**MATHS ACTIVITY**

WHAT REALLY *MATH*TERS:

SAFETY AND ENERGY

**THURSDAY, 8th February 2018.** 1st Session:

**WARNING! THE WARMING!**

* Compare the three safest family cars in 2017, according to Euroncap (<https://www.euroncap.com>).
* Report your results after this short web research.

**GOING THE DISTANCE**

About the safe following distance.

* Study of the braking

*When speaking of Supercars, all the attention is usually focused on speed and acceleration from 0 to 100 km/h.*

*The German fortnightly magazine Auto Motor und Sport has instead reversed the vantage point, focusing on braking. In particular, the aim was to find a response to the following question: "How much space do the best cars in the world need to come to a stop from a speed of 100 km/h?"*

* + *The best result came from the Porsche 911 GT3 (991), the only one to break the barrier of 31 metres: its mark was 30.7 metres, 30 centimetres less than its pursuers*
* http://www.brembo.com/en/company/news/50-special
* Calculate the brake-acceleration in SI units for this supercar.
* Considering the calculated acceleration as a constant, calculate the distances travelled by this car when slowing down, from different initial speeds (10 km/h, 20 km/h, 30 km/h,... 120 km/h, 130 km/h, 140 km/h).
  + Use Google Spreadsheets
  + Make a graph
  + Add a graph considering the distance travelled as a math function (initial speed as independent variable).

**ENERGY BRAINSTORMING**

* How much fuel does a car need to speed up from 0 to 100 km/h? Does it depend on the time? What other variable or variables do we need to know?
* Yes, it depends on the fuel as well. So, consider some different substances: gasoline, gas-oil (diesel fuel), biofuels (ethanol, biodiesel), others.
* Work-energy theorem ([wikipedia](https://en.wikipedia.org/wiki/Work_(physics)#Work%E2%80%93energy_principle), [lumen](https://courses.lumenlearning.com/boundless-physics/chapter/work-energy-theorem/)).
* From Wh to joules.
* Choose a real commercial car, and get the specific answer for the previous question.
* Study how mass affects the fuel consumption. Design tables and graphs.
* Report your results comparing the money involved in each one. Compare the results with the price of electricity. Is it good for our ***pockets*** to use electric cars in real life?
* Brainstorming for clean energy: think of different and creative ways to get a toy car to move. Try to consider in your answer gravitational interaction, electric energy, magnetism, elastic forces, air propulsione, waves, etc.
  + Make a list with your ideas. The longer the list is, the better.
  + Think about how to implement your ideas. You have some days until the next session (Monday, 12nd february) to get the things you need for the car to move with clean energy.

**MONDAY, 12nd February 2018.** 2nd Session: ENGINEERING!!

You have the great responsibility of informing the World about clean energy for cars that you propose. In this session it is the time of playing with a given toy car and try to get it to travel as long as possible, using creative solutions. It doesn't matter if the solutions you propose are not useful. That’s not the important thing; what matters is to work creatively.

Prepare for this session the material that your team will need to make the car move.

You will need to register the data (space and time, others) in order to compare the different options of your team, and also with the other team. We’ll see who wins!