eTwinning	LICEO LINGUISTICO STATALE DANTE ALIGHIERI CESENA	DE BRON VRIJE ASO.SCHOOL

Mars, here we come …

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EXPERIMENT: generating gravity

RESEARCH QUESTION

On a long spacetrip astronauts want to generate gravity, so that they experience less problems. To do this, they can spin their spacecraft.

- How is gravity changing if you change the velocity of a turning mass? ? If the velocity increases the gravity increases while if the velocity decreases the gravity decreases.
- How is gravity changing if you change the radius of the circle made by a turning mass? If the radius gets bigger the gravity increases while if the radius gets smaller the gravity decreases.

HYPOTHESIS (indicate the correct answer)

- If you want to keep a bigger mass (m') at the same height (see figure), you have to turn the rubber caps *quicker*.
- If you turn the rubber caps quicker, the radius of the circle in which the rubber caps turns, becomes *bigger.* For this experiment, you keep the mass m' constant.

MATERIAL

- Little glass tube with nylon thread
- Different masses
- Rubber caps
- Chronometer

OPERATION OF THE EXPERIMENT

- Turn the rubber caps around in a circular motion, make sure you keep the radius constant. Measure the time you need to make 10 tours.
- Attach an other mass m' and repeat the experiment. Repeat it with 4 different masses.
- Now attach the first mass m' again and repeat the experiment. However, now turn faster.

THE RESULTS:

❖ Doing the experiment

➢ Bring the rubber caps in a uniform circular motion and keep the radius constant. To be sure that the movement is really a uniform circular motion, you have to take care that, during the movement, the mark on the nylon thread remains at the same hight like the mark on the little glass tube.

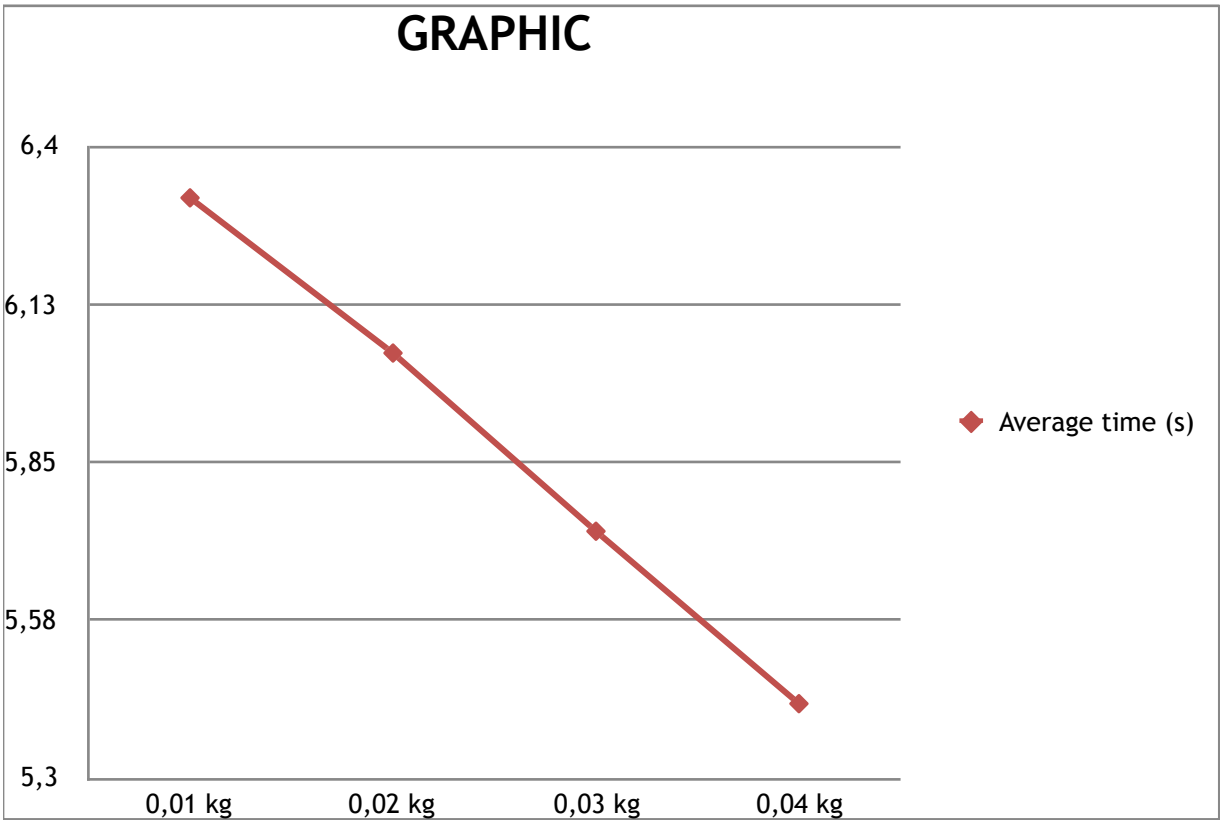
➢ Measure the time you need to make 10 turns exactly. Do the measurement two times. If the deviation is too big (more than 0,3 s), then do a third measurement. Of these possible three measurements, take the two that are the closest to each other.
Then take the average of the two measured times.

➢ Repeat this experiment with other masses m', the rubber caps remain the same. You have to do the experiment with four different masses.

❖ Complete the chart

Mass m' (kg)	Time 1 (s)	Time 2 (s)	Average time (s)
0,01	6.21	6.40	6.31
0,02	5.98	6.09	6.04
0,03	5.69	5.76	5.73
0,04	5.30	5.56	5.43

❖ Make a graph (excel) of the time in function of the mass m'. Copy the graph in this document.



❖ Put the first mass m' on the thread again and spin quicker than the first time. Look what happens.

CONCLUSIONS

- The heavier the mass that pulls down the rubber caps, the quicker you have to turn.

- If you turn quicker, the mass m' rises

REFLECTION

- Using the conclusions, you can conclude how you can change gravity by spinning a mass. Describe this below and explain how you come to this conclusion.

  If the mass that pulls down the rubber caps is heavier you have to turn quicker in order to mantain the radius constant while the velocity increases but the time decreases because velocity and time are inversely proportional. We came to this conclusions analysing the information in the chart.

- Compare your results with the results in the other school. Do they conclude the same?

We compared the results with the other group and they were very similar to ours even if they used bigger masses. Both experiments conclude that the velocity of a turning mass increases if the weight is bigger while the time decreases because less seconds are needed to make 10 turns, infact time and velocity are inversely proportional so if one increases the other decrease. Thanks to this experiment we were able to see how astronauts generate gravity in the space.