

The Daily STEM

Student's favourite newspaper

November 2016

Monthly edition related to the eTwinning project "THE DAILY STEM"

<https://twinspace.etwinning.net/25110/home>

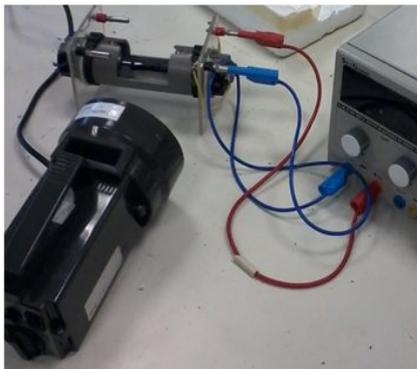
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Measurement of rotational speed

(Clarisse Yohann and Lanvin Jean Monnet School-France)

Our experiment consists of a stroboscope and a motor. The motor is turning at an unknown speed. We have adjusted the frequency of the flashes emitted by the stroboscope so that the motor seems standstill. In our experiment the stroboscope displayed 2243 flashes per minute. Thus the rotation speed of the motor is 2243 tr/min.



The first kidney transplant

(Mario Roncero Medina-6ºB CEIP Jose Maria de la Fuente - Spain)

The first kidney transplant was done by Dr.Murray in 1954,the kidney was from Ronald Herrick to his brother Richar who die 8 years later.The transplant was done in more of 5 hours,in the Hospital Brigham.The kidney usually is puted in a different place of the original,in the right lower quadrant.In 1990,Dr.Murray received the Novel of Medicine because of the kidney transplant.

Volcanic eruptions experiment

(Sabina, Lavinia, Simona, Cristian and Roxana - I.V.Liteanu High School, Romania)

Have you ever made a volcano experiment at school? Our Chemistry teacher presented an experiment about how we can make a volcano. We made it ourselves for you as it follows. Firstly, our teacher brought the Potassium Dichromate, the main ingredient of the volcano. One of the students made the experiment.



Our classmate put the Potassium Dichromate on an asbestos sieve and burnt the substance.



You can see the result: a volcano in laboratory!



https://youtu.be/ro2RB8_tOPQ

Mixing colours

(Amalia Tzortzi A' Class - Junior High School of Thermi - Greece)

The detergent dissolves the fat inside the milk and it is dragging the colours away.



Pottery making technology in ancient times - Mycenaean Greece

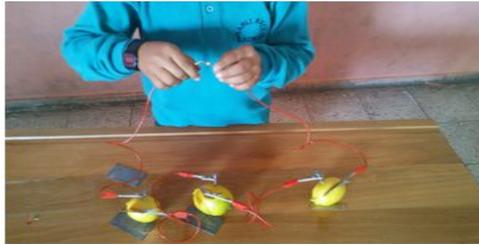
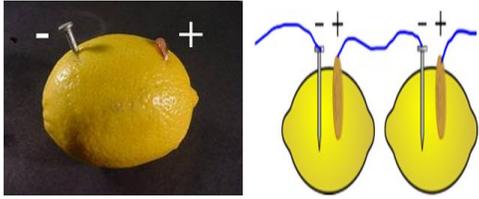
(Junior High School of Thermi - Greece)



During History lessons pupils made jewelry of ancient Mycenaean style. Pottery is a technique that began possibly around 30,000 BC. Even today we follow the same procedure. At a temperature of 1000C and higher, chemical reactions producing anhydrous silica oxide SiO₂ drive off more water and the clay becomes hard.

Burn led lamp with lemon

(Ali Murat ÇİVİ- Narlıkuyu İlkokul -Turkey)



Thought Questions

Does lemon generate electricity?

Materials:

Lemon, copper, zinc, led lamp, cable

Practice: An acidic solution consists of two different metals.

For these metals, the most suitable one in a lemon solution is copper and zinc.

The citric acid contained in the lemon provides the acidic solution needed for us. Zinc and copper in our experience.

I put copper on one side of the lemon and zinc on the other side.

We made a simple battery. Our fire and zinc electrodes.

Lemon juice is electrolyte. All batteries have positive (+) and negative (-) poles.

Here the (+) pole is copper, (-) polar pole. The electrons start to flow from the (-) pole to the (+) pole, which allows us to generate voltage.

If the number of lemons is too much, the led lamp gives a lot of light

Result: The pillars never produce energy.

Chemical events, the chemical energy they turn into electrical energy.

<https://www.youtube.com/watch?v=smo8ncgAmyA>

Why does the heart need electricity?

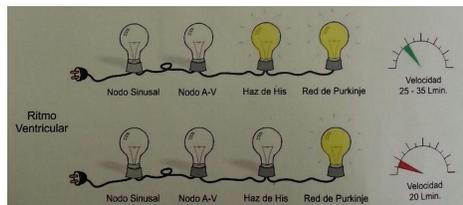
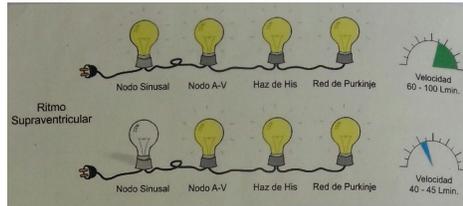
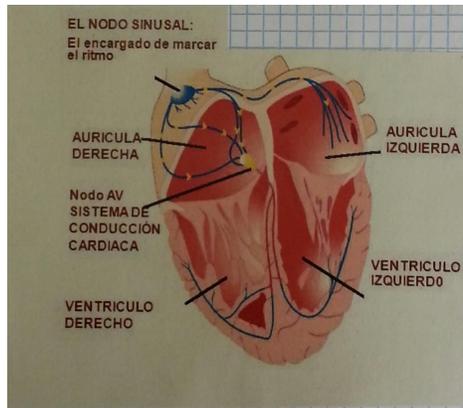
(Jorge De La Ossa 6ºA - CEIP Jose Maria de la Fuente - Spain)

Electricity is a kind of energy and the body is material made of atoms. These atoms have a core that is charged positively and others without charge. The human body produces also electricity.

The heart is a physical organ and it hasn't enough force to push the blood through the body. Electricity is constantly flowing, and that is the reason why heart contracts and expands blood through all the body.

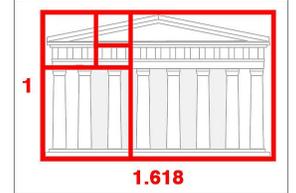
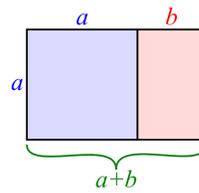
The heart has four chambers: right and left atriums and right and left ventricles. Normally, the heartbeat starts in the right atrium in a group of cells called sinoatrial node (S.A.). They send out an electrical signal (impulse) and travels through the heart and it contracts.

Regular, rhythmic electrical signals keep the heart pumping blood to the lungs and the body.



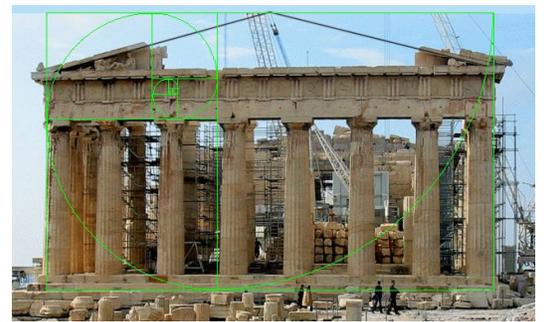
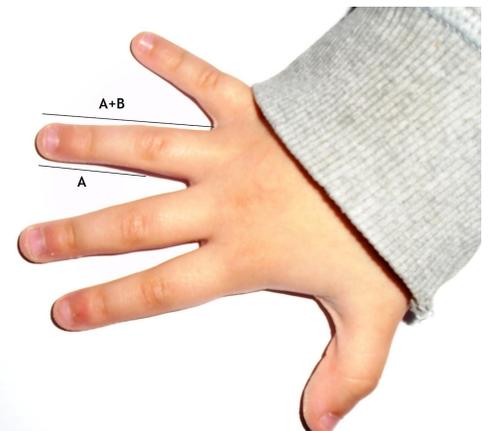
Phi, the Golden Ratio

(Junior High School of Thermi - Greece)



$$\phi = 1,618 = (a + b) / a$$

On tv screen the width of the display is 1.6 times its height. This ratio is close to the golden ratio which is approximately 1.618. Our fingers has the same ratio between phalanxes and Parthenon too.



Links

https://en.wikipedia.org/wiki/Golden_ratio

<http://www2.rgu.ac.uk/subj/ats/teachingweb/teaching/t26-DesignPrinciples/TheGoldenSection/TheGoldenSection.htm>

<http://www.goldennumber.net/parthenon-phi-golden-ratio/>

Our pulmonary circulation projects

(6th A and 6th B - CEIP Jose Maria de la Fuente - Spain)

During November we have been learning about the circulatory and excretory systems in Natural Science classes. We have created pulmonary circulation models using paper and red and blue yarn to differentiate the blood with high quantity of oxygen and the blood with high quantity of carbon dioxide. Here are some photos of our creations!



Ana Belén 6th A



Jacobo 6th B



Javier 6th A

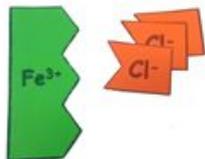


Celia 6th B

Ionic chemical formulas

(8th C - Tiago Metelo - Portugal)

The substances are represented by means of chemical formulas. The chemical formula of any ionic substance has a qualitative meaning, *i.e.* it indicates the ions that make up the substance, and a quantitative meaning: they indicate the proportion in which the ions bind to one another in the substance, so that the set is electrically neutral.

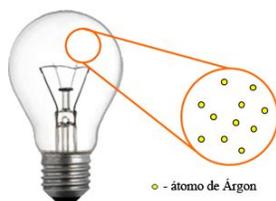


In our classes we used models like the one above to learn about chemical formulas of ionic substances. In this example, an iron (III) ion binds three chloride ions. The final formula is FeCl₃.

Elemental substances

(8th C - Miguel Pinheiro - Portugal)

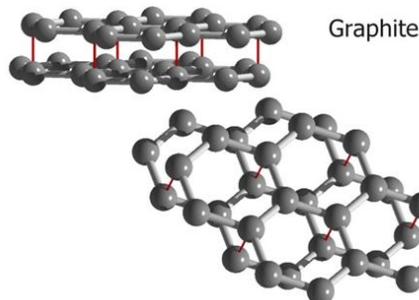
Elemental substances are substances whose structural units are constituted by a single type of atoms, that is, atoms of a single element. These can be formed by isolated atoms, molecules or atoms arranged in giant structures. Helium, neon, and argon are elemental substances made up of atoms.



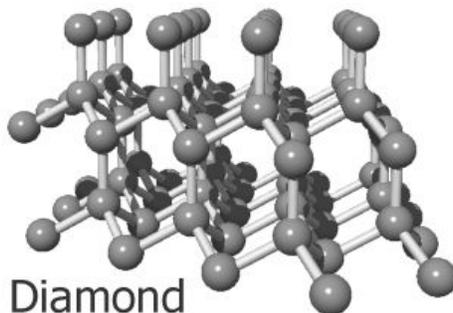
Some examples of elemental substances whose structural units are molecules are hydrogen, oxygen, ozone, chlorine and nitrogen.



Diamond and graphite are made up of carbon atoms that are arranged in giant structures of atoms. In graphite, the carbon atoms are in parallel layers thus forming hexagonal structures.



In diamond, each carbon atom is bound to four carbon atoms, thus forming tetrahedral structures.



Diamond

Gas pressure

(8th C - Francisco Inocêncio - Portugal)

Because gas particles have mobility, they hit the walls of their container frequently, exerting force. The greater the amount of gas, more particles hit the walls of the container, greater the pressure the gas exerts. Pressure exerted by a gas, expressed in *pascal* (Pa), and is calculated using the expression:

$$P = \frac{F}{A},$$

where *F* is the force exerted by the gas, in *newton* (N), and *A* is the surface area in square meters (m²). Gas pressure is measured with a manometer, invented in 1661 by the dutch physicist and astronomer Christiaan Huygens.



Example of a manometer used in our lab classes. This manometer is recording a pressure of 12,2 N/cm² or 122000 Pa (122 kPa).

Why do flies fly in circle?

(Junior High School of Thermi - Greece)

Probably when the flies are looking for a mate fly in circles to achieve their purpose.



Our first Robotic experience

(Junior High School of Thermi - Greece)



mBot is an all-in-one solution to enjoy the hands-on experience of programming, electronics, and robotics in classroom. Working with mBlock inspired by Scratch 2.0, connecting with computers or smart devices via Bluetooth or 2.4G (by different version), this easy-to-assemble mBot provides infinite possibilities for the kids to learn STEM (Science, Technology, Engineering, Mathematics).

Computer users may quickly learn programming through mBlock, a software based on Scratch 2.0 and could turn the block like codes into C language. mBot also supports APP Inventor, which allows children to control their mBot with their self-created Android APPs.

Mnemonic rule for the first 23 digits of pi $\pi = 3.14$

(Junior High School of Thermi - Greece)



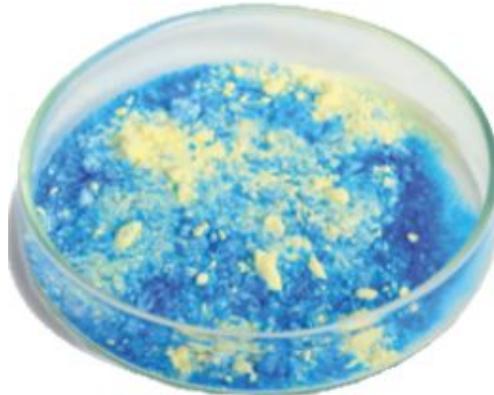
Being an irrational number, π cannot be expressed exactly as a fraction. But we can remember the first 23 digits following this rule. Each digit assigned to the number of letters of each greek word. “Αεί ο Θεός ο Μέγας γεωμετρεί, το κύκλου μήκος ίνα ορίση διαμέτρω, παρήγαγεν αριθμόν απέραντον, καί όν, φεύ, ουδέποτε όλον θνητοί θα εύρωσι”
 $\pi = 3,1415926535897932384626$
“God the great, always geometrizes to define the diameter of the circle’s length and made a number eternal and existing, alas no mortal will never be able to find it as a whole.”

<https://en.wikipedia.org/wiki/Pi>

What are mixtures

(8th C - Ana Beatriz - Portugal)

A mixture can be defined as a material made of two or more pure substances. Mixtures have variable composition. Two types of mixtures can be found: Heterogeneous mixtures - In these mixtures the components can be observed. Take as an example a mixture of copper sulphate and sulfur. Another example is a water and oil mixture.



Homogeneous mixtures - Also known as solutions, are mixtures where the components are not observable. By dissolving copper chloride in water you obtain a homogeneous solution.



The mysterious oil bubble

(6th class B - Istituto Giovanni XXIII -Italy)

You’ve certainly noticed that if you pour some oil in the water, the two liquids do not mix together. Actually oil floats on water.

What happens if you use alcohol instead of water?

Pour some alcohol into a narrow glass and fill about half of it. Add two teaspoons of oil: as you can see, oil settles on the bottom of the glass without mixing with alcohol.



Do you think the experiment is over? It isn’t. The best is yet to come!

Now add slowly some water. What happens? Magically a mysterious oil bubble appears and it is suspended in the water-alcohol mixture.



But is the force of gravity no longer there? Of course not!

There is another explanation: oil is thicker than alcohol but less thick than water.

Thanks to this experiment we can understand that there are “friends molecules” which get along (such as water and alcohol) and “enemy molecules” that do not want links between them –they do not mix at all– (water-oil and alcohol- oil).

The alcohol climbing in the straw

(6th class A - Istituto Giovanni XXIII -Italy)

Do you know that alcohol has the power to climb? We are going to prove it with the following experiment.



Take two straws, plasticine, a bowl, alcohol, colored water, hot water, two bottles with two straws inserted into the perforated cap and, using plasticine, around the hole, create a volcano from which lava definitely will not come out!



Pour some hot water into the bowl and, unless you want to burn your fingers, do not touch the water! Dip in the water the two bottles, one with alcohol and the other with colored water and ... let's start!



The alcohol quickly leaves, gets much higher and wins. They could attend the climbing Olympics! Alcohol wins because its expansion coefficient is 5 times greater than water and for this reason it runs faster and gets higher.

All science: second edition

(6th class C - Istituto Giovanni XXIII -Italy)

The scientists of 1th C have discovered that the rise in temperature increases the volume of gases and of all substances. On the contrary the decreasing in temperature makes it decrease the volume. Water is an exception, in fact between 0 °C and 4 °C the volume increases instead of decreasing (the volume of the ice increases). Do you want to find it out with us? Try it yourself too.



Take two bowls, one with hot water and the other with cold water, dip two bottles with balloons inserted on the neck in place of the caps. The balloon inserted on the bottle immersed in hot water, will inflate by magic while the other won't. But what happened?



Let's explain it to you. The air in the bottle immersed in hot water gets heat and expands. This inflates the balloon.

Non-newtonian fluid

(Janire Uriarte, Mikel Ortega, Izaro Orbe and Jia Hui Xu - Larramendi Ikastola - Basque Country)

We mix two cups of cornflour and one cup of water in a baking mould. We try to make an homogeneous mixture. After that, we observe the properties of the fluid.

Is it a liquid? Is it a solid? It's both!

Liquids properties: it has a constant viscosity or flow.



Solids properties: you punch severely the fluid and the fluid stay rigid.



It is based on the kinetic molecular theory of matter. It is a state of matter between the solid state and the liquid one.

[Here you have a video about this](#)

Compressed air pressure

(Oleksandr Shevchenko, teacher Pavlo Laskuryk, Dolynska Gymnazium #3 - Ukraine)

“It’s a well known experiment, but when you make it successfully it makes you excited.”

1. We cut out 7 rings of newspaper of the same size, put them together and dip into the water.
2. We light the floating candle on the water
3. We take out the paper ring and put on a glass edge, then we take another glass and cover



the first glass with it closely until the edges match.

4. After candle fizzes because all of the oxygen is burnt

5. The glass is difficult to snap off, because it compresses the pressure which is bigger than the pressure in glasses.



Liquids with different densities

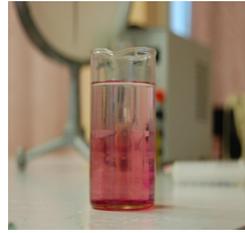
(Mykola Zhdaniuk, teacher Pavlo Laskuryk, Dolynska Gymnazium #3 - Ukraine)

We made a very interesting experiment recently!!!

1. Pour the salt water in the flask, add a little manganese ore, in order to distinguish fresh from salt water.
2. Draw fresh distilled



water into the syringe. 3. Gently squeezing the contents of the syringe on the walls of the flask with salt water, not to tear the film 4. Shortly the film is formed, which is clearly visible. 5. Put a flask of liquid on a heater, after a while, manganese ore begins to rise, but it only rises up to the film and then reflects and goes to the bottom. The most interesting was when the salt water got hot and the fresh water was still cold.



Make a cloth hanger balance

(A3 Class – 1st Junior secondary School of Xanthi - Greece)

The most common method to measure mass is to use a balance. A balance uses a known mass to measure the unknown mass.

You can make a quick and easy balance using a clothes hanger, yarn or string, two identical paper or plastic cups and your imagination.

Measure equal lengths of yarn about 30cm long. Loop one end of the yarn through a hole and tie it securely with a double knot. Repeat with all holes in the cup and tie the yarn together at the top.



If you look at the photos, all these components are not strictly required. You can mix and match with what you have in your junk box. The important thing is that you get the basic principle right.



Now you are ready to compare an unknown mass to some known.

When the masses on each side are equal, the hanger will be flat. In other words, balanced.



Fireproof paper

(B3 & B4 Class – 1st Junior secondary School of Xanthi - Greece)

In a beaker, prepare a mixture of water and alcohol, in ratio 1:1. Take a paper napkin and dip it into the liquid.



Make sure that it is completely soaked in the mixture. Remove the paper napkin using tongs or tweezers. Allow excess liquid to drain.



Ignite the paper napkin with a lighter. You should carry out this experiment in a dark room. What happens? Despite the flame the paper does not burn.



Paper burns when held in a flame. When wet (with water) paper will not burn. When wet with a mixture of about 50% alcohol and water, the alcohol will burn, but there is sufficient water so that the paper will not burn.

The secret, of course, is the addition of water to the mixture. Water has a high heat capacity and heat generated by the reaction goes to heating water. Thus the energy is not enough to ignite the paper.

Do you want to have your own crystal?

(Dima Alifonov, teacher Larysa Doroshenko, Dolynska Gymnazium #3 - Ukraine)

“We thought it is very difficult and impossible, but it turned out to be easy and interesting!”

Follow these steps and you'll make your own crystal:

1. Boil 2 liters of water
2. When water is boiling over low heat put the first cup of sugar
3. Stir it to the complete solution of sugar in the water
4. Do this 2 or more times (points 2 and 3).
5. Let the solution simmer (2-3 min.)
6. Pour solution in the test-tube and give a little cool down
7. Select the largest sugar crystal and tie the thread (as best as possible)
8. Tie the thread on a toothpick
9. Drop the crystal on a thread in the solution of sugar and water
10. Wait from two weeks up to two months (the more we wait the larger Crystal will grow).

