

Types of Angles

A LESSON PLAN by George Kallithrakas Moschochoritis
Mavromataki Private School

Grade 5

General Information about the resource

The specific lesson plan was carried out in the context of the 5th grade Mathematics lesson, more specifically utilizing the 38th Chapter of the book with the topic “Different types of angles”. Kinaesthetic activities were utilized that functioned as the initiation and application of the object to be processed. Initially the students were asked to represent acute, right and obtuse angles. In the second phase, the teacher would count down from 5 to 1 and at the end of the count, he would say a kind of angle which the students would show with their hands. Finally, the students formed a right angle with their fingers which they compared with other angles they found in objects around them, in order to recognize the type of angle they had.

Keywords: angles, acute, right, obtuse, kinaesthetic learning

Further notes about the resource and its use:

1. **Cognitive objective:** Students are to recognize the different types of angles. To be able to compare the different types of angles in order to understand the reason behind their categorization. To apply their new and prior-knowledge, so as to connect school knowledge with the natural world.
2. **Prior knowledge:** The students had been taught the concept of angle in geometric figures, as well as how to draw a right angle, the previous school year.
3. **Material and technical infrastructure:** Room with blackboard, chairs, protractor, rulers (optional), school items (such as exercise book, different kinds of rulers, erasers, etc).
4. **Time:** One teaching period (45 minutes)

Application:

We remembered what we had been taught about right angles and associated the word 'right' with the word 'upright'. We then drew a person standing on a straight line and identified the angle it creates.

We played a kinaesthetic trust game. We tried to create all kinds of angles with our bodies with the support of our classmates. We measured the opening of the acute or obtuse angle that we can form without needing the support of our classmates.

After learning about the categorization of angles we represented acute, obtuse and right angles kinaesthetically through a trust game. We tried to create all kinds of angles with our bodies with or without the support of our classmates. We measured the opening of the acute or obtuse angle that we can form by ourselves without any support.

We identified geometric shapes/solids that are in the school area and have right angles.

Reference:

Marcia Wade, (2016) Math and Movement: Practical Ways to Incorporate Math Into Physical Education, Strategies, 29:1, 10-15, DOI: 10.1080/08924562.2015.1111788



Dramatic play:

Subtraction with regrouping

A LESSON PLAN by Artemis Choreftaki
Mavromataki Private School

Grade 2

General Information about the resource

The specific lesson plan was carried out in the context of the Mathematics lesson of the 2nd grade Elementary School, specifically as an extension of the Chapter entitled: "I calculate a result of doing vertical subtraction with regrouping". It was an attempt to approach one of the most difficult mathematical algorithms taught to students in the 2nd grade, in a fun and experiential way, making it appear like a game. The activity took place during Drama class and was aimed both at further practice on the algorithm, as well as at the artistic expression of the students and the cultivation of teamwork.

Keywords: dramatic play, subtraction, regrouping, vertical subtraction

Further notes about the resource and its use:

1. **Cognitive objective:** The students will practice and understand in depth the algorithm of vertical subtraction of two-digit numbers with regrouping.
2. **Prior knowledge:** Students have recently been taught the algorithm of vertical subtraction of two-digit numbers with regrouping and have mastered it completely or to some extent.
3. **Material and technical infrastructure:** Spacious classroom, stationery
4. **Time:** One teaching period (45 minutes)

Application:

We start by choosing the numbers which we will use in the subtraction.

Six students are needed for each subtraction of two-digit numbers. Each student will be given the role of a digit that they can hold or wear, so we start by choosing the numbers and making digit cards.

We can also create tabs for the ones and tens, which they will wear according to their digit position, as well as the mathematical symbols of "minus" and "equals".

The first four students take a seat next to each other based on the digit they are holding. The dramatization begins with the units of each number. The first two children can come forward and start the dialogue.

Reference:

https://www.youtube.com/watch?v=w4VH7_xn9yU



Numbers up to 10,000

A LESSON PLAN by Artemis Choreftaki
Mavromataki Private School

Grade 3

General Information about the resource

The specific lesson plan was carried out in the context of the 3rd Grade Mathematics lesson, specifically as an extension of the Chapter of the book entitled: Numbers up to 10,000. It consists of two activities, through which further practice is sought in identifying, comparing and forming numbers up to 10,000 in a playful and creative way. In the first activity entitled "Numbers in a row", students bring up the numbers, which they are asked to sort in the way they are requested to. In the second activity entitled "Last Man Standing", the students each hold a card with a four-digit number. The purpose is to follow the instructions so that they remain standing.

Keywords: ones, tens, hundreds, thousands, ten thousands, compare, form numbers

Further notes about the resource and its use:

1. **Cognitive objective:** The aim of the activities is for students to practice processing numbers up to 10,000 in an experiential and playful way.
2. **Prior knowledge:** Students should be able to recognize the value of each digit of a number based on its position (ones, tens, hundreds, thousands, tens of thousands) and be able to read and form numbers up to 10,000.
3. **Material and technical infrastructure:** Spacious classroom, stationery, hula hoops or other board game accessories
4. **Time:** One teaching period (45 minutes)

Application

First Activity: The numbers in the series

A child takes on the role of sorter.

The rest of the children each pick a card with a four-digit number, they can wear it in some way (e.g. with a crown on their head).

All children move freely in the space, you may add some background music.

The sorter is asked to put the rest of the children in the appropriate order according to the instructions they will be given (e.g. from largest to smallest, those with an even number in the ones (units) together, those with less than 4,000 together, those with 5 tens together).

The smaller or larger groups that will be formed are encouraged to create shapes or patterns of their liking with their bodies. The teams are given some time to prepare (~ 5 minutes).

The activity concludes with the presentation of the groups to the whole class.



Numbers up to 10,000

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Second Activity: The Last One Standing

Each child picks a card with a four-digit number and holds it without showing it.

The teacher begins to name the values of certain digits of the four-digit numbers that he/she has distributed in random order (eg. who has 4 tens, who has 7 thousands, etc.). You can also use UNO cards for random (more objective) selection, matching each color to the positional value of each digit.

When a child hears a digit value they have in their four-digit number, they must immediately make a figure-movement, otherwise they will be forced to sit down.

The game continues in the same way until only one child remains standing or all children make a move.

References:

<http://taksiasterati.blogspot.com/2014/05/1000-41-2.html#.VuUwp5yLTIU>

<http://pitnerm.blogspot.com/2012/08/last-man-standing-freebie.html>



The number stars

A LESSON PLAN by Evangelia Mylonaki
Mavromataki Private School

Grade 1-2

General Information about the resource

With the number stars, we can introduce the multiplication tables. Each of the 10 boards represents a number star that the child has to thread according to the respective coloring row. A typical pattern is created in each case. In this way, children learn about the individual multiplication series in a playful and pictorial way and are very motivated by the task of threading the pattern and the movement. Inspired by the corresponding Montessori material, we created another version of it, adding creative movement instead of using the stationary material. In a Montessori environment, where the children follow the theory of the developmental stages, which are described from Maria Montessori as "Sensitive periods" the recommended age is 4 years old and up, as the children have already worked with materials with the help of which they have acquired a first impression of the size and quantity of the numbers.

Keywords: multiplication table, patterns, creative movement

Further notes about the resource and its use:

1. **Cognitive objective:** The multiplication tables and especially the multiplication of units.
2. **Prior knowledge:** The children have become familiar with addition up to 100, the concept and the process of multiplication, and have already had a first contact with prefiguration.
3. **Material and technical infrastructure:** Spacious room, the corresponding Montessori material, strings (20m) on the color of each number according to the Montessori material (1-red, 2-green, 3-pink, 4-yellow, 5-light blue, 6-purple, 7-white, 8-brown, 9-dark blue, 10-golden). Depending on the color of the string, a typical pattern is created and we can also offer control cards as additional material to help children learn how to learn independently.
4. **Time:** One teaching period (45 minutes)

Application

First Activity:

- Sitting in a circle, the teacher introduces the corresponding Montessori material so that the children become familiar with the process.
- The teacher "weaves" the stars of the numbers one by one as the children say the multiplication row all together.
- The teacher gives the children the opportunity to interact with the material in a circular way (either individually or in small groups). They separate the children to different points in the classroom where they can use the material on their own and after 2-3 minutes (after making the star of each number once), they move to the next point, to the next number.



The number stars

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Mavromataki Private School

Second activity:

- 10 of the students make a circle, they agree on which star to create and choose the corresponding color of string or ribbon. They also decide which child will start and then the ribbon is moved clockwise.
- To the sound of gentle music in the background, so that the children can be heard as they say the multiplication, the ribbon is passed from one child to another. Just as the ribbon was passed around the pin of each number in the original material, so now when the children get the ribbon, they can make a turn around themselves or some other creative movement to stabilize the ribbon at their spot.
- The process is repeated for each number, and if the group includes more than 10 children, the participants in the circle can be changed.
- Finally, giving the children a trigger to take their thinking one step further, after one circle is completed, we can ask the children how they imagine the circle will continue and where they think the next number will be in the circle. Particularly if we have a large group of children, we can have a large circle where everyone participates, trying to continue the specific multiplication row.

Reference:

https://www.montessori-material.de/arbeits-und-lehrmittel/mathematik/zahlensterne-fuer-das-kleine-einmaleins_563_1349



Symmetry through traditional Cretan dance “Sousta”

A LESSON PLAN by Artemis Choreftaki and Konstantinos Manolakis
Mavromataki Private School

Grade 5-6

General Information about the resource:

The specific lesson plan includes the educational activities that took place in the context of the meeting in Sweden with Greek, Swedish and Cypriot students, who are in the 5th and 6th grade of the Primary School. What was sought during the planning of the action, was the connection of the traditional Cretan dance of Sousta with the rotational or radial symmetry, which is formed by the bodies of the dancers during this dance. The activities carried out include the teaching of the Sousta dance, the teaching of symmetry and the creative expression of the students through dance in the context of cooperative teaching.

Keywords: rotational symmetry, radial symmetry, Cretan dance, Sousta

Further notes about the resource and its use:

1. **Cognitive objective:** Students in an experiential way come into contact and are able to recognize rotational symmetry and distinguish it from reflection symmetry.
2. **Prior knowledge:** If we are addressing students in higher classes of Primary school, we expect them to know the concept of symmetry, but not necessarily its various types.
3. **Material and technical infrastructure:** Computer with internet access, projector, blackboard, spacious room.
4. **Time:** One teaching period (45 minutes)

Application:

We start with a motivational activity, get into pairs and play the mirror game. Where the children of each pair will alternately take on the role of the mirror learning reflection symmetry. (~5 minutes)

We continue by talking about the Cretan Sousta dance, which is similar to the game we just played, since the dancers are facing each other. We can show the corresponding video: <https://www.youtube.com/watch?v=mvBYT-41WuQ>.

At this point we encourage the children to learn the basic steps of Sousta together, which is a very simple dance, consisting of just three steps with the feet going alternately. (~10 minutes)

After mastering the basic step, we can also practice some other dance moves to embellish our dance. The dance moves in Sousta are almost always danced in pairs, so we can go back to the pairs we had in the first activity or form new ones. For practical reasons, it is suggested to form two lines, where each child will be opposite his/her partner.



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Some extra dance moves we can practice are the encounter (meeting), the hook and the window, during which we always move with the basic step. We are now trying to practice the dance moves with the music. <https://www.youtube.com/watch?v=BVqjWukeOA4> (~10 minutes)

At this point, we make the connection to mathematical concepts. With a short lecture, we seek to explain to the students, rotational symmetry (180 degrees) that we form with our bodies when we do the dance moves and compare it with the reflection symmetry.

[Reflectional Symmetry and Rotational Symmetry | Don't Memorize](#)

We can ask a pair of students to do the dance moves slowly and with pauses, so that together we can identify and explain the symmetries that are formed. We repeat as many times as necessary, if we want with a different pair. (~10 minutes)

As a final activity, we allow some time for each pair to work alone and create their own dance move, which may contain some symmetry of their choice. We conclude by presenting each pair's dance move to the rest of the class. (~10 minutes)

Reference:

Παρούτσας, Δ., Κ., (2002), *Οι ελληνικοί παραδοσιακοί χοροί κατά περιοχές: Κρήτη - Σούστα*, available at <https://paroutsas.jmc.gr/dances/crete/sous-cre.htm>

Multiplication tables in songs

A LESSON PLAN by Artemis Choreftaki
Mavromataki Private School

Grade 2

General Information about the resource

The specific lesson plan includes the activities that were carried out, with the initial purpose of assisting and making it easier for the 2nd grade primary students of our school to memorize the material, through learning songs with lyrics that refer to the multiplication tables. The school year that followed, the needs of the students in our class were different, as the English-speaking students that joined our class had not had any contact with the operation of multiplication. As a result, the challenge arose to teach the multiplication tables in English once again with the help of the corresponding songs in English. A powerful motivation for the students in learning the multiplication- tables was a presentation that took place in the context of an event at our school on the theme “The Arts in education”.

Keywords: multiplication tables, multiplication songs, learning through singing

Further notes about the resource and its use:

1. **Cognitive objective:** Our goal is for the students to master and memorize the multiplication tables of the following numbers: 3, 4, 6, 7, 8 in both languages (Greek-English).
2. **Prior knowledge:** Dealing with the concept of multiplication and the teaching of the multiplication tables have preceded.
3. **Material and technical infrastructure:** Computer with internet access, audio player, (optional) paper and stationery
4. **Time:** One teaching period (45 minutes) per teaching each multiplication table

Application

The students have already come into contact with each multiplication table. For practice, we can make them listen to each multiplication song, repeating it as many times as necessary, aiming for the best possible memorization.

It is quite helpful for the children to combine the multiples of ten of each lesson with using their fingers to help them in the process, later, they are able to calculate things more quickly.

Another helpful idea is to combine the song with a visual activity that can be done in their math notebook. For example, ask the children to draw their hands on two pages of their notebook and write on their fingers the ten multiples of each multiplication.

The songs used during the implementation of the activities in both languages are the following:

Multiplication table of 3:

https://www.youtube.com/watch?v=mc_lono23Zc

<https://www.youtube.com/watch?v=stMCyHxf0VM>

Multiplication table of 4:

https://www.youtube.com/watch?v=u_6oW3acfsg

<https://www.youtube.com/watch?v=DJq7-bpgOLo&authuser=0>



Multiplication tables in songs

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Multiplication table of 6:

<https://www.youtube.com/watch?v=MokJxmjrD14>

<https://www.youtube.com/watch?v=XXvHYKFcveU&t=7s&authuser=0>

Multiplication table of 7:

https://www.youtube.com/watch?v=_05g5OuirTU

<https://www.youtube.com/watch?v=HNN8qXu4E4w&authuser=0>

Multiplication table of 8:

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

<https://www.youtube.com/watch?v=oNKEHQ60HNA&authuser=0>

Reflection of the action:

In general, it seemed that the children were sufficiently helped in memorizing the lessons thanks to the songs. It was also quite a fun process for them, since it was quite different from a regular math lesson. It is worth noting that the presentation held as part of the event at our school motivated all the children to do their best and learn the multiplication tables in both languages, as best they could according to their level.

References:

<https://pileidou.files.wordpress.com/2016/06/cebcecb1ceb8ceb1ceb9cebdcf89-cf84ceb7cebd-cf80cf81cebf80ceb1ceb9ceb4ceb5ceb9ceb1-cebcceb5-ceb4cf85cebf-cf84cf81ceb1ceb3cebf85ceb41.pdf>

https://www.researchgate.net/publication/324224657_Mathematika_me_tragoudia_stis_A%27_B%27_taxeis_tou_Demotikou_Scholeiou_Protaseis

https://e-didaskalia.blogspot.com/2018/12/4_19.html



Fraction Glossary and Terms

A LESSON PLAN by Maria Evgeneia Pontikaki
Mavromataki Private School

Grade 5

General Information about the resource

The specific lesson plan includes the activities that were carried out, with the initial purpose of facilitating the 5th grade students of our school in memorizing specific mathematical terminology, through learning songs with lyrics related to the terminology of fractions.

The students' difficulty lies in learning and using this mathematical terminology. That's why we were inspired by the song above, making a musical math glossary, better embedding the terminology of fractions.

Keywords: fraction, like, unlike, equivalent, creative movement

Further notes about the resource and its use:

1. **Cognitive objective:** Students are to master and memorize special mathematical terminology related to fractions. More specifically, we referred to like, unlike and equivalent fractions.
2. **Prior knowledge:** Students know the concept of a fraction and what each fraction represents.
3. **Material and technical infrastructure:** Classroom with table, chairs, computer, TV screen
4. **Time:** One teaching period (45 minutes)

Application

First Activity: Make up a song about fractions.

Keywords: same denominators, like, unlike

The like fractions can be added and subtracted easily. In order to add and subtract unlike fractions you first have to convert them into like fractions. The same denominators mean that the fractions represent the same value, they depict the same parts of a whole unit, they belong to the same family, they have the same surname. The like fractions are not equal if they do not have the same numerator, unlike fractions can be equivalent though.

A song in English made with the help of AI (<https://chat.openai.com>):

In the world of fractions, let us explore,
All of like and unlike fractions, we'll adore.
Like fractions, they share the same denominator.
They're quite similar, but they might have different numerators.
Two-thirds and four-sixths, they're like fractions indeed,
Equal in value, they fulfill our needs.
Half and one-eighth, a different class they belong,
Unlike fractions, with values that differ strong.
Like fractions, they make counting parts a breeze,
Equal denominators, they put our minds at ease.
Unlike fractions, they challenge us with their variety,
Different denominators, with values of disparity.



Fraction Glossary and Terms

A LESSON PLAN by Maria Evgeneia Pontikaki
Mavromataki Private School

But fear not, for fractions teach us to compare,
Like and unlike, they both have their flair.
Let's embrace the beauty of fractions so grand,
For they expand our understanding and expand.
So let us delve into the world of fractions with delight,
Discovering the wonders of like and unlike with all our might.
For fractions are a magical realm, full of intrigue,
Where numbers come alive and our knowledge takes a league.

Second Activity: Creative movement with the following song from the NUMBEROCK platform about equivalent fractions.

<https://numberock.com/lessons/equivalent-fractions/>

The song is also on YouTube

Equivalent Fractions Song For Kids | 3rd Grade - 4th Grade

The NUMBEROCK platform (<https://numberock.com/>) includes a collection of many songs and videos with mathematical content even in its free form.

After the students watch the video and ask questions, we can give them the lyrics of the song as a worksheet and fill in the blanks by omitting the underlined words.

Equivalent fractions

If there were four socks to wear,
then we would say there'd be two in each pair;
and one of the two pairs, we can declare,
equals two fourths of all the socks there.
Drawing one half and two fourths on a number
line shows they can be described with an equal sign;
an equal value is what they're worth
so we say one half is equivalent to two fourths.

Equivalent fractions is the name
for fractions whose values are the same.

Once upon a time, there were nine canaries
on telephone wires, sittin' down in threes.
Each wire contained one third of the birds,
so three ninths is equivalent to one third.
Drawing one third and three ninths on a number
line shows one third equals three parts out of nine.

Therefore, equivalent is the word
that describes three ninths and one third.

Equivalent fractions is the name
for fractions whose values are the same.



Fraction Glossary and Terms

A LESSON PLAN by Maria Evgeneia Pontikaki
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If the numerator and denominator share a common factor, then you can divide the top and bottom by the same number.

On top and under, and say with satisfaction,

“We found an equivalent fraction”.

And you can multiply the top and the bottom

by the same number on top and under,

which is really a fraction whose value equals

one,

and through this action we found an equivalent fraction!

Equivalent fractions is the name

for fractions whose values are the same.

(The values are the same! Woo!)

Equivalent fractions is the name

for fractions whose values are the same.

(Uh-huh! Uh-huh! The values are the same!)

Reference:

<https://youtu.be/K1EtxcKWtB4>

https://www.ducksters.com/kidsmath/fractions_glossary.php



Rhythm in fractions

A LESSON PLAN by Artemis Choreftaki
Mavromataki Private School

Grade 3

General Information about the resource:

The specific lesson plan was carried out in the context of the 3rd grade Mathematics lesson, specifically as an extension to the chapter of the book entitled: "Introduction to fractions". It consists of two activities, which aim to consolidate and deepen what material has been presented- taught. The first activity focuses on connecting the concept of the fraction with the musical meter of four quarters (4/4), with the aim of the students recognizing and expressing the fractions that arise within the musical meter. The second extension activity focuses on the students' creative expression in the context of their group, through the creation of their own musical measures that contain creative movement.

Keywords: fraction, rhythm, quarter, creative movement

Further notes about the resource and its use:

1. **Cognitive objective:** When we consider four quarters of time as one unit, we teach the concept of fractions and how we can express the same quantity in different ways. Four quarters corresponds to the fraction $\frac{4}{4}$, which is equal to the number 1. This means that four quarters is a unit of time and corresponds to an entire melody or beat in music. In this way, we learn to express time dimensions based on the understanding of fractions and the correspondence in quarters.
2. **Prior knowledge:** Students have already been taught and understand (fully or to some extent) fractions as part of a unit (e.g. $\frac{1}{4}$ of a pizza). Also in the context of the music lesson, they have come into contact with musical notes and the musical meter.
3. **Material and technical infrastructure:** classroom with whiteboard, chairs, optional musical instruments (percussion).
4. **Time:** One teaching period (45 minutes)

Application:

First Activity: We begin our lesson by reminding the students of the musical time of four quarters (4/4), and we demonstrate this together by clapping in four equal beats.

Then, we write a pattern on the table, which we can symbolize with vertical lines or by using some other symbol (e.g. | | - |, i.e. 1, 1, pause, 1), explaining that each vertical line symbolizes a beat within the measure of four.

We ask the children to draw out the pattern on the board and then try to express it as a fraction.

At this point, we can give the children different patterns within the 4/4 time signature and repeat the process. For example: | - | |, | - | -, | - - |.

We can also encourage students to write a pattern of their own and have the rest express it as a fraction and act it out (clapping).

Finally, if we have musical instruments, we hand them out to the students and ask them to play the patterns individually or several in a row, forming a melody.



Rhythm in fractions

A LESSON PLAN by Artemis Choreftaki

Second Activity:

We start by forming a circle with the chairs and ask the children to sit on them. We are also part of the circle.

First, we show the children our own pattern of movements within the measure of four quarters, that is, a pattern of four movements - beats that last the same time.

We ask the children to repeat the pattern all together, we repeat as many times as necessary even with a different pattern.

We point out that the pattern we draw must be within the measure of four quarters, but it need not consist of four movements. It may have fewer movements and pauses.

At this point, we divide the children into pairs and encourage them to work together to create their own movement pattern within the 4/4 time signature. We give the groups time to work (5-10 minutes).

Finally, each group presents its pattern to the whole class and we all repeat it together, continuing until all groups have presented.

Reference:

Βιώνης, Παναγιώτης. (2018). *Μουσικά Μαθηματικά*. Πανεπιστήμιο Πατρών, σελ. 47-59, available at <https://www.slideshare.net/PanagiotisVionis/ss-86641744>



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