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KA229 - Cooperation for Innovation and the Exchange of Good Practices
2019-1-RO01-KA229-063584.

CLIL LESSONS in Secondary School



Participating countries:



LICEUL TEORETIC „SALAMON ERNŐ”



AGRUPAMENTO DE ESCOLAS DO VISO – PORTO



ZESPOL SZKOL NR 1 W PRZYSIETNICY



ŠKOFIJSKA GIMNAZIJA VIPAVA



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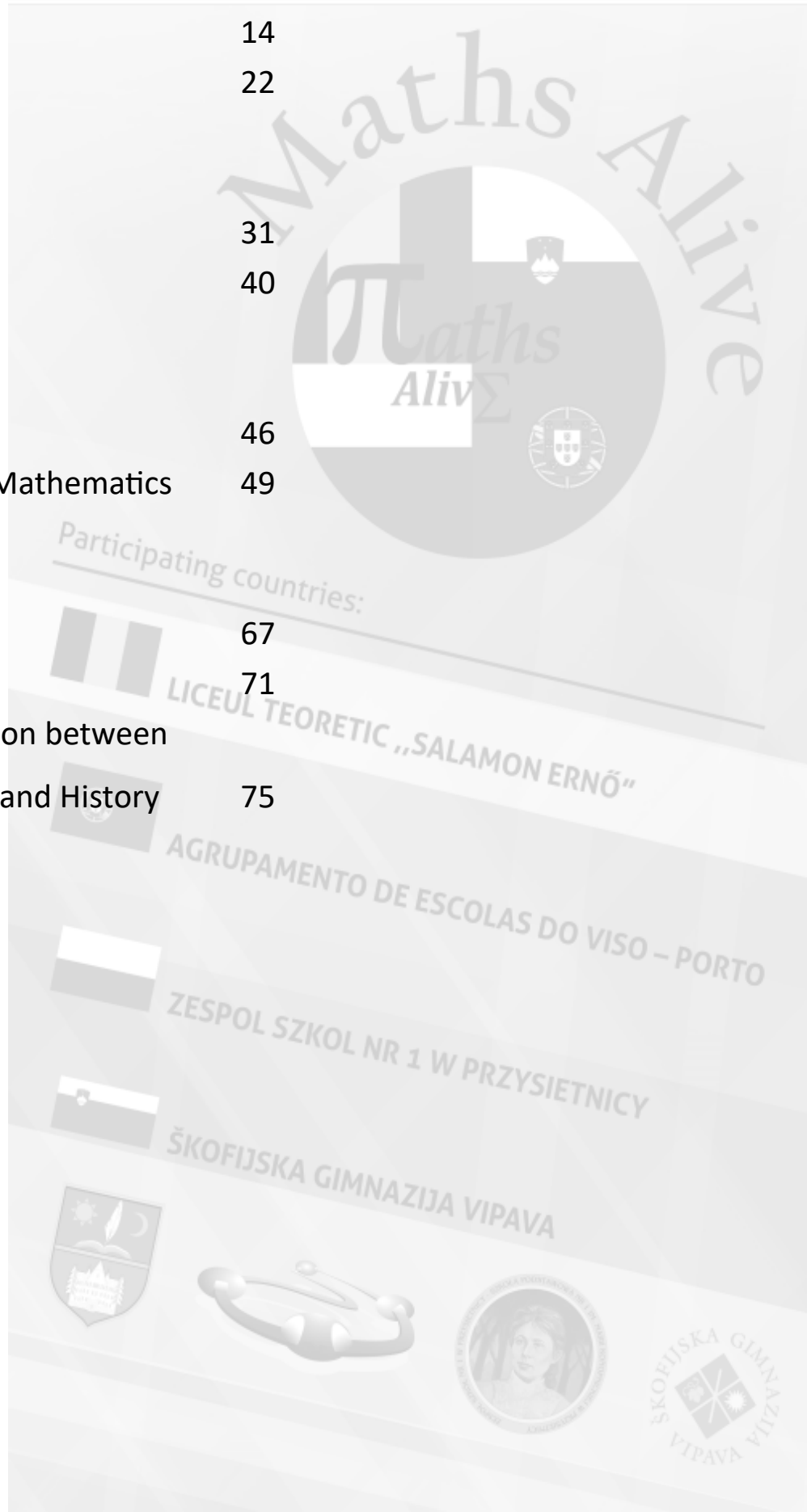
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Title: Healthy eating		
Subject: Biology	Students: 6 international groups aged 12-18	Timing: 50 min
Topic: Biology	Resources & materials: <ul style="list-style-type: none"> • worksheet • pictures with food • printed text • laptop, documentary, projector • imagine of the healthy eating pyramid 	
CONTENT		
Learning objectives <ul style="list-style-type: none"> • To enhance MIs: linguistic, biological-physical, interpersonal intelligences • To enhance learning skills (collaboration, creativity, critical thinking and communication), literacy skills and life skills (flexibility, leadership, productivity, social skills) 	Content objectives: <ul style="list-style-type: none"> • To identify healthy and unhealthy foods • To identify the healthy and unhealthy elements in their own diet • To identify different fruits and vegetables by shape, color, texture • To create an 'eatwell plate' 	
	Language objectives: <ul style="list-style-type: none"> • Read and comprehend a text about alimentation • Describe a fruit or vegetable orally • To classify foods into different groups • To resolve a crossword 	
COMMUNICATION		
Skills	<input type="checkbox"/> Reading <input type="checkbox"/> Listening <input type="checkbox"/> Writing <input type="checkbox"/> Speaking <input type="checkbox"/> Interacting	
Grammar & syntactic structures Vocabulary Pronunciation, intonation & fluency	Language of learning <ul style="list-style-type: none"> • Understanding the language of narrative texts • Understanding the language of a documentary • Vocabulary: bread, broccoli, butter, cheese, chocolate, cream, eggs, fish, honey, lemons, meat, milk, mushrooms, nuts, oil, pasta, potatoes, rice, tomatoes, yoghurt etc. Language for learning <ul style="list-style-type: none"> • Describing fruits and vegetables, using descriptive adjectives • Writing a short text Language through learning <ul style="list-style-type: none"> • Interpreting different meanings • Any language that comes up through the session 	



COGNITION

<p>LOTS (lower-order thinking skills)</p> <p>HOTS (higher-order thinking skills)</p>	<ul style="list-style-type: none">● Remembering: previous knowledge on the topic (describe, relate, tell, find)● Understanding: discuss, outline, explain, predict● Applying: use, illustrate, complete, solve <ul style="list-style-type: none">● Analysing: identifying genres, compare, explain, categorize● Evaluating: decide, prioritize, rate, justify● Creating: imagine, design, plan● Summarizing● Debate: giving opinion, exemplifying,
<p>Questions to be used</p>	<ul style="list-style-type: none">● How often do you eat...?● Do you like playing?● Is it red?● Is it green?● Is it round?● Is it crunchy when eaten raw?● Is it mushy?● Is it larger than a golf ball?,● Is it shorter than a pencil?● Does it grow in Europe?● Does it grow on a tree?● Does it grow underground?● Do you eat a balanced diet?● Can you add any more ingredients?● Which foods does the plate tell us to eat often?● Which foods does the plate tell us not to eat often?● Is your diet balanced? Why/Why not?

CULTURE

<p>Build a knowledge in a wider cultural context, learn about healthy eating, health.</p> <ul style="list-style-type: none">● Learn about the fruits and vegetables● Learn about the healthy eating plate● Learn about the unhealthy food

METHODOLOGY

1. Enabling activities	pre-reading activity about eating customs
2. Development and final products	describing fruits and vegetables by color, shape, texture, size reading activity, that helps identify the content of our food
3. Final or follow-up activities	complete a crossword, create a healthy eating plate
4. Assessment	Group project: Keep a food diary. Observations

Lesson plan

1A. Pre-reading

Read and tick for you.

	often	sometimes	never
eat fast food?			
drink fizzy drinks?			
eat fruits and vegetables			
eat breakfast?			
eat sweets and chocolate?			

How often do you ...





1B. Pre-reading

Tick ✓ the things below that you look for when choosing ingredients for a meal.

- | | |
|---------------|--------------------|
| 1 balanced | 7 seasonal |
| 2 fresh | 8 simple |
| 3 healthy | 9 colourful |
| 4 natural | 10 value for money |
| 5 filling | 11 varied |
| 6 nutritional | 12 sweet |

1C. Now let's play a little! Do you like playing? Yes? It's okey, because we are going to play a lot today!

I will give everyone a picture, mostly about fruits and vegetables. Don't show that please to anybody. In every group the others have to figure out what kind of fruit or vegetable do you have, by asking you some questions, like: Is it red? Is it green? Is it round?.... You can only answer with yes or no....

Here are some prompt questions for the game:

Colour (Is it red?, Is it green? Is it purple)

Shape (Is it round? Is it shaped like a cilinder?)

Texture (Is it crunchy when eaten raw? Is it mushy?)

Size (Is it larger than a golf ball?, Is it shorter than a pencil?)

Where and how it grows (Does it grow in Europe? Does it grow on a tree? Does it grow underground?)



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2. Reading

Read the text. Do you eat a balanced diet?

BALANCING ACT!

If you want to be healthy, a balanced diet is very important. Food gives us the energy and nutrients we need to live. There are no good and bad foods, but we need to get the right amount of each type of food to be strong and fit. Junk food and fast food are high in fats and sugar. These foods might be delicious and it's OK to enjoy them sometimes, but don't forget 'an apple a day keeps the doctor away'.

The five food groups

Everything we eat is from one of the five different food groups. Every day, our bodies need protein, carbohydrates and healthy fats to give us energy and good health.

1 Meat, fish and eggs

This group also includes beans and nuts. These foods have protein and this helps us grow.

2 Bread and cereals

Potatoes are in this group too. These foods give us energy.

3 Fruit and vegetables

It is very important to eat fruit and vegetables. These foods help our digestion and have lots of vitamins and minerals.

4 Milk and dairy

These foods have calcium, which is important for our bones and teeth.

5 Fats and sugars

These foods are not very good for us so it is important not to eat them very often.

If you have a balanced diet, you will have more energy for school, for friends and for your hobbies!



3A. Vocabulary

Put these ingredients in the correct group in the table.

Can you add any more ingredients? You can use these websites to help you:

www.bbc.co.uk/health/treatments/healthy_living/nutrition/index.shtml

www.nutrition.org.uk/healthyliving/basics/what-are-nutrients

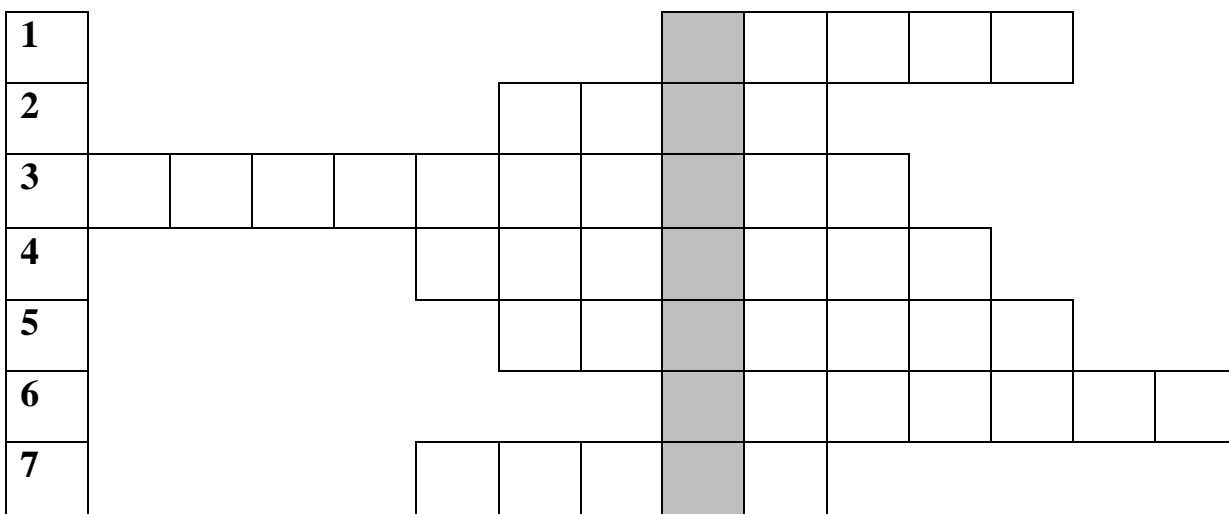
bread, broccoli, butter, cheese, chocolate, cream, eggs, fish, honey, lemons, meat, milk, mushrooms, nuts, oil, pasta, potatoes, rice, tomatoes, yoghurt

Dairy products	Starchy foods	Fats and sugars	Protein	Fruit and vegetables
	bread			



3B. Vocabulary

Complete the crossword and find the missing word.



1 I want to make a sandwich. I have some cheese and (5)

- 2 I love all kinds of ... – beef, pork, chicken and lamb. (4)
- 3 Carrots, peas and broccoli are all (10)
- 4 You can find lots of ... C in oranges. (7)
- 5 Iron is a very important You can find it in green vegetables like spinach. (7)
- 6 ... is a mineral you can find in milk and other dairy products. (7)
- 7 ... are white and hard. There are lots of them inside our bodies. (5)

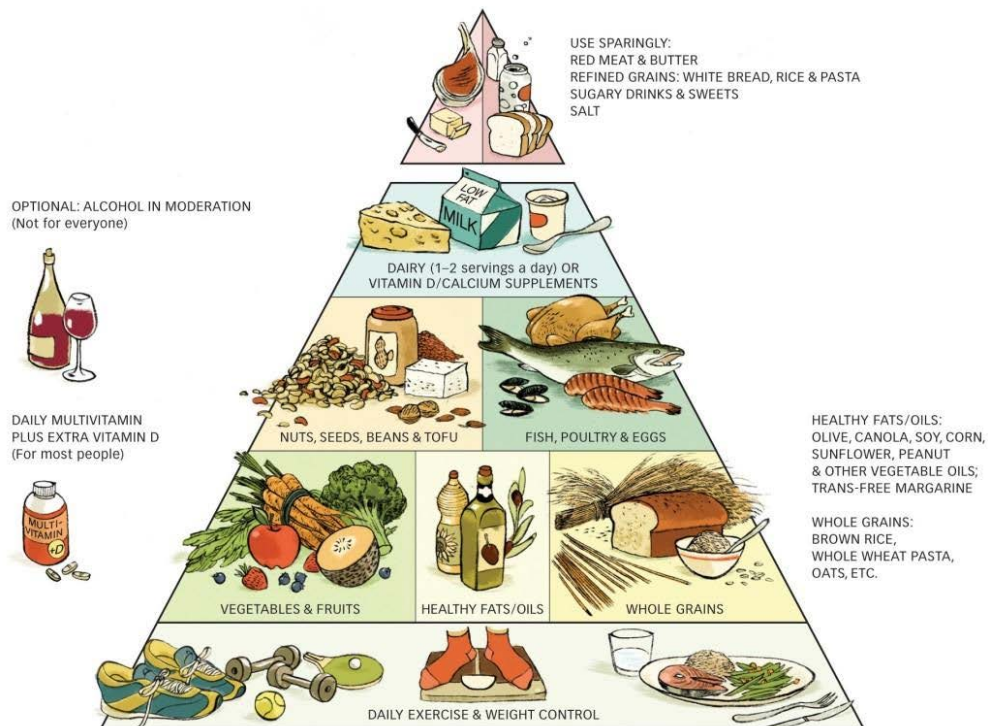
4A. Practice

Let's watch a documentary about food pyramid and than place the different food on the food pyramid.

https://www.youtube.com/results?search_query=THE+FOOD+PYRAMID+Educational+Video+for+Kids

THE HEALTHY EATING PYRAMID

Department of Nutrition, Harvard School of Public Health





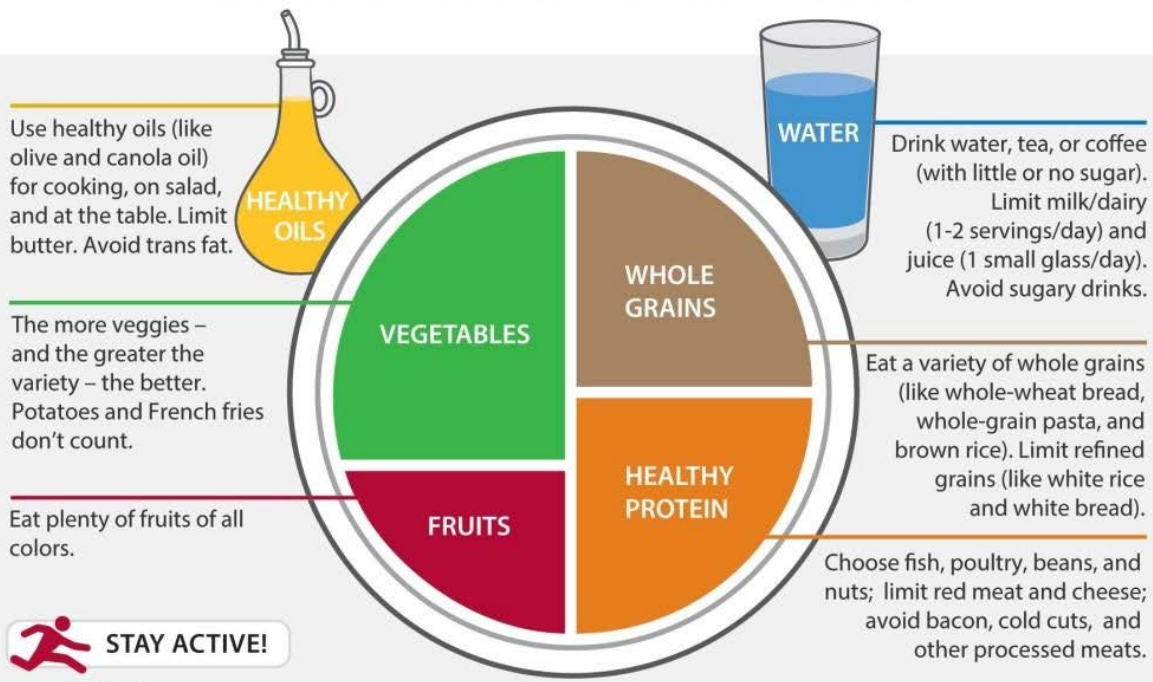
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4B. Practice

Do an Internet search for balanced diet and label the ‘eatwell plate’ with the food groups from exercise 2.

The eatwell plate

HEALTHY EATING PLATE



© Harvard University



Harvard T.H. Chan School of Public Health
The Nutrition Source
www.hsph.harvard.edu/nutritionsource

Harvard Medical School
Harvard Health Publications
www.health.harvard.edu



5. Writing

Look at the 'eatwell plate' and answer the questions.

- 1 Which foods does the plate tell us to eat often?
- 2 Which foods does the plate tell us not to eat often?
- 3 Is your diet balanced? Why/Why not?

6. Reading

Find more information about healthy diets in the Internet. Then read the 'dos and don'ts' below and write *T* (true) or *F* (false).



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- 1 Do eat a variety of foods from different food groups.
- 2 Don't eat fruit and vegetables with every meal.
- 3 Do eat lots of fish.
- 4 Do 'super-size' your meals whenever you can.
- 5 Do eat lots of fats and sugars.
- 6 Do be active every day.
- 7 Do eat the same as a boy if you are a girl.
- 8 Do put apple pie in the 'fruits and vegetables' section of your plate.

7. Project

Keep a food diary. Follow these steps:

- Write down what you eat for breakfast, lunch, snacks and dinner for three days.
- Look at your diary and write five sentences about your diet, e.g. I often eat fruit when I want a snack. I never eat chocolate between meals.
- Compare your sentences with your classmates. Discuss how your diet can be healthier.



Title: Lead, the little soldier			
Subject: English		Students: 6 international groups aged 12-18	
Topic: Developing critical thinking and problem-solving skills through literature (21 st century skills)		Timing: 50 min	
		Resources & materials: <ul style="list-style-type: none"> • printed and projected text • Worksheet • Images of royal guards • Colored pencils • 10-12 tokens (eg. small strips of paper) • Computer, projector 	
CONTENT			
Learning objectives <ul style="list-style-type: none"> • To enhance MIs: linguistic, logical-mathematical, interpersonal intelligences • To enhance learning skills (collaboration, creativity, critical thinking and communication, problem-solving), literacy skills and life skills (flexibility, leadership, initiative, productivity, social skills) 		Content objectives: <ul style="list-style-type: none"> • To identify and analyse literary devices • To be able to distinguish the elements of a fable • To solve a mathematical problem • To understand certain aspects of a monarchy as a system of government 	
		Language objectives: <ul style="list-style-type: none"> • Read and comprehend an original text • To give opinions and make comparisons orally and in writing • To summarize a text and create meaning to some elements of a fable as well as from real contexts 	
COMMUNICATION			
Skills		√ Reading √ Listening √ Writing √ Speaking √ Interacting	
Grammar & syntactic structures Vocabulary Pronunciation, intonation & fluency		Language of learning <ul style="list-style-type: none"> • Understanding the language of narrative texts • Using past tenses and conditionals • Vocabulary: royal guards, valuable, enigma, successor, mission etc. Language for learning <ul style="list-style-type: none"> • Describing characters, using descriptive adjectives • Writing a short text Language through learning <ul style="list-style-type: none"> • Interpreting different meanings while understanding the difference between homophones and homographs 	

	<ul style="list-style-type: none"> Any language that comes up through the session
COGNITION	
LOTS (lower-order thinking skills)	<ul style="list-style-type: none"> Remembering: previous knowledge on the topic (describe, relate, tell, find) Understanding: discuss, outline, explain, predict Applying: use, illustrate, complete, solve
HOTS (higher-order thinking skills)	<ul style="list-style-type: none"> Analysing: identifying genres, compare, explain, categorize Evaluating: decide, prioritize, rate, justify Creating: imagine, design, plan Summarizing Debate: giving opinion, exemplifying,
Questions to be used	How would you read the title?; How should we pronounce the title?; Can you say other homographs?; Can you name some countries that have royal guards?; How do we call these countries?; Can you predict what type of story will it be?; What did you find out about Lead?; What do we call "enigma"?; How will the little soldier solve the enigma?; Were your guesses correct?; Which group was the closest to the solution?; What would you have done if you were Lead? Etc.
CULTURE	
Build intercultural knowledge in a wider cultural context, learn about monarchies etc.	
<ul style="list-style-type: none"> Learn about the Royal Guards Learn about the Royal Guards' ethics and mindset and discuss universal themes like loyalty, sense of duty, honor etc. Learn about the fable as a literary genre 	
METHODOLOGY	
1. Enabling activities	Brainstorming activity: recapping and recycling vocabulary
2. Development and final products	Matching pictures and vocabulary, listening comprehension
3. Final or follow-up activities	Show and tell: debate, devising a similar task on problem-solving
4. Assessment	Peer-assessment: students evaluate their group work and the others

	Group project: elaborate an enigma to be solved and present it to the class Observations
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Stages

1. Lead-in: (5')

- T introduces herself
- Ss introduce the person sitting next and say a sentence about them (hobbies, anything they have found out about the other)

2. Introduction: (3')

- T explains that Ss are going to read a short story about **Lead**, the little soldier. To make it more challenging, Ss will work and compete in international groups and collect tokens to work with. These tokens will be exchanged into various materials to work with in the STEAM class.
- Ss name-tag their groups, written on the board.

3. Warm-up: group work (5')

- Objectives: - to activate vocabulary and prior knowledge
- to engage students

Material: Worksheet 1, a picture of a lead soldier

The T projects a PPT slide (showing it for 10" x 2) , Ss have to write down as many words as possible related to what they have seen

- the group with the longest list gets a *token*



4. Pre-reading activities : open class (5')



-The T hands out the text to each group

-Ask: Look at the title: what can you notice?

-The T asks the Ss to pronounce the first word: "lead"

-Board: T explains that lead is a homograph : [li:d] ; [led], explains the meanings, and introduces the notion "homograph"

-Open class: How should we say it? Ss opt for the best version: [led]= plumbum, a type of metal, toy soldiers are often made from or [li:d]= short form of "leader"

-Ask: Can you say other homographs?

By the end of the class Ss decide which way of saying it would suit the text better.

5. While-reading activities: Ss read the first paragraph of the text: open class, group work (10')

Once upon a time, there was a **little soldier named Lead**. He was a member of the **Royal Guard** in a faraway kingdom.

-Ask: Name some countries that have royal guards (*token*)

Explain: those countries have royal guards where there is monarchy, empire etc.

5.1. Look at the first paragraph again: open class

-Ask: What type of story will it be?

Revise types of stories , eg. tales, fables etc. Give some reasons.

5.2. Read the next part of the story

Lead was **60 years old**, and was the head of the **three soldiers** that made up the Royal Guard. Their work was to protect the King.

-Ask: What did you find out about Lead? (He was 60 years old, Ss predict he is about to retire etc)



5.3. Read the next part

One day the little soldier went to talk to the others, “I have a mission for you and that is to solve this enigma. I am about to **retire**, so, whoever solves it will be the **new chief**“.

“If I have **17 hats** and I have to share them out **between the three of you**, how can I make you all happy?”

Open class reading

-Ask: What is enigma? Check vocabulary comprehension

Worksheet: write 4 synonyms for the word ‘enigma’

(*token*)

5.4. Read the next part

The soldiers started to answer in order. Neither of the two first were right, but **the third one** said:

- Ask: How can the little soldier solve this enigma?

-Ss come up with possible solutions- group work (*token*)

- Ss present their version to the other groups

5.5. Read the next part

“If I borrow a hat from a shopkeeper, we would have 18 hats which, divided into three parts would be 6 hats for each of us, and then if we give the shopkeeper 3 hats we will have 5 each.”



- Ask (open class discussion):

Were your guesses correct?

Which group was the closest to the solution?

Did it surprise you? Why/why not?

5.6. Read Lead's reaction/ final thoughts (5')

They were all surprised, Lead said “Your answer is **the smartest one**, and you have solved the enigma.”

While the other two **congratulated him**, Lead interrupted them. “By the way, **none of you will be my successor**“. The soldiers looked at him very surprised. “But **I solved the enigma!**”- said the smart soldier.

And **Lead** answered: “Did any of you think about why a soldier would want five hats? A soldier has to **have one hat and take care of it**. When you learn to take care of your things like we **care for our King**, you will **succeed me.**“.

That is how Lead, the little soldier, **taught the soldiers a valuable lesson.**

Group work: Summarize the lesson Lead taught his soldier and write it down on your worksheet

6. Post-reading activity (7')

6.1. Group work: Debate: decide if Lead's decision was correct or not. (*token*),

Present it to the class.



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6.2. Group discussion: What would you have done if you were Lead? (*token*)

Present it to the class.

6.3. Group work: Think of 5 qualities/ physical attributes a royal guard needs. Put them in order of importance.

Present it to the class.

6.4. Group work: List 4-5 elements of a fable and give examples from the text. (*token*)

7. Assessment: (10')

Group work: Our school headmaster is looking for a student successor. Think of a similar “enigma” for the candidates to solve. Present it to the class. (*token*)

Lead, the little soldier

Once upon a time, there was a **little soldier named Lead**. He was a member of the **Royal Guard** in a faraway kingdom.

Lead was **60 years old**, and was the head of the **three soldiers** that made up the Royal Guard. Their work was to protect the King.

One day the little soldier went to talk to the others, “I have a mission for you and that is to solve this enigma. I am about to **retire**, so, whoever solves it will be the **new chief**”.

“If I have **17 hats** and I have to share them out **between the three of you**, how can I make you all happy?”

The soldiers started to answer in order. Neither of the two first were right, but **the third one** said: “If I borrow a hat from a shopkeeper, we would have 18 hats which, divided into three parts would be 6 hats for each of us, and then if we give the shopkeeper 3 hats we will have 5 each.”

They were all surprised, Lead said “Your answer is **the smartest one**, and you have solved the enigma.”



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While the other two **congratulated him**, Lead interrupted them. “By the way, **none of you will be my successor**“. The soldiers looked at him very surprised. “”But **I solved the enigma!**”- said the smart soldier.

And **Lead** answered: “Did any of you think about why a soldier would want five hats? A soldier has to **have one hat and take care of it**. When you learn to take care of your things like we **care for our King**, you will **succeed me**.“.

That is how Lead, the little soldier, **taught the soldiers a valuable lesson**.



Title: Estimating the area of an irregular shape			
Subject: Mathematics	Students: 6 international groups aged 12-18	Timing: 45 min	
Topic: <ul style="list-style-type: none"> • Consolidation of knowledge learned in mathematics through examples from the surrounding life • Formation and development of correct estimation skills through estimates, using the map at a given scale of a nearby lake. 	Resources & materials: <ul style="list-style-type: none"> • printed and projected text • Worksheet • Maps • Square grid • Pencil, ruler, calculator, protractor • Computer, projector 		
CONTENT			
Learning objectives <ul style="list-style-type: none"> • To enhance logical-mathematical, interpersonal intelligences • To enhance learning skills (collaboration, creativity, critical thinking and communication, problem-solving), life skills (flexibility, leadership, initiative, productivity, social skills) 	Content objectives: <ul style="list-style-type: none"> ○ to define the area of a surface; ○ to calculate with a good approximation, the area of an area divided into unit squares; ○ use correctly the formula for calculating the area of a triangle; ○ to calculate with a good approximation, the area of the same surface divided into triangles; ○ to use geometric tools with skill 		
	Language objectives: <ul style="list-style-type: none"> • Read and comprehend an original text • To give opinions and make comparisons orally and in writing 		
COMMUNICATION			
Skills	√ Reading √ Speaking	√ Listening √ Interacting	√ Calculating
Grammar & syntactic structures Vocabulary Pronunciation, intonation & fluency	Language of learning <ul style="list-style-type: none"> • Understanding the language of narrative texts • Vocabulary: area, irregular shape, triangle, square, angle, grid. Language for learning <ul style="list-style-type: none"> • Describing methods, using descriptive adjectives • Writing a short text 		



	<p>Language through learning</p> <ul style="list-style-type: none"> • Interpreting different meanings while understanding the difference between shape and area • Any language that comes up through the session
COGNITION	
<p>LOTS (lower-order thinking skills)</p>	<ul style="list-style-type: none"> ● Remembering: previous knowledge on the topic (describe, relate, tell, find) ● Understanding: discuss, outline, explain, predict ● Applying: use, illustrate, complete, solve
<p>HOTS (higher-order thinking skills)</p>	<ul style="list-style-type: none"> ● Analyzing: identifying genres, compare, explain, categorize ● Evaluating: decide, prioritize, rate, justify ● Creating: geometric editing, design, plan ● Summarizing ● Debate: giving opinion, exemplifying,
<p>Questions to be used</p>	<p>How would you use formula?;</p> <p>How should we pronounce the name of the lake?;</p> <p>Can you name some countries that have volcanic lake?;</p> <p>How do we call these countries?;</p> <p>Can you predict what is the area of the lake St. Anne?;</p> <p>What do you know about the simple shapes area (formula)?</p> <p>Were your guesses correct?;</p> <p>Which group was the closest to the solution?;</p> <p>Which method did you like the best?</p>
CULTURE	
<p>Build intercultural knowledge in a wider cultural context</p> <ul style="list-style-type: none"> • Learn about Hargita county • Learn about the St. Anna Lake geographical features • Learn about the Legend of St. Anna Lake 	
METHODOLOGY	
<p>1. Enabling activities</p>	<p>Brainstorming activity: conversation, explanation, exercise, problematization, I know / want to know / I have learned;</p>



2. Development and final products	Matching the two maps edited by triangular and square grid.
3. Final or follow-up activities	Show and tell: debate, devising a similar task on problem-solving
4. Assessment	Peer-assessment: students evaluate their group work and the others

Estimating the area of an irregular shape

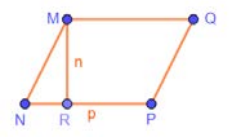
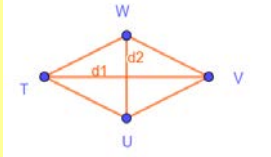
Introduction

- Area is the quantity that expresses the extent of a two-dimensional figure or shape.
- The area can be measured by comparing the shape to squares of a fixed size, named unit squares.
- In the International System of Units (SI), the standard unit is the square meter (m²), which is the area of a square whose sides are one meter long.
- There are several well-known formulas for the areas of simple shapes such as triangles, rectangles, parallelograms, quadrilaterals.

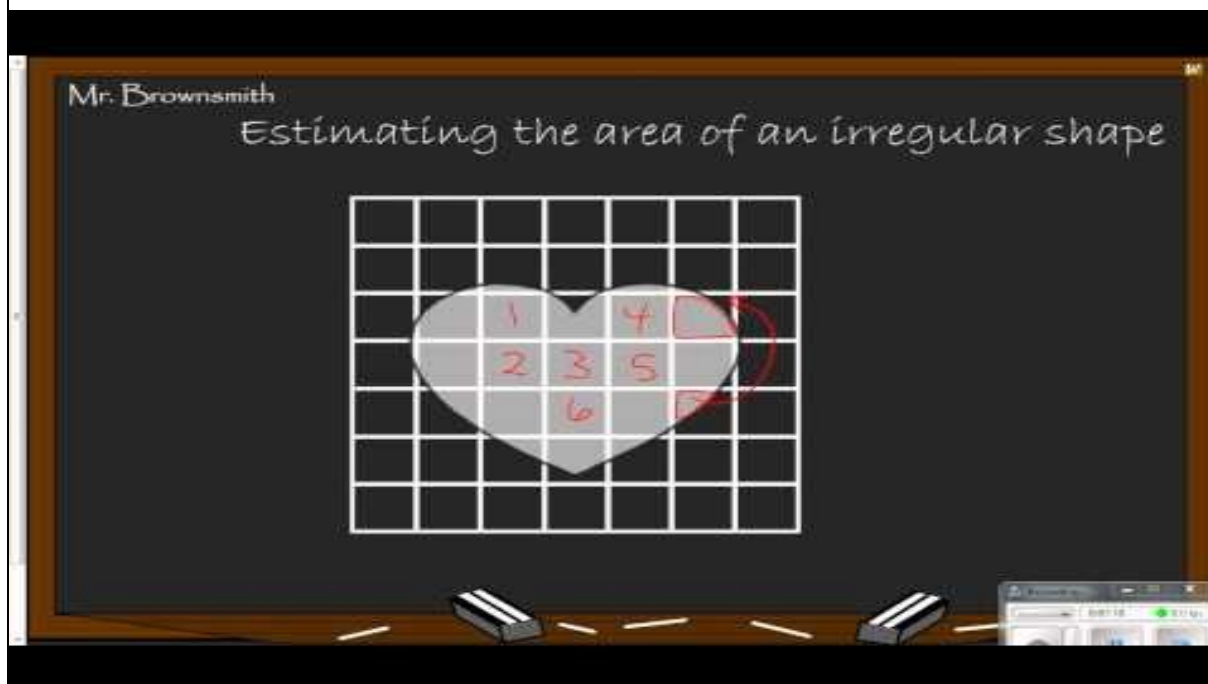
<i>simple shapes</i>	<i>figure</i>	<i>area formula</i>
triangle		$A = \frac{a \cdot h}{2}$ $A = \frac{a \cdot b \cdot \sin C}{2}$ $A = \frac{a^2 \cdot \sin B \cdot \sin C}{2 \cdot \sin A}$ $A = \sqrt{p(p-a)(p-b)(p-c)}, \quad p = \frac{a+b+c}{2}$
square		$A = a^2$
rectangle		$A = a \cdot b$



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parallelogram		$A = p \cdot n$
diamond		$A = \frac{d_1 \cdot d_2}{2}$

- Using these formulas, the area of any polygon can be found by dividing it into triangles.
- For shapes with curved boundary, calculus is usually required to compute the area.
- For irregular shapes, the area cannot be calculated accurately only approximate methods can be used.
- Let's watch a short video to learn the easiest way.



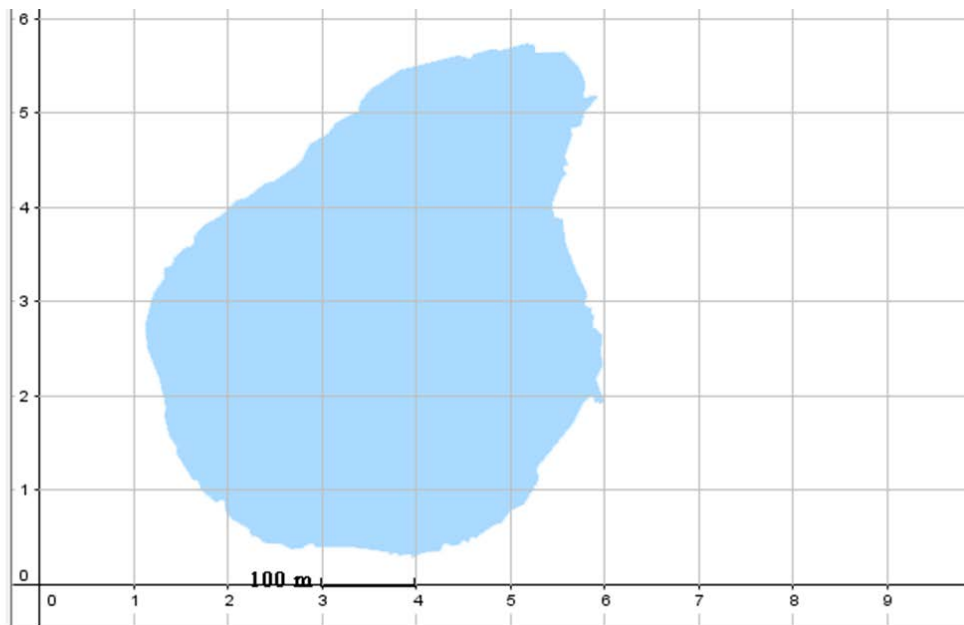
[Video](#)

1st task



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- Draw a square grid on the Saint Anne Lake's map, and evaluate its area by counting the unit squares.
- The unit square has a side of 100 meters, so one square has an area of 1 hectare.

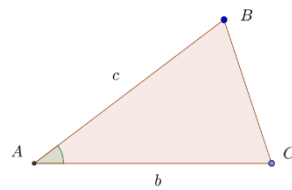
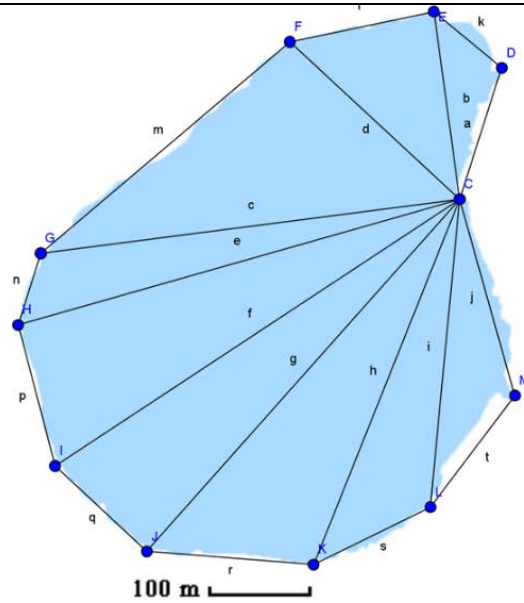


2nd task

- Another method is to divide the shape into triangles, and calculate their area.
- The most practical formula gives us the area as half product of two sides of the triangle and the sine of the angle enclosed by them.
 - Divide the lake's surface into triangles and calculate the sum of their areas.



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$$\mathcal{A} = \frac{b \cdot c \cdot \sin(A)}{2}$$



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- Comparing the area values calculated by the two different methods, the following results could be recorded per group.



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The calculated results

Group	Name	1st task	2nd task	average
1	Sushizz	19,6	21,6	20,6
2	Equationers	19,3	19,03	19,165
3	SRP	19,1	15,4	17,25
4	Anonims	19,5	19,4	19,45
5	Tigers	18,5	24,2	21,35
6	S-unit	18,5	18	18,25
	average	19,08	19,61	
	(Saint Anne Lake area is 19,3 ha)			

Feed-back worksheet

Write sentences using the given words.

Example:

Erasmus+ Programme – Strategic Partnership
Project Nr: **2019-1-RO01-KA229-063584**



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Lake, St. Anne, county

St. Anne Lake is located in Harghita County.

- Origin, lake, volcanic

.....

- Shape, triangle, square, regular

.....

- Grid, area, square, approximate, irregular

.....

- Video, legend

.....

- Chapel, wood, stone, to build

.....



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Title: <u>Consolidation of solubility matter.</u>		
Subject: Chemistry	Students: 6 international groups aged 12-18	Timing: about 50 min
Topic: Topic: Developing critical thinking and problem-solving skills through chemistry.	Resources & materials: <ul style="list-style-type: none"> ● a worksheet (WORKSHEET) ● a multimedia presentation, ● <i>The graph of the solubility curve</i> 	
CONTENT		
Learning objectives Students: - define the term soap - classify soaps - list the methods of obtaining soaps - describe the process of saponification of fats	Content objectives: Students: <ul style="list-style-type: none"> ● Apply theoretical knowledge in practice, ● Recall and consolidated what they know about solubility and percentage concentration 	
	Language objectives: <ul style="list-style-type: none"> ● Learn new vocabulary connected with solubility and mixing liquids ● Communication within groups in order to make the final product which is homemade soap 	
COMMUNICATION		
Skills	<ul style="list-style-type: none"> ✓ Reading ✓ Listening ✓ Writing ✓ Speaking 	



	<p>✓ Interacting</p>
<p>Grammar & syntactic structures Vocabulary Pronunciation, intonation & fluency</p>	<p>Language of learning</p> <ul style="list-style-type: none"> • Understanding the language of the names of chemical processes • Using Present and Future Tenses • Vocabulary: solution, concentration, percentage, concentration, solubility, saturated solution, unsaturated solution, precipitate, dissolve, solute, solvent, increases, decreases <p>Language for learning</p> <ul style="list-style-type: none"> • Application of the theory of mixing liquids in practice • Making a soap. <p>Language through learning</p> <ul style="list-style-type: none"> • Revision of words connected with mixing liquids and solubility that comes up while performing experiments
<p>COGNITION</p>	
<p>Active methods</p>	<p>In order to encourage ss in the lesson, the T uses active methods, such as: brainstorming, filling the tables, answering questions, presenting their answers to the rest of the group</p>
<p>Questions to be used</p>	<p>Do you know the term of solubility? How do we count percentage concentration? How the mass of the substance depends on the percentage of concentration?</p>
<p>METHODOLOGY</p>	
<p>1. Enabling activities</p>	<p>Brainstorming activity: revising and recycling vocabulary</p>
<p>2. Development and final products</p>	<p>Applying theoretical knowledge in practice – making homemade soap.</p>
<p>3. Final or follow-up activities</p>	<p>Students present the results of their group work to the teams</p>
<p>4. Assessment</p>	<p>Peer-assessment: students evaluate their group work and the others observations</p>



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Stages of the CLIL Chemistry lesson:

I Lead-in: (5')

- T introduces herself and welcomes all the ss
- Ss introduce themselves and get to know other members of the group.

II Introduction: (10')

The teacher explains the objectives of the lesson to the ss and informs them about the main topic of the lesson, which is consolidation of solubility matter. The ss are divided into multinational groups, whose task is to communicate together in English in order to solve the tasks given by the teacher. Then, ss watch a short presentation to familiarise with the definition of solubility.

<https://www.youtube.com/watch?v=7tOOG0n-K2c>

III Warm-up: (10')

Ss work in groups. They have to match terms to the definitions.

TERM	DEFINITION
solubility	1. mass of a substance in 100 g of solute at a given temperature
solute	2. Substance that is dissolved in another substance
percentage	3. Substance that increase solubility of another substance
solvent	4. Substance that other substance is dissolved in.
concentration	5. mass of a substance in 100 g of solution

IV Presentation (5')

<https://www.youtube.com/watch?v=zVz6o08g5Po>

V Controlled Practice (20')

Each group is given a handout with three exercises to do.



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WORD CARD - group 1

Task 1

500 gram of sugar was dissolved in 200 grams of water. Using the diagram of solubility curve and basic calculations state the temperature of water.

(The graph of the solubility curve on a separate sheet).

Write down the water temperature value, which you read on a piece of paper.

Write in down solubility of sugar.

Task2

Calculate percentage concentration of your saturated solution (from previous task).

Write the result on the piece of paper.

Task3

State whether it is possible to prepare a salt solution with the concentration similar to the concentration of sugar (from previous task)? Discuss your results in groups.



WORD CARD - group 2

Task 1

550 gram of sugar was dissolved in 200 grams of water. Using the diagram of solubility curve and basic calculations state the temperature of water.

(The graph of the solubility curve on a separate sheet).

Write down the water temperature value, which you read on a piece of paper.

Write in down solubility of sugar.

Task2

Calculate percentage concentration of your saturated solution (from previous task).

Write the result on the piece of paper.

Task 3

State whether it is possible to prepare a salt solution with the concentration similar to the concentration of sugar (from previous task)? Discuss your results in groups.



WORD CARD - group 3

Task 1

600 gram of sugar was dissolved in 200 grams of water. Using the diagram of solubility curve and basic calculations state the temperature of water.

(The graph of the solubility curve on a separate sheet).

Write down the water temperature value, which you read on a piece of paper.

Write in down solubility of sugar.

Task2

Calculate percentage concentration of your saturated solution (from previous task).

Write the result on the piece of paper.

Task3

State whether it is possible to prepare a salt solution with the concentration similar to the concentration of sugar (from previous task)? Discuss your results in groups.



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WORD CARD – group 4

Task 1

650 gram of sugar was dissolved in 200 grams of water. Using the diagram of solubility curve and Basic calculations state the temperature of water.

(The graph of the solubility curve on a separate sheet).

Write down the water temperature value, which you read on a piece of paper.

Write in down solubility of sugar.

Task 2

Calculate percentage concentration of your saturated solution (from previous task).

Write the result on the piece of paper.

Task 3

State whether it is possible to prepare a salt solution with the concentration similar to the concentration of sugar (from previous task)? Discuss your results in groups.



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WORD CARD - group 5

Task 1

700 gram of sugar was dissolved in 200 grams of water. Using the diagram of solubility curve and Basic calculations state the temperature of water.

(The graph of the solubility curve on a separate sheet).

Write down the water temperature value, which you read on a piece of paper.

Write in down solubility of sugar.

Task2

Calculate percentage concentration of your saturated solution (from previous task).

Write the result on the piece of paper.

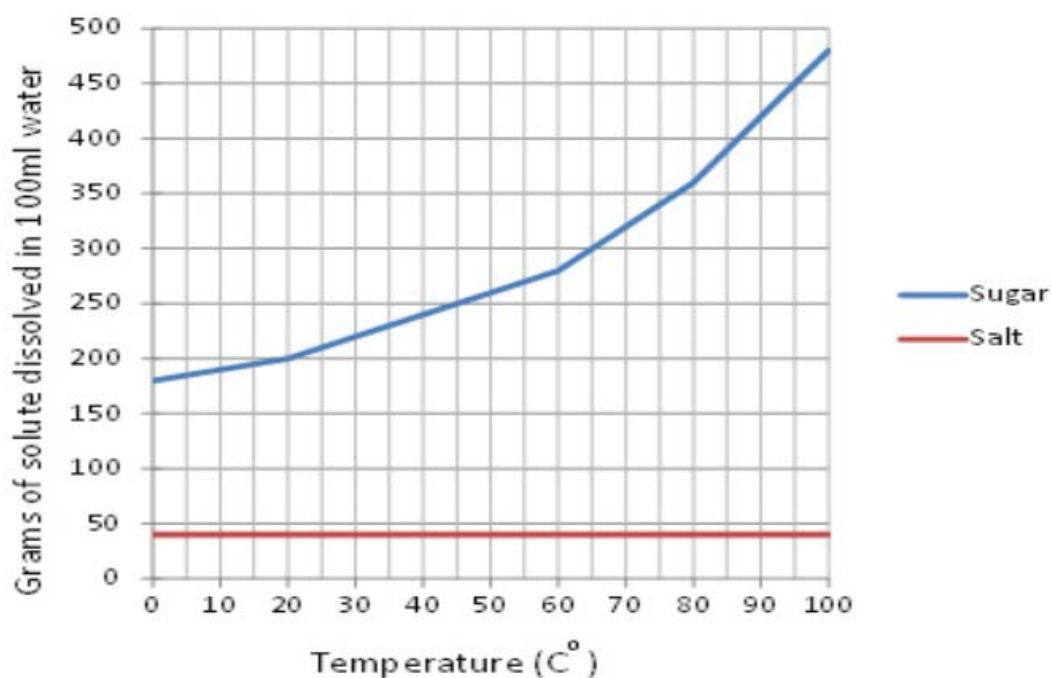
Task 3

State whether it is possible to prepare a salt solution with the concentration similar to the concentration of sugar (from previous task)? Discuss your results in groups.



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Solubility of Salt and Sugar



VI Summary (5')

Ss complete the table:

Group number	Solubility	Temperature ^o C	Percentage concentration
1			
2			
3			
4			
5			

Students present the results of their work in groups to the team. They complete the table and they are able to find the conclusion of the lesson which is:

Everything depends on the substance.



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• Title: Polish sites on Unesco's World Heritage List.		
Subject: Geography	Students: 6 international groups aged 12-18	Timing: about 60 min
Topic: Developing critical thinking and problem-solving skills through geography.	Resources & materials: <ul style="list-style-type: none"> ● a worksheet (WORKSHEET) ● a geographical atlas; ● a multimedia presentation, ● a crossword puzzle 	
CONTENT		
Learning objectives to get to know the tourist attractions of Poland with particular emphasis on the objects inscribed on the UNESCO World Cultural and Natural Heritage List	Content objectives: <ul style="list-style-type: none"> ● to know Poland's major tourist attractions and Polish sites inscribed on the UNESCO World Heritage List. ● to understand the need to preserve the values of heritage, natural heritage; ● to know the influence of each inhabitant of Poland on the cultural development of the country. ● to characterise the tourist values of Poland using examples and reflect on their value; ● to locate on a map and describe objects from the UNESCO World Heritage List in Poland. 	
	Language objectives: <ul style="list-style-type: none"> ● knowledge of the Polish sites inscribed on the UNESCO World Heritage List. ● The ability to place the locations of those signs on the map. ● Creation of their own presentation about chosen object from the Unesco Heritage list. 	
COMMUNICATION		
Skills	<ul style="list-style-type: none"> ✓ Reading ✓ Listening ✓ Writing 	



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	<ul style="list-style-type: none"> ✓ Speaking ✓ Interacting
<p>Grammar & syntactic structures Vocabulary Pronunciation, intonation & fluency</p>	<p>Language of learning</p> <ul style="list-style-type: none"> • Understanding the language of geographical features • Using Present and Future Tenses • Vocabulary: heritage, monuments, historical sites, churches, open-air museum. <p>Language for learning</p> <ul style="list-style-type: none"> • Describing Polish landmarks, using descriptive adjectives • Making a presentation <p>Language through learning</p> <ul style="list-style-type: none"> • Revision of words connected with geographical features (appearing not only in Poland) • Any language that comes up through the session
COGNITION	
<p>Active methods – the students in the centre of the teaching and learning process</p>	<p>In order to make the process of cognition a long time process the teacher's idea is to let students work on their own so as they remember Rother students' ideas.</p>
<p>Questions to be used</p>	<p>Do you know the meaning of word 'heritage'? What do you know about UNESCO? Can you name Any UNESCO sites? Have you ever visited one? Have you got any UNESCO sites in your country? Can you name them or even show on the map? Etc...</p>
CULTURE	
<p>Build intercultural knowledge in a wider cultural context, learn UNESCO sites etc.</p> <ul style="list-style-type: none"> • Learn about Polish Heritage list, • Learn about landscapes and buildings etc. 	



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• Learn about Polish geographical features	
METHODOLOGY	
Enabling activities	Brainstorming activity: revising and recycling vocabulary
Development and final products	Making group presentations, searching for some new information about UNESCO sites, browsing the Internet sites
Final or follow-up activities	Students present the results of their work in groups to the team
Assessment	Peer-assessment: students evaluate their group work and the others Observations

Stages of the CLIL Geography lesson:

I Lead-in: (7')

- T introduces herself and welcomes all the ss
- Ss introduce themselves and get to know other members of the group.

II Introduction: (5')

The teacher explains the objectives of the lesson to the ss and informs them about the main topic of the lesson, which is the UNESCO listed monuments. The teacher divides the ss into multinational groups, whose task is to communicate together in the language of the project - which is English.

III Warm-up: (7')

The teacher explains what the UNESCO World Heritage List is; recalls that UNESCO is the United Nations Educational, Scientific and Cultural Organisation;

[PPT - UNESCO PowerPoint Presentation, free download - ID:5514781 \(slideserve.com\)](#)



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IV Presentation (22')

The teacher presents to the students issues related to the tourist attractiveness of Poland presented on a multimedia presentation with a division of the objects placed on the Unesco World Heritage List into natural and non-natural values. The teacher projects a PPT slide (showing it for 10" x 2) in order students can deal with the task in the next stage.

V Controlled Practice (10')

- The teacher distributes photocopies of maps of Poland to the students, so that they can use the multimedia presentation to mark on the photocopies the sites included in the UNESCO list

Task 1:

On the basis of geographical coordinates determine the location of selected Unesco sites in Poland. Write their names (work with the geographical atlas)

- a) 20°31'E 49°51'N
- b) 21°02'E 52°12'N
- c) 18°37'E 53°02'N
- d) 16°12'E 51°04'N

On the map showing the Unesco sites in Poland, mark with a color:

- a) blue Bialowieza Forest
- b) red - Centennial Hall in Wrocław
- c) black the Teutonic Castle in Malbork
- d) green Muskauer Park



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- The students, working in groups, perform a set of tasks summing up the topic of the lesson. The aim of the tasks is to consolidate the pupils' knowledge of the Unesco sites in Poland and their location on the map of Poland. Students also use their mathematical knowledge in solving geographical tasks, e.g. calculating the real distances between the Unesco sites on the map.

Task 2:

Indicate in what year did the creation of the Unesco World Heritage List begin?

Mark the correct answer:

- a) 1972
- b) 1975
- c) 1977
- d) 1979



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Task 3:

Link the object to the appropriate criterion for its Unesco listing:

Write the correct criterion in the appropriate space in the table

(VI criterion, IV criterion)

Old Town in Cracow	
Auschwitz – Birkenau	

VI Summary (15')

Students present the results of their work in groups to the team.

The last part of the lesson is the possibility to revise Polish UNESCO sites through the game and test their knowledge:

<https://wordwall.net/pl/resource/17730963/historia/polish-unesco-heritage-sites>



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Title: The Tile Arts and Math (geometric proportions)		
Subject: Arts	Year: 6 th April 2022	Timing/number of sessions: 60 min/1
Topic: The architecture of the city of Porto	Resources & materials <ul style="list-style-type: none"> • Whiteboard • Computer & access to the Internet 	Students: 6 international groups aged 12-18
CONTENT		
Learning objectives “Isometries in the light of Porto tiles”	Content objectives: <ul style="list-style-type: none"> • To learn about local and global heritage • To recognize the heritage and national identity • Recognize and name the types of isometries • Recognize symmetries and axes of symmetry. • Know the history of tile art • Isometric transformations in the Cartesian plane • To learn about types of symmetry 	
	Language objectives: <ul style="list-style-type: none"> • To comprehend oral presentation • To express and give opinions and make comparisons orally • To respond to questions and provide answers 	
COMMUNICATION		
Skills	Reading √	Listening √
	Speaking √	Writing √
		Interacting √
Grammar & syntactic structures Vocabulary Pronunciation, intonation & fluency	Language of learning <ul style="list-style-type: none"> • Understanding the language of historical narrative • Using past tenses • Vocabulary: vanguard, emperor, flank, etc. Language for learning <ul style="list-style-type: none"> • Responding to questions • Paraphrasing pieces of information Language through learning <ul style="list-style-type: none"> • Interpreting • Any language that comes up through the session 	



COGNITION		
LOTS (lower-order thinking skills)	<ul style="list-style-type: none"> Remembering: previous knowledge on the topic (describe, relate, tell, find) Understanding: discuss, outline, explain, predict Applying: use, illustrate, complete, solve 	
HOTS (higher-order thinking skills)	<ul style="list-style-type: none"> Analysing: identify, compare, explain, categorize Evaluating: decide, prioritize, rate, justify Creating: imagine, design, plan Summarizing Debate: giving opinion, exemplifying 	
Questions to be used	<ul style="list-style-type: none"> What coating did they observe on the facade of the buildings? What themes are used in this coating? What colors dominated What pattern did you observe? How will the manufacturing process of these coatings be? 	
CULTURE		
Build intercultural knowledge in a wider cultural context. Taking into account the fact that these students visited the city of Porto the day before the class, its architectural heritage, where a special focus was given to the various tiles present in the city, it is justified from them to talk about mathematics and in particular modules, Cartesian axes and isometries.		
METHODOLOGY		
1. Enabling activities	Power point and video presentation of the topic	Google slide presentation "Art and Mathematics"
2. Development and final products	Listening and visual comprehension, oral responding	
3. Assessment	During the presentation, we point out key information, re-establish some of the concepts.	



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CLIL lesson plan

	Procedure of the lesson	Brief argumentation
Stage 1: Introduction		
IP:	<p>We gather at the Arts Classroom. I welcome the visiting students and their teachers to the school and wish them a pleasant stay.</p> <p>I announce the topic of the lesson and introduce the students to the most important facts.</p> <p>I prepare the students for the presentations, presentation some of the buildings the student visited in the day before.</p>	<p>To establish a welcoming and productive working environment.</p> <p>To introduce the topic and prepare the students for their work.</p>
Time:	5-10 min	
Stage 2: The Tile		
IP:	Presentation: Google slide presentation “Art and Mathematics”	<p>To provide the background for the topic.</p> <p>To present the topic in an engaging and visually appealing way.</p>
Time:	20-30 min	
Stage 3: Quiz		
IP:	The students are tested about their understanding and knowledge of the topic.	To check the students understanding of the topic.
Time:	10-15 min	

ART AND MATHEMATICS



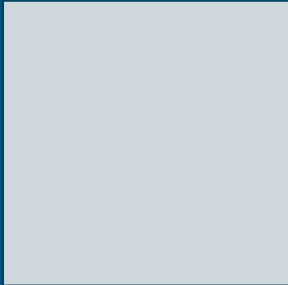
Erasmus+ Maths Alive

abril-2022



TILE

Is a small ceramic piece known in Arabic as a polished stone. A tile is a piece of little thickness square or not, with shiny and waterproof glazed face.



The tile can be:
hand - painted, abstract prints or figurative motifs with drawings.



Or patterns combined in panels, using many tiles



If we talk about colors, there are tiles of different colors, however the most common are blue. But we can easily find them in white, yellow, etc.



It's incorrect to state that the tiles comes from blue. But it is true that blue is the color of many tiles.

The tiles tell us old stories.



Conquest of Ceuta by the
Infantes D. Duarte, D.
Pedro and D. Henrique



or the lives of saints, like an illustrated bible or country landscape, etc.

The tiles decorated palaces, chapels, churches, halls and monumental kitchens.



Where and when tiles born?

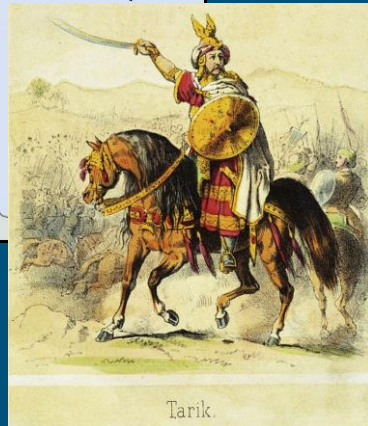
The first known expressions come from Egypt in the 27th century BC.



Also another good example is in Mesopotamia in the 575 BC the Babylonian Gate



How did the tiles come to Portugal?



In 711 AD the Muslims took over a large part of the Iberian Peninsula and stayed here for 800 years.

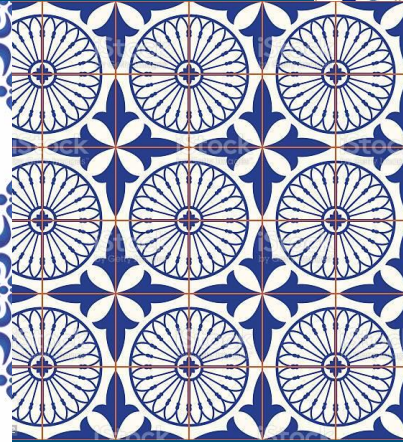
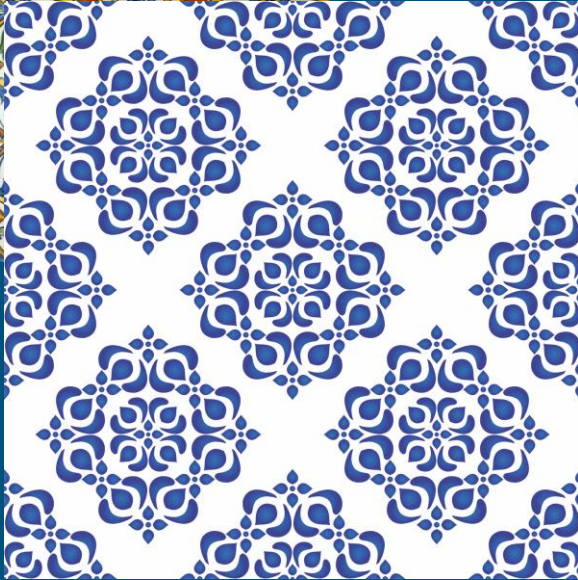
At that time they left agricultural, mathematical and tile knowledge, who stayed in Spain.

When D. Manuel I (portuguese king) travelled to Spain, was fascinated by the tiles and ordered them for the Palácio de Sintra.

In the XVI th century, Flemish artisans came to Portugal and this art became popular.



After the earthquake of 1755, and the need to reconstruction Lisbon, the tile appears as an alternative to stone. This is when the pattern tiles appear more prominently.



As a set, forming patterns, tiles are easy to reproduce and place, and quickly become fashion, starting to fill the facades with patterns and colors.

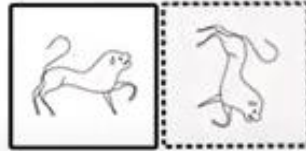


Now comes the point where geometry comes in to talk about tiles.

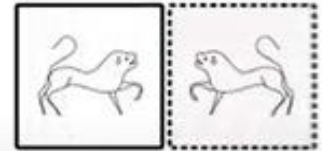
ISOMETRIAS
ISOMETRIES



TRANSLAÇÃO
TRANSLATION

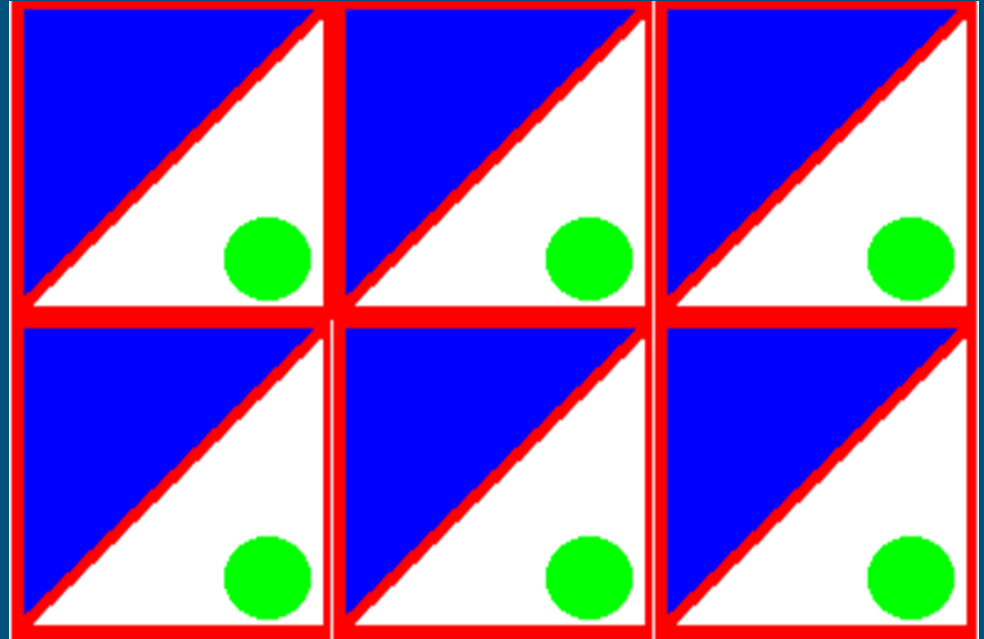
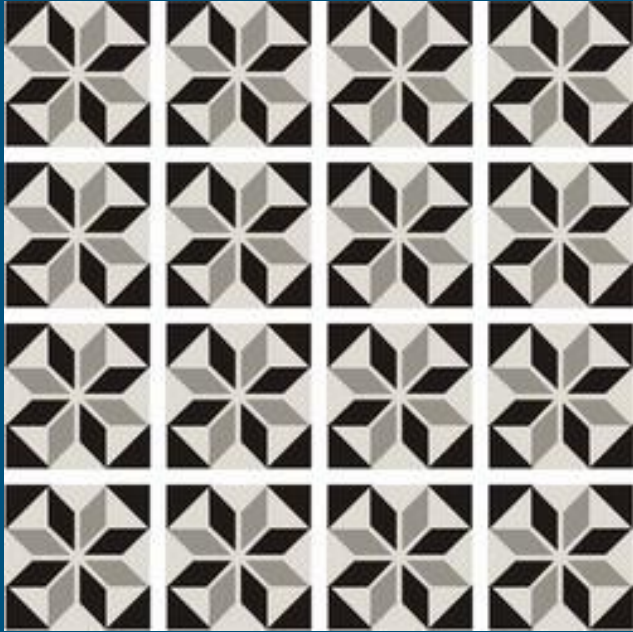


ROTAÇÃO
ROTATION



REFLEXÃO
REFLECTION

To create a pattern by repeating/translating the module.



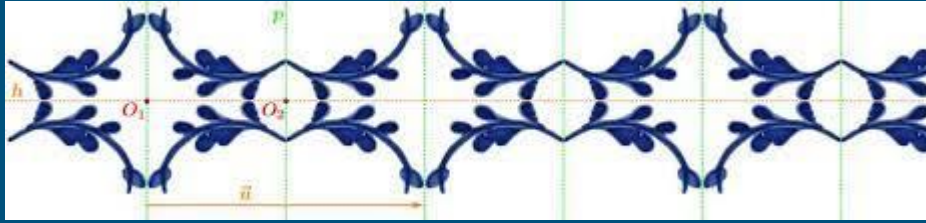
Translation: the module is always repeated in the same way, parallel or vertically at itself.

To create a pattern by repeating/rotating the module.



Repetition of one or more module through a rotating movement about an axis.

To create a pattern by repeating/reflection the module.



A figure has a reflective symmetry when half of the figure reflects on the other half.

Now let's work.

-Activity:

Suggested time, to complete the task in 50 minutes.

Suggested materials: A4 size sheet containing a copy of the activity, pencil, eraser, pencil sharpener, markers or colored pencils, ruler, square and compass.

1. Choose an A4 sheet available, with an image of Portuguese tiles.
 - a) Draw by completing the missing tile.
 - b) Paint with the material of your choice that best suits the chosen image.

2. Identifies the isometric present.



Title: The Battle of the Frigidus River		
Subject: History	Year: 9 th May 2022	Timing/number of sessions: 45 min/1
Topic: Historical background to and the outcome of the Battle of the Frigidus River.	Resources & materials <ul style="list-style-type: none"> • Whiteboard • Mobile phones & access to the Internet • 	Students: 6 international groups aged 12-18
CONTENT		
Learning objectives To learn about the historical background of the Battle of the Frigidus River.	Content objectives: <ul style="list-style-type: none"> • To learn about Vipava Valley, the Roman Empire and the Battle of the Frigidus river • To familiarise with the reasons behind the civil wars in Roman Empire. • To contextualise and emphasise the importance of the battle for the fate of Roman Empire 	
	Language objectives: <ul style="list-style-type: none"> • To comprehend oral presentation • To express and give opinions and make comparisons orally • To respond to questions and provide answers 	
COMMUNICATION		
Skills	Reading √ Listening √ Writing √ Speaking √ Interacting√	
Grammar & syntactic structures Vocabulary Pronunciation, intonation & fluency	Language of learning <ul style="list-style-type: none"> • Understanding the language of historical narrative • Using past tenses • Vocabulary: vanguard, emperor, flank, etc. Language for learning <ul style="list-style-type: none"> • Responding to questions • Paraphrasing pieces of information Language through learning <ul style="list-style-type: none"> • Interpreting • Any language that comes up through the session 	



COGNITION		
LOTS (lower-order thinking skills)	<ul style="list-style-type: none"> • Remembering: previous knowledge on the topic (describe, relate, tell, find) • Understanding: discuss, outline, explain, predict • Applying: use, illustrate, complete, solve 	
HOTS (higher-order thinking skills)	<ul style="list-style-type: none"> • Analysing: identify, compare, explain, categorize • Evaluating: decide, prioritize, rate, justify • Creating: imagine, design, plan • Summarizing • Debate: giving opinion, exemplifying 	
Questions to be used	<p>Where does the Battle of the Frigidus River take place?; Who were the leaders of the two opposing armies?; What were some of the reasons behind the battle?; What are some of the other names for Constantinople?; How many soldiers does a legion consist of?; What is the Bora wind and what role did it play in the battle?; Who won the battle?; Why did the Roman Empire fall?; What are some of the things that we can learn from the Battle of the Frigidus River?</p>	
CULTURE		
<p>Build intercultural knowledge in a wider cultural context, learn about Roman Empire, etc. The most important facts and connections between Vipava Valley, the Roman Empire and the Battle of the Frigidus river.</p>		



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METHODOLOGY		
1. Enabling activities	Power point and video presentation of the topic	
2. Development and final products	Listening and visual comprehension, oral responding	
3. Final or follow-up activities	Kahoot quiz which tests the students understanding of the topic	
4. Assessment	<p>During the quiz, we point out key information, re-establish some of the concepts and correct some of the most glaring wrong answers.</p> <p>The winner of the quiz is announced and presented with a complementary prize.</p>	



CLIL lesson plan

	Procedure of the lesson	Brief argumentation
Stage 1: Introduction		
IP:	<p>We gather at the school auditorium. I welcome the visiting students and their teachers to the school and wish them a pleasant stay.</p> <p>I announce the topic of the lesson and introduce the students to the most important facts and connections between Vipava Valley, the Roman Empire and the Battle of the Frigidus river.</p> <p>I prepare the students for an animated documentary video about the Battle of the Frigidus river.</p>	<p>To establish a welcoming and productive working environment.</p> <p>To introduce the topic and prepare the students for their work.</p>
Time:	5-10 min	
Stage 2: Battle of Frigidus 394 documentary video		
IP:	<p>Students watch a documentary video about the Battle of the Frigidus river and the subsequent fall of Roman Empire.</p> <p>They are asked to pay close attention to the details in the video, as their knowledge would be tested after the lesson.</p> <p>Video: <i>Battle of Frigidus 394 - End of the Pagan Rome DOCUMENTARY</i> https://www.youtube.com/watch?v=bNSyUqIHjcI (from 11:43)</p>	<p>To provide the background for the topic.</p> <p>To present the topic in an engaging and visually appealing way.</p> <p>To familiarise the students with the reasons behind the civil wars in Roman Empire.</p> <p>To contextualise and emphasise the importance of the battle for the fate of Roman Empire.</p>
Time:	10-15 min	
Stage 3: Kahoot quiz		
IP:	<p>Having watched the video, the students are now asked to use their mobile phones to test their understanding and knowledge of the topic through Kahoot quiz, specifically designed for the purpose of the lesson.</p> <p>During the quiz, we point out key information, re-establish some of the concepts and correct some of the most glaring wrong answers.</p> <p>The winner of the quiz is announced and presented with a complementary prize.</p> <p>Kahoot quiz: <i>Battle of the Frigidus River</i> https://create.kahoot.it/details/e75e94f8-1e74-40cd-9fbe-5ea922f2d434</p>	<p>To check the students understanding of the topic in a fun and engaging way and to put their knowledge to use.</p>
Time:	20-25 min	



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<p>Title: Otto von Guericke- scientist his experimete about pressure in Physic</p>	<p>Students: 6 international groups aged 12-18</p>	
<p>Subject:Physic</p>	<p>Year:11th May 2022</p>	<p>Timing/number of sessions: 45.minutes</p>
<p>Topic: Idea - The connection between mathematics and physics and the connection between mathematics and history</p>	<p>Resources &materials Computer Projector Powerpoint presentation, pictures</p>	
<p>CONTENT</p>		
<p>Learning objectives To learn about basic presentation of von Guerick and his famous experiment and for the importance of this experiment for the further development of science. And to learn about the historical background of his life and work.</p>	<p>Content objectives: To learn about von Guerick and his famous experiment and for the importance of this experiment for the further development of science. To familiarise with the reasons how he sucked air out of the space between the two stacked hemispheres with his air pump. If there was air and normal air pressure between the hemispheres, the spheres separated easily. When he sucked out the air, however, the hemisphere could not separate even eight pairs of horses.</p>	



To contextualise and emphasise the importance of his work for science, basic presentation of von Guerick and his famous experiment and for the importance of this experiment for the further development of science.

Language objectives:

- To comprehend oral presentation
- To express and give opinions and make comparisons orally
- To respond to questions and provide answers

COMMUNICATION

Skills

Reading ✓ Listening ✓ Writing ✓ Speaking ✓
Interacting ✓

Grammar & syntanctic structures

Vocabulary

Pronunciation, intonation & fluency

Language of learning

- Understanding the language of historical narrative
- Using past tenses
- Vocabulary: air pressure, reduce the pressure, Vacuum gripper etc.

Language for learning

- Responding to questions
- Paraphrasing pieces of information

Language through learning

- Interpreting
- Any language that comes up through the session
-



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COGNITION		
LOTS & HOTS	<ul style="list-style-type: none"> • Remembering: previous knowledge on the topic (describe, relate, tell, find) • Understanding: discuss, outline, explain, predict <p>Applying: use, complete, solve</p> <ul style="list-style-type: none"> • Analysing: identify, compare, explain, categorize • Evaluating: decide, prioritize, rate, justify • Creating: imagine, Experimental work , physic task • Summarizing <p>Debate: giving opinion, exemplifying</p>	
Questions to be used	<p>Does anyone know where Magdeburg is located? Is that what you mean, or do you know? How do you know? What do you conclude?</p> <p>Where do we apply the von Guerick experiment principle today?</p>	
CULTURE		
Build intercultural knowledge in a wider cultural context, etc.		
METHODOLOGY		



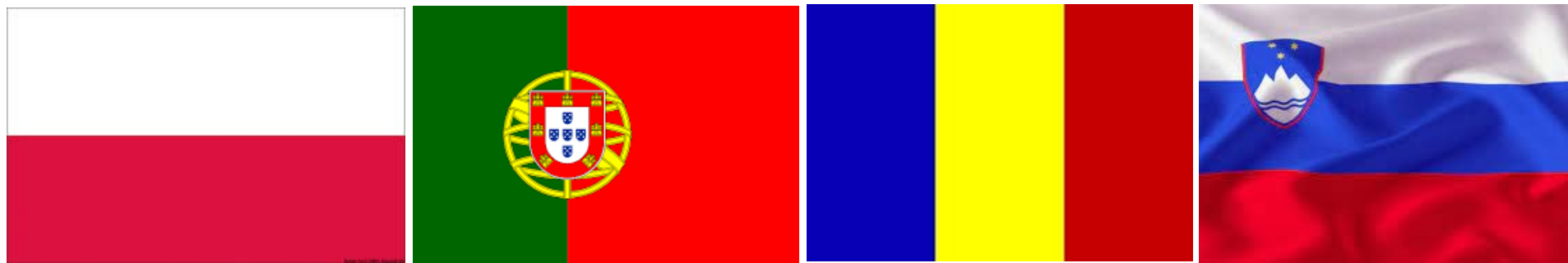
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1. Enabling activities	Power point and video presentation of the topic	
2. Development and final products	Listening and visual comprehension, oral responding	
3. Final or follow-up activities	Trying to separate which tests the students understanding of the topic Each group performs experimental tasks and physical tasks	
4. Assessment	Questions to fit back understanding presentations	

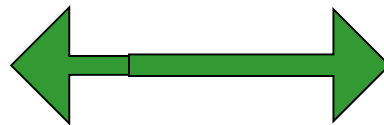
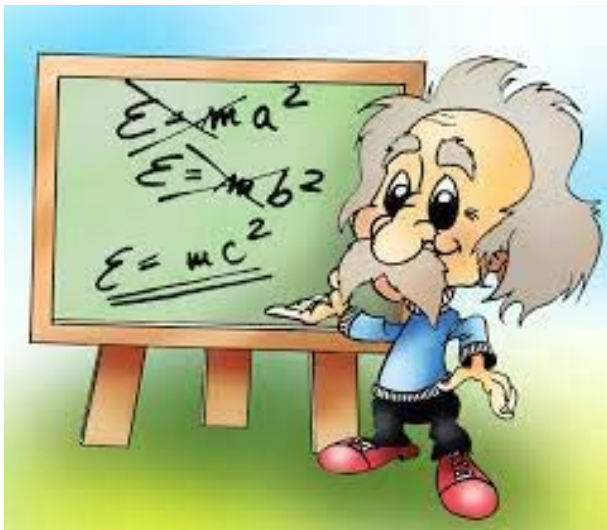
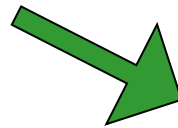
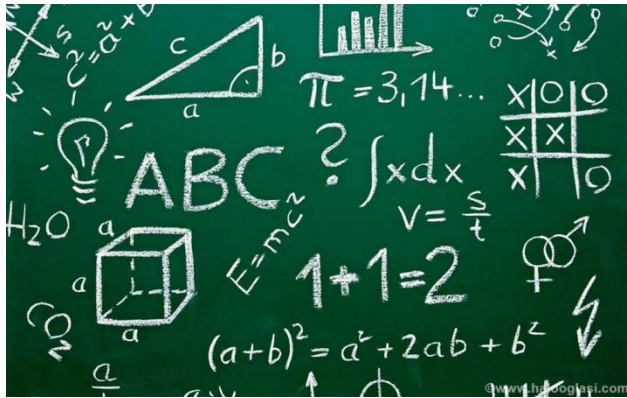


MATHS ALIVE

Vipava, 11. 5. 2022



Idea - The connection between mathematics and physics and the connection between mathematics and history





physics - history

MATHS alive



1654 City of Magdeburg



Otto von Guericke



Lived 1602 – 1686.



Otto von Guericke

Lived 1602 – 1686.



MATHS alive



He was the mayor of the city

He was a politician, a judge, a mathematician, a physicist, an engineer, a linguist, a philosopher, ...

Above all, he was an inventor



He designed the air pump himself and did experiments at reduced air pressure.



He was one of the first to study static electricity, measured air pressure, connected changes in air pressure with weather, and he was the first to predict that there was an empty space (vacuum) between planets and stars ...



Otto von Guericke

Lived 1602 – 1686.

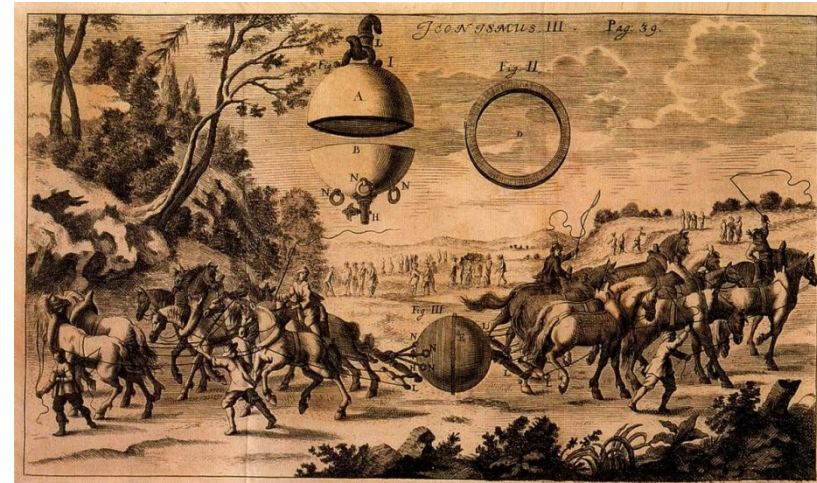
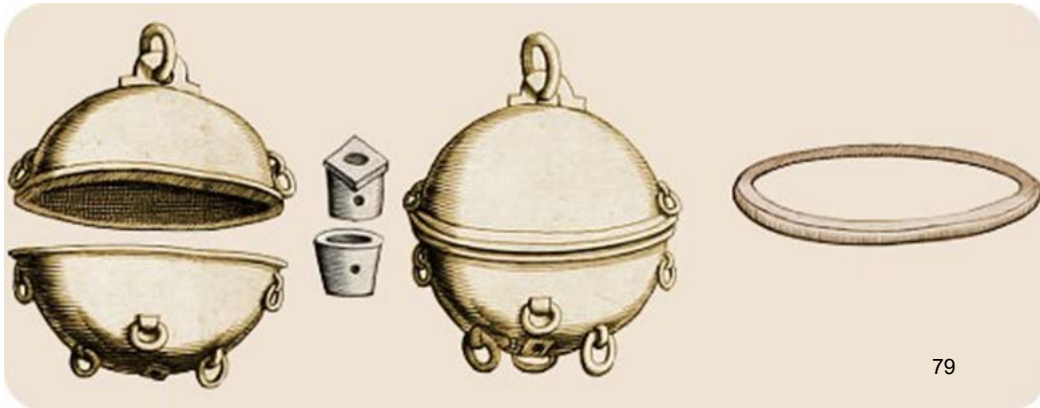


MATHS alive

1654 in Magdeburg he showed the famous experiment



In front of a large crowd, he sucked air out of the space between the two stacked hemispheres with his air pump. As long as there was air and normal air pressure between the hemispheres, the spheres separated easily. When he sucked out the air, however, the hemisphere could not separate even eight pairs of horses.





Otto von Guericke

Lived 1602 – 1686.

1654 in Magdeburg



MATHS alive





Otto von Guericke

Lived 1602 – 1686.

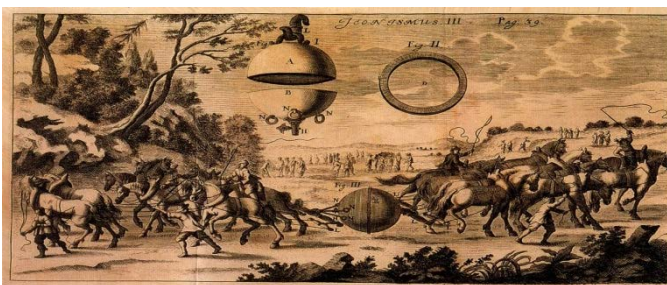
1654 in Magdeburg



MATHS alive

model of Magdeburg
hemispheres





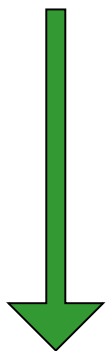
Why is Guerick's Magdeburg experiment so important?



It showed for the first time how high intensity the air pressure has.



We don't have a sense of how much power air pressure has.



Based on the experiment, he measured the air pressure.



1 barr or 100 kPa or 100.000 N/m²

Where do we apply the von Guerick experiment principle today?



Inside the limited space, we reduce the pressure, and the normal pressure of the surrounding causes something ...





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