



My
interdisciplinary
project

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Why I
decided to
take physics
?

I thought about math or physics as my subject and I chose physics because the project looked a lot more interesting than the math topic, and also I was only one who chose the physics topic so I feel more special about that.



How did I start ?

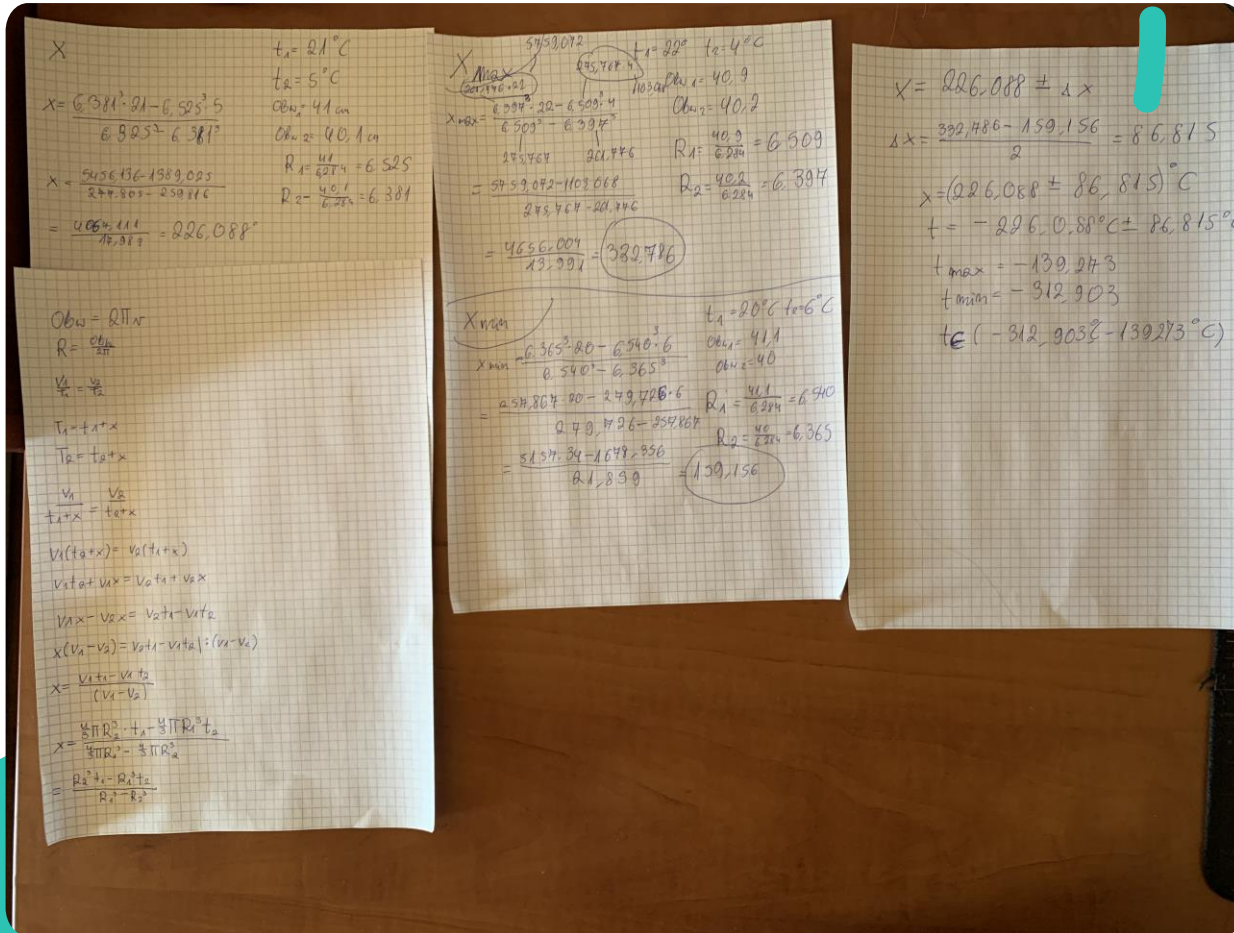
My goal was to determine the absolute zero temperature from the change in volume of the balloon as the temperature was lowered. To begin with I talked with my physics teacher, Jakub Sadurski about how to do the practical part of the experiment and it was explained to me in great detail.

Then I got the necessary accessories needed to perform the experiment and it was a balloon in the shape of a ball, a tailor's ruler and a thermometer.



Course of experiment

The whole practical part of the experiment unfortunately didn't go smoothly and according to plan.



My reflexion

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My goal for this project was to do an experiment so that I could determine the temperature of absolute zero in celsius temperature scale. The value of the absolute zero equals -273 celsius degrees.

My method assumed that by using a balloon in the shape of sphere and examining the change in its volume with decreasing temperature, I would be able to calculate the value of absolute zero. To do that, I to do this, I should have known basic knowledge from thermodynamics, especially the types of gas transformations.

First of all, I inflated the balloon and measured its circumference using a tailor's ruler and after that I put it into my fridge for as long as it took until the temperature of the balloon equaled the temperature inside the fridge. The air in the ballon had undergone an isobaric transformation. To measure the temperature of the balloon I used a regular thermometer. The low temperature affected the reduction of the balloon volume. Then when I had the temperature and volume before, and after the experiment, I calculated the absolute zero value by substituting into the appropriately transformed formula for the relation between volume and temperature. I also had to use the least positive case method to accurately estimate measurement errors and find the possible smallest as well as largest value of X (absolute zero). The value of absolute zero temperature was fortunately within the limits of the measurement error. All calculations are in the posted photos.

To conclude everything, the whole practical part of the experiment went quite well, because of the overall conclusion is in line with professional calculations. Measurement errors resulted from the fact that 1 millimeter means a big difference in measurements, and it is easy to make a mistake in such an experiment. In professional measurements it is important to measure the volume accurately.

Bibliography:

-jamboard physics table

-my own knowledge

-english wikipedia

$$t = -273^{\circ}\text{C} \quad (\underline{T = 0\text{K}})$$

$$t_1 = 22^{\circ}\text{C} \rightarrow V_1 = \dots$$

$$t_2 = 4^{\circ}\text{C} \rightarrow V_2 = \dots$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$T = t + x$$

↓

$$277\text{K} = 4^{\circ}\text{C} + \underline{\underline{273}}$$

$$T_1 = t_1 + x$$

$$T_2 = t_2 + x$$

$$x = (308 \pm 42)^{\circ}\text{C}$$

$$x =$$

$\frac{V}{T}$ ↓

Bibliography

- the jamboard table
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- english wikipedia



Thanks for your
attention