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MATH DAY PROGRAMME

- **9:00** Attendance greetings from the principal of the school mrs. A. Rapti and the vice mayor mr. A. Mittas.

- **9:30** Presentation of 3rd mobility activities.

- **10:30** Physical education and mathematics symmetrical dance (6th grade) and kinetic numerical pattern in line (1st grade).

- **10:45- 11:05** Intermission

- **11:05 Math labs**
  - Decimal numbers (4rth grade)
  - Fractions (3^{rd} grade)
  - Math crossword puzzle
  - Magic squares (5^{th} grade)
  - Average (6^{th} grade)
  - Golden ratio of the Parthenon (6^{th} grade)
  - The secrets of the castle (6^{th} grade)

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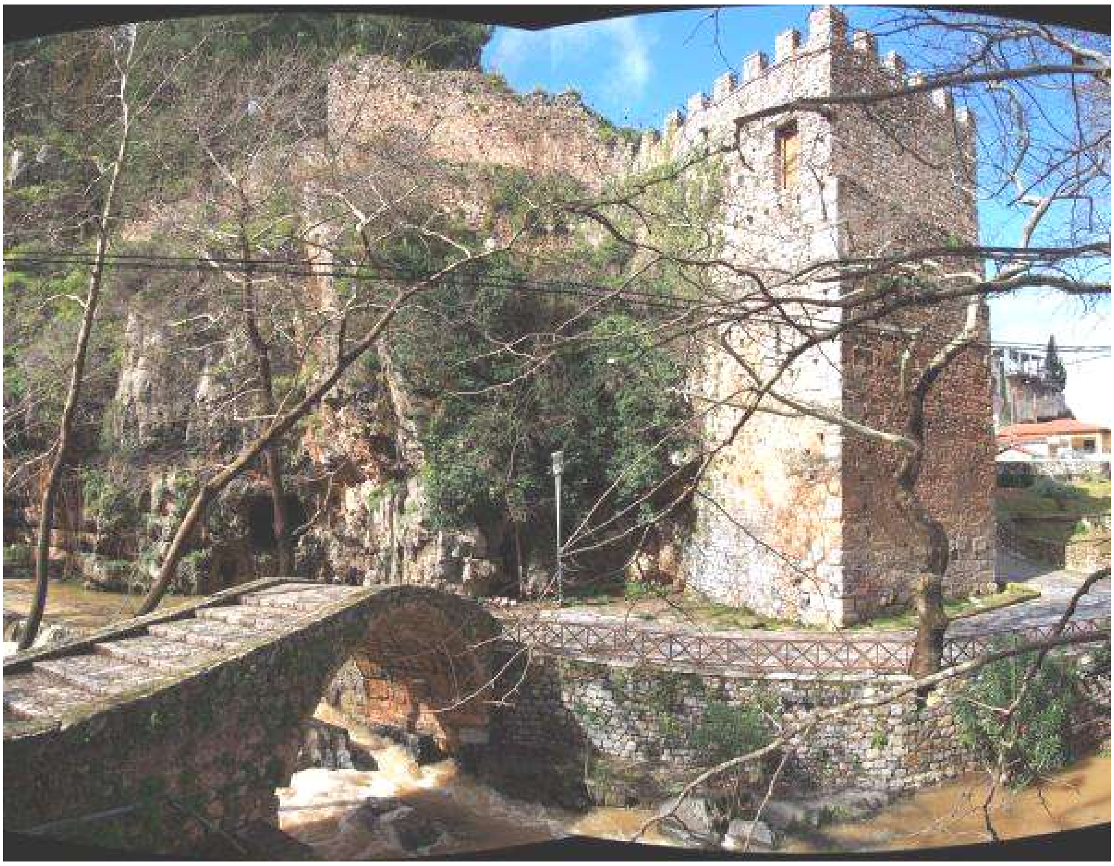
4th Primary School of LIVADIA

Co-funded by the European Union

Become European maths champions

THE SECRET OF THE CASTLE



Hello, Champions and welcome to Livadia!

Today you are invited to solve a mystery by solving the mathematical puzzles given to you below. So it calls upon your mathematical knowledge, your logic and your curiosity.

Many years ago, some residents of Livadia were locked inside the castle, to save themselves from the Turkish invaders. Although they had no supplies, they withstood the Turkish siege for 17 whole days.

What was it that kept them alive that the besiegers did not know?

Carefully solve the following math puzzles, which are referring to the fractions, find the appropriate letters, combine them and discover the clue word that helped the Greeks inside the castle.

GOOD LUCK, CHAMPIONS!

1st element : Equivalent fractions

Circle the fractions that are equivalent to the original:

$\frac{1}{2}$ $\frac{5}{8}$ $\frac{2}{4}$ $\frac{16}{32}$ $\frac{3}{6}$ $\frac{4}{2}$

r

$\frac{4}{16}$ $\frac{1}{2}$ $\frac{1}{4}$ $\frac{16}{64}$ $\frac{2}{10}$ $\frac{1}{8}$

s

$\frac{2}{5}$ $\frac{6}{30}$ $\frac{1}{2}$ $\frac{1}{3}$ $\frac{8}{20}$ $\frac{8}{10}$

e

$\frac{12}{36}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{2}{6}$ $\frac{3}{9}$ $\frac{6}{16}$

t

Discover the 1st element:

Below each fraction is a letter. Circle the letter of the fraction that has the fewest equivalents to find a letter of the word you are looking for.

The letter is: ………………

2^{nd} element : Comparing and ordering fractions

Table each fraction to the appropriate one, according to its value:

Close to 0	**Close to $\frac{1}{2}$**	**Close to 1**
t	**s**	**k**

Discover the 2nd element:

Under each table is a letter, which belongs to the element word. Circle the letter of the column that has the most fractions.

The letter is: ………………

3rd element : Mixed numbers

Find with **X** whether the following equalities are true or false:

MIXED NUMBERS	TRUE	FALSE
$\frac{26}{4} = 6\frac{2}{4}$		
$5\ \frac{1}{2} = \frac{11}{2}$		
$\frac{40}{12} = 4\frac{1}{12}$		
$2\ \frac{2}{8} = \frac{26}{8}$		
$\frac{28}{3} = 9\frac{1}{2}$		
$\frac{57}{5} = 11\frac{2}{5}$		
$3\ \frac{1}{12} = \frac{37}{12}$		
$\frac{90}{11} = 8\frac{2}{11}$		

a **z**

Discover the 3rd element:

Under each TRUE/FALSE column is a letter, which belongs to the element word. Circle the letter of the column where you have put the most **X** 's.

The letter is: ……………….

4th element : Addition and subtraction of fractions

Solve the operations and circle the correct answer:

$\frac{3}{5}$**+**$\frac{2}{5}$ **=**	a) **1**	b)$\frac{5}{10}$
$\frac{3}{4}$**-**$\frac{1}{2}$ **=**	a)$\frac{2}{2}$	b)$\frac{1}{4}$
2 $\frac{3}{5}$**+**$1\frac{2}{5}$ **=**	a) **2**	b) **4**
2 $\frac{3}{5}$**-**$1\frac{2}{5}$ **=**	a)$1\frac{1}{5}$	b)$\frac{2}{5}$
$\frac{2}{4}$**+**$\frac{3}{5}$ **=**	a)$\frac{5}{9}$	b)$1\frac{2}{20}$
2 $\frac{1}{4}$**-**$\frac{1}{2}$ **=**	a) **6**	b)$\frac{7}{4}$
$\frac{5}{10}$**+** $0,8$ **=**	a)$\frac{5}{10}$	b)$1\frac{3}{10}$
$\frac{9}{10}$ **-** $0,2$ **=**	a)$\frac{7}{10}$	b)$\frac{6}{10}$
	r	**m**

Discover the 4th element:

Under each column of answers there is a letter, which belongs to the element word. Circle the letter in the column that you have circled the fewest.

The letter is: ……………….

5th element : Multiplying and dividing fractions

Solve the operations and circle the correct answer:

$\frac{4}{5}\mathbf{x}\frac{2}{5}$ **=**	a)$\frac{8}{25}$	b)$\frac{8}{5}$
$\frac{3}{4}\mathbf{:}\frac{1}{2}$ **=**	a)$\frac{3}{2}$	b)$\frac{2}{3}$
$\mathbf{2}\,\frac{3}{5}\mathbf{\times}1\frac{2}{5}$ **=**	a) $\frac{91}{25}$	b) $\mathbf{18}\frac{1}{5}$
$\mathbf{2}\,\frac{3}{5}\mathbf{:}1\frac{2}{5}$ **=**	a)$1\frac{1}{25}$	b)$\frac{65}{35}$
$\frac{2}{4}\mathbf{:}\frac{3}{5}$ **=**	a)$\frac{10}{12}$	b)$\frac{2}{20}$
$\mathbf{2}\,\frac{1}{4}\mathbf{\times}\frac{1}{2}$ **=**	a) $\mathbf{2}\frac{1}{8}$	b)$1\frac{1}{8}$
$\frac{5}{4}\mathbf{x}\frac{4}{5}$ **=**	a) **1**	b)$\frac{25}{20}$
$\frac{5}{4}\mathbf{:}\frac{4}{5}$ **=**	a) **1**	b)$\frac{25}{16}$
	w	**j**

Discover the 5th element:

Under each column of answers there is a letter, which belongs to the element word. Circle the letter in the column that you have circled the most.

The letter is: ………………

Now match the letters to get past the element word.

The element word is **_ _ _ _ _ .**

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Presentation on: Mathematics and Philosophy

Good morning.

Today this presentation is about: Mathematics and Philosophy.

- Mathematics, a Greek word, is not only what is known through the lessons, it is something much more.
- Philosophy, also a Greek word, is from the word friend/ friendship, which in Ancient Greek meant "to love", and the word wisdom.

Both of these words, with the same meaning, exist just like that in ALL the languages of the world!

Very soon I will try to talk to you about these two concepts and their relationship.

The presentation, as you already know, will include the following sections:

A) Proposal

1. Mathematics is a Greek science.
2. Throughout time, the knowledge of elements of Mathematics was and is a prerequisite for dealing with philosophy.
3. Mathematics is the first human science and paved the way for the rest to be created.

B) Exercises - games

1. Measuring the diagonals of a pentagon, measuring all its lines. Generalization: construct type measuring all lines of a polygon.
2. Counting all the handshakes exchanged by members of a group of people.

C) And a logic riddle: A shepherd wants to go across a river, a sheep, a wolf and a bundle of clover. Given that, the boat is small and can carry the shepherd and only a sheep or a wolf or a bundle of clover, how will the shepherd go across the river without the sheep eating the clover, or the wolf eating the sheep?

Closure

Mathematics: the ultimate exercise in the art of (formal) logic.

Course Development

A) Proposal

1. Mathematics is a Greek science.

"The foundations of Mathematics and a large part of their content are Greek. The Greeks laid the first scientific foundations, they created the methods from the beginning as well as the terminology. In a few words, Mathematics is a Greek science, whichever development modern research brought or will bring ".

Don't think that it is selfish because Sir Thomas L. Heath claims it in his work, "History of Greek Mathematics", that is well-known worldwide.

Example 1

Of course elementary Mathematics (practical arithmetic), the operations of addition, subtraction etc. , were created thousands of years ago, when man began to live in groups. Likewise, practical geometry was known long before Thales, Euclid, Pythagoras, etc. In Egypt, especially geometry was developed because every winter, the Nile flooded and the borders of the fields disappeared and in the spring , they had to be redrawn. That is how practical geometry was developed. It comes from the words earth and measure . As we will ascertain later, the Greeks made Mathematics a **science** and that makes the difference.

Example 2

In the World Mathematical bibliography the well-known number 3.14 (approximately) is symbolized by the Greek letter π (Greek letter "π") mentioning at the same time that the ancient Greeks had found many different geometric approximations of this number.

Example 3

In the World Mathematical bibliography is often mentioned, one of the greatest "Mathematicians" and philosophers, the Greek Diophantus, who laid the most solid foundations of Algebra. This science is directly or indirectly related to what man has invented to make his life easier, e.g. cars, washing machines, rockets etc.

2. Throughout time, the knowledge of elements of Mathematics was and is a prerequisite for dealing with philosophy.

The most famous philosopher, Plato who was also good at Geometry), had written the following at the entrance of his school: "No one who has not dealt with Geometry, should pass this door", meaning that it would be useless for them.

And here's why: Geometry and Philosophy always start with "what" (is true) and "why" (is true) to find answers. And furthermore, Geometry trains us on how to arrive at the answer (proof).

So even in our time there is no philosopher who does not have knowledge of mathematics and physics.

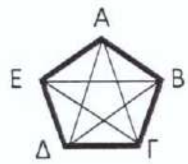
3. Mathematics is the first human science and paved the way for other sciences to be created.

As we said previously, practical geometry pre-existed as a practical form of measuring pieces of land and marking out fields. At some point, Thales appeared and was the first of the seven sages of antiquity. He was a great philosopher, geometer, astronomer and physicist of the time. Typically, Bertrand Russell said that "Western philosophy begins with Thales". So, what did this great Philosopher and Geometer do? Until then, everything was associated with a myth or with some wish of a god. He set aside all myths and put research and proof in their place. That is, for everything he started with "what is true" and by making simple reasonings he reached "why it is true". Thus, he proved many of the theorems that we are still taught in Geometry and Astronomy. Thus Geometry (Mathematics of the time) became the first science, because it was based on research and proof.

Thales even won the admiration of the Egyptians by measuring the height of the pyramids, based on the length of their shadow and the shadow of a rod fixed into the ground.

B) Exercises - games

1. Measuring the diagonals of a pentagon, measuring all its lines. Generalization: construction of a formula measuring all the lines of a polygon.



Note: The exercise will involve 5 students, and we will use a pentagon made from pieces of rope. Look at the following shape:

Students hold one vertex of the pentagon and move apart appropriately to form a pentagon. We ask the students: How many "lines" does each person hold and join him/her with the rest? Answer 4. We continue with the question: Since you are 5 why are there four lines that join you? Because there a line that connects everyone to themselves.

Conclusion: 5 vertices so 5-1 = 4 lines joining each vertex to all others.

So, if it is K the vertices, it will be K-1 the lines joining each vertex to all the others.

Question: There are 5 vertices and 4 lines start from each vertex, how many are all the lines? (5x4=20). So, if it is K the vertices, it will be K(K-1) the lines.

Question: We measured the line (e.g. AC) once for A and once for C. So, have all the lines been measured twice? Answer: YES

And then, truly all the lines in the pentagon are: $\frac{5x4}{2}$ = **10 lines** , so when it is K the vertices, it will be $\frac{K(K-1)}{2}$**lines** .

We proceed to the second exercise - game

2. Counting all the handshakes exchanged by the members of a group of people.

<u>The exercise aims to show that Mathematics works in the same way in different "situations" and exists in all sciences and all human functions.</u>

Note: 5 different students will participate in the exercise.

The students come one by one to a point in the room after we ask them the following: As they approach they will greet those classmates who are already there.

The first question is: How many handshakes did each of them do? (Answer 4, one with each of the rest of their classmates). The same procedure is followed, as in the above exercise: 5 students multiplied by 4 handshakes each, so first conclusion 5x4 = 20 handshakes. But each handshake has been counted twice. For example, once for student A and once for student B, etc. So, finally: $\frac{5x4}{2}$ = **10 handshakes** , so when it is K students, it will be $\frac{K(K-1)}{2}$**handshakes** .

C) A logic riddle

A shepherd wants to go across a river, a sheep, a wolf and a bundle of clover. Given that the boat is small and can carry the shepherd and only a sheep or a wolf or a bundle of clover. How will the shepherd go across without the sheep eating the clover, or the wolf eating the sheep?

Thinking: What is true? So, what's the point? The point is that when the shepherd goes across the river, the wolf should never be left with the sheep or the sheep with the clover. So, the only right thing left, is for the wolf to remain on the same side as the clover.

Therefore, the shepherd will go the sheep across the river, he will return and go the clover across. Returning, he will take the sheep with him, he will leave the sheep in the original position and he will take the wolf with him. Then, he will go the wolf across the river and finally he will return and take the sheep again.

Closure

Mathematics: the ultimate exercise in the art of (formal) logic.

A) Once upon a time, the great physicist, the "grandfather" Albert Einstein had a hard time and could not complete his well-known theory, the "Theory of Relativity" because he could not make and solve some equations that were necessary. He talked to a colleague of his, at the University of Munich, the Greek Mathematician Constantinos Karatheodoris , who made and solved the equations he needed. Einstein sent him some letters of thanks, which have been published, telling him how great his contribution to humanity was.

B) Again, Albert Einstein has written in one of his books: I would not have succeeded in becoming who I have become if I did not know good Geometry. Because Geometry is the best thing man has found to practice the art of (formal) logic.

And that's how we come to the end, but before I finish let me tell you two short but true stories.

I conclude by saying that all subjects and all sciences are good and useful, but **Mathematics** has two more reasons. Firstly, it is a "helper" to all other sciences and secondly because it teaches us to think about something very useful for all our activities and our whole life.

Thank you very much for your patience.

Damianos Moraitis

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1st Activity

The Parthenon

The Parthenon is designed with genius and innumerable subtleties realized with mathematical precision, based on the golden ratio of 4:9.

How can we find its width, based on the golden ratio 4:9, if we know the height of the temple which is 13.72 metres? And when we find its width, can we use the golden ratio 4:9 again and find its length?

Solution:

2nd ACTIVITY

I solve **magic squares** .

In each square the **sum of** each **row** , each **column** and each **diagonal it's** the **same** . I **fill** in with the **correct ones numbers** the magic squares below.

0.7		
	0.6	**0.4**
		0.5

60,000		**150,000**
210,000		
90,000		**180,000**

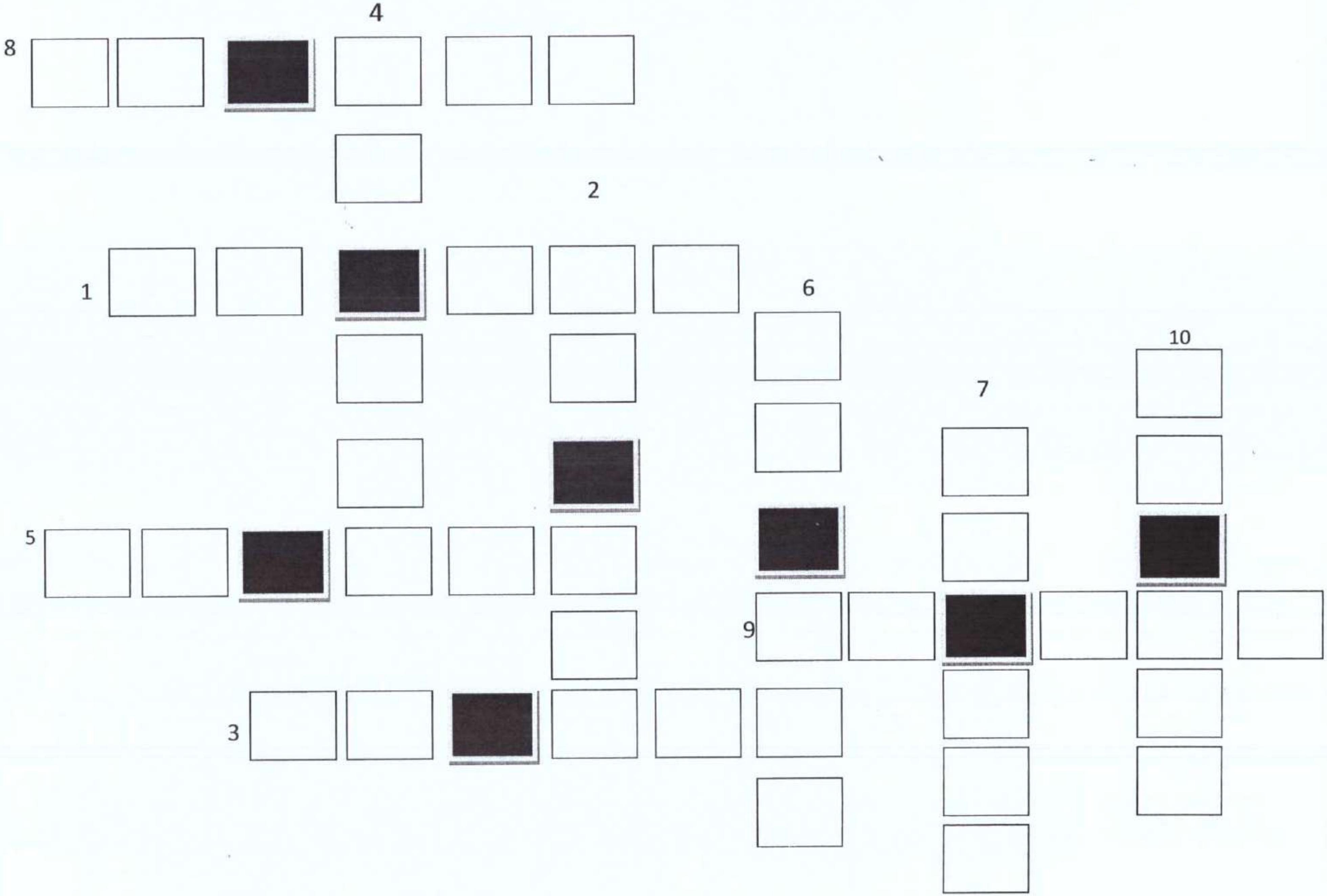
56		**112**
84	**70**	**140**

		1.1
	0.8	**0.6**
		0.7

Now I make my own magic squares, following the instructions below:

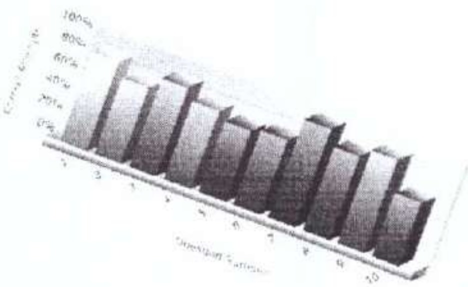
1. In the center we place any number, e.g. the 8.
2. Then we think of another number. We add and subtract this number with the center number. The resulting new numbers are placed diagonally.
   E.g. We add 3 and subtract it with 8. So we take the numbers 11 and 5 respectively and place them diagonally. If we add the numbers we find that they add up to 24.
3. Then in the same way we add and subtract another number from the central number.
   E.g. We add 2 and subtract it with 8. So we take the numbers 10 and 6 respectively and place them on the other diagonal.
4. Finally, we fill in the remaining boxes with the appropriate numbers, so that the sum horizontally, vertically and diagonally is 24.
   This way we can create as many magic squares as we want!

HAVE FUN!


4
8
2
1
6
10
7
5
9
3

1. Half of 75,500
2. The next number from 49,999
3. Five times 15,000
4. Half of 50,000
5. Double the 47,500
6. A) Half of 68,800 B) Add 1,000
7. The previous number from 100,000
8. A) Double the 17,600 B) Subtract 1000
9. Half of 97,000
10. Three times the 23,000

4th Activity



Dear champions, now we will do some statistics. We will ask the ages of all the champions, young and old, who are in this space and, after collecting all the data in the table, we will find the average of our ages. We hope you remember the process of finding the average, as Math champs we are!

Ask – Collect – Record – Collaborate – Calculate – Communicate

TABLE DATA

SOLUTION

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The purpose of teaching is for children to learn fractions through music.

What we've used: worksheets with the values of notes and pauses and staff.

Teaching method:

Step 1: We explain to the students the time value of notes and pauses (each equals to a number).

Step 2: Then we give students a pentagram in which a fraction is written (e.g. 4/4).

Step 3: The children, using the notes and pauses create meters whose sum has to be equal to the fraction.

INSTRUCTIONS TO STUDENTS

-Children I will give you a staff where a fraction is written after the music key (4/4 or c) the time value of notes and pauses (each equals to a number).

I'm writing on the board the duration (value) of each note with numbers.

You should create a pattern of notes in order to create the fraction indicated.

When the fraction is complete, you must place a vertical line which in music is called a dilatation.

I'd like you to form ten combinations of this kind.

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