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SUSTAINABILITY · SCIENCE · TECHNOLOGY · ENGINEERING · MATHEMATICS

Bianual journal with a sustainability, sciences, technology, engineering and math productions focus from the community of Rochester School in Chía, Cundinamarca, Colombia

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EDITORIAL

After one year with no face-to-face classes, due to the Covid-19 pandemic, the community experienced the importance of using or even developing skills to overcome the need to be effective students, teachers, "housewives", and harmonic members of a family. At Rochester School, we seek to teach students to use and enhance their skills to be used in real world situations, just like we did during the pandemic. Rochester's teachers are always refining their curriculums towards competencies.

According to what Ananiadou & Claro (2009) wrote in the paper 21st Century Skills and Competences for New Millennium Learners in OECD Countries, "a competence is more than just knowledge or skills. It involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competence that may draw on an individual's knowledge of language, practical IT skills and attitudes towards those with whom he or she is communicating". p.8.

Classes like Natural Science, Computer Science and Mathematics are designed to help students put into practice skills such as the analysis of variables and graphics and using detail protocols and methodologies to be able to prove their hypothesis. Students develop these skills through designing and assembling models to simulate situations or applying concepts, laws or principles in real life. In this edition of RocheSTEM, you will be able to see some examples of how students use models to show their learning in different areas systemically.

Enjoy!

María del Pilar Tunarroza Sierra
Natural and Environmental Science Director

Ananiadou, K. and M. Claro (2009), "21st Century Skills and Competences for New Millennium Learners in OECD Countries", OECD Education Working Papers, No. 41, OECD Publishing, Paris, https://-doi.org/10.1787/218525261154.

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THE GEARBOX EXPERIMENT

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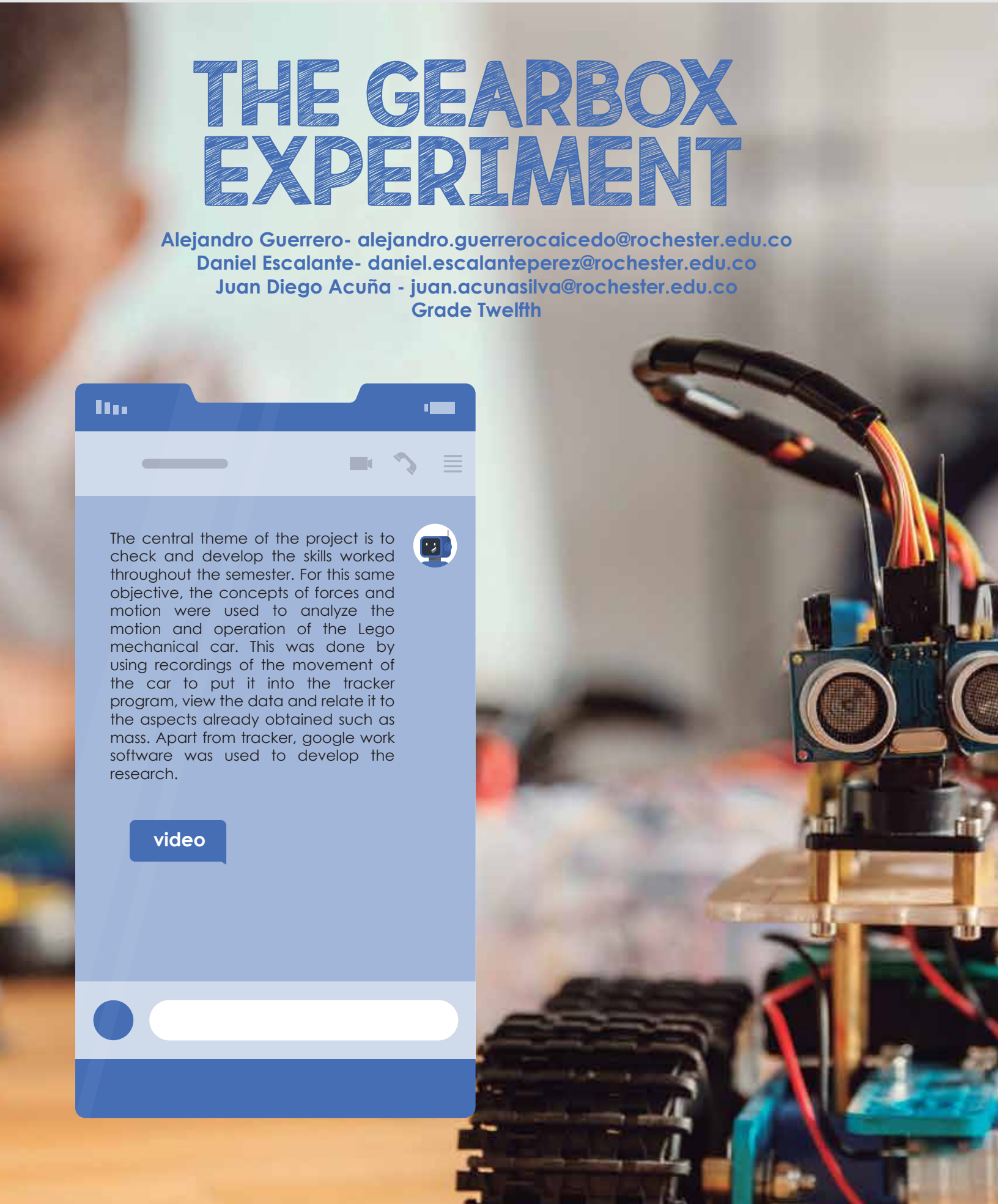
Grade Twelfth



The central theme of the project is to check and develop the skills worked throughout the semester. For this same objective, the concepts of forces and motion were used to analyze the motion and operation of the Lego mechanical car. This was done by using recordings of the movement of the car to put it into the tracker program, view the data and relate it to the aspects already obtained such as mass. Apart from tracker, google work software was used to develop the research.

video

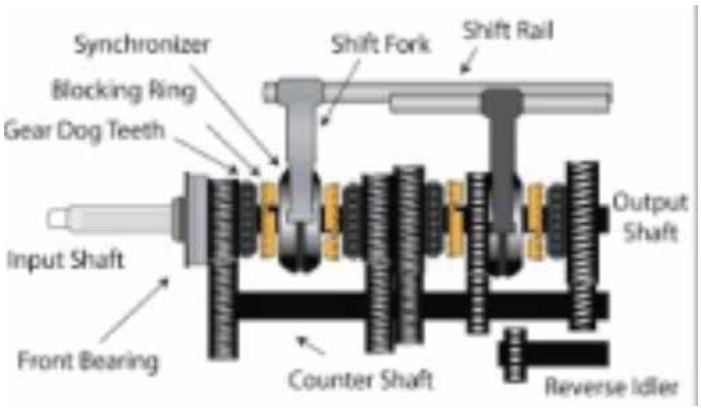
1. INTRODUCTION

The objective of this laboratory is to find out how a mechanical gearbox works and how is this related to kinematics and dynamics. The hypothesis is that it will be possible to find data on the applied forces of the gears and how they affect the position, velocity and acceleration of the car. Also, when increasing the gear, the force will be reduced and the velocity increased. This project is being done for rehearsing and proving the knowledge of physics. This project is being developed through the use of a lego mechanical car developed by Alejandro Guerrero. The process will be to take data with a tracker on the movement and make an analysis on multiple factors such as forces.

2. BACKGROUND

Historically, transmission and gearboxes are a very recent invention that has revolutionized the way humans use transportation. Some of the first significant advancements in gearbox history was the use of three-speed manual transmission in 1891. After that, the first car to use manual transmission with synchromesh was the 1929 Cadillac. In 1947, Porsche patented the split ring synchromesh system, which went on to become the most common design for passenger cars. Six-speed manual transmissions started to emerge in high-performance vehicles in the early 1990s and are the most used nowadays.

Before discussing the gearbox let's talk a little about the gearbox itself and its components. The first important element is the Counter Shaft, which connects with the clutch shaft directly and contains the gear which connects it to the clutch shaft as well as the main shaft. The main shaft is the shaft which runs at the vehicle speed. It carries power from the counter shaft by using gears and according to the gear ratio, it runs at different speeds. the gears are the most important part, they transmit the power from one shaft to another. They are the most useful components of the transmission box because the variation in torque of the counter shaft and main shaft depends on the gear ratio. The gear ratio is the ratio of the driven gear teeth to the driving gear teeth. Last but not least are the bearings, they support the revolving part and reduce the friction. In the gearbox both the counter and main shafts are supported by the bearing.



In this lab, 2 particular concepts were used, motion in one dimension and forces. [8] Motion in one direction means movement in a straight line in a particular direction, it involves three main aspects. Position, velocity and acceleration. The position is the plays of the object related to the initial point. (Eq.1) Velocity is the change of position through time. (Eq. 2) It has 2 values, the average velocity which is the displacement over time. Also, the instant velocity which is the change of position through time at a specific point. (Eq.3) The speed is similar to velocity; it is a magnitude without direction and is found from the division of total distance moved over time. (Eq.5) "Acceleration is the rate of

change of velocity with respect to time." (Eq.5) Acceleration also has instantaneous and average accelerations. Average acceleration is the change in velocity through time in an interval. Instantaneous acceleration is the rate of change of velocity in an instant. (Deutsch, 1997) (Eq. 7) Forces are a push or pull which affect an object. [Eq.8] There are different types of forces such are gravitational forces (10), normal forces and frictional forces (12). (2020) [9] There are 3 laws for forces called "Newton's Laws". The first law of inertia which states that any object on a uniform state of motion will stay the same unless acted upon it. The second law is that the force is the mass multiplied by the acceleration. (Eq.6) It also states that the net force is the addition of all forces. The third law states that every action has a reaction equal and opposite. (Smith, 2010)

Equations:

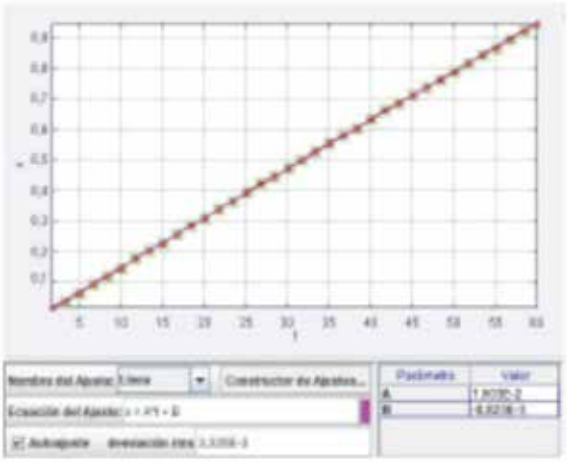
1. Position as a function of time: $x(t) = x_i + v_i + \frac{1}{2} \cdot a \cdot t^2$; where x is measured in [m] and t in [s].
2. Velocity as a function of time: $v(t) = v_i + a \cdot t$; where time (t) is measured in [s], v_0 is the initial velocity measured in $[m/s]$
3. Instant velocity: $v = \frac{dr}{dt}$, $[m/s]$
4. Speed: $s = \frac{distance}{time}$; $[m/s]$
5. Acceleration:$[m/s^2]$
   1. Average: $a_{av} = \frac{\Delta v}{\Delta t}$
   2. Instantaneous: $a = \frac{dv}{dt}$
6. Force: $F = m \cdot a$; [N]
7. Weight ; $w = m \cdot g$
8. Gravitational force: $\vec{F}_G = \frac{G \cdot m_1 \cdot m_2}{r^2} \hat{r}$, where G is the gravitational constant, m_1 and m_2 are masses [kg], r is the distance between the masses,g; $[m/s^2]$
9. Frictional force: $F_f = f_n \cdot \mu$; [N], where μ is the coefficient of friction, f_n is the normal force.
10. Kinetic energy: $E_k = \frac{1}{2} \cdot m \cdot v^2$

3. PROCEDURE

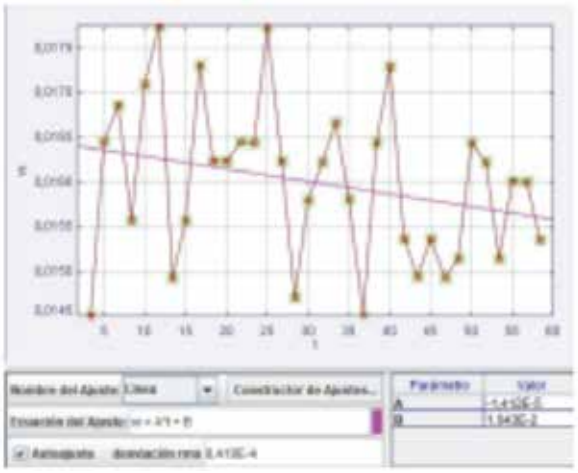
Materials:
- Masking tape
- Lego Manual Car
- Camera
- Tracker
- Google Softwares
- Scale

The montage for this project was to place a meter long track with a beginning and ending marked by the masking tape. The car is turned on and it is recorded during its movement. The video is uploaded to a tracker and analyzed. From the tracker we get different data as position, velocity and acceleration. With the scale we know the mass of the object and calculate forces. This procedure will be repeated with different frictions.

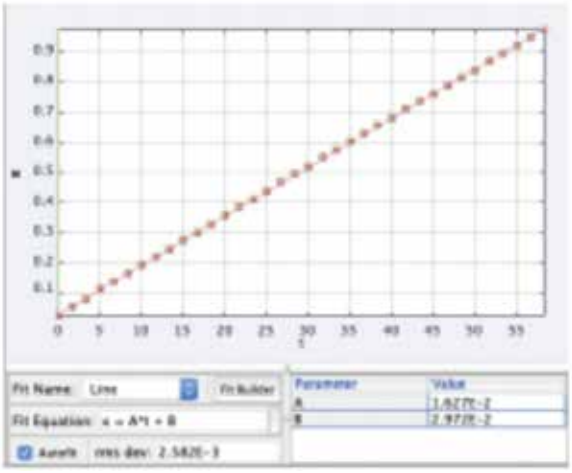
4.DATA



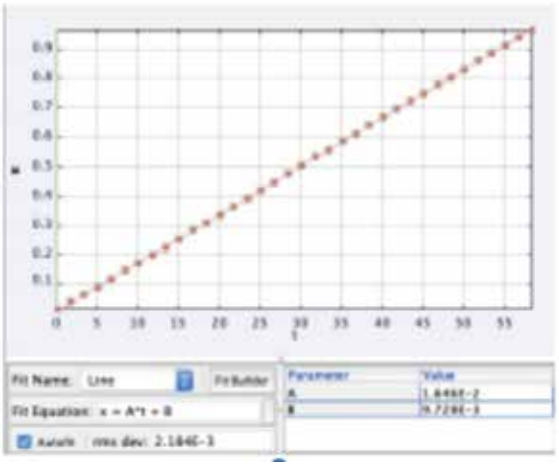
Graph 1. Position vs. time gear 1 video 1



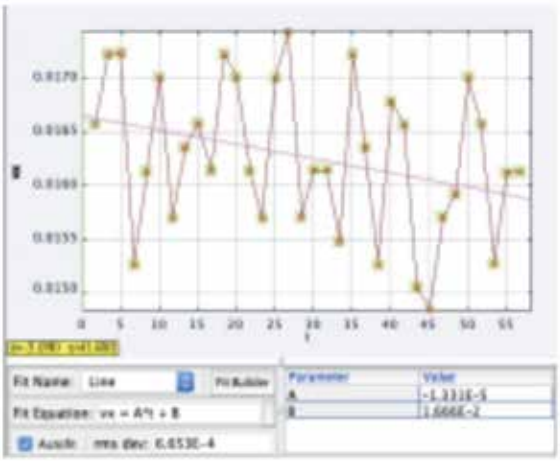
Graph 2. Velocity vs. time gear 1 video 1



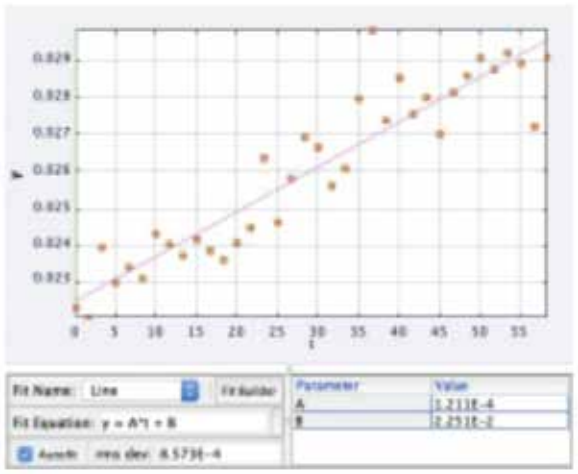
Graph 5. Position vs. time gear 1 video 3



Graph 3. Position vs. time gear 1 video 2

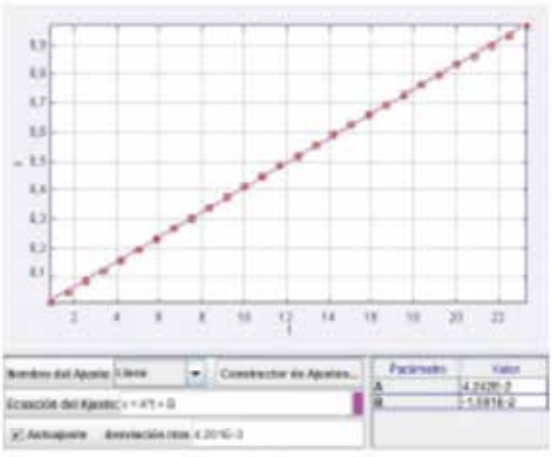


Graph 6. Velocity vs. time gear 1 video 3

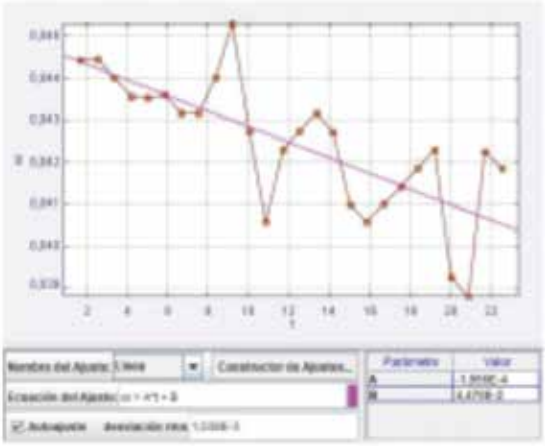


Graph 4. Velocity vs. time gear 1 video 2

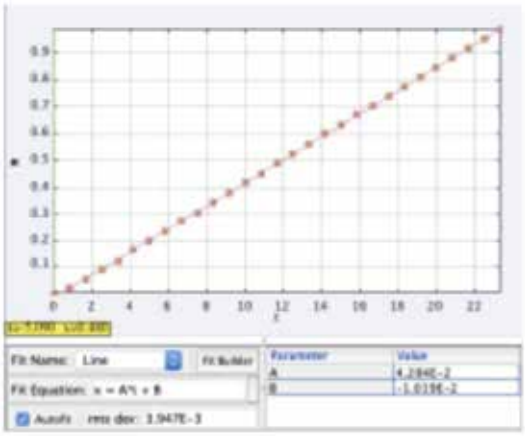
CAMBIO 2



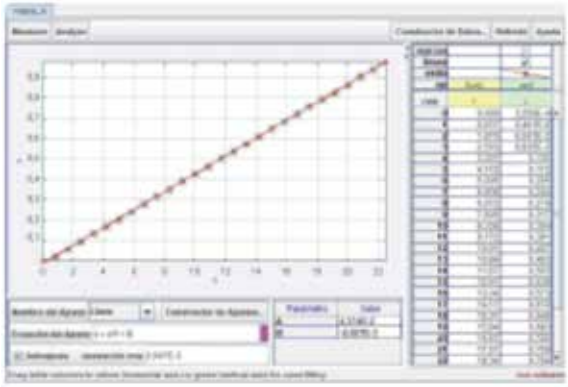
Graph 7. Position vs. time gear 2 video 1



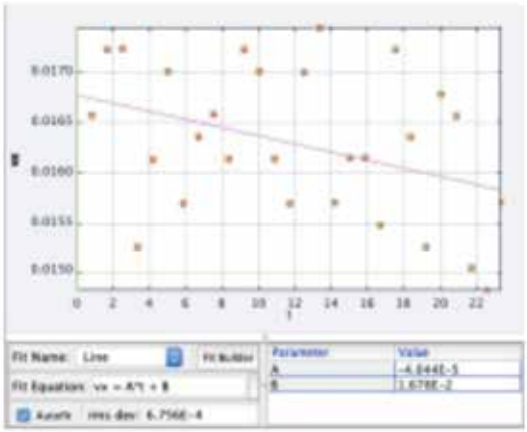
Graph 8. Velocity vs. time gear 2 video 1



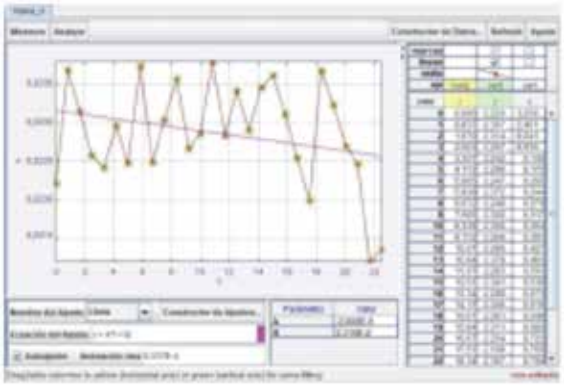
Graph 11. Position vs. time gear 2 video 3



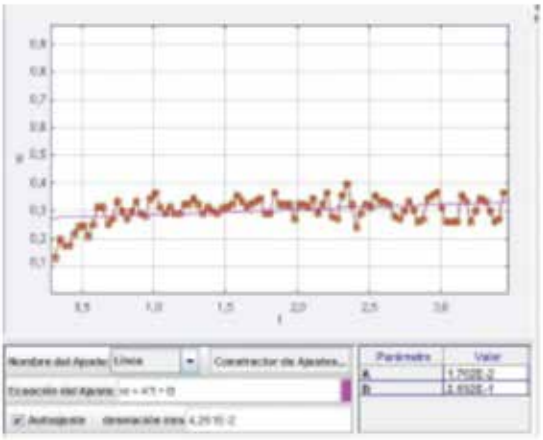
Graph 9. Position vs. time gear 2 video 2



Graph 12. Velocity vs. time gear 2 video 3



Graph 10. Velocity vs. time gear 2 video 2



Graph 14. Velocity vs. time gear 3 video 1

5. ANALYSIS

From the data taken from the videos factors such as velocity, kinetic energy and the friction forces can be analyzed. First of all the average velocities need to be found per gear of the car.

Gear 1:
0.015 m/s + 0.016 m/s +0.016 m/s = 0.47 / 0.47 ÷ 3 = 0.0157 m/s = Average

Gear 2:
0.045 m/s + 0.043 m/s +0.043 m/s = 0.131 / 0.131 ÷ 3 = 0.0437 m/s

Gear 3:
0.27 m/s + 0.27 m/s = 0.54
0.54 ÷ 2 = 0.27 m/s

As it can be seen, the second trial's value of velocity for the third trial was not taken into account due to a possible error in data collection. This error may have rooted on the scaling of the simulation. An interesting observation that can be made from this average is that when the gear is higher, the velocity will increase. But when the gear is lower, the motor exerts more force in the car thanks to the use of more gears filtrating the movement of the motor, which as already said, reduces the velocity. This last observation is supported by the behavior in the videos. In the videos, it was observed that it took more to the last two gears to reach their constant velocity due to the lack of force at the instant of turning on the motor.

Another point of analysis is energy. The car is first having electrical energy which then is transformed into kinetic energy. We can analyze the kinetic energies of the car in the different gears with the Eq. 10:

Gear 1:
$$E_k = 9.24 \times 10^{-5} \quad [J]$$
Gear 2:
$$E_k = 7.16 \times 10^{-4} \quad [J]$$
Gear 3:
$$E_k = 2.7 \times 10^{-2} \quad [J]$$

As it can be seen, the same previous observation of velocity is applied with energies. When increasing the gear, the energy increases. This is because the equation remains constant for all the gears except for the velocity.

We can make an observation on work made by the motor. If the work is the change of kinetic energy. And the initial velocity and kinetic energy is 0. Then the kinetic energies are also the work.

To relate the project to another type of force we have to talk about the friction force. To find that relation we have to analyze how the force of friction affects each of the three gears. Friction greatly affects movement because the force of friction opposes the motion of an object, causing moving objects to lose energy and slow down. When objects move through a fluid, such as air or water, the fluid exerts a frictional force on the moving object. The frictional force from a fluid is called a drag force. But for this specific example we are not talking about liquids and we also take into account that friction, when we are talking about wheels, actually speeds up the movement. the only real friction you have to work against is between the four wheels and their axles. As you push a cart, the relatively smooth inside surfaces of the wheels rotate and slide around the relatively smooth outsides of the axles (which in this case relate to the gears). The important word here is smooth; the key to how wheels reduce friction is that they can slide more smoothly round their axles than an object can slide across rough ground. If the ground were always as smooth as ice, we wouldn't really need wheels and axles at all. With or without bearings, there's much less friction compared to pushing the box straight along the ground—and that's why the cart makes loads easier to move. Taking all of this into account it is also important that we discuss the main equation of friction Eq.9

In which μ is the coefficient of friction, and mass multiplied by gravity equals the normal force. Based on this, we can know that if the surface has higher friction then the wheels will have more grip and cause the movement to be faster than a lower coefficient of friction.Needless to say, as seen in Graph 14 and Graph 18, there is some sort of acceleration in the first instants of the movement. By doing quadratic regression on both graphs it was obtained that Graph 14 has an acceleration of 0.028m/s2 while Graph 18 has an acceleration of 2

0.017m/s in the first instants. This means that the device was not exerting enough force for it to move at a constant velocity. The gear relationship was 1:1 meaning that the rotation was linear, with no diversions. This caused that the front wheels would not have enough force to instantly move the device at a constant velocity resulting in an acceleration in a small period of time until arriving to constant speed.

6. CONCLUSIONS

- It can be concluded that as seen in the comparison of the velocities. When increasing the gear the velocity increases but the force applied by the motor decreases. That is why in Graphs 14 and 18 it can be seen that the car takes more time to reach the constant velocity. The same relationship of gears and velocity occurs with gears, energies and work. When the gear increases, the energies and work increase because their behavior depends on the velocity. This can be seen in the development of the equation (Eq.10). This conclusion supports part of our hypothesis because it was manifested that when increasing the gear velocity will increase and force will be reduced.

- Part of the hypothesis was wrong because with the data taken it was not possible to find the applied forces of the gears because we had a constant speed. This means that we couldn't find the force of the specific gears. It was possible to find the force but in a short span of time.

- As said before an aspect that is important to be taken into account is the fact that a surface with more friction would help the grip of the wheels on the floor and would therefore make it go faster. We were unable to experimentally test this because we don't know the exact coefficient of friction of the surface and we also do not know the exact force applied by the motor.

- It is also concluded that the way in which force is distributed is important. When in gear 1, the car will convert the input into more force than movement and by changing gears that inverse relationship will change. The greater the gear, the smaller the force.

7. ANNOTATED BIBLIOGRAPHY

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In this source we learned about power-to-weight ratio, how it can be measured and its importance. "So, what is power-to-weight? Just take the power figures of the car and divide it by its curb weight. … We can also use the compound unit for power-to-weight ratio: horsepower per kilogram (hp/kg). You can also use kilowatts (kW) if you want to stick to the metric system. What this means is that for every kilogram of weight on the car, the power available to move said kilogram is so and so.

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In this article we gathered information on the different aspects that can be modeled mathematically by analyzing a gear box. These are frequencies of the system, transmission efficiency,gear dynamics and reliability. Even Though, not all the concepts are going to be implemented, they give us a better idea on the functioning of the gearbox and its implementation.

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Information about friction and how it relates to any type of movement.

COLLECTING DATA ABOUT ATMOSPHERE AND HYDROSPHERE AT SCHOOL

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The objective of this project was to measure different atmospheric conditions present at Rochester School. We measured aspects such as temperature, pressure, pH in the water, the type of clouds, among others. Later we analyzed the data and came up with conclusions regarding the behavior during February and March.

Research Questions

Does the water from the reservoir present any type of contamination?

What does the quantity of dissolved oxygen represent within the context?

What does an atmospheric or hydrospheric pH variation indicate?

Introduction

he atmosphere is the gaseous envelope of a celestial body (like a planet) in this case, planet earth. Thanks to the atmosphere we can have life in our planet. We analyzed atmospheric characteristics such as the temperature of the atmospheric pressure among others and collected data that is going to be used in this project. We utilized the water reservoir, which is a little pond in the backside of the school, to measure different properties that the hydrosphere around the school could have.

Research Methods

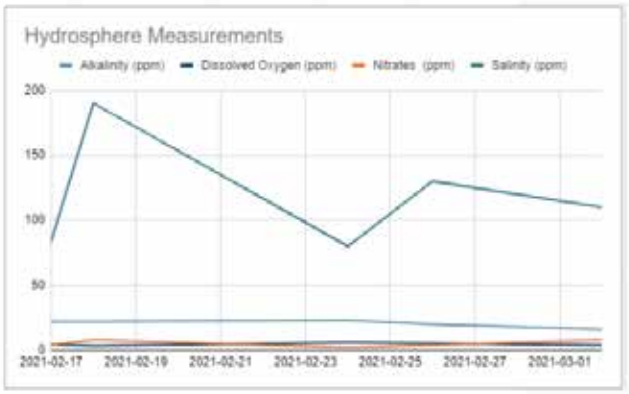
Planning Investigations: The study was planned and took place at Rochester School, located in Chía, Colombia. The school has a soccer field, where the data regarding the atmosphere was collected, and a water reservoir, where the data regarding the hydrosphere was obtained. For the study different, tools and materials were used: infrared thermometer, barometer, Globe website, clouds chart, pH meter and different chemical substances. The data was taken every day at midday.
Carrying Out Investigations: For the collection of the data regarding the atmosphere, the soccer field and the meteorological station were the places where the collection took place. The temperature was obtained with the infrared thermometer, we collected the average temperature and the temperature from 9 spots of the field. The conditions of the clouds were analyzed thanks to the information provided by some charts that included types, characteristics, etc. For the collection of the data regarding the hydrosphere, the water reservoir was the place where the collection took place. The pH, salinity, and alkalinity data were measured with various samples from the water, which were subjected to different procedures, involving the usage of chemical substances. The data was collected every day, between 11:00 am and 2:00 pm. Tomas was in charge of the experimental part of the experiment, while Juanita wrote down the results. Carolina was the checker for both roles.
These are some protocols established by GLOBE for hydrosphere and atmosphere.

Hydrosphere measures dictated by Globe Protocols:

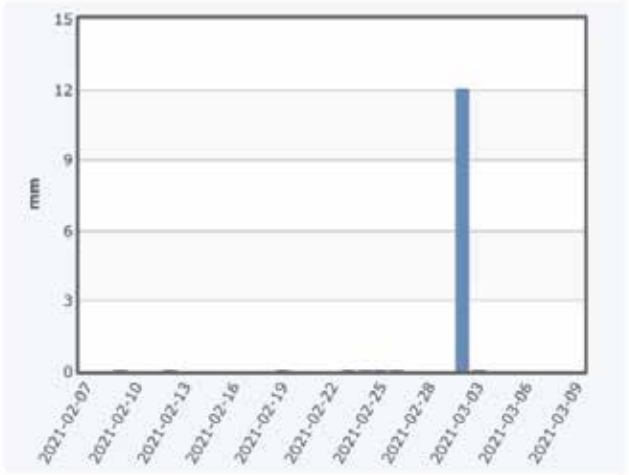
Dissolved oxygen protocol: students will measure dissolved oxygen in the water at their site using a dissolved oxygen test kit or probe.
Salinity protocol: Students will measure the salinity of a salty or brackish water sample using a hydrometer and thermometer.
pH protocol: Students will measure the pH of the water using either pH paper or a pH meter.
Alkalinity protocol: Students will measure the alkalinity of water using an alkalinity test kit.

Atmosphere measures dictated by Globe Protocols:

Barometric Pressure protocol: Students use an aneroid barometer to measure barometric pressure in support of the Aerosols and Water Vapor Protocols.
Clouds protocol: Observe and report which types of clouds are visible, how much of the sky is covered by clouds, and the opacity of clouds.
Surface Temperature protocol: Students use an infrared thermometer (IRT) to measure the temperature of the Earth's surface.



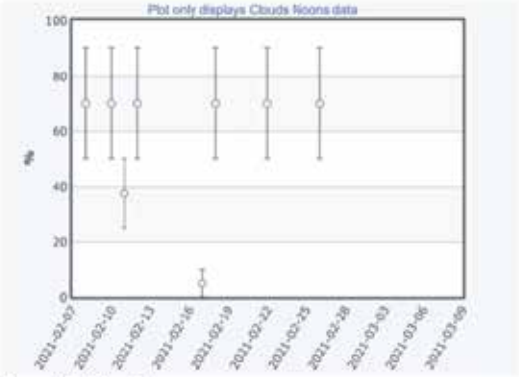
Graph 1. Hydrosphere Measurements



Graph 2. Precipitations

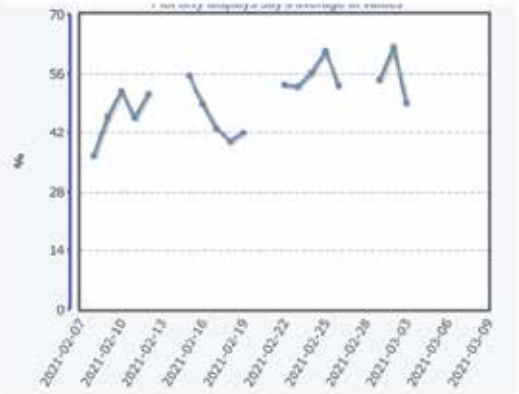
Graph 3. Barometric Pressures

Graph 4. Temperature



Graph 5. Clouds

Graph 6. Relative Humidities



Discussion

Among the hydrosphere measurements, it can be observed that the highest values correspond to alkalinity in comparison to dissolved oxygen, nitrates, and salinity.

On graph 6 the percentage of humidity

had a tendency to fluctuate downwards by this we mean that only a couple of times did the relative humidity went up unlike the couple more it went down.

In graph 2 we can observe that we were only able to record the precipitations once this is because the method used to measure set precipitations needed high quantities of precipitations to be considered into our data if that threshold wasn't passed the data that it gives was too small to be taken into account.

All the data was taken indirectly with the different tools for things like the atmospheric pressure or the temperature, so no calculations were necessary.

For obtaining water's oxygenation we needed to add different chemicals to it, to get a mixture that will give us the value.

Based on the different measures of alkalinity it was seen that it was always between 7 and max 7.8 indicating the water capacity of neutralizing acids.

To explain why sometimes we obtained more than 7 in pH which means the water was more basic. The water that was taken during these measurements usually has the presence of some strong bases that contribute to a more basic pH result.

The quantity of dissolved oxygen indicates whether the water is contaminated or not, based on the PPM of DO found on the water which was between 5 and 6 as you can see in figure 1 we can assure that the water is capable of housing living organisms on it.

As said before by the DO we notice that this water doesn't have a high level of contamination and as can be seen in figure #2 the nitrate level is low which indicates that this water isn't too contaminated.

Based on the data that was given by the hydrometer and the results that are shown in figure 1 and that normally the salinity of these types of water are less than 1000 ppm it was seen that the results were among the normal range.

Conclusions

In the case of dissolved oxygen, we observe that it varies by temperature, the higher the temperature, the less amount of dissolved oxygen.

It was analyzed that salinity depends on several factors, for example, evaporation, rainfall, and the depth of the aquifer body, which can explain its variation as seen thanks to data collection.

The alkalinity depends on the geographical location and the minerals and rocks of the environment, for this reason, this parameter does not vary much.

The pH was kept constant, proving that the concentration of hydrogen ions was not affected by the environment, proving that it was not an acid or a base, always being neutral with an approximate pH of 7.

The clear and usual interaction between the hydrosphere and the atmosphere was observed. Mainly showing the water cycle, in which water evaporates due to the sun. The water vapor then turns into water droplets as it cools, and then they connect to

form clouds. Then it rains and the water flows into rivers, streams and falls directly into the ocean, where the cycle can restart. This leads us to think that if, for example, the pH of the water where the samples were taken is less than 7 (acidic), eventually when it rains (precipitation) the rain could be acidic.

Our recommendation when doing this project in the future is for the people who are collecting the data is to be sure that the instruments are all in working order since if they are not then the collection of data might become inaccurate.

We recorded the precipitations with a tube that stored the amount of water precipitated into the area in question. However, we relied on big quantities of water to precipitate to get a potential data point. So we suggest that in the future the precipitation is recorded using another tool so that it's less weather reliable.

We can observe that both the barometric pressure graph from graph 3 and the cloud % from graph 5, stayed pretty consistent within each other since for example in graph 3. We were measuring the barometric pressure at the same location each time, so a fluctuation in the data would be of much concern. On the other hand graph 5 being consistent just means that there were many clouds at the time of taking this data which is reasonable considering both the time of year and the location where the recollection of data took place We can see that the temperatures recorded in this experiment were very fluctuant by this we mean that there wasn't a single day when they were the same. The peak temperature recorded was around 33ºC and the lowest was around 20ºC.

This data might not seem important on a small scale i.e when 1 or 2 people at 1 or 2 different locations take it. However, it becomes crucial to understand things like climate change since it helps to have a record of how different locations may have different atmospheric and hydrographic characteristics. It is also important since it helps to keep a record of the different areas which are going to change and by taking this data we can rest assured that we will know how to react if anything changes for the worse.

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Class Foundations

THE LINEAR RELATIONSHIPS AND THE ADVERTISING ACTIVITY

By: María José Tobón
and Salomé Cortés
Grade: 7thA

During the last weeks, we have been learning in math class the concepts of linear relationships and constant of proportionality. We have analyzed different graphs to learn what it means to have a linear relationship between two variables, how to identify the constant of proportionality and its meaning.

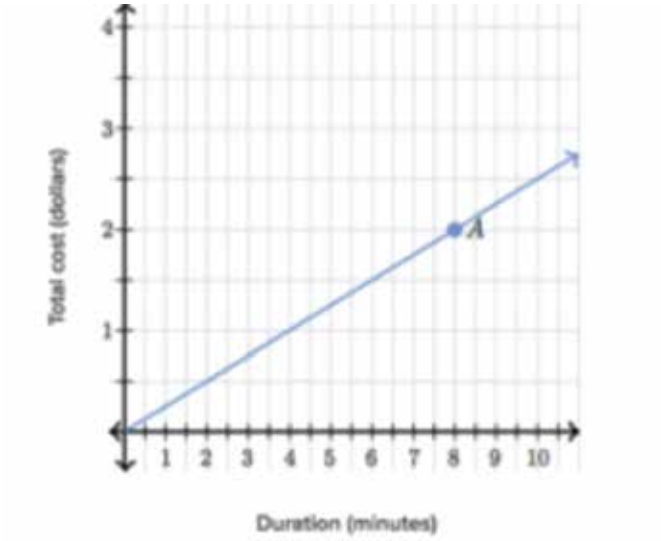
It has been interesting for us to discover that the constant of proportionality and the unit rate are basically the same, because now we can understand that there is a connection between this topic and what we have been learning in previous years.

Once we understood this, it became easier to find the equation that represents the relationship between the variables, because when you know the unit rate, all you need to do to find the value of Y for any quantity is multiply the unit rate times the value of X.

In the Advertising Activity, we had the opportunity to apply all this in a real life context. This activity is presented in a graph, the information of a cell phone carrier. We were asked to identify the meaning of a specific pair of coordinates, and to find the constant of proportionality and the equation. In addition, we should create the same information for another cell phone carrier that would be our competence, and indicate why our company would be the best option for the clients. All this should be presented in an advertising way, using our own language to explain this information to the clients.

We really enjoyed this activity because we saw that this was a real life situation, and trying to explain all this information with our own words to someone that was not the math teacher or a math student, was very challenging. At the beginning we didn't know how to do it because we thought that we should just give mathematical answers to our teacher. But then, when we understood the real purpose of the activity it was very interesting because we really saw that this is actually what the companies do with their advertising, so this is really useful in real life. We also learned that the real challenge we have in math is not only to learn the concepts or the procedures, but to understand how they work and how to explain them in real life and with our own language.

COST PER MINUTE OF PHONE COMPANIES

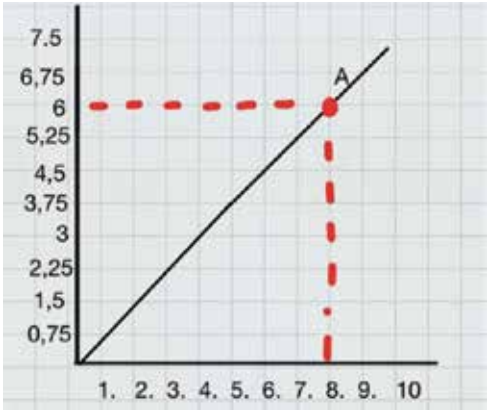


This company is called Wow. Every 8 minutes of the call equals 2 dollars .

That means that 0 minutes of call equals 0 dollars.

(1, 0.25) means that 1 minutes of call equals 0.25 cents

x = duration min
Y = cost $
Cs = 0.25
y= 0.25 X

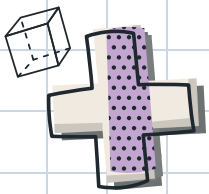


This company is more expensive and is Called TeMaWe.

Every (8, 6) 8 minutes equals 6 dollars .That means that 0 minutes of call equals 0 dollars but if you call the minute would be higher than the other one.(1, 0.75) means that 1 minute equals 0.75 cents

x = duration min
Y = cost $
Cs. = 0.75
Y = 0.75 X

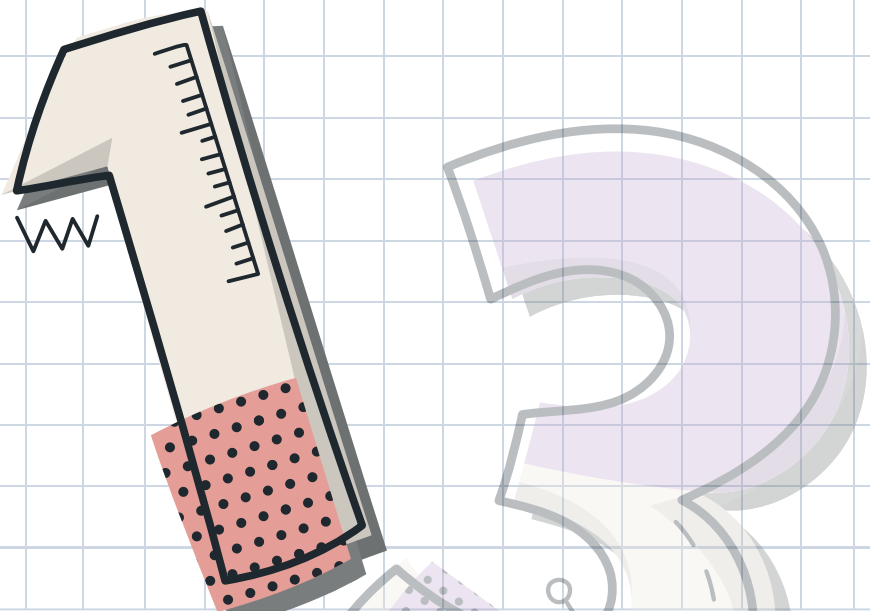
Each company has a diferent cost for the minutes in the call. The first company is better because 0.25 cents for each minute and the other company cost 0.75 cents for each minute. So it will be better the first company because it is cheaper than the other one.



TEN FRAMES

Carolina Sandino - Teacher

Ten frames is a useful visualization tool when kids first learn about numbers and is often used to introduce addition and subtraction in kindergarten. Students use concrete material to understand this method. Students can learn the facts that add to ten by placing counters of one color onto the ten frame and then either counting the remaining cells or placing counters of a different color to calculate how many more to ten.



Scan QR code to see explaining her work

GREENHOUSE GASES AND ATMOSPHERIC PRESSURE

Nicole Munevar Murcia

We have a crisis to attend, the rising temperatures of earth have been out of control over the past years. Our planet is burning up; we are losing ecosystems, species are going extinct, and all because of the excessive amount of greenhouse gases produced. A humankind, we have left this issue out of our responsibility, and it's the moment to act. Although we know what the basic climate crisis, and the greenhouse effect, everything in life is connected. I have researched the connection between the release of greenhouse gases to the atmospheric pressure, how these two are connected and their impact on the whole crisis. But, what exactly are greenhouse gases? How is this occurring? What isthe connection between both of them?

Gases such as methane (CH4), ozone (O3), nitrous oxide (N2O), and carbon-dioxide (CO2) among others, are called greenhouse gases.

These gases participative in the greenhouse effect by warming thearth's surface and making this planet suitable for organism like us. It basically works like the walls of a greenhouse, making our planet warm.

These gases produced by earth are natural , as an example we can have the production of carbon dioxide by plants, or the natural decomposition that produces methane. Humans are altering the natural process of the greenhouse effect by emiting more greenhouse gases into the atmosphere. We know that since the industrial revolution in the 1700 our climate has been changing. Industries and people started producing immense quantities of greenhouse gases through industries, transportation, agriculture, and a new life style.

The atmosphere is a cover of gases between space and the earth itself. The atmosphere is composed of four layers, the Troposphere, Stratosphere, Mesosphere, and the Thermosphere. Without the atmosphere, life on earth would not be possible. This is because the atmosphere provides the oxygen us beings can breathe, keeps up the warmth upon earth, and can also protect us from the harmful rays from the sun (UV). The atmosphere has always worked as a cover to keep earth warm. This is possible because of the gases mentioned before such as carbon dioxide (CO2), and methane (CH4) , but the amount of gases that are being produced is excessively large resulting in the atmosphere storing more heat than what it's supposed to, finally forming the global warming crisis.

Now what if I told you that depending on the atmospheric pressure the amount of gas released is affected? According to several studies developed by the new University of British Columbia Research, the atmospheric pressure can affect in a big scale the amount of gas leaks from wellsbelow the ground surface, which can mostly be at oil and gas sites. The atmosphere varies its pressure, when the pressure increases soil gas is crushed/compressed and pushes all the natural leaked gases deeper into the ground, resulting in such gases not being detected on the surface up the ground. On the other hand when the atmospheric pressure decreases all the leaked natural gases compressed at the high pressure conditions will emerge from the ground and head out to the atmosphere. This will later impact on the amount of greenhouse gases in the atmosphere.

anything that flows including liquids and gases. In which our case are the greenhouse gases. As to make this a whole, the pressure we can see acting on these fluids is the atmosphere. We also know that pressure is the force acting on aspecific are a which leaves us with the formula: P = F/A (P = Pressure, F = Force, A = Area). Pressure is measured in N/m^2 or Pa which stands for Pascal. As Pascal law states whenever pressure is applied to a fluid it spreads evenly throughout the whole thing. As we can see how the pressure of the atmosphere increases and decreases the fluids (gases) are moving. They spread through the whole thing,once underground when the pressure increases, and once emerging to the atmosphere when pressure decreases.

Even though the chances of the atmospheric pressure changing are not pretty likely, a way to measure it is with a barometer. This is because of the atmosphere layer covering the earth, the air acts as a weight and presses against everything, which is what the barometer gets to measure as pressure. As like the barometer, the use of a manometer can also tell the pressure of the atmosphere. Telling us whenever the atmospheric pressure has increased or decreased. Both these instruments allow us to identify the pressure, and the air pressure acting upon earth. Another way to find the atmospheric pressure is by following the formula: Ph = P0e -mgh / kT (Ph = pressure at height, P0 = sea level pressure, m = mass of one air molecule, T = absolute teperature, k = Boltzmann's constant, g = gravity acceleration). As a small conclusion we can see how the pressure is moving the fluid around. To include density into the whole analysis, we need to know more about the atmospheric pressure. The atmospheric pressure uses the measuring units of atmospheres or could be also called bars. We know that density is the mass found in agiven area, more specifically volu me, the formula learned to find density is the following: P = M/V (P = Density, M = Mass, V = Volume) and such is measured in Kg/m^3. Now, we know that the density of air is different as altitudes vary. Meaning that as the altitude increases the atmospheres are lower because the air is exerting less pressure and its density is lower. If done otherwise, and the altitude decreases then the density of air will increase, increasing the number of atmospheres too.

In order to get these gases all the way to the atmosphere, not only pressure is needed, but a force acting upon them too. The force known to take objects in an upwards direction in the presence of gravity (fluids) is the buoyant force. The Archimedes principle is the one that states such buoyant force, the formula for this type of force is: Fb = Mf/g (Fb = Buoyant Force, M = Mass, F = Force, G = Gravity). It's known that if the object floats in this case

our gases, the density of such are less than the fluid it is in, in our case the air. Therefore as the altitude varies the amount of force transporting / lifting these gases up will vary too. Bernoulli Equation explains the relationships between velocity and pressure. This equation is a clear example of a principle to the conservation of energy where he talks about the three forms of energy included, which are PxV (P = Pressure, V = Volume), Kinetic Energy (Flowing fluid), and Potential Energy (Gravity). The relationship that he states is that the velocity of a fluid changes depending on the pressure applied to such.

e
n
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higher or lower velocity to move. He gives a formula to find the pressure at a given depth which is: P = pgh (P = Pressure, P =Density, G = Gravity, H = Height). With that we can tell how such is related to our situation. This formula can be used to find the different pressures acting on air and the atmosphere itself, since the pressure in the air is not the same at every altitude, nor the pressure of the atmosphere at the same scenario. With all the formulas mentioned we are capable of understanding the changes in the pressure, density, and velocity of the air, atmosphere and the greenhouse gases.

To see the whole picture, soil gases are moved around by the pressure of the atmosphere, and all the process is affected by the density, force and other variables affecting this process. These gases will later emerge traveling all the way to the atmosphere. The amount of pressure exerted by the atmosphere varies depending on the altitude reached and the density of air, which, if higher altitudes are reached this may decrease the pressure making the velocity of these gases / molecules take longer to reach the actual atmosphere, and vice versa. It's like a cycle, everything is affecting everything.

Now, there is nothing we can do to not have the atmosphere change its pressure, but there are many other ways to solve global warming. We have all heard the solutions, use less transportation, or carpool. Reduce the use of plastics, and other materials that will contribute to global warming. Still, it's just up to us to educate ourselves and make sure we do our parts.

PRESSURE IN DEEP WATER

Sarah Jiménez Romero

PRESSURE IN THE OCEAN

Pressure is one of the biggest problems that explorers face when trying to go deeper into the ocean, the atmospheric pressure rises as you swim downwards, and to explain better this there's the example of swimming in a pool that's relatively deep; as you swim into the bottom of the pool you'll feel how your ears start feeling pressed and how your lungs experience compression, forcing you to go up as quick as possible for air. This pressure that you experience is what surrounds the ocean and what forces us to stay in the surface instead of discovering the profound and pristine ocean deeps. But, this is a problem that humans face, because living beings in the ocean have adapted to survive in the complex layers of the ocean depth, adapting their bodies to have more flexibility to survive in their natural habitats. An example of this is the Sperm Whale, that has the adaptation of diving quickly into the depths of the ocean without suffering the mortal consequences of atmospheric pressure. Sperm Whales dive to catch their mortal enemy, the Giant Squid, an animal that also lives in the deep places of the ocean; so the Sperm Whale follows the Squid as deep as possible and having a huge velocity but their bodies have adapted over with an evolutionary process to be more flexible, having more loose, bendable cartilage, which allows them to dive without feeling the pressure that would easily compress and snap our human bodies. Some depths that Sperm Whales have gone to follow the Giant Squid are to even 7,000 feet, and to put this into perspective, humans have only been able to dive without equipment 40 m.

Knowing this information, the goal of this research is to understand the influence of pressure in water and how that affects the different marin ecosystems according to their classification in depth.

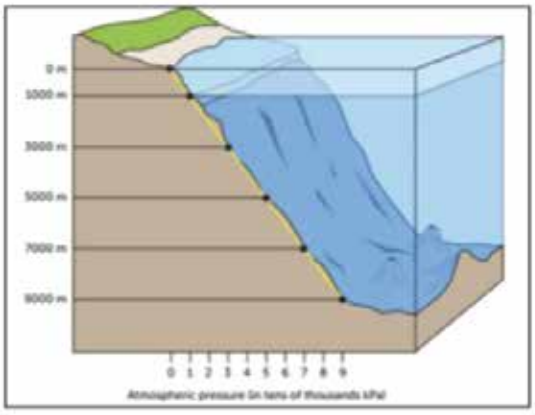


Figure 1 Depths of the ocean

Figure 2 Lantern fish

PRESSURE IN DEPENDING ON DEPTH

At any depth, the water pushes on any object below it, so that's where the term of "atmosphere" in the ocean comes from, because as you go deeper into the marine zones, you'll feel how the atmospheres start to pressure you from all places, and when you've reached a certain point, if your not adapted to the pressure your body will basically explode (the pressure on your ears and lungs will cause this).

Now, to learn about the pressure in the different zones of the ocean (figure 1) and how living beings have adapted to it, it is necessary to know which zones do the ocean possesses:

- Epipelagic Zone (Sunlight Zone): Extends from the surface to 200 meters (656 feet). It is where most of the visible light exists which provides heat to this zone, and the heat is responsible for the wide ranges of temperatures on it, providing biodiversity visible for us.

- Mesopelagic Zone (Twilight Zone): Extends from 200 meters (656 feet) to 1,000 meters (3,281 feet). The light that penetrates to this depth is extremely faint. It presents the first indices of bioluminescent creatures and fishes out of the ordinary.

- Bathypelagic Zone (Midnight Zone): Extends from 1,000 meters (3,281 feet) down to 4,000 meters (13,124 feet). There's no visible light, only by the living beings that produce it themselves. The water pressure at this depth is approximately 5,850 pounds per square inch (powerful pressure).

- Abyssopelagic Zone (The Abyss): Extends from 4,000 meters (13,124 feet) to 6,000 meters (19,686 feet). The temperature in this zone is nearly freezing and there's no visible light. Very few big creatures can be found in this place because of the crushing pressure that it contains. Three-quarters of the ocean floor is in this zone. (Figure 2)

- Hadalpelagic Zone (Trenches): Extends from 6,000 meters (19,686 feet) to the bottom of the deepest parts of the ocean. It's mostly found in deep water trenches and canyons. The deepest point in the ocean is located in the Mariana Trench off the coast of Japan at 35,797 feet (10,911 meters). The temperature is just a little above freezing and the pressure is an incredible eight tons per square inch.

Despite all of this, life forms can still be found in here, invertebrates such as starfish and tube worms can prosper at these depths. With this information we can now understand what the pressure inside the different zones of the ocean is, which helps us comprehend how living creatures survive in rough environments such as this. If we pay attention, we'll notice that as the pressure rises, the living beings become more adaptable and depend less on things that we need to survive such as the sun. They also become smaller and more anatomically flexible; the only life that can be found in the two last zones (The Abyss and Trenches) are mostly invertebrates creatures that have a more adaptable body to the pressure that their ecosystem has. This helps us conclude that pressure lowers and rises depending on the zone of the ocean and that living beings that prosper in this zones have had to adapt over their evolutionary process to become more resilient to survive in this sort of ecosystem, becoming anatomically "simple".

EXAMPLE OF TECHNOLOGY TO MEASURE DEEP WATER

"The CTD (conductivity, temperature, and depth) is the primary tool to measure all the physics and the physical characteristics of water. It detects how the conductivity and temperature of the water column changes depending on its depth. Conductivity is a measure of how well a solution conducts electricity, and it is directly related to salinity. By measuring the conductivity of seawater, the salinity can be derived from the temperature and pressure of the same water. The depth is then derived from the pressure measurement by calculating the density of water from the temperature and the salinity. (OER, What does "CTD" stand for?)."

"This machine helps us understand the ocean water's characteristic through the entire water column, which is crucial for understanding the physics involved. The physics in turn allow biologists to understand why the biology is present or not present at different depths and why the chemical makeup of the water changes over depth. The CTD is the key to understanding the physics, chemistry, and biology of the water column." (OER, What does "CTD" stand for?)."

According to the Ocean Exploration and Research organization, the CTD is a machine created to analice and process the physics involved in the measuring of water conductivity, temperature and depth, which is the best way to learn from the unknown places of the ocean seeing that at the moment (and near future) we are not able to go to deep zones without facing multiple issues, so with this we can get a closer understanding on the characteristics that the ocean possesses and the science behind such uniqueness.

zoo

The 3rd grade students designed their own zoo to teach people about the life cycles and adaptations of the animals. They selected different groups of animals, among mammals, reptiles, amphibians, insects and birds, and researched about their life cycles' stages. Students compared these life cycles finding similarities and differences, and analyzing their importance for the survival of the species. Students learned that despite their differences, all animals need strategies to survive. Kids recorded a video inviting the people to their zoo and teaching their findings about those animals that they selected. I invite you to watch the following video done by Nicolás Acosta (3A) and Juan Antonio Klopper (3C).

Manuela Venegas
Natural and Environmental Science teacher
Third Grade

Scan QR code to see explaining her work

Thermal Energy Experiment

Diego Moreno
Sixth Grade

I did a fun and easy experiment at home lo learn more about Thermal Energy, using just few materials and the help of an adult.

For my Earth Space and Physical Science class, we did an experiment at home with the help of an adult since we were using fire; I used few materials easy to find at home: a small candle, a piece of paper and scissors. First of all, I drew an spiral on the paper and then cut it. My mom helped to lit the candle, then I put the spiral over the candle being very careful not to burn it. At the beginning, nothing happened but I tried few more times, adding another candle and shortening the spiral, it did start moving around circles but very slowly and not endlessly. After many more attempts and thinking it wouldn't work, I
decided to hang the spiral from the kitchen extractor and making the spiral longer and thinner, then finally my spiral started spinning in perfect circles and in a rapid pace, it was awesome!

From this experiment I learned more about Thermal Energy, I learned that the heat from the candle warms the air around causing the air molecules to move farther apart, so making the air less dense, making the paper spiral to spin. The process kept working because the cooler surrounding air kept coming towards the light and warming it up. This is a demonstration of type of thermal energy called convection which is the transfer of heat from one place to another by circulating it through air or liquids. Other examples of convection are heating water on the stove, a hot air balloon, air conditioner, refrigerator etc.

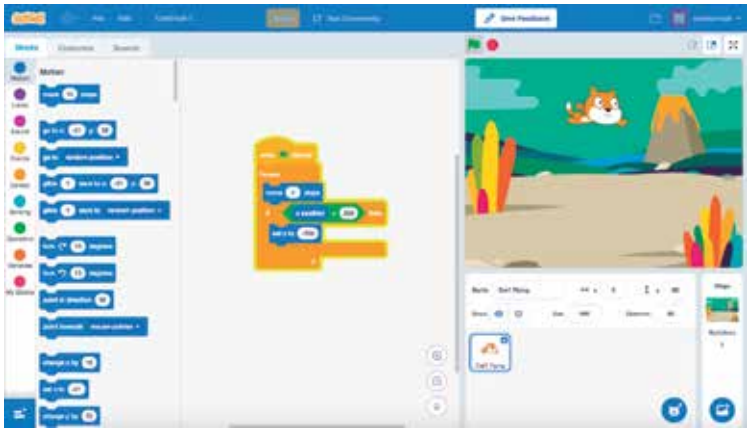
I really enjoyed doing this experiment even though it worked for me after many attempts and few modifications. It is impressive to see in real life what we have learned in class. I definitely love science experiments and I will be happy to try more experiments in the science lab when we get back to school.

Scan QR code to see explaining her work

Creando y programando juegos en SCRATCH

Los estudiantes en Primaria, tienen la oportunidad de aprender a programar y a usar código a través de la plataforma de Scratch, la cual fue creada por MIT, y es de acceso completamente gratuito.

En la clase de Computer Science, los estudiantes aprenden a usar este código mediante la elaboración de juegos que son actualmente parte de su mundo de calidad, tales como "Crossy Road", "Google Dino Game" y "Kinect game" entre mucho otros. Todos los juegos son creados desde "cero" y aprenden a usar comandos como bucles, condicionales, vatiables y métodos.



Sara Polanco, estudiante de 4B, nos cuenta cómo ha sido su experiencia creando los juegos en la plataforma de Scratch.

"Bueno, a mí me gustó mucho que se podían hacer muchas cosas como un laberinto y Crossy Road y muchos más. También se le puede dar moviento al muñequito y es muy divertido jugar y también es muy entretenido."

"Definitivamente es muy divertido crear los juegos en Scratch, porque puedes crear tu propio juego y también lo puedes personalizar a tu manera y con tus propias reglas, entonces es muy entretenido."

"Lo que más me ha gustado de Scratch es que tú creas tus propios juegos, con tus propias reglas de una forma muy fácil y divertida."

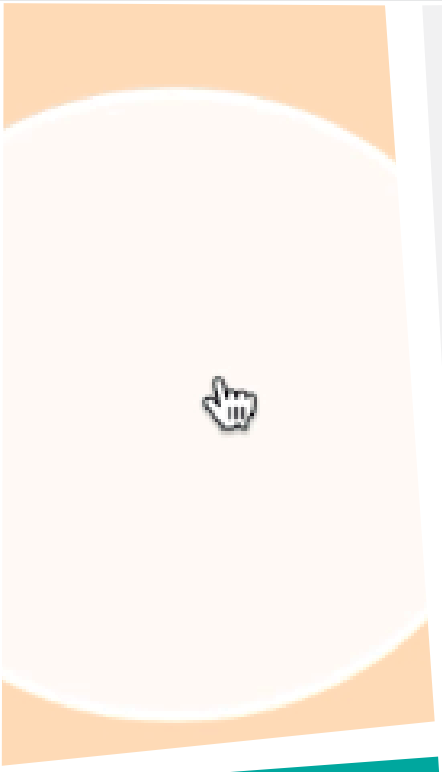
CODING: A NEW WORLD

BY:
LAURA COLL RULLÁN

The World Economic Forum advises us on the essential skills to develop today and tomorrow, with predictions for 2022. Taking this into account, in Computer Science Third grade class, one of the learning goals we set, was to develop the soft skills that students need for the future: mainly creativity, critical thinking, emotional intelligence, complex problem-solving, reasoning, ideation, and analysis. Also, during the process, we focused on active learning strategies. On the other hand, the specific goals were clear, to develop viso-manual coordination, keyboard typing, and computer mouse skills.

Therefore, students were introduced to animation through the creation of comics using coding. With this activity, all students showed their creativity and represented the situation that they were living in, and a recurrent topic was the Coronavirus. "I think the activities of Computer Science are fun, difficult, exciting, and easy sometimes", says María José Guarín from 3AC HL. This activity allowed us to develop relationships and cement an Emotional Connection.

The students discovered the world of animation with Scratch, a platform developed by MIT for learning code. Through coding, students brought comics to life with animation. This project was designed as a cross-curricular activity with another teacher, in which the children had to create scenes with characters who were going to live in the city of their dreams. "My favorite activity that we did in Computer Science class, was the game of Scratch, because it was fun and I learned some things that are fun. I learned to make animations and some games, I also did the comic which was fun", points out Juan Esteban Henao from 3B HL. Students explored Scratch through characters, costumes, settings, music, and code.



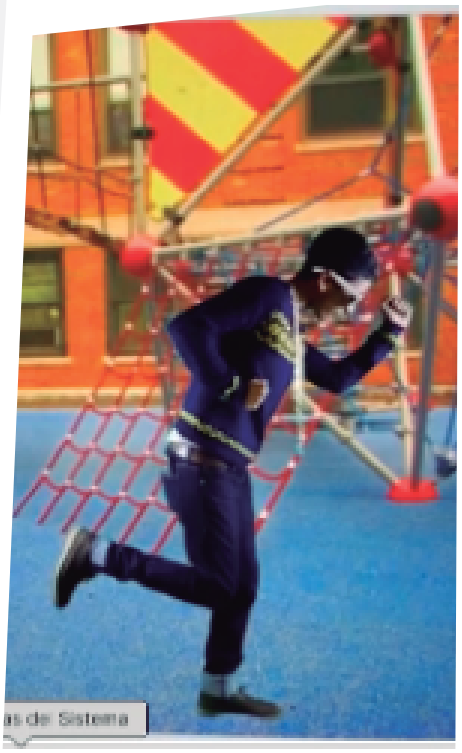
CODING:
A NEW
WORLD

Furthermore, relating all the prior knowledge, students developed a game for the first time in Scratch. We prioritized happiness and wellbeing as a tool for learning, so they were really excited throughout the project. In the process they learned how to use the new blocks, and used the "sensing", "forever" and "if_then", coding blocks for the first time. "The game in Scratch and Computer Science class was the most exciting in all the planet and the year", says Salomón López from 3C OC.

The assessment was very clear. My focus is to evaluate the process, so first I designed a rubric for learning and shared all the criteria with students regarding characters, stage, sound, and motion/code. When students presented their project, they had the chance to self evaluate and reflect on their learnings to decide to either complete all the goals and improve their competency or achieve mastery. "What I enjoyed the most was the presentation day", noted Luciano Severiche from 3AC HL.

In conclusion, these types of cross-curricular projects allow students to solve complex problems, explore coding in a fun and attractive way, and discover a passion for learning while preparing themselves for the skills they will need in the future.

CODING:
A NEW
WORLD



CODING:
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Energy Day at Rochester School

World Energy Day, celebrated internationally on October 22nd, and supported by a large number of United Nations member states, aims to raise awareness about the importance of saving our natural resources, for sustainability, conservation, climate change, carbon emission reduction, and environmental protection. All these contribute to increasing energy efficiency and sustainability.

At Rochester School, we participated in this worldwide event, while educating our community to learn about the benefits that alternative energies have over climate change, and how our school is committed to innovate and implement strategies towards sustainability.

Students discussed a video about the different strategies the school has to save energy, such as the solar panels, LED bulbs, solar tubes, natural light and movement sensors for lighting up the rooms and hallways. Given that an estimated 1.1 billion people worldwide live without access to electricity, students expressed their gratitude for the energy resources that we have.

Students played with energy, built different models to test the types and transformation of energy and visited the new photovoltaic panels arrangements. Teachers planned interesting classes using a new platform called Learning Lab, filled with hands on activities. It was a day for learning, having fun and being conscious of the energy we have, used and need every day of our life.

Scan QR codes to see her explaining her work

FLUID MECHANICS

Maria Camila Esquivel and Gabriela Guzmán Ardila. 10th Grade

Taking into account that blood pressure and blood flow are very important processes in our body that happen constantly, from my perception I believe it is important to understand how they work and how different factors can affect them. Regarding the fact that fluid mechanics is a topic that can be seen in our every day lives; we can relate it to how our human bodies work and how they can be affected by this mechanics. To begin with this analysis and research, it is important to recall different concepts related to fluids and fluid mechanics as well. Pressure has a lot to do with fluids and it also very related to blood flow and blood pressure because as the name says, it is the pressure from our blood.

Scan QR Code to see Magazine

COVID-19 SIMULATION OVER TIME AND RECOMMENDATIONS TO IMPROVE IMMUNE SYSTEM

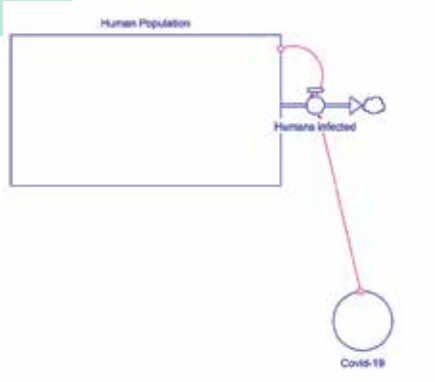
INTRODUCTION

Nowadays, the world is paralyzed due to the covid-19 pandemic. Regardless of the relatively low rate of mortality of the virus, this pandemic leaves us with a lesson and reiterates that we are not prepared for such situations. This disease spreads across continents and becomes a challenge for the scientific community, health systems, social services, national governments and the media. We simulated the effects of this new virus on the world population (WHO, 2020).

Despite the fact that many governments recognize the importance of their own personal immune system to fight the diseases, none of them emphasize the importance of each individual's behavior, besides the social distancing and use of facial mask, such as specific actions which can improve the immune system. In consequence, the aim of this article is to make a prediction about the amount of people who will get infected with the diseases in time if some of the biosecurity measure continue being avoided and if no vaccine becomes available for everyone. Moreover, we would like to give some recommendations for what we consider the most important action individuals should implement in order to get a better immune system and fight COVID avoiding fear and taking in mind the power of the human body.

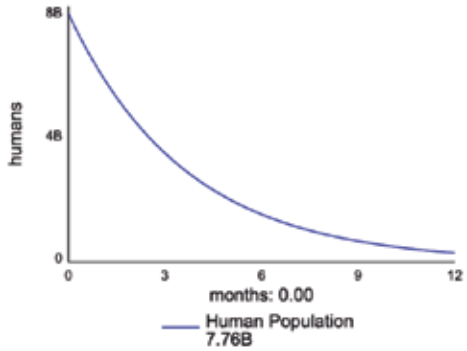
METHODOLOGY

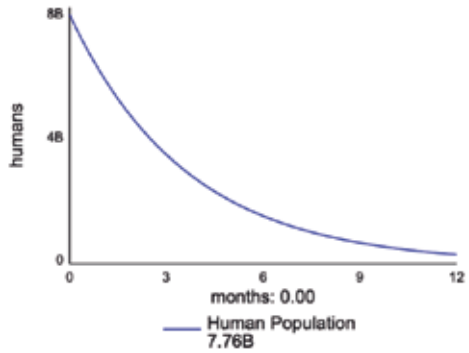
For this simulation, first of all to we had to register in Stella online; the web page that allows someone to create and develop different simulations. Then searched for an approximation of the world population in 2021, which was equal to 7.8 billion people. Then, because we were seeking to simulate the Covid- 19 infection rate, we looked up how many people were infected around the world, and it was found that about 96 million people are infected. Then we subtracted 96 million to 7.8 billion which gave us 7.762,773,543 healthy people. Finally we added how many people were being infected monthly, which is about 20,655,000 people. Then after using proportions we found that people are

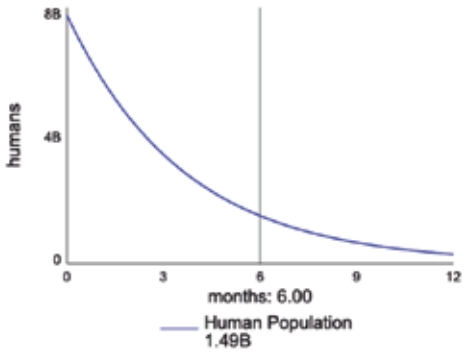


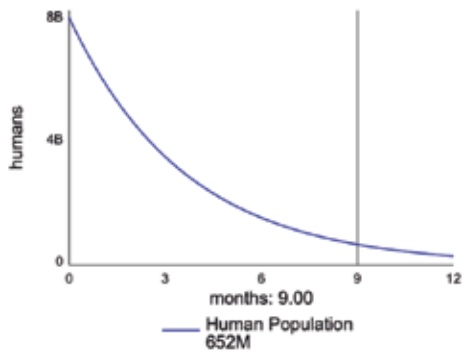
being infected by a rate of 0.26 individual / month. Then the last thing that was done was to run the simulation and analyze what happened every 3 months. For the conclusions and recommendations to improve immune systems, we use the knowledge we acquired in the Biology class.

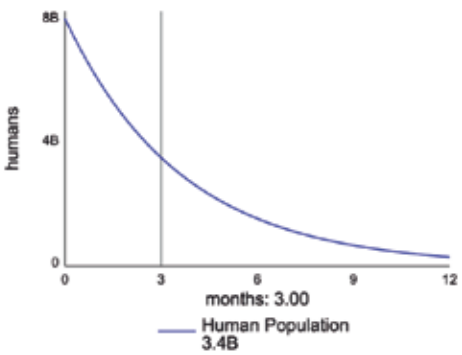
RESULTS AND ANALYSIS

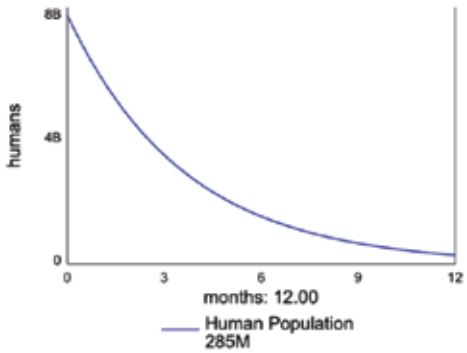












5. CONCLUSIONS

To sum up , it can be said that the simulation is showing us the exponential growth of Covid - 1 9. The expression of exponential growth is applied to a magnitude such that its variation in time is proportional to its value, which implies that it grows faster over time. This means that the infected of coronavirus are proportionally increasing due to the time that has passed. This also means, that if more time goes by, more reports and more cases are going to happen because some virus carrier that have no symptoms since the carriers can spread the virus up to 5 members of their family; repeating the cycle.

Our findings represent a model of what can happen in the future if people around the world ignore the biosecurity measures and if there is not a vaccine available for everyone. However, it is important to mention that the model does not include the factor of improving immune system. This factor, in fact, is the most important measure, along with social distancing and the proper use of facial masks. If people around the world understand the importance of taking care of themselves and the power of the human body, this situation could be less traumatic than what it already is.

We would like to emphasize the power of what we do. According to choice theory, all we can do is act in order to satisfy our basic needs. This means, all we can do to prevent getting a COVID infection is to follow the biosecurity measures that experts have developed and boost our immune system.

It is important to remember that our immune system is linked to our digestive and nervous systems. Therefore, everything we eat and think has a link to the ability of the body to fight any type of infection. In fact, this is not the first time humanity has faced a pandemic disease. The only difference is that today we have a lot more knowledge about the healing power of our body. We would like to ask, why are we so afraid of this diseases? Is this the first time our body has to fight a biological intruder? With this questions in mind, we would like to give you some recommendations on how to improve your immune system and how to help your body to defend itself no matter the circumstances. Since we cannot control what happens in our environment, we definitely can control what happens inside our body. Consequently, we would like to share some tips beyond the COVID behavior around the world.

First, remember you are pretty much what you eat. In fact, the molecules your body absorb came mainly from everything you placed in your mouth. Always try to eat more than half of your plate of uncooked vegetables; eat at least three portions of fruit, and remember when we talk about fruits and vegetables, the more different colors, the better. Meaning, try to eat different colors of fruits and vegetables so you can get the full spectrum of vitamins and minerals contained in these foods. Avoid processed carbohydrates and always have a portion of protein in your plate. Remember, that vegetarian proteins do not have any additional antibiotics or hormones.

Second, William Glasser (1999) talks about the importance of relationships, and the fact that relating well with others increases our chance of happiness. When we perceive that we have healthy and successful relationships, our body produces endor-

Juan Nicolas Acosta Prada 1, Nicolás Bejarano Marmolejo 2, Andrea Polanco Pinzón 3
1 Tenth grade student. Rochester School. Chía, Colombia2 Tenth grade student. Rochester School. Chía, Colombia3 High school Biology teacher. Rochester School. Chía, Colombia

phins and serotonin which are neurotransmitters related to the production of T-cells, the soldiers of our immune system.
Third, do not forget the importance of working out. When we go back and remember total behavior, in which we have direct control of what we do and think and indirect control of our feeling and physiology, it is worth analyzing the importance of the physiology associated to all our behavior. In other words, we have indirect control of our physiology, therefore, we can contribute with what we do to change the physiology in our body. For this reason, working out is an action we can do to change our physiology. When the body exercise, it releases hormones and neurotransmitters which contribute to the reinforcing of our immune system. At the same time, the release of these substances influence the way we feel. No matter how you work out. Some people like to go to the gym and exercise for one hour, others like to run or do yoga. No matter the physical activity, move your body for at least 10 minutes and enjoy the fact that you are healthy enough to do it.Finally, be grateful and enjoy nature. Juan Pablo Aljure mentioned in a meeting the fact that countries and governments are putting all their efforts into fighting COVID, but so many of them are using the same effort to fight global warming. For how long are we going to have the gift of nature? How many species are going to disappear before we die?Enjoy looking at a tree, breathing fresh air and do not forget the fact that the sun is life. Literally, 5 minutes of exposure to sunlight increases the amount of vitamin D crucial in the adaptive immune response.

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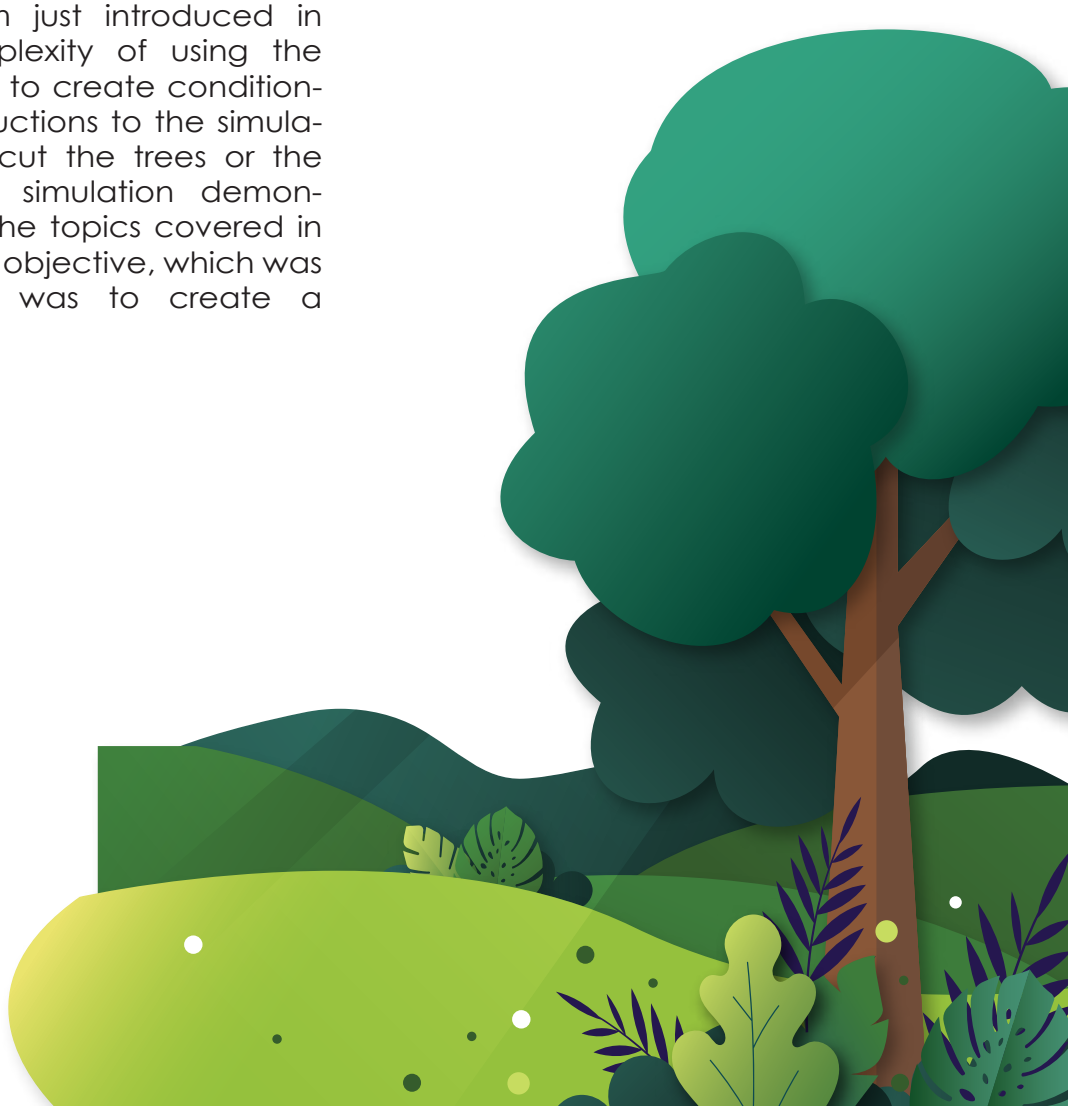
Daniel Escalante
Twelve Grade

SUSTAINABLE FOREST

During AP Calculus class, a project was developed with the goal of creating a hypothetical sustainable forest. In this project, extensive research was carried out on the type of tree to be used, a complementary plant and the behavior of the terrain. Using graphical and mathematical methods such as trend analysis and behavior prediction, the aim was to create the sustainable forest. As a final product, it was expected to create a solution presented in an IEEE report and a simulation of it in the VENSIM application.

This work goes beyond competent due to the correct use of the platform just introduced in class.Also due to the complexity of using the programs tools which helped to create conditionals and patterns to give instructions to the simulation of when to plant and cut the trees or the complementary plants. This simulation demonstrates an understanding of the topics covered in class and the fulfillment of the objective, which was already mentioned, which was to create a sustainable forest.

Scan QR Code to see video



PLANNING, BUILDING, AND TESTING A SOLAR OVEN

Students Fourth Grade

Why Build a Solar Oven?

In Science class, we were learning about renewable and non-renewable resources. We learned that all types of energy have advantages and disadvantages when we use them for different purposes. We decided to test a solar oven to find out if the energy from the Sun is powerful enough to cook our food.

What Do You Need to Build a Solar Oven?

To make the oven, you will need a shoe box, aluminum foil, plastic wrap, black paper or cardboard, and, of course, food.

What Are the Steps?

First, cut your box to make a flap on the top.

Then, add aluminum foil in the bottom of the box and under the flap.

Now, lay a piece of plastic wrap on the other side of the flap.

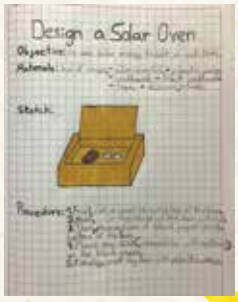
Also, if you want your food to cook better, stick a piece of black paper or cardboard at the bottom.

Set your solar oven out in the Sun, wait until your food is warm, and enjoy.

So, What Happened?

A solar oven is a small oven powered by the Sun's energy that is able to cook your food. It works because the inside of the flap on the solar oven reflects the rays of the Sun from the aluminum foil and into the box, and then it starts to get hot and slowly cook your food. A solar oven can work depending on how sunny it is outside. We had to wait for many days to try out our oven.

In my experience, I learned that you can use natural resources to make different things, and that you can cook with the Sun. The part that I enjoyed the most was making the oven, because it was really fun to make it with my family. I also enjoyed making the plan for the oven. The hardest part was to sketch the model first, because I had no idea how it would end up.



Special guest

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El día de la energía también se celebra en casa

La celebración del día de la energía no solamente se vivió en el colegio con actividades divertidas sino que en casa, los estudiantes de primaria baja trabajaron con sus padres en la construcción de modelos y en buscar información para entender los diferentes tipos de energía y cómo las energías alternativas son una excelente opción. Los dejamos con sus maravillosos relatos.

"Desde el momento en el que elegimos hacer un experimento en casa, Pablo se emocionó y se interesó en hacerlo pues sabía que lo iba a hacer en compañía de su familia e íbamos a poder vivir esta experiencia juntos, además porque el tema era de su completo interés. Lo primero que hicimos fue ver el video que nos sugirió la miss para saber de qué se trataba cada tipo de energía y que Pablo escogiera el de su preferencia. El elegido fue el volcán que representa la energía Geotérmica, seguido a esto alistamos los materiales para hacerlo (plastilina, bicarbonato de sodio y vinagre). Teniendo todo listo, Pablo con la ayuda de nosotros sus padres, empezó a hacer la forma del volcán en plastilina mientras entendíamos e investigábamos más a profundidad acerca de este tipo de energía para que Pablo al final le explicara todo el proceso a sus amigos y a la Miss por medio de un video y realmente tuviera claro que era lo que estaba haciendo y cómo funcionaba.

"Para nuestro trabajo del día de la energía realizamos un experimento sobre la energía eólica. Utilizamos una botella pequeña de gaseosa, una pita gruesa y unos palos largos. Los colaboradores fueron Marta Helena Páez (kínder A), Verónica Patiño (mamá) Deyanira Osorio (abuela) y Alberto Patiño (abuelo). Tardamos 2 horas, y como familia aprendimos que este tipo de energía eólica reduce el uso de combustible que originan las emisiones de efecto invernadero, es una energía que no contamina y es inagotable. Aprendimos también cómo podemos generar energía a partir del viento y la importancia de este tipo de energías alternativas en el futuro para el medio ambiente".

Verónica Patiño,
mamá de Martha Helena Páez KA

"Nuestro trabajo se centró en energía geotérmica. Nuestro objetivo fue explicarle a Palomita cuán grande es el poder de la energía geotérmica que hay dentro de la tierra y cómo ésta la podemos utilizar para reemplazar fuentes de energía que son altamente contaminantes. Para esto realizamos el modelo de un volcán. Primero investigamos sobre cómo provocar una reacción similar, y encontramos que podría utilizarse vinagre con bicarbonato; con base en ese hallazgo, hicimos pruebas con vinagre puro y descubrimos que la reacción podría ser menos violenta reduciendo un poco el vinagre con agua. Adicionalmente hicimos pruebas de color para que la erupción tuviera un tono amarillo, naranja y rojo ubicando gotas de anilina en diferentes capas de bicarbonato. Para la estructura del volcán hicimos un cono de acetato que luego cubrimos con plastilina para simular los colores de la montaña y de una erupción. Para finalizar ubicamos la estructura encima de un vaso en el que estaba la mezcla de bicarbonato en las proporciones que había probado y luego palomita virtió sobre ella la solución de vinagre y agua, obteniendo así una simulación de una erupción."

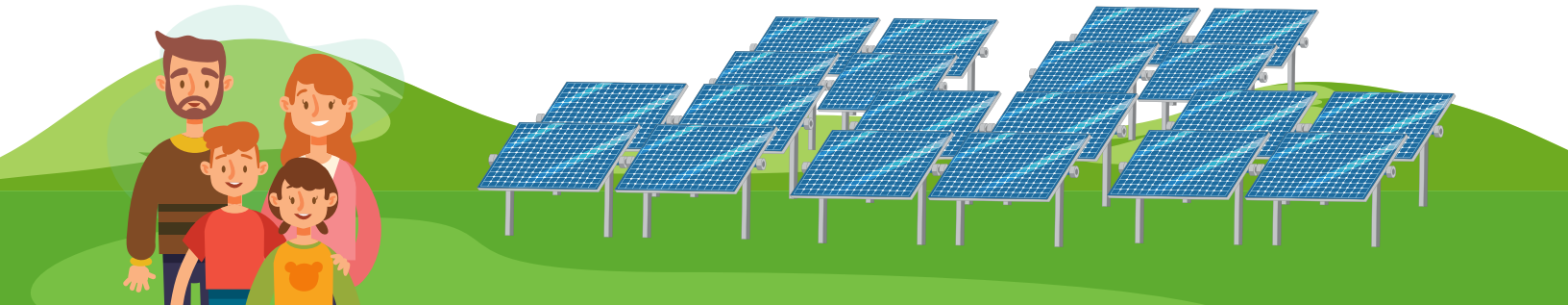
Familia de Ibagón Téllez María Paloma

"El resultado de esta actividad fue un tiempo de calidad en familia haciendo algo diferente en casa, aprendiendo juntos, compartiendo y escuchando todo lo que nuestro hijo aprende a diario, lo cual muchas veces por estar inmersos en la rutina diaria nos perdemos como padres, le agradecemos al colegio por este tipo de espacios los cuales nos permiten conectar con nuestro hijo y como familia."

Paula Alvarado,
mamá de Pablo Pinzón Alvarado
KA

"Realizamos la actividad energía geotérmica por medio del modelo de un volcán, que fue la que le pareció más divertida a Emilio, además tenía los materiales en casa: arcilla, vinagre, bicarbonato de sodio y temperas ya que Emilio quería que fuera del color de la lava! Miramos el video en youtube y lo primero que hicimos fue hacer el volcán con la arcilla, le explicamos a Emilio que era como plastilina para hacer como serpientes y que nos quedara el volcán con el espacio en el centro. Cuando ya estaba listo, ensayamos la mezcla del vinagre y bicarbonato en una tacita para ver si funcionaba y después lo hicimos en nuestro volcán. ¡Emilio se divirtió mucho! Además, con la visita a los paneles solares del colegio, entendió mucho mejor las energías alternativas. Un día se nos fué un segundo la luz en el apartamento y nos preguntó si no teníamos paneles solares en el edificio." ;)

Familia de Suárez Beltrán Emilio



"El trabajo con Palomita se centró en Energía geotérmica. El objetivo fué simular un volcán. Primero investigamos sobre como provocar una reacción similar, y encontramos que podría utilizarse vinagre con bicarbonato, con base en ese hallazgo hicimo pruebas con vinagre puro y descubrimos que la reacción podría ser menos violenta reduciendo un poco el vinagre con agua. Adicionalmente hicimos pruebas de color para que la erupción tuviera un tono amarillo a naranja y rojo ubicando gotas de anilina en diferentes capas de bicarbonato. Para la estructura del volcán hicimos un cono de acetato que luego cubrimos con plastilina para simular los colores de la montaña y de una erupción. Para finalizar ubicamos la estructursa encima de un vaso en el que estaba la mezcla de bicarbonato en las proporciones que había probado y luego palomita virtió sobre ella el vinagre reducido co n agua, obteniedo así una simulación de una erupción. Nuestra objetivo fué explicarle a palomita cuan grande es el poder de la energía geotérmica que hay dentro de la tierra y como esta la podemos utilizar para reemplazar fuentes de energía que son altamente contaminantes."

Familia de María Paloma Ibagón Téllez

"El experimento escogido por Murad fue el del volcán, para evaluar la energía geotérmica. Utilizamos un video de YouTube. En el que explicaron cómo realizar un volcán y los material necesarios, lo cual permitió que Murad captara la dinámica del experimento. De materiales se utilizaron una botella vacía de yogurt, cartulina, playdho, pintura para simular el volcán, dos cucharadas de bicarbonato y vinagre blanco. Tardamos toda la tarde, Murad preparó la mayoría del experimento y nosotros, sus padres, participamos también.

Discutimos sobre cómo ayudar al planeta con estos conocimientos y concluimos que la educación es la clave. Se nos ocurrió que pueda haber aldeas o predios en los que haya reglas como: reciclar, usar solo el agua necesaria en casa y que sea revisado por algún organismo controlador, utilizar otras fuentes de energía que no contaminen, promocionar el uso de transporte eléctrico y combatir la ignorancia de buscar otro planeta para vivir. Es necesario mantener nuestro planeta en equilibrio"

Familia Bader-alin Chaar Murad Gabriel

Scan QR code to see explaining her work

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