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2026 Team First

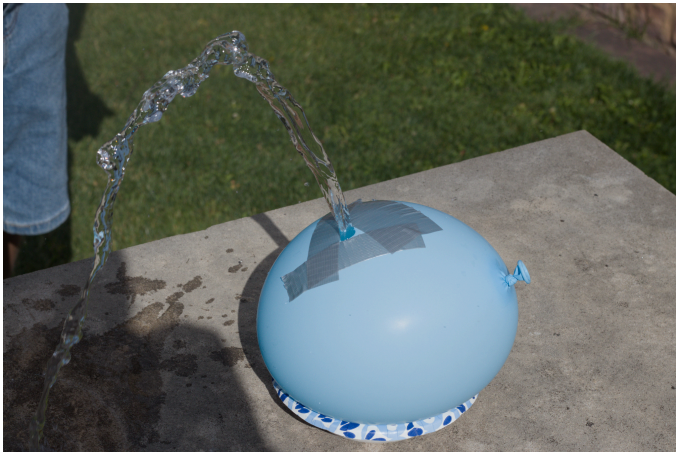
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2026 Team First Report

Introduction

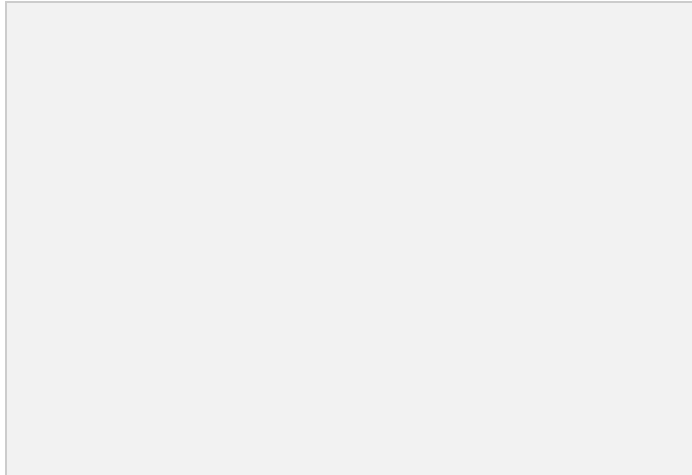
For the Team First project, my group decided to photograph water leaving a small hole in a water balloon. We wanted to capture the water's laminar flow and any reflections of the surroundings. We worked outside the Miramontes Baca Education building for the nice



background and the natural sunlight. My team used tape to make a hole in the balloon without popping it, which made the flow leaving the balloon laminar after a short period. During this attempt, I set up the apparatus and made the hole while my two teammates took pictures.

Fluid Analysis

My group used a bowl to hold the water-filled balloon and keep it stable. We used tape to keep the balloon intact while creating a hole. We took the image immediately after we made a hole in the balloon, so the flow was turbulent before it became laminar over time.



(Orlando Science Center)

The forces acting on the water are the pressure built up inside the balloon as the rubber squeezes inward, and gravity acting downward on the flow.

$$Re = \frac{\rho * V * L}{\mu} = \frac{998 \text{ kg/m}^3 * 0.5 \text{ m/s} * 0.005 \text{ m}}{0.001 \text{ Pa-s}} = 2,500$$

ρ - Density

V - Velocity

L - Diameter

μ - Dynamic Viscosity

The Reynolds number describes whether a fluid is in turbulent or laminar flow. It uses density, fluid velocity, stream diameter, and dynamic viscosity to determine this. When the Reynolds number is between 2,300 and 4,000, the flow is laminar (NASA). I looked at the velocity at the top of the flow, as that is where it is most likely to be turbulent. My calculations show the flow is barely laminar, which matches the image.

Imaging Techniques

The picture was taken outside the Miramontes Education building using all natural lighting and no shading. It was at approximately 2pm so the sun was pretty much directly above the apparatus. The image was taken by Elijah Jones using a digital camera, the Canon ESO 80D



using a Canon EF 50mm f/1.8 STM lens.

The field of view was 30.0° diagonally (25.14° horizontally and 16.95° vertically).

The distance to the object was about 1.25 meters away. The focal length is 50 mm.

The original image dimensions are (width by height) 6014 by 4010 and the final image dimensions are 2664 by 1595 pixels. Aperture is f/10.0 is 1/1000, the shutter speed is 1/250, the ISO is 200. I changed increased the radius of sharpness to 3.5, the amount of sharpness to .74, as well as decreasing the exposure to -0.78. I edited the photo so that the stream was clearer with more detail in the turbulent regions.

Reflection

The image shows me more detail of the laminar flow from water balloons and how it does not always start out laminar. The picture shows how the flow changes in the arc as its velocity decreases due to gravity. If I could take the picture again, I would edit it so it doesn't look quite so plastic while maintaining the definition. I think the physics are shown better in the original image because of having the balloon in frame however, I like that there is less distractions in the image.

Citations

Orlando Scientific Center (2021) <https://www.osc.org/demonstrate-laminar-flow-at-home/>

NASA <https://www.grc.nasa.gov/www/k-12/airplane/reynolds.html>