MATHS IS AROUND US

ERASMUS+

STATISTICAL SURVEY
How students feel about math

MATHS AND ARTS
Enjoy with our art pieces

CRYPTOGRAPHY AND EUROPEAN HERITAGE

Read our coded messages about Europe

Contents

Maths is around us
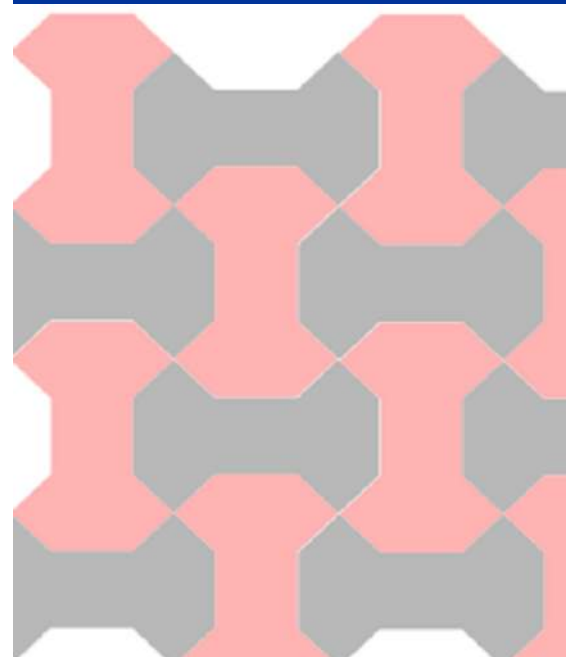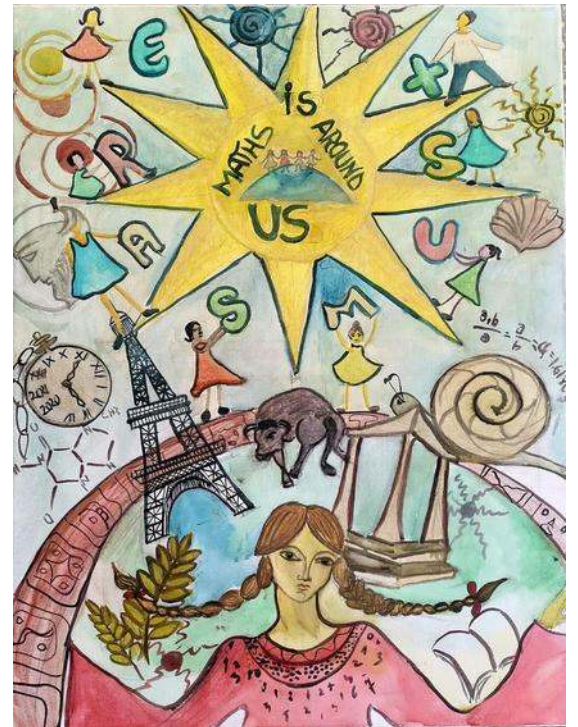
Our project

COORDINATORS

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Our objetives

The aim of the project is to involve our students in interdisciplinary activities that, through maths, will model and describe real word and will reinforce positive attitudes towards science in general and mathematics in particular. Students will cultivate communicative, exploratory skills, respect for different opinions, customs and values belonging to the cultural characteristics of the other European members. By using online communities, web 2.0 tools, specific mathematical software and mobile devices their digital skills will be improved. This project includes 4 main activities: statistics, Math and Arts, cryptography and mathematical walks. The first activity is about statistics, participants will create a survey searching students' perceptions about mathematics. Once the survey will be finished, they will have experiences on a complete statistical study. Through a very important topic for the educational community, students will discover the importance of statistics in life The second activity is about geometry and Arts. Students will explore the contribution of maths to Arts, raising awareness of the importance of Europe's cultural heritage. Students will make their own artistic constructions and with the cooperation with the local Laboratory Center of School Science of Rethymno(Greece), they will construct a "camera obscura". The third activity is about cryptography, applying gamification techniques students will apply mathematical functions and will identify the connection between maths and cryptography. They will encrypt and decipher the names and locations of European monuments. In the computer lab, they will create collaboratively algorithms like a coding/decoding machine. The fourth activity is the mathematical walk.Eeach country will prepare a mathematical walk and upload it to website mathcitymap.eu app. The participants will search maths in the streets of their cities using mobile devices and at the same time will become familiar with the culture and the monuments of the other participating countries.

Maths is around us
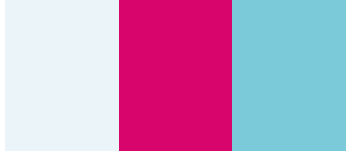
WHO ARE WE?
WHAT DO WE EXPECT?

▼ WE COME FROM GREECE, ROMANIA AND SPAIN

Three secondary schools: Gregory Antipa in Brasov, 3rd high school in Rethymo and IES Izpisúa Belmonte in Hellín. The participating students in the project are aged between 15 and 17 and 72% of them are girls

▲ EXPERIENCE IN INTERNATIONAL PROGRAMMES

25% of the participating students had an exchange experience and 66% had experience in eTwinning project
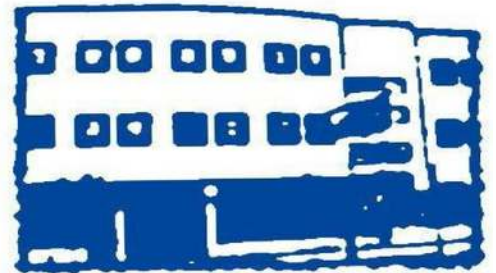
◀ MAIN EXPECTANCES

To learn mathematics in a different way. To know people from other countries. To use digital tools. To work in teams. To know about Europe

Maths is around us

HARD BUT FUN

KIND OF PUZZLED

SMART USEFUL

ENTERTAINING

INTERESTING

JUST A PROBLEM

STRESSED

ANXIOUS

JOY

DIFFICULT

FUN

ENTHUSIATIC

MAGICAL

HAPPY

EXCITING

COMPLICATED

Mathematics in a single word

Population:1020

Sample:204

Sampling error/conficence level: 5,25%/90%

Sampling type: Stratified (for countries and courses they attend to) .

Population 1020
Population:1020 students
Greek students attend to the high school.
Romanian students attend to Secondary school.
Spanish students, since the educational system is different, attend to 4ºESO and bachiller

Survey *"Students thoughts about mathematics"*
Technical information

The process of collecting data

Students translated the survey into their mother languages.
A sample was chosen and the individuals answered the survey.
Students belonging to Erasmu+ team collected the results and shared them inTwinspace in a spreadsheet.
Next pages show the questions, the spreadsheet and the work students did in Brasov.

The questions of the survey

There were 25 questions. The 3 first were about nationality, age and gender. Then, there were different groups of questions, such as attitudes towards maths, perspectives, influence factors and proposals for the lesson. The questions are based on Doctoral dissertation of Kapetanas E. (2016)

Students thoughts about maths

Complete the following form

1. I am *

- ○ a boy
- ○ a girl

2. I live in *

- ○ Greece
- ○ Romania
- ○ Spain

3. I'm *

O 12 years old

O 13 years old

O 14 years old

O 15 years old

O 16 years old

O 17 years old

O 18 years old

O more than 18 years old

4. I get good math grades

O never

O rarely

O sometimes

O often

O very often

O always

Select a response which characterizes you most

5. Are you afraid of maths? *

○ Yes

○ No

○ I do not know

6. If the lesson was optional would you choose it? *

○ Yes

○ No

○ I do not know

7. During math tests, do you feel panicked? *

○ never

○ rarely

○ sometimes

○ often

○ very often

8. Do you feel anxiety (worried,concerned) during math tests, because you think that you will forget things you may know well? *

○ never

○ rarely

○ sometimes

○ often

○ very often

○ always

9. When you cannot solve a mathematical problem, how much time will you still keep trying? *

○ I will stop immediately

○ for 5-10 minutes more

○ for 10-15 minutes more

○ for 15-20 minutes more

10. When you cannot solve a mathematical problem, what do you do? *

○ You get disappointed and you stop trying

○ You stop for a while and you continue later

○ You ask help from your teacher

○ You ask help from a classmate

○ You look the result from the solution book

11. When you have to answer a math question in the class, how often do you feel like you do not have enough time to answer?

○ never

○ rarely

○ sometimes

○ often

○ very often

○ always

12. When you have to answer a mathematical question in front of your classmates, how often do you feel stressed? *

○ never

○ rarely

○ sometimes

○ often

○ very often

○ always

13. The math lesson at school is interesting. *

○ Strongly disagree

○ Disagree

○ Not sure

○ Agree

○ Strongly agree

Perspectives

Choose the grade you agree with the following states.

14. The ability of understanding maths is innate (we are born with that, it is natural) *

- ○ Strongly disagree
- ○ Disagree
- ○ Not sure
- ○ Agree
- ○ Strongly agree

15. Maths is useful only for the students who want to study this kind of sciences. *

- ○ Strongly disagree
- ○ Disagree
- ○ Not sure
- ○ Agree
- ○ Strongly Agree

16. The math lesson is useful for our daily life. *

- ○ Strongly disagree

- ○ Disagree

- ○ Not sure

- ○ Agree

- ○ Strongly Agree

17. Only the clever students can learn mathematics. *

- ○ Strongly disagree

- ○ Disagree

- ○ Not sure

- ○ Agree

- ○ Strongly Agree

18. The boys are more effective in solving mathematical problems than girls. *

○ Strongly disagree

○ Disagree

○ Not sure

○ Agree

○ Strongly Agree

Influencing factors
Select a response which characterizes you most

19. The attitude you have now towards maths was influenced by the teachers you had in junior high school (gymnasio) *

○ Strongly disagree

○ Disagree

○ Not sure

○ Agree

○ Strongly Agree

20. The attitude you have now towards maths was influenced by your parents. *

○ Strongly disagree

○ Disagree

○ Not sure

○ Agree

○ Strongly Agree

21. Does your mother believe that she is good at maths? *

○ Yes

○ No

○ Not sure

22. Does your dad believe that he is good at maths? *

○ No

○ Yes

Proposals for the lesson

23. The Math lesson would be more interesting with mathematical games included. *

○ Strongly disagree

○ Disagree

○ Not sure

○ Agree

○ Strongly Agree

24. The Math lesson would be more interesting with the use of technology (computers, mobile devices etc.) *

○ Strongly disagree

○ Disagree

○ Not sure

○ Agree

○ Strongly Agree

25. I would feel less anxiety if we had more lessons in class for revision. *

○ Strongly disagree

○ Disagree

○ Not sure

○ Agree

○ Strongly Agree

26 Something else you would like to write

Tu respuesta

Number of questions:26

Maths is around us

QUESTION	ANSWERS	Spain	Romania	Greece	TOTAL
1	a(boy)	17	53	32	10
	b(girl)	15	57	30	10
2	a(Greece)	0	0	62	6
	b(Romania)	0	110	0	11
	c(spain)	32	0	0	3
3	a(12 years)	0	0	0	
	b(13 years)	0	0	0	
	c(14 years)	1	0	0	
	d(15) years	4	14	20	3
	e(16years)	14	68	21	10
	f(17 years)	11	28	15	5
	g(18 years)	0	0	18	1
	h(>18 years)	2	0	0	
QUESTION	ANSWERS	Spain	Romania	Greece	TOTAL
4	a(never)	2	1	3	
	b(rarely)	7	11	6	2
	c(some times)	12	38	16	6
	d(often)	7	33	14	5
	e(very often)	4	16	10	3
	f(always)	0	11	13	2
5	a(yes)	3	21	10	3
	b(no)	21	54	26	10
	c(dont Know)	8	35	26	6
6	a(yes)	26	60	30	11
	b(no)	6	19	16	4
	c(not sure)	0	31	16	4

Students translated the survey into their own language and a sample was extracted in each country

T

This page shows the collected data before making the processing of the sample. The data ia authentic, collected by our students in the three countries

The results of each country were summarized and post in twinspace in a shared spreadsheet, later in Brasov they worked in teams and the study they made is shown in the next pages

Maths is around us

Data

QUESTION	ANSWERS	Spain	Romania	Greece	TOTAL
7	a(never)	5	19	9	33
	b(rarely)	14	27	19	60
	c(some times)	0	40	18	58
	d(often)	7	7	10	24
	e(very often)	3	12	2	17
	f(always)	3	5	4	12
8	a(never)	3	18	8	29
	b(rarely)	12	19	13	44
	c(some times)	0	35	16	51
	d(often)	12	16	12	40
	e(very often)	2	11	4	17
	f(always)	3	11	9	23

QUESTION	ANSWERS	Spain	Romania	Greece	TOTAL
9	a(stop)	2	6	5	13
	b(5-10 min)	17	59	23	99
	c(10-15min)	9	33	19	61
	d(15-10 min)	4	11	15	30
10	a(stop)	2	3	4	9
	b(stop-continue la	10	35	23	68
	c(ask teachers he	14	23	20	57
	d(ask students he	0	34	7	41
	e(look in internet.	6	15	8	29
11	a(never)	6	17	27	50
	b(rarely)	10	30	17	57
	c(some times)	12	33	7	52
	d(often)	2	20	5	27
	e(very often)	2	6	4	12
	f(always)	0	4	2	6

QUESTION	ANSWERS	Spain	Romania	Greece	TOTAL
12	a(never)	16	23	22	61
	b(rarely)	5	24	14	43
	c(some times)	7	26	10	43
	d(often)	2	15	4	21
	e(very often)	2	9	7	18
	f(always)	0	13	5	18
13	a(total disagree)	1	2	20	23
	b(disagree)	4	12	19	35
	c(not sure)	12	40	10	62
	d(agree)	9	53	8	70
	e(absolute agree)	6	3	5	14
14	(total disagree)	3	5	23	31
	b(disagree)	9	31	18	58
	c(not sure)	11	32	10	53
	d(agree)	5	37	8	50
	e(absolute agree)	4	5	3	12
15	a(total disagree)	7	10	25	42
	b(disagree)	15	44	19	78
	c(not sure)	4	21	10	35
	d(agree)	3	29	6	38

QUESTION	ANSWERS	Spain	Romania	Greece	TOTAL
16	a(total disagree)	3	6	24	33
	b(disagree)	8	24	14	46
	c(not sure)	9	31	12	52
	d(agree)	7	47	7	61
	e(absolute agree)	5	2	5	12
17	a(total disagree)	11	12	25	48
	b(disagree)	14	51	28	93
	c(not sure)	4	27	8	39
	d(agree)	3	19	1	23
	e(absolute agree)	0	1	0	1
18	a(total disagree)	20	35	26	81
	b(disagree)	3	34	16	53
	c(not sure)	9	24	16	49
	d(agree)	0	10	0	10
	e(absolute agree)	0	7	4	11
19	a(total disagree)	3	2	4	9
	b(disagree)	4	10	13	27
	c(not sure)	9	24	16	49
	d(agree)	10	51	21	82
	e(absolute agree)	6	23	8	37

QUESTION	ANSWERS	Spain	Romania	Greece	TOTAL
20	a(total disagree)	10	15	12	37
	b(disagree)	8	42	25	75
	c(not sure)	7	36	17	60
	d(agree)	5	16	8	29
	e(absolute agree)	2	1	0	3
21	a(yes)	11	31	16	58
	b(no)	2	38	21	61
	c(not sure)	0	41	25	66
22	a(yes)	19	45	21	85
	b(no)	13	65	14	92
	c(not sure)	0	0	27	27
23	a(total disagree)	0	5	3	8
	b(disagree)	1	9	6	16
	c(not sure)	11	26	15	52
	d(agree)	8	44	26	78
	e(absolute agree)	12	26	12	50
24	a(total disagree)	0	2	3	5
	b(disagree)	3	9	6	18
	c(not sure)	8	20	15	43
	d(agree)	14	56	26	96
	e(absolute agree)	7	23	12	42
25	a(total disagree)	1	1	4	6
	b(disagree)	6	20	6	32
	c(not sure)	5	37	10	52
	d(agree)	13	42	23	78
	e(absolute agree)	7	10	19	36

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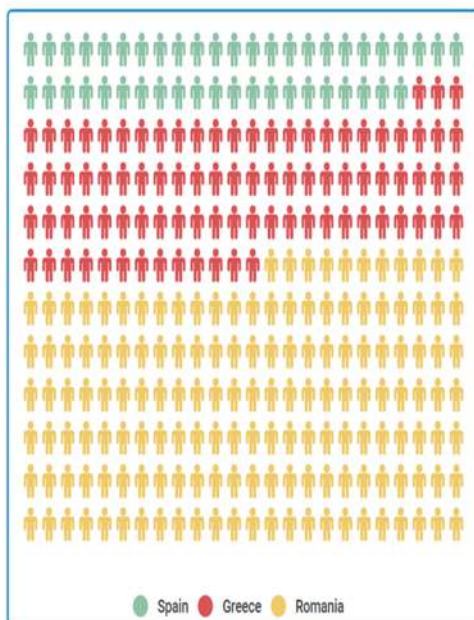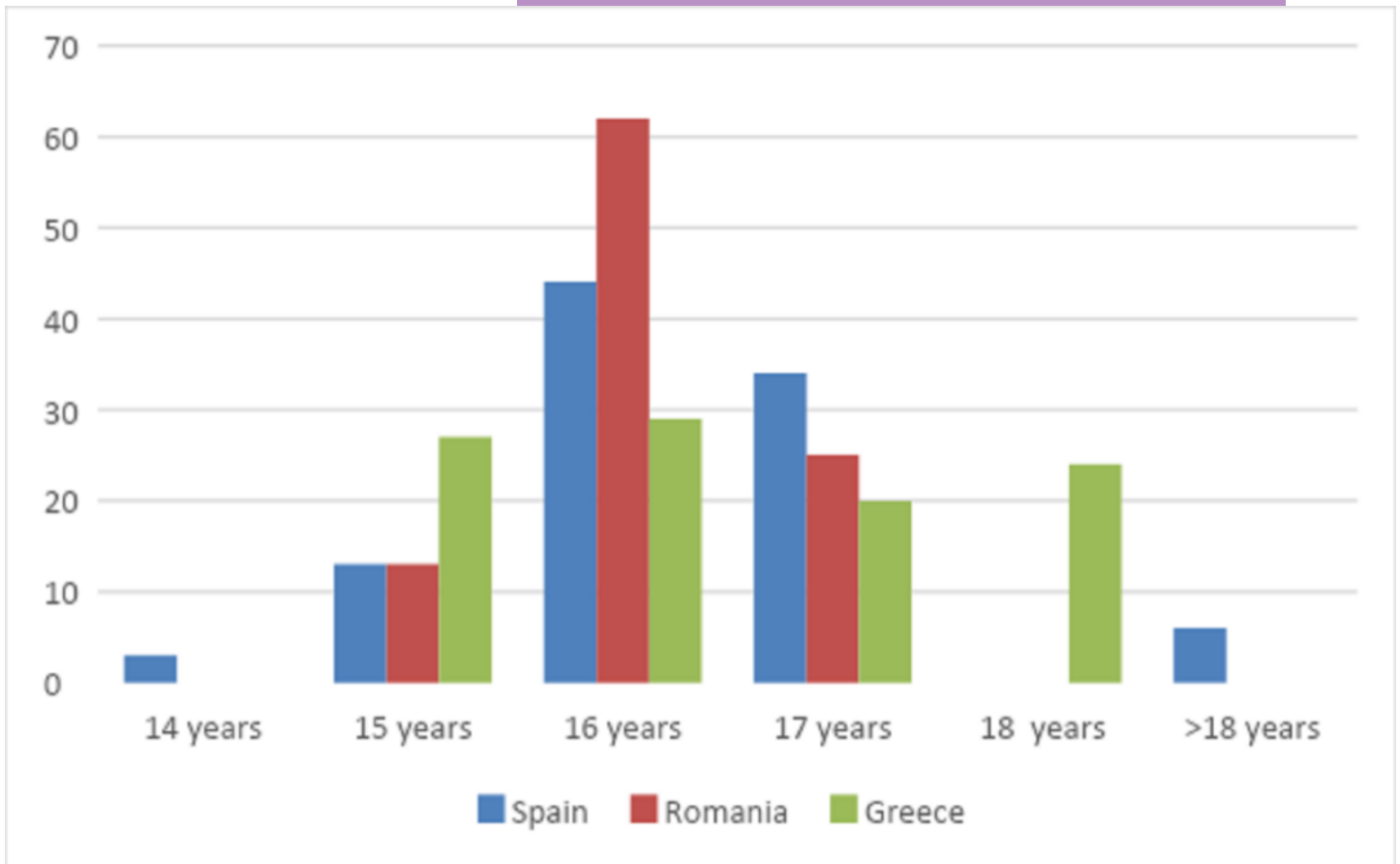
GENERAL QUESTIONS

Questions 1,2 and 3

Gender :

204 people answered the survey, 50% boys and 50% girls.

Nationality:

30.3 % of the students are Greek, 53.9% are Romanian and the remaining 15.8% come from Spain.

Age:

50% of students are 16 years old
26.5% are 17 years old
18.6% are 15 years old

Maths is around us---Statistical Survey

Spain   Romania   Greece

- a(never)
- b(rarely)
- c(some times)
- d(often)
- e(very often)
- f(always)

Never 2.94%
Always 11.76%
Rarely 11.76%
Very Often 14.71%
Good marks
Often 26.47%
Sometimes 32.35%

GENERAL QUESTIONS

Question 4

Marks in mathematics lessons

As a remarkable aspect of this survey is that 53% of the students answered in a positive way about their marks in mathematics, but a comparison between countries shows that in Greece and Romania more than 50% of students have good marks and in Spain this percentage is smaller about 35%

ARE YOU AFRAID OF MATHEMATICS?

Global results
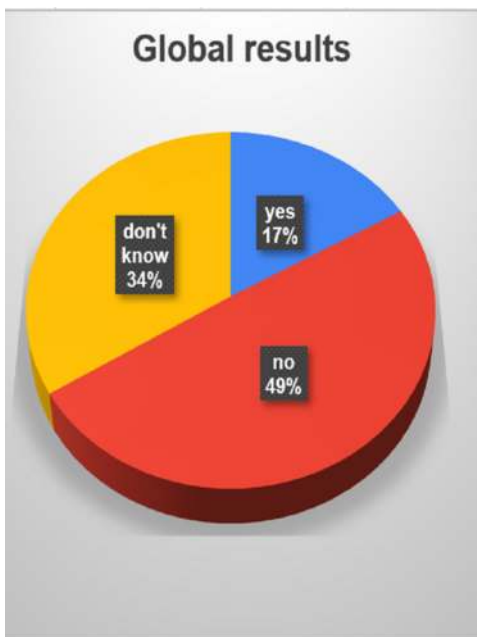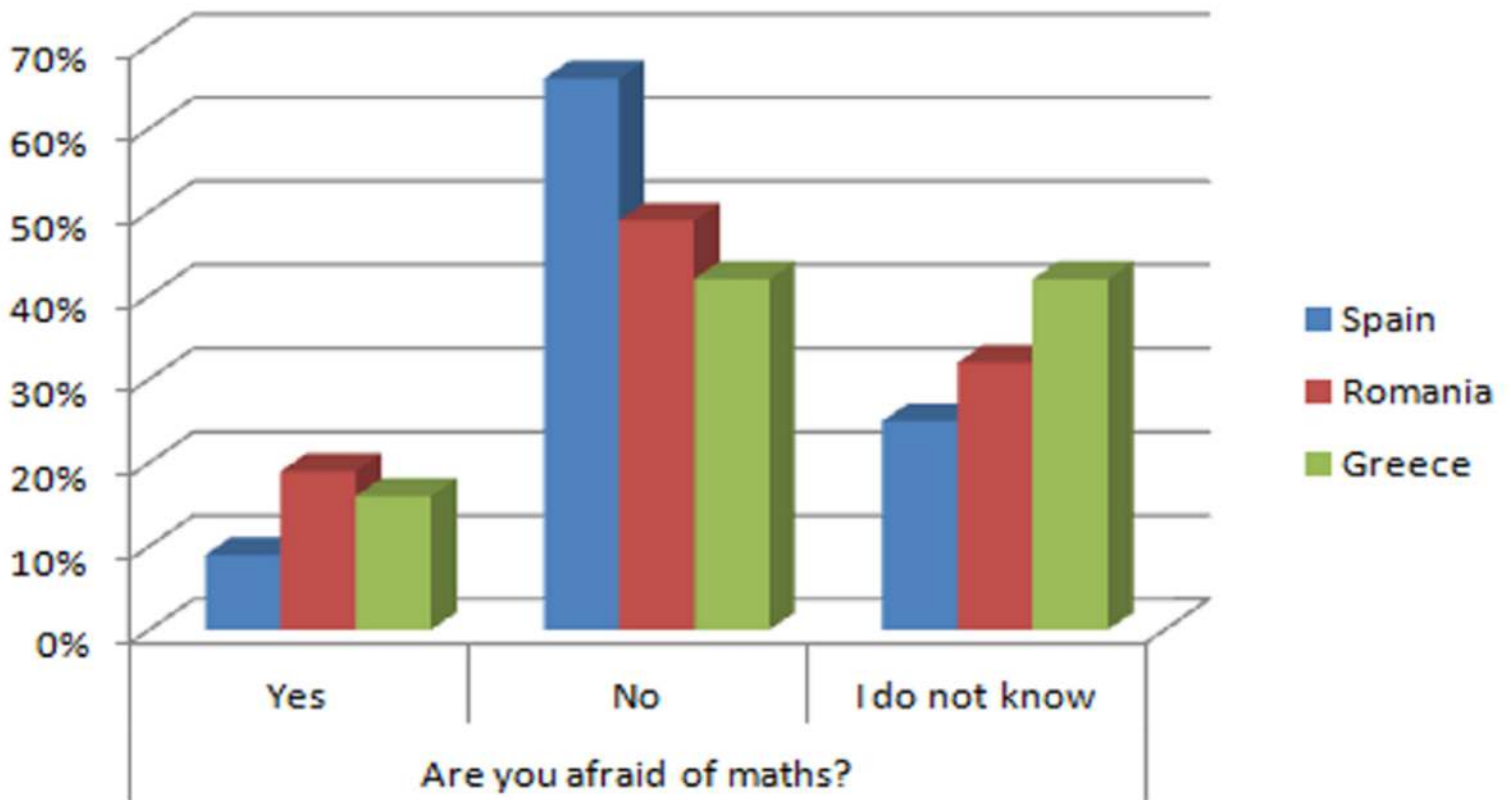
ATTITUDES TOWARDS MATHEMATICS

QUESTION NUMBER 5.

More than 60% of Spanish students are not afraid of mathematics, in Greece and Romania this percentage is about 40-50%. 40% of the Greek students doesn't know if they feel fear or not. Globally 49% of students are not afraid.

Students who attend to the meeting expressed their own opinions about that trying to provide an explanation of these results *"The Spanish people are not afraid of math because they think that it's only a subject to pass. The Greek people are not afraid of math because they study and they are prepared for the exams. Romanians are not scared of math because it is theoretical and there is a lot of information, but we have good teachers which help us".*

Maths is around us---Statistical Survey

If the lesson wa optional would you choose it?

Global
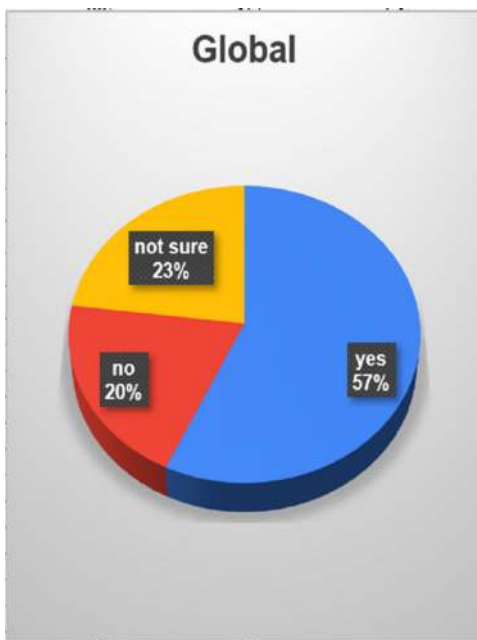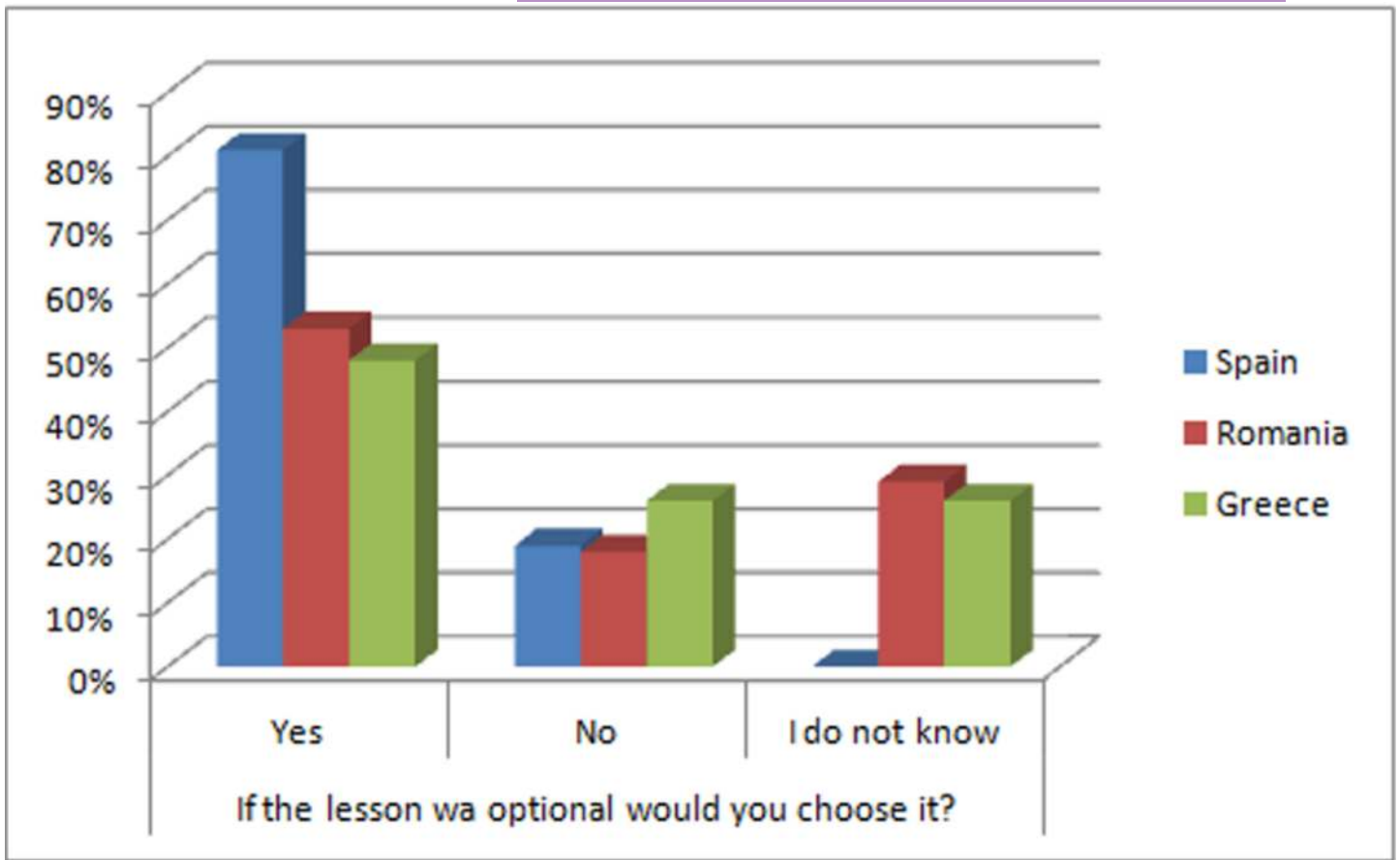
ATTITUDES TOWARDS MATHEMATICS

QUESTION NUMBER 6.

In general students will choose this subject even if it was optional (51%) and only 20% of them are sure that they won't attend to math lessons if it was possible. Again there is a difference between countries, maybe because the differences between the educational systems. In Spain, in fact, this subject is optional and the majority of students choose it, maybe Greek and Romanian students don't know because they haven't thought about it.

The students in Brasov thought that "The Spanish people think that you have to know the basics of maths to applicate them in your life. The Greek people would choose maths because they like the subject. The Romanian would choose to learn math because it's an useful skill in day to day life".

Maths is around us---Statistical Survey

Do you feel panicked during math tests?
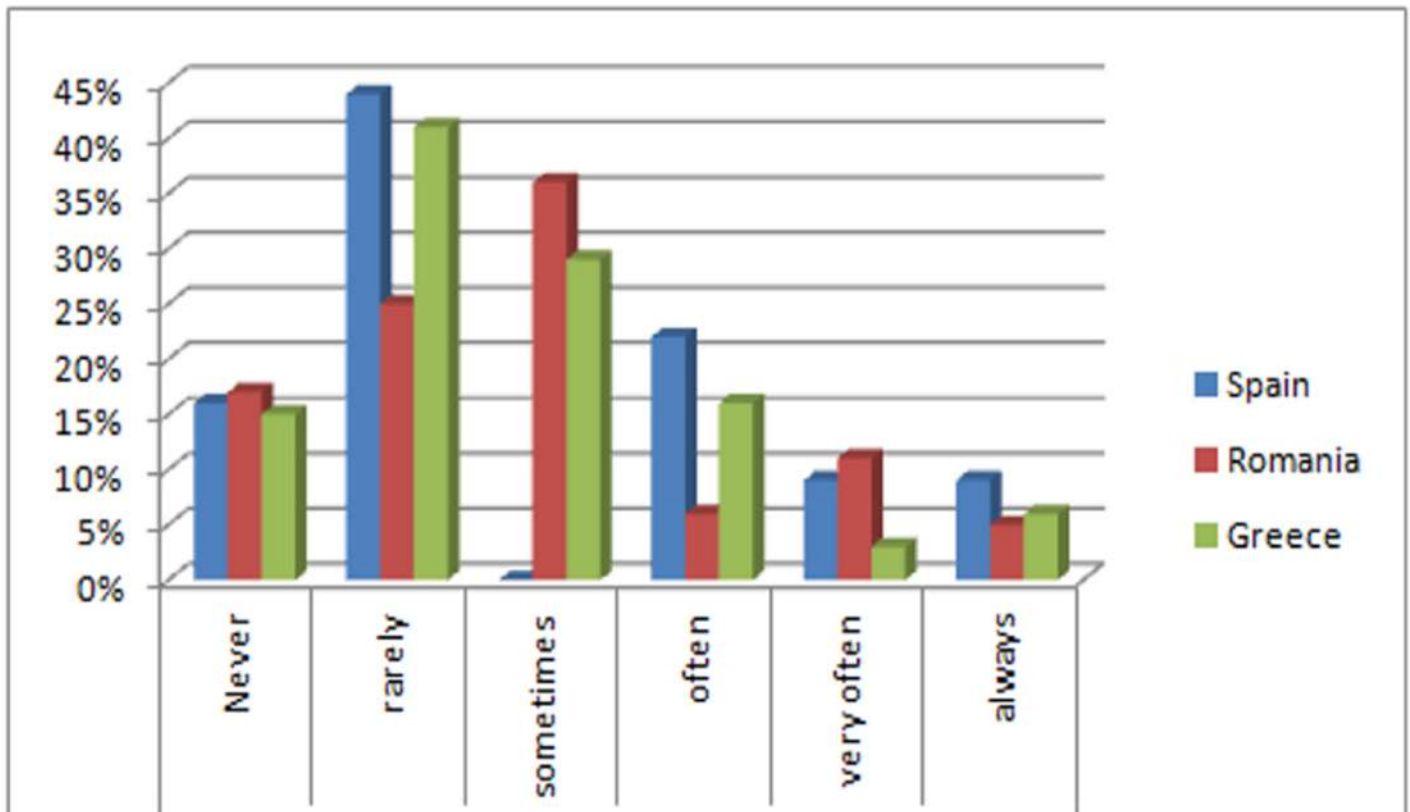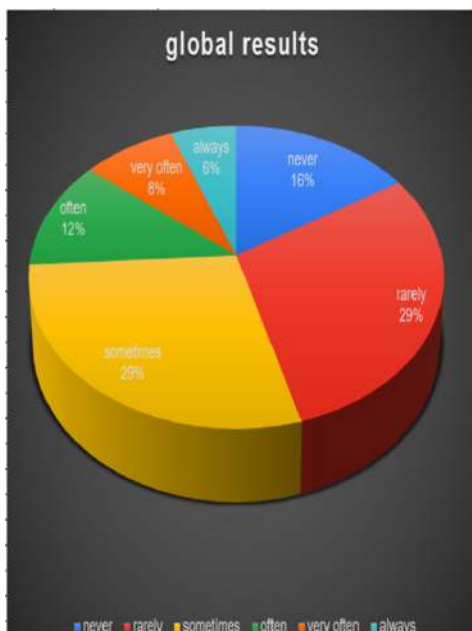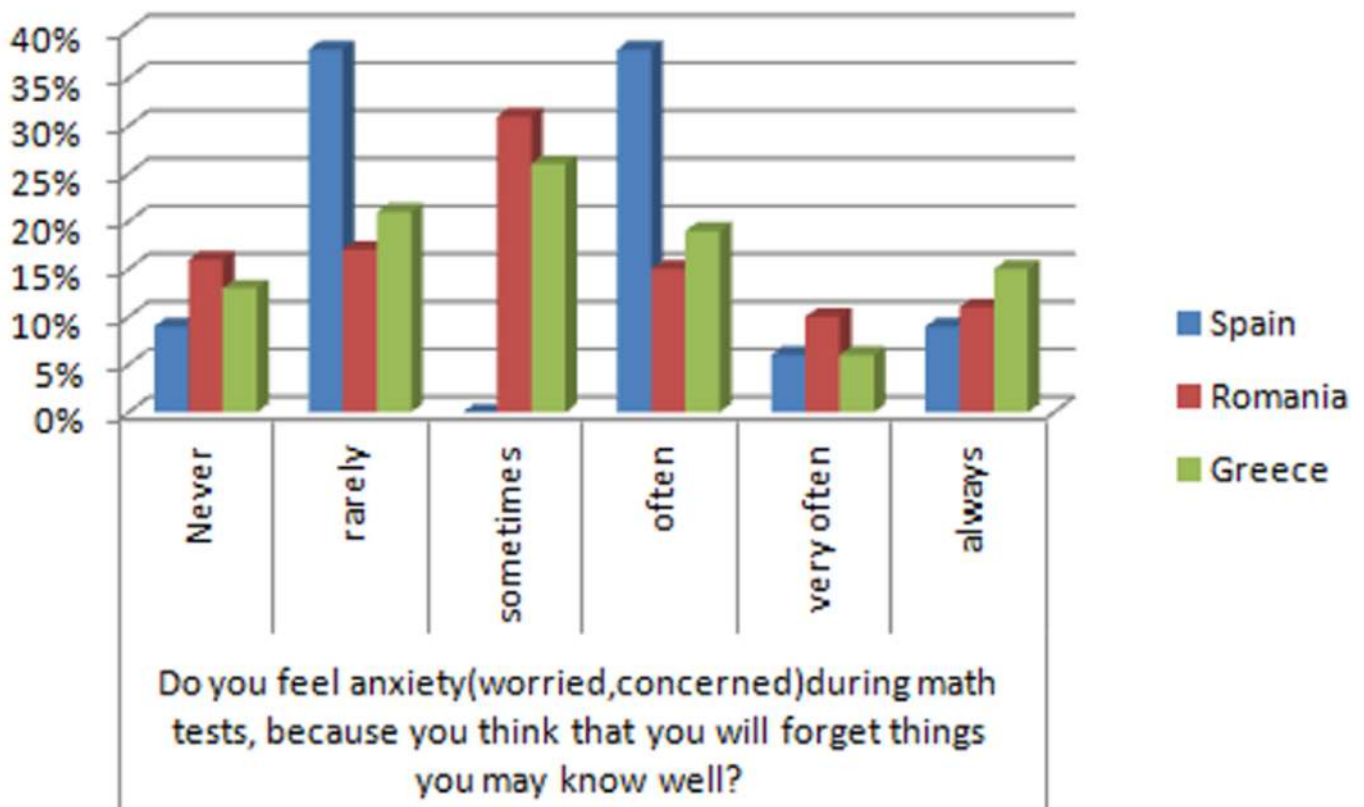

global results

ATTITUDES TOWARDS MATHEMATICS

QUESTION NUMBER 7

Globally 47% of students don't feel panicked and 29% more feels it sometimes. Analyzing the results in each country it is nocitable that Romanian students have more negative feelings than the students from other countries (aproximately 20% feel panicked often or more frequently).
These are the opinions in Brasov meeting *"The Spanish people rarely feel panicked during their math tests when they haven't studied. The Greek people rarely feel panicked because they like maths and they study a lot for tests thus feeling prepared. The Romanians feel panicked if they haven't studied but if they do they don't feel panicked."*

Maths is around us---Statistical Survey

Do you feel anxiety(worried,concerned)during math tests, because you think that you will forget things you may know well?

Global

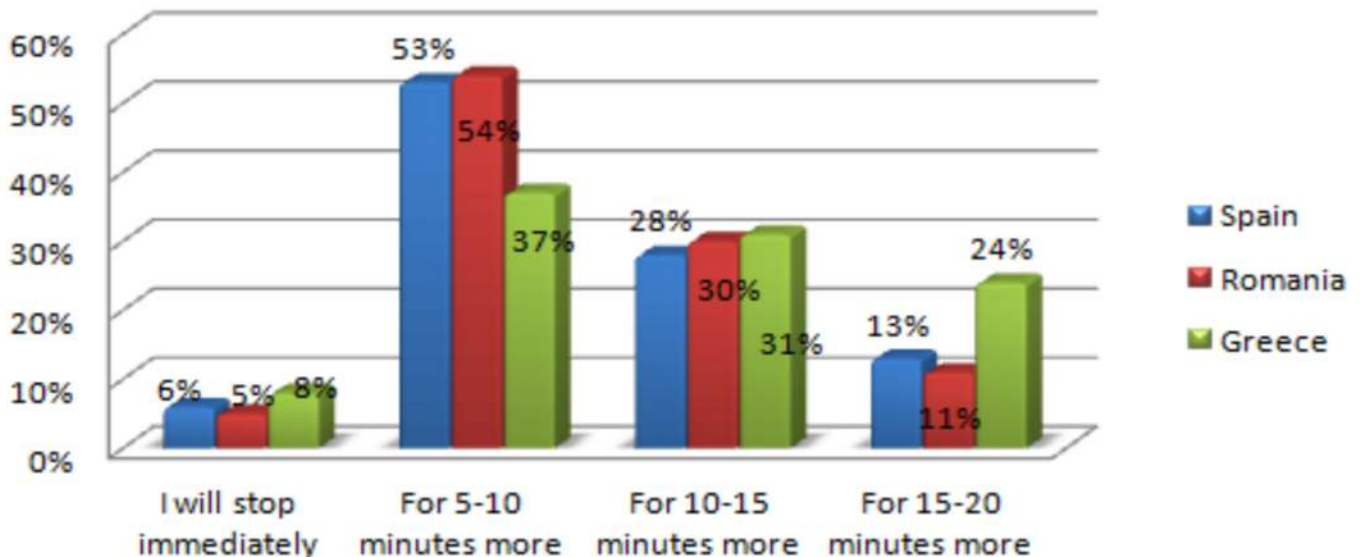## ATTITUDES TOWARDS MATHEMATICS

QUESTION NUMBER 8

The positive answers again are greater than the negative ones (36% rarely or never plus 25% sometimes). Analyzing the differences between countries, Greece shows a disturbing 15% of students that always feels anxiety.

About what students told us in the meeting *"The Spanish people often feel anxious in math tests because they haven't studied before. The Greek people sometimes feel anxious because they don't always study for the exams. The Romanians sometimes feel anxious because their parents and professors put pressure on them".*
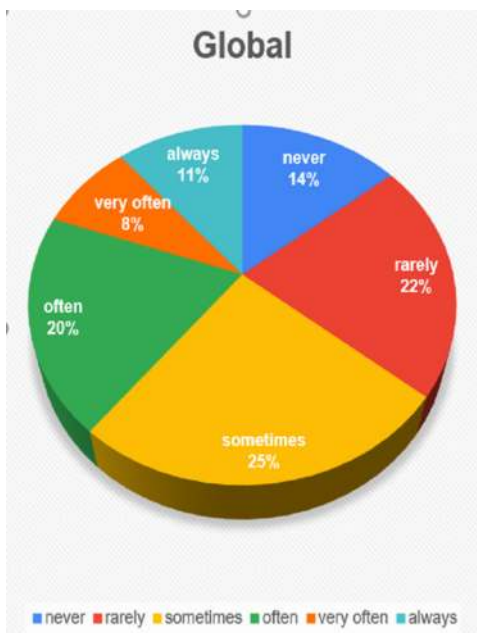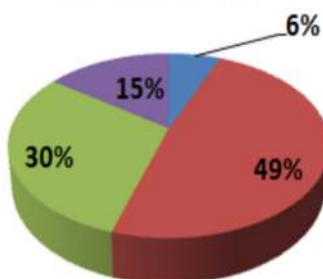
When you cannot solve a mathemathical problem, how much time will you still keep trying?

	I will stop immediately	For 5-10 minutes more	For 10-15 minutes more	For 15-20 minutes more
Spain	6%	53%	28%	13%
Romania	5%	54%	30%	11%
Greece	8%	37%	31%	24%

Percentages of all respondends

- I will stop immediately
- For 5-10 minutes more
- For 10-15 minutes more
- For 15-20 minutes more

6%
15%
30%
49%

ATTITUDES TOWARD MATH
Question 9.

Almost the half of the Spanish (53%) and the Romanian (54%) students try to solve a mathematical problem for 5-10 minutes. On the contrary the Greek students seems to try more. The 55% of the Greek students try for 10-15 or 15-20 minutes.

The percentage of the total sample which stop immediately the effort is low (6%, pie chart)

In the discussion *the students claimed that the most of them give up after 5-10 minutes because they want to continue solving the other problems and if they have time they will come back and check it again to see if there is something they can do about it.*

Maths is around us---Statistical Survey

When you cannot solve a mathematical problem, what do you do?
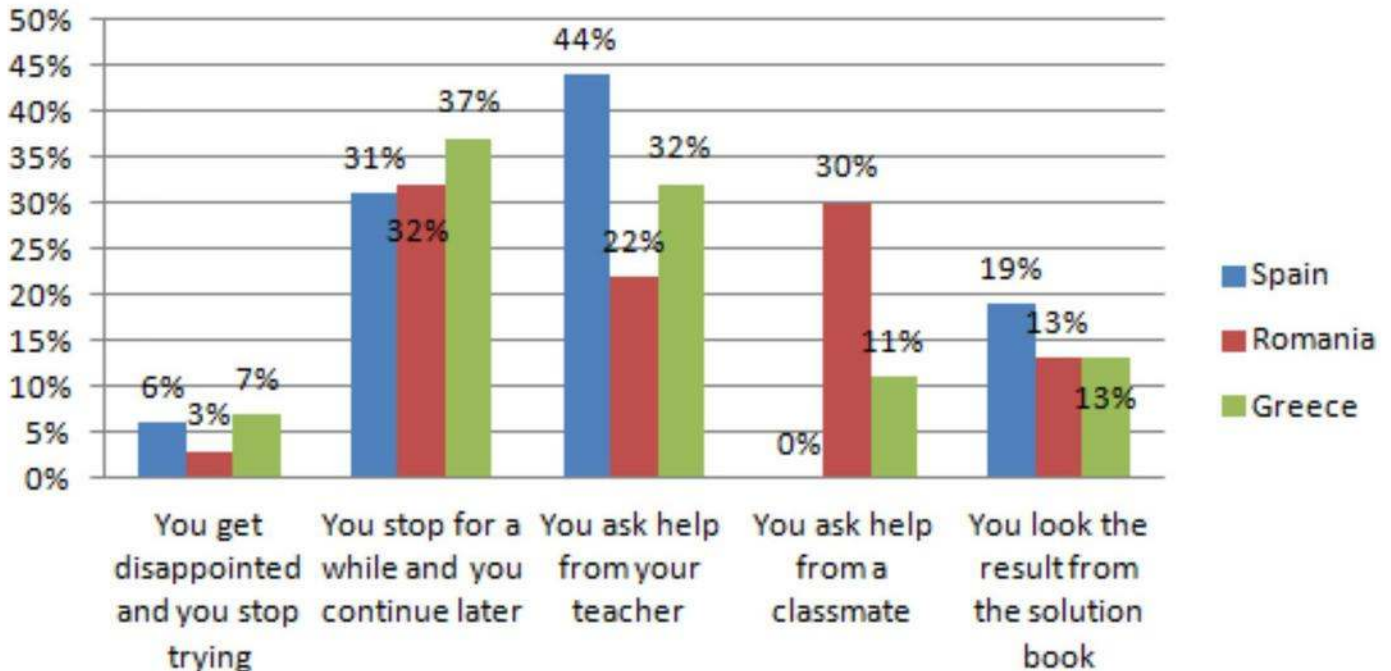
Total percentages

- You get disappointed and you stop trying
- You stop for a while and you continue later
- You ask help from your teacher
- You ask help from a classmate

pic1
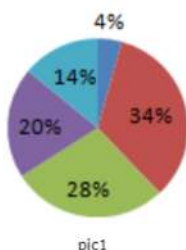
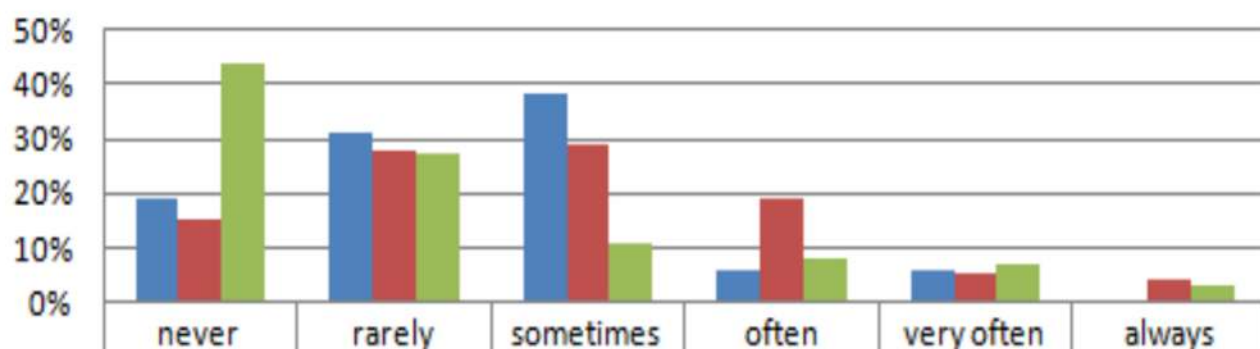**ATTITUDES TOWARD MATHS Question 10.**

A high percentage of Spanish students asks teachers for help(44%), when they cannot solve a mathematical problem.
While Spanish students don't ask at all classmate's help, a low percentage of Greek students(11%) and a significant percentage of Romanian(30%) seek the support of their classmates.
The percentage of Spanish(19%) which prefer to look the result at the solution book is higher than the corresponding precentage of the other countries.
A significant percentage 34% of all the students (69 out of 204 students) stop for a while and continue later, as we can see in pic1.
In the interview Spanish students told that they dont ask for help from a classmate because they believe they can do it themselves
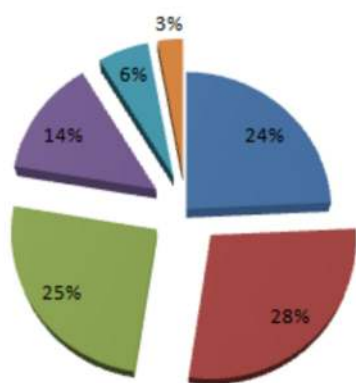
Maths is around us---Statistical Survey

When you have to answer a math question in the class, how often do you feel like you do not have enough time to answer?

	never	rarely	sometimes	often	very often	always
Spain	19%	31%	38%	6%	6%	0%
Romania	15%	28%	29%	19%	5%	4%
Greece	44%	27%	11%	8%	7%	3%

Total percentages

■ never   ■ rarely   ■ sometimes
■ often   ■ very often   ■ always

pic1

ATTITUDES TOWARD MATHS
Question 11

Greek students at a very high persentage (71%) never or rarely have the feeling that they don't have enough time to answer a math question in class. The corresponging percentage to spanish and to Romanian students is much lower(50%, 43% respectively)

It must be noted that the 25% of all the respondents feel that sometimes they wish they had more time. A little more than the half (52%) are sufficient with the time they have to answer(piechart)

In the discussion, greek students told that barely ever get nervous about timing, because they like these kind of lessons, although they dont have or will not all of them choose sciences studies in the future

Maths is around us---Statistical Survey

When you have to asnwer a mathematical question in front of your classmate, how often do you feel stressed?
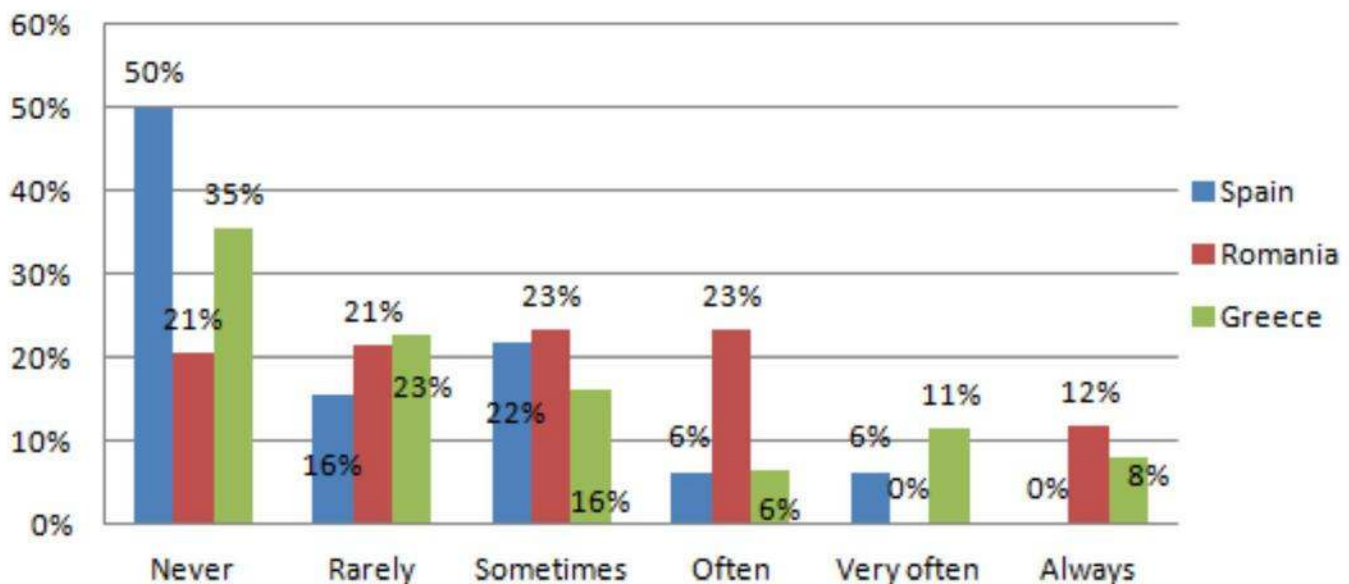
percentages of all respondents
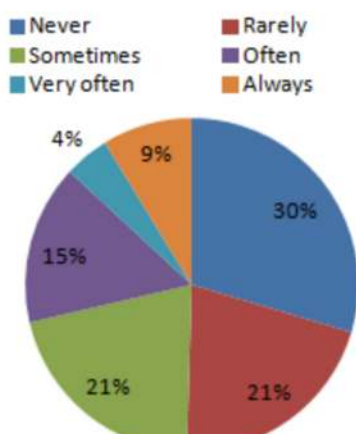
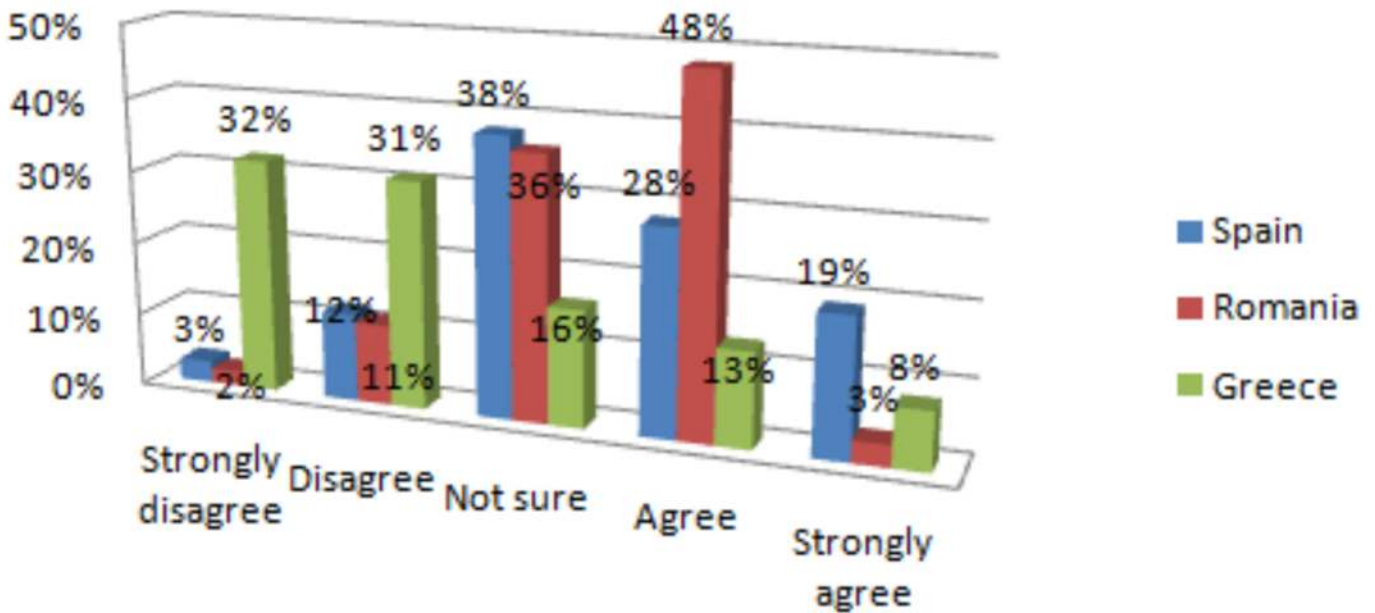**ATTITUDES TOWARD MATHS**
Question 12

The modal response among Spanish students with 50% percentage, is that they never feel stress when they have to give an answer in front of the students. The modal value to Greek students is also never but to a lower percentage (35%). Sometimes and often is the modal responce to the romanian students(23%).

A significant number of romanian students (48%) feel stress sometimes up to always. The number of the spanish students (11 out of 32) who feel stress sometimes up to always is the lowest among the other countries (34%).

As we can see on the piechart the percentage of all the students who feel sometimes up to always stress is 49%.

Math is around us---Statistical Survey

The math lesson in school is interesting

Legend: Spain, Romania, Greece

	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
Spain	3%	12%	38%	28%	19%
Romania	2%	11%	36%	48%	3%
Greece	32%	31%	16%	13%	8%

Percentages of all respondents.

Legend: Strongly disagree, Disagree, Not sure, Agree, Strongly agree

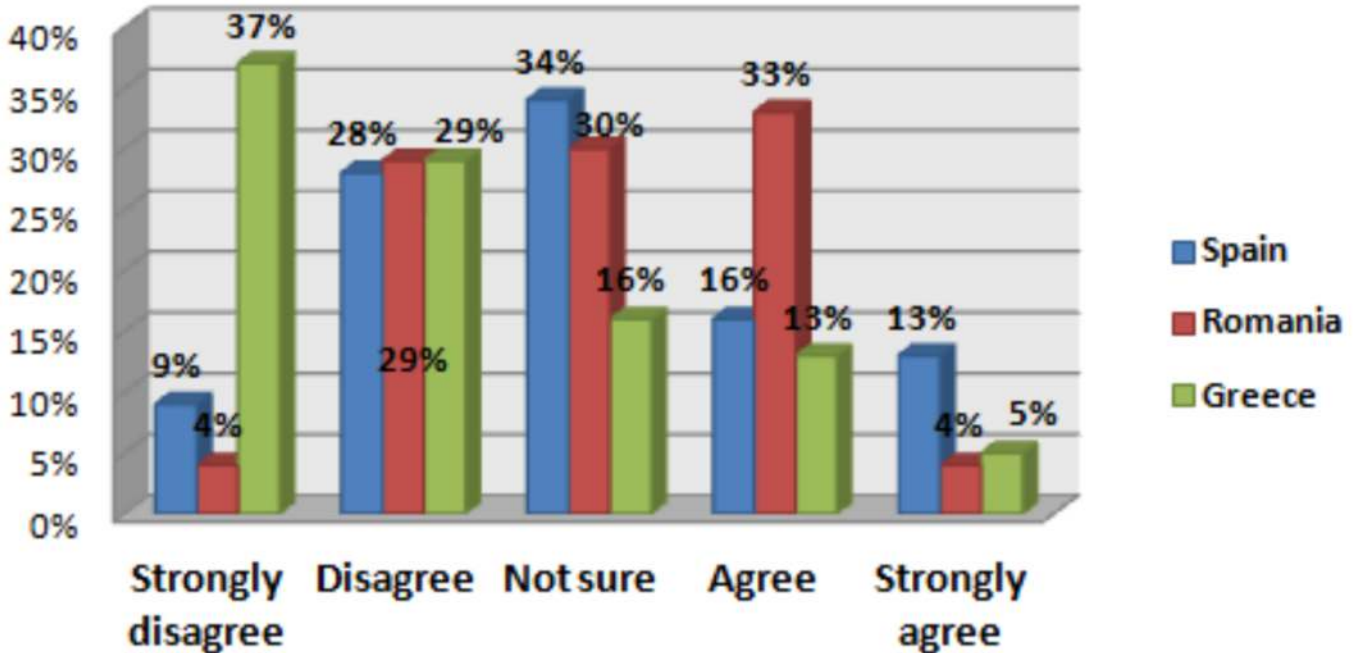Pie chart: 11%, 17%, 31%, 34%, 7%
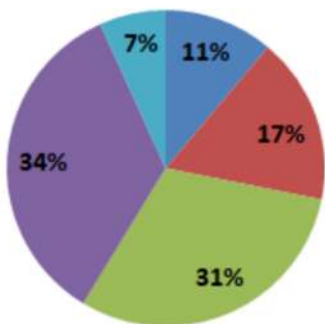
Attitudes towards maths Question 13

While about the half of the Romanian students (51%) and the spanish students (47%) agree or strongy agree with the argument that math lesson in school is intersenting, the majority of the greek students (63%) disagree or strongly dissagree.
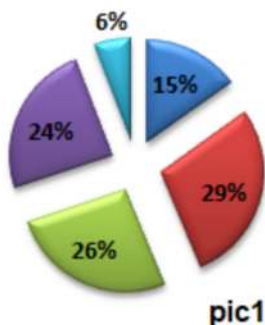
From the pie chart we observe that 41% of the sample found math lesson in school ineteresting. Nevertheless a percentage of 31% of all the sample respondents is undecided

Maths is around us---Statistical Survey

The ability of understanding maths is innate

Persentages of all respondents

Legend:
- Strongly disagree
- Disagree
- Not sure
- Agree
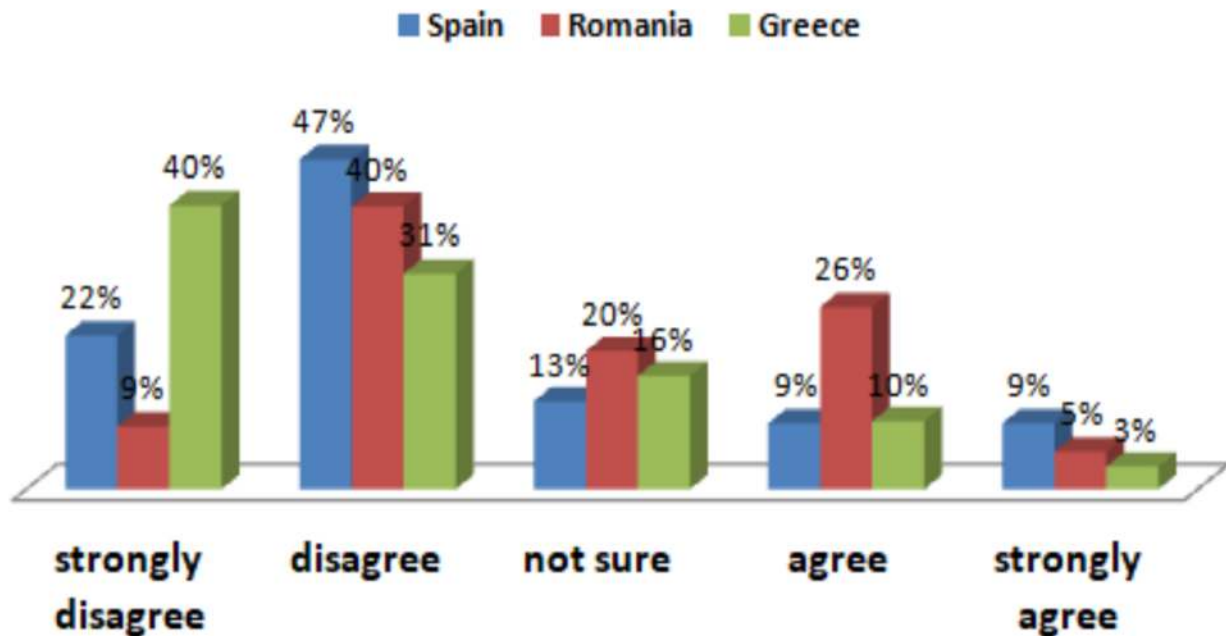- Strongly agree

pic1

Perspectives--Question 14

Altough a significant persentage(37%) of Romanian students agree or strongly agree with the perspecetive that maths abilities are innate, that percentage is smaller to Spanish students(29%) and even smaller to Greek students(18%).

There is also a significant percentage of the Romanian(30%) and the spanish students(34%) which are not sure .
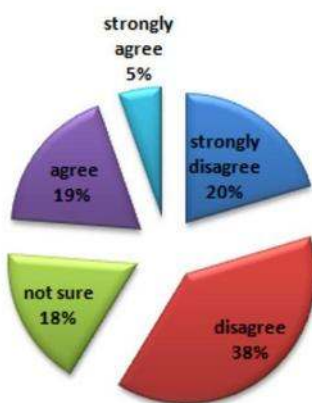
On the other hand the magoriry (66%) of the Greek students believes that it is not innate.

As we can see from the pie chart the 30% of the total sample support the argument that maths ability is innate

Maths is around us---Statistical Survey

Maths is useful only for the students who want to study this kind of sciences

Spain ■ **Romania** ■ **Greece**

	strongly disagree	disagree	not sure	agree	strongly agree
Spain	22%	47%	13%	9%	9%
Romania	9%	40%	20%	26%	5%
Greece	40%	31%	16%	10%	3%

Percentages of all respondents

strongly agree 5%
agree 19%
not sure 18%
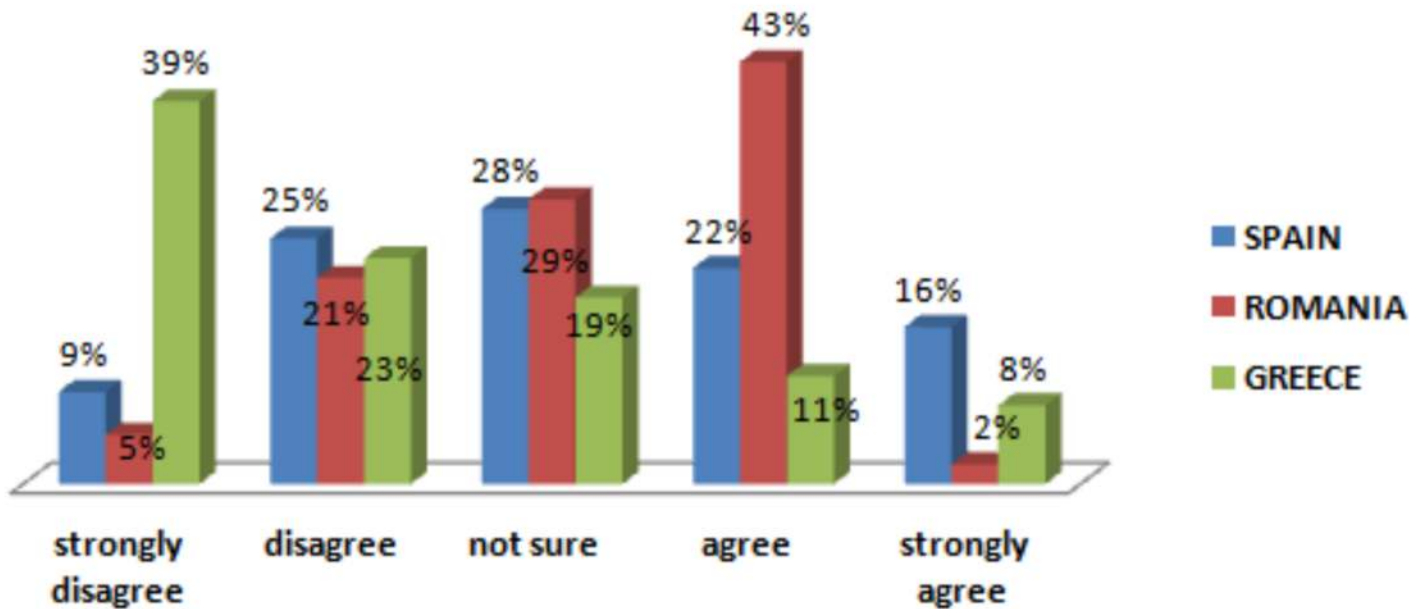strongly disagree 20%
disagree 38%

Perspectives---Question 15

The majority of the spanish students (69%) and the greek students (71%) disagree or strongly disagree with the argument that maths is useful only to those who want to study sciences.
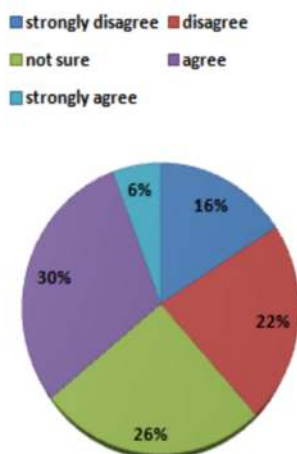
A much smaller perscentage (49%) but almost the half romanian students strongly disagree or disagree with that argument.

As we can see from the piechart, the perspective that maths is not only for those which want to continue with science studies, prevails(58% of all the respondents).

Maths is around us---Statistical Survey

The math lesson is useful for our daily life.

	SPAIN	ROMANIA	GREECE
strongly disagree	9%	5%	39%
disagree	25%	21%	23%
not sure	28%	29%	19%
agree	22%	43%	11%
strongly agree	16%	2%	8%

Percentages of all respondents

■ strongly disagree ■ disagree
■ not sure ■ agree
■ strongly agree

6%
16%
30%
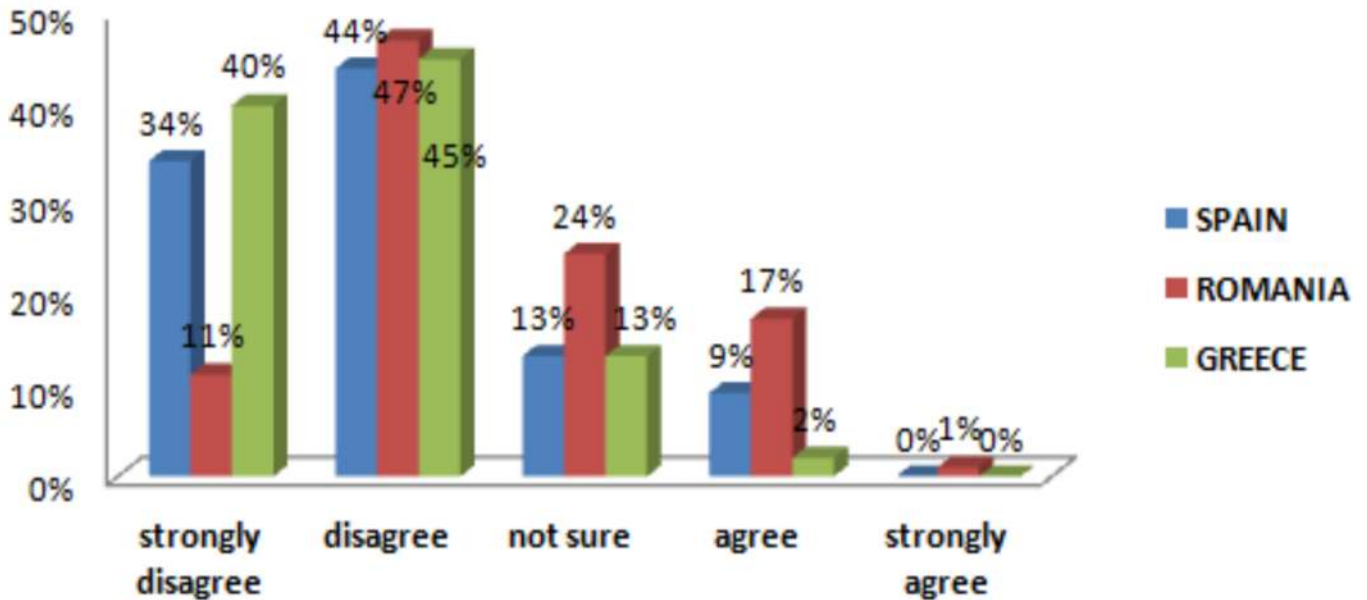22%
26%

Perspective ---Question 16

The modal response among Romanian students, is that math lesson is useful to our daily life.
The dominant responce (28%) to Spanish students is that they are not sure.
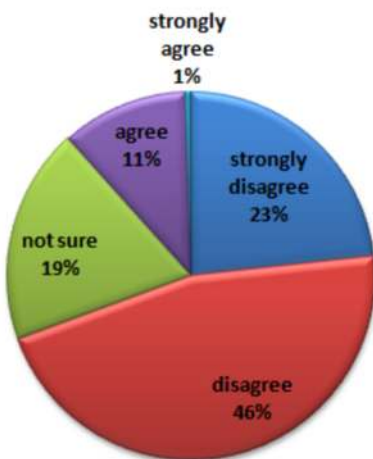The modal responce to the Greek students with a significant percentage (39%) is that they strongy disagree.

As we can see in the piechart the persentages of the students which agree or disagere are about the same. In more detail the 36% of the sample strongly agree or agree and the 38% of the sample strongly disagree or disagree.

Maths is around us---Statistical Survey

Only the clever students can learn mathematics.

	strongly disagree	disagree	not sure	agree	strongly agree
SPAIN	34%	44%	13%	9%	0%
ROMANIA	11%	47%	24%	17%	1%
GREECE	40%	45%	13%	2%	0%

Percentages of all respondents

- strongly agree 1%
- agree 11%
- not sure 19%
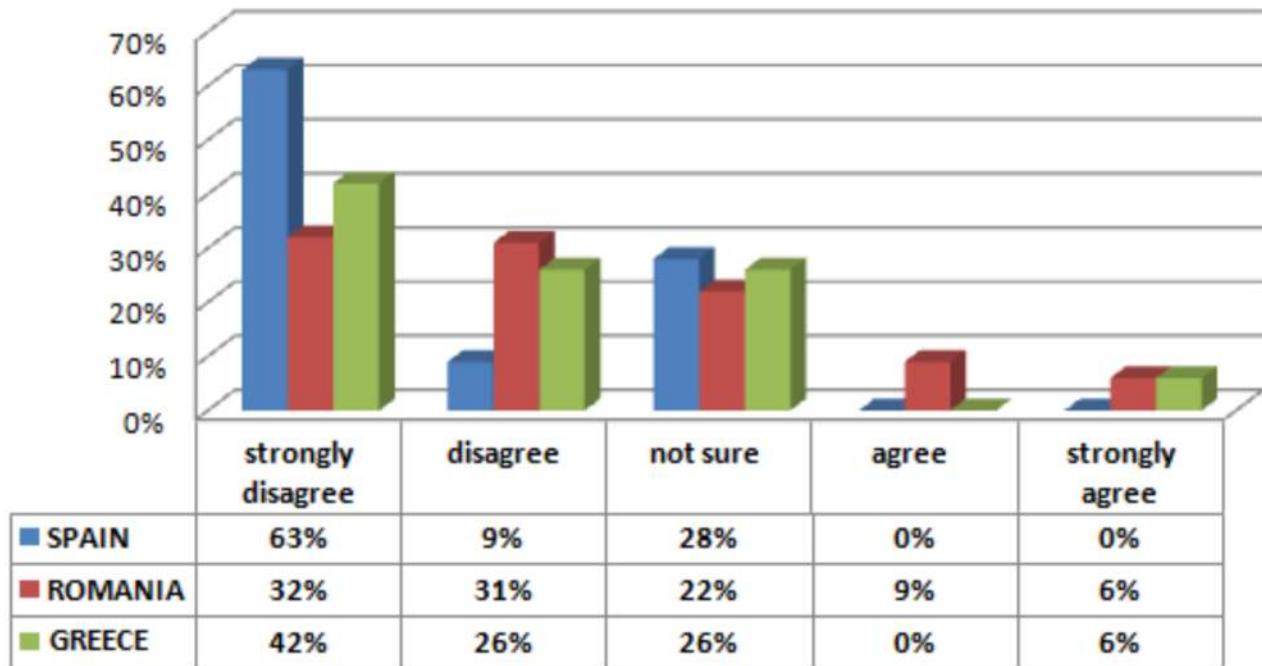- strongly disagree 23%
- disagree 46%

Perspective ----Question 17

Overwhelming majority of the Greek students (85%) and the spanish students (77%) disagree or strongly disagree with the argument that maths is only for the clever people.

A smaller perscentage (55%) but also more than the half Romanian students disagree or strongly disagree with that point of view.
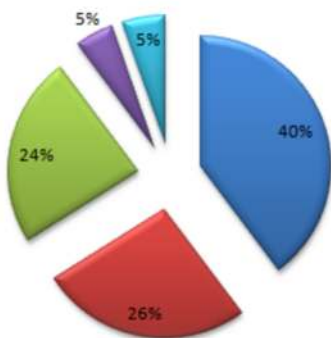
The majority of the sample(69%) disagree or strongly disagree with that argument. A low percentage are not sure(19%), as we can see from the pie chart.

Maths is around us---Statistical Survey

The boys are more effective in solving mathematical problems than girls.

	strongly disagree	disagree	not sure	agree	strongly agree
■ SPAIN	63%	9%	28%	0%	0%
■ ROMANIA	32%	31%	22%	9%	6%
■ GREECE	42%	26%	26%	0%	6%

Percentages of all respondents

■ strongly disagree ■ disagree
■ not sure ■ agree
■ strongly agree

5% 5%
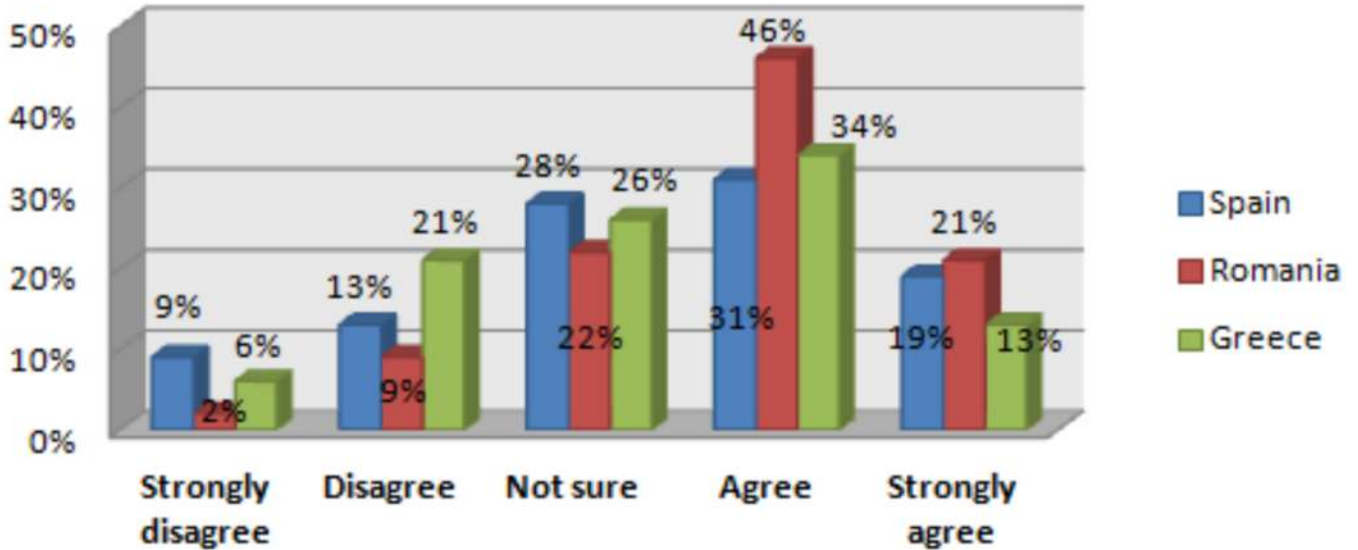24%
40%
26%

Perspectives-----Question 18
The majority of the Spain students(72%), the Greek students (68%) and the Romanian students (63%) disagree or strongly disagree with the argument that boys can solve mathematical problems more effective.

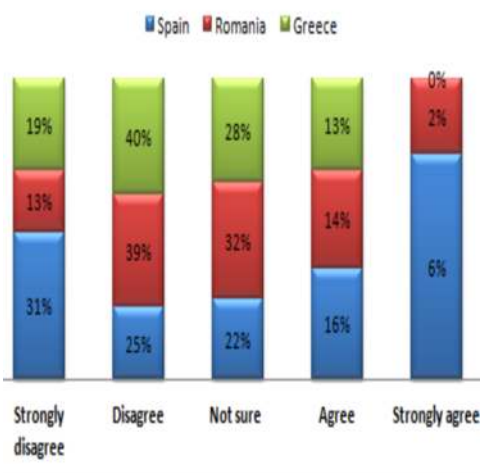None of the Spain students agree with that point of view.

Nonetheless there are students from Spain, Romania and Greece who are not sure(28%,22%,26% respectively).

As we can see from the piechart, the percentage of all the respondents who agree or totally agree with that argument is low (10%). Specifically there are 21 students out of the 204 who live in Romania and Greece and believe that the boys are more efficient in solving mathematical problems than the girls.

Maths is around us---Statistical Survey

The attitude you have towards maths was influenced by the teachers you had in junior high school (gymnasion)

Legend: Spain, Romania, Greece

	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
Spain	9%	13%	28%	31%	19%
Romania	2%	9%	22%	46%	21%
Greece	6%	21%	26%	34%	13%

The attitude you have now towards was influenced by your parent.

Legend: Spain, Romania, Greece

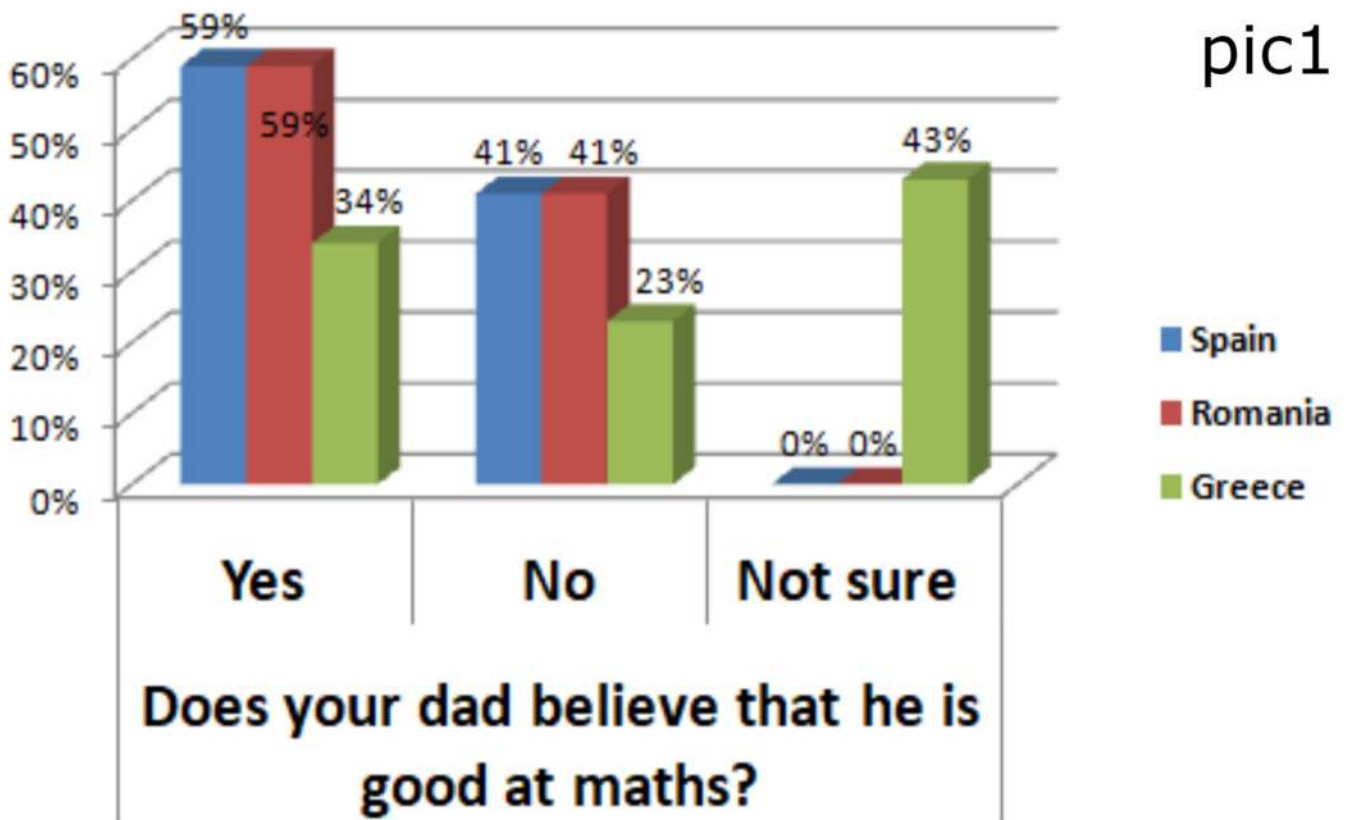|	Strongly disagree	Disagree	Not sure	Agree	Strongly agree
Spain	31%	25%	22%	16%	6%
Romania	13%	39%	32%	14%	2%
Greece	19%	40%	28%	13%	0%

Influencing factors--Question 19, 20

More than the half of romanian students' sample (67%), the half of the spain students and a little less than the half (47%) of the Greek sample, claim that they were influnced by the teachers they had in junior high school.

Although the majority of the sample consider the previous math teachers a influencing factor, the same sample doesn't believe that it was influenced by the parents. More than the half of each nationality disagree or strongly disagree with the statement that it was influnced by the parents, as it seems from the left chart(56% Spanish, 52% Romanian, 59% Greek students). Of course a significant percentage of Romanian student is uncertain(32%)
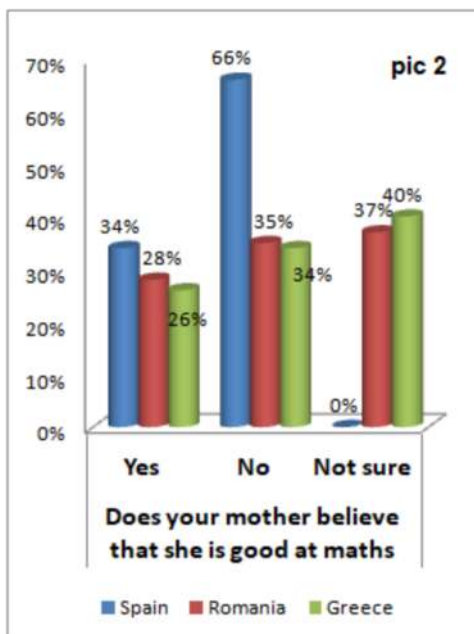
Maths is around---Statistical Survey

Does your dad believe that he is good at maths?

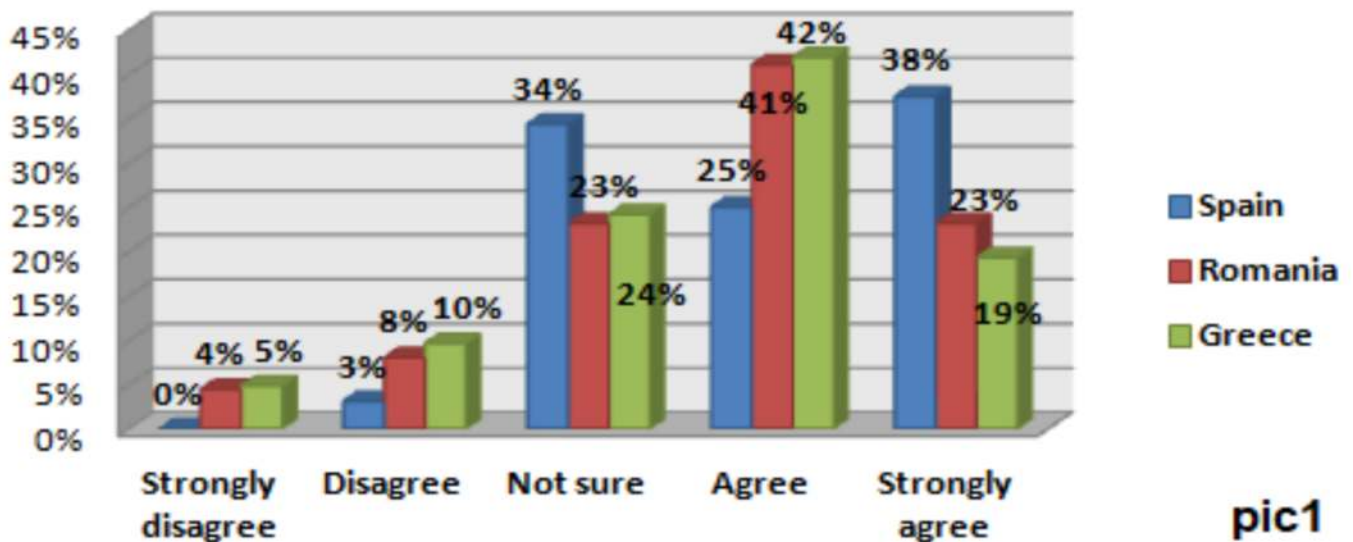Does your mother believe that she is good at maths

Influencing factors--Question 21, 22

Although more than the half of Spanish and the Romanian fathers consider themselves good at maths(pic1), the Spanish and the Romanian mothers seems not to have the same impression for themselves (pic2).
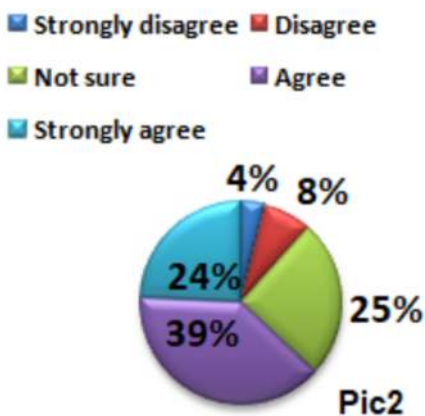
It is charecteristic that the 66% of Romanian mothers believe that they are not good at maths(pic2).

Maths is around us---Statistical Survey

The Math lesson would be more interesting with mathematical games included

Bar chart comparing responses from Spain, Romania, and Greece:

Response	Spain	Romania	Greece
Strongly disagree	0%	4%	5%
Disagree	3%	8%	10%
Not sure	34%	23%	24%
Agree	25%	41%	42%
Strongly agree	38%	23%	19%

pic1

Percentages of all respondents the

Pie chart (Pic2):
- Strongly disagree
- Disagree — 8%
- Not sure — 25%
- Agree — 39%
- Strongly agree — 24%
- 4%

Pic2

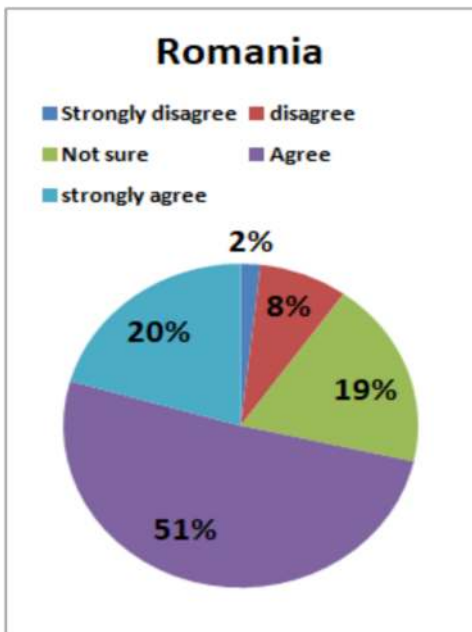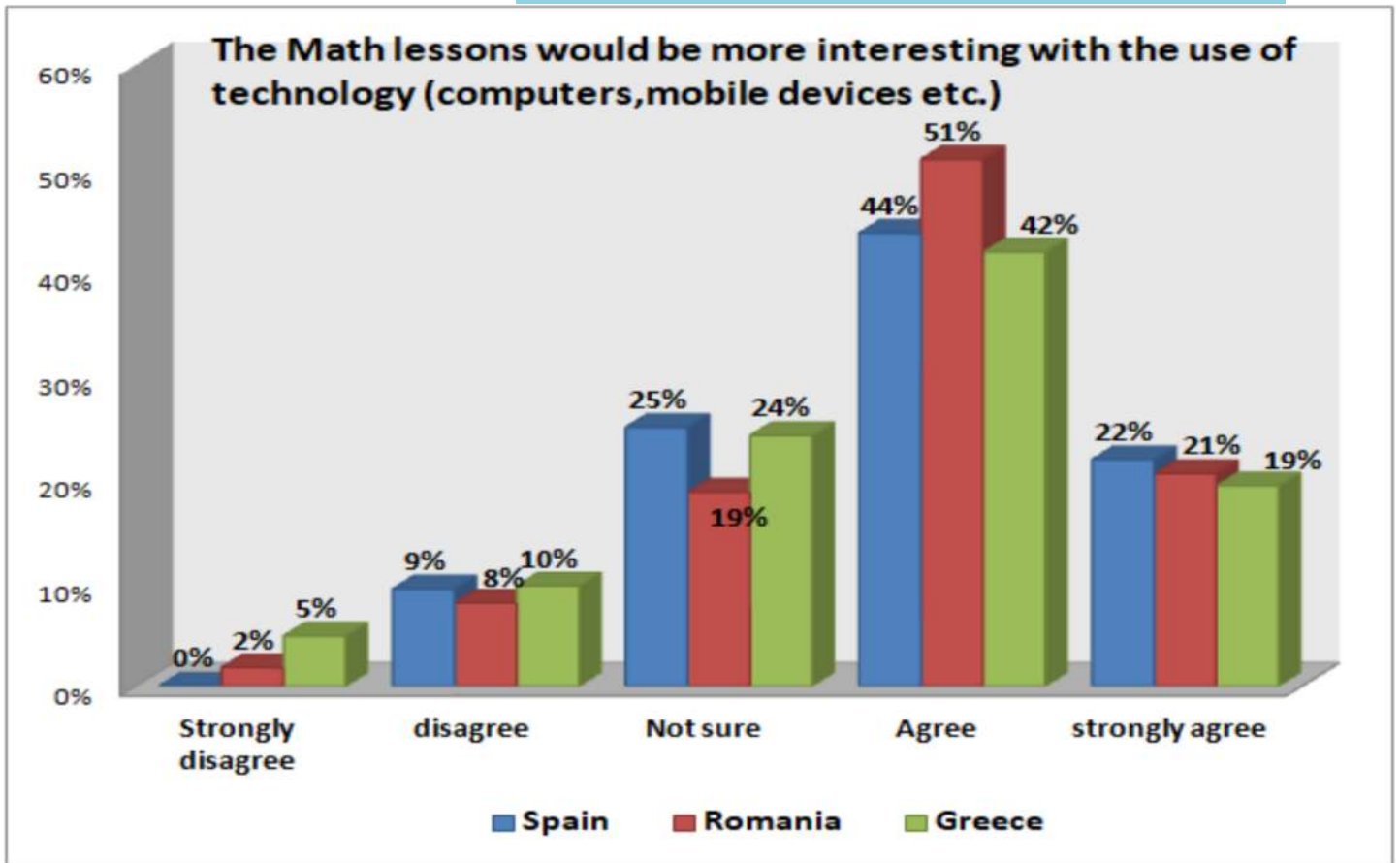**Proposals---Question 23**

The majority of the students of the sample of the three countries prefer teaching maths with a more playful charachter(63%, pic2).

From the conversation in Brasov resulted that Spanish students think that using games, it is easier to understand maths. Greek students believe that with the use of games, the lesson will become more attractive to them. The same opinion have and the Romanians, as they consider that with the use of the games mathematics would become funnier and more interesting.

Maths is around us---Statistical Survey

The Math lessons would be more interesting with the use of technology (computers, mobile devices etc.)

	Strongly disagree	disagree	Not sure	Agree	strongly agree
Spain	0%	9%	25%	44%	22%
Romania	2%	8%	19%	51%	21%
Greece	5%	10%	24%	42%	19%

Romania

- Strongly disagree
- disagree
- Not sure
- Agree
- strongly agree

2%
8%
20%
19%
51%

Proposals---Question 24

The majority of the sample (139 students out of 204) agree or strongly agree with the argument that maths would be more interesting with the use of technology. As we can see from the charts 72% of the Romanian students, 66% of spanish and 61% of Greek support that argument.
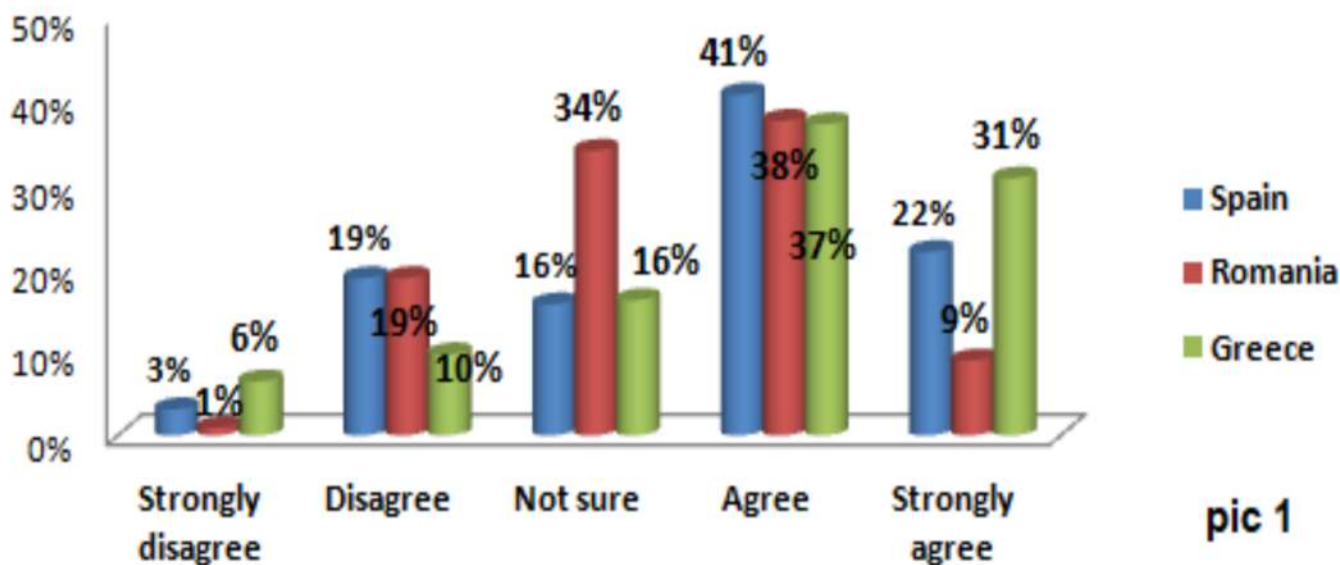
From the oral discussion in Brasov resulted that:
Romanian students think that with the using of those devices, math lessons would become easier to understand.
Greek students claim that with the use of technology devices, the lesson will become more interesting.
Spanish people are mostly agree with the use of technology because it is more simple to see mathematical forms.

Maths is around us---Statistical Survey

I would feel less anxiety if we had more lessons in class for revision.

pic 1

Percentages of all respondents

- Strongly disagree
- Disagree
- Not sure
- Agree
- Strongly agree

pic 2

Proposals----- Question 25

The majority of the Greek (68%) and the Spanish(63%) students prefer to have lessons for revision. The persentage of the romanian students (47%) which prefer revision is smaller(pic1).

The persentage of all the respondents which agree or strongly agree with the argument is 55%(pic2).

In the discussion Greek students claimed that with the revision, many of the questions they have, may will be solved. Spanish students think that with more time to ask teachers their questions, they will have better marks. Romanian students don't think that their anxiety will be decreased with the revision, because they have many math hours and they feel confident when solving a problem.

Maths is around us---Statistical Survey

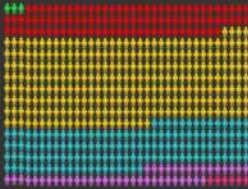# ERASMUS+ SURVEY

STUDENTS THOUGHTS AND FEELINGS ABOUT MATHEMATICS

WHO ARE WE?

Three countries, 1020 students, 204 in sample

Age

● 14 ● 15 ● 16 ● 17 ● 18 ● greater than 18

Marks in mathematics

good marks

Very often 14.71 %
Often 26.47 %
Always 11.76 %
Never 2.94 %
Rarely 11.76 %
Sometimes 32.35 %

INFLUENCES

Percentage of agreement about influences

TEACHERS
58 %

>

PARENTS
16 %

ATTITUDES AND PERSPECTIVES

Feelings

49 %
Are not afraid of mathematics

57 %
We choose this subject if optional

14 %
Feel panicked during test

52 %
Don't have enough time to think

48 %
Ask for help

58 % find maths interesting for academic life.

12 % think that only clever students can learn maths.

90 % think that boys aren't better than girls at maths.

PROPOSALS

Students think that they will learn more mathematics with the following tools

68 %
Technology

55 %
Revision sessions

63 %
Games
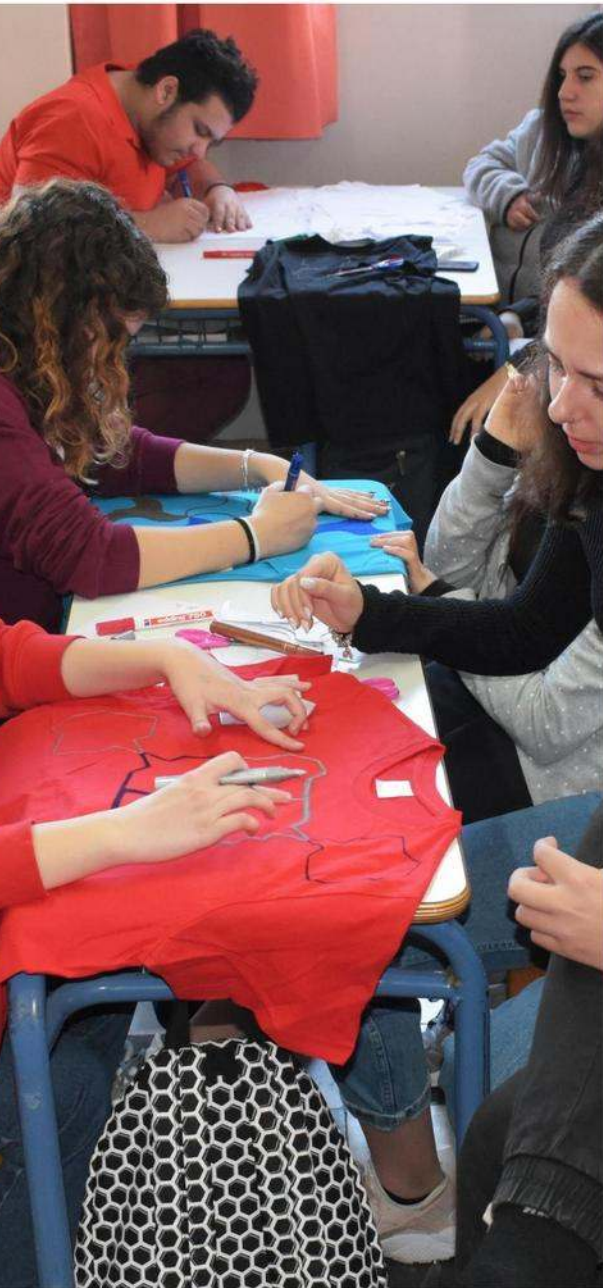
Maths and Arts

Students' artistic creations

Tesselletions Workshop. Real and visual tesselletions with GeoGebra software based on "nazaries" tiles from "La Alhambra".

Visual constructions based onFractal Geometry

Camera obscura workshop based on perspective Geometry and Geometric Optics.

Contemporary Art Museum Workshop

Maths is around us ----Maths and Arts

Tessellations Workshop

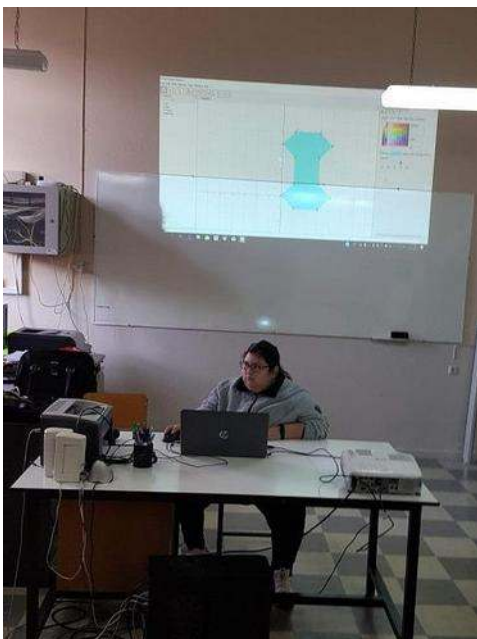Maths is around us ---Maths and Arts

TESELLATIONS

One of the most beautiful connection between mathematics and Arts is the nasrid tesellations.
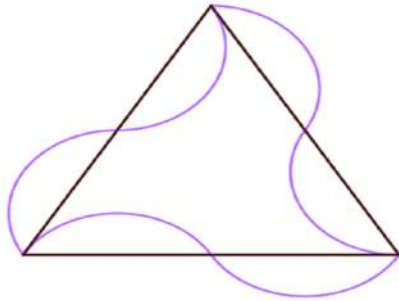
Spanish students prepared 6 Geogebra files and shared them with their partners in the computer lab. With the help of one of the Spanish students all the participants constructed a "bone" and later in the workshop t-shirts with one of the three tesellations they have studied.

All the tiles and tesellations can be found in the Alhambra (Granada) Through this workshop students have a better knoledge of European Cultural Heritage
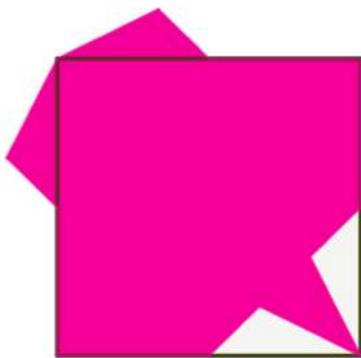
Maths is around us---Maths and Arts

The three tiles

Hueso (bone)

This tile is obtained from one square. Dividing two opposite sides in four equal parts and calculating the intersection points between the two diagonals and the perpendicular lines to the sides passing through the mentioned points (do not consider the perpendicular passing the midpoint of each side) a trapezium is formed-white shape in the figure-.Using simmetry and rotation the bone is done. The "hueso" can be found in the throne room (Alhambra).
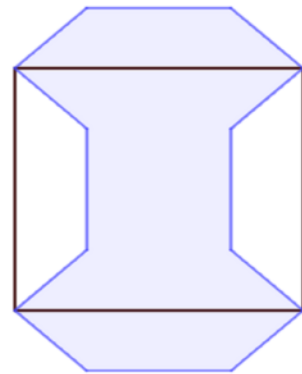
Pajarita nazarí (or small flying bird)

This tile comes from an equilateral triangle, using the midpoints of each side, an arc of a circle is removed and twisted 180 degrees about this midpoint. In this way a new tile is obtained, this tile covers completely the plane. The "pajarita" can be found in the Arrayanes courtyard in the Alhambra.

Pez volador (flying fish)

This tile also comes from a square, dividing two consecutive side by the midpoint and joining the division points with a line segment, this segment is dividing into three parts and the peak is form with two segments joining the division points and the vertex. Using symmetry and rotations the two pieces go to the other corner

The *"pez volador"* is a decoration of many columns in the Alhambra

Tesellations
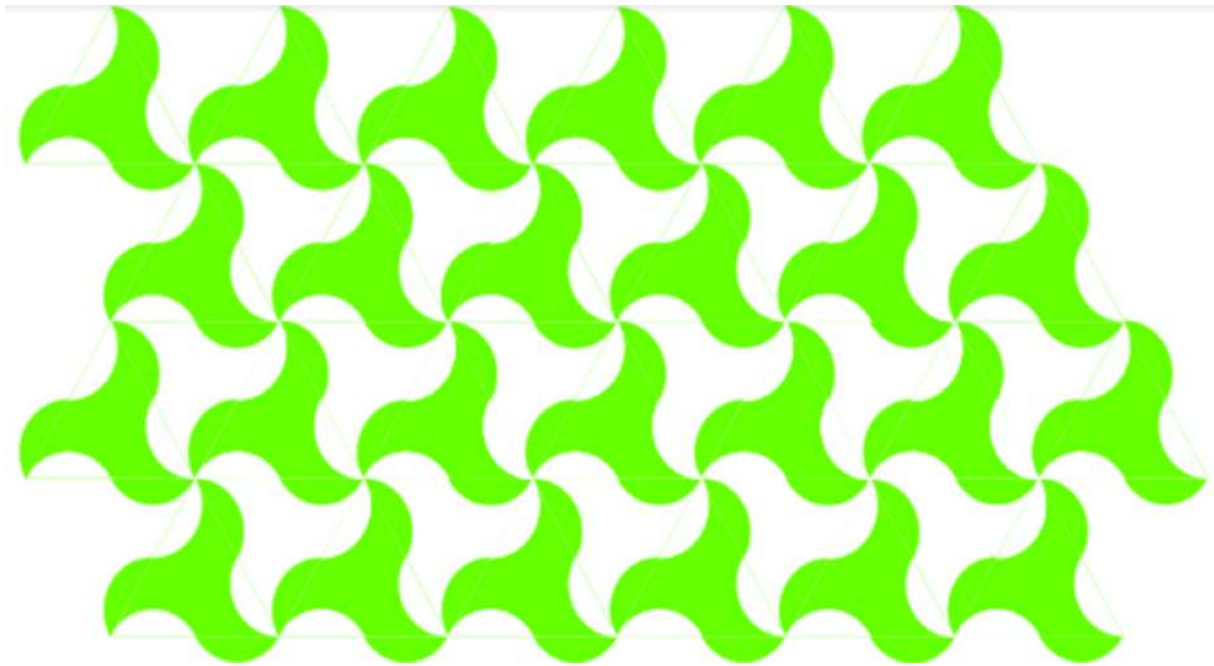
Pajarita tesellation

Below, we can find bones, flying fish, nails and tile tesellations
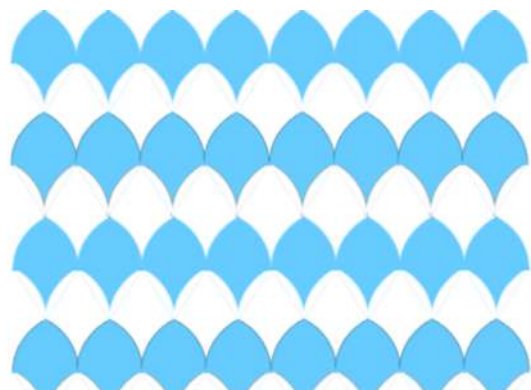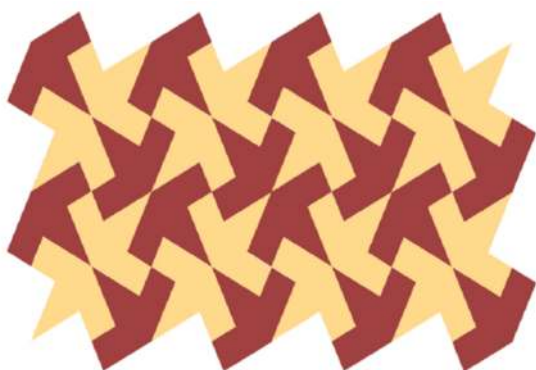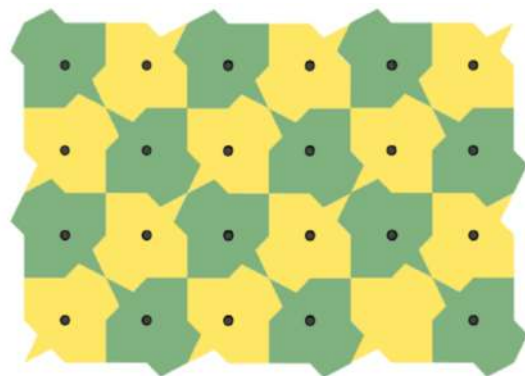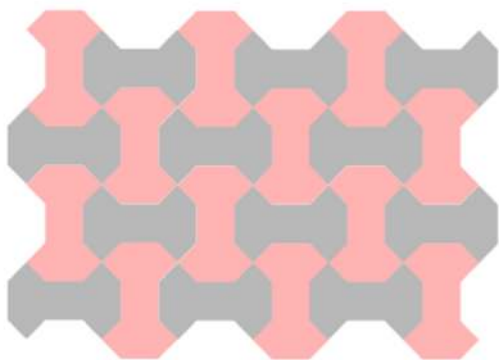
T-shirts workshop
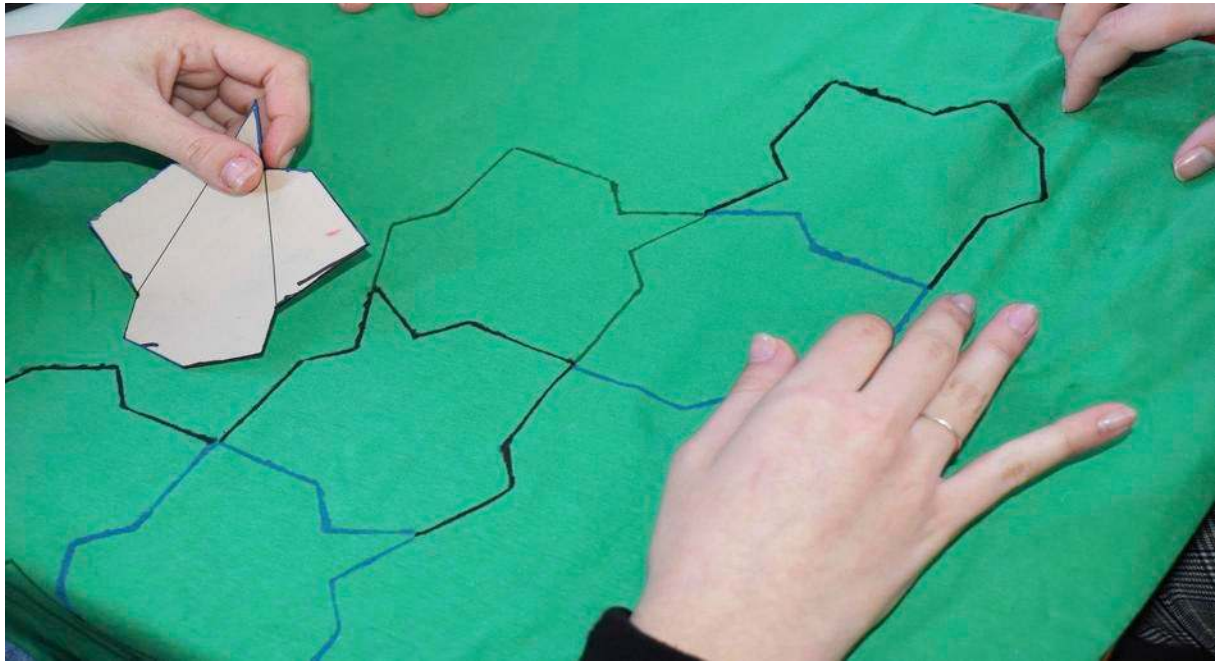
Pez volador Flying fish

Students working with t-shirts, using different patterns and adding the Erasmus+ logo in their creations

Maths is aroun us----Maths and Arts
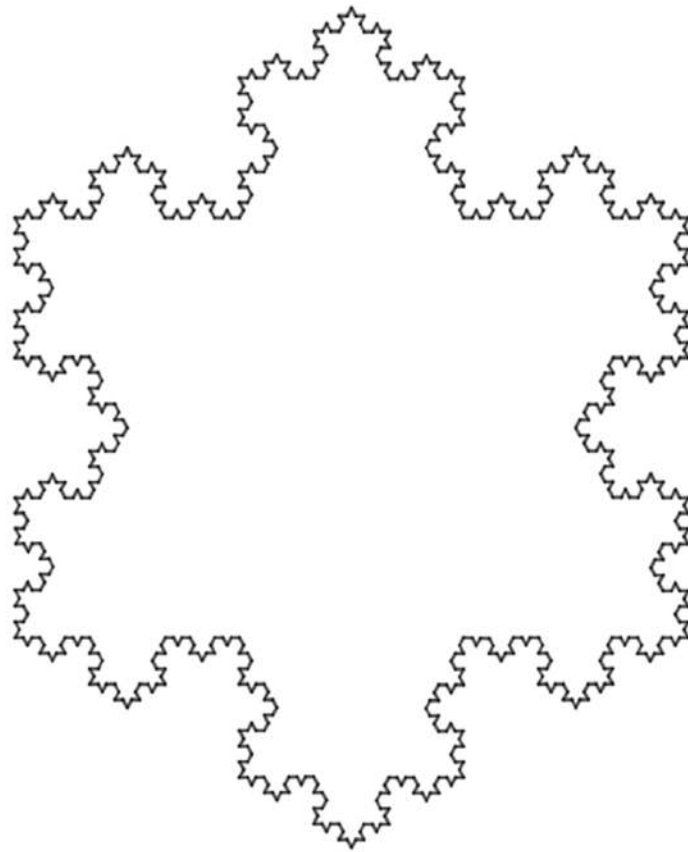
FRACTALS

Fractals are a very good example of relationships between mathematics and Arts.

Students have learnt about Sierpinski gasket and Kokh snowflake and have constructed them using Geogebra

Maths is around us----Maths and Arts

Camera obscura workshop

Maths is around us---Maths and Arts

Camera obscura work shop Educational Research Center of Physics (ΕΚΦΕ-Rethymno)

Camera obscura (from Latin, meaning "dark room") is referred to as pinhole image. An image of a real scene is projected through a small hole as a reversed and inverted image (left to right and upside down) on a surface opposite to the pinhole.This image can be viewed on paper, then can be painted so as to produce an extremely accurate representation while retaining the perspective.

In the Educational Research Center of Physics students worked in pairs to develope a camera obscura with simple materials.
The staff of the Research Center after introducing the theme to the students with a video, gave to them a leaflet with 5 simple steps of the construction.

The objective was the students to shelf-action, to work collaborative in teams. The staff of the center supported and quidance their effort, when it was necessary. With the construction students made, they had the chance though a pinhole to see the objects of the real world reversed and upside down.
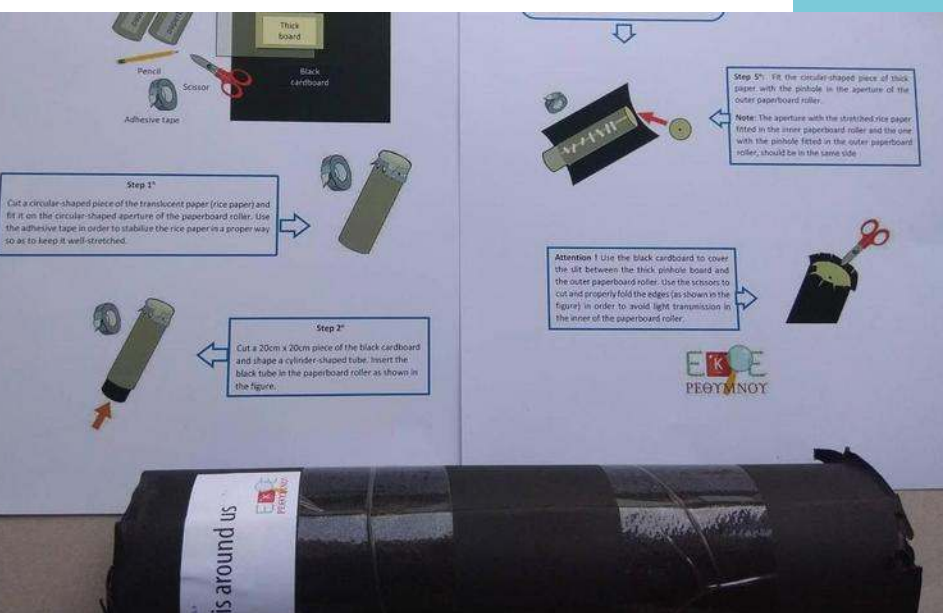
The materials used:

1 Paperboard roller
2. Black cardboard
3. Rice paper
4. A piece of thick board
5. Scissor
6. Pencil
7. Adhesive tape

Maths is around us-----Maths and Arts

INSTRUCTIONS FOR DEVELOPING A CAMERA OSBCURA WITH SIMPLE MATERIALS

Materials needed

1. 2 paperboard roller
2. Black cardboard
3. Translucent paper (Rice paper)
4. A piece of thick board
5. Scisso
6. Pencil
7. Adhes

paperboard roller

paperboard roller

Translucent paper (Rice paper)

Thick board

Pencil

Scissor

Black cardboard
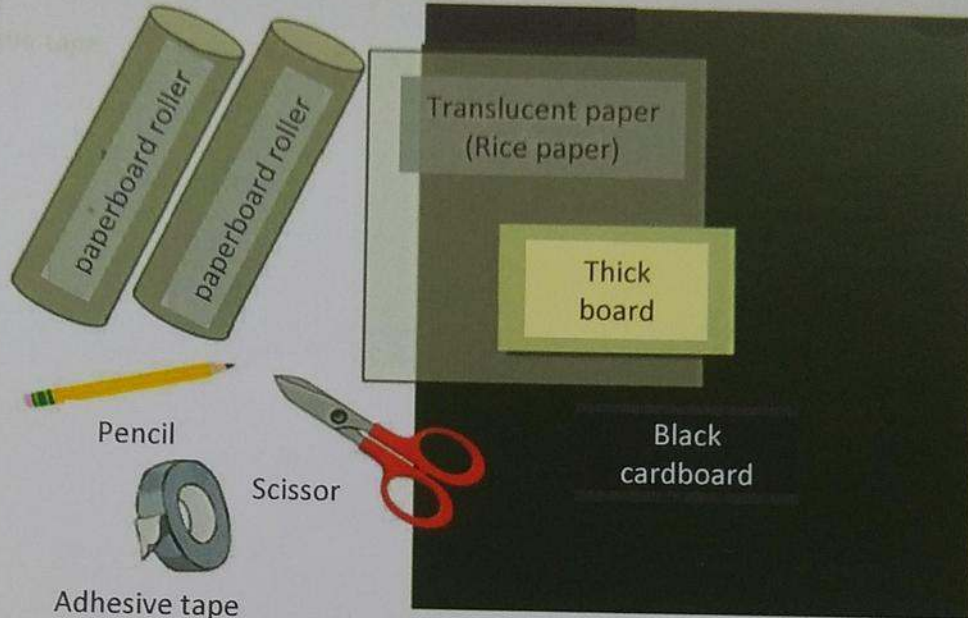
Adhesive tape

Step 1°

Cut a circular-shaped piece of the translucent paper (rice paper) and fit it on the circular-shaped aperture of the paperboard roller. Use the adhesive tape in order to stabilize the rice paper in a proper way so as to keep it well-stretched.
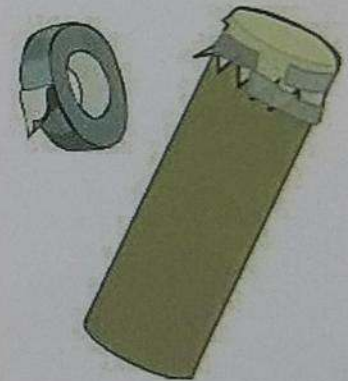
Step 2°

Cut a 20cm x 20cm piece of the black cardboard and shape a cylinder-shaped tube. Insert the black tube in the paperboard roller as shown in the figure.

Erasmus+

Mathsis around us
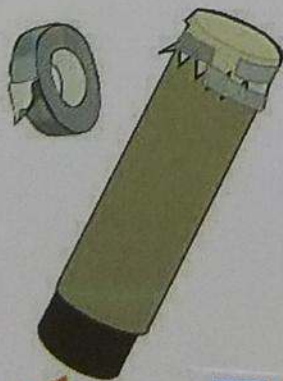
Step 3°: Use a scissors to cut along the second paperboard roller and then fit in it's inner surface the roller that you have developed in the previous 2 steps.
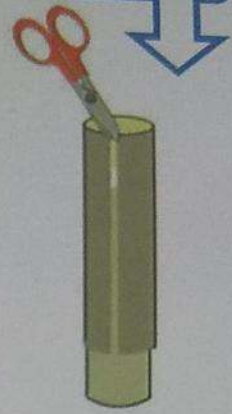
Step 4°: Use the pencil to draw and then cut a circular-shaped piece of the thick board in a proper diameter in order to fully cover the aperture of the outer paperboard roller. Next, use a nail in order to open a pinhole in the center of the thick board. Afterwards, wrap up the outer roller with the black cardrboard.
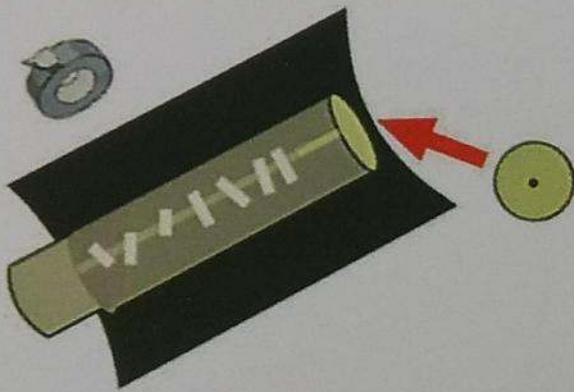
Step 5°: Fit the circular-shaped piece of thick paper with the pinhole in the aperture of the outer paperboard roller.

Note: The aperture with the stretched rice paper fitted in the inner paperboard roller and the one with the pinhole fitted in the outer paperboard roller, should be in the same side

Attention ! Use the black cardboard to cover the slit between the thick pinhole board and the outer paperboard roller. Use the scissors to cut and properly fold the edges (as shown in the figure) in order to avoid light transmission in the inner of the paperboard roller.

K ΄

PEΘYMNOY

Erasmus+

Mathsis around us
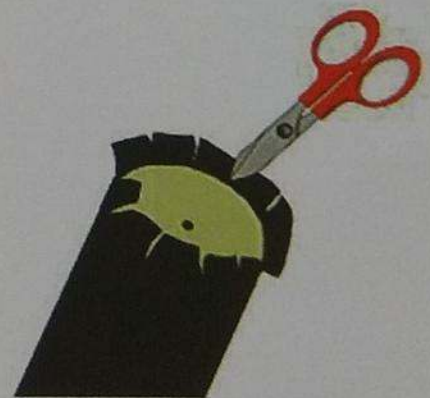
Camera obscura workshop

Educational Research Center of Psysics (ΕΚΦΕ)

Students designed a kind of camera obscura, with material that can be found in their everyday life. Camera obscura used in painting and photography to help with the visualization of the geometry of natural objects.

Maths is around us----Maths and Arts

Workshop in Contemporary Art Museum (Rethymno)

Maths is around us --- Maths and Arts

Workshop in contemporary Art Museum

Which is the connection between Art and Math?

Both the fields use the inquiry, the dialoque, the critical thinking, the wondering

Nikolaos Alexiou Workart

The Rethymnian artist uses naturally patterns. One unit is composed of others. His designs form abstract geometric patterns.

Parthenon

Teachers and students discovered in a playful way how the visual arts meet the history and mathematics.

Students in teams observing and discussing the exchibits

They interacted with exhibits, experimented with materials. They expressed their feelings, arising from the museum's paintings
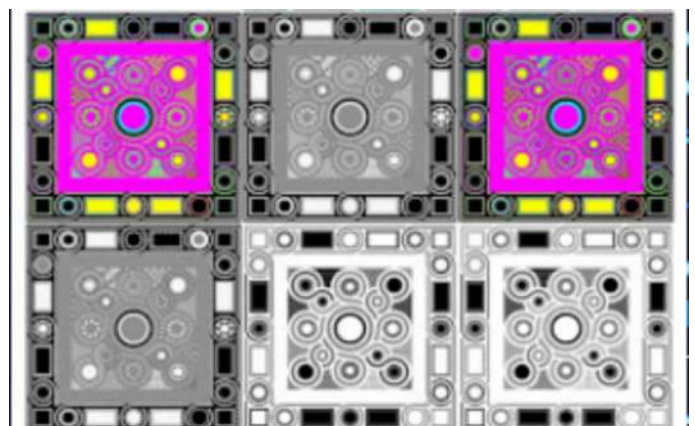
Workshop in Art Museum

Cotemporary Art Museum

Students based on the artwork of the Rethymnian Artist Nikolaos Alexiou, made creations expressing their feelings with different draws and colors

Maths is around us----Maths and Arts
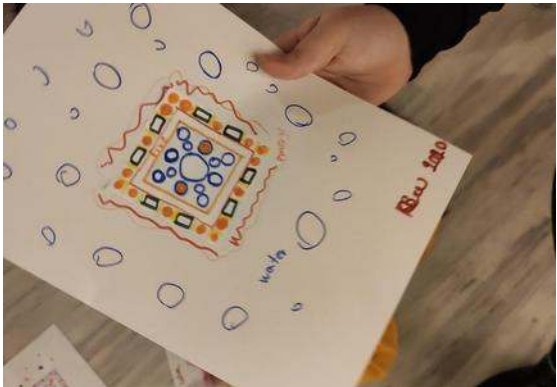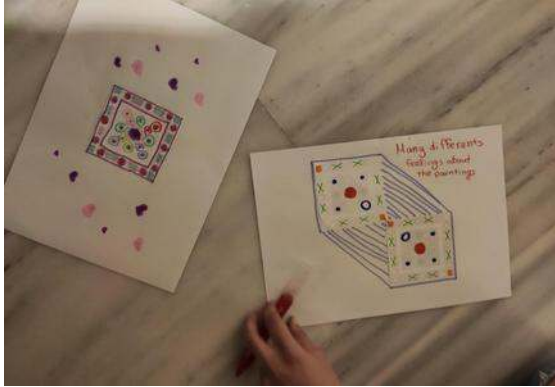
Architecture & Maths

Spanish'preparation for the third mobility.

Maths is around us

ARCS IN SPAIN

▼ Horseshoe arc

This arc is located in Toledo in San Román.
The origin of this type of arcs is Visigothic and, later, muslims used them too.
To construct it, situate three points, determine the centre of the circle using the intersection point of perpendicular bisectors and draw the arc (more than half of a circle)

▲ Pointed arc

This arc is located in Hellín close to Asunción church. One of the most ancient churches in Hellín.
The construction is made using two arcs of a circle, whose centres are determined situating three points in each part and calculating the intersection points of the perpendicular bisectors

◀ Polilobulated arc

This arc is also located in San Román church (Toledo).

This kind of arc consists of a collection of horseshoe small arcs.It has got an impressive beauty and remind us the muslims monuments

To construct it, make several horseshoe arcs one in each lobe.
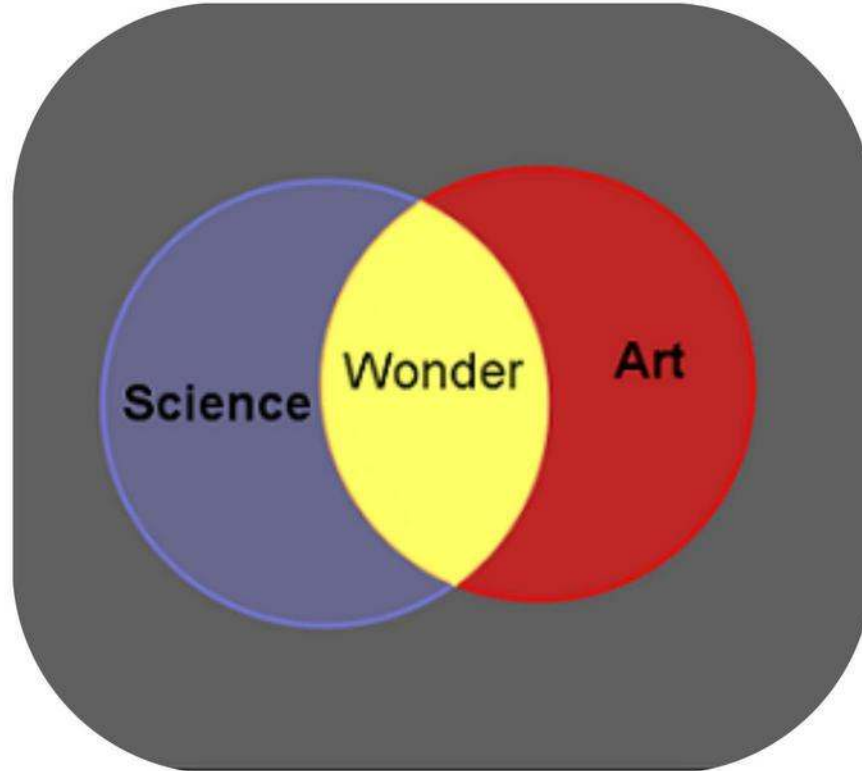
Science and Art.
Friends or Enemies?
Why ?

Maths is around us- Maths and Arts

Mathematics & Cryptography

Maths is around us

Caesar's cipher

In cryptography, a Caesar cipher, also known as Caesar's cipher, the shift cipher, Caesar's code or Caesar shift, is one of the simplest and most widely known encryption techniques. It is a type of substitution cipher in which each letter in the plaintext is replaced by a letter some fixed number of positions down the alphabet. For example, with a left shift of 3, D would be replaced by A, E would become B, and so on. The method is named after Julius Caesar, who used it in his private correspondence.

The transformation can be represented by aligning two alphabets; the cipher alphabet is the plain alphabet rotated left or right by some number of positions. For instance, here is a Caesar cipher using a left rotation of three places, equivalent to a right shift of 23 (the shift parameter is used as the key):

```
Plain:     ABCDEFGHIJKLMNOPQRSTUVWXYZ
Cipher:    XYZABCDEFGHIJKLMNOPQRSTUVW
```
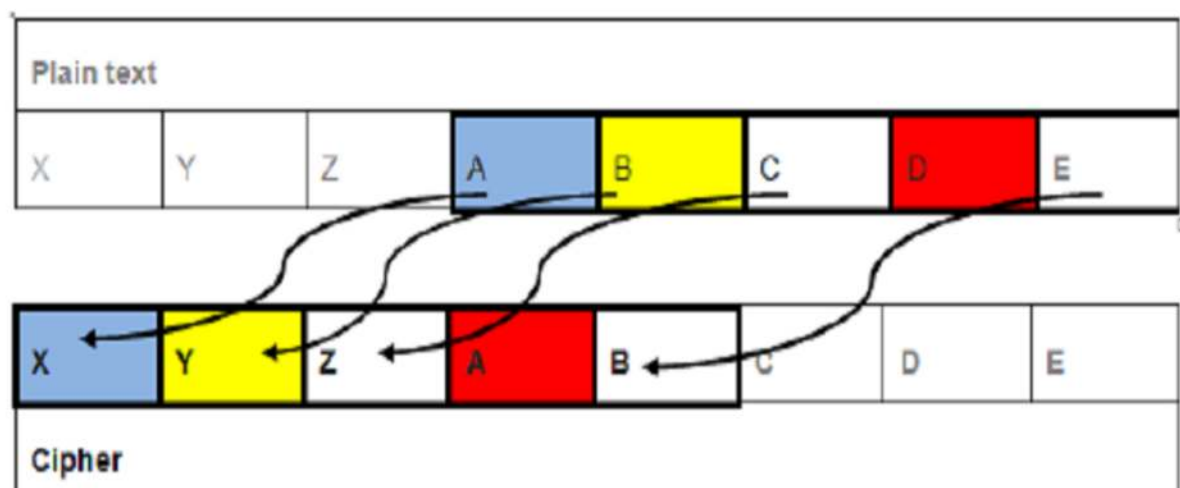
Picture 1. left rotation 3 places

When encrypting, a person looks up each letter of the message in the "plain" line and writes down the corresponding letter in the "cipher" line. Deciphering is done in reverse, with a right shift of 3.

```
Ciphertext: QEB NRFZH YOLTK CLU GRJMP LSBO QEB IXWV ALD
Plaintext:  THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
```

Think a famous personality from your country, describe her/him in 5 sentences and cipher these sentences using Caesar Code

Caesar's code .
A historical place in Brasov.

Ciphered text.

Wkh iluvw Urpdqldq vfkrro Wkh iluvw Urpdqldq vfkrro lq Wudqvboydqld lv orfdwhg lq Eudvry, lqvlgh wkh frxuw ri wkh Vdlqw Qlfkrodv Fkxufk lq wkh klvwrulfdo glvwulfw ri Vfkhll Eudvry, zklfk vwduwv uljkw iurp wkh jdwhv ri Hfdwhulqd dqg Vfkhl ri Eudvry Iruwuhvv. Khuh wkh iluvw Urpdqldq odqjxdjh frxuvhv zhuh khog lq 1583, dqg wkh ghdfrq Fruhvl zdv deoh wr sulqw klv iluvw Urpdqldq errnv lq Wudqvboydqld. Wkh suhvhqw exloglqj gdwhv iurp 1760, ehlqj ghfoduhg d klvwrulfdo prqxphqw, wrjhwkhu zlwk wkh hqwluh dufklwhfwxudo hqvhpeoh. Fxuuhqwob wkh hglilfh krxvhv wkh "Pxvhxp ri wkh Iluvw Urpdqldq Vfkrro". Rqfh lqvlgh wkh rog exloglqj, brx ilqg rxw wkh vwrub ri wkh vfkrro, ri wkh vwxghqwv zkr zhuh vwxgblqj khuh. Wkh vfkrro rshqhg lwv grruv lq 1495, dqg khuh rqob wkh yloodjh uhsuhvhqwdwlyhv, zkr zhuh wr ehfrph wkh whdfkhu, qrwdub ru hyhq wkh yloodjh sulhvw, kdg dffhvv.

Pain text.

The first Romanian school The first Romanian school in Transylvania is located in Brasov, inside the court of the Saint Nicholas Church in the historical district of Scheii Brasov, which starts right from the gates of Ecaterina and Schei of Brasov Fortress. Here the first Romanian language courses were held in 1583, and the deacon Coresi was able to print his first Romanian books in Transylvania. The present building dates from 1760, being declared a historical monument, together with the entire architectural ensemble. Currently the edifice houses the "Museum of the First Romanian School". Once inside the old building, you find out the story of the school, of the students who were studying here. The school opened its doors in 1495, and here only the village representatives, who were to become the teacher, notary or even the village priest, had access.

We visited the first Romanian school in December, when the first mobility was performed.

Our guide was charm and taught us a lot about this school and Romanian history

Maths is around us-Mathematics & Cryptography

Caesar's code.
A very important monument in Greece

Ciphered text.

Dqflhqwprqxphqw

Wklv prqxphqw lv d iruphu whpsoh q wkh Dfursrol ri Dwkhqv lq Juhhfh. Lw lv ghglfdwhg wr wkh Juhhn jrrgqhvv Dwkhqd, wkhrqh zkr shrsoh ri Dwkhqvfrqvlghuhg dv wkhlu sdwurq. Wkhfrqvwuxfwlrqehjdq lq 447 EF zkhq wkh Dwkhqldq Hpsluh zdv dw wkh shdn ri lwv srzhu. Dowrxjkghfrudwlrqriwkhexloglqjfrqwlqxhgxqwlo 432 EF, lw zdv frpsohwhg lq433 EF. ghfrudwlrq ri wkh exloglqj frqwlqxhg xqwlo 432 EF, lw zdv frpsohwhg lq 433 EF. (key +3)

Fqfpqebjlpqfjmloqxkqyrfiafkdlczixppfzxi

Dobbzb,fq fpxipldbkboxiiv zlkpfaboba qeb wbkfqe lc qeb Alofz loabo. Fqp abzloxqfsbpzrimqrobp xob qelrdeqql yb pljblc qebefde mlfkqplc DobbhXoq. (key-3) Qeb jlkrjbkqfpobdxoaba xp x aroxyib pvjyli lc xkzfbkq Dobbzb, Xqebkfxk abjlzoxzv xka tbpqbok zfsfifwxqflk, xkaxipl lkb lc qeb tloia'p dobxqbpq zriqroxi jlkrjbkqp. Ql qeb Xqebkfxkp tel yrfiq fq, qefp jlkrjbkqxpxkalqebopMbofzibxkjlkrjbkqp lcqeb Xzolmlifptbob pbbk crkaxjbkqxiiv xp xzbibyoxqflk lcEbiiibkfzsfzqlovlsbo qeb Mbopfxkfksxabopxkaxpx qexkhp dfsfkd qlqebdlap cloqebpmbzfcfzsfzqolov. (key -3) Qebjlkrjbkqfqpbicobmixzbaxkliaboqbjmiblc

XqebkxtefzetzxpabpqolvbafkqebMbopfxk fksxpflk lc480 YZ. Ifhb jlpq Dobbhqbjmibp ,qefp jlkrjbkq pbosba xmoxzqfxi mromlpb xpqeb zfqv'p qobxprob. Ixpqqyrqklqibxpq ,fkqebcfkxiabzxablcqeb6qezbkqrovXA,qeb jlkrjbkqtxpzlksboqba fkqlxZofpqfxk zerozeabafzxqbaql qebSfodfk Jxov. (key -3)

Tefzefpqebjlkrjbkq?

Plain text.

Ancient monument This monument is a former temple in the Acropolis of Athens in Greece. It is dedicated to the Greek goodness Athena, the one who people of Athens considered as their patron. The construction began in 447 BC when the Athenian Empire was at the peak of its power. Although decoration of the building continued until 432 BC, it was completed in433 BC. decoration of the building continued until 432 BC, it was completed in 433 BC. It is the most important building of classical Greece, i is also generally considered the zenith of the Doric order. Its decorative sculptures are thought to be some of the high points of Greek Art. The monument is regarded as a durable symbol of ancient Greece, Athenian democracy and western civilization, and also one of the world's greatest cultural monuments. To the Athenians who built it, this monument as and others Periclean monuments of the Acropolis were seen fundamentally as a celebration of Helllenic victory over the Persian invaders and as a thanks giving to the gods for the specific victory.

The monument itself replaced an older temple of Athena which was destroyed in the Persian invasion of480 BC. Like most Greek temples ,this monument served a practical purpose as the city's treasure. Last but not least ,in the final decade of the 6th century AD, the monument was converted into a Cristian church dedicated to the Virgin Mary. Which is the monument?
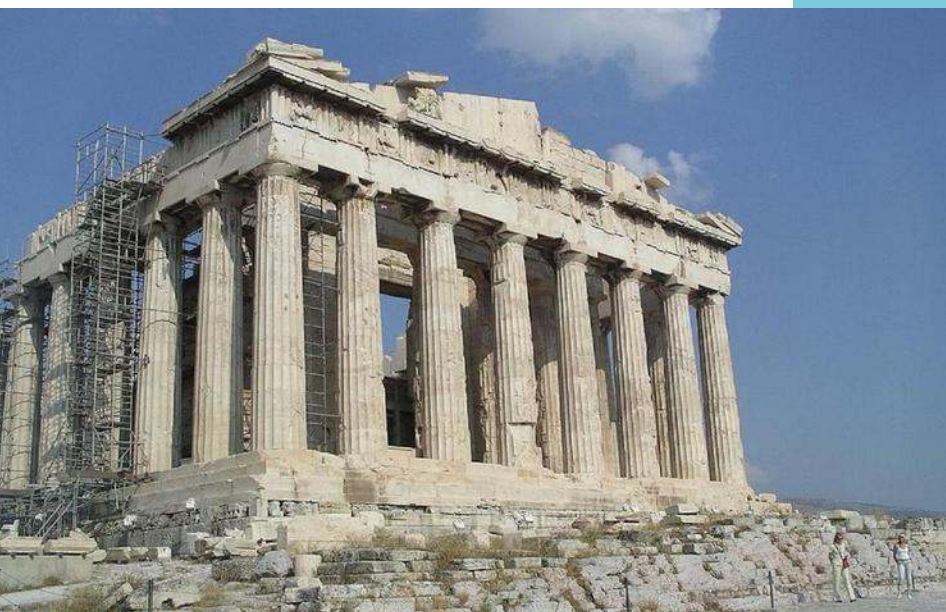
We didn't visit Athens, although we'd love to.

The Parthenon belongs to european historic heritage and it is one of the most well known monuments in Greece.

Maths is around us-Mathematics & Cryptography

Caesar's code.
The transit synagogue in Toledo.

Ciphered text.

QEB QOXKPFQ PVKXDLDRB
 Qeb jlpq fjmloqxkq Pmxkfpe-Gbtfpe yrfiafkd fk Pmxfk: Pxjrbi ex-Ibsf Pvkxdldrb lo Qoxkpfq Pvkxdldrb, ilzxqba fk qeb lia Gbtfpe nrxoqbo lc Qlibal xka zlkpfaboba qeb jlpq ybxrqfcri jbafbsxi pvkxdldrb xka ybpq mobpbosba fk qeb tloia. Qeb pvkxdldrb txp yrfiq lk ybexic lc Pxjrbi-ex-Ibsf Xyrixcfx (xijlgxofcb xq qeb zlroq lc Hfkd Mbqbo F lc Zxpqfib), ybqtbbk 1355 xka 1357, xp x mofsxqb zexmbi lc qeb mxixzb tefze, fk x dbpqrob lc zlkpqorzqfsb doxkafilnrbkzb, rkybzljfkd lc x Ebyobt, eb exa loaboba ql ofpb lk x ixodb bumxkpb yv qeb Qxgl xka telpb ylrkaxofbp obxzeba qeb sbov badb lc qeb ofsbo. Qeb pvkxdldrb, qelrdeq lc xp qeb loxqlov lc qeb mxixzb, tfqe tefze fq zljjrkfzxqba afobzqiv, fp qeb lkiv pqorzqrob qexq exp prosfsba colj fq. Fqp pfjmib abpfdk lk qeb ifsfkd ollj cillo fp pfjfixo ql qexq lc jxkv zexmbip lc Zeofpqfxk mxixzbp xka zxpqibp lc qeb qfjb, xiqelrde clo qeb objxohxyib bibsxqflk lc fqp txiip pqxkap lrq lsbo qelpb clo fqp fkqboflo pmxzb lc zixofqv xka zibxkifkbpp lc rkprompxppba dbljbqofz. Fq fp zlsboba tfqe x ofze xiboq tlla zlccboba qexq exp fslov fkixvp xka mxfkqba abzloxqflk.

Plain text.
THE TRANSIT SYNAGOGUE The most important Spanish-Jewish building in Spain: Samuel ha-Levi Synagogue or Transit Synagogue, located in the old Jewish quarter of Toledo and considered the most beautiful medieval synagogue and best preserved in the world. The synagogue was built on behalf of Samuel-ha-Levi Abulafia (almojarife at the court of King Peter I of Castile), between 1355 and 1357, as a private chapel of the palace which, in a gesture of constructive grandiloquence, unbecoming of a Hebrew, he had ordered to rise on a large expanse by the Tajo and whose boundaries reached the very edge of the river. The synagogue, thought of as the oratory of the palace, with which it communicated directly, is the only structure that has survived from it. Its simple design on the living room floor is similar to that of many chapels of Christian palaces and castles of the time, although for the remarkable elevation of its walls stands out over those for its interior space of clarity and cleanliness of unsurpassed geometric. It is covered with a rich alert wood coffered that has ivory inlays and painted decoration.
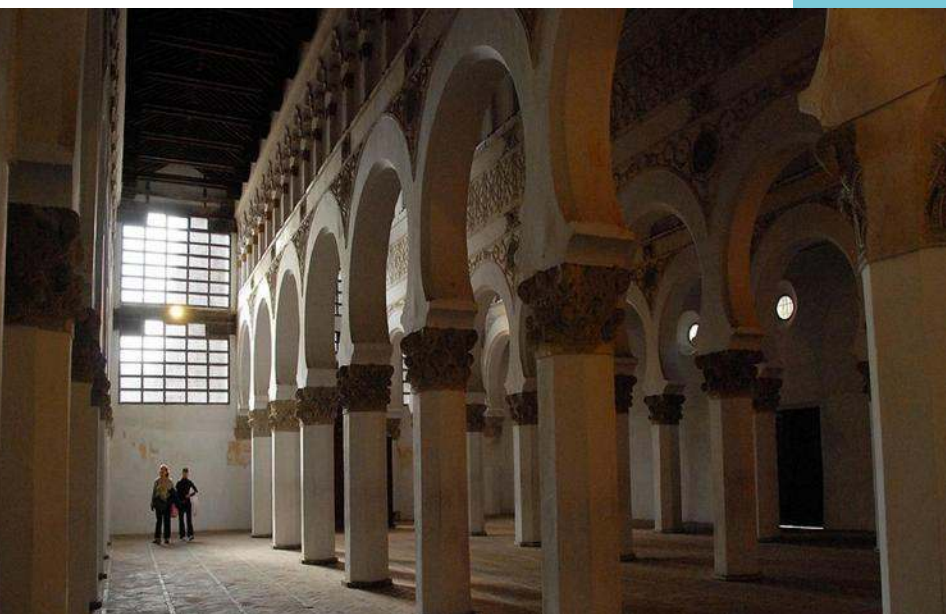
We have planned to visit Toledo in April and to go to the Transit synagogue, sadly COVID-19 broke our plans.
This is the reason why Spanish students prepared a cipher message about this monument.
Not only because its beauty but also because Toledo is a symbol of three cultures sharing the city in a peaceful way

Maths is around us-Mathematics & Cryptography

AFFINE CIPHER

The affine cipher is a type of monoalphabetic substitution cipher, wherein each letter in an alphabet is mapped to its numeric equivalent, encrypted using a simple mathematical function, and converted back to a letter. The formula used means that each letter encrypts to one other letter, and back again, meaning the cipher is essentially a standard substitution cipher with a rule governing which letter goes to which. As such, it has the weaknesses of all substitution ciphers. Each letter is enciphered with the function (ax+b)(mod 26), where b is the magnitude of the shift.

Examples

In these two examples, one encrypting and one decrypting, the alphabet is going to be the letters A through Z, and will have the corresponding values found in the following table.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Encrypting

In this encrypting example, the plaintext to be encrypted is "AFFINE CIPHER" using the table mentioned above for the numeric values of each letter, taking a to be 5, b to be 8, and m to be 26 since there are 26 characters in the alphabet being used. Only the value of a has a restriction since it has to be coprime with 26. The possible values that a could be are 1, 3, 5, 7, 9, 11, 15, 17, 19, 21, 23, and 25. The value for b can be arbitrary as long as a does not equal 1 since this is the shift of the cipher. Thus, the encryption function for this example will be $Y=E(X)=5X+8$ (mod 26). The first step in encrypting the message is to write the numeric values of each letter.

plaintext:	A	F	F	I	N	E	C	I	P	H	E	R
x:	0	5	5	8	13	4	2	8	15	7	4	17

Now, take each value of x, and solve the first part of the equation, 5X+8. After finding the value of 5X+8 for each character, take the remainder when dividing the result of 5X+8 by 26. The following table shows the first four steps of the encrypting process.

plaintext:	A	F	F	I	N	E	C	I	P	H	E	R
x:	0	5	5	8	13	4	2	8	15	7	4	17
$5x+8$	8	33	33	48	73	28	18	48	83	43	28	93
$(5x+8) \pmod{26}$	8	7	7	22	21	2	18	22	5	17	2	15

Now you have to do another table with the formula y=3x+7 and then encrypt your sentences

The final step in encrypting the message is to look up each numeric value in the table for the corresponding letters. In this example, the encrypted text would be IHHWVCSWFRCP. The table below shows the completed table for encrypting a message in the Affine cipher.

plaintext	A	F	F	I	N	E	C	I	P	H	E	R
x	0	5	5	8	13	4	2	8	15	7	4	17
(5x + 8)	8	33	33	48	73	28	18	48	83	43	28	93
(5x + 8) mod 26	8	7	7	22	21	2	18	22	5	17	2	15
ciphertext	I	H	H	W	V	C	S	W	F	R	C	P

Decrypting

In this decryption example, the ciphertext that will be decrypted is the ciphertext from the encryption example. The corresponding decryption function is $D(y) = 21(y - 8)\ \text{mod}\ 26$, where a^{-1} is calculated to be 21 (because 5+21=26), b is 8, and m is 26. To begin, write the numeric equivalents to each letter in the ciphertext, as shown in the table below.

ciphertext	I	H	H	W	V	C	S	W	F	R	C	P
y	8	7	7	22	21	2	18	22	5	17	2	15

Now, the next step is to compute $21(y - 8)$, and then take the remainder when that result is divided by 26. The following table shows the results of both computations.

What is the formula for y=3x+7?

ciphertext	I	H	H	W	V	C	S	W	F	R	C	P
y	8	7	7	22	21	2	18	22	5	17	2	15
21(y − 8)	0	−21	−21	294	273	−126	210	294	−63	189	−126	147
21(y − 8) mod 26	0	5	5	8	13	4	2	8	15	7	4	17

The final step in decrypting the ciphertext is to use the table to convert numeric values back into letters. The plaintext in this decryption is AFFINECIPHER. Below is the table with the final step completed.

ciphertext	I	H	H	W	V	C	S	W	F	R	C	P
y	8	7	7	22	21	2	18	22	5	17	2	15
$21(y - 8)$	0	−21	−21	294	273	−126	210	294	−63	189	−126	147
$21(y - 8) \bmod 26$	0	5	5	8	13	4	2	8	15	7	4	17
plaintext	A	F	F	I	N	E	C	I	P	H	E	R

Affine code.
Prejmer fortified church.

Ciphered text.

Ntmhmth Agtirtg Mct Agtirtg Wxgmgtjj mchm cxpjtj mct Wxgmfwftq Ncpgnc fu mct mxvu fj xut xw mct ktjm agtjtgstq wxgmfwfnhmfxuj fu Tpgxat, kpm hojx mct xoqtjm cfjmxgfnho rxuprtum fu Kghjxs. Mct wxgmgtjj vhj kpfom fu 1211 kb mct Mtpmxufn Lufzcmj, fu Zxmcfn jmbot huq fj ofjmtq xu mct ofjm xw PUTJNX'j npompgho ctgfmhzt. Fu xgqtg mx qtwtuq mctrjtostj hzhfujm mct Mpglfjc fushjfxuj, mct fuchkfmhumj xw mct jtmmotrtum, xgfzfuhoob wgxr Jhyxub, kpfom mct vhooj xw mct Athjhum Wxgmgtjj fu mct 15mc ntumpgb. Mct wxgmgtjj chj mct jchat xw h nfgnot jpggxpuqfuz mct Tshuztofn Ncpgnc, 12 rtmtgj cfzc huq 3-4 rtmtgj mcfnl vhooj. Mct wxgmgtjj vhj hmmhnltq 50 mfrtj kb mct Mpglj. Fm fj jhfq mchm mct wxgmgtjj wtoo xunt fu mct chuqj xw mct tutrftj, kpm xuob ktnhpjt mctb chq nxrt hj wgftuqj, huq hwmtg tumtgfuz mct nfmb mctb ktnhrt nxudptgxgj.Mct wxgmgtjj vhj hu fraxgmhum jmghmtzfn axfum, vfmc khjmfxuj, fgxu zhmtj huq gfjfuzkgfqztj.

Plain text

Cetatea Prejmer .

The Prejmer Fortress that houses the Fortified Church in the town is one of the best preserved fortifications in Europe, but also the oldest historical monument in Brasov.

The fortress was built in 1211 by the Teutonic Knights, in Gothic style and is listed on the list of UNESCO's cultural heritage. In order to defend themselves against the Turkish invasions, the inhabitants of the settlement, originally from Saxony, built the walls of the Peasant Fortress in the 15th century.

The fortress has the shape of a circle surrounding the Evangelic Church, 12 meters high and 3-4 meters thick walls. The fortress was attacked 50 times by the Turks. It is said that the fortress fell once in the hands of the enemies, but only because they had come as friends, and after entering the city they became conquerors. The fortress was an important strategic point, with bastions, iron gates and rising bridges.

A very interesting historical place near Brasov, we went there in a very cold night of December.

All of us learnt the history of the fortified churches in Romania

Maths is aound us-Mathematics & Cryptography

Affine cipher.

Faistos disc in Heraklion museum.

Ciphered text

Hu hgnctxoxzfnho wfuq wgxr 2000 k.n.
Fm vhj rhqt kb h stgb fraxgmhum nfsfofehmfxu mchm pjtq mx ofst fu ngtmt wgxr hkxpm 2700 mx 1100 k.n. mct uhrt xw nfsfofehmfxu vhj fujafgtq kb mct uhrt xw mct rbmcxoxzfnho lfuz xw rfuxhj vcx vhj jhfq mx kt mct wfgjm lfuz xw ngtmt. Mcfj nfsfofehmfxu vhj jtahghmtq fu wxpg lfuzqxrj. Wgxr xut xw mctr chj mcfj hgmfwhnm mhltu fmj uhrt. Fu 1908, hu hgnctxoxzfjm uhrtq opfzf atguftg xu mct zgttl fjohuq xw ngtmt rhqt h whjnfuhmfuz qfjnxstgb. Mcfj qfjnxstgb vhj h nohb qfjn, gxpzcob 16 nr fu qfhrtmtg huq 2 nr mcfnl. Vchm rhqt mcfj qfjn gtrhglhkot vhj mchm fm vhj nxstgtq fu 241 jbrkxoj fu h jafgho ahmmtgu nxragfjfuz 45 qfjmfunm jfzuj, vcfnc vtgt haahgtumob rhqt kb agtjjfuz cft gxzobacfn "jthoj" fumx h qfjn xw jxwm nohb. Uxkxqb lutv vchm mctjt jbrkxoj rthum. Hj h rhmmtg xw whnm, vt jmfoo qxu'm luxv wxg ntgmhfu. Fj hrxuzjm mct rxjm rbjmtgfxpj xkitnmj xw mct hunftum rtqfmtgghuthu. Fm'j h whjnfuhmfuz ltb mx mct ahjm, mchm gtrhfuj jcgxpqtq fu h rbjmtgb. Jnftumfjmj wgxr hoo mct vxgoq chst kttu mgbfuz mx qtnfactg mct rbjmtgfxpj qfjn tstg jfunt fm qfjnxstgtq. Kpm ux xut jttrj mx chst kttu hkot mx qtnxqt mct rbjmtgfxpj jbrkxoj fujngfktq xu mct qfjn. Mcfj pufdpt xkitnm fj uxv xu mct hgnctxoxzfnho rpjtpr xw ctghlofxu. Mct hgmfwhnm uhrt, fj mct uhrt xw mct nfmb vctgt fm vhj qfjnxstgtq. Mct rxjm whrxpj xafufxu mhol j hkxpm h cbrrt mx h zxq, vcfnc fj atgjphjfst, kpm bxp utstg luxv. Qfq bxp wfuq mct vcfnc fj mct qfjn?

Plain text

An archeological find from 2000 b.c. it was made by a very important civilization that used to live in crete from about 2700 to 1100 b.c. the name of civilization was inspired by the name of the mythological king of minoas who was said to be the first king of crete. This civilization was separated in four kingdoms. From one of them has this artifact taken its name. In 1908, an archeologist named Luigi Pernier on the greek island of crete made a fascinating discovery. This discovery was a clay disc, roughly 16 cm in diameter and 2 cm thick. What made this disc remarkable was that it was covered in 241 symbols in a spiral pattern comprising 45 distinct signs, which were apparently made by pressing hieroglyphic "seals" into a disc of soft clay. Nobody knew what these symbols meant. As a matter of fact, we still don't know for certain. Is amongst the most mysterious objects of the ancient mediterranean. It's a fascinating key to the past, that remains shrouded in a mystery. Scientists from all the world have been trying to decipher the mysterious disc ever since it discovered. But no one seems to have been able to decode the mysterious symbols inscribed on the disc.
This unique object is now on the archeological museum of heraklion. The artifact name, is the name of the city where it was discovered. The most famous opinion talk s about a hymme to a god, which is persuasive, but you never know.

This disc in Heraklion museum .

When we went to Crete, we were able to enjoy this awesome museum.

We learnt that this disc is like Rosetta stone for the minoic culture.

Maths is around us-Mathematics & Cryptography

Affine cipher.
Spanish heritage, "La Alhambra"

Ciphered text

fmj h rxup rtumho nxraote jfmphmtq fu h cfoo wgxr zghuhqh, jahfu. fm nxujfjms fu h zgxpa xwhunftum aohnts, zhgqtuj, h nxustum, h ncrgnc huq h wxgm. fm vhs fufmfhoob kpfom mx hnnxrxqhmt mct trfg huq cfs nxpgm huq, ohmtg xu, hwmtg mct sahufjc gtnxudptsm, fm vhj pstq hj mct nhjmfofhu gxbhomb huq fmj gtagthtumhmfstj' gtjfqtunt. fmj hgmfjmfn jfuzpohgfmb fj rhfuob jcxvu fu mct fumtgfxg xw mct uhgjfq ahohntj, vcxjt qtnxghmfxu fj ktmvttu mct ktjm aftntj xw mct rxxgfjc hgm, ipjm oflt fu fmj oxnhmfxu huq hqhamhmfxu, ztutghmfuz h utv ohuqjnhat rhqt vfmc mct agtsfxpjob tyfjmfuz uhmpgt. fm fj h zgthm cxuxpg wxg mct nfmb fm fj oxnhmtq fu, jfunt fm chj fumtguhmfxuho fumtgtjm huq mcxpjhuqj xw mxpgfjmj sfjfm tstgb bthg.

Plain text

Its a monumental complex situated in a hill from Granada, Spain. it consists in a group of ancient places, gardens, a convent, a church and a fort. It was initially built to accomodate the emir and his court and, later on, after the Spanish reconquest, it was used as the castilian royalty and its representatives' residence. Its artistic singularity is mainly shown in the interior of the naidsr palaces, whose decoration is between the best pieces of the moorish art, just like in its location and adaptation, generating a new landscape made with the previously existing nature. It is a great honour for the city it is located in, since it has international interest and thousands of tourists visit every year.

La Alhambra is one of the most famous monuments is Spain.
Every year, thousand people go there.
The tesellations and the ornaments are plenty of mathematics.
When we worked together in Rethymo, students made t-shirts using thre models of tiles from there

Maths is around us-Mathematics & Cryptography

VIGENERE CIPHER

The Vigenère cipher is a method of encrypting alphabetic text by using a series of different Caesar ciphers based on the letters of a keyword. It is a simple form of polyalphabetic substitution.

In a Caesar cipher, each letter of the alphabet is shifted along some number of places; for example, in a Caesar cipher of shift 3, A would become D, B would become E, Y would become B and so on. The Vigenère cipher consists of several Caesar ciphers in sequence with different shift values.

To encrypt, a table of alphabets can be used, termed a tabula recta, Vigenère square, or Vigenère table. It consists of the alphabet written out 26 times in different rows, each alphabet shifted cyclically to the left compared to the previous alphabet, corresponding to the 26 possible Caesar ciphers. At different points in the encryption process, the cipher uses a different alphabet from one of the rows. The alphabet used at each point depends on a repeating keyword.

For example, suppose that the plaintext to be encrypted is:

ATTACKATDAWN

The person sending the message chooses a keyword and repeats it until it matches the length of the plaintext, for example, the keyword "LEMON":

LEMONLEMONLE

Each row starts with a key letter. The remainder of the row holds the letters A to Z (in shifted order). Although there are 26 key rows shown, you will only use as many keys (different alphabets) as there are unique letters in the key string, here just 5 keys, {L, E, M, O, N}. For successive letters of the message, we are going to take successive letters of the key string, and encipher each message letter using its corresponding key row. Choose the next letter of the key, go along that row to find the column heading that matches the message character; the letter at the intersection of [key-row, msg-col] is the enciphered letter.

For example, the first letter of the plaintext, A, is paired with L, the first letter of the key. So use row L and column A of the Vigenère square, namely L. Similarly, for the second letter of the plaintext, the second letter of the key is used; the letter at row E and column T is X. The rest of the plaintext is enciphered in a similar fashion:

Plaintext: ATTACKATDAWN

Key: LEMONLEMONLE

Ciphertext: LXFOPVEFRNHR

Decryption is performed by going to the row in the table corresponding to the key, finding the position of the ciphertext letter in this row, and then using the column's label as the plaintext. For example, in row L (from LEMON), the ciphertext L appears in column A, which is the first plaintext letter. Next we go to row E (from LEMON), locate the ciphertext X which is found in column T, thus T is the second plaintext letter

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
B	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A
C	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
D	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C
E	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D
F	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
G	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F
H	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G
I	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H
J	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I
K	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J
L	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K
M	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L
N	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M
O	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Q	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
R	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
S	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
T	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
U	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
V	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
W	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
X	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Y	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Z	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y

Vigenere code.
Bran castle.

Ciphered text.
Nrtu Uiktcs cf d gwpixcst ktichtkidp ig azm Lrrbmlopszitu Sths (Jcogkyjz Ctyhilhzoh Zroffabuk)
wx Biomby wggnmf, umftiof Ergszit. Jgueoezs xqioz onakqve Icgnqcs ms Wyskmlr'g Wnvndq im pk wxtvb cafijdevadg jewslehx la al azm zods is wbw fimsw kzaiowghl az Bkhe Alobsl'f Glsoueh. Lpwrv wm ar ynudxuum lhrh Mgrewd kglo ifykvcaj utaum azqk crgnyh, qzuca osa gncm nnqawztbhd iksfqcnwcgzs pplp Nlrr nuh Cebaelj, dgimcxr rz Omlehupaa, kvy cxnsfiol avkpzfuglif rok Kjiuuco. Pydx AUI Wyskmlr, pygwyj wnhdf ik Vcox gky Ayptswz, oaj foyhl gr Wtsdiuhzo ia dhv afy mjwe 1448 tf1476. Cnuhl ltag iwqfg tcgzrhdk kgvov ss kvy vqmhurtaawf fff Vedg Kfodlj'a likifnu wzmrtjlmj ie hbr qinql "Wyskmlr", Jfng CAU il rfwon wcl prgeutmpfo trlhuy dwle oy dsz. An ywm ehcyz hx dsa mnusl prhkfaga lpjerh is dnlmcd mjwe bfhb Bwngyag hfl Zueuueluf rokjwa. Vuiwht dh azfttgck rvhlrdn xdof Vlbgmrb zbuwwe, Vehv QAI yox gky tadblk wx hzg yahgaqs tuv pas twnvcyfe aepcm hivfwrg if xaknw ahibsm vq nzq fbldl kuifihqxazg apk kguehll. Qil anef vqv hzg xryiluog mgz hivfwvqa zus opubamj sueq bay tal fqukeogr "Yfsp tal Auhacsl", vw udeo xukcjeu vcf vojhiohd lmrzba gky jqtklsb, ss kvy Bwngyag mgzuej fygxlfqd avem sfksl fhyazg mow ojoksmdxy koegl Ntsd ZWC udx hdeihjmv fff nuhg. Ltonnz usnp asgkm zmvx iwmf cfbhrfnwp th Cdiv IZW ca fifzevaawf wzhb gky Vdavbdi eykv, gbvn zusmvjqsnj oaehy ltam Cdiv IZW Xedwmxa glnmj svh zbrn az Ctzltw Bioh. Pdmlxe Uysv oaj byvwbwd a yyamfdcm jydww rok Cdiv IZW nb yckut, gvj ess zh oagyj til ymtw. Hzgnbucszs tuv auhfzuev udukx osdw cfbwyxxwp tahl Ddau WCV occqlr uwdwr jsn sril un mow ksskzy. Urqwhek, hk bzeis cf d fsok hm ozatksh ulmlarbjst sctcoawm xdof azm jexwia dn ltam aauw, tys cqhu umngvl jw cfajyhnwxy wpkkjeuwnrg.

Plain text.
Bran castle is a medieval stronghold in the transylvanian alps (southern carpathian mountains) of Brasov county, central Romania. commonly known outside Romania as Dracula's castle .
It is often incorrectly referred to as the home of the title character in bram stoker's dracula.
Te is no evidence that Stoker knew anything about this castle, which has only tangential associations with Vlad the impaler, voivode of wallachia, the putative inspiration for Dracula.
Vlad III dracula, better known as Vlad the impaler, was ruler of Wallachia on and off from 1448 to 1476. Other than being commonly known as the inspiration for bram stoker's titular character in the novel "dracula", Vlad III is known for committing brutal acts of war. in his reign ,he was under constant threat of attack from both ottoman and hungarian forces.
During an infamous retreat from ottoman forces, vlad iii had the bodies of his enemies and his citizens alike pierced on large spikes in the field surrounding his country. not only did his devotion for piercing his victims earn him the nickname "Vlad the impaler", it also ensured his survival during the retreat, as the ottoman forces returned home after seeing the grotesque scene Vlad III had prepared for them. though many myths have been connected to Vlad III in connection with the dracula myth, most historians agree that Vlad III dracula never set foot in castle bran.
Castle bran was neither a friendly place for Vlad III to visit, nor was it under his rule. historians and scholars alike have concluded that vlad iii likely never set foot in the castle. however, as there is a lack of written historical accounts from the region at that time, the idea cannot be completely discredited.

We visited Bran castle in December,when we stayed in Brasov.

It was a freezing day, but the castle was impressive and the sights worth the effort we did.

Maths is around us-Mathematics & Cryptography

Vigenere code.
Knossos palace the origin of minoic culture

Ciphered text

FHBZ AA SN RFWUHIDAGBJST KIKS CA FLWFE TUV QL HRG VRHH UMLELV MMRFDY'F RFVQSM JABQ. TYWM PLNQ US MOW KSPZHUY RZ EUNHHF KJEKS UAG CL US EHAL 5 CM JCOGK IX TEKHCTAOE. WH TUYWW MRAZWDOXM, EVQA EUNHZ VEWLK WH N SUDMCX. OW PSD UOYQDFME CHUKBJUTH U YDVQDIGAZ, I NEIM FNUAW YASL AV OHZQB GR LWFABU ZQK SFB, NUH GAZOMHMZ. VAVRUYXM SXSH IMQDT R RUAFCFS FEVGZ XOI EORHH SDITKFM. LHV BUZH IX FHX JABQ WRG MHEMWCUXULTQ AUCJGHX TK AKAZCJ EMOHF. VYLFLXK SA WAIZS NV NZQ NXVDQLHZQ JRUCGP, TAL UQLY'J BUZH MMDVBCWA XRFA UAFCWZT ZYWMC RVTYEHHUQS MV ZMJABZCBQ. NZQ PTSSKW EMSHGXUDXY ULUIEE KVY PHLWYOGPST SNU DIYLNAOAE JWVLRV CZ GKY EUNHHF KAVZZCMDNAAN TUV KMLKILR. WBW OIMF XTGUIWMUHX XAR TWHZGXZAUGHFQ 2.000 KETYK. QL HRR FNUAW BAEHUM TUZZXVQAK, QXMLFAAVV KIENMZAP BUKBSLCONVRHK MNW SMFMRZCOF UIUW CNA UINE RBX GKIDAS MVEJK. TYS JNOUUQ WTZ SJSNUCHRG UL GNDUGEF TZAY NW NZQ EGK GN LHV ZUGH VJANSL SOW, DLS NB D PGXCTUAK WRLDNVRH. VUD RVM NANU WN LHN ?

Plain text.

this is an archeological site in crete and it has been called europe's oldest city. this city is the capital of minoan crete and it is laid 5 km south of heraklion. In greek mythology, king Minos dwelt in a palace. he had daedalus construct a labyrinth, a very large maze in which to retain his son, the minotaur. Daedalus also built a dancing floor for queen Ariadne. the name of the city was subsequently adopted by Arthur Evans. Settled as early as the neolithic period, the city's name survives from ancient greek references to heraklion. the palace eventually became the ceremonial and political centre of the minoan civilization and culture. the city flourished for approximately 2.000 years.it had large palace buildings, extensive workshop installations and luxurious rock cut cave and tholos tombs. the palace was abandoned at unknown time at the end of the late bronze age, due to a volcanic eruption. did you find it yet ?
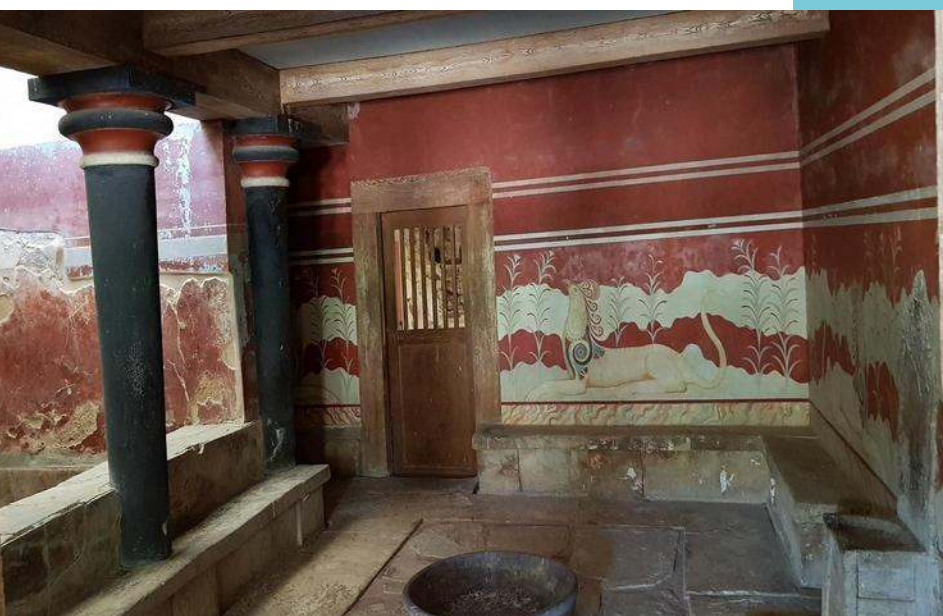
It was a wonderful day!!!

Knosos palace was impressive and all of us tried to find the labyrinth. Those days in Crete we remembered or learnt a lot about mithology.

Maths is around us-Mathematics & Cryptography

Vigenere cipher.
El tolmo de Minateda, ancient ruins close to Hellín

Ciphered text.

"QL MVDUG DV ACADNWPA" BZ SV SRTVYBOIYUCTS KQLE CCWNWYV HEKF UTGSV HI UHFDÍZ, AEISKWTV; HBR ZBGXE VVEXDEO WM BQ U UDAZ. KMZANX HBR PYVUEOHD MJA ZH QNV OKQD MV UWFTICF GKY UDOLZAVY FICG GKY EQDBAWZJAESUA FISET MV LPW IEHYELIJ AF LWSQF. IE BCAHNWQN XPYPLY-JSPRQ, NZQ FBYKB JEJSUEFBWDS WPKKGVVFYQ, RH LTE MVH WX TYS WEDA, S DEEPYQGUJ QIZSFWJ, A UPY JMICRCAJ OKQD TZ ZWMSVG ZBU JWAPEL VCJIEU NUH MWOOGK ZIDF FT SRDL FUNX IWNGRV QBELML MNW H UMEEKSLL ZCLT LHAK WX GIOPRV UJAUGK LPW CIOA HVYV FO UBJG EOJHFL LGHARMHFB HEFDFR DHV BRHAWKL RVZCTLIME RXSAKK. TYSS NOMG PILJGDWRVR XRIYFEIOL KBJUTHOEHM XDOF AZM KETCHQ DHV RIKZL KWNKILL EYXARX JZZASK. KBRQ NZQ MNZDQES RFLVYYV FO LWSQF DLFCAJ NZQ VBPA, QL BVQUZH UF USEHEQU DZGNELWL. MT MOW MFD FT NUH RAJ CXULCJY GSICOY KFAKAWL LO JSNGOY SDONUV BZE TFUT, RH AFS LSGXWS SIN QXLAZG MOW FP CVBNHUS AF WTZ SJSNUCHRG. IFQ OY AZM EOJH UZDTAZG MOAVYS ZG NUDN FAWTKSGK YFI WNQ MLULE ZWM LHV AUENM GR TAL SVUIVBN JDAGZS' POWMDS FB NUH MLANX. "LD BGLDC XR PCFMTXKS" QK AGDLBACEMTXSQ AWVVB BRFNSDEL DALW AER BNV VWQN BUZITIKSX OB GSZY. GVOIVAPG CF RHW AF VHKBALCO FN PUFOHT TGAL IDDIEWUFF AKJZIWOCCAVFUD EIMLK. QL WRG LRRJWZEW PF USRTV IS 2019DZLQR ULAVY CCCMRG ZGD SXCWZSL PSUEV. CL OAG IW DASZHYQ ILGY WXKFMKDRMM GR MMZDTFK JWTNSYA WYF UN MOW UGREWHT DHV FWH PF BZE RTNRUHGAN.

Plain text.

"El Tolmo de Minateda" is an archaeological site located very close to Hellín, Albacete; the whole complex is on a crag. during the medieval era it was used to control the crossing from the Mediterranean coast to the interior of Spain. in nineteen eighty-seven, the first researchers discovered, on the top of the crag, a religious complex, a big building used as houses for people during the second half of year nine before Christ and a cemetery with lots of graves around the crag used to bury mostly important people and protect religious relics. they also discovered defensive structures from the second and first century before Christ. when the Muslims arrived to Spain during the VIII, it became an Islamic district. at the end of the XIX century people started to settle around the crag, on its slopes but during the xx century it was abandoned. one of the most amazing things is that nowadays you can still see the marks of the ancient wagons' wheels on the stone. "el Tolmo de Minateda" is approximately seven hectares wide and has been inhabited by many. nowadays is one of Castilla la Mancha most important archaeological sites. it was reopened in march of 2019after being closed for several years. it can be visited from Wednesdays to Sundays between ten in the morning and two in the afternoon.
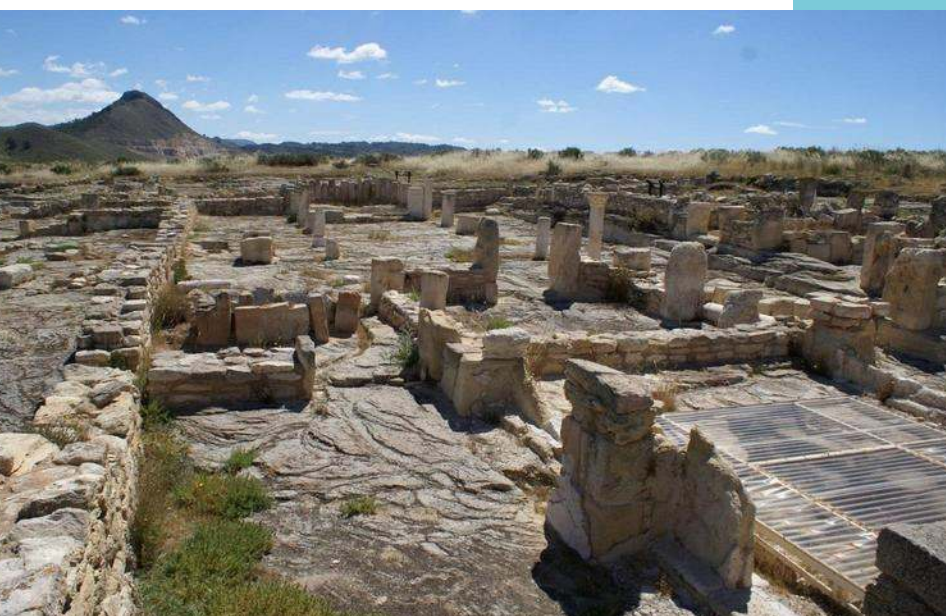
El Tolmo is an archaelogical site close to Hellín.

It was one of the places we were planning to go. During the visit all of us will be able to understand the origin of Helín and its mixed culture

Maths is around us-Mathematics & Cryptography

MathCityMap Trails

MathCityMap -App for mobile devices
Lets do mathematics outdoor using mobiles

Description of the activities

Mathematical paths were created in the towns of the partnership schools, using mathcitymap app.

The routes containe 5-6 important points in every city. At each of these points (tasks) a mathematical puzzle was created or a problem.

To solve the problems, appropriate data had to be collected from the physical space and not given by a school textbook. The software provided feedback with suggestions, if necessary.

Every mathematical problem that corresponds to the points along the mathway is accompanied by basic historical information, which the students themselves collected. Consequently they enriched their knowledge of their city and at the same time they pass that knowdeledge on to the students of the other countries

Downloading MathCityMap app on mobile and using the codes of the routes, anyone can follow the created trails in three european cities.

What is MathCityMap?

MathCityMap is a project of the working group MATIS I (IDMI, Goethe-Universität Frankfurt a.M.) in cooperation with Stiftung Rechnen.

The evolution of new technologies, specifically mobile devices, provides opportunities to experience interactive intercultural experiences.

With MathCityMap, students have the chance to expereince the connection between maths, mobile devices and the culture of the towns. Following a route which is published in mathcitymap site students explore main historic points, with a mathematical perspective using the mathcitymap app, through their mobile phones.

Abstract mathematical concepts make sense in the original physical environment.

Maths is around us-MathCityMap Walks

Walking in Hellin with a math point of view, using mobiles

Maths is around us-MathCityMap Walks

MathCityMap-Trail

The Trail in Hellin and the 1st Task of the Mathematical walk
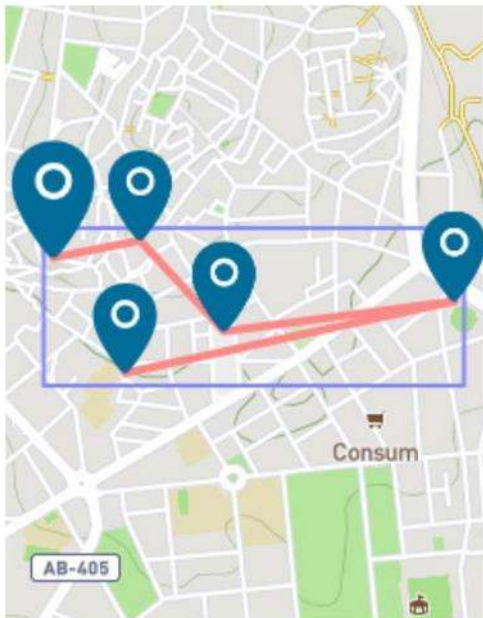
▼ 1st Task- Kiss Passage

Kiss passage is the narrowest street in Hellín. Make an estimation about the greatest number of people that could be inside this street at the same time

▲ Trail in Hellin

The trail consists 5 pleasant playingful stohastic tasks.

Students explore significant historic sights, with a mathematical perspective, using mobile devices

(code: 372054)

MathCityMap-Trail

Trail in Hellin - 2nd and 3rd Task of the mathematical walk

▼ 2nd Task---Church square

Imagine that the steps in the stairs have been numbered, given number 0 to the groung level, number 1 to the first step, number 2 to the second and so on. The last one is the one on the platform (do not count the small stairs at the main door of the church). A bored student decided to do the following: First: He started to climb the stairs, went up step number 1 and then went down. Second He climbed uptp step number 2 and went down. Third: He climbed upstep number 3 and went down, And so on. The question is: How many steps did he climb in total (up and down)? (DO NOT COUNT STEP NUMBER 0)

▲ 3rd Task -The drummer monument

Look at the sculpture, in one of the drums you can see a date (written with two digits), this date is a year of the 20th century. Imagine now that it os a very ancient statue and that it was erected in the 13th century. What was the year? (use 4 digits)

MathCityMap-Trail

Trail in Hellin - 4th and 5th
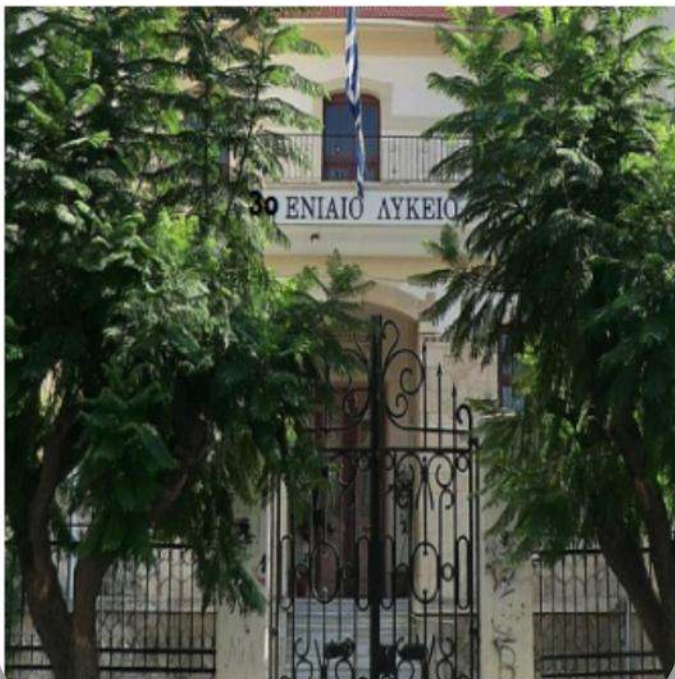## Task of the mathematical walk

▼ **5th Task-**The numerical street

What is the number of our numerical street? Call it N and solve this exercise: N houses have N cats living in,each cat eats N mice, each mouse,if not eaten, would eat N ears of wheat. How many ears of wheat could be eaten if the mice wouldn't have eaten by the cats?

▲ **4th Task -** The bullring

The bullring was built between 1860 and 1862. The outer part is a 32 sides polygon, but inside it is a circle.
First: Enter into the bullring and count the number of steps along the circumference
Second: Convert them into centimetres (one step is about 65 centimetres)
Third: calculate the area of the circle in square metres

We would like to thank the supporting team of MathCityMap, especially Mr Joerg Zender, for his remarkable advices and his significant help

Maths is around us-MathCityMap Walks

Indicative Tasks of the Trail in Rerthymno

venetian well- (Stochastic Combinatoric Task)

How many possibilities exist to go upstairs only the marked steps, if one can take one or two steps within each move. The step sequences can be combined(stochastic Task)

▼ Venetian Well (Geometry Task)

Find in meters the side of a equilateral triangle which has the same perimeter as the regular hexagon located at the top of the well. (Geometry Task)
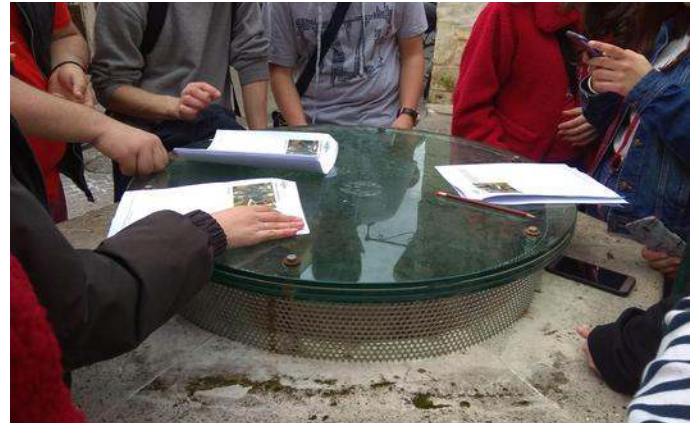
◀ Rimondi Fountain- (Combinatoric,stochastic Task)

The Rimindi fountain has lions weighing integer kilos each. Each lion weighs a different weight than the others. Their total weight is 67 kg. Which is the highest possible weight in kilo that the lightest lion can have?

Fortezza - (Geometry, Measure Task) ▶

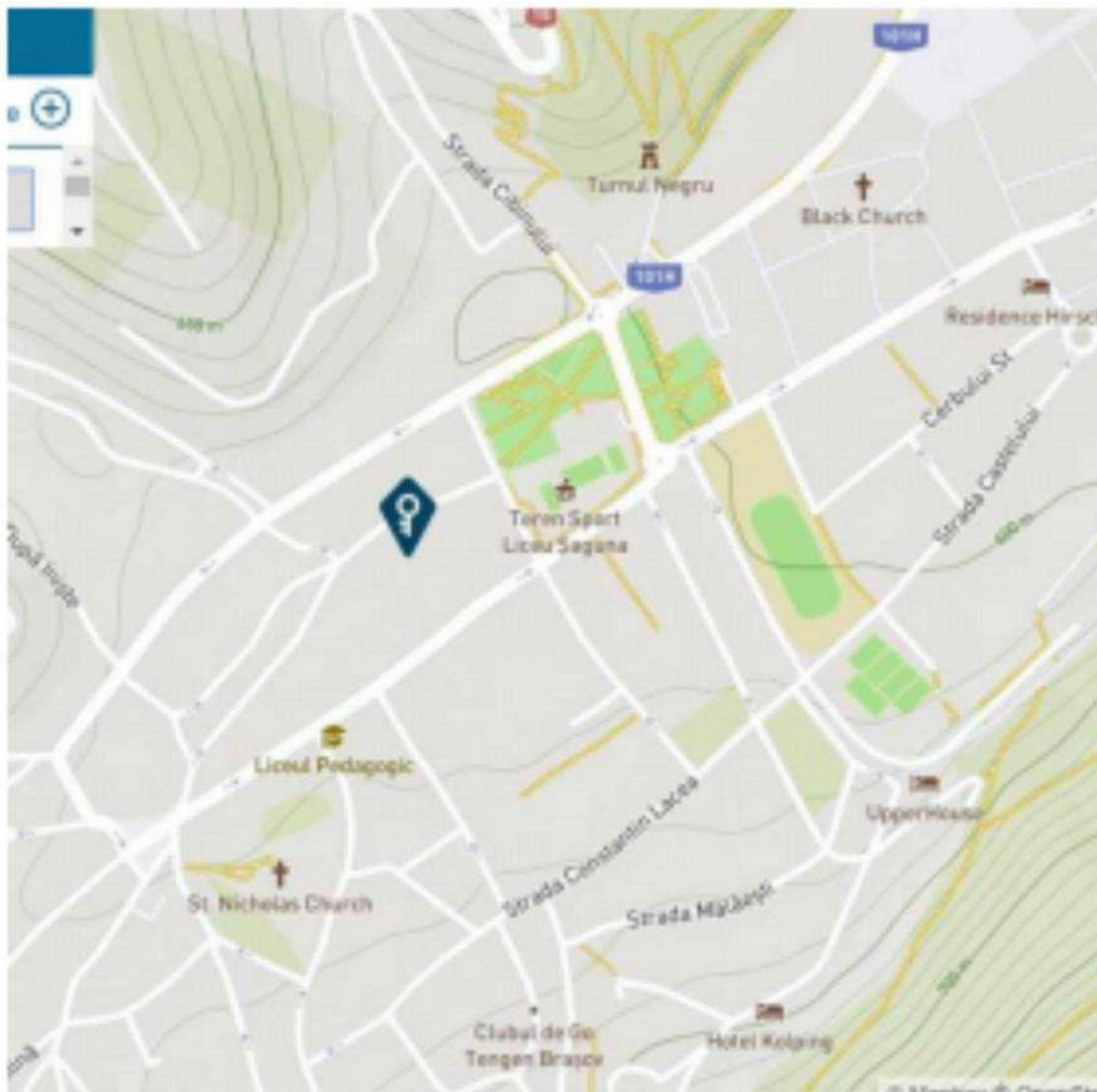which is the height of the door (the height of the red line) in meters?

(code 172072)

Maths is around us-MathCityMap Walks

MathCityMap

Treasure Hunt

Dana Alexandrescu

MathCityMap-Trail

Trail in Brasov- The tasks of the Tressure Hunt

▲ Cristianity

Determine the area (in m²) of the roof section of this tourist attraction, knowing that the height of the roof is 0.8 m

Schei Gate ▶

Calculate the width (in cm) of the main gate using your step.

▼

The Old Town Hall

You are a restorer and you have to paint the entrance doors from the Old Town Hall Museum. Determine the amount of paint (l) needed for painting the doors, knowing that 0.2 l of paint are needed for 1 m²

◀ The first Romanian school

The principal of the first Romanian school wants to cover the teachers' staircase with a carpet. Determine the dimensions (in m²) of the carpet.
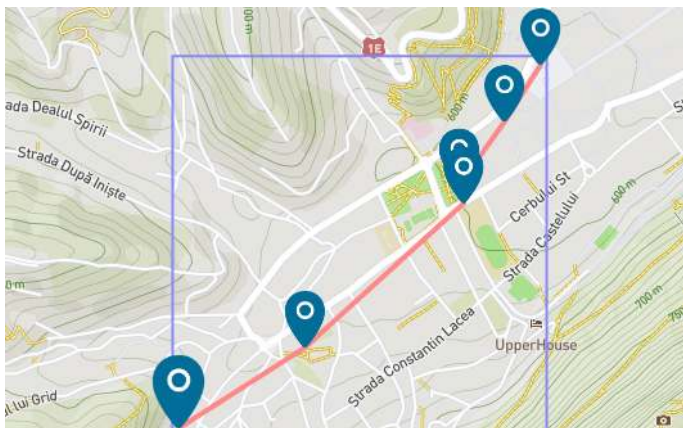
MathCityMap-Trail

The Trail in Brasov-The tasks of theTressure Hunt

▲ Catherine's Gate

The shape of the first floor of Catherine's Gate is a square-based prism. Your task is to determine the volume of the body of the first floor (m³), considering that all the bricks of the first floor have the same height.

The MathcityMap app ▶

TheTressure Hunt on mobiles (CODE: 262109)

▼ Black Church

On the right side of the Black Church is the statue of Johannes Honterus . Your task is to determine the lateral surface area of the the pedestal of the statue (m²) on which is engraved the inscription with the year of construction.

◀ Bsarov Trail

The 6 tasks of the MathcityMap Trail in Brasov.

Maths is around us-MathCityMap Walks

Links

The blog of Erasmus+ project
1 https://mathsisaroundus.blogspot.com/

Twinspace
2 https://twinspace.etwinning.net/92568/home

Facebook
3 https://www.facebook.com/Erasmus-Maths-is-around-us-110890993684913/

Erasmus+ project card
4 https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/#project/2019-1-ES01-KA229-063829

School web page
5 http://csantipa.ro/principalEN.html

School web page
6 http://www.iesizpisuabelmonte.es/

School web page
7 https://3lyk-rethymn.reth.sch.gr/

Resources

Mathcitymap
https://mathcitymap.eu/en/

Rethymno Art museum
https://www.cca.gr/home.html
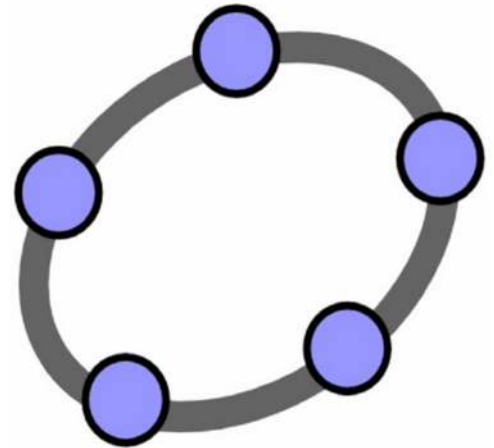
Canva
https://www.canva.com/

Geogebra
https://www.geogebra.org/

Google forms
https://docs.google.com/
forms/u/0/

Google spreadsheets
https://docs.google.com/
spreadsheets/u/0/

Kapetanas, E.(2016)
https://www.didaktorika.gr/eadd/handle/10442/
37884

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MathCityMap

Canva
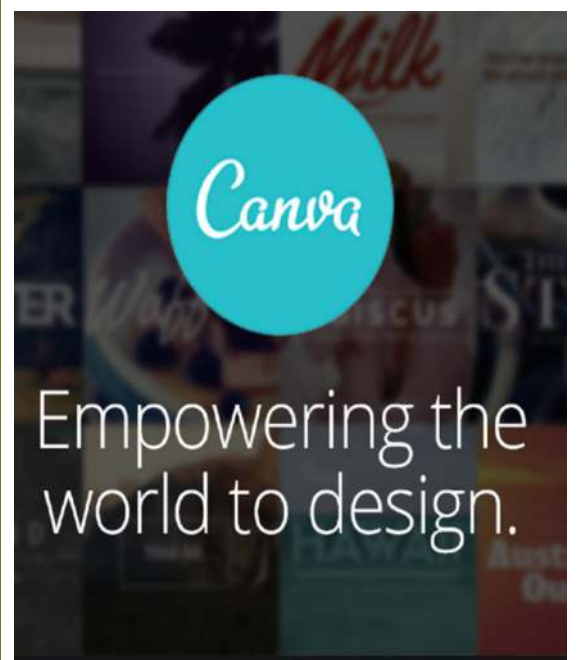
Empowering the
world to design.
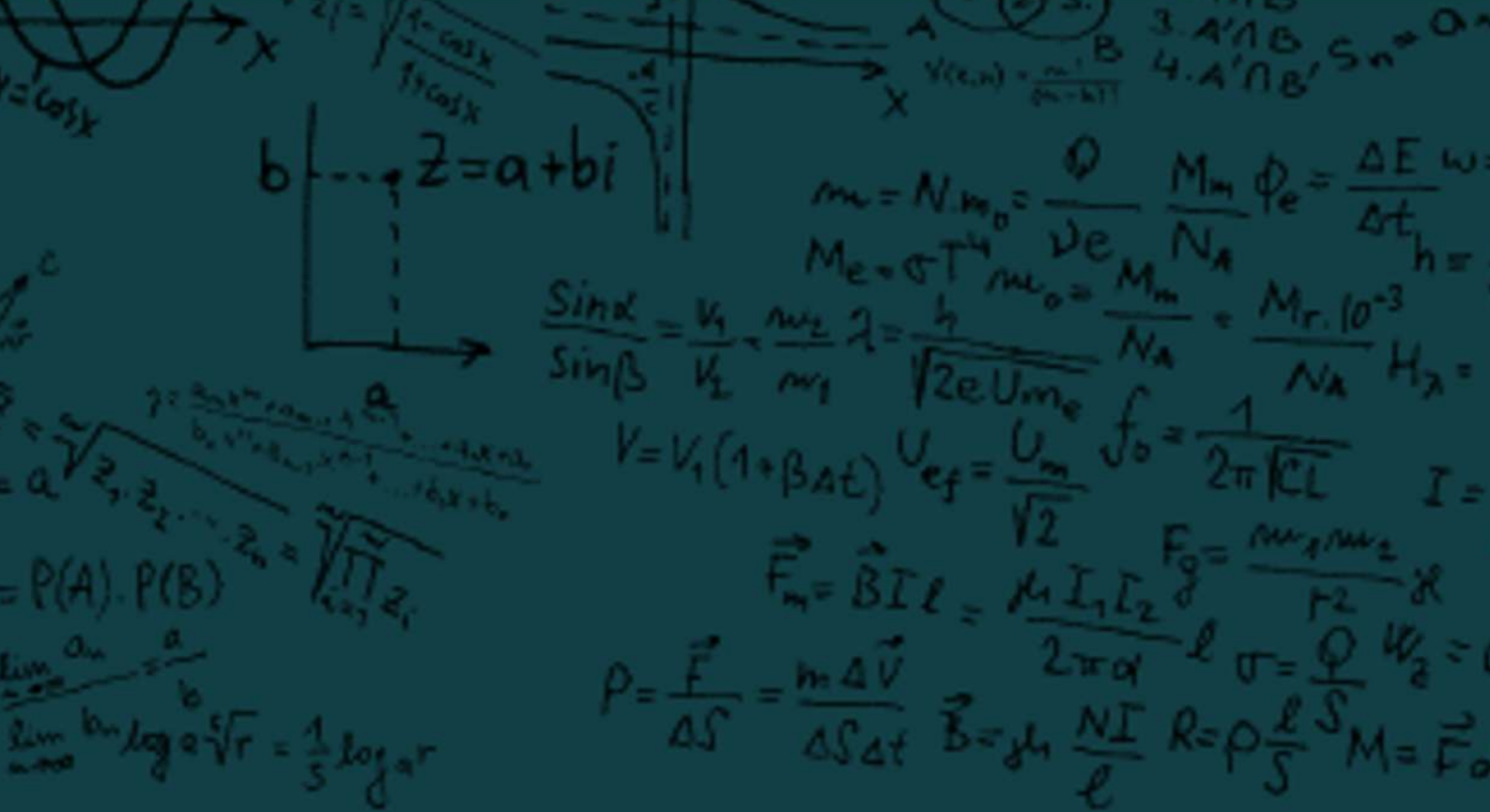
ERASMUS ✚

Mistakes Allow Thinking to Happend

Maths is around us

MATHS IS AROUND US

"MATHEMATICS IS THE MUSIC OF REASON"
-JAMES JOSEPH SYLVESTER-