ROCOCO
ROBOTICS CORRESPONDENCE COMPETITION

Task 3 (March)

Fresh Air to the Classrooms

We spend many hours every day inside classrooms. We learn, think, discuss, and solve problems together. But have you ever wondered whether the air we breathe and the space we share are really sufficient for healthy learning? Fresh air and enough personal space are not just matters of comfort — they directly influence concentration, performance, and well-being. High carbon dioxide levels can cause tiredness and headaches, and overcrowded rooms make it harder to focus and work effectively. Modern building standards define minimum requirements for floor area and air volume per person to ensure safe and healthy indoor environments.

Now it's your turn: Your challenge is to turn your robot into a scientific assistant and investigate whether your classroom meets these requirements. Use your **mBot2 robot to measure the dimensions** of your classroom. Determine the *length, width,* and *height* of the room. You may use creative measurement strategies — for example, measuring distances by counting wheel rotations or using onboard sensors — but your method must be clearly explained in your documentation. Think about creative use of the sensors you have. Measurement doesn't have to be fully autonomous, you can move the robot also manually.

Then, calculate (better - the robot will do the math) the total **floor area** and the total **room volume** and use the following minimum requirements from the standards: **2 m²** of floor area per student and **6 m³** of room volume per student. Estimate the maximum number of students allowed in your classroom based on available free floor area and available room volume. Compare the two results and determine which condition is more restrictive. Based on your calculations, evaluate whether the current number of students in your classroom meets the recommended limits.

Your submission must include a scaled drawing of the classroom with clearly marked dimensions, all calculation steps (area, volume, per-student limits) and a final justified conclusion. Of course, a video demonstrating the measurement process and the complete program used to control the robot is compulsory again.

Bonus challenges: Determine the actually free floor area by subtracting the space occupied by desks, cabinets, or other permanent furniture. The way you estimate or measure the occupied space must also be documented and justified. Estimate how quickly carbon dioxide concentration could increase in a fully occupied classroom without ventilation and propose a simple strategy (such as regular window opening intervals) to maintain healthy air quality.

Illustration photo by GeminiAI