Problems for the 14th IYNT 2026

In fact, although the general tournament, in which all knights fought at once, was more dangerous than single encounters, they were, nevertheless, more frequented and practised by the chivalry of the age.
Ivanhoe, Sir Walter Scott

Main Problems for Science Fight 1

1. Aztec Death Whistle
A so called Aztec Death Whistle creates a scary sound similar to a human scream. Produce such a toy. Investigate its sound and study how human listeners perceive such a sound.

2. Mysterious precipitate
Saturated solutions of KNO_3, K_2SO_4 and $Fe_2(SO_4)_3$ are prepared at 80 ºC. Equal volumes of these three solutions are mixed together and then cooled down to a certain temperature. How does the composition of the observed precipitate depend on the final temperature?

3. Life cycle of a butterfly
Observe in controlled conditions the stages of metamorphosis from caterpillar to butterfly for the species of your choice. How much do caterpillars eat before they morph into a chrysalis?

4. Flowing through a sieve
If placed atop a mesh with small openings, a layer of dry granulated sugar easily flows through. Grind the sugar into a fine powder and place it atop the same mesh without shaking. Does it flow through? Investigate what parameters affect the ability of powders to flow through a sieve.

5. Glowing red hot
If a needle is heated by a candle or a gas stove burner, the metal starts to glow. How does the observed color of the glowing needle depend on its temperature?

6. Wrinkly fingers
If fingers or toes are soaked in water, the skin wrinkles. Perform experiments to validate or invalidate various possible mechanisms for this effect. Collect data to show how properties of wrinkled fingers or toes depend on relevant parameters.

Main Problems for Science Fight 2

7. Piercing space
A sheet of thin paper is crumpled into a ball and pierced with a long needle. When unfolded, the sheet will have a certain number of holes. What factors affect the observed number and positions of holes?

8. Sticky solutions
Sugar syrup is sticky, but many other common solutions are not. Why? What quantitative parameters allow describing how sticky a solution is?

9. Moldy bread
Investigate how temperature, moisture, light, and access to fresh air affect mold growth in bread.

10. Leaky boat
The hull of a toy boat is made from a metal mesh. Although such a boat sinks in water, it will stay afloat if the hull if covered with a hydrophobic coating, e.g. paraffin wax spray. What extra weight can such a boat carry before sinking?

11. Nylon rope
A long nylon rope can be produced using an aqueous solution of hexamethylene diamine and a solution of sebacoyl chloride in cyclohexane. Make a demonstration of how such a synthesis works. Can one replace the reagents with other similar compounds? Study the factors that affect the physical properties and chemical composition of the resulting material.

12. Illusory taste
Use tasteless food coloring to prepare several samples of the same drink that differ only in color. Ask human volunteers to taste these drinks in controlled conditions. Investigate whether your results are sufficient to conclude that color influences the perceived taste of food or drinks.

Problems *Invent Yourself* for Science Fight 3

13. Invent Yourself: Spiders
Propose an experimental problem focused on spiders or spider webs.

14. Invent Yourself: Rubber mechanics
Formulate an experimental problem involving stretched or twisted rubber bands or membranes.

15. Invent Yourself: Bird feeder
A feeder attracts birds and can be used to collect various data about endemic bird species, their physiology and population dynamics. Suggest a problem concerning particular findings that can be made with a bird feeder.

16. Invent Yourself: Electroplating
If direct current passes through a salt solution, a metal layer can form on the electrode. Come up with a problem about chemical and physical aspects of electroplating a metal object.

17. Invent Yourself: Ringelmann effect
Although team work is expected to increase productivity, it may occur that in some cases a group performs a task slower than expected. Propose a study into a situation where the Ringelmann effect may be significant.

The problems are authored by Nikita Chernikov, Artem Golomolzin, Ilya Martchenko, and Alex Mirkin. Selected, prepared, and edited by Ilya Martchenko and Nikita Chernikov. This official set of problems for the 14th IYNT 2026 is approved by General Council of the IYNT and can be used only at the events endorsed by the General Council of the IYNT.

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