Original statements of problems *Invent Yourself* for SF 3

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Croatia

13. Hearing. Each speaker can pronounce a vowel on several pitches, yet a listener is likely to recognise the phoneme. Astonishing auditory illusions (e.g. Yanny and Laurel), so called mondegreens, experiences demonstrate nevertheless that listeners perceive sounds, words and phrases differently.
Propose a problem that connects speech perception and physical differences between people.

14. Chemical oscillators. Example of an oscillating chemical reaction is the Manganese-catalyzed Bromate-Malonic Acid reaction which results in periodic color changes. Investigate how temperature and turbulation affect the velocity of the chemical reaction, number of oscillations and colour intensity.

15. Tasting food. Taste can be divided into five main categories, Investigate how detection of each one depends on concentration and temperature of different ingredients.

16. Soap production. Vegetable and animal oils are historically used to make soap. Produce home-made soaps from easily accessible ingredients and investigate how physical and chemical properties of soap depend on relevant parameters.

17. Weight. The weight of a living organism is not constant due to effect of different parameters, such as gender and menstrual cycle. Investigate how relevant parameters affect long-term and short-term variations in the total body mass of a living organism.

Georgia

13. Hearing. There are a lot of interesting hearing illusions as well as hearing exercises. Test some of already known illusions and exercises and create your own.

14. Chemical oscillators. Determine how temperature and concentrations affect the period of Bray-Liebhafsky reaction.

15. Tasting food. There are ways you can "Hack" one's perception of taste (for example, taking away their ability to smell, vision or even food items like toothpaste, cold water and others). Investigate such ways and see how much of a difference they're able to make.

16. Soap production. There are a lot of different recipes to make soap from scratch. Depending on how they're made or how long they've had to dry, they last different amount of times. Investigate this phenomenon and see how such soaps hold up under constantly running water.

17. Weight. Produce different living conditions for several hamsters of same species. Different conditions consist of different daily diets and routines. Investigate how these conditions affect weight of hamsters.

Greece-Anatolia

13. Hearing. In 2018, an audio "illusion" called "Yanny or Laurel" was posted on Reddit and soon went viral.

14. Chemical oscillators. Investigate how temperature affects the color in Belousov-Zhabotinsky reaction.

15. Tasting food. Volunteers are given the task to try out 2 glasses of lemon-water in order to test how taste is affected by odor.

16. Soap production. Create different types of soap and investigate their properties.

17. Weight. Infants weight varies in the first months of their lives. What are the major factors that affect the infant's weight? What is the average baby weight per month?

Greece-Fryganiotis

13. Hearing. Investigate the differences between the sounds "B" and "P" and how well people of different groups can tell the difference between them.

14. Chemical oscillators. Create and investigate the properties of a simple chemical oscillator.

15. Tasting food. Investigate how different age groups taste food.

16. Soap production. Investigate the differences between soaps using as base NaOH (hard soaps) or KOH (soft soaps).

17. Weight. Investigate the changes in weight of plants.

Greece-Pinewood

13. Hearing. Each speaker can pronounce a vowel on several pitches, yet a listener is likely to recognize the phoneme (e.g. /o:/ or /u:/). Astonishing auditory illusions (e.g. Yanny and Laurel), so called mondegreens, and experiences of persons with poor hearing demonstrate nevertheless that listeners perceive sounds, words and phrases differently. Investigate how people of different ages comprehend the same spoken phrase.

14. Chemical oscillators. Examples of oscillating chemical reactions are the Briggs-Rauscher reaction or the Belousov- Zhabotinsky reaction which result in periodic color changes. While some of such reactions are difficult to reproduce, there are multiple ways to produce a simpler and more reliable chemical oscillator. Investigate the effect of temperature on the oscillating Briggs Rauscher reaction.

15. Tasting food. Volunteers are given the task to judge the taste of food samples using a quantitative parameter. The results may depend on multiple factors (e.g. hunger or satiety, age of individuals, or temperature of food). Can you differentiate between normal sensory function, ageusia, and type I, II and III hypogeusia?

16. Soap production. Vegetable and animal oils and fats are historically used to make soap. Investigate how the fatty acid composition of fats influences the properties of soap produced by saponification. What are the factors that affect the mass and pH of soap after maturity, as well as the lather produced in soft and hard water?

17. Weight. The weight of a living organism is not constant. Investigate how age and gender affect the short term weight changes.

Greece-Raptou

13. Hearing. Different people may hear certain phrases differently. Propose which people are more likely to mishear words or phrases.

14. Chemical oscillators. Investigate the parameters that affect a chemical oscillator.

15. Tasting food. Investigate the differences in taste between different age groups.

16. Soap production. Investigate which parameters affect the hardness and other parameters of soap.

17. Weight. Investigate the changes in human's weight in various cases.

Kazakhstan-Almaty

13. Hearing. Investigate the influence of nationalities of people to their hearing and speaking abilities.

14. Chemical oscillators. Investigate the effects of different parameters on color change on the oscillator.

15. Tasting food. Investigate the influence of the state of hunger or satiety to testing food.

16. Soap production. Investigate the influence of concentration of different fats on properties of soap.

17. Weight. Investigate the influence of stress on the total mass of the living organism.

Kazakhstan-RFMS

13. Hearing. Investigate the influence of ages of people to their hearing and speaking abilities.

14. Chemical oscillators. Investigate the different parameters of a chemical oscillator.

15. Tasting food. Investigate the influence of the ages of people to testing food.

16. Soap production. Investigate the influence of concentration of different fats on properties of soap.

17. Weight. Investigate the influence of ages on the total mass of living organisms.

Romania-RADIX

13. Hearing. Create your own auditory illusion based on other viral auditory illusions and study the perception of various testing subjects.

14. Chemical oscillators. Study the cycle time* and its variation when changing the reactants concentration and the temperature in both the traffic light experiment and the blue bottle experiment.
*cycle time = elapsed time from the moment I started shaking the solution to the moment when it gets back to its original state.

15. Tasting food. Study how various parameters affect the perception of taste. Investigate the effects of state of matter, the role of olfaction, the alteration of taste receptors etc.

16. Soap production. Investigate how different types of lye solutions affect the properties of liquid and solid soap.

17. Weight. Investigate how the weight of a plant varies over a period of time. Apply a similar study for a small animal and interpret the results.

Russia-Element

13. Hearing. Think of a dress that some People saw as white and gold, and others as black with blue stripes - it's an illusion. It also happens with words. People sitting next to each other can hear the same word in different ways. Suggest an auditory illusion and the factors that affect it.

14. Chemical oscillators. Study reactions that can cause fluctuations in reagent concentrations, the formation of complex ordered structures (dissipative structures), and explore the role of related parameters.

15. Tasting food. Sometimes only when you smell or see a product, you want to eat it immediately. Suggest product parameters that affect its taste perception.

16. Soap production. Many disinfectant Soaps dry your hands by killing bacteria. Suggest a recipe for soap that not only sanitizes, but also moisturizes your hands.

17. Weight. To study the influence of various factors on changes in the weight of the selected organism.

Russia-Island 418

13. Hearing. Investigate the problem of the perception of alternating consonants in words in depending speed of pronunciation.

14. Chemical oscillators. Physical oscillators (pendulums, oscillatory circuit, etc.) are used to measure time, for example - a clock on a quartz stone. Suggest a way to use a chemical oscillator you know to measure time. Explore the parameters that affect the accuracy and reliability of such a "chemical watch".

15. Tasting food. As people say even stale black bread with salt can be tastier than cake. Explore under what conditions this is possible.

16. Soap production. Offer a technology for the production of detergents in self-isolation at a dacha in Tver.

17. The weight. Fitness trainers and nutritionists (experts in healthy eating) are arguing: is it really necessary to measure it daily to control body weight? Some of them consider this approach unnecessary and even harmful. State well-founded arguments in favor of a particular position and confirm or refute them by experiment.

Russia-Maximum

13. Hearing. How can a person's age affect their hearing and speech perception?

14. Chemical oscillators. What is the way to create a simple chemical oscillator and how do its constituent elements affect its properties?

15. Tasting food. How do people of different ages and different degrees of satiety perceive the taste of food that differs in temperature?

16. Soap production. What are the simplest methods of obtaining Soaps from natural raw materials that have a positive effect on the skin, have an interesting color and smell?

17. Weight. What factors can affect the change in weight and total weight? How does this happen?

Russia-Uranium-239

13. Hearing. Research of the influence of pronunciation features, presence of extraneous noise and spectral composition of the voice on the accuracy of speech recognition by artificial intelligence.

14. Chemical oscillators. Creating a working chemical oscillator based on the "Traffic light" reaction".

15. Tasting food. Study of the possibility of the influence of various factors on the taste perception of food using the A/B test.

16. Soap production. How to make antibacterial soap at home.

17. Weight. Investigation of short-and long-term changes in body weight based on data obtained from a fitness tracker.

Switzerland

13. Hearing. Pitch is perceived differently. Investigate the interpretation of pitch and the way humans are able to recognize sound and perceive speech. How does this impact conversation?

14. Chemical oscillators. One example of oscillatory reactions are the Briggs Rauscher reactions. Determine the effects of adding antioxidants to such a reaction and investigate if such a reaction can be used to obtain the antioxidant content of fruits.

15. Tasting food. The different aspects of food perception can be grouped into physiological and psychological effects. Determine to what extend factors from both groups influence the taste and which of them is stronger.

16. Soap production. Soap can be produced from vegetable and animal oils and fats. Produce soap from natural ingredients and different fats and oils available in your household. Compare the differences of physical and chemical properties of the produced soaps.

17. Weight. During the COVID-19 lockdown, most of our social live, sports classes and PE lessons stopped. Investigate how a personal activity plan influences the development of your body weight in comparison to others, that do not follow a strict plan. Include your nutrition plan in the analysis.