Poland
- b. Romania
- c. Portugal
- d. Turkey

10. The Dragon's Lair is the name of the following cave in Poland:

- a. Benagil
- b. Staircase
- c. Wind
- d. Smocza Jama

11. The sea cave in Portugal is:

- a. Candelabrum Cave
- b. Benagil
- c. Cave of Coins

**12. About the Cave of Coins, it is said that:**

- a. It has a lot of salt and ice
- b. The temperature is always 18 degrees, because it is not ventilated
- c. There are many colored stalactites inside
- d. It is carved by the force of the wind

ERASMUS+ strategic partnership project KA2, „QUEST”**SHEET NO. 2****"THE PAPER SCALE"**

1. Calculate/measure the distance between the given capital cities using the ruler and map of Europe.
2. Find out the actual distance between the capitals mentioned in the handout using google maps.
3. Calculate the scale of the map.

No. Crt.	The capitals	The actual distance between the capitals	The distance calculated on the map between the capitals	Map scale
1.	Bucharest – Roma			
2.	Rome-Madrid			
3.	Ankara - Rome			
4.	Madrid – Bucharest			
5.	Lisbon - Bucharest			

**SHEET NO. 2****"THE PAPER SCALE".**

1. Calculate/measure the distance between the given capital cities using the ruler and map of Europe.
2. Find out the actual distance between the capitals mentioned in the handout using google maps.
3. Calculate the scale of the map.

No. Crt.	The capitals	The actual distance between the capitals	The distance calculated on the map between the capitals	Map scale
1.	Lisbon - Bucharest			
2.	Lisbon - Rome			
3.	Warsaw - Ankara			
4.	Bucharest - Ankara			
5.	Lisbon-Madrid			

SHEET NO. 2

"THE PAPER SCALE".

1. Calculate/measure the distance between the given capital cities using the ruler and map of Europe.
2. Find out the actual distance between the capitals mentioned in the handout using google maps.
3. Calculate the scale of the map.

No. Crt.	The capitals	The actual distance between the capitals	The distance calculated on the map between the capitals	Map scale
1.	Bucharest - Ankara			
2.	Lisbon-Madrid			
3.	Bucharest - Warsaw			
4.	Rome - Warsaw			
5.	Ankara - Lisbon			

Curiosities about caves

<https://learningapps.org/27988294>





QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

Date: 15 Decembrie 2022

profesor: Dascălu Daniela

Tipul lecției: Lecție STEM în cadrulul proiectului Erasmus+ QUEST

Topic: Journal STEM prin centrul Pământului

Metode: gândire creativă, brainstorming, învățare prin descoperire, jurnalul creativ;

Resurse: coli de hârtie, markere, telefoane, laptop-uri, coduri QR, flipchart, foi de lucru;

Obiective generale: Scopul lecției este de a asigura un climat educațional propice învățării prin cooperare și interrelație, aplicând metode moderne și strategii participative pentru a descoperi cartea lui Jules Verne și a aduce la zi descoperirile care au pus bazele științei moderne.

Bibliografie:

Jules Verne, "Călătorie spre centrul pământului", Ed. Litera, București, 2019.

<https://edpuzzle.com/discover;>

<https://www.plickers.com/library.>

Activitatea 1 Exerciții de spargere a gheții

SCOP: crearea unei atmosfere plăcută în timp ce îi face pe elevi să se cunoască între ei;

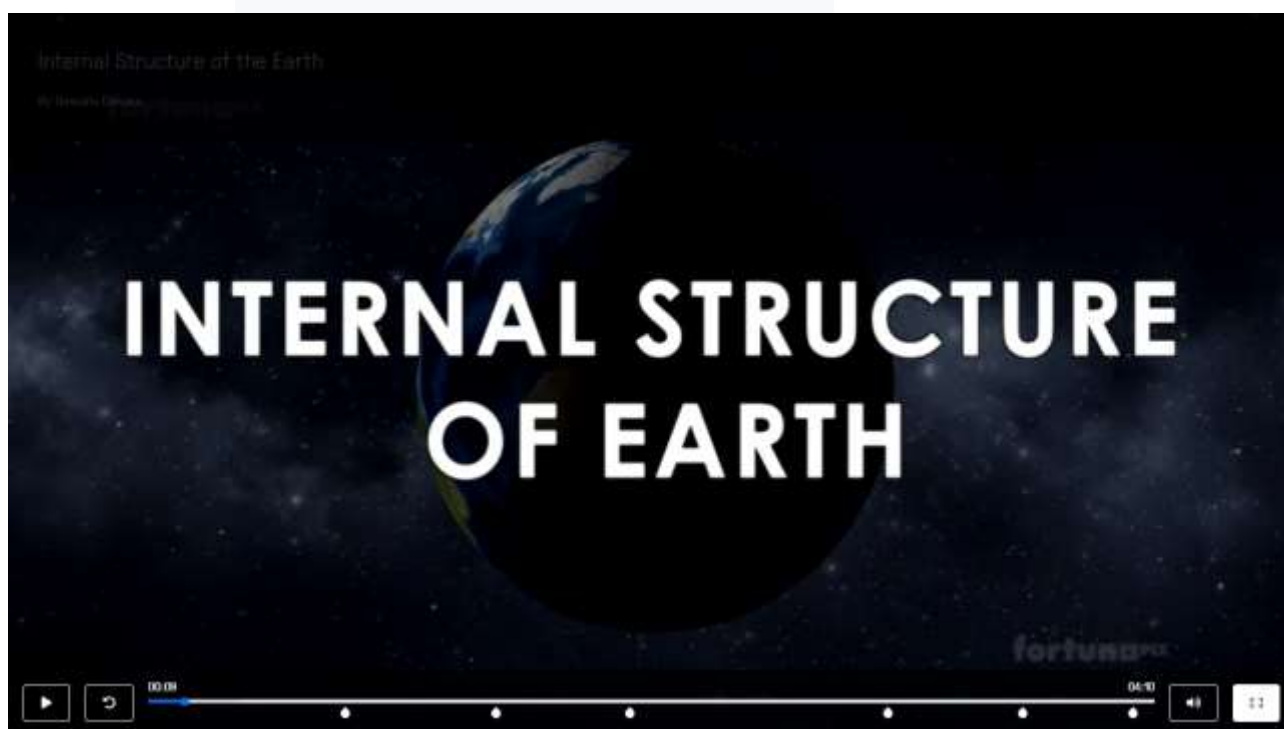
PROCEDURA: Fiecare elev va primi un jurnal în care va nota activitățile desfășurate.

Elevii vor alege fiecare câte un cartonaș cu un cuvânt scris, se vor grupa în perechi și vor aborda subiectul câte un minut.

Activitatea 2 Să învățăm despre ce se află în interiorul planetei noastre cu edpuzzle!

SCOP: Împuternicirea elevilor pentru a avea să aibă un rol activ în învățarea lor cu lecții video interactive care stârnesc creativitatea și curiozitatea.

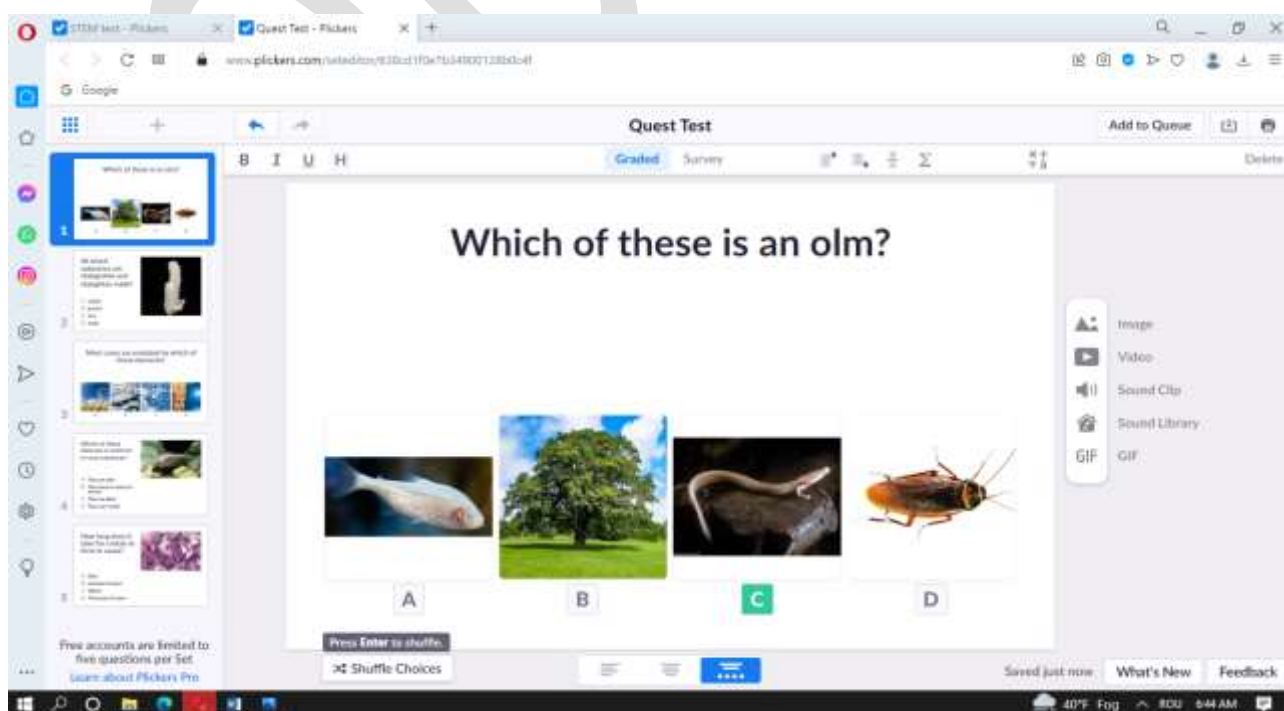
PROCEDURĂ: elevii vor fi grupați în trei grupe și vor răspunde la întrebările din aplicația edpuzzle despre structura internă a Pământului.



Activitatea 3 *Învăță cu Plickers!*

SCOP: utilizarea instrumentului digital Plickers folosit în educație pentru a realiza scurte chestionare la care elevii le răspund cu propriile dispozitive (de obicei un telefon mobil) despre centrul pământului;

PROCEDURA: elevii vor fi grupați în trei grupe și vor răspunde la întrebările din aplicația plickers



This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use, which may be made of the information contained therein

Activitatea 4 Știați că?

SCOP: pentru a afla mai multe informații despre oamenii de știință care au folosit lucruri din peșteri pentru descoperirile lor.

PROCEDURĂ: Profesorul oferă studenților coduri QR, pentru a viziona și a citi informațiile și le cere să numească și să arate peșteri din care oamenii de știință au folosit diferite lucruri pentru descoperirile lor.



Activitatea 5 Călătorie în centrul Pământului!

SCOP: Elevii să-și folosească creativitatea

PROCEDURĂ: elevii vor lucra în trei grupe pe care le vor numi trecut, prezent și viitor și își vor crea propria mașină care va ajunge în centrul pământului din perspectiva grupelor.



QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

Date: 15th December 2022

Teacher: Dascălu Daniela

Type of lesson: STEM Lesson within QUEST Erasmus Project

Topic: Stem Journal through the center of the Earth

No. of students: 18 (international group)

Methods: creative thinking, brainstorming, learning through discovery, the creative journal

Resources: sheets of paper, markers, phones, laptops, QR codes, flipchart, worksheets;

General Aims: The purpose of the lesson is to ensure an educational climate suitable for learning through cooperation and interrelationship, applying modern methods and participatory strategies in order to discover Jules Verne's book and bring up to date the discoveries that laid the foundations of modern science.

Bibliography:

Jules Verne, "Călătorie spre centrul pământului", Ed. Litera, București, 2019.

<https://edpuzzle.com/discover;>

<https://www.plickers.com/library.>

Activity 1 Ice breaking exercises

AIM: to create an enjoyable atmosphere while getting students to know each other

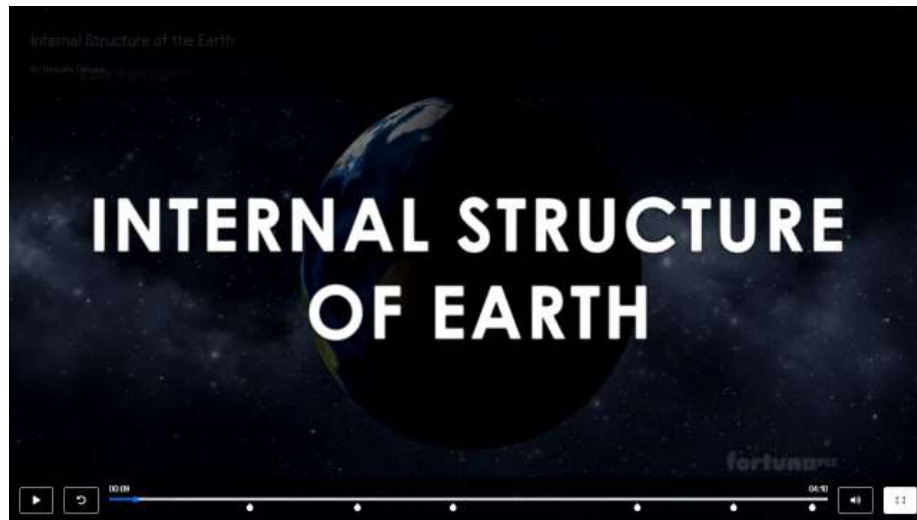
PROCEDURE: Each student will receive a journal in which he will note the activities carried out.

Students will each draw a card with a word written on it, they will group in pairs and address the subject for one minute each.

Activity 2 Let's learn about what is inside our planet with edpuzzle!

AIM: Empower students to take an active role in their learning with interactive video lessons that spark creativity and curiosity.

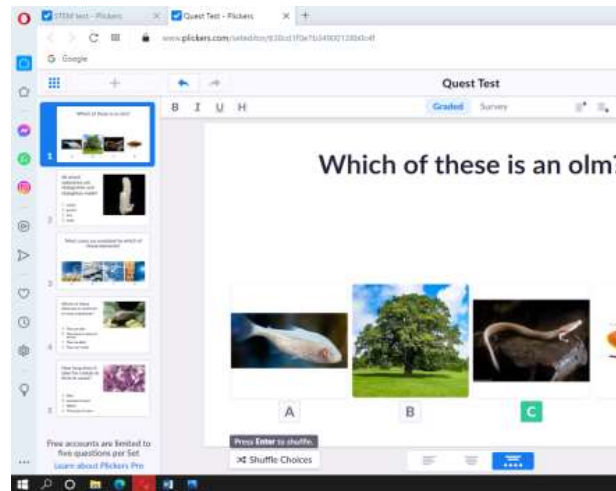
PROCEDURE: the students will be grouped into three groups and will answer the questions from the edpuzzle application about the internal structure of the Earth.



Activity 3 Learn with plickers!

AIM: using the Plickers digital tool used in education to make short quizzes that students answer with their own devices (usually a mobile phone) about the center of the earth;

PROCEDURE: the students will be grouped into three groups and will answer the questions from the plickers application.



Activity 4 *Did you know?*

AIM: to find out more information about scientists who used things from caves for their discoveries

PROCEDURE: Teacher provides the students QR Codes, to watch and read the information and asks them to name and show caves from which scientists used different things for their discoveries.



Activity 5 *Journey to the center of the Earth*

AIM: Students to use their creativity

PROCEDURE: the students will work in three groups that they will call past, present and future and they will create their own car that will reach the center of the earth from the perspective of the groups

APPENDIX NO.1 - Words to talk about: mine, bear, diamonds, bats, metals, salt, lava, mineral water, silver, stalagmites, stalagmites, scorpion, magma, sperologist, cave, gold, vulcano, spring

**APPENDIX NO.2 - Journey to the Center of the Earth, by Jules Verne**

In this novel, Jules Verne describes the unusual expedition of Professor Otto Lidenbrock. Inspired by the discovery of a mysterious ancient scroll, he decides to explore the center of the planet. The scientist is accompanied by his nephew Axel and a guide named Hans.

They enter the underground world through the crater of an extinct volcano and advance more and more towards the center of the Earth. They saw the interior of the planet as a fantastic world, full of grottoes, passageways, tunnels and wells. They make this descent very easily, the most important tool being a mobile lamp.

The three approach the center of the Earth solving many difficult mazes. During the journey, they discover a huge underground sea where magnetic and electric forces produce a kind of aurora borealis that illuminates the interior of the Blue Planet, making the expedition much more fascinating. Exploring the underground sea on a raft, the three travelers encounter mythological creatures.

The team almost reaches their destination, when suddenly their access is blocked by a huge block of rock. The three decide to destroy it with the explosive, although they know that the explosion could have terrible consequences. In the end, Professor Lidenbrock and his companions are thrown back to the surface by just such a volcanic eruption, reaching home safely.

APPENDIX NO.3**Activity no.4 sheet**

After reading the information generated by the qr codes, answer the following questions:

1. What is name of the famous inventor from:
 - a) Romania
 - b) Spain
 - c) Portugal
 - d) Turkey
2. Calculate the age at which he died or how old is he
3. **What he invented?**
4. Name a material from which his invention is made.
5. Name a mine in the inventor's country where the material used for the inventions is found.

Great inventors



Poland

Jan Józef Ignacy Łukasiewicz (b. 8 March 1822, Zaduszniki, Austrian Empire - d. 7 January 1882, Chorkówka, Austria-Hungary) was a Polish pharmacist, pioneer of the oil industry, builder of the world's first oil refinery in 1856. Among other achievements his include the discovery of a technique for distilling kerosene from crude oil, the invention of the kerosene lamp (1853), the introduction of the first street lamp in Europe (1853), and the construction of the first oil well in Poland (1854). Łukasiewicz became rich from his inventions and became a well-known philanthropist in Galicia.

After spending about 7 million euros on exploration activities, Central European Petroleum (CEP), a Canadian firm, has found evidence that one of the largest undiscovered deposits of gas and oil is located in Pomerania, between Swinoujscie and Miedzyzdroje, and around the island of Wolin.

Right now, the company has only preliminary evidence indicating that that field could be large enough to provide power for up to three decades.

Great inventors

Portugal



Manuel António Gomes (9 December 1868 – 21 December 1933) was a Portuguese Catholic priest, inventor and physicist. He was a very tall man, and was nicknamed *Father Himalaya* (in Portuguese: *Padre Himalaya*), a name he proudly used frequently. He was born at Santiago de Cendufe, Arcos de Valdevez in 1868 and died at Viana do Castelo in 1933.

He was a vegetarian and was interested in naturopathy, particularly fitotherapy and hydrotherapy. He studied in Paris with Marcellin Berthelot and developed mathematical and astronomical theories to construct innovative ways of concentrating solar radiation in order to maximise useful energy production. Gomes is the creator of the pyreliophorus,

a series of reflecting mirrors to concentrate sunlight towards a common point in order to melt materials.

He lived in the United States and Argentina between 1927 and 1932. In Argentina he wrote a book about cosmology, his inventions and his innovative views on several areas of science.

Optical mirrors are made of gallium. Current mirrors are made by spraying a thin layer of aluminum or applying a layer of molten silver to the underside of a glass plate in a hermetically sealed container. A mine of silver in Portugal is Sao Domingos Mine.

Great inventors

Romania



Traian Vuia Traian Vuia (b. August 17, 1872, Traian Vuia, Timiș, Austria-Hungary - d. September 3, 1950, Bucharest, Romania) was a Romanian inventor, pioneer of world aviation. On March 18, 1906, he made one of the first self-propelled flights (without catapults or other external means) with a heavier-than-air device.

Aluminum and aluminum alloys are still very popular raw materials in the manufacture of commercial aircraft due to their high strength at relatively low density. Currently, the high-strength alloy 7075, which contains copper, magnesium and zinc, is the one predominantly used in the aeronautical industry.

Aluminum is obtained from about 95% of the mined bauxite, smaller quantities are used in the production of chemical products containing aluminum, in the production of abrasives and fire-resistant materials

In Romania, bauxite is found in the Dobroesti mine, Oradea.

Great inventors

Spain



Juanelo Turriano or Giovanni Torriani or Gionello della Torre, born in Cremona, then in the Duchy of Milan, around 1500 and died in Toledo, Spain on June 13, 1585, is a famous Spanish-Milan watchmaker, engineer and automaton maker of his time.

He is notably the inventor of a hydraulic system of water supply for the city of Toledo.

The hydraulic drive system is a physical drive system composed of generator (pump), engine and ancillary facilities. The generator (ie hydraulic pump) has the role of producing hydraulic energy. The engine receives the energy in the form of a mass of liquid set in motion by the generator and transforms it into mechanical energy. Ancillary facilities are secondary elements that assist the main process of converting hydraulic energy into mechanical energy. They can be: control pressure gauges, connections, rigid and flexible pipes, valves, filters, radiators, pressurized tank, lubrication and drain holes, connection sockets. The resulting mechanical energy is intended to set a final device in motion.

To create a hydraulic system we need pistons that are made of steel. Steel is an alloy containing as main elements iron and carbon, having a carbon content below 1.7%.

Great inventors

Turkey



Selçuk Bayraktar, the son-in-law of President Recep Tayyip Erdoğan and chief technology officer of Baykar Makina, which produces Bayraktar TB2 military drones, said on a television program on Wednesday that Turkey's drone and unmanned fighter jet projects would fail if there is no political backing, putting his support behind the current government before the upcoming elections in 2023.

The unmanned aerial vehicle (English unmanned aerial vehicle - UAV), also called a drone, is an aircraft that does not have a human pilot on board, being guided either by a digital automatic pilot on board, or by remote control from a ground control center or which is located in another manned aircraft. Drones are used in the military field, but also in the civil field. They have a payload on board.

Military drones are used for reconnaissance, surveillance, espionage or combat purposes. Depending on the purpose, they have reconnaissance equipment and/or weapons as

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their payload. Civilian drones can be commercial or recreational. Data buses in drones are copper or fiber optic paths between sensors.

The Murgul mine is a large mine in the east of Turkey in Artvin Province 465 km east of the capital, Ankara. Murgul represents one of the largest copper reserve in Turkey having estimated reserves of 40 million tonnes of ore grading 1.25% copper.

ADÂNCUL PEȘTERILOR

Date: 15 Decembrie 2022

Profesor: Poască Angelica

Tipul lecției: Lecție STEM în cadrul proiectului Erasmus + QUEST

Topic: Jurnalul STEM în centrul pământului

No. of students: 18 (international group)

SCOP: dezvoltarea competențelor transversale prin asctivități experiențiale STEM

COMPETENȚE CHEIE / OBIECTIVE

C1 : Comunicarea într-o limbă străină de înțelegere interculturală

O1. Dezvoltarea capacității de comunicare constructivă cu ceilalți elevi din țările partenere

C2 : digitală, utilizarea cu încredere și în mod critic a tehnologiei informației

O 2. Determinarea densității corpurilor utilizând platforma Phet colorado

O3. Verificarea legii a doua a refracției utilizând platforma Phet colorado

O4. Stimularea și antrenarea elevilor utilizând aplicația digitală Plickers

C3: Sociale și civice

O5. Stimularea capacității de relaționare internațională a elevilor din proiectul european Erasmus -QUEST

C4: În domeniul științei și matematicice

O6. Învățarea STEAM fără frontiere

Grup țintă: 18 elevi (elevi din Spania, 2 elevi din Polonia, 3 elevi din Turcia, elev din Italia, 1 elev din Portugalia , 8 elevi din România)



RESURSE MATERIALE: fișe de lucru , pixuri, postituri, o colecție de emoji, globulețe, pahare Berzelius, spatule, substanțe chimice, fire de lână, agrafe, baghete de sticlă

RESURSE PROCEDURALE: comunicare, descoperire dirijată, observație independentă, brainstorming

FORMA DE ACTIVITATE: individuală, pe echipe, frontală

DESFĂȘURAREA ACTIVITĂȚII

Exercițiu de dezgheț: Jocul cu titlul ABC-ul cunoașterii

Materiale necesare: pixuri, globuri cu titlu și sigla proiect și sigla Erasmus+

Scopul:

- ✓ cunoaștere și autocunoaștere
- ✓ prezentare
- ✓ autocaracterizare
- ✓ formulare de întrebări și răspunsuri

Cum procedăm: Fiecare elev va primi o cate un globulet cu următoarele rubrici în lb. engleză:

- Nume și prenume
- Vârsta
- Țara natală
- Pasiuni.

Elevii vor completa individual globulețul cu datele personale;

Profesorul strânge globulețele și le redistribuie elevilor, de data aceasta fiecare elev primind globul unui alt coleg și nu globul său;

Pe rând, elevii vor prezenta globul în fața clasei, apoi îl prind în brațul clasei.

Activitatea 1

- Elevii sunt invitați la un tur al peșterilor din România urmărind o prezentare power point
- Elevii descoperă reacțiile chimice care stau la baza formării stalactitelor și stalagmitelor urmărind filmul pe youtube <https://www.youtube.com/watch?v=wFd3YmS-VBA>
- Elevii efectuează practic un experiment ce are ca scop obținerea în laborator a stalactitelor și stalagmitelor.

SARCINA DE LUCRU 1 „*Stalactite și Stalagmite – în laborator*”

Elevii primesc fișa de lucru și urmează instrucțiunile menționate în aceasta.

Activitatea 2

Luăm diferite corpuri din peșteri și le analizăm din punct de vedere fizic

- ✓ Elevilor li se distribuie fișa nr. 1 cu titlul „Determinarea densității unui corp”, pe baza căreia vor identifica substanța din care este confecționat.
- ✓ Elevii primesc fișa nr. 2 cu titlul „Refracția luminii”

SARCINA DE LUCRU 1: „*Determinarea densității unui corp*”

Elevii vor utiliza platforma Phet colorado și vor efectua experimentele prezentate identificând care dintre corpuri este gheața, compenenta de bază a Ghețarului de la Scărișoara.

SARCINA DE LUCRU 2: „*Refracția luminii*”

Elevii observă devierea fasciculului de lumină la trecerea prin bucată de gheață și vor descoperi legile refracției.

EVALUARE – În urma vizionării filmului despre peșterile din România, elevii vor juca Jocul interactiv cu titlul „Curiozități despre peșteri”, prin utilizarea aplicației digitale Plickers

<https://www.plickers.com/seteditor/6383c25ff3c4f800116f8ebd>

REFLECȚIE : CUM TE-AI SIMȚIT AZI LA ACTIVITATE? : elevii sunt invitați să împărtășească cu ceilalți felul în care s-au simțit la activitate cu ajutorul unui emoji pe care îl aleg de pe catedră și îl prind pe o foaie de flipchart.

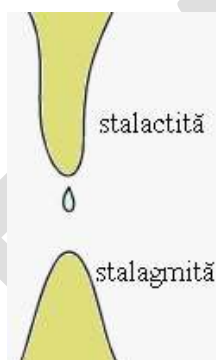
STALACTITE ȘI STALACMITE

FIȘĂ DE LABORATOR – nr 1

1. Scopul lucrării – obținerea în laborator a unor formațiuni asemănătoare stalactitelor și stalagmitelor din peșteri
2. Fundamentarea teoretică

Apa saturată de carbonat de calciu (sau alte minerale în unele cazuri) se scurge încet pe pereții peșterilor. Evaporarea apei lasă în urmă doar mineralul, care în timp se adună și formează depozite. Când acest lucru se întâmplă cu apa ce curge din tavan, apar stalactitele.

Stalagmitele cresc datorită apei ce curge pe podeaua peșterii; când o stalactită și o stalagmită se unesc, dau naștere unei coloane.



Încă mai încurcați cele două formații calcaroase între ele? Iată cum stau lucrurile...

Experimentul de față își propune să ne construiască propriile formațiuni. Evident, acest lucru se va întâmpla mult mai rapid decât în cazul procesului natural, care durează mii de ani – rata medie de creștere a stalactitelor și stalagmitelor este de ceva mai mult de o zecime de milimetru pe an.

3. Materiale necesare:

- două pahare Berzelius de minim 500 ml
- sare solubilă în apă ca sulfatul de magneziu sau carbonat de sodiu (sodă pentru spălat rufe)
- apă
- spatula
- fâșie de bumbac sau de lână cu o lungime de 50 cm și 3-4 cm lățime (se poate tăia un prosop vechi)
- două piulițe la capetele fâșiei pentru contragreutate
- tavă pe care să curgă picăturile

4. Mod de lucru

Umplem trei sferturi din fiecare pahar Berzelius cu apă fierbinte. Așezăm paharele pe tavă. Adăugăm sarea aleasă amestecând până când apa este atât de saturată încât nu se mai dizolvă și rămâne pe fundul recipientului. Punem fiecare capăt al fâșiei de material în câte un pahar, și așezăm recipientele pe tavă astfel încât mijlocul fâșiei să se afle la o înălțime de 4-6 cm.

Depozităm montajul experimental într-un loc unde nu va fi deranjat timp de o săptămână. Stalactitele și stalagmitele vor începe încet să se formeze, iar dacă avem noroc chiar se vor uni într-o coloană.



Formarea unei coloane în laborator. Animație.

Explicația experimentului

Experimentul arată cum se formează depozitele în peșteri. Apa conținând săruri dizolvate curge de-a lungul fâșiei de material poros. Când se evaporă, cristalele sunt depozitate. Creșterea formațiunilor are loc de jos în sus pentru stalagmite și de sus în jos pentru stalactite.



DETERMINAREA DENSITATII UNUI CORP

FISA DE LABORATOR nr 2

1. Scopul lucrării determinarea densității unor corpuri din materiale /substanțe necunoscute
2. Fundamentarea teoretică

Densitatea unui corp este o mărime fizică care se exprimă matematic prin relația $\rho = m/v$, unde m -masa corpului

V - volumul corpului

Unitatea de măsură $\rho = \text{kg} / \text{L}$

3. Materiale necesare

Pentru investigare vom folosi aplicația Phet pe care poți să o deschizi accesând linkul de mai jos, alegând secțiunea MISTER

https://phet.colorado.edu/sims/html/density/latest/density_ro.html

4. Modul de lucru

Determină masa corpului paralelipipedic așezându-l pe cântarul din stânga și notează valoarea obținută în tabelul de mai jos.

Citește volumul de lichid indicat ce se află în vas.

Așează cubul A în vasul cu lichid și citește volumul final (dacă corpul plutește fiind parțial scufundat, trage de corp vertical în jos astfel încât să-l scufunzi complet).

Calculează și notează în tabel valoarea obținută a volumului corpului, prin diferența dintre cele două citiri.

Calculează densitatea corpului A cu formula $\rho = m/v$

Se repetă etapele de mai sus și pentru corpurile B,C,D,E , trecându-le valorile în tabel.

PARALLELIPEDIC CORP	m (Kg)	V (L)	$\rho = m/V$ $< \rho > = \text{kg} / \text{L}$	Material/ substanta

5. Prelucrarea datelor experimentale

Utilizand tabelul cu densități, identificați materialul din care sunt confecționate corpurile



6. Concluzii

Identificati care corp este din gheață si dacă conține si alte impurități.

REFRACTIA LUMINII

FISA DE LABORATOR nr. 3

1. Scopul lucrării – observarea devierii fasciculului de lumină la trecerea prin bucata de gheață
2. Fundamentarea teoretică

Refracția luminii este fenomenul în care lumina își schimbă direcția de propagare atunci când traversează suprafața de separație dintre două medii transparente diferite.

În vid lumina se propagă cu viteza de 300.000.000 m/s și se notează cu litera "c" și nu cu "v", ca la viteză. Cu "v" notăm viteza luminii în celelalte medii (substanțe transparente). În alte medii viteza de propagare a luminii este mai mică.

Deci lumina își schimbă viteza de propagare în funcție de mediul traversat.

Indicele de refracție (notat cu n) al unui mediu transparent este dat de raportul dintre viteza luminii în vid (c) și viteza luminii în mediul respectiv (v).

$$n = \frac{c}{v}$$

Indicele de refracție este o *constantă de material*, care se ia dintr-un tabel, fiind specific fiecărei substanțe transparente (vezi tabelul de mai jos).

Indicii de refracție ai unor materiale

Substanța	Indicele de refracție (n)
Vid	1
Gaze la 0°C și 1 atm	
Aer	1,000293
Helium	1,000036
Hidrogen	1,000132
Dioxid de carbon	1,00045
Lichide la 20°C	
Apă	1,333
Etanol	1,36
Ulei de măsline	1,47
Solide	
Gheață	1,309
Plexiglas	1,49
Sticlă "Crown"	1,52
Safir	1,77
Zirconiu	2,15
Diamant	2,42

Pentru a vedea cum trece lumina în cel de-al II-lea mediu, adică cum se refractă, avem două cazuri:

Cazul I: Când $n_1 < n_2$

Adică indicele de refracție al primului mediu este mai mic decât indicele de refracție al mediului II (exemplu: aer-apă, apă-sticlă, aer-sticlă, aer-diamant, apă-diamant etc.), raza refractată se apropie de normală și unghiul de refracție (r') este mai mic decât unghiul de incidență (i).

Notații (legenda) pentru desenul de la refracția luminii :

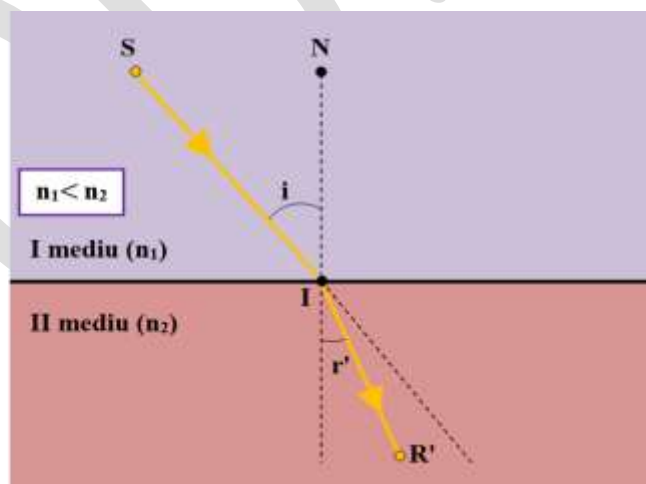
SI = raza incidentă

RI = raza refractată

NI = normala la suprafața de separare

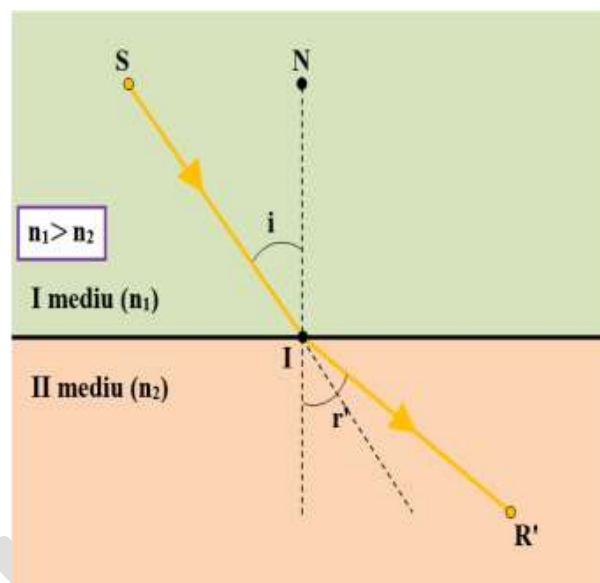
i = unghi de incidență

r' = unghi de refracție



Cazul II: Când $n_1 > n_2$

Adică indicele de refracție al primului mediu este mai mare decât indicele de refracție al mediului II (exemplu: apă-aer, sticlă-apă, sticlă-aer, diamant-aer, diamant-apă etc.), raza refractată se depărtează de normală și unghiul de refracție(r') este mai mare decât unghiul de incidență(i).



3. Materiale necesare

Pentru investigare vom folosi aplicația Phet pe care poți să o deschizi accesând linkul de mai jos

https://phet.colorado.edu/sims/html/bending-light/latest/bending-light_en.html

4. Modul de lucru

- măsoară unghiul de incidență și unghiul de refracție corespunzător utilizând raportorul
- modifică unghiul de incidență și observă cum se modifică unghiul de refracție
- completează tabelul de mai jos
- compară rapoartele din tabel

Nr crt	i (unghi de incidenta)	r (unghi de refractie)	$\frac{\sin i}{\sin r}$	n_{aer}	n_{gheata}	$\frac{n_{gheata}}{n_{aer}}$
1						
2						
3						
4						
5						

5. Concluzii

Comparați rapoartele $\frac{n_{gheata}}{n_{aer}}$ și $\frac{\sin i}{\sin r}$

Ce observați?

Raportul dintre sinusul unghiului de incidență (i) și sinusul unghiului de refracție (r) este egal cu raportul dintre indicele de refracție absolut al mediului al II-lea și indicele de refracție absolut al I mediu :

$$\frac{\sin i}{\sin r} = \frac{n_2}{n_1} = n_{21}$$

n_{21} = indicele de refracție relativ al mediului al II-lea față de primul



STEM LESSON

Date: 15th December 2022

Teacher: Poască Angelica

Type of lesson: STEM Lesson within QUEST Erasmus Project

Topic: Stem Journal through the center of the Earth

No. of students: 18 (international group)

PURPOSE: the development of transversal skills through experiential STEM activities

KEY COMPETENCES / OBJECTIVES

C1 : Communicating in a foreign language of intercultural understanding

O1. Develop the ability to communicate constructively with other students in partner countries

C2 : Use laboratory equipment and computer technology to study properties/phenomena

O1. Preparation of saturated solutions

O 2. Determination of density of bodies using the Phet colorado platform

O3. Verification of the second law of refraction using the Phet colorado platform

O4. Stimulate and train students using the digital application Plickers

C3: Social and civic

O4. Stimulating the international networking skills of pupils in the Erasmus -QUEST European project

C4: Science and mathematics

O5. STEAM learning without frontiers

CONDUCT OF THE ACTIVITY

Defrosting exercise: The game with the title ABC of knowledge

Materials needed: pens, globes with title and project logo and Erasmus+ logo

The goal:

- knowledge and self-knowledge;
- presentation;
- self-characterization;
- formulating questions and answers

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How we proceed: each student will receive a globule with the following rubrics in lb. English:

- ✓ Name and surname;
- ✓ Age;
- ✓ Country of origin;
- ✓ Passions.

Students will individually fill in the globule with their personal data;;

The teacher collects the globules and redistributes them to the students, this time each student receiving another classmate's globule and not their globule;

One by one, the students will present the globe in front of the class, then catch it on the class tree.

Activity 1:

- Students are invited to a tour of the caves in Romania by accessing the presentation.
- Students discover the chemical reactions that underlie the formation of stalactites and stalagmites by watching the video on youtube <https://www.youtube.com/watch?v=wFd3YmS-VBA;>
- The students practically carry out an experiment aimed at obtaining stalactites and stalagmites in the laboratory.

ASSIGNMENT 1 "Stalactites and Stalagmites - in the laboratory"

The students receive the worksheet and follow the instructions mentioned in it.

Activity 2

We take different bodies from the caves and analyze them physically

- Students are distributed sheet no. 1 with the title "Determining the density of a body" on the basis of which they will identify the substance from which it is made.
- Students receive form no. 2 titled "Refraction of Light"

WORK TASK 1: "Determining the density of a body"

- Students will use the Phet colorado platform and perform the presented experiments identifying which of the bodies is ice, the basic component of the Scărișoara Glacier.

ASSIGNMENT 2: "Refraction of light"

- Students observe the deflection of the light beam when passing through the piece of ice and will discover the laws of refraction.

ASSESSMENT - After watching the film about the caves in Romania, the students will play the interactive game with the title "Curiosities about caves" by using the digital application Plickers

<https://www.plickers.com/seteditor/6383c25ff3c4f800116f8ebd>

REFLECTION: HOW DID YOU FEEL AT THE ACTIVITY TODAY? : students are invited to share with others how they felt about the activity with the help of an emoji they choose from the classroom and stick it on a large sheet of paper.

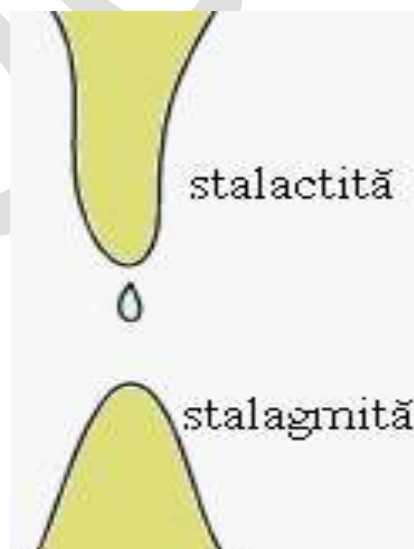
STALACTITES AND STALACMITES

LABORATORY SHEET - No 1

1. Aim of the work - to obtain stalactite and stalagmite-like formations in caves in the laboratory
2. Theoretical background

Water saturated with calcium carbonate (or other minerals in some cases) flows slowly down cave walls. Evaporation of the water leaves behind only the mineral, which over time collects and forms deposits. When this happens to the water flowing from the ceiling, stalactites appear.

Stalagmites grow because of the water flowing on the cave floor; when a stalactite and a stalagmite join, they form a column.





Still confusing the two limestone formations with each other? Here's the thing...

This experiment aims to build our own formations. Obviously, this will happen much faster than the natural process, which takes thousands of years - the average growth rate of stalactites and stalagmites is just over a tenth of a millimetre a year.

3. Materials needed:

- two Berzelius glasses of at least 500 ml
- water-soluble salt such as magnesium sulphate or sodium carbonate (washing soda)
- water
- spatula
- a strip of cotton or wool 50 cm long and 3-4 cm wide (an old towel can be cut)
- two nuts at the ends of the strip for counterweight
- a tray to drip the drops onto

4. How to work

Fill three quarters of each Berzelius glass with hot water. Place the glasses on the tray. Add the salt of your choice, stirring until the water is so saturated that it no longer dissolves and remains at the bottom of the container. Place each end of the strip of material in a glass, and place the containers on the tray so that the middle of the strip is 4-6 cm high.

Store the experimental set-up in a place where it will not be disturbed for a week. The stalactites and stalagmites will slowly begin to form, and if we are lucky they will even join into a column



Forming a column in the laboratory.

5. Explanation of the experiment

The experiment shows how deposits form in caves. Water containing dissolved salts flows along the strip of porous material. When it evaporates, the crystals are deposited. The growth of the formations occurs from bottom to top for stalagmites and top to bottom for stalactites.

DETERMINATION OF THE DENSITY OF A BODY

LABORATORY SHEET No. 2

1. The purpose of the work is to determine the density of bodies made of unknown materials/substances

2. Theoretical foundation

The density of a body is a physical quantity that is expressed mathematically by the relation $\rho = m/v$, where m - mass of the body

V - body volume

The unit of measure $\langle \rho \rangle = \text{kg} / \text{L}$

3. Required materials

For the investigation we will use the Phet application, which you can open by accessing the link below, choosing the MISTER section

https://phet.colorado.edu/sims/html/density/latest/density_ro.html

4. Working method

Determine the mass of the parallelepiped by placing it on the scale on the left and note the value obtained in the table below.

Read the volume of liquid indicated in the container.

Place the cube A in the container with liquid and read the final volume (if the body floats being partially submerged, pull the body vertically down so as to submerge it completely).

Calculate and note in the table the obtained value of the body volume, by the difference between the two readings.

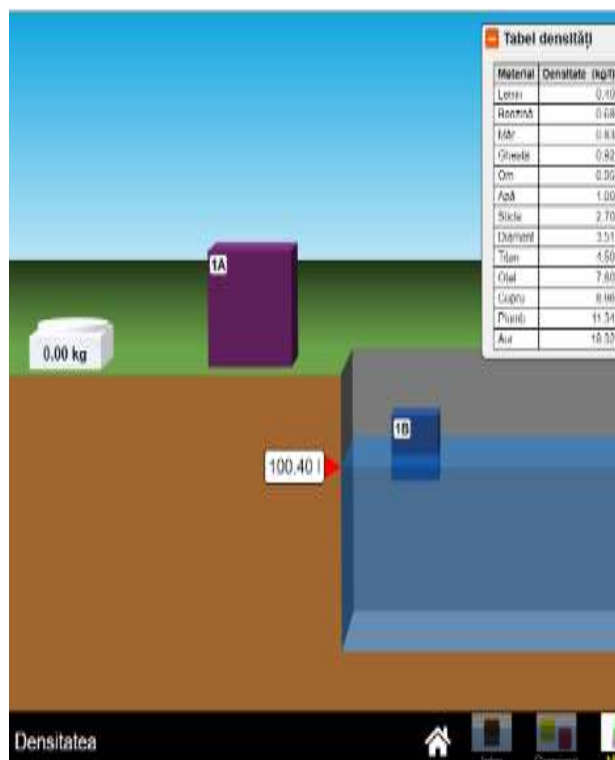
Calculate the density of body A with the formula $\rho = m/v$

The steps above are repeated for bodies B, C, D, E, entering their values in the table.

Parallelepipedic body	m (Kg)	V (L)	$\rho = m/V$ < ρ > = kg / L	Material/ substanta

5. Experimental data processing

Using the table of densities, identify the material of which the bodies are made



6. Conclusions

Identify which body is made of ice and if it contains other impurities.

REFRACTION OF LIGHT

LABORATORY SHEET no. 3

1. The purpose of the work – observing the deflection of the light beam when passing through the piece of ice

2. Theoretical foundation

Refraction of light is the phenomenon in which light changes its direction of propagation when it crosses the separating surface between two different transparent media.

In a vacuum, light propagates at a speed of 300,000,000 m/s and is denoted by the letter "c" and not by "v", as in speed. With "v" we denote the speed of light in the other media (transparent substances). In other media the speed of light propagation is lower.

So light changes its propagation speed depending on the medium it crosses.

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The refractive index (denoted n) of a transparent medium is given by the ratio of the speed of light in a vacuum (c) to the speed of light in that medium (v).

$$n = \frac{c}{v}$$

The refractive index is a material constant, which is taken from a table, being specific to each transparent substance (see the table below).

Indicii de refracție ai unor materiale

Substanța	Indicele de refracție (n)
Vid	1
Gaze la 0°C și 1 atm	
Aer	1,000293
Helium	1,000036
Hidrogen	1,000132
Dioxid de carbon	1,00045
Lichide la 20°C	
Apă	1,333
Etanol	1,36
Ulei de măsline	1,47
Solide	
Gheață	1,309
Plexiglas	1,49
Sticlă "Crown"	1,52
Safir	1,77
Zirconiu	2,15
Diamant	2,42

To see how light passes through the second medium, i.e. how it is refracted, we have two cases:

Case I: When $n_1 < n_2$

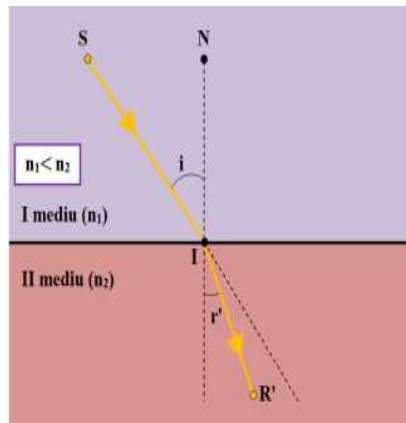
That is, the refractive index of the first medium is lower than the refractive index of the II medium (example: air-water, water-glass, air-glass, air-diamond, water-diamond, etc.), the refracted ray approaches the normal and the angle of refraction (r') is smaller than the angle of incidence (i).

Notations (legend) for the light refraction drawing:

SI = incident radius

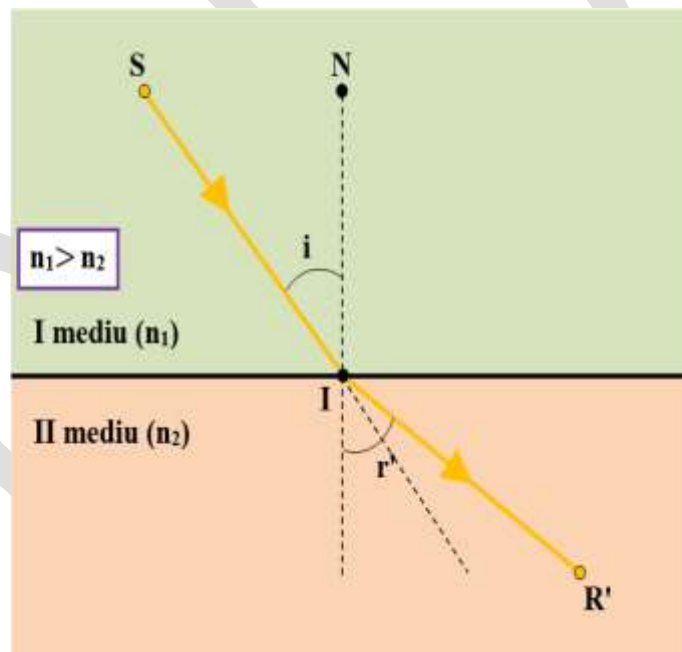
RI = refracted ray

NI = normal to the parting surface



Case II: When $n_1 > n_2$

i.e. the refractive index of the first medium is greater than the refractive index of medium II (e.g. water-air, glass-water, glass-air, diamond-air, diamond-water, etc.), the refracted radius deviates from normal and the angle of refraction(r') is greater than the angle of incidence(i).



3. Materials required

For the investigation we will use the Phet application which you can open by clicking on the link below,

https://phet.colorado.edu/sims/html/bending-light/latest/bending-light_en.html



4. How to work

- measure the angle of incidence and the corresponding angle of refraction using the protractor
- change the angle of incidence and see how the angle of refraction changes
- complete the table below
- compare the ratios in the table

Nr crt	i (angle of incidence)	r (angle of refraction)	$\frac{\sin i}{\sin r}$	n_{air}	n_{ice}	$\frac{n_{ice}}{n_{air}}$
1						
2						
3						
4						
5						

Conclusions- Compare the ratios n_{ice}/n_{air} and $(\sin i)/\sin r$
What do you observe?

QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

DATA: 15 Decembrie 2022

PROPUNĂTOR: prof. BOGOI COSTEL

TIPUL LECȚIEI: Activitate STEM parte a proiectului Erasmus+ QUEST

SUBIECT: Vânătoarea de comori

NR. DE ELEVI: 54 (grup internațional)

METODE: Gândirea creativă, brainstormingul, învățare prin descoperire

RESURSE: romanele lui Jules Vernes, puzzle-uri, markere, regulamentul jocului, fișe de lucru

OBIECTIVE GENERALE

Scopul activității este asigurarea unui climat educațional propice învățării prin cooperare și descoperire, îmbunătățirea colaborării, stimularea comunicării, aplicarea unor metode moderne și strategii participative pentru a descoperi misterele romanelor lui Jules Verne și a aduce la zi descoperirile care au pus bazele științei moderne.

Activitatea stimulează gândirea analitică și creativă, testează unitatea echipei, formată din membri din fiecare țară și presupune adaptabilitate la schimbări, realizarea unei strategii cât și comunicare eficientă. Împărțiți în echipe, participanții vor trebui să parcurgă zona de desfășurare a activităților pentru a găsi și rezolva indiciile care îi vor ajuta să descopere comoara ascunsă. Această activitate este una complexă deoarece misiunile din care este compusă presupun atât logică cât și curaj.

VÂNĂTOAREA DE COMORI

Regulile jocului

La acest joc participă 6 echipe formate din 9 elevi din țări diferite. Scopul jocului este acela de a rezolva în echipă cât mai repede misiunile astfel încât să ajungeți primii la sfârșitul jocului. Cine ajunge primul va avea prima șansă la găsirea cheilor ce vor deschide comoara. Alegerea cheilor ce deschid comoara nu este întâmplătoare. Fiți atenți la indiciile de pe parcursul jocului. Ele vă vor ajuta să descifrați mai repede misterul și să găsiți comoara mult visată.

La fiecare probă vor participa cel puțin 3 elevi din fiecare echipă. Munca în echipă va fi un plus pentru a rezolva sarcinile cât mai repede. La sfârșitul jocului fiecare elev din fiecare echipă trebuie să fi participat la cel puțin 2 probe.

PROBA 1 – ECUAȚIA

Piratul a fost foarte strângător toată viața lui. Întreaga comoară a fost numărată de foarte multe ori, de aceea matematica a devenit un punct forte al piratului. Crezi că te pricepi? Dacă da, mai alege 2 colegi pricepuți și încercați să rezolvați cât mai repede ecuația matematică. Aceasta se află în plicul numărul 1 după masă. Răspunsul corect reprezintă codul de acces la următoarea probă. Dacă nu reușești o poți lua de la căpăt. Nu este greu. Te poți folosi de un instrument ajutător contra unei sarcini suplimentare. (Va trebui să execuți 10 genunflexiuni). Cine termină primul are avantaj la proba următoare. Succes!

$$(3+3:3) \times (18-9 \times 2 + 3^3 \times 9 + 7 \times 7 + 3 \times 11 \times \sqrt{25})$$

PROBA 2 – PUZZLE

Piratului i-a plăcut dintotdeauna să rezolve mister. Găsește și alege una din cutiile cu puzzle-uri și rezolvă cel mai repede. Găsește și 2 colegi care să te ajute pentru a fi mai rapid. Cine termină primul are avantaj la proba următoare. Succes!



PROBA 3 - LOGICĂ

Logica a fost punctul forte al piratului. Dacă consideri că te pricepi, mai găsește 2 colegi cu care să faci cea mai bună și rapidă echipă. Cine termină primul are avantaj la următoarea probă. Vei avea de rezolvat 5 enigme, aflate în plicul numărul 3, pentru a putea trece mai departe. Dacă nu reușești, trebuie să încerci din nou. Dacă consideri că nu te descurci, vei putea cere ajutorul unui coechipier contra unei probe sportive. (Va trebui să execuți 10 genunflexiuni). Succes!

Echipa: _____

Elevul care participă la această probă:

1. Într-un sat fără electricitate în care copiii nu au în case computere, tablete sau telefoane, locuiesc șapte frați.

Primul citește o carte, al doilea a plecat să ducă vaca la câmp, al treilea joacă șah, al patrulea rezolvă un rebus dintr-un almanah vechi, al cincilea pune masa, iar al șaselea umflă o minge. Ce face al șaptelea dintre frați?

RĂSPUNS: _____

2. Doi tați și doi fii au găsit, în pădure, trei comori. Totuși, fiecare i-a revenit câte o comoară. Cum a fost posibil?

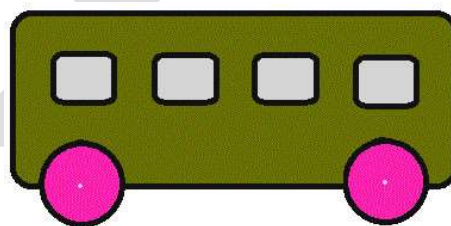
RĂSPUNS: _____

3. În care direcție merge autobuzul?

E o problemă de logică destul de simplă și foarte răspândită în cărțile cu probleme de logică, probleme cu care sunt obișnuiți copiii, dar care le dau mare bătaie de cap adulților.

Deci, în care direcție merge autobuzul? Cum ți-ai dat seama?

RĂSPUNS: _____



4. Tu conduci un tren. În el se află 10 persoane, 5 coboară la prima stație și se urcă 2. Câți ani are soferul trenului?

RĂSPUNS: _____

5. Sunt trei camere, alege una în care să supraviețuiești.

1) o cameră plină cu criminali care sunt gata să te omoare.

2) o cameră cu lei nemâncați de 5 ani

.

3) o cameră cu gaz toxic care te-ar omorâ.

Ce cameră alegi?

RĂSPUNS: _____

PROBA 4 – MISTERUL CĂRȚILOR

Găsește și alege una dintre cărți și rezolvă codul secret. Doar dacă ai descoperit cele 6 cuvinte poți trece mai departe. Fiecare elev va trebui să găsească 2 cuvinte după modelul/exemplul dat, după care pasează ștafeta următorului coleg din echipă. Prima echipa care găsește cele 6 cuvinte poate trece mai departe.

PRIMUL ROMAN Un bilet de loterie Farul de la capătul lumii			
P 5	R 12	W 9	CĂLĂTOR
P 22	R 6	W 5	
P 31	R 15	W 3	
P 68	R 9	W 7	
P 93	R 13	W 9	
P 116	R 19	W 13	
P 139	R 7	W 13	
Legendă P= PAGINĂ R= RÂND W= CUVÂNT			

AL DOILEA ROMAN VULCANUL DE AUR			
P 41	R 10	W 8	RUFURI
P 89	R 15	W 8	
P 116	R 3	W 6	
P 142	R 9	W 6	
P 170	R 16	W 11	
P 216	R 21	W 9	
P 275	R 3	W 6	
Legendă P= PAGINĂ R= RÂND W= CUVÂNT			

AL TREILEA ROMAN INSULA MISTERIOASĂ			
P 14	R 9	W 2	EXPANSIUNI
P 30	R 13	W 8	
P 56	R 9	W 8	
P 83	R 12	W 7	
P 120	R 17	W 3	
P 141	R 17	W 10	
P 172	R 21	W 1	
Legendă P= PAGINĂ R= RÂND W= CUVÂNT			

AL PATRULEA ROMAN 20000 DE LEGHE SUB MĂRI			
P 21	R 13	W 7	CA? ALOT
P 63	R 18	W 10	
P 82	R 14	W 4	
P 114	R 14	W 9	
P 138	R 13	W 11	
P 158	R 21	W 8	
P 196	R 43	W 8	
Legendă P= PAGINĂ R= RÂND W= CUVÂNT			

AL CINCILEA ROMAN COPIII CĂPITANULUI GRANT			
P 11	R 8	W 4	OM
P 36	R 14	W 6	
P 61	R 7	W 8	
P 82	R 9	W 4	
P 101	R 29	W 4	
P 112	R 12	W 4	
P 125	R 9	W 5	
Legendă P= PAGINĂ R= RÂND W= CUVÂNT			

AL ȘASELEA ROMAN ȚINUTUL BLĂNURIILOR			
P 158	R 25	W 5	ASTRONOM
P 137	R 28	W 7	
P 117	R 36	W 4	
P 94	R 39	W 11	
P 62	R 3	W 7	
P 37	R 22	W 7	
P 14	R 19	W 6	
Legendă P= PAGINĂ R= RÂND W= CUVÂNT			

PROBA 5 – MATE + LOGICĂ

Piratul știe cum să te pună în încurcătură. Tocmai de aceea ți-a pregătit un nou test. Desfășură plicul numărul 5, unde o să găsești 3 poze. Împarte-le cu alți doi colegi și încercați să rezolvați misterul. La sfârșit așezați corect rezultatele astfel încât să aflați codul secret care vă va permite să treceți la următoarea probă. Succes!

$$\text{Apple} + \text{Apple} + \text{Apple} = 30 \text{ lei}$$

$$\text{Apple} + \text{Banana} + \text{Banana} = 18 \text{ lei}$$

$$\text{Banana} - \text{Coconut} = 2 \text{ lei}$$

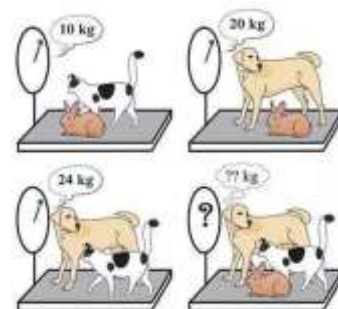
$$\text{Apple} + \text{Coconut} + \text{Banana} = ??$$

$$\text{Apple} + \text{Apple} + \text{Apple} = 30$$

$$\text{Apple} + \text{Banana} + \text{Banana} = 18$$

$$\text{Banana} - \text{Coconut} = 2$$

$$\text{Coconut} + \text{Apple} + \text{Banana} = ?$$



PROBA 6 – GHICITOAREA

Piratului i-au plăcut mereu misterele. De aceea a scris foarte multe ghicitori. Găsește ursul misterios, care ascunde o parte din ghicitorile piratului. Extrage una și încearcă să o rezolvi. Dacă ai reușit lasă locul următorului coleg din echipă. Rezolvă 3 ghicitori pentru a putea trece mai departe. Fiecare elev va trebui să rezolve câte una, dacă consideri că nu știi, îți poți întreba colegii contra unui mic schimb. (Va trebui să execuți 10 genunflexiuni). Cine termină primul va avea avantaj la proba următoare.

<p>1. Care roată nu se mișcă când o mașină face dreapta?</p> <p>2. Ce zboară când vine pe lume, stă nemișcat când este viu și curge când moare?</p> <p>3. Cu cât scoți mai mult din ea, cu atât devine mai mare. Ce?</p> <p>4. Numai crește, nu scade niciodată. Ce?</p> <p>5. Cine merge și rămâne nemișcat?</p> <p>6. Ce nu este nici în casă, nici afară, ci este și în casă și afară?</p> <p>7. Cine zboară fără să zboare?</p> <p>8. Cine face un pas înainte și se dă înapoi, dar nu merge niciodată?</p> <p>9. Peste tot în lume găsești cinci frați cu același nume. Cine sunt?</p> <p>10. În fața cui trebuie să-și scoată fiecare pălăria?</p> <p>11. Ce are patru picioare dar nu poate merge?</p> <p>12. Îți aparține, dar prietenii tăi îl folosesc mai mult. Ce este?</p> <p>13. Ce merge doar înainte și nu se întoarce niciodată înapoi?</p> <p>14. Ce trebuie spart înainte de utilizare?</p> <p>15. Ce are cuvinte dar nu vorbește niciodată?</p> <p>16. Ce înconjoară curtea, dar nu se mișcă?</p> <p>17. Unde poți găsi străzi, magazine, orașe, drumuri, dar nu și oameni?</p> <p>18. Ce este plin de găuri, dar încă ține apa?</p> <p>19. Ce călătorește în toată lumea, dar stă într-un colț?</p> <p>20. Ce are cinci degete, dar nicio viață?</p>	<p>1. Roata de rezervă</p> <p>2. Fulgul de nea</p> <p>3. Groapa</p> <p>4. Vârsta</p> <p>5. Ceasul</p> <p>6. Ușa și fereastra</p> <p>7. Pasagerii avioanelor</p> <p>8. Ușa</p> <p>9. Degetele</p> <p>10. Frizerul</p> <p>11. Masa și scaunul</p> <p>12. Numele tău</p> <p>13. Vârsta</p> <p>14. Oul</p> <p>15. Cartea</p> <p>16. Gardul</p> <p>17. Pe hartă</p> <p>18. Burete</p> <p>19. Timbrul</p> <p>20. Mănușă</p>
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Felicitări!!!

Ai găsit comoara piratului!!!!



STEM LESSON

DATE: 15th December 2022

TEACHER: BOGOI COSTEL

TYPE OF ACTIVITY: STEM activity part of the QUEST Erasmus Project

TOPIC: TREASURE HUNT

NO. OF STUDENTS: 54 (international group)

METHODS: creative thinking, brainstorming, discovery learning

RESOURCES: Jules Verne novels, paper puzzles, markers, game rules, worksheets.

GENERAL OBJECTIVES:

The purpose of the activity is to ensure an educational climate conducive to learning through cooperation and discovery, improving collaboration, stimulating communication, applying modern methods and participatory strategies to discover the riddles of Jules Verne's novels and bring up to date the discoveries that put the foundations of modern science.

The activity stimulates analytical and creative thinking, tests the unity of the team, made up of members from each country, and involves adaptability to changes, making a strategy and effective communication. Divided into teams, the participants will have to go through the activity area to find and solve the clues that will help them discover the hidden treasure. This activity is a complex one because the missions it is composed of require both logic and courage.

TREASURE HUNT



Rules of the game

6 teams of 9 students from different countries participate in this game. The goal of the game is to solve the missions as quickly as possible as a team so that you reach the end of the game first. Whoever arrives first will have the first chance to find the keys that will open the treasure. The choice of the keys that open the treasure is not accidental. Pay attention to the clues throughout the game. They will help you decipher the mystery faster and find the long-dreamed-of treasure.



At least 3 students from each team will participate in each test. Teamwork will be a plus to solve tasks as quickly as possible. At the end of the game, each student in each team must have participated in at least 2 trials.

TEST 1 – EQUATION

The pirate was very tight-lipped all his life. The entire treasure was counted many times, so mathematics became a strong point of the pirate. Do you think you can do it? If so, choose 2 more skilled colleagues and try to solve the mathematical equation as quickly as possible. This is in envelope number 1 behind the desk. The correct answer is the access code to the next test. If you don't succeed, you can take it from the beginning. It is not difficult. You can use a helpful tool against an additional burden. (You will need to perform 10 knee bends). Whoever finishes first has the advantage in the next round. Good luck!

$$(3+3:3) \times (18-9 \times 2 + 3^3 \times 9 + 7 \times 7 + 3 \times 11 \times \sqrt{25})$$

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TEST 2 – PUZZLE

The pirate has always liked solving mysteries. Find and choose one of the puzzle boxes and solve it the fastest. Also find 2 colleagues to help you to be faster. Whoever finishes first has an advantage in the next race. Good luck!



TEST 3 - LOGIC

Logic was the strong point of the pirate, if you think you're good at it, find 2 more colleagues with whom you can make the best and fastest team. Whoever finishes first has the advantage in the next round. You will have to solve 5 puzzles, located in envelope number 3, in order to move on, if you fail you must try again. If you think you can't handle it, you will be able to ask a teammate for help against a sports challenge. (You will need to perform 10 knee bends). Good luck!

Team: _____

The student who participated in this test:

1. Seven brothers live in a village without electricity where the children do not have computers, tablets or phones in their homes.

The first is reading a book, the second is off to take the cow to the field, the third is playing chess, the fourth is solving a puzzle from an old almanac, the fifth is preparing dinner, and the sixth is inflating a ball. What does the seventh brother do?

ANSWER: _____

2. Two fathers and two sons found three treasures in the forest. However, everyone got a treasure. How was it possible?

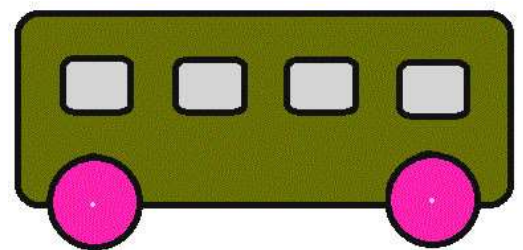
ANSWER: _____

3. In which direction does the bus go?

It's a fairly simple logic problem and fairly common in logic problem books, problems that kids are used to, but they give kids a lot of trouble.

So which way is the bus going? How did you solve it?

ANSWER: _____



4. You drive a train. There are 10 people in it, 5 get off at the first station and 2 get on.

How old is the train driver? How did you solve it?

ANSWER: _____

5. There are three rooms, choose one in which to survive.

1) a room full of criminals who are ready to kill you.

2) a room with lions that have not eaten for 5 years.

3) a room with toxic gas that would kill you.

Which room do you choose?

ANSWER: _____

TEST 4 – THE MYSTERY OF BOOKS

Find and choose one of the books to read and solve the secret code. Only if you have discovered the 6 correct ones can you move on. Each student will have to find 2 words according to the given example, after which they leave their place to the next colleague in the team. The team that finds the 6 words first can move on.

BOOK 1 A lottery ticket The lighthouse at the end of the world			
P 5	R 12	W 9	CĂLĂTOR
P 22	R 6	W 5	
P 31	R 15	W 3	
P 68	R 9	W 7	
P 93	R 13	W 9	
P 116	R 19	W 13	
P 139	R 7	W 13	
Legend			
	P = PAGE	R = ROW	W = WORD

BOOK 2 The golden volcano			
P 41	R 10	W 8	RUFURI
P 89	R 15	W 8	
P 116	R 3	W 6	
P 142	R 9	W 6	
P 170	R 16	W 11	
P 216	R 21	W 9	
P 275	R 3	W 6	
Legend			
	P = PAGE	R = ROW	W = WORD

BOOK 3 THE MYSTERIOUS ISLAND			
P 14	R 9	W 2	EXPANSIUNI
P 30	R 13	W 8	
P 56	R 9	W 8	
P 83	R 12	W 7	
P 120	R 17	W 3	
P 141	R 17	W 10	
P 172	R 21	W 1	
Legend			
	P = PAGE	R = ROW	W = WORD

BOOK 4 20000 LEAGUES UNDER THE SEA			
P 21	R 13	W 7	CA?ALOT
P 63	R 18	W 10	
P 82	R 14	W 4	
P 114	R 14	W 9	
P 138	R 13	W 11	
P 158	R 21	W 8	
P 196	R 43	W 8	
Legend			
	P = PAGE	R = ROW	W = WORD

BOOK 5 CHILDREN OF CAPTAIN GRANT			
P 11	R 8	W 4	OM
P 36	R 14	W 6	
P 61	R 7	W 8	
P 82	R 9	W 4	
P 101	R 29	W 4	
P 112	R 12	W 4	
P 125	R 9	W 5	
Legend			
	P = PAGE	R = ROW	W = WORD

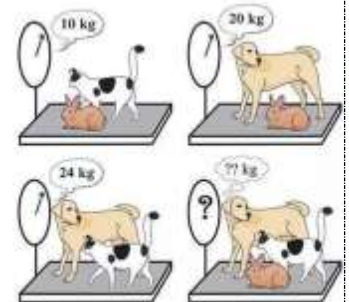
BOOK 6 THE LAND OF FUR			
P 158	R 25	W 5	ASTRONOM
P 137	R 28	W 7	
P 117	R 36	W 4	
P 94	R 39	W 11	
P 62	R 3	W 7	
P 37	R 22	W 7	
P 14	R 19	W 6	
Legend			
	P = PAGE	R = ROW	W = WORD

TEST 5 – MATHS + LOGIC

The pirate knows how to mess you up. That's exactly why he prepared a new test for you. Open envelope number 5, where you will find 3 pictures. Share with two other colleagues and try to solve the mystery. At the end, place the results correctly in order to find out the secret code that will allow you to move on to the next test. Good luck!

$$\begin{aligned} \text{Apple} + \text{Apple} + \text{Apple} &= 30 \text{ lei} \\ \text{Apple} + \text{Banana} + \text{Banana} &= 18 \text{ lei} \\ \text{Banana} - \text{Coconut} &= 2 \text{ lei} \\ \text{Apple} + \text{Coconut} + \text{Banana} &= ?? \end{aligned}$$

$$\begin{aligned} \text{Apple} + \text{Apple} + \text{Apple} &= 30 \\ \text{Apple} + \text{Banana} + \text{Banana} &= 18 \\ \text{Banana} - \text{Coconut} &= 2 \\ \text{Coconut} + \text{Apple} + \text{Banana} &= ? \end{aligned}$$



TEST 6 – THE RIDDLE

The pirate always liked mysteries. That's why he wrote a lot of riddles. Find the mysterious bear, which hides part of the pirate's riddles. Draw one and try to solve it. If you succeeded, leave the place to the next colleague in the team. Solve 3 riddles to move on. Each student will have to solve one, if you think you don't know, you can ask your colleagues for a small exchange. (You will need to perform 10 knee bends). Whoever finishes first will have the advantage in the next round.

<p>1. Which wheel does not move when a car turns right?</p> <p>2. What flies when it comes into the world, stands still when alive and flows when it dies?</p> <p>3. The more you take out of it, the bigger it gets. What?</p> <p>4. Only increases, never decreases. What?</p> <p>5. Who walks and stays still?</p> <p>6. What is neither in the house nor outside, but is also in the house and outside?</p> <p>7. Who flies without flying?</p>	<p>1. Spare tire</p> <p>2. Snowflake</p> <p>3. Pit</p> <p>4. Age</p> <p>5. The clock</p> <p>6. The door and the window</p> <p>7. Airplane passengers</p> <p>8. Door</p>
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8. Who steps forward and steps back but never walks?	9. Fingers
9. Everywhere in the world you find five brothers with the same name. Who?	10. The barber
10. Before whom should everyone take off his hat?	11. Table
11. What has four legs but can't walk?	12. Your name
12. It belongs to you, but your friends use it more. What is it?	13. Age
13. What only goes forward and never goes back?	14. Egg
14. What must be broken before use?	15. Book
15. What has words but never speaks?	16. The fence
16. What surrounds the yard, but does not move?	17. On the map
17. Where can you find streets, shops, cities, roads, but not people?	18. Sponge
18. What is full of holes, but still holds water?	19. Stamp
19. What travels all over the world, but sits in a corner?	20. Glove
20. What has five fingers but no life?	

Congratulations!!

You found the pirate's treasure!!!!





QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

JULES VERNE, creatorul viitorului

DATA: 13 decembrie 2022

PROFESOR: Mariana Caplea

TIPUL LECȚIEI: Lecție STEM în cadrul Proiectului QUEST Erasmus

SUBIECT: Invențiile lui Jules Verne pe care le-a prezis înainte de vremea lui

NR. DE ELEVI: 20 (grup international)

METODE: aruncarea zarului, gândire creativă, brainstorming, căutare și potrivire

RESURSE: coli de hârtie colorate, markere, telefoane, zar, coduri QR tipărite, cărți cu imagini, cărți de invenții

WEBLIOGRAFIE: <https://interestingengineering.com/culture/prophet-or-futurist-7-technologies-jules-verne-predicted-leagues-ahead-of-his-time>;
<https://www.byarcadia.org/post/jules-verne-his-impact-on-the-future-and-his-hand-in-shaping-it>

OBIECTIVE GENERALE:

- să stârnească curiozitatea elevilor față de opera literară și științifică a lui Jules Verne;
- să dezvolte abilități de echipă și de vorbire în public într-un cadru de proiect ca urmare a nevoii de adaptare la situații care schimbă viața;
- să ofere studenților instrumente STEM eficiente pentru creșterea creativității lor dincolo de mediul clasei.

PROBLEME ANTICIPATE:

Elevii s-ar putea simți puțin neliniștiți la începutul activității până când se obișnuiesc cu noul mediu de lucru, dar pe măsură ce înaintăm, ajung să se amestece și să colaboreze unii cu alții pentru a-și îndeplini sarcinile.

ACTIVITATEA 1: Încălzirea - Doar lucruri frumoase..

SCOP: de a crea o atmosferă plăcută pentru ca elevii să se cunoască între ei

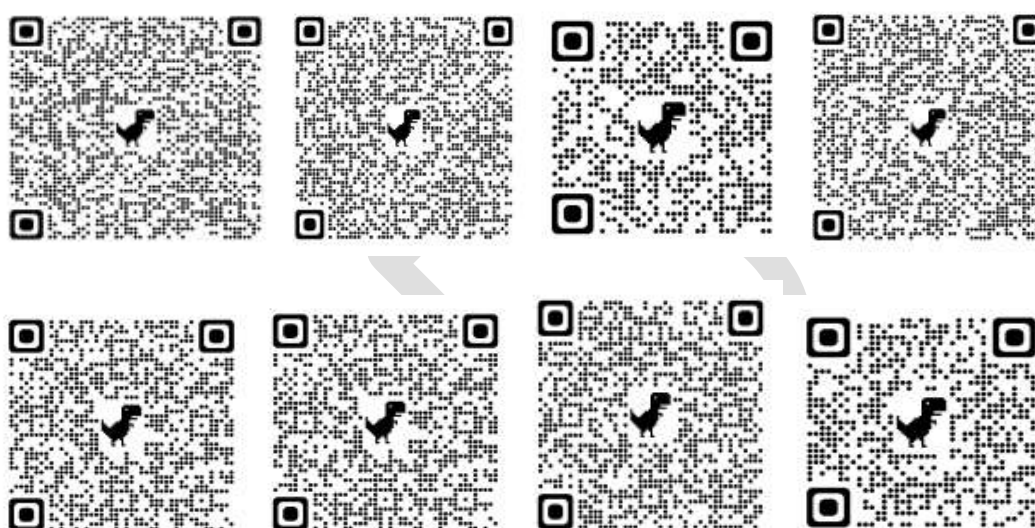
PROCEDURĂ: Elevii, așezați în cerc, își iau puțin timp să se observe, apoi se prezintă pe rând și fac schimb de complimente. În acest fel ei ajung să se familiarizeze unul cu celălalt, ceea ce creează atmosfera pentru activitățile de grup care urmează.

ACTIVITATEA 2: 8 minuni de Jules Verne

SCOP: a afla despre descoperirile lui Jules Verne

PROCEDURĂ: Profesorul oferă elevilor un zar mare căptușit cu coduri QR pe toate părțile. În grupurile lor, elevii vor descoperi imaginile descoperirilor lui Jules Verne, aruncând zarul o dată pe rând. Toate progresele tehnologice ale lui Jules Verne vor fi enumerate pe tablă pentru ca toate echipele să le vadă.

*Fiecărei echipe i se atribuie 2 descoperiri.

**ACTIVITATEA 3: Cartea invențiilor (pe baza descrierii invenției)**

SCOP: de a selecta informații specifice legate de invențiile lui Jules Verne

PROCEDURĂ: Vor fi 8 foi de carton (cu informații despre invențiile menționate anterior) împrăștiate în clasă, pentru ca elevii să meargă și să le găsească pe cele care se potrivesc cu imaginile lor (descoperite prin QR-uri). După identificarea acestora (2 per grup), elevii vor trebui să completeze informațiile potrivite din Cartea de invenții. La sfârșitul activității ei vor trebui să pună și să răspundă la întrebări legate de descoperirile lor.

ACTIVITATEA 4: Fii tu însuși un inventator!|Pe urmele lui Jules Verne...

SCOP: de a determina elevii să-și exploreze latura creativă utilizând abilitățile STEM

PROCEDURĂ: Elevii vor primi cartonașe cu 2 obiecte pe care vor trebui să le combine într-o singură invenție, folosindu-și imaginația. Apoi, ei vor trebui să-și prezinte ideea



celorlalți studenți, convingându-i pe ceilalți de utilitatea acesteia, la fel cum a făcut Jules Verne în scrierile sale.

Elevii își vor schița invenția pe carton colorat de la profesor.

ACTIVITATEA 5: Știi că?...

SCOP: pentru a-și completa cunoștințele despre viața și opera autorului

PROCEDURĂ: Pentru această sarcină de colaborare, elevii vor trebui să găsească informațiile lipsă pentru a finaliza diagrama „Știi că?” a lui Jules Verne, prin desfacerea straturilor unui cadou pe rând, acordând atenție și indiciilor date pe spatele ambalajului.

QUEST



STEM LESSON

DATE: 13th December 2022

TEACHER: Mariana Caplea

TYPE OF LESSON: STEM Lesson within QUEST Erasmus Project

TOPIC: *Jules Verne's inventions that he predicted ahead of his time*

NO. OF STUDENTS: 20 (international group)

METHODS: dice rolling, creative thinking, brainstorming, search and match

RESOURCES: coloured sheets of paper, markers, phones, dice, QR codes printed out, picture cards, invention books

WEBLIOGRAPHY: <https://interestingengineering.com/culture/prophet-or-futurist-7-technologies-jules-verne-predicted-leagues-ahead-of-his-time>;

<https://www.byarcadia.org/post/jules-verne-his-impact-on-the-future-and-his-hand-in-shaping-it>

GENERAL AIMS:

- to stir students' curiosity about Jules Verne's literary and scientific work;
- to develop team and public speaking skills in a project setting as a result of the need to adapt to life-changing situations;
- to give students effective STEM tools for increasing their creativity beyond classroom.

ANTICIPATED PROBLEMS:

Students might feel a little uneasy at the beginning of the activity until they get used to the new working environment, but as we go along, they get to mingle and collaborate with one another in completing their tasks.

ACTIVITY 1: *Warm-up/ What a nice thing to say!*

AIM: to create an enjoyable atmosphere while getting students to know each other

PROCEDURE: Students, seated in a circle, take a little time to look around at one another, then take turns introducing themselves and exchanging compliments. In this way they get to familiarize with each other, which sets the atmosphere for the group activities to come.

ACTIVITY 2: *8 Marvels by Jules Verne*

AIM: to learn about Jules Verne's discoveries

PROCEDURE: Teacher provides the students with a big dice padded with QR codes on all its sides. In their groups, the students will discover the pictures of Jules Verne's discoveries by rolling the dice once at a time. All the technological advances by Jules Verne will be listed down on the board for every team to see.

*Each team is assigned 2 discoveries.

ACTIVITY 3: *Invention Book(based on Invention Description)*

AIM: to select specific information connected with Jules Verne's inventions

PROCEDURE: There will be 8 sheets of cardboard (with information about the inventions previously mentioned) spread around the classroom for the students to go around and find the ones matching their pictures(discovered through QRs). After identifying them(2 per group), students will have to fill out the suitable information in the Invention Book. At the end of the activity they will have to ask and answer questions connected with their discoveries.

Cardboard used:

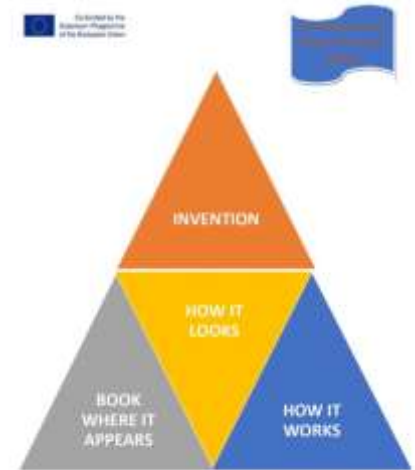


ACTIVITY 4: *Be an inventor yourself!|Following into Jules Verne's footsteps...*

AIM: to get students exploring their creative side by making use of STEM skills

PROCEDURE: Ss will be given cards with 2 objects that they will have to combine into a single invention, by using their imagination. Then they will have to pitch their idea to the rest of the students, convincing those of its utility, similarly to how Jules Verne did in his writings.

Students will draft their invention onto coloured cardboard from the teacher.

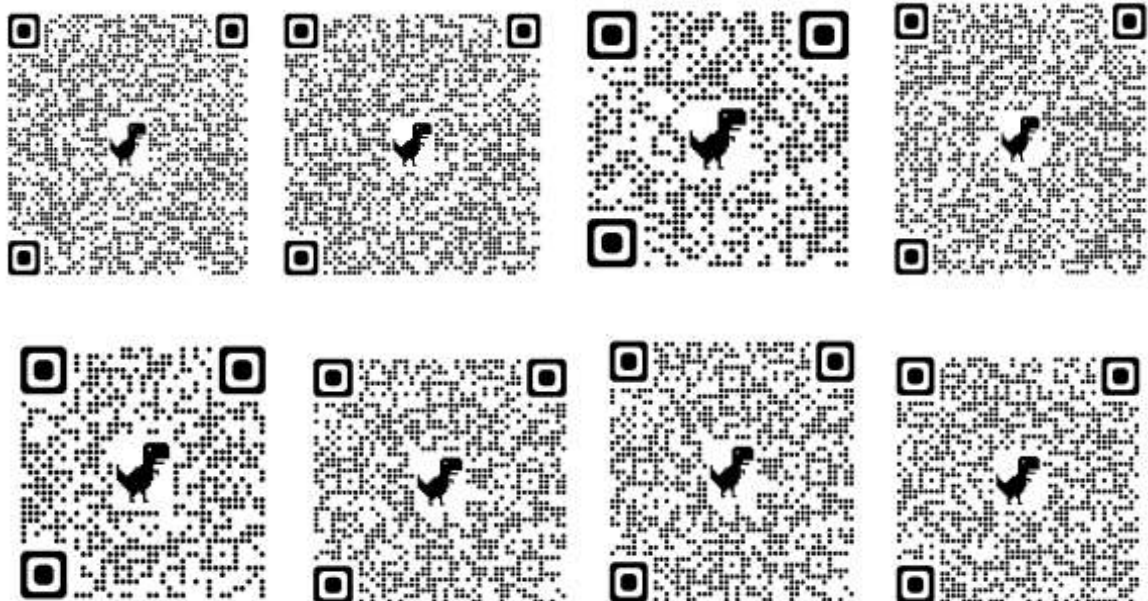


ACTIVITY 5: *Did you know?..*

AIM: to round off Ss' knowledge about the author's life and work

PROCEDURE: For this collaborative task, Ss will have to find the missing information in order to complete Jules Verne's "Did you know?" chart, by unwrapping the layers of a gift one at a time while also paying attention to the clues given on the back of the packaging.

QR CODE





QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

AGRUPAMENTO DE ESCOLAS ANTÓNIO ALVES AMORIM

LOUROSA PORTUGAL

STEM ACTIVITIES

LESSON PLANS

TEACHERS

CÉU GONÇALVES

ANTÓNIA CUNHA

SANDRA GONÇALVES



Water electrolysis

Objectives:

The objectives of water electrolysis are to decompose water into its basic components, hydrogen and oxygen, through the application of an electric current.

Preparation:

Material and reagents:

- Voltmeter
- Spatula
- Water
- Connecting wires
- Power supply (battery)
- Baking soda

Experimental procedure:

- 1- Install the electrical circuit with the voltmeter, the power supply and the connecting wires;
- 2- Add water to the voltmeter, ensuring that the test tubes are inverted, sealed and completely filled with water;
- 3- Add a spatula of baking soda to the water, stirring until dissolved;
- 4- Turn on the electrical circuit.

Activities:

In 2 groups the students answer to a QR code about water electrolysis.

Resources:

[\(26\) Eletrólise da água – YouTube](#)

Video of preparation of the experience made by the students

https://youtu.be/Go3j_A2-jzk

Questionnaire – Electrolysis of water

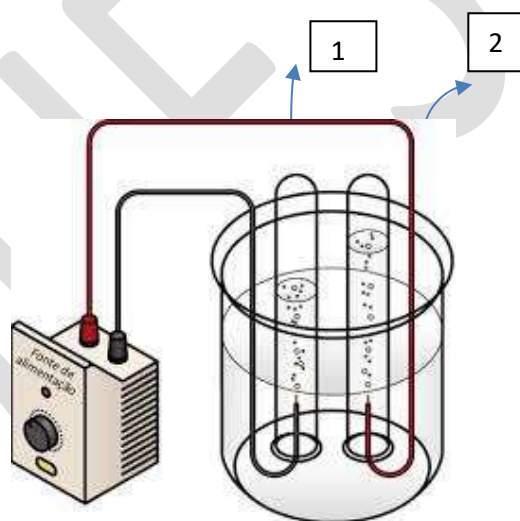
Hydrogen is a clean fuel with a high calorific value and water is the only product of combustion. The electrolysis of water is a relatively simple process for the production of hydrogen. In the electrolysis of water, the gases hydrogen and oxygen are obtained by the application of electric current that promotes the dissociation of the water molecule through oxidation-reduction reactions.

1- Select the option that correctly completes the next sentence.

"An electrolysis is a reaction in which

- (A) ... a substance reacts by giving rise to two or more substances, by the action of electricity."
- (B) ... two substances govern by giving rise to a substance, by the action of electricity."
- (C) ... a substance reacts by giving rise to two or more substances by the action of heat."

2- Look at the image and answer the questions:



2.1. Select the correct option.

"This chemical reaction happened....

- (A) ... by the action of heat."
- (B) ... by mechanical action."
- (C) ... by the action of electric current."
- (D) ... by joining substances."

2.2. In which of the test tubes is hydrogen produced?

2.3. In which of the test tubes is oxygen produced?

Challenge:

1- Imagine that you only had liquid hydrogen as fuel. How would you use it to raise your balloon?

2- In your opinion, what is the fuel that you consider most advantageous for our planet? Why?

Inquisitiveness:

Also in rockets that use liquid dihydrogen as fuel a combustion reaction occurs. The reaction with the dioxygen is explosive, which allows obtaining the energy for the launch of the rocket. In this non-polluting reaction, water vapour, H₂O, is formed.

Hydrogen + oxygen → water



Visit to a cork Stopper

Objectives:

- ✓ Identify a cork tree;
- ✓ Know cork and the process to produce cork stoppers;
- ✓ Understand the application of knowledge in cork factories (for example Chemistry contents).



Cork



Cork stoppers



The students will see the preparation of the cork (raw material) and the production of different cork stoppers.

Portugal is the largest cork producer in the world, accounting for half of global production.

Maths Class: Conversion of units of measure

Objectives

Conversion of Units of Measure



What are we going to learn?



- Units of Measure in the International System (IS)
- The units of measure in the Imperial System
- Converting units of measure to other Units of measure in the same System
- Convert units of measure to other units of measure from different measure systems

Measurement Systems



	US Standard Unit
Length	Inch, Foot, Yard, Mile
Mass	Ounce, Pound, Stone
Capacity	Pint, Gallon

Imperial Sistem

Used in USA and United Kingdom and other countries of the Commonwealth

Length: In; ft; ya; mi...

Mass: lb (pound); oz (ounce); st(stone)...

Capacity: Pint; Gallon...

Measurement Systems

International Sistem (IS)

This Sistem is used in most countries

	Metric system
Length	Millimeter, Centimeter, Meter, Kilometer
Mass	Milligram, Gram, Kilogram
Capacity	Milliliter, Centiliter, Liter

Length:

Km; hm; dam; m, dm; cm; mm

Mass:

mg; cg; dc; g, dag; hg; kg

Capacity:

Kl; hl; dal; l; dl; cl; ml

Attachment:**Length**

Metric			US or Imperial
1 millimeter [mm]		→	0,03937 in
1 centimeter [cm]	10 mm	→	0,3937 in
1 meter [m]	100 cm	→	1,0936 yd
1 kilometer [km]	1000 m	→	0,6214 mile

Area

Metric			US or Imperial
1 sq cm [cm ²]	100 mm ²	→	0,1550 in ²
1 sq m [m ²]	10.000 cm ²	→	1,1960 yd ²
1 hectare [ha]	10.000 m ²	→	2,4711 acres
1 sq km [km ²]	100 ha	→	0,3861 mile ²

US or Imperial			Metric
1 inch [in]		→	2,54 cm
1 foot [ft]	12 in	→	0,3048 m
1 yard [yd]	3 ft	→	0,9144 m
1 mile	1760 yd	→	1,6093 km
1 int nautical mile	2025,4 yd	→	1,852 km

US or Imperial			Metric
1 sq inch [in ²]		→	6,4516 cm ²
1 sq foot [ft ²]	144 in ²	→	0,0929 m ²
1 sq yd [yd ²]	9 ft ²	→	0,8361 m ²
1 acre	4840 yd ²	→	4046,9 m ²
1 sq mile [mile ²]	640 acres	→	2,59 km ²

Mass

Metric			US or Imperial
1 milligram [mg]		→	0,0154 grain
1 gram [g]	1.000 mg	→	0,0353 oz
1 kilogram [kg]	1.000 g	→	2,2046 lb
1 tonne [t]	1.000 kg	→	1,1023 short ton
1 tonne [t]	1.000 kg	→	0,9842 long ton

Volume/Capacity

Metric			US Measure	Imperial
1 cu cm [cm ³]		→	0,0610 in ³	
1 cu decimeter [dm ³]	1.000 cm ³	→	0,0353 ft ³	
1 cu meter [m ³]	1.000 dm ³	→	1,3080 yd ³	
1 liter [l]	1 dm ³	→	2,113 fluid pt	1,7598 pt

US or Imperial			Metric
1 ounce [oz]	437,5 grain	→	28,35 g
1 pound [lb]	16 oz	→	0,4536 kg
1 stone	14 lb	→	6,3503 kg

US Measure	Imperial		Metric
1 cu inch [in ³]		→	16,387 cm ³
1 cu foot [ft ³]		→	0,02832 m ³
1 fluid ounce	1,0408 UK fl oz	→	29,574 ml
1 pint (16 fl oz)	0,8327 UK pt	→	0,4732 liters
1 gallon (231 in ³)	0,8327 UK gal	→	3,7854 liters

Evaluation

Group _____

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use, which may be made of the information contained therein

Activity 1:

You must go outside and look for the Lemon tree patch. Measure the sides and calculate:

- a) The área of that space in ft^2 .



Help

$$1m^2 \text{---} 10,76 \text{ } ft^2$$

$$1m \text{---} 3,28 \text{ } ft$$

- b) The perimeter in feet (ft).

**Activity 2:**

Go to the library and weight that is on the table.

Calculate the weight of the book in pounds (lb).

Help

$$1kg - 1000g$$

$$1lb - 0,4536Kg$$

Activity 3:

In front of the door of buiding number three, we have a drinking fountain.

Take measures and calculate the maximum capacity of water in liters (l) and in gallons it can contain.

**Help**

$$1cm^3 - 0,001dm^3$$

$$1dm^3 - 1l$$

$$1\text{ gallon} \approx 4,55\text{ l}$$

**Activity 4:**

Celsius to Fahrenheit: $(^{\circ}\text{C} \times \frac{9}{5}) + 32 = ^{\circ}\text{F}$

Fahrenheit to Celsius: $(^{\circ}\text{F} - 32) \times \frac{5}{9} = ^{\circ}\text{C}$

In your phone, you can see the temperature in $^{\circ}\text{C}$.

Convert this temperature in $^{\circ}\text{F}$.

Congratulations!

You finished the Activity.

Visit to the Paper Museum of Paços de Brandão

Objectives:

- ✓ Discover the history of the paper production in 19th and 20th century;
- ✓ Understand how paper recycling was processed, using river water as an energy source;
- ✓ Produce a sheet of recycled paper.



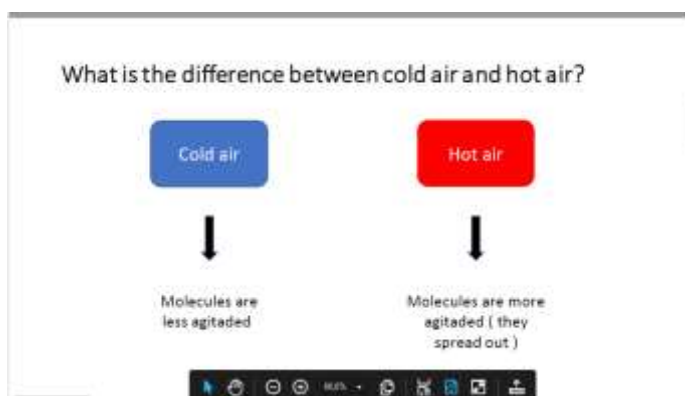
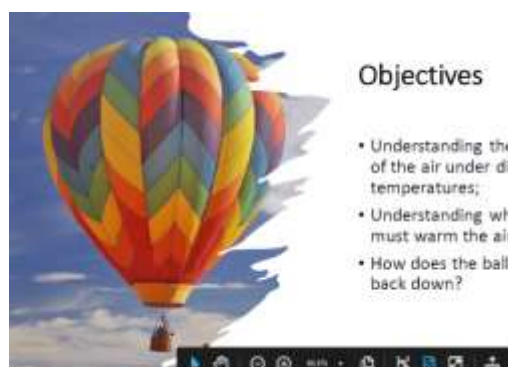
This museum is housed in two former paper factories. That's why you can see a paper production factory from the 19th century. Visitors will have the opportunity to produce a sheet of recycled paper. You may also realize that this industry could work without electricity but could not work without river water.

Visit to the Funicular in Braga

The Funicular from Bom Jesus in Braga was the first to be built in the Iberian Peninsula and the only one in the world still in full operation. These carriages run on a ramp, being independent but linked together by a funicular system with a water counterweight located under the carriage floor. The only energy source is the water.

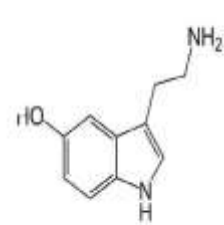


Science class - Hot air properties



What are molecules?

- A molecule is two or more atoms connected by chemical bonds, which form the smallest unit of a substance. Molecules form the basis of chemistry. Molecules are noted with the element symbol and a subscript with the number of atoms.



Why a pilot must warm the air inside?

Hot balloon pilots warm the air inside the balloon so that it can float.

That happens because when the temperature starts to rise, the molecules start to move faster and they spread out, making the air less dense so it can float up.

Warm air always floats up.



How the balloon gets back down?

- The pilot opens a flap at the top of the balloon that lets the hot air out.
- As the balloon fills with cooler, denser air, it begins to sink gently back to the ground.



Resources

<https://youtu.be/ABsVP41-EeY>

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use, which may be made of the information contained therein

Activity: “Let’s make a balloon goes up”

Students should heat the air inside the bag and then release the bag, checking if it rises.

Material:

- ✓ Plastic bag;
- ✓ Hairdryer.

**Experimental procedure:**

- ✓ Try tightening the bag entrance with 2 small knots;
- ✓ Hold the plastic bag over a hair dryer. Turn on the device and wait a minute until it warms up before filling the bag with air;
- ✓ When it starts pulling, release it. The hot air inside will make it float.



Attention: You must turn off the hair dryer before letting go of the balloon.

Maths Class: Isometries and Biodiversity

Objective:

- Use the isometries that we learn in Math into the real life. In his case, we will create a Digital painting, like in the tiles.

Isometries

Isometries are transformations in geometry that preserve the shape and size of an object.

Isometries can be of different types:

- reflections;
- rotations;
- translations;
- glide reflections.

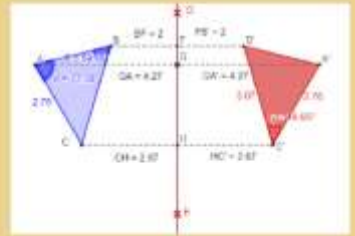
Each type of isometry has its own set of properties and rules that govern how it transforms an object.

Uclon: Isometrie

Reflection

A reflection is a type of isometry in which a figure is reflected across a line or plane, resulting in a mirror image of the original figure.

We need to have an image and a line of reflection.



Rotation

Rotations are a type of isometry in which a figure is turned or rotated around a fixed point called the center of rotation, without changing its size or shape.

We need to know the center of rotation and the angle.

Translation

A translation is a type of isometry that moves an object a certain distance in a certain direction.

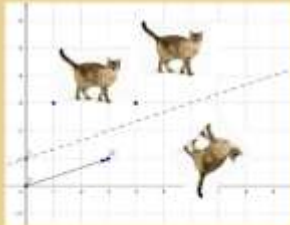
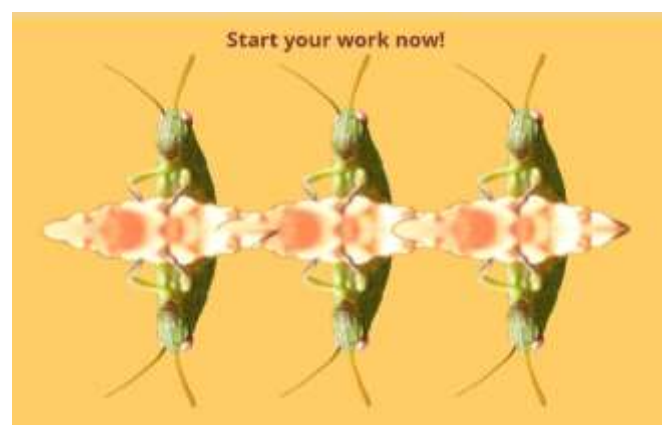
Specifically, a translation moves every point of an object by the same distance and in the same direction.

For example, if you translate a triangle 3 units to the right, every point of the triangle will be moved 3 units to the right.

In a translation we must define a vector (direction and length)

Glide Reflection

A glide reflection is a type of transformation in geometry that combines a reflection and a translation. It involves reflecting an object across a line and then translating it parallel to that line.

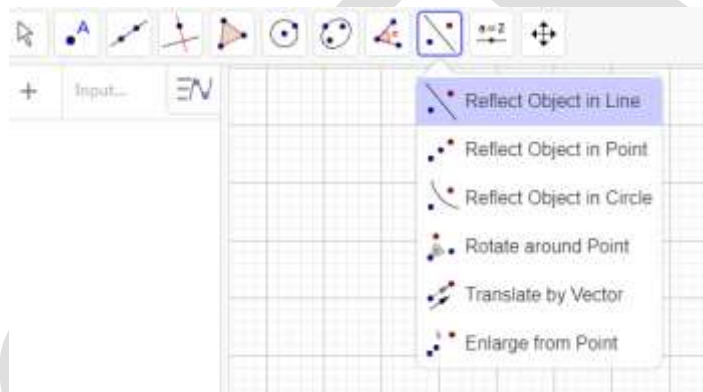



Some notes To help the students With Geogebra

- You must choose image and import your image;



- With your image you choose the isometry that you want;



- You can clear the gridline and change the background colour;



Click here and choose "Background colour"

- When your composition is done, you must use this tool from the computer ;

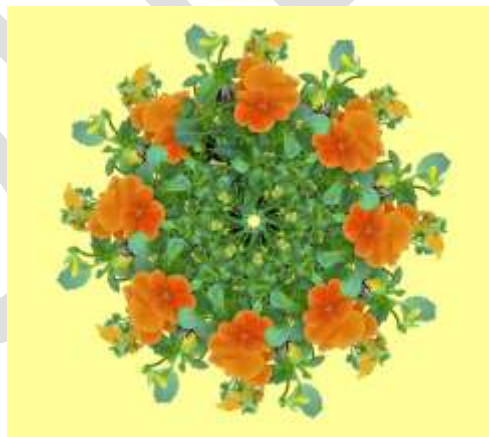


- Save the image with your name on the desktop of the computer.

Congratulations!

You finished the Activity.

Example of a panel with rotations:





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of the European Union

QUELQUES VOYAGES EXTRAORDINAIRES FROM JULES VERNE TO STEM

BOSTANCI ATATÜRK ORTA OKULU

ISTANBUL TURKIYE

STEM ACTIVITIES

LESONN PLANS

TEACHERS

DERYA ALP

SİBEL GEZER



TEACHER DERYA ALP

THE MOON SURFACE AND MAKING THE MOON CRATER

OBJECTIVES

1. Understanding the Moon 's surface structure (dark and bright parts)
2. Understanding how the craters are formed on the surfaces of planets and their satellites,
3. Understanding, why the craters are in different shapes.

PREPARATION

Do you like tales?

The Moon has always been an inspiration for poems,books and tales.

Have you ever heard tale about the moon?

Let's watch a tale about moon.Rabbit in the Moon.(The Legend Of The Moon Rabbit youtube video is going to be watched)

After watching the video, shapes on the moon pages are given. The students are going to be asked to choose a shape.They are going to be asked to create the shape they chose, with their body. The group that finishes in the shortest time and most similar figure is selected as the winner.

MATERIALS

The Moon Maps Shapes on the moon pages , Table, Strafor, Flour, Cocoa, 1 strainer, Cake sprinkles (decorations), 1 spoon, Stones (different size), moon map

RESOURCES

<https://youtu.be/hM1XKh05KkU> (The Legend Of The Moon Rabbit youtube video)

[nationalgeographic.com](https://www.nationalgeographic.com) (Why Do People See Faces In The Moon)

NASA/Goddard Space Flight Center (How were the Moon's Craters & Maria Formed?)

What are Craters - More Grades K-5 Science on the Learning Videos Channel

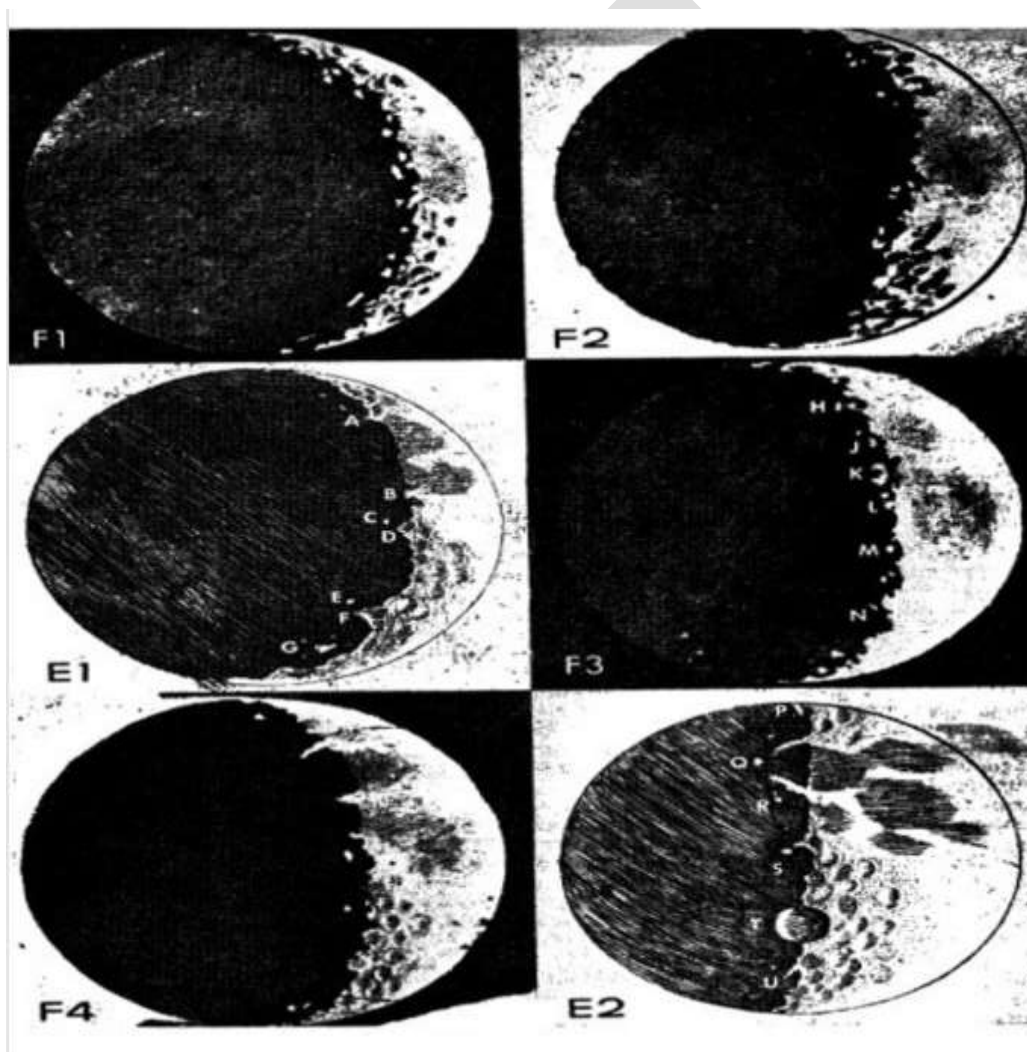
<https://www.jpl.nasa.gov/edu/learn/project/make-amoon-crater/tubitak>

seterra craters:map quiz game geoguessr.com

OUTLINE

The moon has always been the subject of belief, literature and science. Jules Verne, is one of the writers, who mentioned the moon in his books. “From The Earth To The Moon” is one of these books, in this book he also mentions some writers like Edgar Alan Poe, Jean Boudain who wrote stories about the Moon.

Jules Verne gives scientific informations about the Moon. He mentions how Galileo observed the moon and discovered the Moon mountains. Galileo was the first scientist who observed the Moon with a telescope. He noticed mountains and plains on the moon surface. He drew them on his notebook.



Galileo's The Moon observing draws

The dark part of the Moon's surface are the plains. They're called Mare(maria) It considered as sea.

The bright parts of the Moon's surface are the highlands. They are called Terrea.



There is a dust cloud around the Moon. It's made by comets. 5 tons of comet particles hit the surface of the Moon in 24 hours.

The Moon solid is called regolith.

The Moon surface has craters. Crates formed by asteroid and comet impact. Did you know on the surface of the moon there are thousands of craters?

Developed artificial intelligence that can count the craters on the Moon's surface. It counted more than a hundred thousand craters.

- (How were the the Moon's Craters& Maria Formed video watches)

“More Grades K-5 Science on the Learning Videos Channel”.

Let's make our own craters!

<https://www.jpl.nasa.gov/edu/learn/project/make-amoon-crater>

An asteroid or meteor has more chance to hit Earth, because the Earth is a lot bigger than the Moon, so it gives a lot area a meteorit to hit! (You can put 49 moon inside to earth)But we know only about 188 crater on earth! We can see many thousands of crater on the moon. Why is that? We have 3 reasons; There is no **erosion** on the moon. Because it has no atmosphere. That means it has no wind, it has no weather, and it certainly has no plant. So marks on the moon's surface can't remove on its surface once they are made. Astronauts footsteps who once walked on the Moon are still there today,

The second thing is something called **tectonics**. Tectonics are processes that causes our planet's surface to form new rocks, get rid of old rocks.

The third thing is **volcanism**. Volcanism is the eruption of malten rock from inside the earth to the surface. Volcanic flows can cover up [impact craters](#).

When you look at the Moon on a clear night, you can see pits on the Moon's surface. These pits are called craters. Craters are formed when rocks or comets collide with the Moon. As a result of this impact, minerals, rock fragments and dust in the structure of the Moon's crust are scattered on the surface of the Moon. Thus, patterns called crater lines appear that radiate outward as lines from the center of the collision.

ACTIVITIES

First of all, let's fill the cake mold with flour to form the base of our moon crust.

Next, spread the cake sprinkles on the flour to represent the rocks and minerals found under the Moon's surface.

Finally, with the help of a strainer, completely cover the table with cocoa to represent the surface of the Moon.

Now get the stone in our hands. This stone represents the pieces of rock that crashed into the Moon's surface (in other words and asteroid). Drop the stone from a reasonable height to a selected point in the cake mold.

When we first drop the stone into the table a hole is formed on the surface. This pit is called a crater. There are also cake decorations and flour around the pit. When we look at the cake decorations, we see various minerals and rock fragments scattered from the Moon crust as a result of this impact. When we look at the flours, we see the crater lines spread out in lines.

Rock fragments may not always hit the Moon's surface perpendicularly. Now, take the stone again and throw it into the cake mold at a certain angle, not vertically. As you can see, a different collision pattern emerged this time. There are no crater lines on the side where the rock approaches the Moon, but there are lines on the side where it collides and moves away.

That's how scientists can explain the angles at which pieces of rock hit the Moon's surface by looking at the patterns of the crater lines.

ACTIVITY 2

MAKING THE MOON CRATER



Table



4 Piece Strafor



Flour



Cacao Powder



Sprinkles Different Sized and Shaped



Stones as meteorite

Cover the corners of the table with strafor. A pool is created. A plastic bag is placed inside the pool. Then put flour into the pool. Spread it over the surface. After spreading sprinkles onto its surface. Finally spread cacao powder to surface. The moon's surface is ready now. Divide the students into a number of groups and give them a part on the surface.

Each group throws stones to their part of the surface. Students make incline and verticle throwings

They observe the shape of craters and notice difference of craters.

- Try dropping the same ball from a different height. What does the resulting crater look like?
- Try dropping balls of different sizes from the same height, and examine the resulting craters.

The Moon Maps

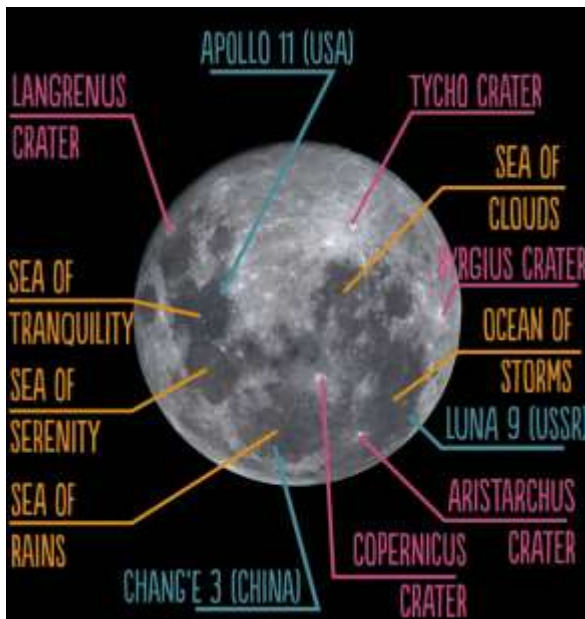


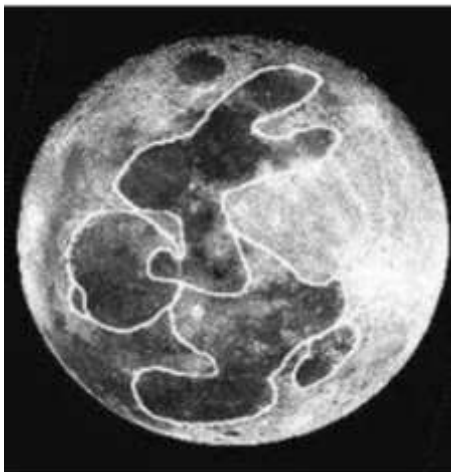
EVALUATION

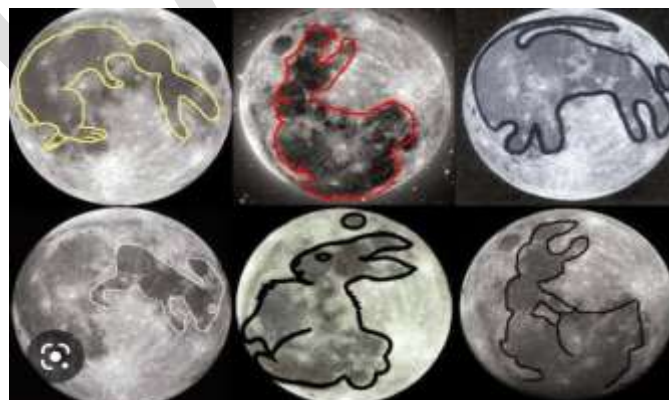
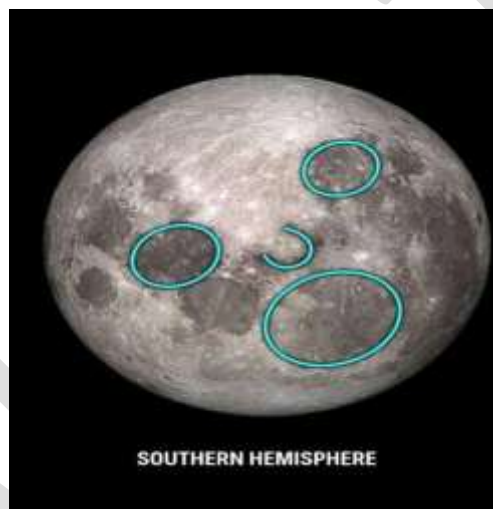
After the moon crater activity

The moon map is given to the students. Let them to check the map, find craters locations and names. Craters and Mares map quiz link (seterra.com/quiz/geoguessr.com) is sent to the students phone. Students are asked to mark the craters and mares in the online game. Each student gets a screenshot of the score they got at the end of the game. The student with the highest score in the shortest time will be the winner..

THE MOON CRATER MAP







TEACHER DERYA ALP

ROCKET CAR

OBJECTIVE

Following this activity, students are going to:

- understand space program,
- Make observations about the nature of forces and motion
 - Explain Newton's Third Law of Motion, and apply examples to everyday life
 - Investigate Newton's Third Law of Motion by designing and constructing rocket-powered racing cars

PREPARATIONS

1. In the beginning the students are going to answer the following questions.

- Do you know Nasa?(American Space Agency)
- Does your country has space agency?
- Do you know any other space agency?
- Does your country have a space program?
- Do you have any information about the other countries' space programs?
- How do they go to moon, other planets or space? What kind of vehicles do they use?



Students are going to be asked to match the space agency logos with the countries they belong to (logos will be given to students) (ACTIVITY 1 PAGE GIVEN)



ROMANIA	ROSA	AGENTIA SPATIALA ROMANA
POLAND	POLSA	POLSKA AGENCIA KOSMICZNA
ITALY	ASI	AGENZIA SPAZIALE ITALIANA
SPAIN	INTA	INSTITUTO NACIONAL DE TECNICA AEROESPACIAL
TÜRKİYE	TUA	TÜRKİYE UZAY AJANSI
PORTUGAL	PT	SPACE AGENCIA ESPACIAL PORTUGUESA

Each country's space agency's name is going to be told by its own student.

2. What does a space agency do? (Possible answers follows:)

- They make researches and developments of vehicles and activities for the exploration of space within and outside Earth's atmosphere .
- They prepare space programmes.
- They find places to explore in space.
- They provide the materials necessary to carry out these studies

3. What is a space Programme?

A space program is an organized effort by a government or a company with a goal related to outer space

4. Now they are going to create their own space program with their groups.

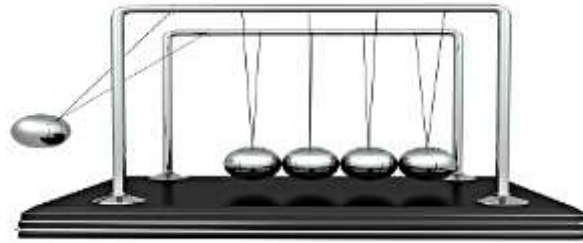
- Find a name for your space program
- Set a mission for your space program (Your destination planet galaxy satellite...)
- Create a logo for your space program

(ACTIVITY 2 PAGE GIVEN)

5. Logos are voted with 1-10 points. The logo with the most points is going to be the winner.

Later they are going to paste or tape the logos you create on the rockets you make.

MATERIALS



Newton Cradle

- Paper towel rolls, styrofoam, wood for making body(optional)
- Chop-sticks -Small plastic stirrers (round cross section) – 2 per student
- Flexi-straws – 3 per student -4- or 5-inch round balloons
- Balloon pump (recommend having at least 4-5 so students can do testing)
- Masking Tape -Pencils -Scissors -Rulers -Post-it -Coloured pencils
- Meter stick or measuring tape
- Additional supplies for modifications to cars (rubber bands, cardboard, CDs, etc.)

RESOURCES

- https://en.wikipedia.org/wiki/List_of_government_space_agencies
- video1 :www.nasa.gov/stemonstation,<http://blogs.nasa.gov/Rocketology/tag/newtons-third-law/>.
(stemonstrations Newton's third law of motion)
- <https://www.physicsclassroom.com/class/netlaws/Lesson-4/Newton-s-Third-Law>
- video2 :learnbright Newton's third law of motion youtube

OUTLINE

Exploring the universe has always been the dream of mankind. Novel of Jules Vernes “ From The Earth To The Moon” is one of the writing reasons of this book. By writing this book, Jules Verne has inspired mankind, to make this dream come true. A cannonball, which was launched to the moon, made it possible to build rockets for the future.

Jules Verne utilized Newtons' Laws for explaining Colombiad working principle. Newton's Third Law of Motion states that for every action, there is an equal and opposite reaction.(Newton Cradle going to show) This means that when one object exerts a force on another object, the second object also exerts an equal and opposite force on the first object. These two forces are referred to as a force pair. A force pair identifies two interacting objects and describes the direction of the force acting on each object. It is important to note that both forces in the force pair are the same type (e.g. gravitational), are equal in magnitude, and are opposite in direction. (video 1:stemonstrations Newton's third law of motion))

NASA uses rockets to launch astronauts and supplies to the International Space Station. Launching a rocket relies on Newton's Third Law of Motion. A rocket engine produces thrust through action and reaction. The engine produces hot exhaust gases which flow out of the back of the engine. In reaction, a thrusting force produces the opposite reaction.

You can use a balloon to provide a simple analogy of how a rocket engine works. The air trapped inside the balloon is pushed out the open end of the balloon. According to Newton's Third Law of motion, the expelled air exerts an equal force in the opposite direction of the motion of the air, causing the balloon to move forward. The force of the balloon on the air is one part of the force pair, and the force of the air on the balloon is the other part. (video 2:learnbright Newton's third law of motion youtube)

If you want to read more about Newton's Third Law of Motion and launching rockets, check out a NASA blog post at <https://blogs.nasa.gov/Rocketology/tag/newtons-third-law/>.

Rocket racer car activity pages given to students.(activity 3)

EXPLORATION OF THE ACTIVITY

Working individually or in pairs, students are going to complete the "Rocket Races" activity found on the next several pages. Students are going to construct "rocket racers", powered with inflated balloons. Instructions for building a basic racer are provided. Students can modify this basic design or come up with their own unique designs using other materials (optional).

After building their rocket racer, students are going to conduct trials to see how far they can go. To prepare for these trials, lay out a course in a large open space, preferably on a smooth floor. Stretch out a straight, 10 meter-long line of masking tape, and make a mark at 10 cm intervals (this may help students calculate their distance quickly). Students are going to line up their racers at the start (two students per trial) and fill up their balloons using a balloon pump (have students use the same number of pumps – you may want to test the balloons ahead of time to determine how many pumps it takes to adequately fill the balloons). Students are going to record the distance their racer travels for their each try.

EVALUATION

-. Laying out a 3 meter-long course. The fastest car is the one that crosses the finish line first. Calculate racer average speed by timing start to finish with a stopwatch.

-. While driving down the road, a firefly strikes the windshield of a bus and makes a quite obvious mess in front of the face of the driver. This is a clear case of Newton's third law of motion. The firefly hit the bus and the bus hits the firefly. Which of the two forces is greater: the force on the firefly or the force on the bus?

ACTIVITY 1

-Space agency logos are given. Write which country the logos belong to



Country:



Country:



Country:.....



Country:



Country:



Country:



ACTIVITY 2

NAME OF THE SPACE AGENCY:

NAME OF THE SPACE PROGRAM:

NAME OF THE MISSION:

DESTINATION:

SPACE VEHICLE TO BE USED:

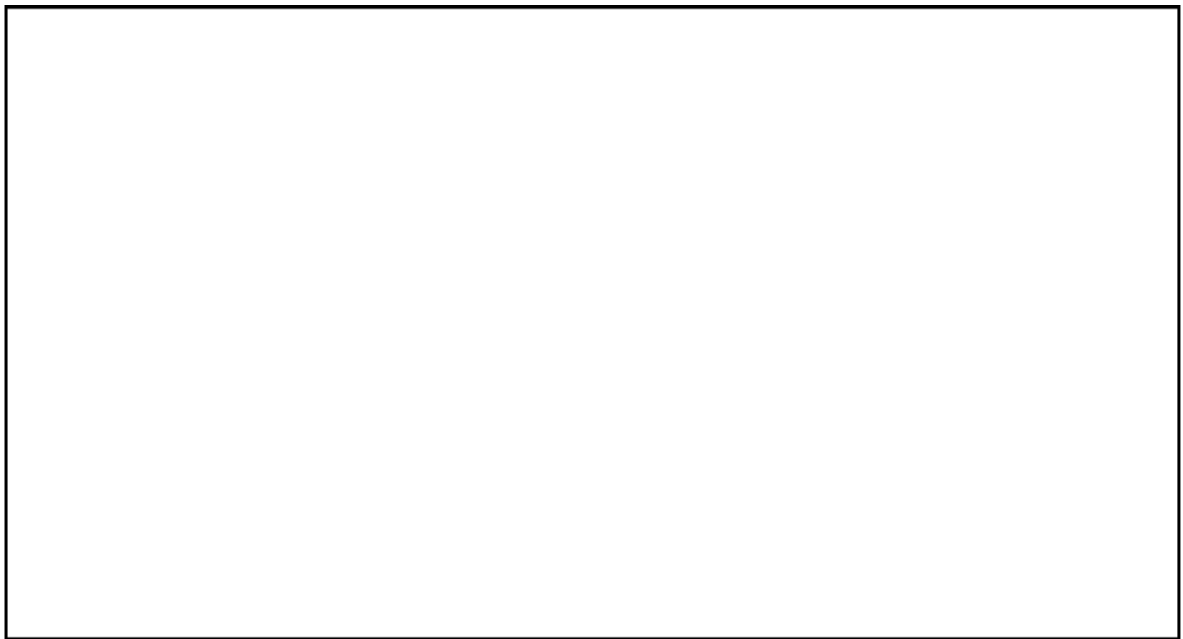
(interstellar probe, spacecraft, rocket, space probe)

LOGO OF THE SPACE PROGRAM:

ACTIVITY 3

1. Look at the instructions and template for building a rocket racer on page and the materials you have to build your racer. You want to build the rocket racer that goes the farthest.

2. Make a sketch of your racer below, and label the body, wheels, and propulsion system.



3. Build your rocket racer using the template or create your own design. Test your design to make sure it travels straight. Remember, you want to build a racer that can go the farthest distance!

4. When your rocket racer is ready, take it over to the track to perform your trials.

5. Fill out the table below for trial.

6. If there is enough time, students will have chance to change body and wheels for another try.

Trial	How Far Did Your Racer Go? (cm)	How Well Did Your Racer Run?	What Improvements Do You Plan to Make?
Example	412 cm	<i>It went a little crooked.</i>	<i>I want to use smaller wheels.</i>
1			
2			
3			

6. How did your rocket racer show Newton's Third Law?

Students can build the rocket car that they chose

Erasmus+



ROCKET CAR

The air coming out of the balloon makes the car move. Because the backward thrust creates forward motion

NOTE:

You can choose different materials for the body (wood and styrofoam)

Materials



Balloon

Permanent Marker



Wooden Beads

Towel Roll

Chopstick



Cable Tie



Box Cover

1

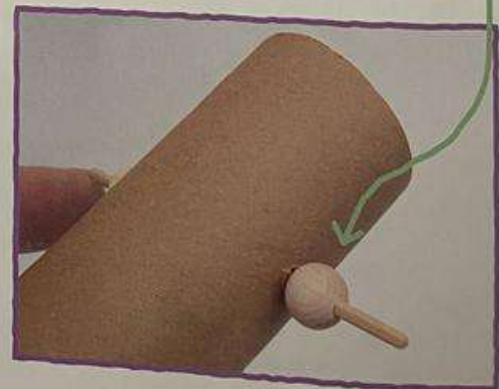
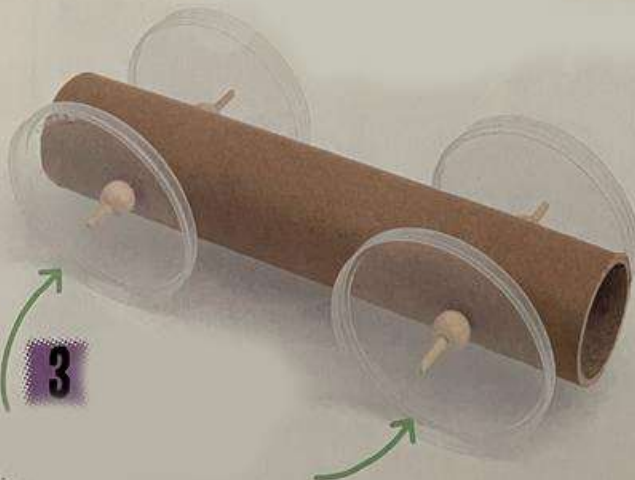
Thread chop-stick through holes, drilled in to the roll

2

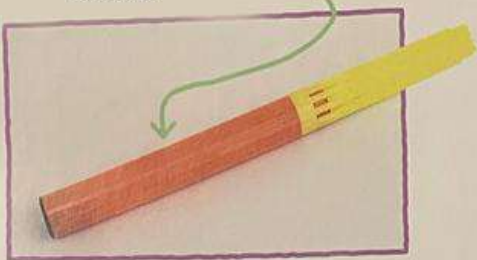
Put the wooden beads on the chop-sticks as in the picture

3


Place the plastic cover on the chop-sticks as in the picture



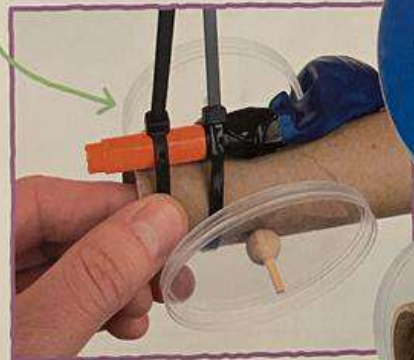
4 Pre-cut permanent marker body for balloon nozzle




5 Attach the tip of the balloon to wide side of the marker and tape it



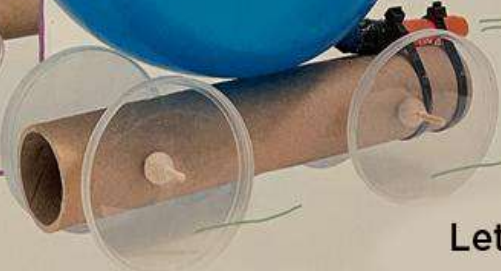
6 Extend the other end of the pen 10mm forward from the roll. Fix it to the roll with a cable tie.



7 Inflate the balloon by blowing it. Seal the nozzle with your finger or tape it.



Put your car on a smooth surface.




Let it GO!

HOW IT WORKS

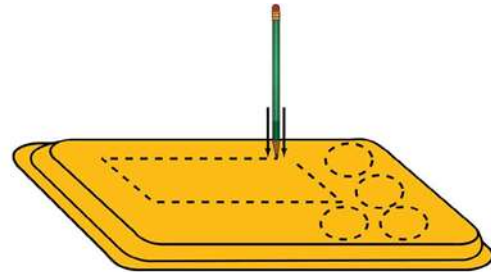
Because of the balloons flexibility when released it'll push the air inside, out therefore the car starts to move.

Every action has an opposite reaction. As the burning gases exit the rocket, it causes the rocket to launch forward.

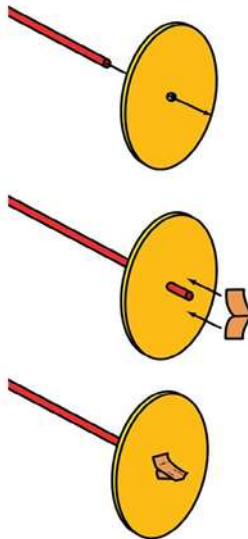


How to Build a Rocket Racer

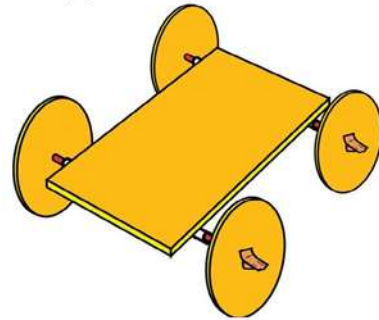
1. Lay out your pattern on the Styrofoam tray. You will need a racer body and wheels. Use a pencil point to score the Styrofoam. Snap out your pieces and smooth them. Make sure your wheels are round! Use sandpaper to round the wheels OR press them on a hard surface and roll them.



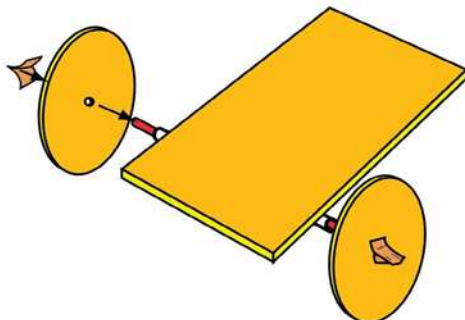
2. Punch a small hole in the center of each wheel with the pencil. Push the axle (stirrer) straw through the hole of one wheel so that it extends 1 cm on the other side. Pinch a piece of masking tape around the end of the straw and smooth it on to the wheel. Do the same for the second axle. Do not add wheels to the other ends yet!



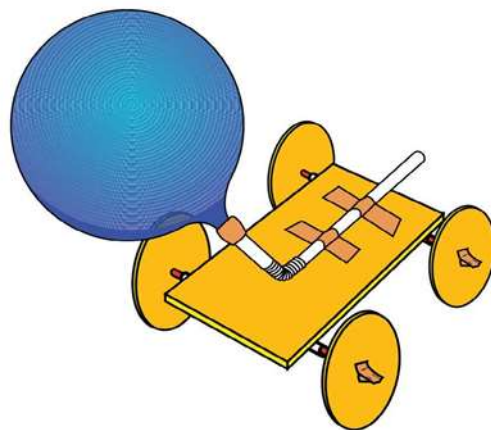
4. Slide the second wheel and axle through the remaining straw and mount the remaining wheel at its opposite end.



3. Cut two large straws to the size you want. Tape them parallel to each other on the bottom of the racer body at opposite ends. Slide a wheel and axel through one of the straws and mount a second wheel on the other end of the axle.

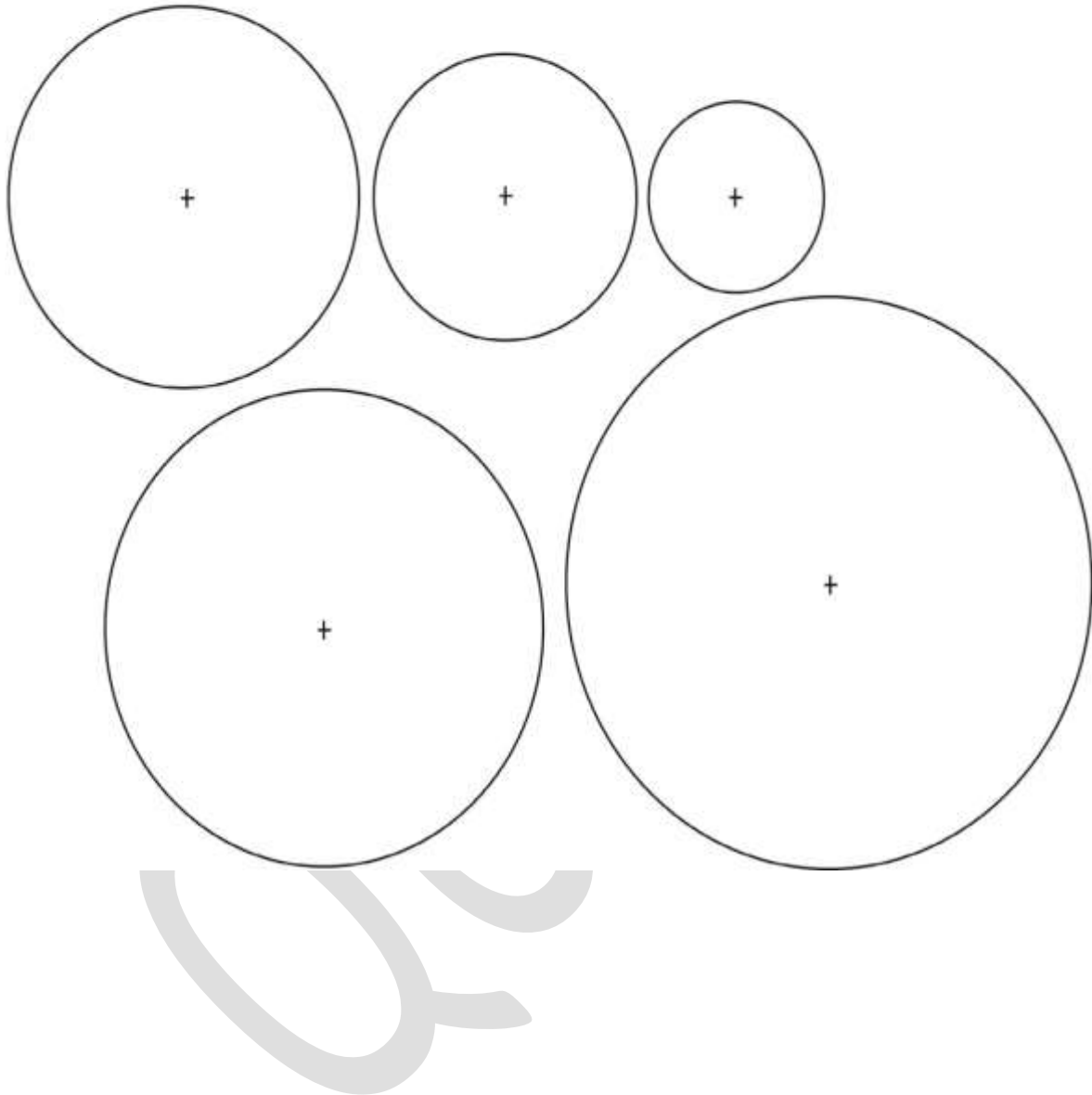


5. Blow up the balloon and then let the air out. Next, slip the straw into the balloon as shown. Use masking tape to seal the balloon nozzle to the straw. Squeeze the tape tightly to seal all holes. Test the seal by blowing up the balloon again through the straw.



6. Mount the balloon and straw to the racer with masking tape as shown. Be sure the end of the straw (rocket nozzle) extends off the end of the racer body.

Cut out the desired wheel size. Trace the wheel outline on the Styrofoam. Punch the pencil point through the cross to mark the center.



TEACHER DERYA ALP

CATAPULT



OBJECTIVES

- Understanding what a catapult is and what it is used for.
- Learning relationship between mass, force and acceleration according to Newton's 2nd law of motion
- Understanding the change in an object's motion depends on the sum of the forces on the object and the mass of the object.
- Observing the effect of change in mass on acceleration.
- Making a catapult race with using different objects (mass) to understand effect of mass on acceleration.

PREPARATION

- Ask to students to know the video game about catapult and get answers. After that show them video game Mont and Blade catapult (video 1)

Catapult is medievil ages war machine. Let's watch a medeviel age siege for snow globe! (Knock down a castle Wall with catapult (video 2)

MATERIALS

Video about what is catapult, -How to make a catapult simple and easy(youtube video),content page about how to make catapult

2basket ball and 1 plastic ball, 8 Regular-Sized Craft Sticks, 2 Large Craft Sticks, 3 Rubber Bands, tray, sand

RESOURCES

- orise.orau.gov , STEMEd@orau.org , teachingscience.us
- How to make a catapult simple and easy(youtube video)
- Knock down a castle Wall with catapult -Da Vinci kids
- stem with Rahul,
- Newton's Law
- catapult style



OUTLINE

If we were living in medieval ages, we could see catapults in the battlefields. Catapults were war machines. They were used to break down walls by throwing giant rocks, applying less force. Let's watch a siege from medieval ages. It is the most used war tool during the Middle Ages. The catapult was used because the cannon wasn't improved yet. It was used to throw heavy stone cannonballs during castle sieges. Today, catapults or similar tools are still using.

In our book From The Earth To The Moon, Barbicane and his friends are planning to send a cannonball to the Moon. While they were making their plan, they talked about Newton's 2nd law and we will discuss about Newton's 2nd law. So we can understand Barbicane and his friends' calculations better. They use mass, force and acceleration during their talk. Make a demonstration to explain correlation between force, mass and acceleration.

The effect that can move a standing object, increase the speed of a moving object, slow it down or stop it, and change the shape and direction of motion of the object is called force. The amount of matter in an object that does not change is called mass. Acceleration is a change in speed or direction.



Take 2 different kinds of balls. Apply the same amount of force. Observe the movement of the balls. Lighter ball moves faster than the heavier ball. Take 2 same kinds of balls. Apply different amounts of forces. Lesser force causes the ball to go slower. Bigger force causes the ball to go faster.

Barbicane and his friends needed great speed to send the cannonball to the moon. So Barbicane wants to give high acceleration to cannonball. He needs high force. Generally, this force is ensured by gunpowder, but gunpowder would cover too much space. They ensure this big force with propellant, also propellant covers less space.

And they talk about mass of cannonball. If they make cannonball from iron, it would be heavy to launch. So they decided to use aluminum. Because it is lighter than iron. Therefore they can have more acceleration. Newton's 2nd law of motion explains correlations between force that we applied, object mass and object acceleration. (acceleration: change in speed, increase or decrease in speed)
 $a = \text{acceleration}$ $F = \text{force}$ $m = \text{mass}$ $a = F/m$

Force and acceleration are directly proportional, mass and acceleration are inversely proportional.

If the mass is reduced, the acceleration increases. If the applied force is increased, the acceleration increases. The force applied to the catapult causes the object to move. (like cannonball) In order to throw the object further, we must pay attention to the connection between force and mass. (video 3 shows)

ACTIVITY 1

You are going to make your own catapult. You are going to learn about simple machines and force. You are going to experiment mass and the amount of force applied to the distance of an object travelling.

Materials

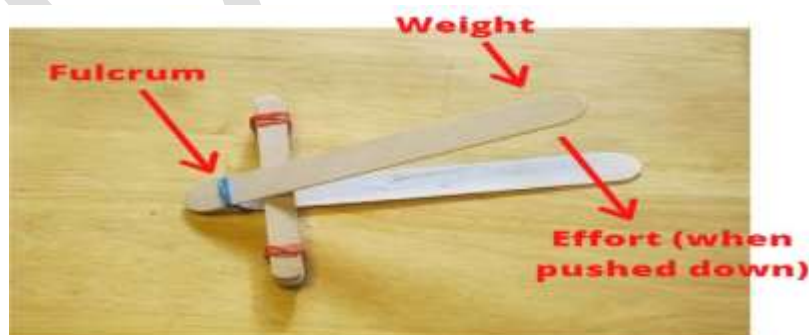
8 Regular-Sized Craft Sticks, 2 Large Craft StickS, 3 Rubber Bands, Box Cutter

Instructions

1. Stack 8 regular-sized craft sticks on top of each other.
2. Tie them off with a rubber band at the ends on each side, and set them out of the way.



3. Stack the 2 large-sized craft sticks on top of each other. Select one end.
4. On the end that you selected, cut small grooves on the sides of the sticks for a rubber band.
5. Wrap a rubber band around the end where the grooves were cut so that the grooves hold the rubber band in place.
6. On the other end opposite the grooves, slide one of the large craft sticks in between the first and second smaller craft sticks that were banded together previously, as shown in the pictures below.
7. Your catapult is now ready for use!



CATAPULT RACE



Sand box

catapult

iron ball

marbless

ping pong ball

THE CATAPULT COMPETITION

MATERIALS

Boxes full of sand, balls in different weights (aluminium, iron, glass, plastic...etc.), ruler, sign flags.

ACTIVITY

This activity aims to make the competitors understand the relation between the mass of an object and the distance it may take according to its mass. Students will use the catapults that they have already prepared. They will throw the balls which are made from different materials like aluminium, iron, plastic and etc. into the sandboxes. They must aim to send the ball to the furthest distance, that's why they should be able to choose the right massed material to throw. Then, they will measure the distance and mark it with their sign flags. Later they will change centimeters into yards which was used to measure the distances of the balls in the book "From the Earth to the Moon". This will also help them understand the measurements that were used in the book. In the end, the farther going ball's group wins the game.

CATAPULT CONTEST

Blue, purple and pink sand are poured into a container, respectively.

Targets of 5, 10, 15 and 20 points were placed on the back of the container.

Blue sand is worth 1 point, purple sand is worth 2 points, and pink sand is worth 3 points. A total of 7 groups are formed, each containing 5 students.

Glass, iron ball, aluminum ball and ping pong balls are put in a box. The student shoots with the 2 balls she/he wants with the catapult.

Students in each group compete for their own group. The student's score at the end of the shooting is written on the group's score table. At the end of the competition, the points are added. The score of the group is calculated. The group with the highest score wins the competition

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use, which may be made of the information contained therein

[illegible]

Score Table of Groups



TEACHER DERYA ALP

SOLAR SYSTEM

OBJECTIVES

- Learning about planets (feature, inner and outer planets) and other objects in the solar system,
- Understanding the order of the planets in the solar system,
- Understanding the distance of planets to sun.

PREPARATION

1.Distribute the “Address Card” to the students. Let them complete it according to their pre-knowledge about the asked information. Have some of the students share their Address Cards aloud in the class They have some common points.Help them to find out this point.(same hemisphere,same continent, same planet, same solar system, same galaxy)The most important fact about the lesson they will find out is: “They live on Earth in the solar system”.

2.Ask students if they know the names of the other planets in the solar system, or if they can name other objects of the solar system

They will watch the “The Planet song” video (video2) and fill in the blanks with the song lyrics and later they will sing it together.

MATERIALS

Address card, planet song lyrics with blanks page, order the planets page Planet bingo cards

RESOURCES / REFERENCES

- <https://www.youtube.com/watch?v=mQrlGH97v94> planet song (video 1)
- <https://www.youtube.com/watch?v=libKVRa01L8> Planet 101 /National Geographic (video 2)
- Learn Bright solar system
- Real World_Scaling the Solar System video NASAeCLIPS (video3)
- stellarlabstore.com (bingo game)

OUTLINE / ABSTRACT

1.Jules Verne’s “*From The Earth To The Moon*” tells a science fiction story about an adventure in the Solar System. In the book they try to go to the moon which is the closest object to the earth. Although no space travel had been made until then, they had made many calculations about the moons’ distance to the earth, solar system planets, celestial objects and tried to make their dream come true.

Observing planets and space at that time was not as easy as it is now. Space telescopes like Hubble and Webb did not exist. Galileo used the telescope for the first time to observe celestial bodies. Herschell built a very large and powerful telescope. He calculated the height of the mountains on the moon. Jules Verne gives

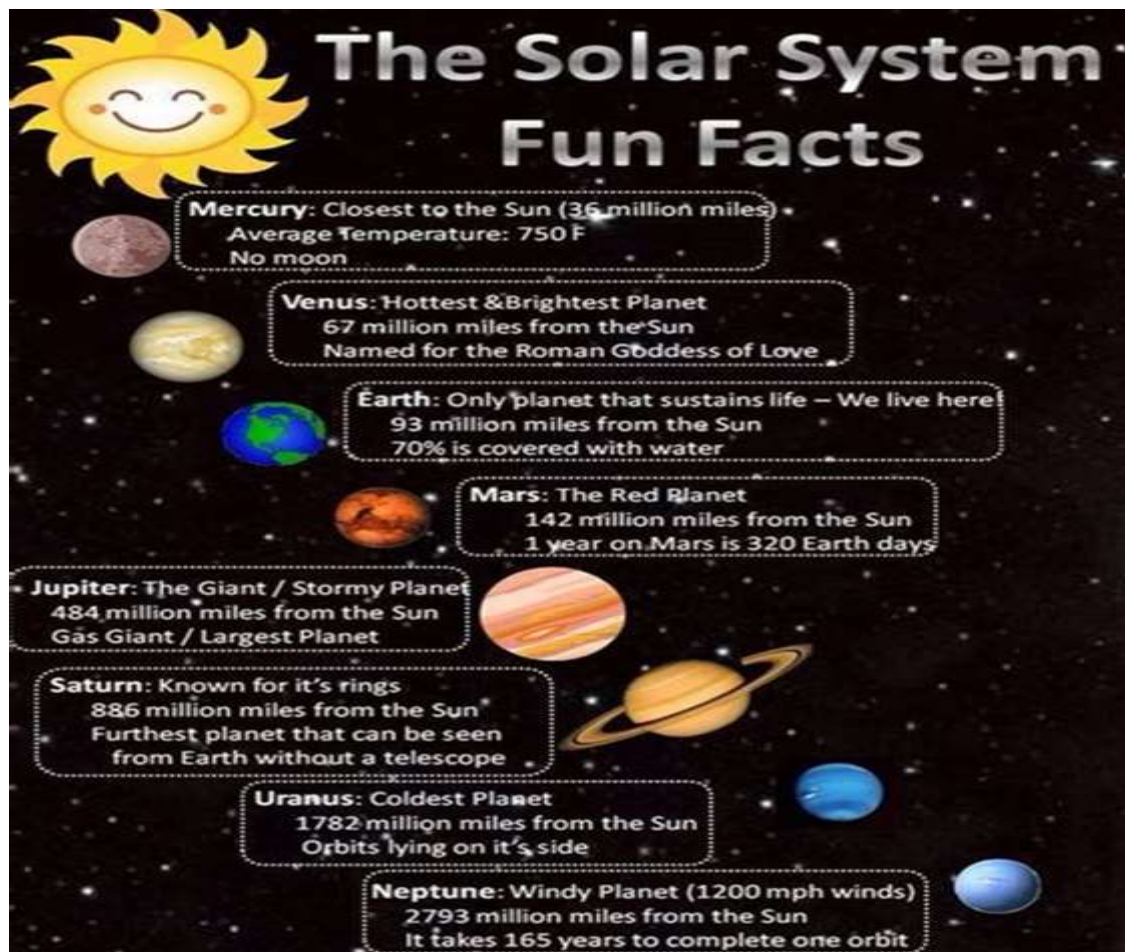
This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use, which may be made of the information contained therein

lots of information in the “From To Earth To The Moon” about size of solar systems’ planets, objects and their distances to each other.

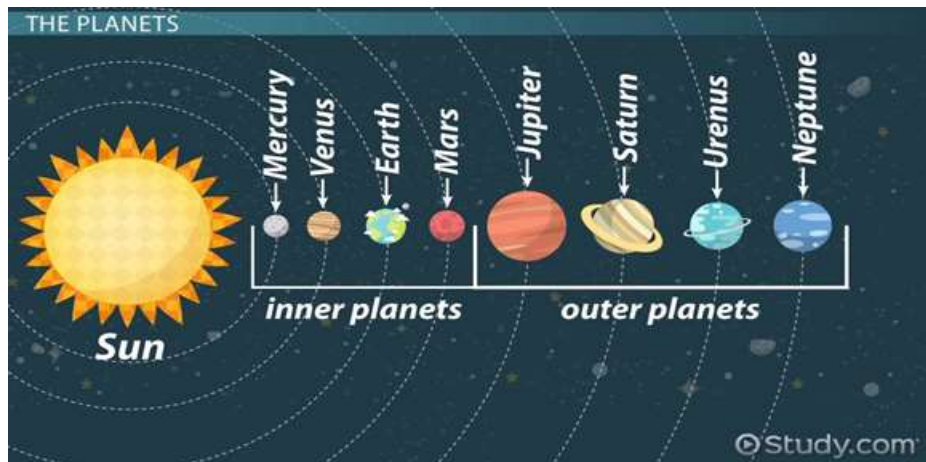
This shows us that Jules Verne did a lot of research as a scientist and studied the solar system very well. From the earth to the moon describes a journey through the solar system We also aim to understand the planets in the solar system and the distances between them.

Let ‘s check the solar system planets feature and distance together.

They are going to watch Planet 101 /national geographic video (video 1) where they will learn about the planets and solar system



We are going to sort them by order and learn their features. Students are going to notice the distances from the Sun and how the asteroid belt is separating the Inner and Outer planets.



2. Asking students if they had noticed anything different about the distances between Inner planets and the outer planets. Allow for responses and discuss about them.

Getting into groups for playing the Planet Bingo. Students are going to play the planet bingo game. The first who finishes the card is going to win the game and so make Bingo.

3. Ordering the planets page is going to be given to the students. Asking them to write the names of the planets in their own language. The papers are collected and attached on the bulleting board of the stem lab.

The planets are not the same distance from the sun. Can you measure the distance of the planets from the sun?

Let's do this measurement with our maths teacher

CALCULATING DISTANCE BETWEEN PLANETS

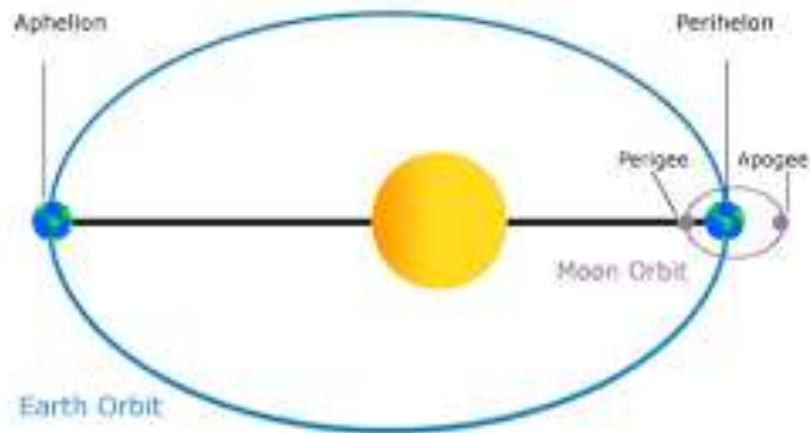
The galaxy we live in contains much more precise and complex mathematical calculations than we think.

-Do you think it is possible to measure the distances between the planets and the sun?

-Can there be very large numbers with lots of zeros?

-Can we express these large numbers in more understandable units of measure?

To put it scientifically, to talk about how far the planets are from the sun, it is very difficult for humans to grasp these distances, because their distances are constantly changing. For this reason, astronomers often use the term astronomical unit (AU), which represents the distance from the Earth to the Sun. The astronomical unit is a measure of distance used in astronomy. The astronomical unit is formed from the distance of the earth we live on from the sun. Earth's orbit is elliptical, and the ellipse separates diameters on the two axes. The astronomical unit is equal to the radius of the major axis of the Earth's orbit.



The gravitational interaction within the Solar System does not allow for a smooth and stable orbital motion. Therefore, the radius of the orbits always changes. In order to solve this problem, the International Astronomical Union (IAU) defined 1 astronomical unit in 1976 as the radius of a regular circular orbit drawn by a particle with zero mass in 1 Gauss year (365.2568983 days) and converted it to a constant value. The average distance between the Sun and the Earth is 1 AU, which is 149,597,870 km, or about 150 million km. Since the Sun-Earth distance is accepted as 1 AU, it is very useful to give the distances of other planets from this measure. AU is also used to specify the dimensions of other planetary systems. In this way, it will be easier for us to compare with our own system.

<https://www.youtube.com/watch?v=KtwVlgkz2s>

The following table was created by Fraser Cain, the founder of Universe Today, in 2008, and all planets and their distances from the Sun are shown in AU units. This actually provides a kind of computational convenience when working with interplanetary distances.

-Now let's calculate the interplanetary distances in AU together.

Example: Mercury is 57 million km from the sun. Let's convert this distance to AU.

If 1 AU=150 million km; To calculate Mercury's distance from the sun in AU, we need to divide.

$57000000 : 150\,000000 = 0.387\text{ AU} \approx 0.4\text{ AU}$ is approximate.

Now let's calculate other interplanetary distances with the same method!

- Mercury: Average: 57 million km / 35 million miles (0.387 AU)
- Venus: Average: 108 million km / 67 million miles (0.722 AU)
- Earth: Average: 150 million km / 93 million miles (1 AU)

- Mars: Average: 228 million km / 142 million miles (1.52 AU)
- Jupiter: Average: 779 million km / 484 million miles (5.20 AU)
- Saturn: Average: 1.43 billion km / 889 million miles (9.58 AU)
- Uranus: Average: 2.88 billion km / 1.79 billion miles (19.2 AU)
- Neptune: Average: 4.50 billion km / 2.8 billion miles (30.1 AU)
- Pluto: Average: 5.91 billion km / 3.67 billion miles (39.5 AU)

Although Pluto is no longer considered as a planet, we wanted to add it to see its distance.

The distance between the Moon and Earth is 384,400 km. Since this is a more understandable distance, it is not expressed as an Astronomical unit.



EVALUATION

- Planet Bingo is played with students.
- If it was possible to live on any planet, which one would you choose and why? Allow time for discussion.



ACTIVITY 1



Address Card

(Fill in the information below.)

My Name _____

Street _____

City _____ State _____ Zip Code _____

County/Township (if applicable) _____

Country _____

Continent _____

Hemisphere (circle): Northern Southern

Planet _____ in the _____

Which is a part of the _____ Galaxy.

Planet Song

There are eight planets in our solar system
We revolve around the sun
Join us to learn about the different planets
Now sing along and have some fun

My name is Mercury
I'm the second hottest planet
The closest one to the sun
A year on my surface is 88 days
I'm the smallest but I'm lots of fun

My name is Venus
I'm the hottest planet
But the second planet from the sun
I'm the brightest planet in our solar system
And I'm too hot for any one

My name is Earth
I'm the planet you live on
The third Planet from the sun
I'm the only planet with organic life
So take care of me 'cause we're all one

My name is Mars
I am red in color
I'm the fourth planet from the sun
I have the highest mountain in our solar system
A volcano named Olympus Mons

There are eight planets in our solar system
We revolve around the sun
Join us to learn about the different planets
Now sing along and have some fun

My name is Jupiter, I am covered in clouds
I'm the fifth planet from the sun
My giant red spot is a raging storm
As for size, I'm the biggest one

My name is Saturn, I am brown in color
I'm the sixth planet from the sun
My outer rings are extremely thin
They're made of dust and icy chunks

My name's Uranus, I am blue in color
I'm the seventh planet from the sun
Humans have named me the icy planet
Because I am the coldest one

My name is Neptune, I am blue in color
I'm the eighth planet from the sun
I have too many storms in my atmosphere
And I'm the furthest planet from the sun

There are eight planets in our solar system
We revolve around the sun
Join us to learn about the different planets
Now sing along and have some fun

Planet Song

There are eight planets in our solar system
We 1..... around the sun
Join us to learn about the different planets
Now sing along and have some fun

My name is Mercury
I'm the second hottest planet
The 2..... one to the sun
A year on my surface is 88 days
I'm the 3..... but I'm lots of fun

My name is Venus
I'm the 4..... planet
But the second planet from the sun
I'm the 5..... planet in our solar system
And I'm too hot for any one

My name is Earth
I'm the planet you live on
The 6..... Planet from the sun
I'm the only planet with organic 6.....
So take care of me 'cause we're all one

My name is Mars
I am 8..... in color
I'm the fourth planet from the sun
I have the mountain in our solar system
A volcano named 9..... Mons

There are eight planets in our solar system
We revolve around the sun
Join us to learn about the different
10.....
Now sing along and have some fun

My name is Jupiter, I am covered in
11.....
I'm the 12..... planet from the sun
My giant red spot is a raging 13.....
As for size, I'm the 14..... one

My name is Saturn, I am brown in color
I'm the 15..... planet from the sun
My outer 16..... are extremely thin
They're made of 17 and icy chunks

My name's 18....., I am blue in color
I'm the 19..... planet from the sun
Humans have named me the 20.....
Because I am the 21..... one

My name is Neptune, I am 22..... in color
I'm the 23..... planet from the sun
I have too many 24..... in my atmosphere
And I'm the 25 planet from the sun

There are eight planets in our solar system
We revolve around the sun
Join us to learn about the different planets
Now sing along and have some fun

ACTIVITY3

Solar System

Order the Planets

Identify the planets and write their names.

See more worksheets at www.jumpstart.com/parents/worksheets

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ACTIVITY 4

RULES OF THE PLANET BINGO GAME

- 1.Information cards are mixed.
- 2.Each groups are given a "Planet Bingo" card.
- 3.Each groups are given 25 bingo stones (you can use any object as a stone).
- 4.Information on the card is read loudly.

For example:

*After reading the information “known as the red planet”, players place a bingo stone on the picture of the planet Mars.

*Find out what the shapes on the bingo card are.

If you can't, you can check out the planet bingo guide.

*There may be more than one Mars planet on the card, but players can only place a stone on one each time the flashcard is read.













5.The next player chooses another flashcard and the game continues.

6.The first player to complete any line on the bingo card says “BINGO” and wins the game.













Stellar Lab

BIGGEST PLANET IN THE SOLAR SYSTEM 	HAS MULTIPLE RINGS 	7TH CLOSEST PLANET TO THE SUN 	IS A STORMY AND BLUE PLANET 
REALLY STORMY PLANET AND HAS RED MARKS ON IT 	HAS A SATELLITE NAMED TITAN 	LOOKS LIKE A BARREL AND SPINS SIDEWAYS 	FURTHEST PLANET FROM THE SUN 
5TH CLOSEST PLANET TO THE SUN 	6TH CLOSEST PLANET TO THE SUN 	HAS A CORE MADE OF ROCK AND SURROUNDED BY GAS 	COLDEST PLANET IT IS ALSO ICY 

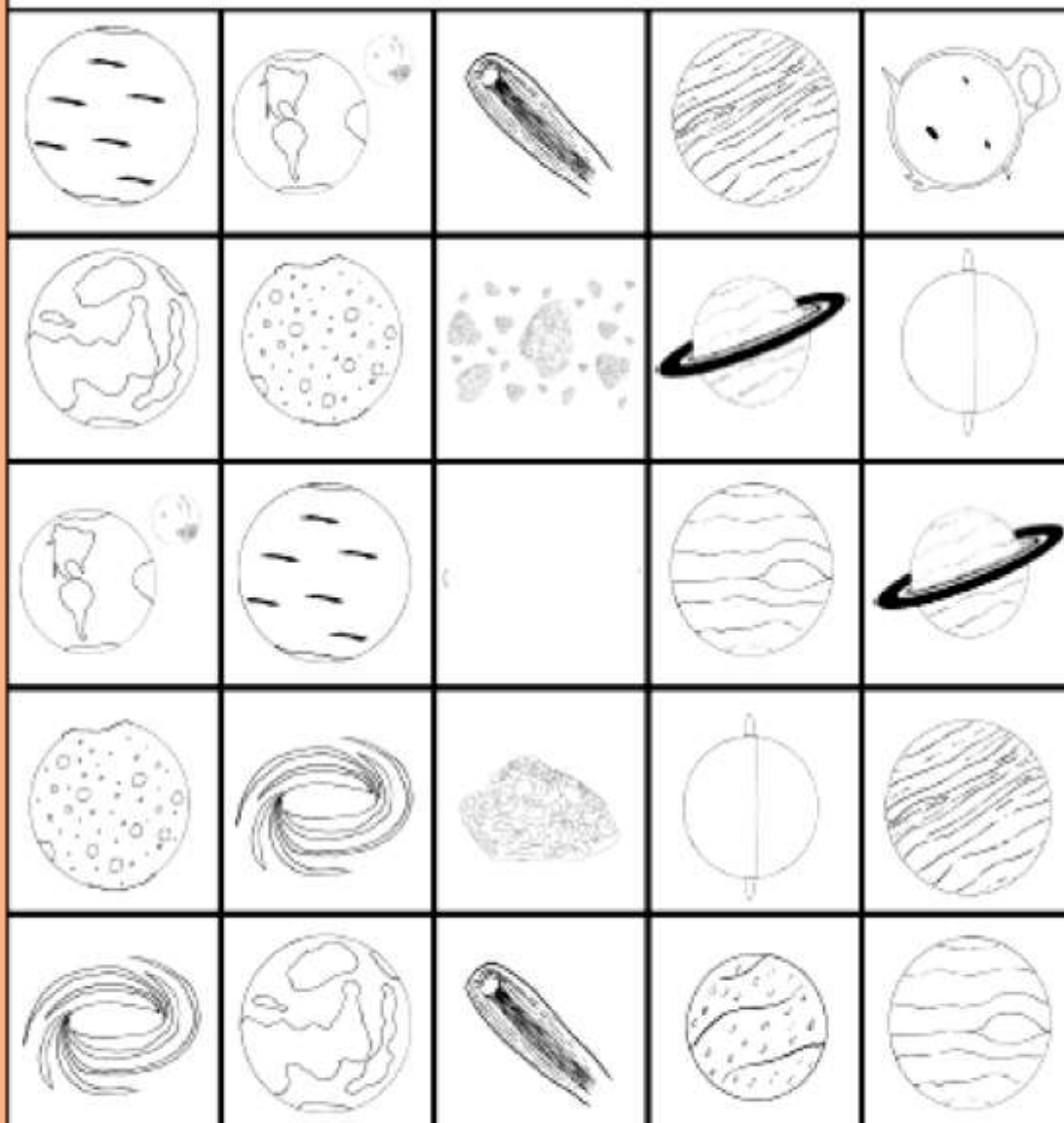
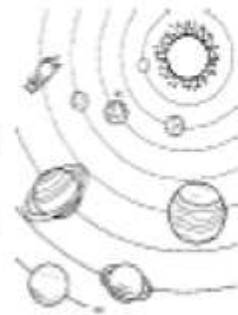
Stellar Lab

GROUP OF ROCKS IN SPACE 	IS IN BETWEEN MARS AND JUPITER 	SMALL ROCKS SEPERATED FROM ASTEROIDS 	WHEN IT ENTERS THE ATMOSPHERE ITS NAMED METEORITE 
IS MADE OF ROCKS, ICE AND DUST. 	COMES TO EARTH EVERY 76 YEARS 	ALSO KNOWN AS DWARF PLANET 	MOVES AROUND THE SUN UNCOORDINATED 
CONTAINS MILLIONS OF STARS 	ALSO KNOWN AS MILKY WAY GALAXY 	IS A STAR 	IS IN THE CENTER OF SOLAR SYSTEM 

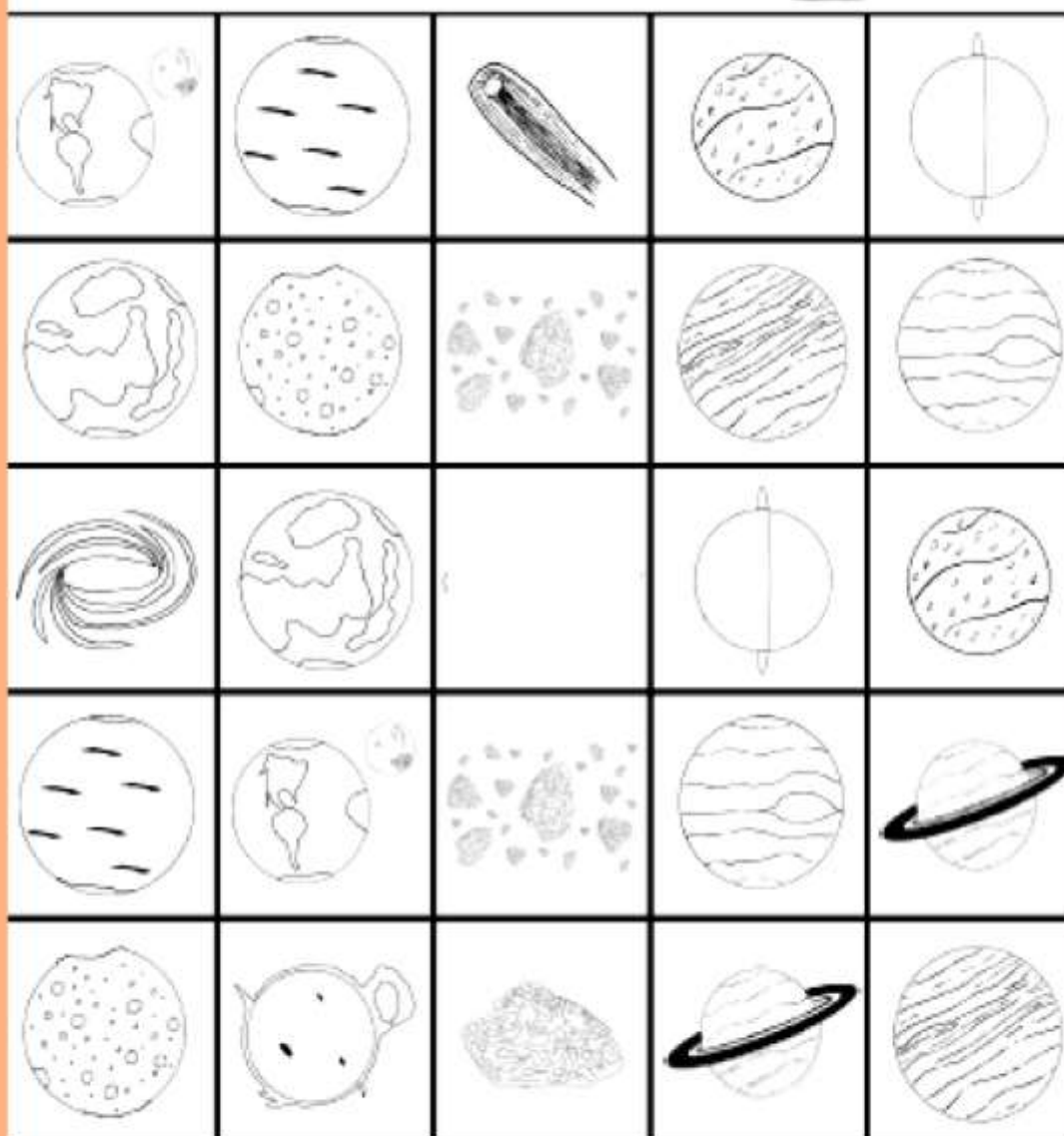
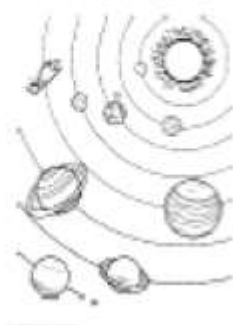
Stellar Lab

CLOSEST PLANET TO THE SUN 	2ND CLOSEST PLANET TO THE EARTH 	3RD CLOSEST PLANET TO THE EARTH 	ALSO KNOWN AS RED PLANET 
METEORITES CAUZES IT TO HAVE PITS 	THIS PLANET IS SORROUNDED BY TOXIC GASES 	THE PLANET WE LIVE IN 	4TH CLOSEST PLANET TO THE EARTH 
THIS PLANET IS HOT DURING DAYTIME 	HOTTEST PLANET 	ONLY PLANET THAT HAS LIFE 	THIS PLANETS SIZE IS HALF OF THE EARTHS 

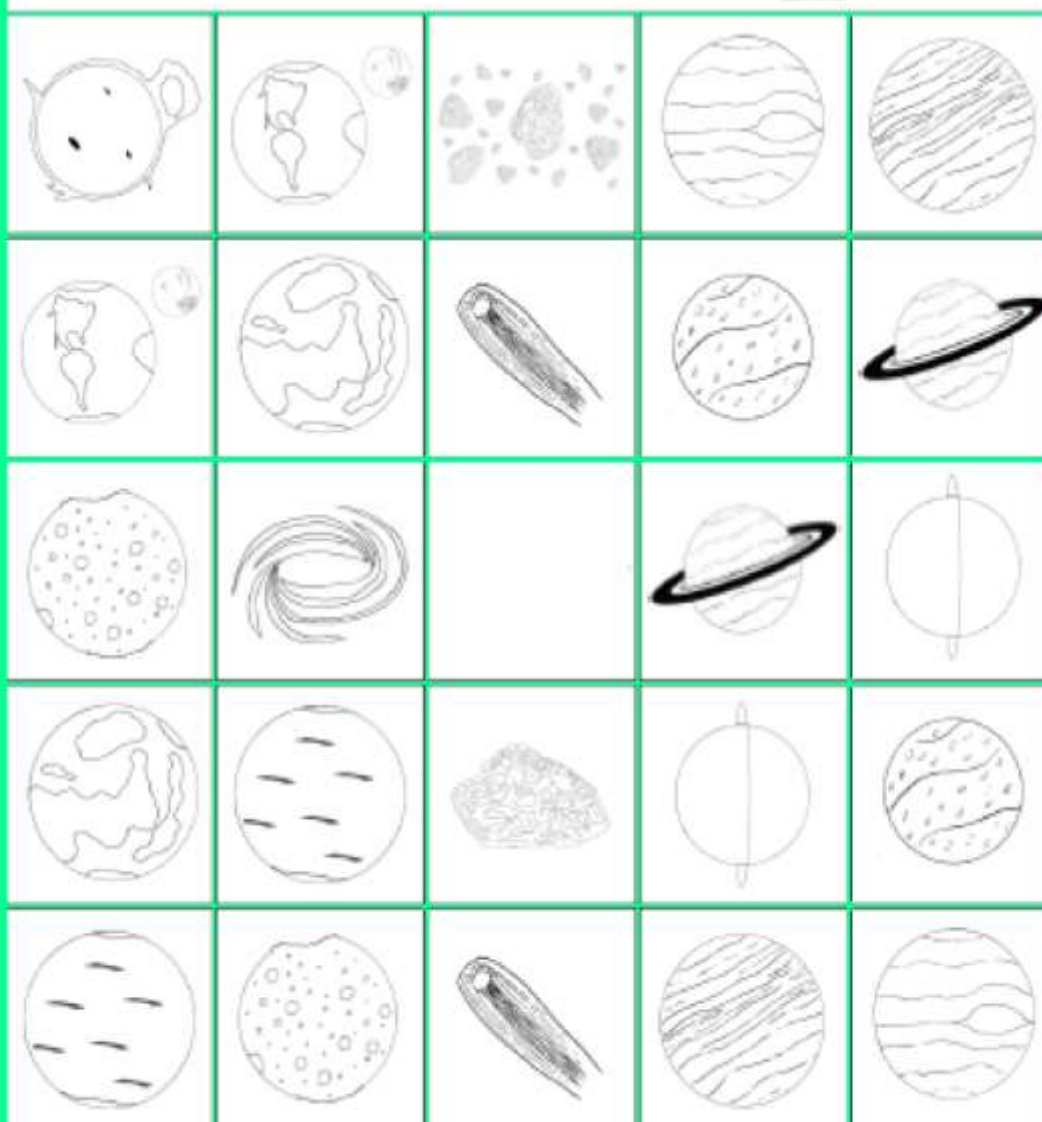
PLANET BINGO



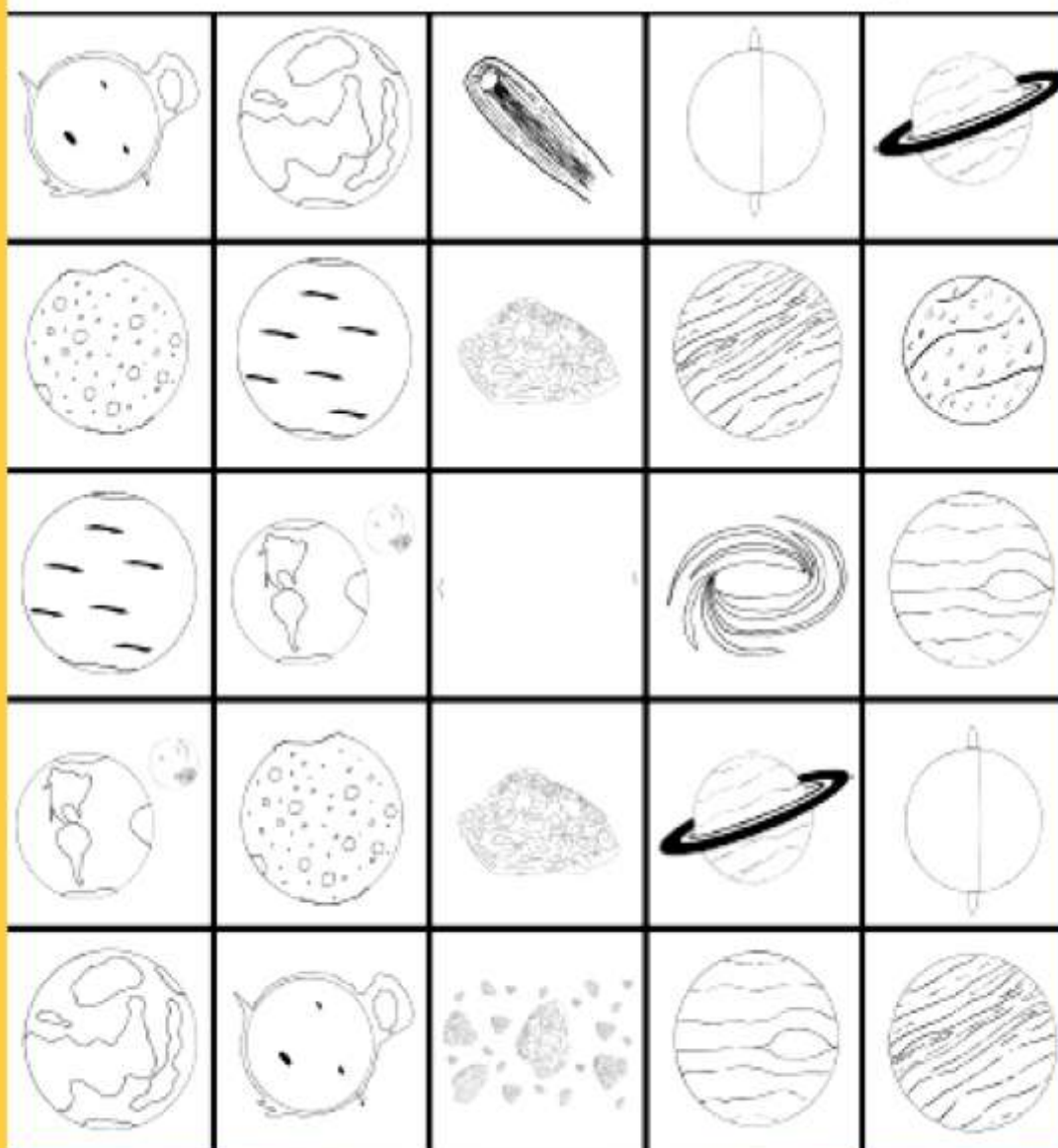
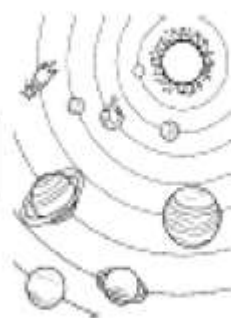
PLANET BINGO



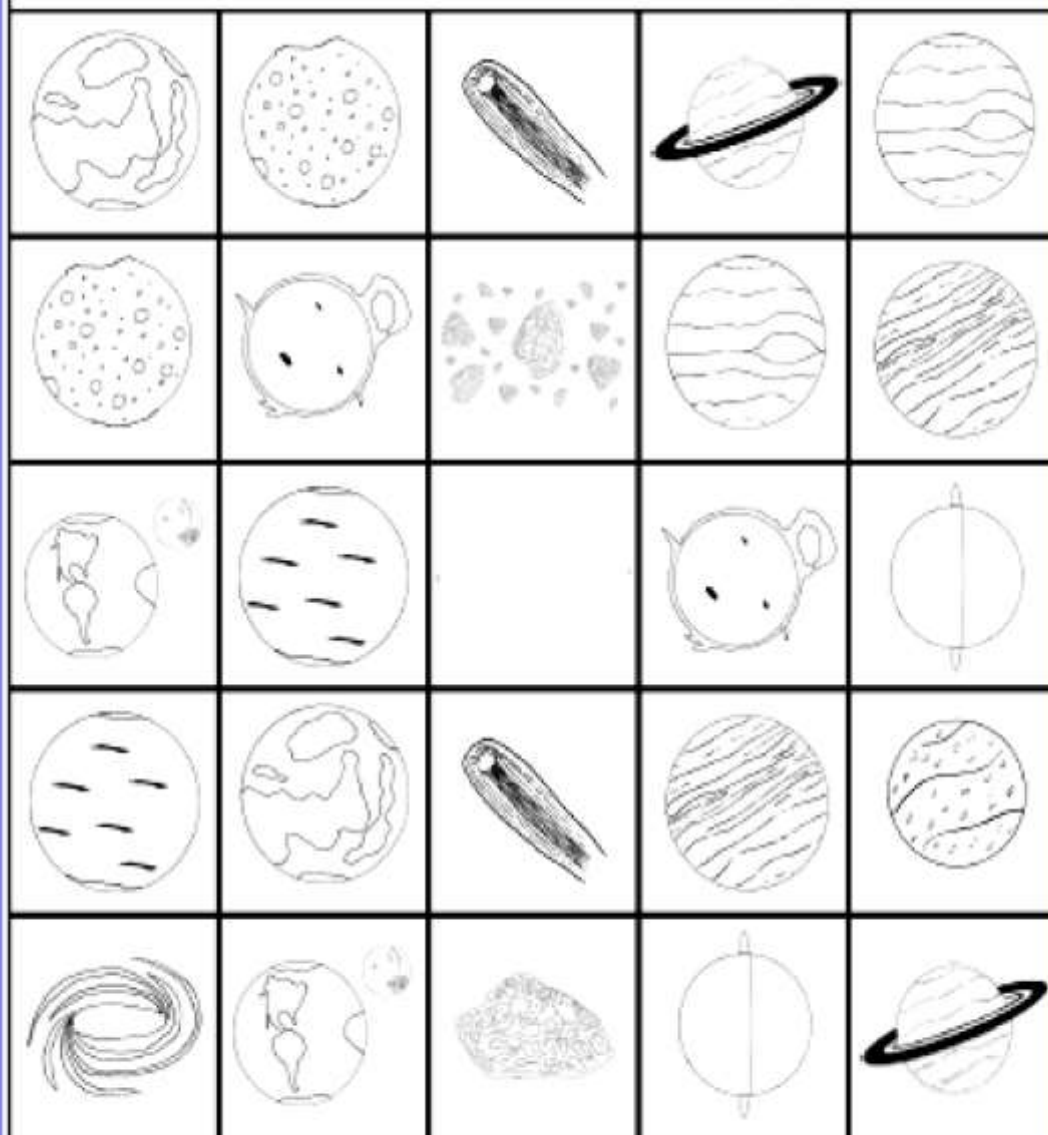
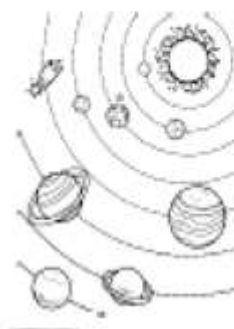
PLANET BINGO



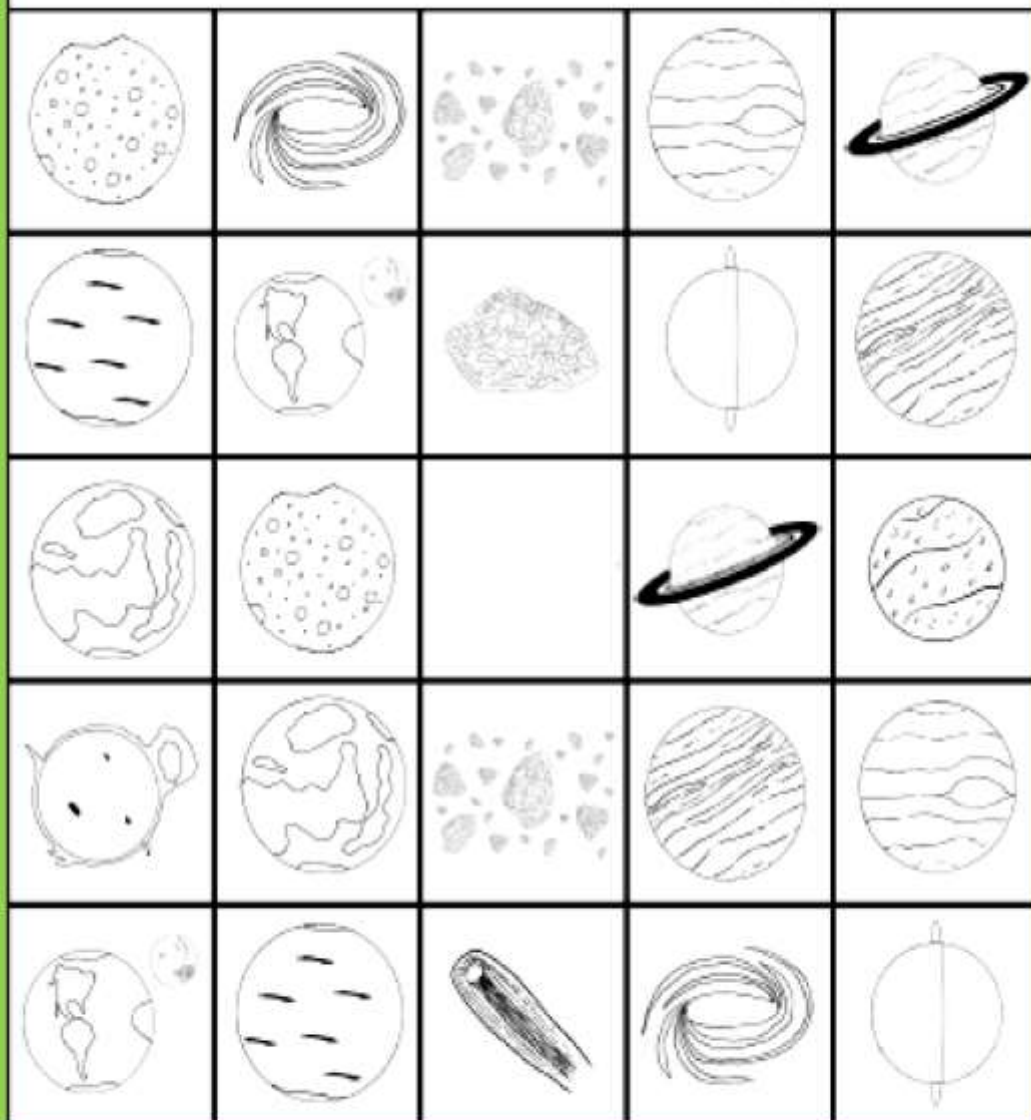
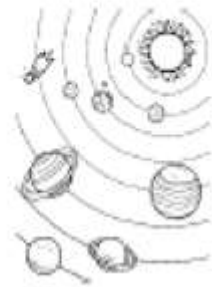
PLANET BINGO



PLANET BINGO



PLANET BINGO



ACTIVITY 5

Example: Mercury is 57 million km from the sun. Let's convert this distance to AU.

If 1 AU=150 million km;

570000000: 150 000000= 0.387 AU = 0.4 AU is approximate.

Now let's calculate other interplanetary distances with the same method!

- Mercury: Average: 57 million km / 35 million miles (0.4 AU)
- Venus: Average: 108 million km / 67 million miles (...AU)
- Earth: Average: 150 million km / 93 million miles (...AU)
- Mars: Average: 228 million km / 142 million miles (...AU)
- Jupiter: Average: 779 million km / 484 million miles (...AU)
- Saturn: Average: 1.43 billion km / 889 million miles (...AU)
- Uranus: Average: 2.88 billion km / 1.79 billion miles (...AU)
- Neptune: Average: 4.50 billion km / 2.8 billion miles (...AU)
- Pluto: Average: 5.91 billion km / 3.67 billion miles (...AU)

ACTIVITY 6

Modeling Interplanetary Distance

Using the ruler given below, place the planets whose distances we have calculated as AU on the ruler. Explain how you arranged the distance between the planets and how you proportioned the ruler as 1 AU.

[illegible]



TEACHER SEVDA UYANIK

COURSE TYPE

Stem Lesson with Quest Erasmus Project

SUBJECT

Imagine, design, produce and solve physical and social problems that may be encountered in creating a long-term living space on the Moon.

NUMBER OF STUDENTS : 30

METHODS

Lego, Brainstorming, Group work, QR CODE, creativity, search and match, slide presentation

REFERENCES

<https://www.bilimkahramanlarıbuluşuygu.org>

GENERAL OBJECTIVE

This research aims to identify the physical and social problems that a person may encounter while doing long-term research on the AY and propose solutions for them.

EXPECTED PROBLEMS

Students may find it difficult to warm up to the group at the beginning and may not answer the questions. Students are relaxed with the tips given by the teacher and the students are included in the activity.

ACTIVITY 1 (WARM) JOURNEY TO THE MOON

OBJECTIVE

To create an enjoyable environment while students get to know each other.

METHOD

The teacher tells the students that a cruise ship will go to the moon and they are invited to this journey. Since the ship is designed in accordance with the conditions of space, the passengers should correctly evaluate the limited options they will take with them. The teacher leaves an invitation card in front of the students. and this invitation asks them to write their names and an item they want to take. There is a secret rule here. If the game gets too busy, the teacher informs the students with a few tips. The game can continue until all participants solve the rules of the game and find an item for themselves.



ACTIVITY 2

SURVIVING THE DEPTH OF THE MOON

OBJECTIVE

Finding out what we need to live on the Moon long term and designing them on Lego

METHOD

The teacher asks the students where they need to live in the world and asks the students to write a sentence. After the answers, the second question is what you would need if you lived on the Moon for more than 1 year. In line with the answers from the groups, the teacher asked the students to write a sentence. He asks them to create a living space on the moon. The students create the living space with the instructions he sends to the students.

The first to complete the Lego work from the groups matches the name of the living area with the corresponding envelope and completes the game.

COURSE TYPE

Stem Lesson with Quest Erasmus Project

SUBJECT

Virtual museum study created as a result of Erasmus Turkey house tour

NUMBER OF STUDENTS 30

METHODS

Internet, Group work, QR CODE, Phone, Research, design, creativity, art, 5E model, slide presentation

REFERENCES

www.artsteps.com

<https://pixabay.com.tr>

<https://dergipark.org.tr/pub/lfmgtd/ISSN:2667-5323>

GENERAL OBJECTIVE

To enable students to transform the knowledge they have acquired during the trip into a museum through design.

EXPECTED PROBLEMS

Problems with internet connections while students are designing.

ACTIVITY 1 I DESIGN WHAT I VISIT WITH TECHNOLOGY

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use, which may be made of the information contained therein

METHOD

The teacher asks the students to create a photo folder on their phones from when they come to Turkey. He asks them to save the information and photographs they have learned during the trip here. At the beginning of the lesson, the teacher asks what they have learned about the moon during the trip. In line with the answers from the students, the teacher asks the students to do research and the teacher collects the subject by sharing the scientific details of the trip in general. The teacher tells the students that they will design a virtual Turkey to the moon museum at the last stage. Then they create a virtual museum using their own folder of pictures. After completing the virtual museums, the students prepare the link to the museums using a QR code. is exceeded.

TEACHER DERYA ALP

WATER ROCKET

OBJECTIVES

-Understanding the working principles of rockets and the connection between those principles and Newton's 3rd Law of Action-Reaction.

PREPARATION

- Rocket101/National Geography is going to be watched
- After making the rocket car students are going to watch the video STEM At Home Episode #9:building a water-powered rocket

MATERIALS

2.5lt plastic bottle, cork stopper, bike pump cartoon, glue, water

RESOURCES

<http://bilimgenc.tubitak.gov.tr>

Rocket101/National Geography

Watch STEM At Home Episode #9:building a water-powered rocket

OUTLINE

After they had prepared their a rocket racer cars, they would be able to understand that for to go forward, a force -in opposite direction- is needed. So this is going to be applied to Newton's 3rd Law of Action-Reaction to water rocket

They are going to launch their rockets to complete their space program. A countdown is going to be done during their launches. They are going to launch their rocket from school garden.

We are going to pump air into a bottle, which has water inside, with bike pump.

Air that we pump causes pressure into bottle. Because of this pressure, water is pushed by air. While water is coming out of the bottle, it applies a force from the bottle's opposite side. By this way our rocket launches.

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STUFF YOU NEED



CUT THEM



TAPE IT TO BOTTLE



CUT THE RADIUS OF THE CIRCLE



ATTACH THE CONE TO BOTTLE



MAKE A HOLE IN THE CORK

W A T E R R O C K E T



DRAW 3 TRIANGLES



DRAW AND CUT A CIRCLE



FOLD IT A CONE



PUT THE CORK ON THE MOUTH
OF THE BOTTLE



TEACHER SİBEL GEZER

OBSTACLE AVOIDING ROBOT

OBJECTIVE

With Mblock encoding the students

- Sees the working logic of the distance sensor.
- Learns the driver connections of DC motors
- Successfully performing the work required by that role as a team member in different roles (such as the robot's external design, the robot's internal system, coding) in the Project Work.
- Discovers debugging and problem solving techniques in the coding process.

PREPARATION

A video is going to be watched about the use of robots in daily life and how robots work. The obstacle avoiding robot construction materials and installation instructions are placed on the tables.

MATERIALS

- Pinoobot Toolkit (Pinoobot Control Board USB cable Gray Cable, Distance Sensor Dc Motor
Wheel Chassis Rover Wheel Screw Battery Cap)
- Pinoobot assembly instruction
- Related video

RESOURCES

<https://www.pinoobot.io/>

<https://bilimgenc.tubitak.gov.tr/>

OUTLINE

In the beginning of the lesson, On the interactive board, a video is going to be shown about the usage areas of robots in daily life and what robots look like. So “how do robots work?” In response to the question, the video showing how the robots work is shown to the students. The obstacle avoiding robot application is going to be given, so that the practice starts. Students are asked to assemble the robot parts on their desks



according to the instructions given in the obstacle avoiding robot instructions. Then, the Mblock program is opened on the computers. The codes which are already written on the instruction sheet which are going to be uploaded to make the robot work given in the instruction are written and uploaded to the robot avoiding the obstacle.

EVALUATION

It is ensured that the connections of the created Obstacle Avoiding Robot are correctly connected. In Mblock, the writing of the codes are checked. Debugging is done. When each group's Obstacle Avoidance Robot encounters an obstacle, it is evaluated whether it can avoid the obstacle by first turning back and then right or left.

QUEST