2020 - PT01 - KA229 - 078508
Improving Students` Motivation – Google Tools and Mobile Apps

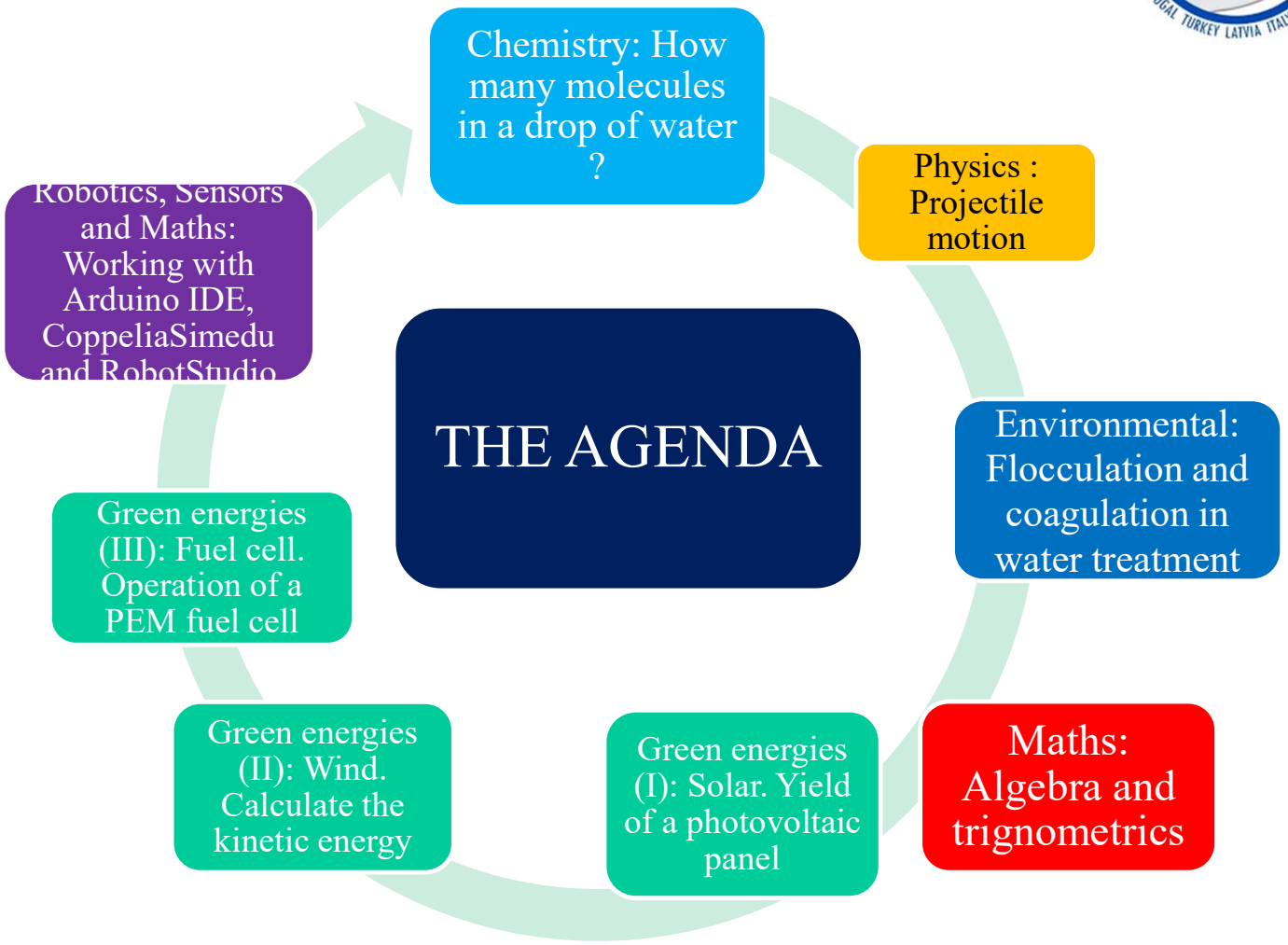
World SCIENCE day

Bulgaria Italy Latvia Portugal Turkey



Lisbon, 24 th NOVEMBER 2021

TO EXPERIMENT
TO INVESTIGATE
DO SCIENCE

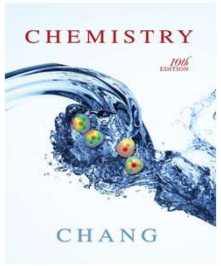

THE AGENDA
Chemistry: How many molecules in a drop of water ?
Physics : Projectile motion
Environmental: Flocculation and coagulation in water treatment
Maths: Algebra and trignometrics
Green energies (I): Solar. Yield of a photovoltaic panel
Green energies (II): Wind. Calculate the kinetic energy
Green energies (III): Fuel cell. Operation of a PEM fuel cell
Robotics, Sensors and Maths: Working with Arduino IDE, CoppeliaSimedu and RobotStudio

Chemistry: How many molecules in a drop of water ?

The AGENDA – Lab #1

Chemistry: How many molecules in a drop of water?

Do you like chem? This is for you.
You will play with mass, volume, mol and volumetric equipment to find the number of water molecules.

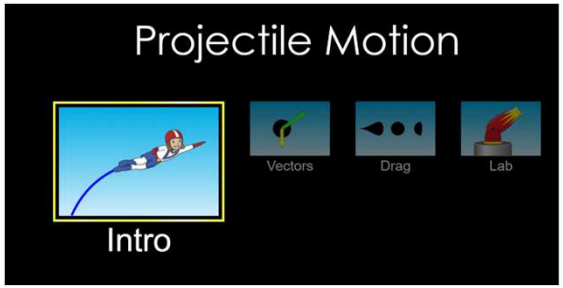


Book: Chemistry, Tenth Edition | Raymond Chang | download (3lib.net)

Physics : Projectile motion

The AGENDA - Lab #2

Physics : Projectile Motion

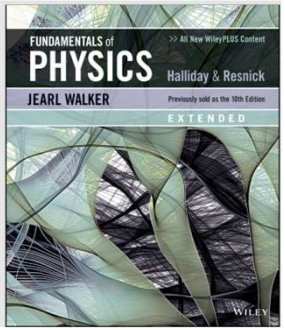


Investigate the factors that affect a projectile's trajectory:

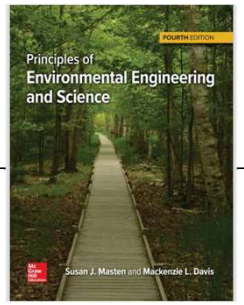
- Angle
- Height
- initial speed
- Air resistance

Link: Projectile Motion (colorado.edu)

Book: Fundamentals of Physics David Halliday, Robert Resnick, Jearl Walker 11th | Fundamentals of Physics David Halliday, Robert Resnick, Jearl Walker | download (3lib.net)



Environmental: Flocculation and coagulation in water treatment



The AGENDA - Lab #3

Environmental: Flocculation and coagulation in water treatment

"…Coagulation is used to remove turbidity, color, and bacteria from drinking waters. The goal of coagulation is to change the surface charge on the particles so they can stick together to form larger particles that will settle by gravity."

"…The goal of coagulation is to ensure that the particles come in contact with one another, "stick together," and form settleable particles called floc."

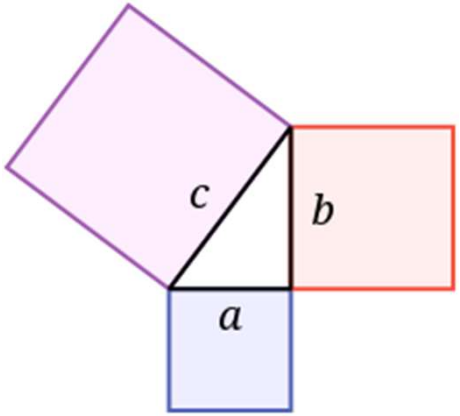
You will learn how to operate with Aluminum Sulfate $Al_2(SO4)_3 \cdot 14\ H_2O$ to precipitate colloidal particles as floc.

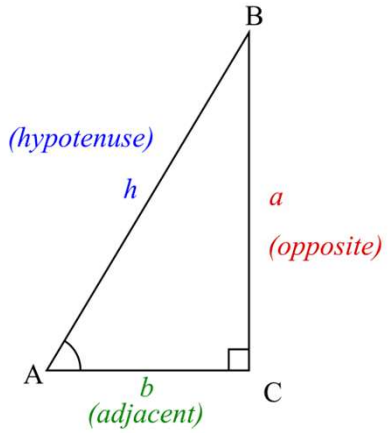
Book: Principles of Environmental Engineering and Science | Susan J. Masten and Mackenzie L. Davis | download (3lib.net)

The AGENDA - Lab #4

Maths: Algebra and trignometrics

In these Lab you will discover more about triangles and trignometrics.





Book: https://3lib.net/book/5678854/4ef54c

Maths: Algebra and trignometrics

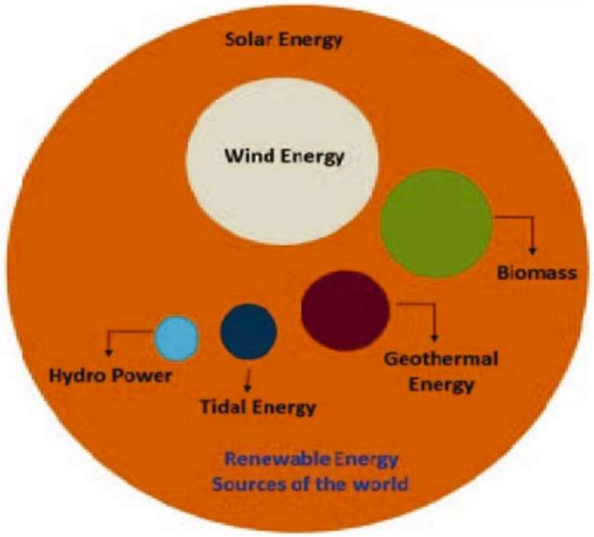
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Green energies (I): Solar. Yield of a photovoltaic panel

The AGENDA - Lab #5

Green energies (I): Solar Energy. η, Yield of a PV (photovoltaic) panel

Sizes of the blobs indicate relative abundances of different renewable energies. Solar energy in the figure is the biggest in abundance.

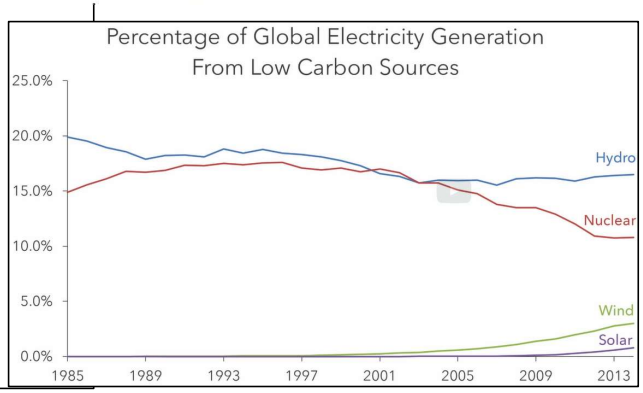


The importance of solar energy as primary energy for electricity generation increase.

Do you know how to select your PV panel?

We explain a simple way to determine the yield or efficiency of the panel by the formula:

$$\eta = \frac{\frac{W}{m^2}\ (Solar\ power\ converted\ in\ DC\ current; P = V.I)}{\frac{W}{m^2}\ (Power\ of\ solar\ radiation)}$$



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Improving Students` Motivation – Google Tools and Mobile Apps

Green energies (II): Wind. Calculate the kinetic energy

The AGENDA - Lab #6

Green energies (II): Wind. Calculate the kinetic energy.

We use an anemometer to measure the wind velocity and determine is kinetic energy.

$$Kinetic\ Energy\ (\frac{Joule}{m3}) = \frac{1}{2}.\rho(air).v^2$$



Green energies (III): Fuel cell. Operation of a PEM fuel cell

The AGENDA - Lab #7

Green energies (III): Fuel cell. Operation of a PEM fuel cell

With a fuel cell the conve

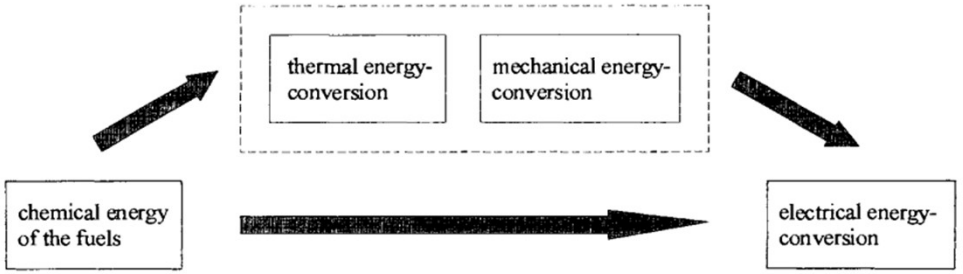
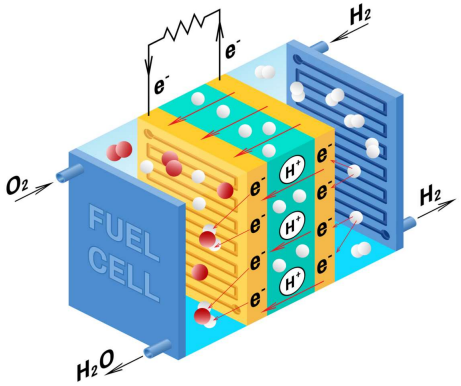


Figure 2-1. Direct Energy Conversion with Fuel Cells in comparison to Conventional Indirect Technology



You will learn to assemble a (PEM-Polymer Electrolyte Membrane) Fuel Cell, generate H_2 and O_2 and run it to obtain DC current, as NASA did.



The AGENDA - Lab #8

Robotics Sensoros and Maths: Working with the Arduino IDE, CoppeliaSimedu and RobotStudio.

How Robots Are Helping in the Fight Against Climate Change?

"… Globally, robot developers and researchers are using their passion for robotics to help the environment. One robot won't solve all of our problems, but together we can all work to make a difference. Here are 15 ways robots are fighting climate change…" How Robots Are Helping in the Fight Against Climate Change | Ozobot

If you don´t have contact yet to Robotics this lab is for you. We introduce you only the basis. Its all Mathematics and programming. Watch the video when you have time… The astounding athletic power of quadcopters | Raffaello D'Andrea - YouTube

Useful links:
RobotStudio | ABB Robotics
Downloads - Coppelia Robotics
Software | Arduino

Robotics, sensors and Maths: Working with Arduino IDE, CoppeliaSimedu and RobotStudio