

# *Equal educational opportunities for students with learning difficulties*

Teaching and learning activities  
Greece, Spain, Cyprus, Turkey and the UK  
2014-2016

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# INTRODUCTION

- The Erasmus+ program which began in September 2014 and ended in June 2016, was intended to teach children with learning difficulties, lessons which are difficult for them to understand and which in some cases fail in the exams (physics, science) at the end of the year and also try to find ways to make these courses more attractive and easy to understand, since these children are disadvantaged compared to the rest.
- The courses of Physics, Maths and Computers are interesting lessons for high school students. However students with learning difficulties because of various problems encountered (lack of concentration, memory loss, difficulty in understanding, difficulty in expressing etc) often find these lessons difficult to understand, so many of them fail.

- In the days we live in, with the new technological means at our disposal, we should be able to find new ways to approach the teaching of these lessons in order to make the course more attractive to all students and more accessible for students with learning difficulties.
- In February 2015, April 2015, October 2015 and March 2016, the children were taught Maths in Konya, Arts in England, Computers in Kilkis and Physics in Cyprus, by five different teachers, from five different countries (Spain, Greece, England, Turkey and Cyprus). Our purpose was for each country to teach a part of the curriculum of each course in its own way, in order to see which way is best suited for those children, or if necessary, to remove something from the curriculum, so these children can attend class more easily and in the end not to fail in their exams. In the following pages you can see the presentations and some pictures of each lesson.

*First teaching and  
learning meeting –  
Turkey  
February 2015  
MATHS*

## *First lesson - Turkey*

- *Teaching Division to Students With Learning Difficulties*

▶ **AHMET KARACIGAN**  
**SECONDARY**  
**SCHOOL/KONYA-TURKIYE**

Teaching division to students who have learning disabilities requires creativity and patience.

As a teacher, you must be willing to move beyond the traditional methods of division while teaching to students who have failed to grasp.

Giving students individualized attention as they attempt to solve division problems will help determine their specific areas of weakness and guide you to choosing the correct strategy to help them nail this crucial mathematical skill.



# Proposed Methods

- Visual techniques
- Games and entertainment
- Real life applications
- Different approaches

## Using Visual

- Use tangible materials
- Colour Charts(showing the process)
- Ask students to use these charts
- Using different coloured pens for each step
- Using flashcards, slides, pictures during class



- For example, for the problem 25 divided by 5, you could give students 25 pieces of candy or little squares of paper and have them determine how many groups of 5 they can make using those items.

## Playing Games

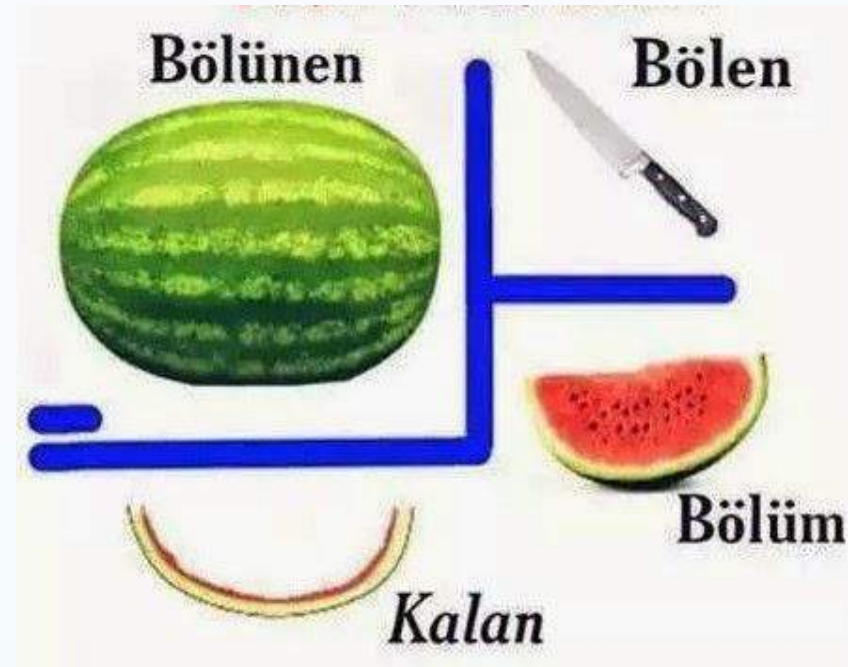
Use online games

- Some students may have an enthusiasm to win game
- Fun4theBrain's "Alien Munchtime" has students who answer division problems to determine which entree each alien wants for lunch

# Real-Life Application

Examples:

- Practice dividing a pie or a package of cookies so that everyone in the class receives an equal amount
- Determine how many quarters go into a roll by dividing \$10 by 25 cents
- Using various vegetables, fruits while explaining problems
- Trying any recipes in class by showing to students as  $\frac{1}{2}$  cup of flour or  $\frac{1}{3}$  glass of sugar



# Different Approaches

- Introduce students to different ways
- Practice solving division problems on graph paper writing each number in a different box to help keeping the step by step
- Organize funny competitions in the class with a small prize as group or individual
- For example, 25 divided by 5 would be represented by an index card with 25 tally marks and an index card with five tally marks.
- Focus on group of numbers at a time, such as dividing by three one day



## *Second lesson – Greece*

- *Teaching Addition to Students With Learning Difficulties*

- ▶ *3rd Gymnasio of Kilkis*

# Addition

It is very important for our pupils to be competent and feel very self confident in executing the basic operations, both academically and in real life situations. Addition is the first operation students learn and by the time they finish primary school they are capable of solving mixed operations problems, meaning the solution requires two or more operations to be executed.

## Objectives

- The curriculum sets some objectives in High School in relation to addition, such as:
- Development of fluency in adding numbers (all kind of numbers – not just whole numbers)
- Develop the ability of recognising and using the properties of addition in order to calculate an expression
- Efficient problem solving when addition is required, especially in combination with other operations
- Executing the operations with the right order (priority)
- Verification of the solution found
- Phrase their own problem in words



# Adjusted objectives

- When teaching to pupils with Special educational Needs, these objectives are adjusted and customized, so they are manageable by our pupils' needs. Even that this process has to do with every individual's needs, there are some guidelines that apply as a suggestion and a starting point. These are:
- Develop of ease and self confident when executing addition
- Recognise and use to their benefit the properties of addition
- Develop the ability of problem solving, specially when it comes to real life situation problems

## Teaching Plan

- One can split the teaching of the addition to three parts:
- Part One is operating addition with whole numbers from one to ten, and the result will not exceed ten.
- Part Two is adding small whole numbers (each less than twenty) which their result exceed ten.
- Part three is adding whole numbers with 2 or more digits.





# Part one

- This part is offered for development of self confident when executing additions. Its is also a good point to realise the properties of addition.
- Use of the internet is very popular among pupils, especially when it is combined with a game. One online site that is useful is the following: <http://www.softschools.com/mathg.jsp> The reason is that one can set the maximum result of the numbers and the maximum range of the number that are added. What is more, the total problems can be set.
- In some cases where students best work visually or they need a visual help, the following is very helpful. It is very convenient in order to explain the properties of addition as well, and can be used as an introduction to vertical addition of whole numbers, because of the visual representation of the numbers <http://www.softschools.com/counting/games/addition.jsp>
- The following online game has proven popular among the students. It gives the choice of setting particular numbers to practice, or range of numbers, so it can be set not to exceed ten as final result.



# Part One Assessing

After finishing with the above activities, there is a stage of assessing the students' understanding of addition and its properties. Some excersises could be the following:

- Make your own verbal phrases from real world situations using the word “addition” and/or synonyms
- Express the properties of addition in your own words
- Which of additions properties corresponds each expression?

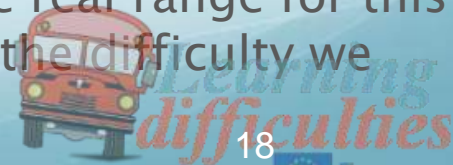
## Part two

Moreover, there is the ability to use the snowball game:

<http://www.fun4thebrain.com/addition/addsnowballdutch.html>

and to set it for adding number 9 and the range numbers 2–10. In this way there is a continuing evolve from the previous lesson.

It is also useful to use the following link, and set the numbers used from 1 to 20 and the result 30 (for example). The real range for this stage is 0–99 to numbers and result, depending the difficulty we want to achieve and the ability of our pupils.



## Part two

- In this lesson, our pupils are involved in adding up whole numbers whose result exceed ten. In this way, they develop the skills to make even greater additions, but the numbers that are added up are still small, two one– digit numbers or one– digit number with a two digit number. One good link that visualise one useful strategy for adding numbers that sum up to more than ten is this:

[http://www.softschools.com/math/addition/addition\\_number\\_bond\\_method/](http://www.softschools.com/math/addition/addition_number_bond_method/)

And this one as well can be useful at this stage:

<http://www.softschools.com/counting/games/addition.jsp>

setting the range for each number from 0 to 20.

Moreover, there is the ability to use the snowball game:

<http://www.fun4thebrain.com/addition/addsnowballdutch.html>

and to set it for adding number 9 and the range numbers 2–10. In this way there is a continuing evolve from the previous lesson.

It is also useful to use the following link, and set the numbers used from 1 to 20 and the result 30 (for example). The real range for this stage is 0–99 to numbers and result, depending the difficulty we want to achieve and the ability of our pupils.



# Assessment of part two

- For assessing the practise of our pupils we can ask them to phrase word problems that enable at least one two– digit number.
- To increase and asses the self confidence of our students we can enable them at these on line activities:

The first online activity asks from the pupils to find the wrong addition from the four additions in a certain time limit.

<http://www.edaskalos.gr/mygames/choise2/choise.html>

This may be proven challenging for pupils with poor visual performance but is beneficial for dyslexic students who have good visual response.

- Then we can ask the students to describe with their own words the process of adding two numbers that sum up to the next tenth. What happens when the result exceeds ten?

# Part three

- In this part one can use a video that explains very well what happens when two numbers exceeds ten and we have to add the first digit of the result to the digit with the greater value. The video is this one and is in Greek:

<https://www.youtube.com/watch?v=buTPNv1jVAc>

It gives the answer to the previous question sour students were asked (what happens when the sum of two digits exceed ten) in a very simple and fun way.

We can ask then from our students to work on this familiar online activity:

- [http://www.softschools.com/math/games/addition\\_practice.jsp](http://www.softschools.com/math/games/addition_practice.jsp)

We can now set the range for the adding numbers from 0 to 1000 and the result range 0 to 2000.

# Final Exercisers

We can ask from the pupils to perform these exercises

- Measure your height in centimetres and add it up with your classmate who sits next to you
- Calculate with your mind the following addition  $75+225+1700$ . Then make it the same addition with using a calculator. Compare your results.
- Nick's father has 287 Euros and he is taking 56 Euros more to pay a bill. How much is the total bill that must be paid?
- George has 479 Euros and his sister Anna 563 Euros How much money do they both have?
- A laptop cost 895 Euros in one shop, but another shop is 35euros more expensive. What is the price in the second store?





## *Third lesson– Spain*

- *Teaching Multiplication to Students With Learning Difficulties*
- *IES FRANCISCO MONTOYA*



# TODAY WE ARE GOING TO LEARN:

- What multiplication is
- Why multiplication is important
- The multiplication table
- When to use the multiplication
- How to multiply
- ✓ Practice
- Problem solving

## What is Multiplication?

Multiplication is the number produced by combining groups of the same size.

The same number can be produced by addition.

$$3 \times 4 = 12$$

$$4 + 4 + 4 = 12$$


Learning difficulties

# WHY MULTIPLY?

Multiplication is easier than addition if you are multiplying many groups of the same size.

EXAMPLE Mary has got 5 exams next week. For each exam she has to study 10 pages. She can easily find out how many she has to study by multiplying.

$$5 \times 10 = 50$$

$$10 + 10 + 10 + 10 + 10 + 10 = 50$$

## MULTIPLICATION

MULTIPLICATION

**3**  $\times$  **5** = **15**

coefficients

multiplicand  $\times$  multiplier = product

$3 \times 5 = 3 + 3 + 3 + 3 + 3$  (five threes)  
 $= 5 + 5 + 5$  (three fives)  
 $= 15$

# THE MULTIPLICATION TABLE

To be able to multiply large numbers, we need to know our Multiplication Table, also known as the Times Table.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

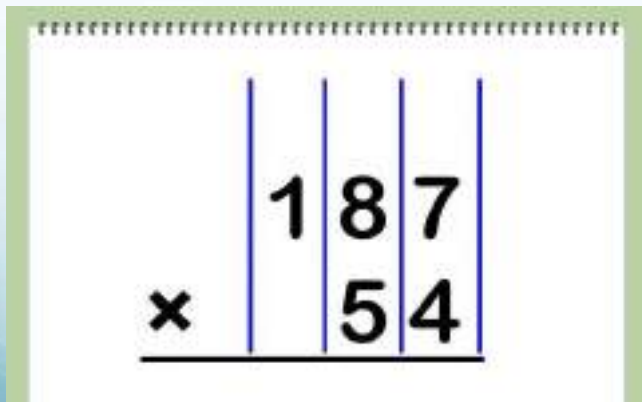
We use the numbers on the sides to find the groups & the numbers in our groups.

There are 10 pages for each exam, so she finds the number 10 on the other side.

Let's try one!

$$6 \times 12 = ?$$

## LONG MULTIPLICATION



1. Line up the numbers you are multiplying. Place the larger number on top of the smaller number and line up the units in the hundredths', tens', and ones' place. In the problem  $187 * 54$ , you should line up 7 over 4, 8 over 5, and 1 over no number, since 54 has no number in the hundredths' place. Write the multiplication sign below the top number and draw a line below the bottom number. You will start multiplying the numbers below the bottom line.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

# LONG MULTIPLICATION

$$\begin{array}{r} 2 \\ 187 \\ \times 54 \\ \hline 8 \end{array} \quad 7 \times 4 = 28$$

2. Multiply the number in the ones' place of the bottom number with the number in the ones' place of the top number. Multiply  $4 * 7$ . Your answer is 28, so write the number 8 from the number 28 below the 4, and carry the 2 from the number 28 over on top of the 8. Any time your answer is two digits long, carry the first digit above the number next to the top first right number, and place the second directly below the number on the second row you were using to multiply.

3 Multiply the number in the ones' place of the bottom number with the number in the tens' place of the top number. First, you multiplied 4 by the number in the ones' place; now, multiply it by the number in the tenths place. Multiply 4 with 8, the digit to the left of 7.  $8 \times 4 = 32$ . Remember that you had placed a 2 over the 8. Now, add it to your answer.  $32 + 2 = 34$ . Place the 4 from the number 34 below the line under the 8, next to the number 8 that you wrote down in the previous step.

• Carry the 3 from the number 34 over the 1 in the number 187.

$$\begin{array}{r} 32 \\ 187 \\ \times 54 \\ \hline 48 \end{array} \quad \begin{array}{l} 8 \times 4 = 32 \\ 32 + 2 = 34 \end{array}$$

# LONG MULTIPLICATION

$$\begin{array}{r} 187 \\ \times 54 \\ \hline 748 \end{array}$$

4 Multiply the number in the ones' place of the bottom number with the number in the hundreds' place of the top number. You just multiplied 4 by the number in the tenths' place; now, multiply it by the number in the hundredths place.  $4 \times 1 = 4$ . Now, add the number that you carried above one to your answer.  $3 + 4 = 7$ . Write this number down on the line below the one. You have used long multiplication to multiply 4 by 187 to get 748.

•Note that if the top number had four or more digits, you would just repeat the process until you multiplied the number in the ones' place of the bottom number with all of the numbers in the top number, continuing to move from right to left.

$$\begin{array}{r} 187 \\ \times 54 \\ \hline 748 \\ 0 \end{array}$$

5 Place a zero in the ones' place below your new product. Place a zero in the ones' place of the new row below the 8 in 748. This is just a placeholder for this method to show that you are moving on to multiply the tenths' place value.



# LONG MULTIPLICATION

$$\begin{array}{r} 3 \\ 187 \\ \times 54 \\ \hline 748 \\ 50 \end{array} \quad 7 \times 5 = 35$$

6 Multiply the number in the tenths' place of the bottom number with the number in the ones' place of the first number. Multiply 5 times 7 to get 35. Write down the 5 from 35 to the left of the 0 and carry the 3 from the 35 above the 8 in the top number.

$$\begin{array}{r} 4 \ 3 \\ 187 \\ \times 54 \\ \hline 748 \\ 350 \end{array} \quad \begin{array}{l} 8 \times 5 = 40 \\ 40 + 3 = 43 \end{array}$$

7 Multiply the number in the tenths' place of the bottom number with the number in the tens' place of the first number. Multiply 5 by 8 to get 40. Add the 3 above the 8 to 40

to get 43.

Write down the 3 from 43 to the left of the 5, and carry the 4 from the 43 above the 1 in the top number.

# LONG MULTIPLICATION

$$\begin{array}{r} \overset{4}{1} \overset{3}{8} 7 \\ \times 54 \\ \hline 748 \\ 9350 \end{array}$$

8 Multiply the number in the tenths' place of the bottom number with the number in the hundredths' place of the first number. Now, multiply 5 times 1 to get 5. Add the 4 over the 1 to 5 to get 9. Write it down next to the 3.

You have done long multiplication to multiply 5 by 187. Your answer for that portion is 9350, since the 5 was in the tens' place

$$\begin{array}{r} 187 \\ \times 54 \\ \hline 748 \\ + 9350 \\ \hline \boxed{10098} \end{array}$$

9 Add the top and bottom products. Just do simple addition to

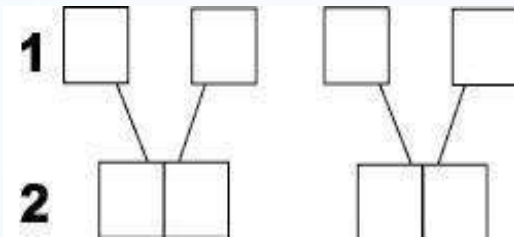
add your two products, 748 and 9350, and you're done.  $748 + 9350 = 10098$



# 1. Make the following operations by using the 1-2 strategy

1-2 strategy

Each class member works (1-2 mins for this stage). Students then in pairs, compare their answers and arrive to an agreement (Another 1-2 mins).



$$34 \times 2$$

$$486 \times 48$$

LET'S CORRECT IT!

The number strategy

Each member of every single group is assigned with a number (1-2). Randomly a number will be chosen and the person with this number will have to stand up and share with the rest of the students the result s/he has decided with his partner.

4 8 6

X 4 8

3 8 8 8

1 9 4 4

2 3 3 2 8

# PROBLEM SOLVING

- ❖ Carefully read the statement
- ❖ Ask for the words you don't understand
- ❖ Focus on the data
- ❖ Apply the suitable operation:  
adding, subtraction, multiplication or division.
- ❖ Solve the problem

## 2. PROBLEM NUMBER 1

### Shared Reading strategy

Working in pairs, one of the student is going to read the statement of the problem and explain to his / her partner what they have to do. Once this is done, it is the other student's turn who does exactly the same. When it is crystal clear for both of them, then they are ready to work on it.



Ismail and his family would like to visit Greece in Easter, if the final price per person is 34€, how much it will be if they are 7 people in total?

LET'S CORRECT IT!

1-2 strategy

Each member of every single group is assigned with a number (1-2). Randomly a number will be chosen and the person with this number will gather together and decide the final result. They have to name a spokesperson and share the product to the teachers.

DATA

Price per person: 34€

Number of people: 7



LET'S CORRECT IT!

1-2 strategy

34€ x 7 people...

$$\begin{array}{r} 34 \\ \times 7 \\ \hline 238 \end{array} \text{ €}$$

The whole family needs 238 €

#### 4. PROBLEM NUMBER 2 Task

Rotation strategy

Each pair of students count on a unique piece of paper. Both pupils read the statement and think about a possible solution. One of the students starts writing the result while the other student just observe him / her. When the first student has finished writing, it is the other's turn who does exactly the same.





Dimitris has got 157€. Andrew has got 80 £. Khadija has got 250 TRY and Andrea 100€.

Who has got more money?

Who has got less money?

Conversion:

€ to TRY you have to multiply x 2,73

£ to TRY you have to multiply x 3,64

## DATA

Khadija has got 250 TRY

Dimitris has got 157€

Andrew has got 80 £

Andrea has got 100€

# LET'S CORRECT IT!

## Spokesperson



- Dimitris  $157\text{€} \times 2,73 = 428,61 \text{ TRY}$

- Andrew  $80 \text{ £} \times 3,64 = 291,20 \text{ TRY}$

- Khadija has got 250 TRY

- Andrea  $100\text{€} \times 2,73 = 273 \text{ TRY}$





## *Fourth lesson– England*

- *Teaching Subtraction to Students With Learning Difficulties*
- *Woodfield Teaching School Alliance*

“Equal educational  
opportunities for  
students with  
learning difficulties”  
Project 2014-1-  
EL01-KA201-001322

- The Learning Journey:
  - ENGAGEMENT
  - COMMUNICATION
  - QUESTIONING
  - CHALLENGE
  - THINKING
  - LEARNING
  - IMPACT

# 70

- What is this project about?

- Equal
- Educational
- Opportunities
  
- for students
- **with learning difficulties**

# SUBTRACTION

The concept of subtraction begins at a very early age

- Most children have the thought process to complete subtraction
- before they start school
- Subtraction begins when children share toys, eat cookies, lose privileges and see family members come and go
- The informal act of doing subtraction is completed without much thought or need for teaching
- Formal subtraction on the other hand, may not always be an easy concept to learn
- There are some steps that can be followed to make learning easier
- when teaching subtraction

# SUBTRACTION



- Prior knowledge

- Ensure the student has a solid grasp of number and quantity
- The student has to be able to understand and apply addition
- Explore addition and subtraction together rather than separating them
- Early stages of subtraction involve counting back and counting on in ones
- Knowledge of number pairs to ten to be secure
- Order matters in subtraction
- Use real things to begin with
- Add number sentences to the manipulation of items
- Write subtraction number sentences using cards and move these sentences around
- 0–100 bead strings help with crossing boundaries



# SUBTRACTION

- Pupils need to be able to both ‘take away’ and ‘find the difference’
- Taking away: is subtracting (counting back) from a large number to land on the answer
- Finding the difference: (counting on) the answer will be the total of what was counted on
- Teachers must be explicit about which method they are teaching
- Four, number sentences can always be formed from + and -
- Give pupils regular opportunities to find ‘missing numbers’ in calculations
- Most of the time we count the ‘jumps’ when subtracting, the starting number is not counted “one”

● TESEKKUR EDERIM – EYXAPIΣΤΩ – GRACIAS

● THANK YOU

# CONCLUSIONS

From the above lessons, we made the following conclusions regarding the curriculum of Maths for children with learning difficulties, and which we present below:

- ❖ Math is more understandable by using visual, presentations.
- ❖ Students express themselves better and more successfully when being interested in as individually.
- ❖ In teaching four aritmatrical operations and the other topics of math, real-life materials should be used and they are necessary for this lesson.
- ❖ Feedback should be given as soon as possible while teaching math. Due to this process, it is appeared that learning problems of some students continue or not....



# OVERALL EVALUATION

As teachers we think that the basic reasons underlying the curriculum reform and/or change in mathematics curriculum are abstractness and hardness of the topics to students' development level. We also report that students do not understand why to learn what are covered, because these topics have been covered without their real life implications. There are reasons why the reform in curriculum is required: abstractness and hardness of the topics, and the lack of real life implementations. We believe that the changes in the curriculum provide students with opportunities to learn the topics by doing and living. We believe that new curriculum should provide the students with plenty of practice in their studies. In addition, the new curriculum contributes to the students to understand the importance of subject taught in classroom and to relate them with real life.

The newly developed mathematics curriculum should pay attention to:

- ❖ Learning by doing and living
- ❖ Encouraging the students to construct their own knowledge by living
- ❖ Encouraging the students to share their knowledge with other Students–centered rather than teacher– or subject centered
- ❖ Suitable to students’ development level
- ❖ Enabling the students to self–express, to be self confident, and self–awareness
- ❖ Encouraging the teacher to develop themselves
- ❖ Emphasizing the understanding of “no students left behind”
- ❖ Encouraging the cooperation among the teachers
- ❖ Using some suitable visual materials ,real life applications as apple,water melon...
- ❖ Making the subject enjoyable thanks to games, presentations and different approaches
- ❖ Cooperating particularly the families who have pupils with learning difficulties
- ❖ Explaining some hard subjects with more illustrative, understandable and simple examples
- ❖ Giving more importances for students with learning difficulties
- ❖ Being more patient and educational while teaching



# Second teaching and learning meeting –

England  
April 2015  
Art

## *First lesson – England*

- *Teaching how to use the clay to Students With Learning Difficulties*
- *Woodfield Teaching School Alliance*

## ● **Reference to scheme of work;**

- This lesson explores many of the skills that are required to fulfil an introduction to the manipulation of ceramics. This unit of work investigates ceramic manipulation skills. Pupils will develop skills to produce a series of three-dimensional shapes in clay from a starting point of a sphere; using techniques and simple that result in a a range of shapes and a thumb pinch pot.
- **Manipulation skills: ceramic thumb pot outcome**
- To be able to produce three-dimensional shapes using
- **Techniques:** simple tapping and rolling techniques, creating straight edges, flat faces
- **Self-management skills:** attendance; punctuality; complete tasks within agreed deadlines; flexibility; take responsibility eg gathering materials, setting up, tidying up; self-motivation; assertiveness; readiness to improve own performance based on feedback

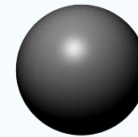
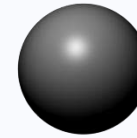
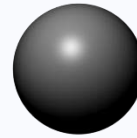
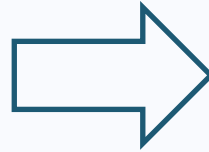
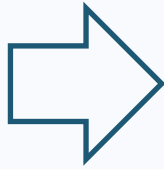
- **Safety:** risks and hazards; personal protective equipment; materials; tools;
- **Working methods:** materials; methods; processes; correct technical terms
- **Discussions:**
- Be able to comment on own work, own view point eg strengths, weaknesses, improvements; listening skills; responses; methods eg sketchbook annotations, written notes, verbal feedback, recordings, illustrated verbal presentations, informal discussion, group discussions; make relevant and positive contributions; respect others' rights to speak.

## **Introduction:**

- Welcome group, hand out labels bonus merits awarded on board. Checking equipment
- *key words for the lesson*
- *Shape; circle, Position and direction Position; Scale oval ellipse rectangle cube pyramid sphere cuboids three-dimensional*

## ● Starter:

- Group discussion – Where does clay come from? Can anyone describe what it feels/smells/looks like
- Write up words used as a reference for plenary
- lesson objectives outlined, tasks outlined (*this is how we are going to achieve the lesson objectives*) 3 main parts to the lesson
- Discuss lesson chunking on blue board and go through lesson check sheet
- **DEMONSTRATION OF CERAMIC MANIPULATIONS – PUPILS TO FOLLOW EACH STEP**
- Main lesson
- *Whole group activity:*
- Pupils to be introduced to creating a sphere – hand modelling





- Aims: to get pupils confident in manipulation of clay
- Task:
- *Whole group activity:*
- Creation of a thumb pot



- Extension activity (if needed): create an interesting shape from the pinch pot





## *Second lesson – Greece*

- *Teaching how music affects our lives to Students With Learning Difficulties*
- *3<sup>rd</sup> Gymnasio of Kilkis*

# MUSIC IS ALL SOUND AROUND US

Major scale

Escala mayor

Majör gam

Μείζον κλίμακα

Minor scale

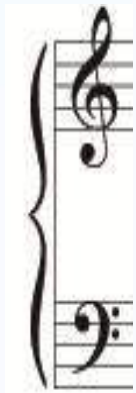
Escala menor

Minör Gam

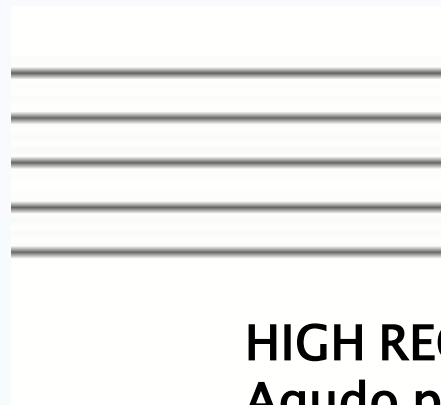
Ελάσσων  
κλίμακα



Learning  
difficulties



5  
4  
3  
2  
1



**LOW REGISTER**  
Voz grave piano  
Düşük harf piyano  
Χαμηλή περιοχή του πιάνου

**HIGH REGISTER**  
Agudo piano  
Yüksek harf piyano  
Ψιλή περιοχή του πιάνου

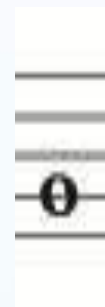


4

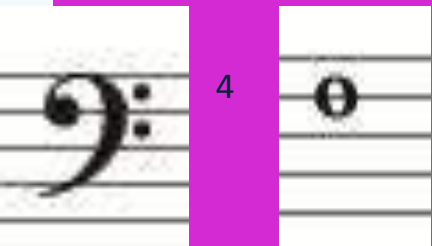
Treble Clef Sol  
Clave de Sol  
Sol Anahtarı  
Το κλειδί του Σολ



2



HIGH REGISTER  
Agudo piano  
Yüksek harf piyano  
Ψιλή περιοχή του πιάνου



**LOW REGISTER**

Voz grave piano

Düşük harf piyano

Χαμηλή περιοχή του πιάνου



## LOW REGISTER

Voz grave piano

Düşük harf piyano

Χαμηλή περιοχή του πιάνου



## HIGH REGISTER

Agudo piano

Yüksek harf piyano

Ψιλή περιοχή του πιάνου

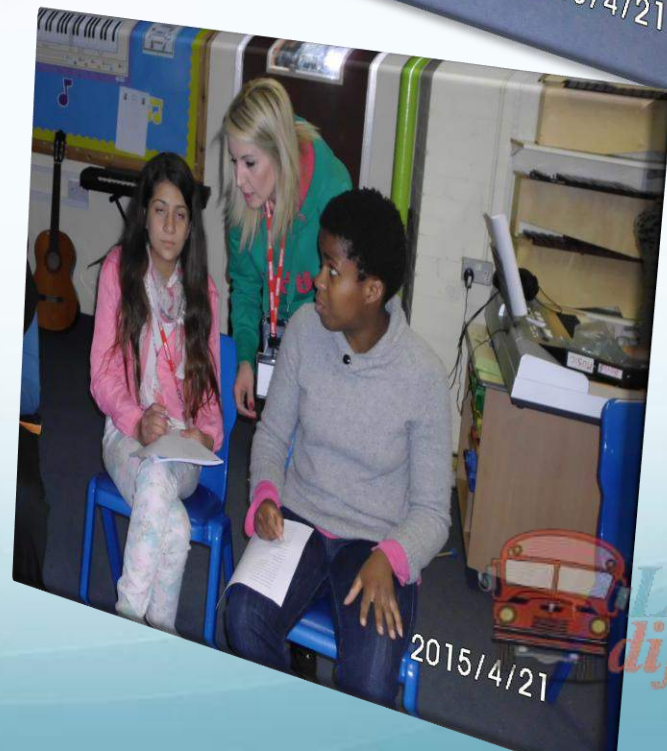




LOW REGISTER  
Voz grave piano  
Düşük harf piyano  
Χαμηλή περιοχή του πιάνου



HIGH REGISTER  
Agudo piano  
Yüksek harf piyano  
Ψιλή περιοχή του πιάνου



## *Third lesson – Cyprus*

- *Teaching traditional art and weaving to Students With Learning Difficulties*
- *Gymnasio Latsion*

# Traditional Arts and Weaving



In the old days people used to make their own fabrics and cloths at home because there were no factories and shops to buy from. So everything was hand made. Table cloths , sheets , and clothes.



These are the silk cocoons made from the silkworms.



We take the silk out of the cocoons and proceed into making it thread.

We put the silk on the wheel and roll it into a ball.

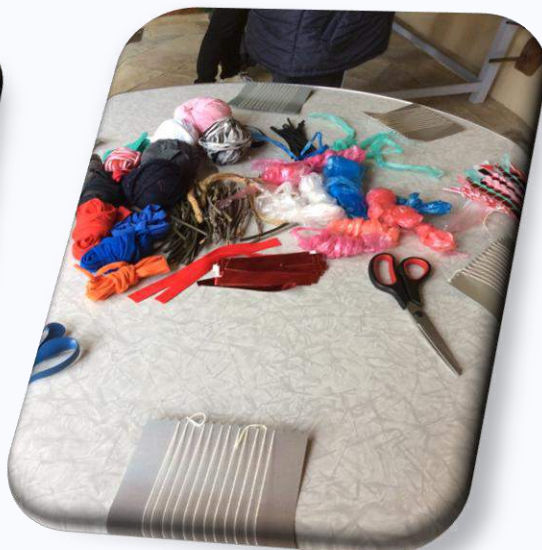


When we are done with the rolling of the silk ball ,we place it on the loom in order to start the weaving process.

We use these tools as needles so we can pass the thread in and out, up and down our loom to weave.



So the weaving begins...  
passing the thread through the  
loom and starting our table  
cloth.



We use a small loom and different materials in order to create our own patterns.



Working together set the loom on fire.



OUR FINAL PIECE !!! EXCELLENT WORK MARIO!!!!



## *Fourth lesson – Spain*

- *Teaching Graffiti to Students With Learning Difficulties*
- *IES FRANCISCO MONTOYA*

# A graffiti in perspective.



# Objectives

- Knowledge

  - Drawing

  - Perspective view

  - The proportions of the human body

  - Vocabulary

- Behaviora

  - I Get rid of the thought 'I can't draw'

  - Express themselves artistically

  - Recognize these techniques in all kinds of art.

# Materials

- Students

  - Drawing sheet (Format A-4)

  - Pencil

  - Rubber Ruler

  - Colour pencils

- Teacher

  - Multimedia

  - projector

  - Blackboard

  - Rulers

# 1<sup>st</sup> Session: Perspective view

## Introduction to perspective drawing.

- Main concepts:

  - Perspective

  - Horizon line

  - Vanishing  
point

- Other concepts:

  - Horizontal line

  - Vertical line Parallel  
lines Perpendicular  
lines

## 2<sup>nd</sup> Session: The proportions of the human body

### Introduction to drawing of the human figure

- Main concepts:
  - Proportionality of the human body. Drawing using a grid

### Methodology

- Grouping students to promote peer learning
- 'Visual explanations' (Use projector if possible)
- Step by step explanation
- Mostly practice
- Reiteration of the main concepts along the lesson
- Intermediate reviews and final summary
- Guided but encouraging the creativity development





# 1<sup>st</sup> session: The wall and the graffiti

- Preparing the material
- Introduction. What's perspective view?
- Drawing the wall guided step by step
- Talking about the graffiti
- Drawing the graffiti
- Colouring the wall and the graffiti
- Review of the session

## 2<sup>nd</sup> session: The skater

- Preparing the material
- Introduction. The proportionality of the human body.
- Drawing the grid to fit the body. Guided step by step
- Starting to sketching the body
- Drawing the details
- Colouring the skater
- Creative end up of the composition.
- Review of the session

## Assessment

- Observation of strengths and difficulties along the process
- Observe what skills have improved
- Evaluation according to personal progress





Third teaching and  
learning meeting –  
Greece  
October 2015  
COMPUTERS

## *First lesson – Greece*

- *Teaching Scratch –  
introduction to Students  
With Learning Difficulties*

▶ *3<sup>rd</sup> Gymnasio of Kilkis*

# WELCOME-LET US INTRODUCE

DIMITRIS TZAVELLAS IT TEACHER

ΚΑΛΩΣ ΗΡΘΑΤΕ  
BIENVENIDO  
HOSGELDINIZ

# Erasmus+

## IT Class in 3o Gymnasio Kilkis

Introduction in Programming and Algorithms

A presentation of Scratch

By Dimitris Tzavellas

IT Teacher

Kilkis

OCTOBER 2015

# SUBJECTS OF THE PRESENTATION

- PROBLEM
- ALGORITHM
- PROGRAM
- PROGRAMMING LANGUAGES
- SCRATCH
- EXERCISES



# THE PROBLEM

- As problem we can define every situation that needs solution
- There are 2 categories of problems
  1. Those can be solved e.g how much is  $2+4$
  2. Those can not be solved e.g Squaring the circle, travel into the past

In this class we worry only for the **category 1**

## THE ENVIRONMENT OF A PROBLEM

- As environment of the problem we define the elements(sometime physical also) that surround the problem. There are different kinds of problems depending the case for example:
  - Mathematical problems
    - Finding the average of the school degree(only include numbers)
  - Chemical problems
    - Which is the best solution for taking out stains from oil (does not involve numbers)



# THE ENVIRONMENT OF A PROBLEM

- Here are some other different kinds of problems :
  - Mechanical problem  
How can I make my bicycle or my car faster?
  - Medical problem  
What drugs should I get in order not to get ill?

CONCLUSION:

PROBLEMS ARE NOT ONLY ABOUT NUMBERS

- GIVE US YOUR EXAMPLES OF PROBLEMS
- PROBLEMS AND COMPUTER

WE OUR USING THE COMPUTER IN ORDER TO SOLVE THE PROBLEMS

- FASTER
- WITH ACCURACY
- AND BY PROCESSING LARGE QUANTITIES OF DATA



# COMPUTER AND SOLUTION

A computer (BECAUSE IT IS A MACHINE) can give a solution only if it has been given a precise set of instructions.

This leads to the definition of the ALGORITHM:

**ALGORITHM** is a defined set of instructions that give a solution to a problem

## EXPRESSIONS OF AN ALGORITHM

An ALGORITHM can be expressed in 3-ways:

- By writing small sentences
- By using flowcharts and diagramms
- By using a pseudoglossa

A good ALGORITHM has 3 basic abilities:

- Is small
- Is accurate
- Gives a solution

# HOW GOOD IS AN ALGORITHM

A solution to a problem can be given by a lot of different algorithms.

The rule is that the smaller (fewer lines) an algorithm is the better it is.

PLEASE GIVE YOUR PROPOSAL IN EXERCISE 5

## PROPOSALS IN EXERCISE 5

1<sup>ST</sup> APPROACH (ASSUMING FACING OUTSIDE)

1. WALK 5 STEPS ahead
2. STOP
3. TURN LEFT  $90^{\circ}$
4. WALK 5 STEPS ahead
5. STOP
6. TURN LEFT  $90^{\circ}$
7. WALK 5 STEPS ahead
8. STOP
9. TURN LEFT  $90^{\circ}$

# PROPOSALS IN EXERCISE 5

2<sup>ND</sup> APPROACH (ASSUMING FACING OUTSIDE)

1. REPEAT ( WALK 5 STEPS ahead → STOP → TURN LEFT 90° ) 3 TIMES

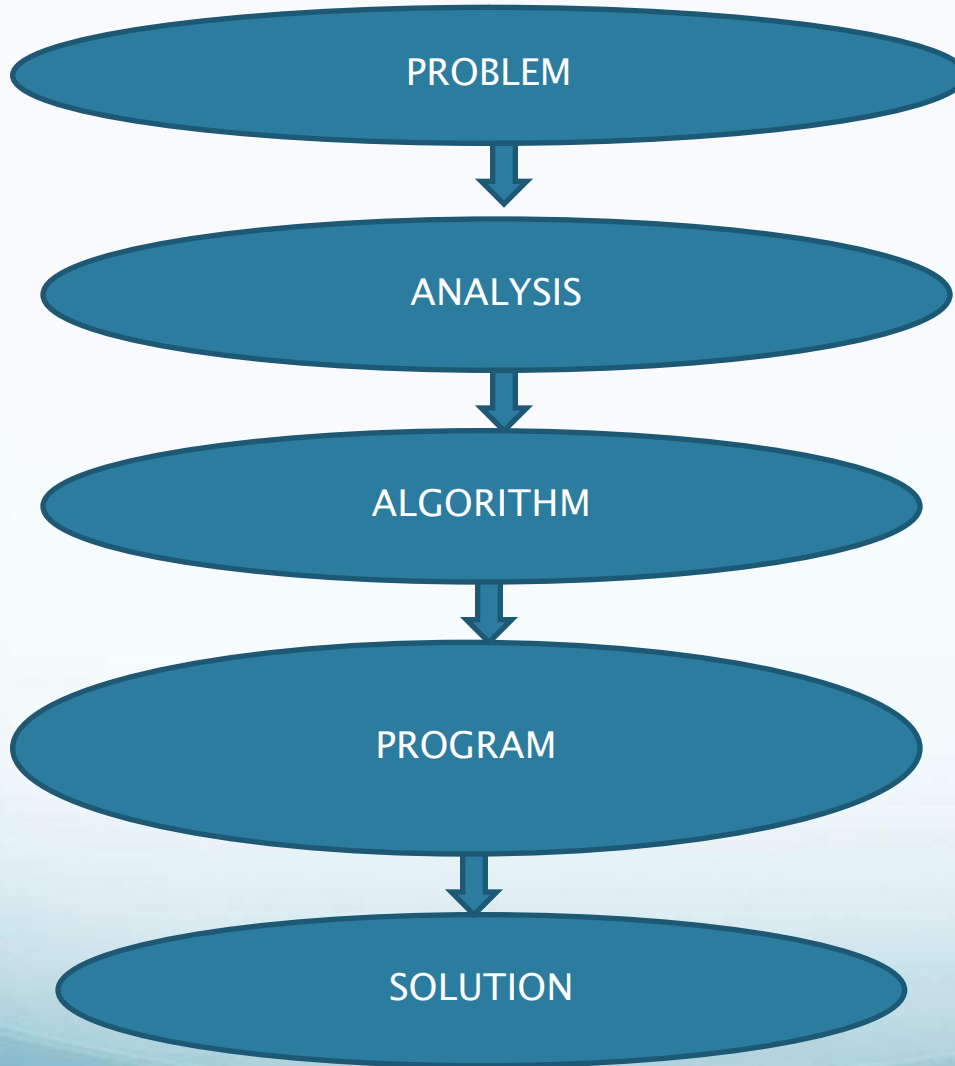
CONCLUSION:

THE 2<sup>ND</sup> APPROACH GIVES THE SAME RESULT JUST IN ONE LINE

## FROM ALGORITHM TO PROGRAM

- The implementation of the algorithm in a language that can be understood by the computer is named PROGRAMMING.
- A programmer can implement an algorithm by using one of the PROGRAMMING LANGUAGES (use simple English phrases and mathematical symbols and special characters) or one PROGRAMMING ENVIRONMENT.
- Both of them use at the end one TRANSLATOR or INTERPRETER which transforms the INSTRUCTIONS into 0 and 1.

# DIAGRAM PROBLEM TO SOLUTION



# INTRODUCING SCRATCH

Scratch is a new programming language that makes it easy to create interactive stories, games, and animations – and share your creations with others on the web.



# BASIC INGREDIENTS OF SCRATCH

Scratch projects are made up of objects called **sprites**.

- You can change how a sprite looks by giving it a different **costume**.
- You can make a sprite look like a person or a train or a butterfly or anything else.
- You can use any image as a costume: you can draw an image in the Paint Editor, import an image from your hard disk, or drag in an image from a website.
- You can give instructions to a sprite, telling it to move or play music or react to other sprites.
- To tell a sprite what to do, you snap together graphic **blocks** into stacks, called **scripts**.
- When you click on a script, Scratch runs the blocks from the top of the script to the bottom.





## *Second lesson – Cyprus*

- *Teaching what Scratch can do to Students With Learning Difficulties*

▶ *Gymnasio Latsion*

# Learner Objectives

- Introduction to Scratch Environment Interface
- Implementation of a simple project using sequence

## Warm Up

- Role Play – Let's meet up!

Two students make a simple dialogue:

- Hello!
- Hello!
- How are you?
- I am fine thanks. And you?
- I am very well thank you.



## **Procedures / Activities**

Teacher presents the interface of Scratch and implements the above case study showing how to choose Stage / Sprites  
create code (using blocks from Move, Looks and Control palettes)  
save

Students complete the worksheet on their pc individually.

## **Assessment**

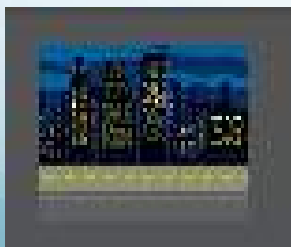
Students complete a quiz.

## *Case Study – scenario*

Mary, a teenager girl is walking in the city at night when she sees her friend Tom passing by with his car. Mary stops. Tom stops as well, he gets out of his car and after greeting each other, he invites her for a ride. Mary accepts his invitation and she goes towards the car. They get into the car and they go for a ride.

### *Select*

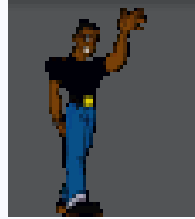
- **Stage:**  
night-city-with-...  
[Outdoors]



- Sprites:



car-blue



boy3



girl1-standing



girl1-walking]

```

when clicked
  wait 1 secs
  show
  go to x: -230 y: -100
  glide 2 secs to x: 10 y: -100
  wait 10 secs
  glide 2 secs to x: 250 y: -100
  hide

when space key pressed
  go to x: -187 y: -100
  hide
  
```

```

when clicked
  hide
  wait 3 secs
  go to x: 10 y: -115
  show
  go to front
  say Hello Mary! for 2 secs
  wait 2 secs
  say Would you like to go for a ride? for 2 secs
  wait 4 secs
  hide

when space key pressed
  hide
  
```

```

when clicked
  hide
  wait 2 secs
  show
  think this is Tom for 1 secs
  wait 2 secs
  say Hello Tom!!! for 1 secs
  wait 3 secs
  say Great idea, let's go!!! for 2 secs
  hide

when space key pressed
  hide
  
```

```

when clicked
  show
  glide 2 secs to x: -120 y: -135
  hide
  wait 9 secs
  show
  glide 2 secs to x: -14 y: -100
  hide

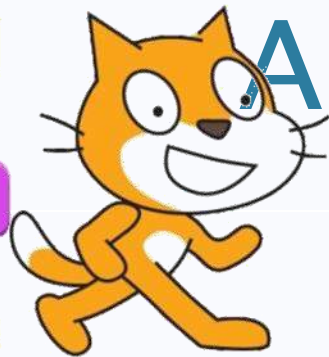
when space key pressed
  go to x: -235 y: -135
  hide
  
```



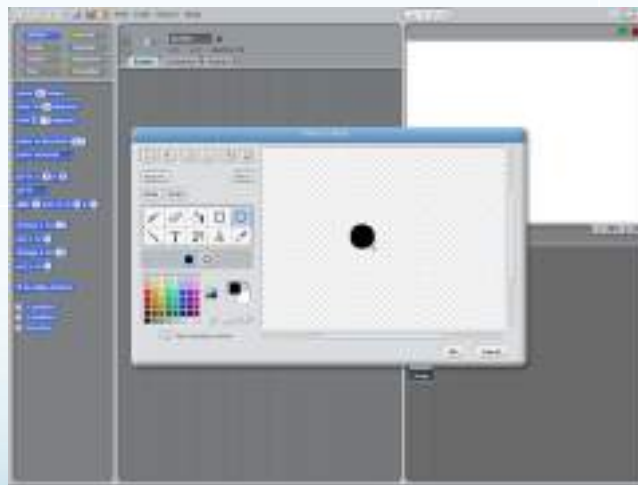
## *Third lesson – England*

- *Teaching what Scratch can do to Students With Learning Difficulties*
- *Woodfield Teaching School Alliance*

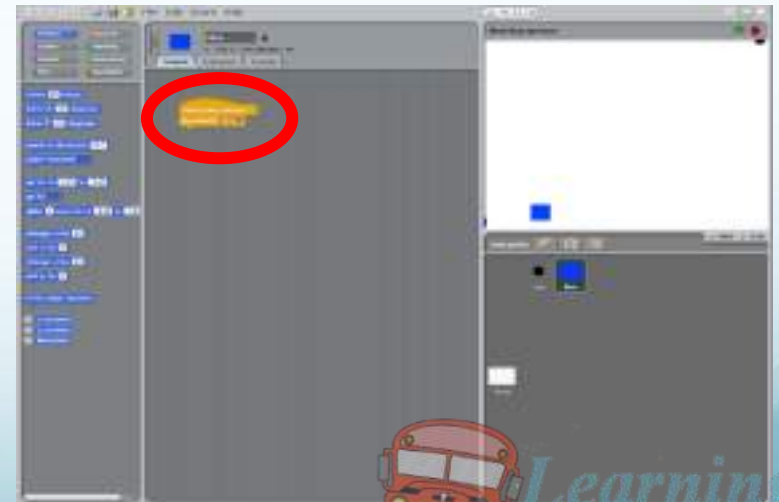
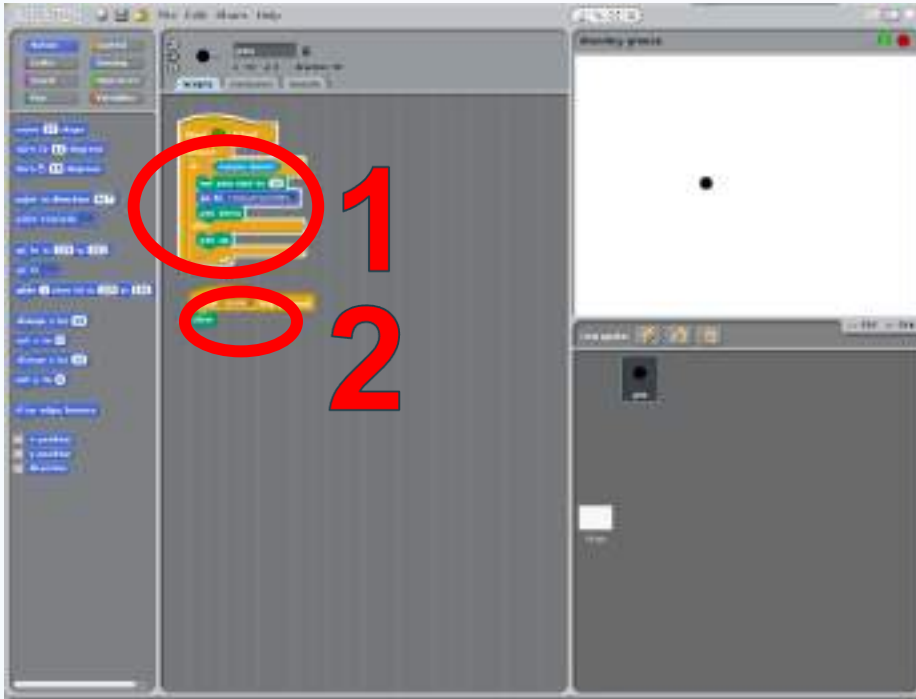




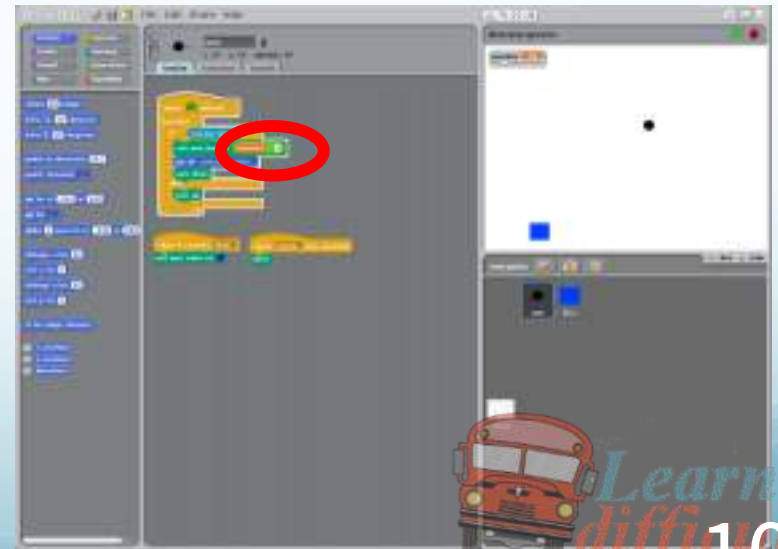
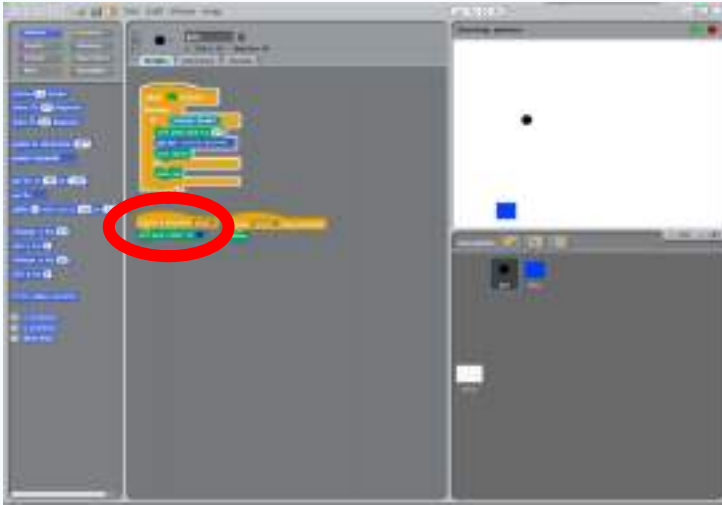
# A drawing program with Scratch



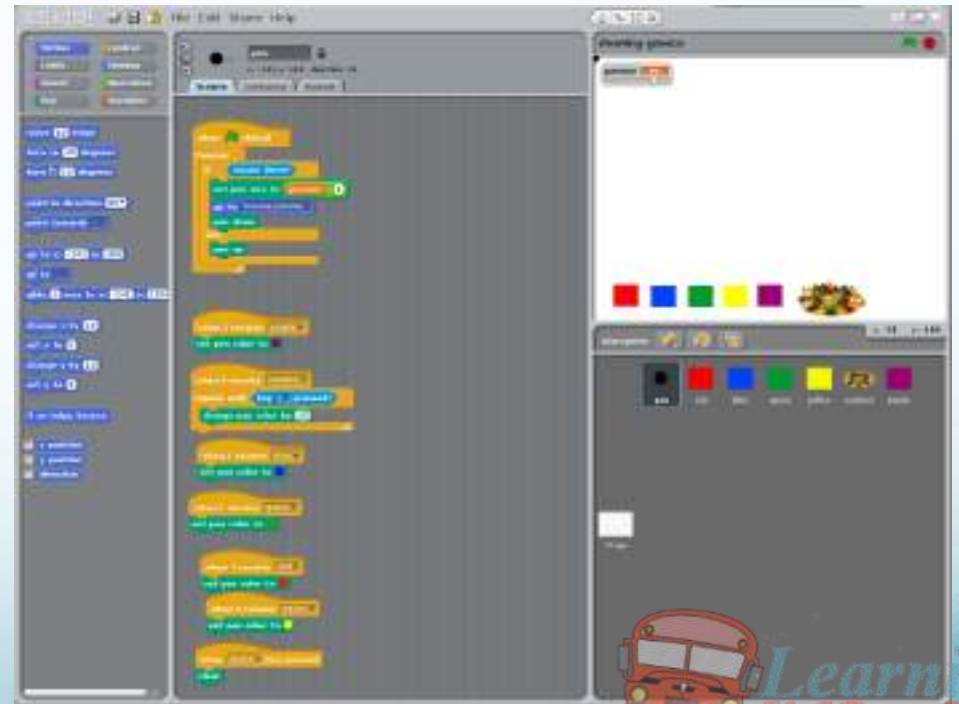
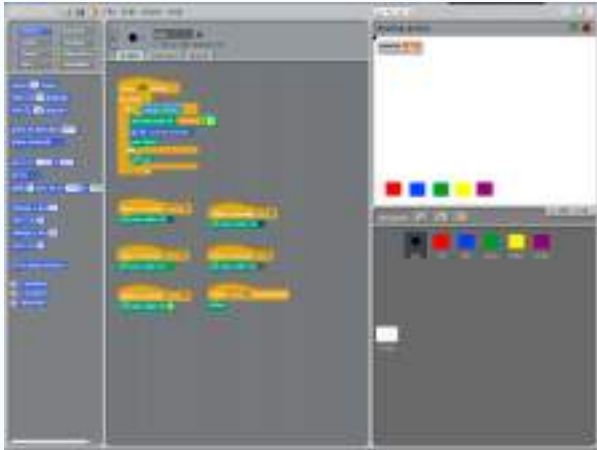
# Pen sprite and drawing code



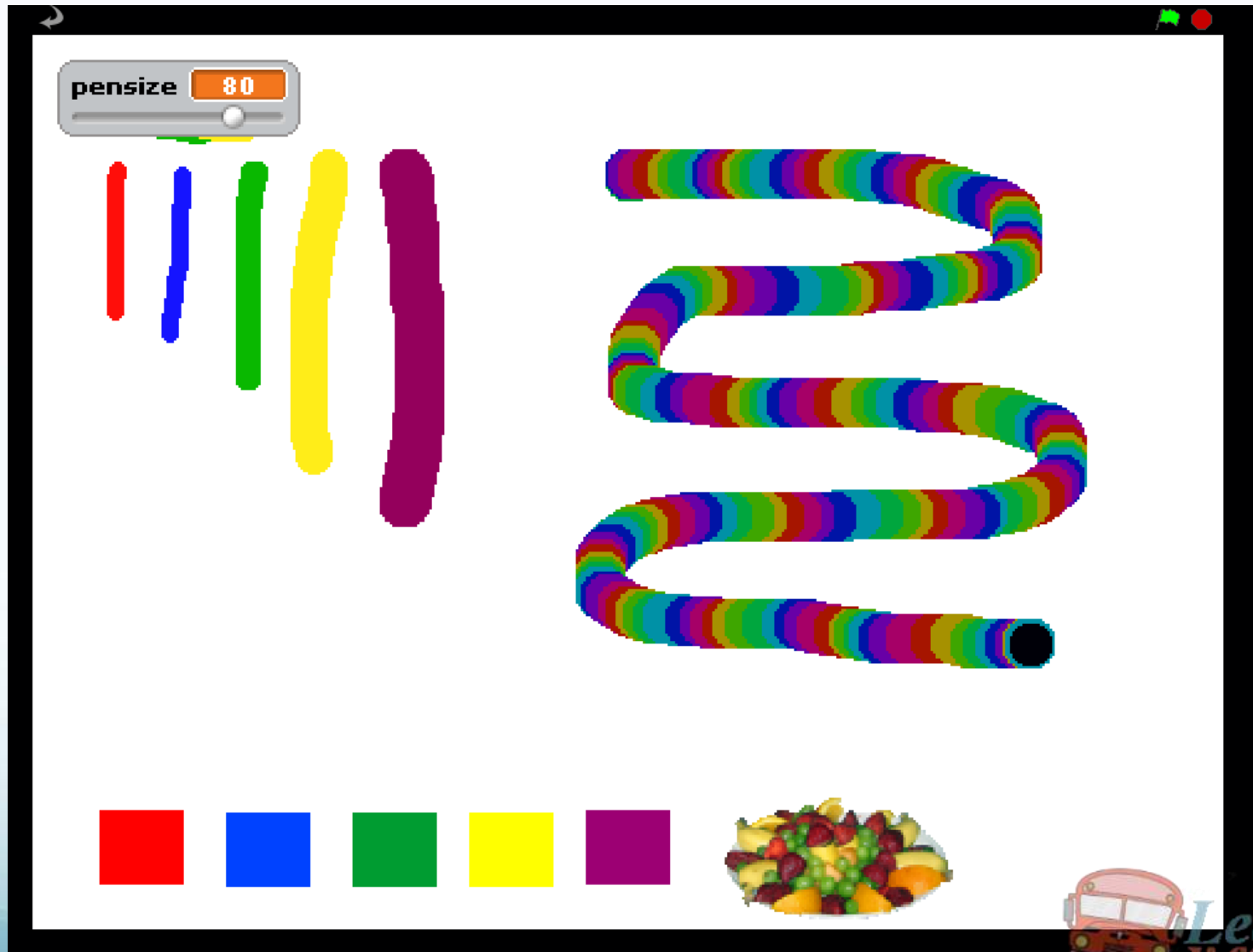
## Pen working with Blue paint



## 5 colour pens completed



# Completed Drawing Program





## *Forth lesson – Spain*

- *Teaching what Scratch can do to Students With Learning Difficulties*
- *IES FRANCISCO MONTOYA*

# Equal educational opportunities for students with learning difficulties

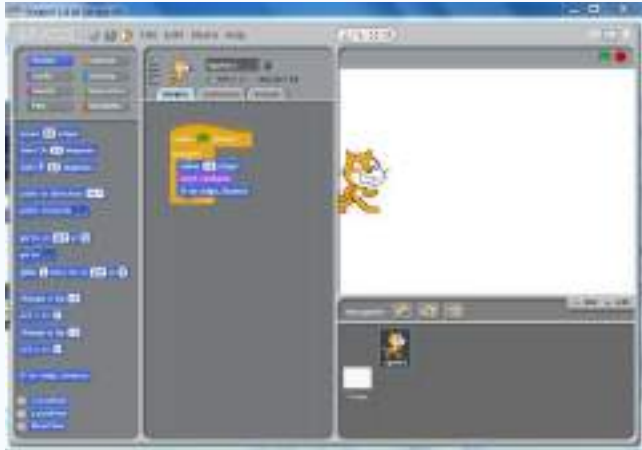
Scratch 1.4.  
Spain: Basic  
programmes

Kilkis, 19– 23  
October 2015

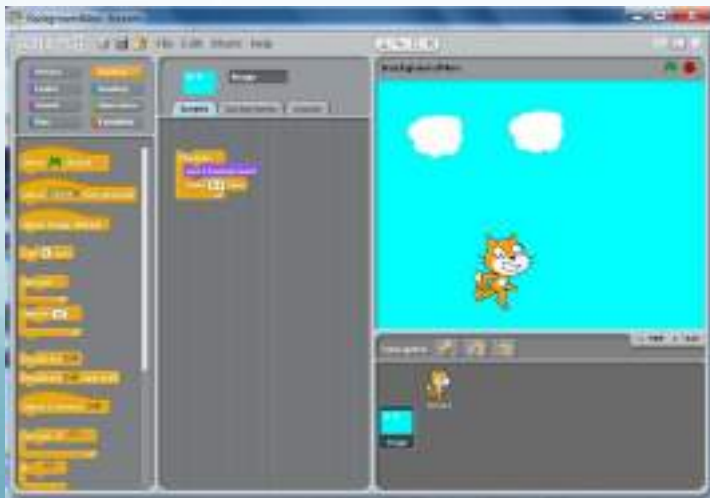




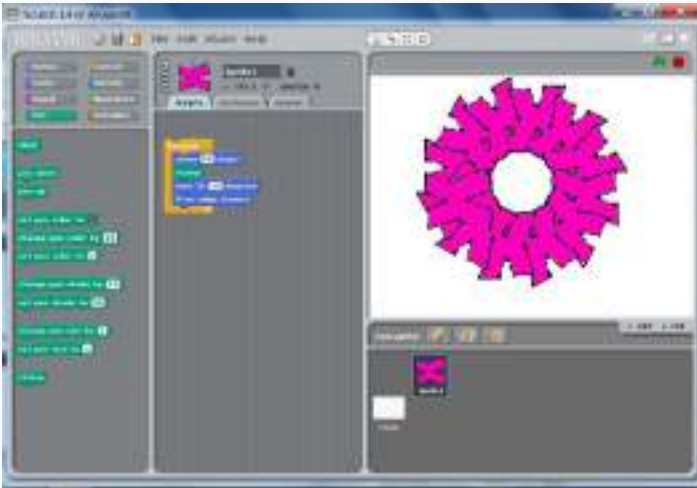
# What we can create...



## First program...



A second one...



A third one...





## Fifth lesson – Turkey

- *Teaching Scratch if-else to Students With Learning Difficulties*

**AHMET KARACIGAN**  
**SECONDARY SCHOOL/KONYA-  
TURKIYE**

# I am Learning «If ... Else ...» ControlIn Scratch



## PEOPLE MAKE DECISIONS EVERYDAY


We make decisions everyday!

For example:

Before we go outside,

EXAMPLE 1. – **IF** it's raining  , THEN take an umbrella



EXAMPLE 2. – **IF** it's sunny  , THEN go to picnic  
**ELSE** (IF it's not sunny),



THEN stay at home and watch TV

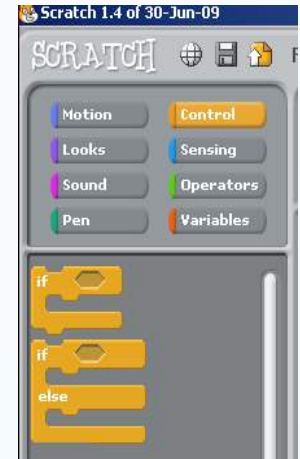


# WE ALSO MAKE DECISIONS IN SCRATCH

- In Scratch, when we need to make a decision, we use if-else blocks under the control category.

- **IF STATEMENT & IF-ELSE STATEMENT**

- In the Control category, there are some important blocks that handle conditional statements.
- Conditional statements are commonly called “if statements” or “if-else statements”.

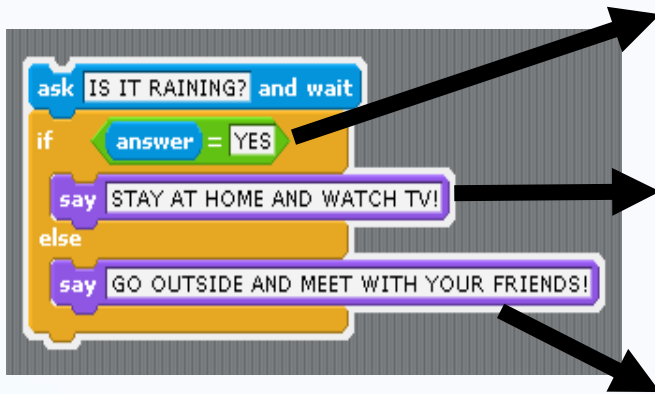


# IF-ELSE BLOCK

CONDITIONAL EXPRESSION

STATEMENT BLOCK EXECUTED  
IF CONDITION IS TRUE

STATEMENT BLOCK EXECUTED  
IF CONDITION IS FALSE



## LET'S TRY «IF-ELSE» BLOCK ON SCRATCH

We are going to implement IF-ELSE control block on a simple example.

In this example, a MATHEMATICAL PROBLEM will appear on the screen.

IF the student answers the question correctly,  
THEN the program will say «CONGRATILATIONS! CORRECT ANSWER!»

ELSE the program will say «WRONG ANSWER! TRY AGAIN.»



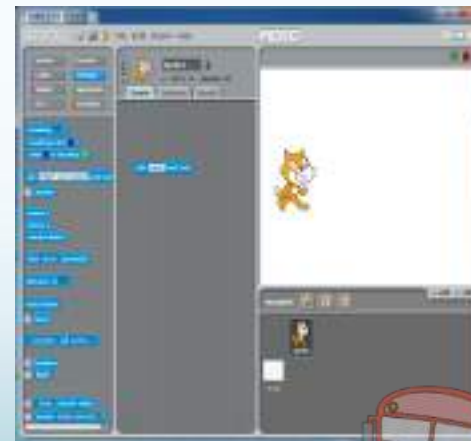
# STEP 1. OPEN SCRATCH

- When you open Scratch, you are going to see this screen.
- As default, the cat sprite is selected on the stage.
- Drag and drop the cat to the left side of the stage using your mouse.



# STEP 2. ASK A MATH PROBLEM

- We want our cat to ask students a math problem.
- In order to do that, click «Sensing» button on the top-left.
- And drag and drop the «ask ... and wait» block to the Scripts area.
- Write « $4 + 3 = ?$ » in the question area.





## STEP 3. ADD AN IF-ELSE BLOCK

- Under the «Control» category,
- Drag and drop an «if ... else...» block to the Scripts area so that it will be attached to the bottom of the «ask ... and wait» block.



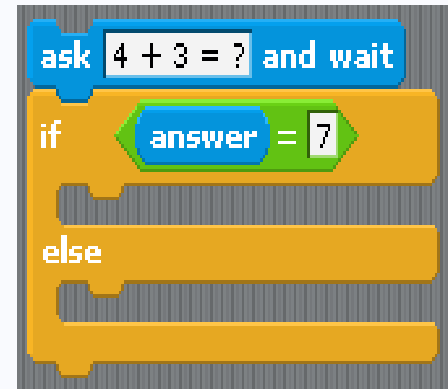
## STEP 4. ADD AN EQUAL OPERATOR

- Under the «Operators» category,
- Drag and drop an «equal operator» into the condition slot of the if-else block as shown in the picture.



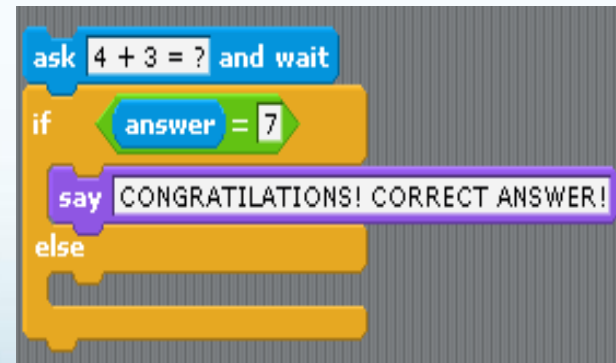
## STEP 5. SPECIFY THE CONDITION

- Under the «Sensing» category,
- Drag and drop an «answer» block into the left-hand side of the equation.
- Also, write «7» into the right-hand side of the equation.



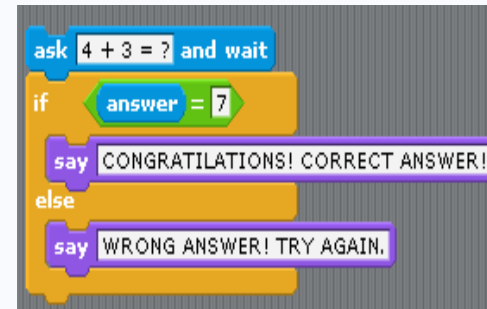
## STEP 6. IF CONDITION IS TRUE, ...

- Under the «Looks» category,
- Drag and drop an «say» block into the first statement area.
- And type «CONGRATULATIONS! CORRECT ANSWER!»



## STEP 7. IF CONDITION IS FALSE, ...

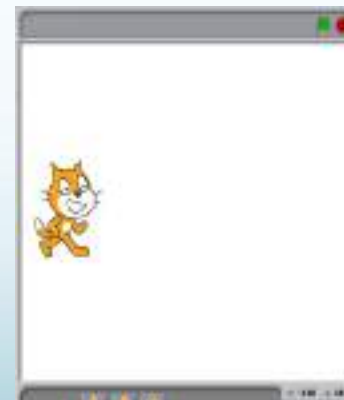
- Under the «Looks» category,
- Drag and drop an «say» block into the second statement area.
- And type «WRONG ANSWER! TRY AGAIN.»



## STEP 8. GREEN FLAG STARTS THE PROGRAM

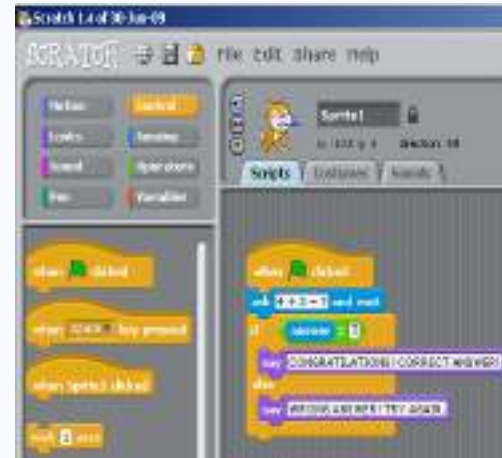
Green flag (on the top-right of the stage) starts the program.

Therefore, we need to tell Scratch what to do when the green flag is clicked.



# STEP 8. GREEN FLAG STARTS THE PROGRAM

- Under the «Control» category,
- Drag and drop an «when the green flag clicked» block into the top of the whole code block.



## RUNNING THE PROGRAM

- You can run and test your program by clicking the «Green Flag» button on the top-right of the stage.
- When you start the program, the cat will ask the math question as shown in the picture.
- You need to write your answer into the area located at the bottom of the stage and click «Enter» on the keyboard.



# RUNNING THE PROGRAM

IF THE ANSWER IS TRUE



IF THE ANSWER IS FALSE



## EXAMPLE 2: SAVE THE FISH

# STEP 1. ADD TWO FISHES TO THE STAGE

- Before starting to create our little game, first thing we need to do is add our actors to the stage: **Shark** and **Fish**.
- Add these sprites by clicking «**Choose new sprite from file**» button located under the stage.
- And name them «**FISH**» and «**SHARK**»



# STEP 2. WRITE THE SCRIPT FOR SHARK

- Firstly, in order to program our shark's movement, you need to select «**SHARK**» sprite and open «**Scripts**» tab.
- We want the shark appear on the top-left of the stage when the green flag is clicked.
- After the shark is born on the stage, its mission is to catch and eat the little fish by chasing it!



## STEP 2. WRITE THE SCRIPT FOR SHARK

- Add «when the green flag is clicked» block.
- Set the location of the shark to (-180, 135)
- Add a «forever» block so that the shark will continuously chase the fish.
- Add a «point towards ...» block and set the target as «FISH» sprite.
- Add a «move ... steps» block and set the step amount to 3, which will determine the speed of the shark.



## STEP 3. WRITE THE SCRIPT FOR FISH

- For the «FISH» sprite, we need to create two code blocks.
- The objective of the first code block is to make the «FISH» disappear **IF** the «SHARK» catches and swallows the «FISH».
- The aim of the second code block is to make the «FISH» continuously move towards the mouse-pointer that the player controls.



# STEP 3. WRITE THE SCRIPT FOR FISH

- Add «when the green flag is clicked» block.
- Add a «show» block (in case that the fish is hidden, it will make it appear again.)
- Add a «forever» block so that it will continuously check IF the «FISH» touches the «SHARK».
- IF the «FISH» touches the «SHARK», then it means the «FISH» is swallowed by the «SHARK». So we must disappear the «FISH» by adding the «hide» block inside the IF STATEMENT.



## ENJOY YOUR GAME 😊

- Start the game by clicking the green flag.
- Use your mouse to help the little fish escape from the shark since the little fish will follow your mouse pointer.
- Do not let the shark catch the fish otherwise you may lose your fish forever 😞







*Fourth teaching and  
learning meeting –  
Cyprus  
March 2016  
Physics*

## *First lesson – Cyprus*

- *Teaching introduction to Forces to Students With Learning Difficulties*
- *Gymnasio Latsion*

# FORCE

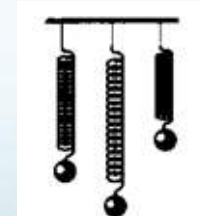
Watch the following video and then answer the questions.

<https://youtu.be/qhbrvWU8SXY>

1. What happens to the car below when the machine starts?
2. Why do you think this happens?

## Activity No 1:

- a) Press the sponge down and write what happens
  - b) Push the wood to the right and write what happens
  - c) Pull the spring downwards and write what happens
- So what can a Force do?



## Activity No 2:

a) Follow the link and open the simulation shown on the picture below.



<https://phet.colorado.edu/el/simulation/forces-and-motion-basics>

b) Open the first simulation to the left.

c) Put a small boy to pull the rope towards one direction first and then two boys towards the same direction. What happens?

d) Now first put a small boy to pull the rope towards the other direction and then two boys to the same direction. What happens?

e) Now try to put two boys of different size to pull towards different directions and write what happens.

f) Follow the link again and open the simulation shown on the picture below.

<https://phet.colorado.edu/el/simulation/forces-and-motion-basics>

g) Open the second simulation to the left.

h) Try to put on the material different size of Forces beginning with small Force and increase it to see what happens.

➤ What happens when you increase the Force?

- i) Keep the Force the same and change the material the boy is pushing. Make it bigger at first and smaller later.
- What happens when the material is bigger with the same Force?
  - What happens when the material is smaller with the same Force?
  - We symbolize Force with the letter **F**, the measurement unit is **N (Newton)** and the measuring instrument is the **dynamometer**.
  - Who is making the materials move?
  - We can say that a Force has a **direction** (horizontally to the left or right, across up or down or even diagonal)
  - We can say that a Force has **measurement** or it can be **measured**
  - We can say that a Force has a **beginning point**.
  - So a Force is a **vector value**.

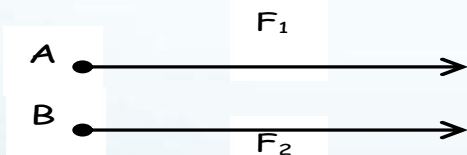


## Exercise 1:

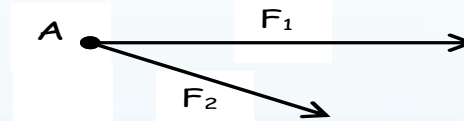
a) Draw a Force of 20N, with horizontally to the left direction, beginning from point A (scale 1 cm:10N).

b) Draw a Force of 150N, with upward across direction, beginning from point B (scale 1 cm:10N).

**Exercise 2:** Find the similarities and the differences concerning the beginning point, the measurement and the direction in the Forces below.



Same:.....  
.....  
Different: .....  
.....



Same: .....  
.....  
Different: .....  
.....

## Activity No 3:    **Hunting Treasure**

There is a gift for each country somewhere in the classroom. Follow the directions given below to find it!!!!

- **Spain:** The **beginning point** for you is the inside door next to the blackboard facing the class. Go 12 steps across in front of you. Turn horizontally to the right and go 8 steps across. Turn horizontally to the left and go 17 steps across. Turn horizontally to the left and go across 9 steps. Turn horizontally to the left and go 8 steps across. Turn horizontally to the right. There is a big cupboard in front of you. The treasure is 1 meter across up and horizontally to the left.
- **England:** The **beginning point** for you is the inside door next to the blackboard facing against the class. Go 10 steps across in front of you. Turn horizontally to the left and go 15 steps across. Turn horizontally to the left and go 5 steps across. Turn horizontally to the left and go across 5 steps. Turn right. There is a cupboard in front of you across down. The treasure is 1 meter across down and horizontally to the right.



- **Greece:** The **beginning point** for you is the main door of the class. Go 15 steps across in front of you. Turn horizontally to the right and go 15 steps across. Turn horizontally to the left and go 8 steps across. Turn horizontally to the right and go 15 steps across. Turn horizontally to the right and go 10 steps across. Turn right. There is a cupboard in front of you. The treasure is 1 meter across down to the left.
  
- **Cyprus:** The **beginning point** for you is the fire exit door of the class. Go 9 steps across in front of you. Turn horizontally to the right and go 10 steps across. Turn horizontally to the left and go 15 steps across. Turn horizontally to the left and go across 10 steps. Turn right. There is a big cupboard in front of you. The treasure is 1 meter across up and horizontally to the right.



## *Second lesson – Spain*

- *Teaching Buoyancy to Students With Learning Difficulties*

- *IES FRANCISCO MONTOYA*

# Who is Archimedes?



c. 287 – 212 BC

Perhaps the greatest scientist of antiquity

- Greek mathematician, physicist and engineer
- Computed ratio of circle's circumference to diameter
- Calculated volumes and surface areas of various shapes
- Discovered nature of buoyant force

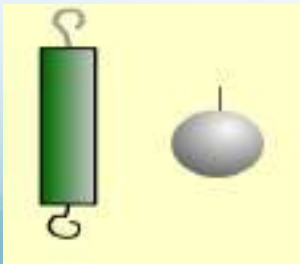
Inventor

- Catapults, levers, screws, etc.

## ARCHIMEDES' PRINCIPLE

Buoyant Force (Upthrust)

1. Weighs the field and scores the value indicating the dynamometer



## ! Buoyant Force (Upthrust)

2. Weighs the field and scores the value indicating the dynamometer



Buoyant Force (Upthrust)  
**WHY WEIGH LESS?**

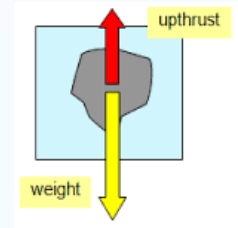


- Buoyant Force (Upthrust)

- The weight of the object in the fluid is reduced, because of the force acting on it, which is called **UPTHRUST**. For a fully submerged object:

- Apparent immersed weight = Weight of object – Upthrust

- $A.W = W.O - \text{Upthrust}$



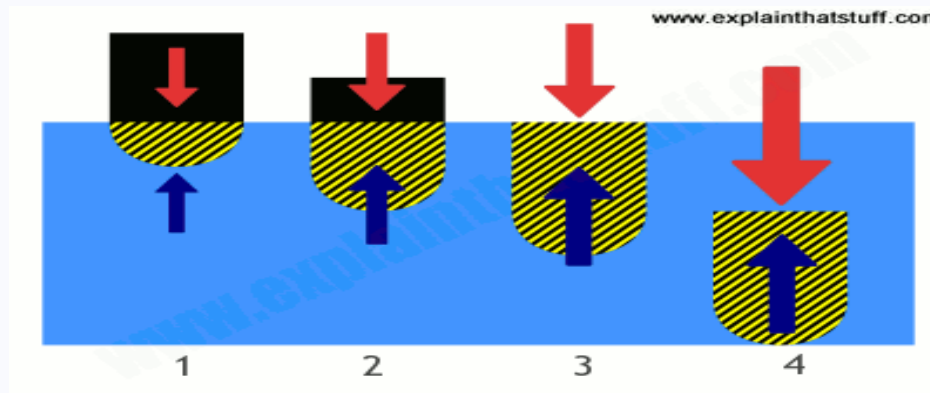
## Ships and Boats

### HOW DO THEY FLOAT?



The ship is balanced

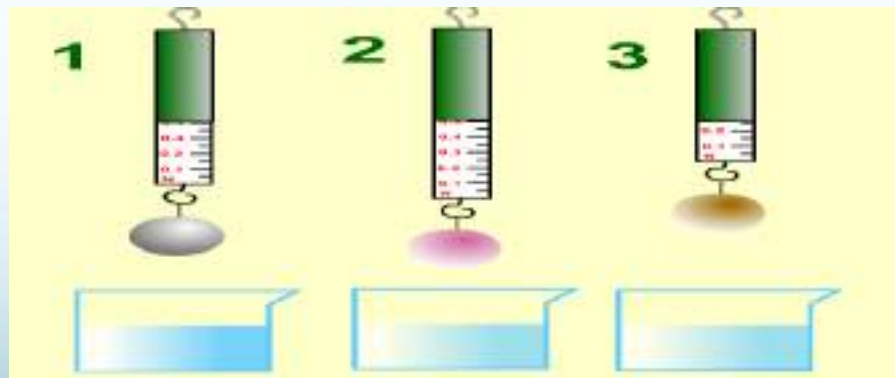
The boat is sinking



### A. Experience

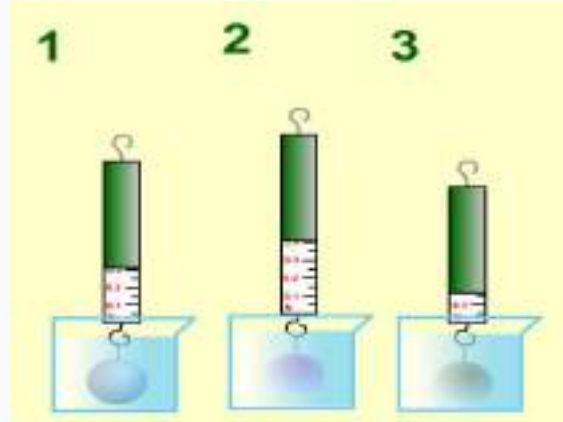
The three spheres having the same volume but different material.

1. Record the weight of each sphere



## A. Experience

2. Its apparent weight scores



## A. Experience

3. Calculate the thrust on each

	W.O	A.W UPTHRUST
Object 1		
Object 2		
Object 3		



# A. Experience

What conclusion can you get?



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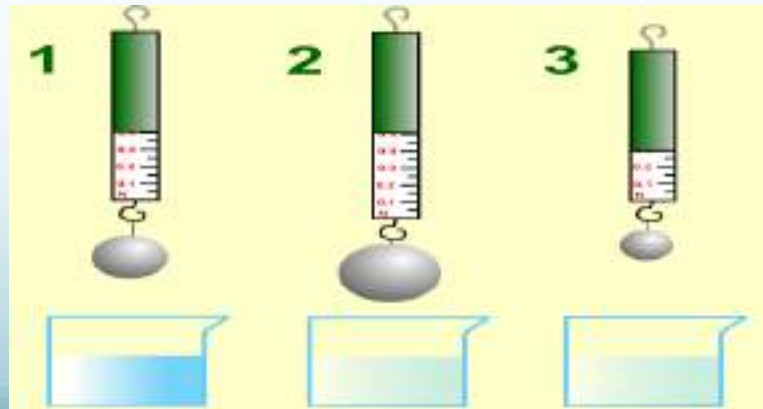
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# B. Experience

Figure spheres are made of the same material but each has different volume.

1. Record the weight



2. Record the weight in water



3. Calculate the thrust on each

	W.O	A.W UPTHRUST
Object 1		
Object 2		
Object 3		

## A. Experience

What conclusion can you get?



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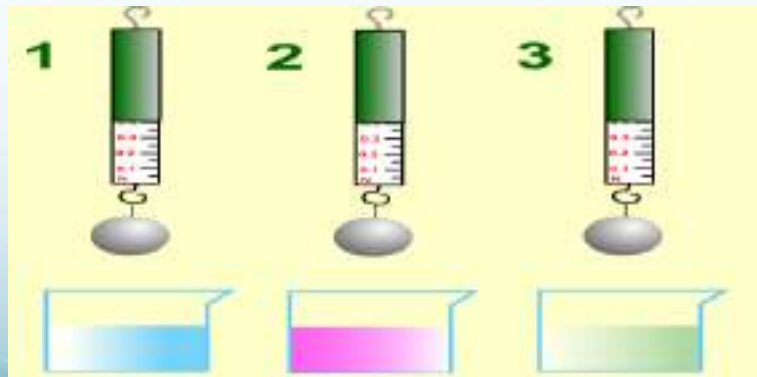
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## C. Experience

The three liquids having different densities.



Does it affect the liquid density value upthrust?



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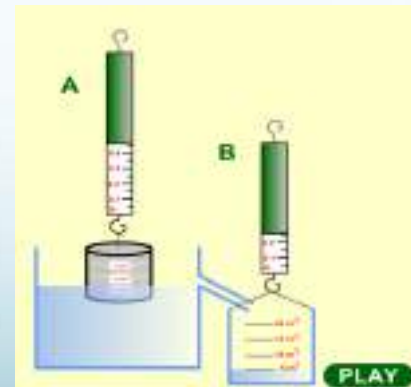
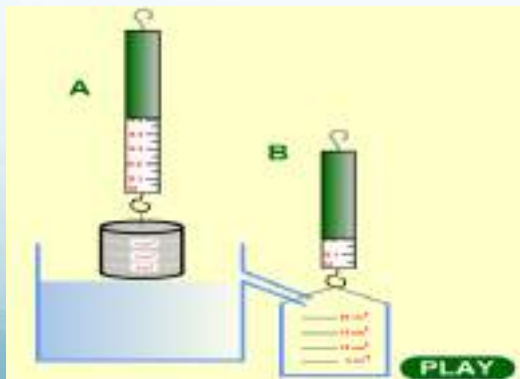
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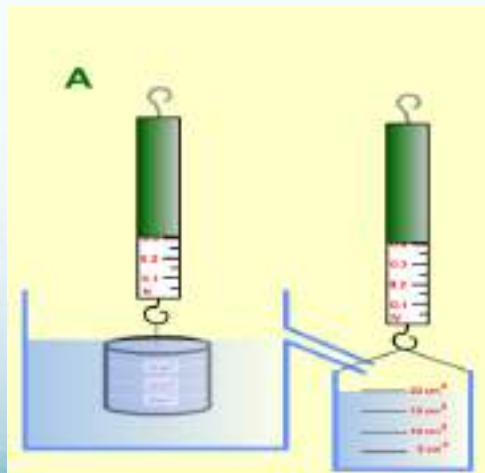
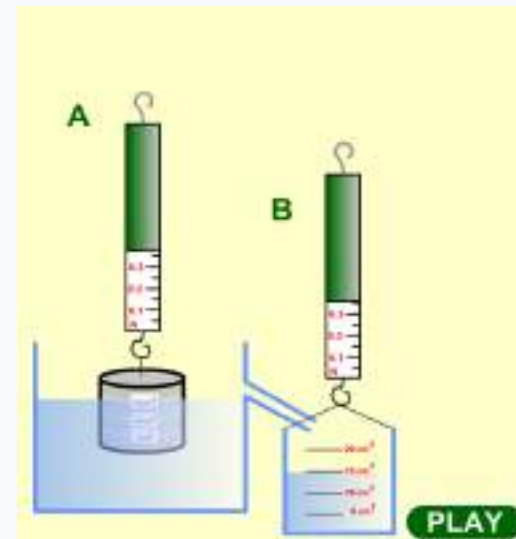
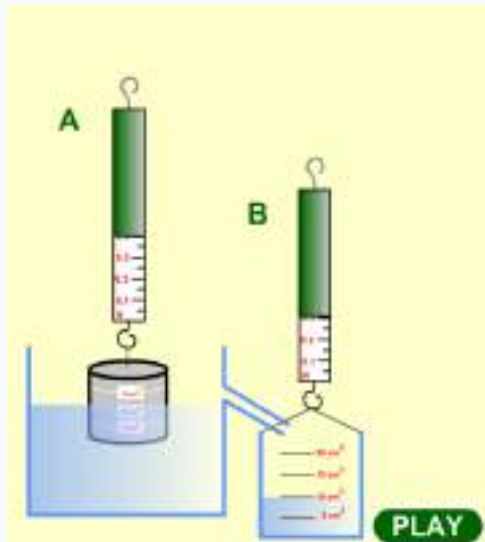
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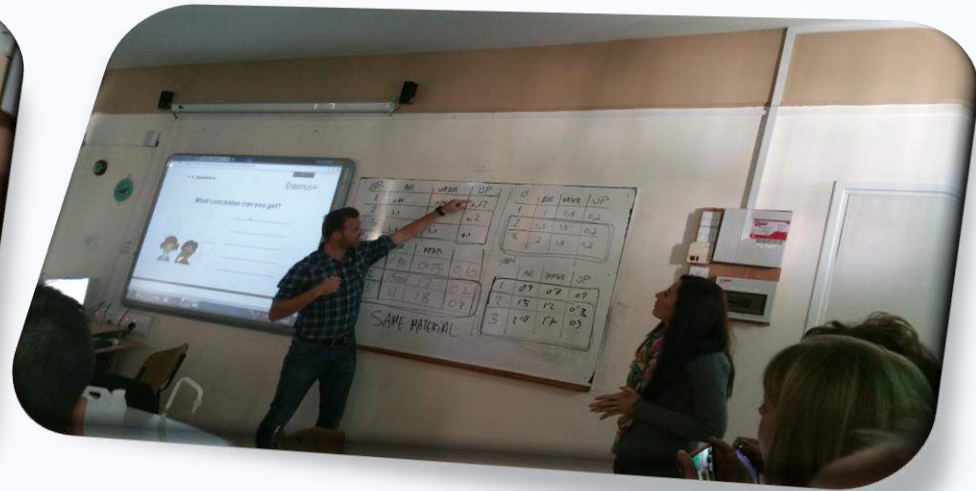
## D. Experience





Any fluid applies a buoyant force to an object that is partially or completely immersed in it; the magnitude of the buoyant force equals the weight of the fluid that the object displaces:

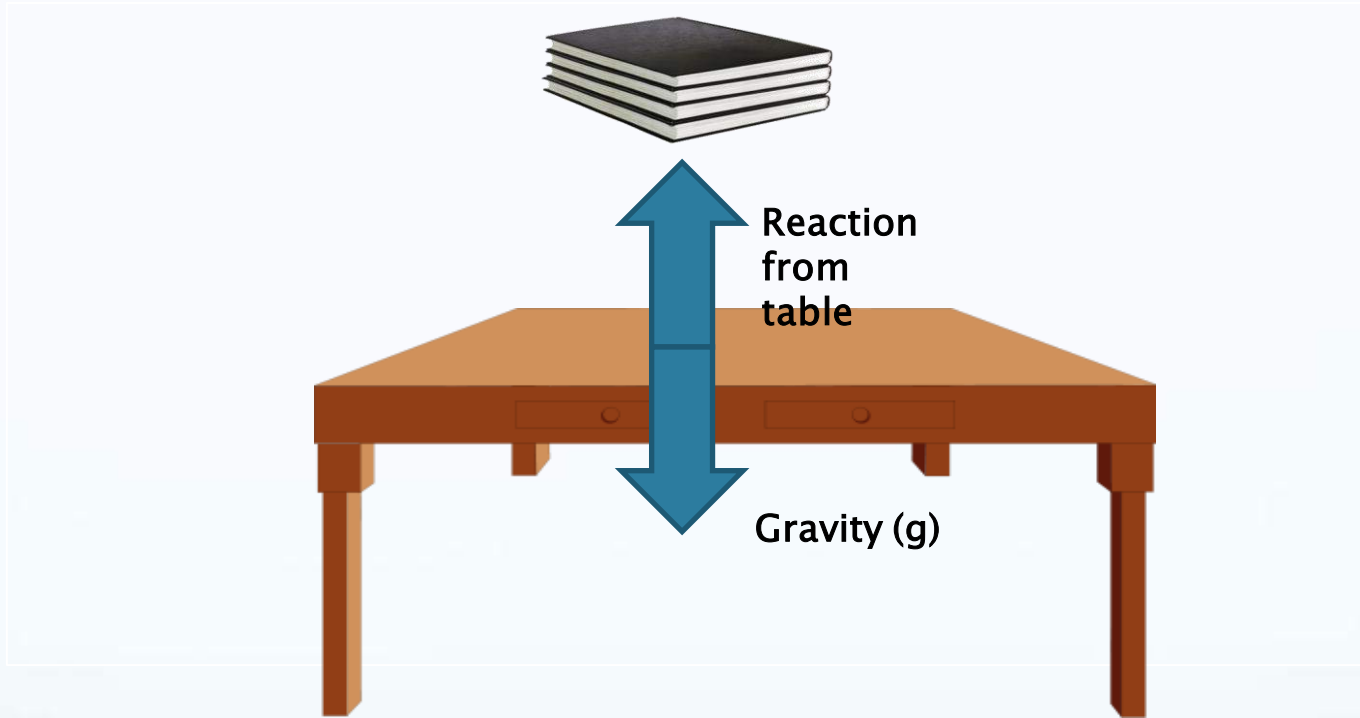
$$\underbrace{F_B}_{\text{Magnitude of buoyant force}} = \underbrace{W_{\text{fluid}}}_{\text{Weight of displaced fluid}}$$



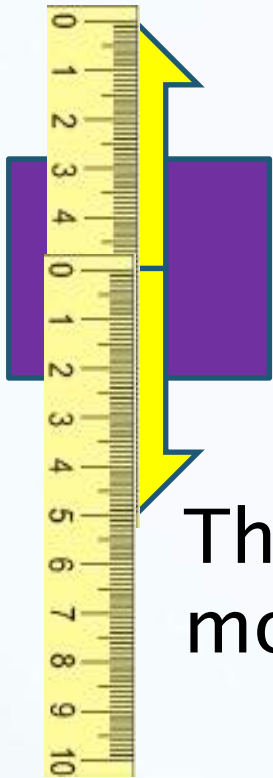
## *Third lesson – England*

- *Teaching Forces in Balance to Students With Learning Difficulties*
- *Woodfield Teaching School Alliance*

# Forces in balance

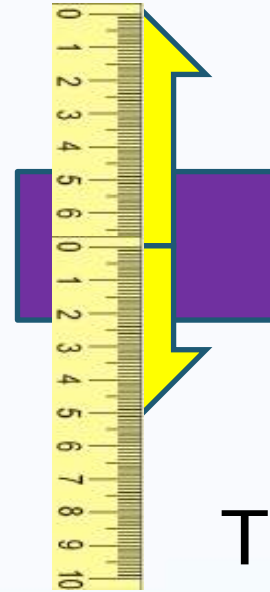






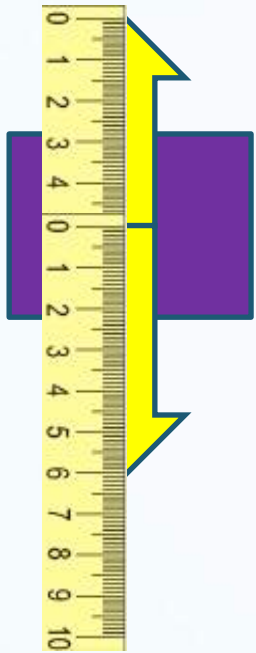
$$5 - 5 = 0$$

The box does not move

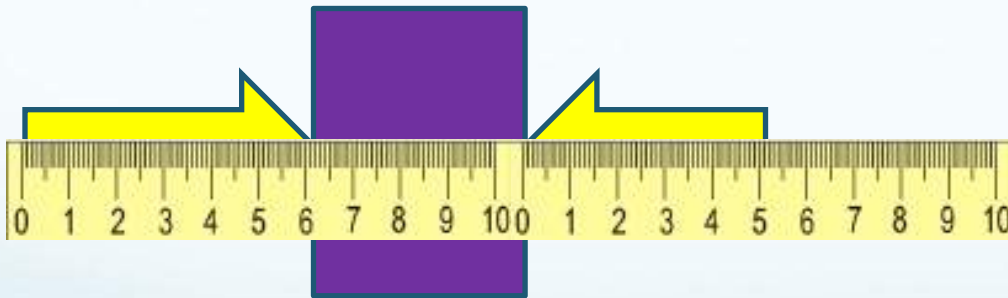


$$7 - 5 = 2$$

The box goes up ↑

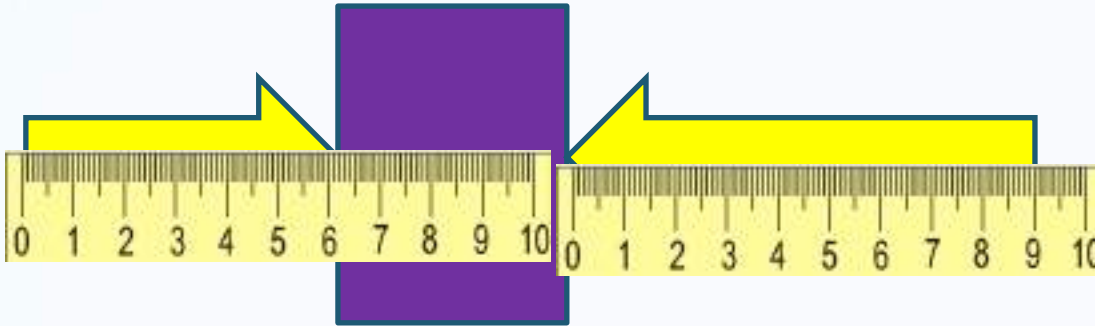


$5 - 6 = -1$  The box goes down ↓



$6 - 5 = 1$

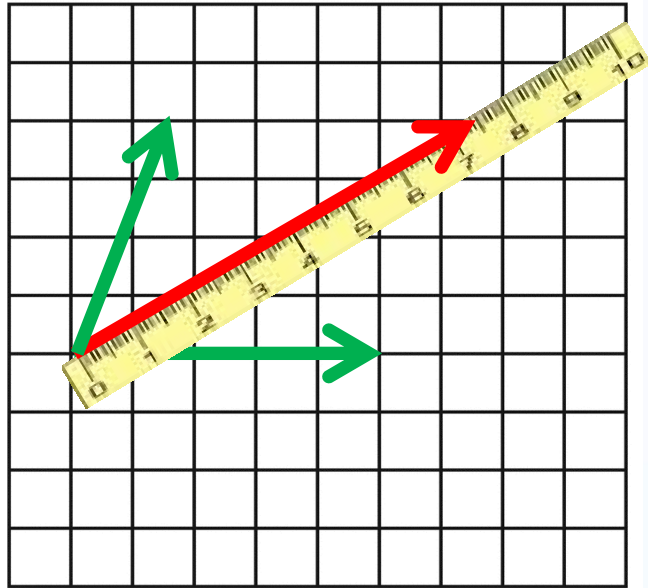
The box goes right →



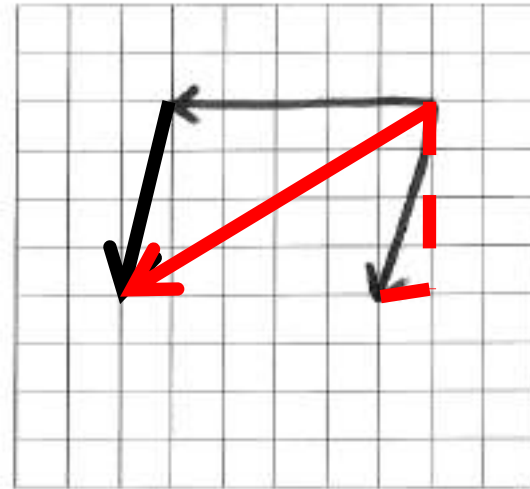
$$6 - 9 = -3$$

The box goes left ←

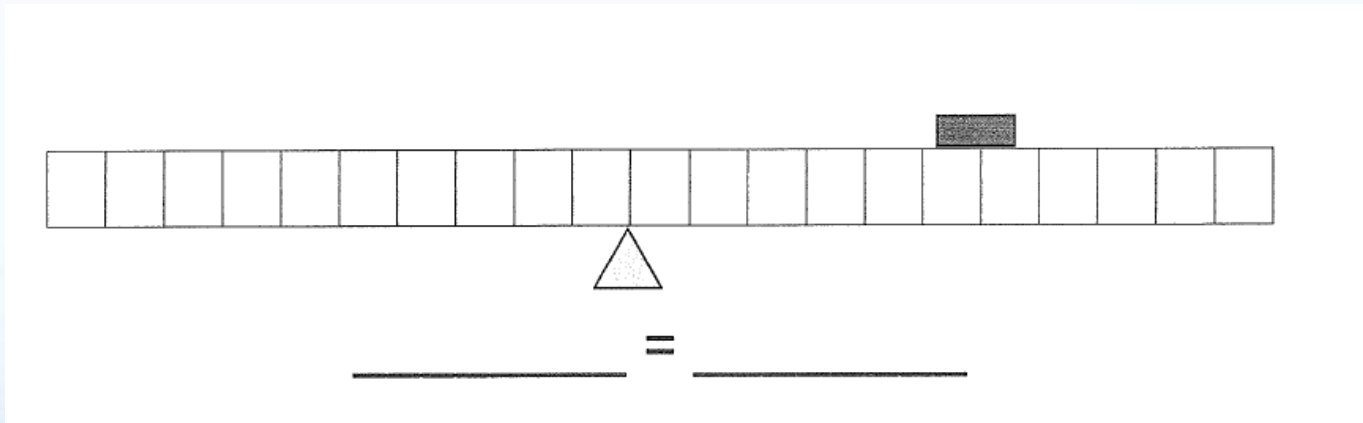
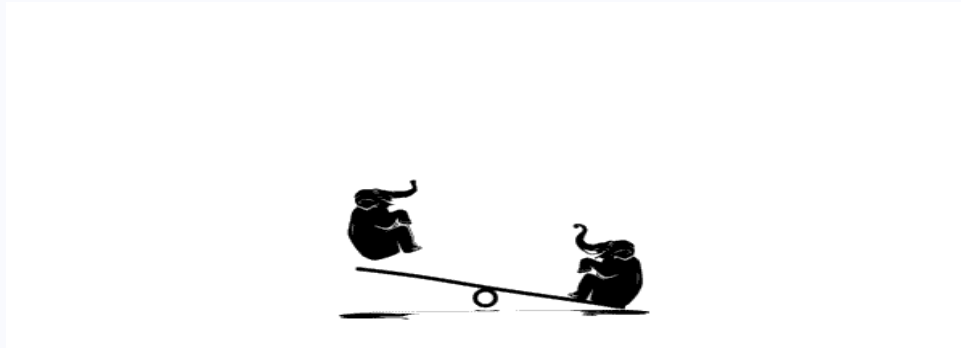
# Adding Forces

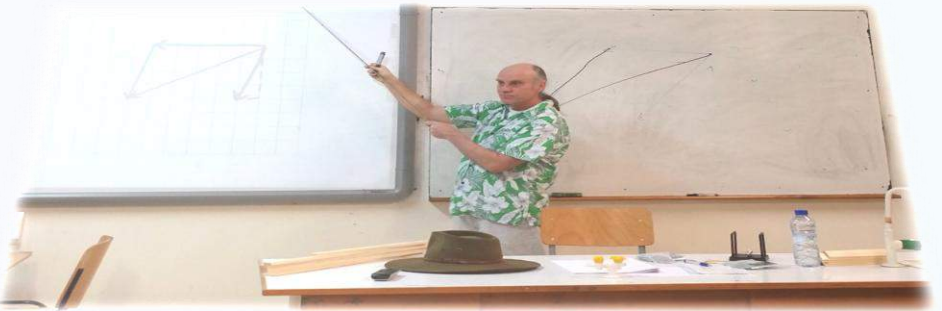


Draw the resultant force and measure the size of the force. Force is: \_\_\_\_\_



# Balancing Forces





## *Forth lesson – Greece*

- *Teaching how we design Forces to Students With Learning Difficulties*
- *3<sup>rd</sup> Gymnasio of Kilkis*

# How we design forces

## Basic rules

- Design ground (horizontal, vertical or incline)
- Design object
- Design forces at the center of the object

## The most basic forces

- Weight
- Normal reaction
- Friction
- Buoyancy

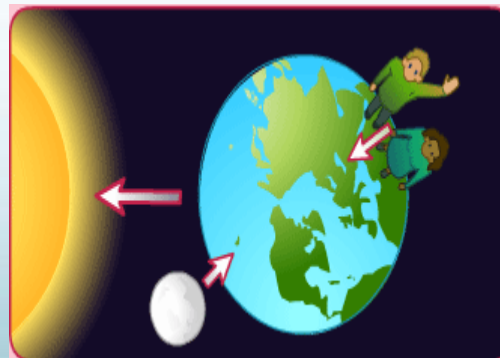


# Weight

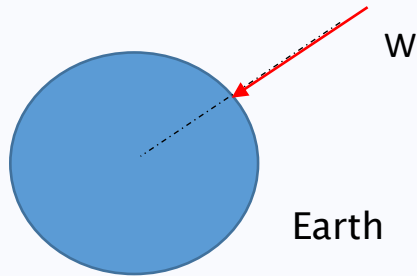
Remember Newton and the apple!



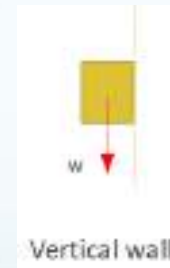
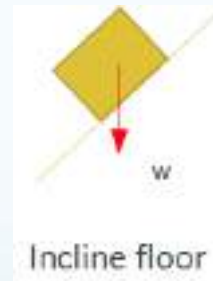
## Weight's direction



# To the center of the earth!



## Direction of weight's force

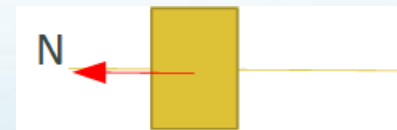
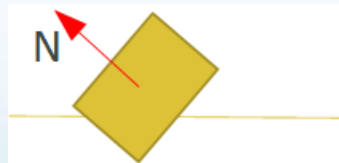
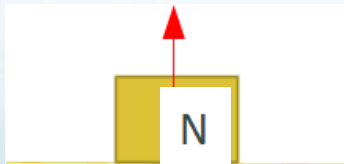


# Normal reaction

- The floor reacts when an object is on it.
- Normal reaction is always vertical to the floor.
- Symbol:  $N$  or  $F_N$



## Direction of normal reaction

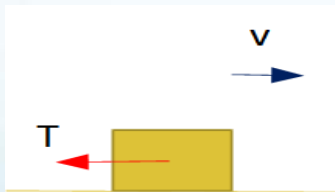


# Friction... a different force

- Friction can't move an object but it can stop a moving object!
- It's a force which resists to an object's moving.
- Symbol:  $T$



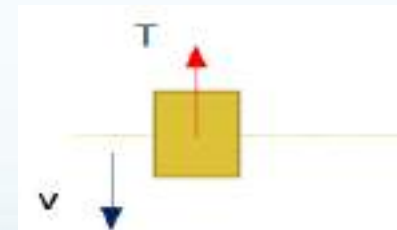
## Friction's direction



Moving to the right



Moving downwards



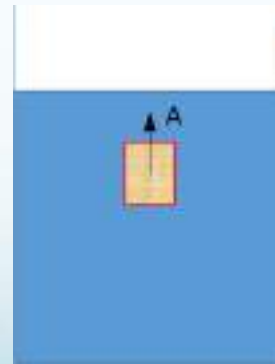
Moving downwards

# Buoyancy

- The force that makes us float to the sea.
- Symbol:  $A$

## Buoyancy's direction

Always upwards!



But... what happens when we want to design more than one force on an object?

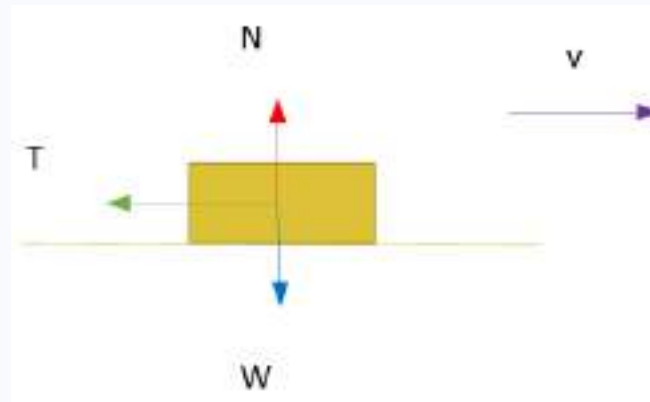


Well, it's really simple

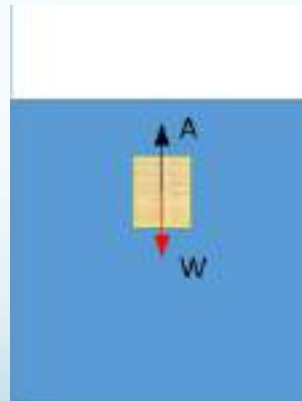
We follow separately the rules  
for each force!



For example...



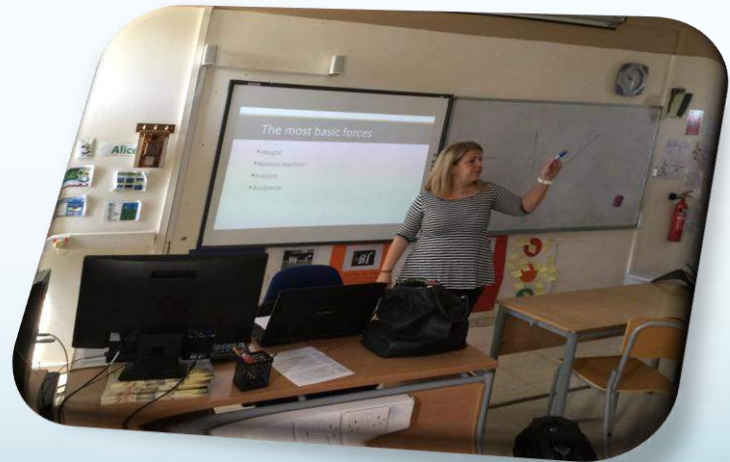
Or...



# Work in steps







# CONCLUSIONS

From the above lessons, we made the following conclusions regarding the curriculum of Physics for children with learning difficulties, and which we present below:

- ❖ 1. The course is more understandable when real experiments or simulations are made by the students, since they are involved and apply in practice what they have learned or will learn in the present future.
- ❖ 2. The examples should be given from everyday life, which students experience daily. This helps them to better understand the concepts they need to know.
- ❖ 3. The teaching should not be frontal but cooperative with the involvement of students in the 80% and in the 20% by the teacher.
- ❖ 4. The curriculum should be more simplified for these students and some not so necessary formulas which are tough not to be taught to them.

For example:



❖a) In the course of the Buoyancy, pupils easily found that when the Buoyancy is greater than the Weight ( $A > B$ ), the body is floating and when the Buoyancy is less than the Weight ( $A < B$ ), the body is immersed. They also understood that the Buoyancy depends on the density of the fluid and the volume of the body through the experiments that were made, but have failed to extract the type of Buoyancy  $A = d.g.V$ .

So this formula could be removed from the curriculum for these children, and to keep the first piece which again gives the whole concept of Buoyancy and the whole idea of how it affects our daily lives.

❖b) In the course of Tightening, the students had fun adding and removing masses in different distance on the stripe given to them. They also understood that if increasing the mass they should reduced the distance and the opposite, they also understood what must happen so that the rod balances but when asked to apply the formula, they found it difficult to implement equality and find the unknown. For example when they were given type  $P_1 = P_2$  and placed a body of a mass on one side and they were asked the question: “were should we place the other mass on the other side so that the rod is balanced”, all the students found it to act but only three of the eight managed to prove it with the formula.



So this formula could be removed from the curriculum for these children, and to keep the first piece which again gives the whole concept of Tightening and the whole idea of how it affects our daily lives.

❖c ) In the course of the Force composition , students easily exported the results of what happens when the Forces have the same or different direction, i.e.  $F_{ol} = F_1 + F_2$  and  $F_{ol} = F_1 - F_2$ , but failed to understand the composition of Forces with different direction and angle or to implement the Pythagorean Theorem.

So the formula of the Pythagorean Theorem could be removed from the curriculum for these children, as well as designing Forces with acute and obtuse angle and leave only the first piece which again gives the whole concept of Forces composition and the whole idea of how it affects our daily lives .

# *E.E.O.f.S.w.L.D*

*Erasmus+ KA2 Strategic Partnerships for school education  
Project: 2014-1-EL01-KA201-001322*

