Original statements of problems *Invent Yourself* for SF 3

10th IYNT 2022
Released on August 17, 2022
Updated on August 23, 2022

Bulgaria-Team A

13. Naming colors
Investigate how the name of a color, given by a large sample of people, depends on the coordinates of this color in the Munsell diagram.

14. Wave optics
Use some wave optical phenomenon to measure the refractive index of a transparent material.

15. Biological clock
Investigate factors having influence on the plants' circadian rhythms.

16. Flying seeds
Investigate the free fall of a seed from a plant of your choice.

17. Principle of least effort
Use the principle of least effort to investigate the time for motion of a body between two points.

Bulgaria-Team B

13. Naming colors
Investigate the correlation between the name of a color, given by a significant number of volunteers, and its coordinates in the Munsell diagram.

14. Wave optics
Investigate a physical property of celestial objects using wave-optics phenomena.

15. Biological clock
Investigate the effects of external factors on the circadian rhythm of plants.

16. Flying seeds
Investigate the aerodynamic properties of a seed from a plant of your choice.

17. Principle of least effort
Use the principle of least effort to predict the time needed by a body to travel between two points. Investigate this motion experimentally.

Croatia

13. Naming colors
A Munsell color chart cab be used to survey volunteers about their perception of different colors. Using a color test, investigate how its results depend on volunteers’ sex and presence of color blindness in controlled conditions.

14. Wave optics
Use wave optics for measuring thickness of human hair and compare different hair types.

15. Biological clock
Examples of timing processes in living organisms are plants opening their flowers at particular times of the day or timing (organizing) their growth based on the environment. Investigate how increased time period of light exposure and effects of drought, affect the plant's biological clock.

16. Flying seeds
It is interesting to observe how maple and hornbeam seeds spin when falling to the ground, so investigate which wind velocity and wind orientation is most suitable for spreading of maple and hornbeam seeds over longest distances?

17. Principle of least effort
Zipf's law describes how the frequency of a word in natural language, is dependent on its rank in the frequency table. Investigate how Zipf's law appears in different literature time periods.

Georgia-National

13. Naming colors
Using a Munsell chart, investigate how the human eye perceives changes in contrast of two colours as ambient light changes.

14. Wave optics
Determine the diameter of thin object with light interference.

15. Biological clock
Examples of timing processes in living organisms are that plants opening their flowers or closing their leaves at particular times of the day. Perform experiments to investigate biological clock in the plants.

16. Flying seeds
Its interesting to observe how ash seeds spin when falling to the ground. Study the motion of ash seeds and investigate parameters that affect phenomenon.

17. Principle of least effort
Propose an interesting experimental test of how light chooses least resistance way during refraction, and study this motion.

Georgia-Vekua

13. Naming colors
A Munsell color chart is used to survey volunteers about their perception of different colors. Investigate how individuals categorize visible colors and then naming them from different countries, different cultures or considering different parameters.

14. Wave optics
Measure the thickness of a thin object using wave optics.

15. Biological clock
It is interesting to observe how the tulip closes and opens its flower during the day. investigate this effect.

16. Flying seeds
It is interesting to observe how the maple seed spins when falling to the ground. Study this phenomenon and investigate the parameters that determine such rotation.

17. Principle of least effort
As we know a complex natural system chooses the path of least resistance in particular settings or situations. Measure light wave velocity in water and examine the parameters that determine the occurrence.

Greece

13. Naming colors
Investigate the factors that affect how well a person can recognize different color shades.

14. Wave optics
Use Snell's Law to study the refraction index of salted water.

15. Biological clock
Propose a problem concerning rhythms and timing in teenagers' (15-16 years old) sleep patterns.

16. Flying seeds
Investigate the parameters that affect the flight of wheat seeds.

17. Principle of least effort
Like many other physical systems, soap bubbles and soap films minimize energy, by minimizing their surface area (minimal surface area). Investigate this phenomenon theoretically and experimentally.

Iran

13. Naming colors
In this question, for the theory part, we have to talk about the Munsell color chart and the occipital lobe, we also have to talk about the primary color, and on the other hand, we have to say how to read Munsell color chart.
And for the rest, we have to choose 9 colors and all 3 colors red, blue and green should be more in each of the 9 selected colors. Also, we need a statistical population of people to take the tests from them.

14. Wave optics
If we drop a stone into the stagnant water of a pond, a circular wave is created on the surface of the water that travels in all directions. Here, the wave fronts are in the form of circles, the place where the stone lands in the water is their center, and they spread on the surface of the water. If two stones are thrown into the water at a distance from each other at the same time, a wave will be created at the intersection of the two fronts, we will see the superposition of the waves and as a result interference. In the same way, when two beams of coherent light reach a region of space at the same time, two waves interfere in the place where they overlap. As a result, at the overlap of two light beams, light and dark interference bands will be created, which is known as an interference pattern.

15. Biological clock
Examples of biological clocks and timing devices in people, plants, animals, microbes and many other living species that are based and organized by the day-cycle and react to light which affect

the organism's activities like sleep in humans and animals or plants opening and closing their petals and flowers throughout the day. Different flowers in different situations with considering different parameters are investigated.

16. Flying seeds
Seeds from plants like dandelions, swan plants and cottonwood trees are light and have feathery bristles and can be carried long distances by the wind. Some plants, like kauri and maple trees, have 'winged' seeds. They don't float away but flutter to the ground. The shape of the seed, and its falling distance with the speed of rotation should be considered.

17. Principle of least effort
Natural systems are ecosystems, the water cycle, water catchment and the 'three waters',... if we want to say and choose path of least resistance for those systems the climate, geographical location and human factors in that area are important parameters.

Kazakhstan-Bobek

13. Naming colors
To study the individual perception of different colors using the example of different age groups and draw conclusions.

14. Wave optics
If we shine light through a foil with two slits, and put a projection screen behind it, then we will see not two stripes on it, as many people think, but many. Explore this experiment . And also explain why photons- particles of light behave completely differently in the same experiment?

15. Biological clock
Study human circadian rhythms and identify the daily dynamics of changes in the total leukocytosis index in the blood.

16. Flying seeds
Maple seeds are propagated by the wind, they can circle in the air for a long time and wind distant distances. Study the influence of factors on the flight of seeds.

17. Principle of least effort
Experience, using water as an example, to demonstrate empirically using the example of water, how a complex natural system is looking for a path with the least resistance.

Kazakhstan-RFMS

13. Naming colors
Investigate and describe the influence of natural day colors to organism of human body.

14. Wave optics
Study Young's experiment of wave interference and refraction. Analyze the differences in the behavior of this experiment for photons and waves.

15. Biological clock
Investigate and describe the violation of the human biological clock and give examples.

16. Flying seeds
Investigate and describe characteristics and movements of helicopter seeds.

17. Principle of least effort
Research and estimate the path of least resistance under the condition of the laser beam.

Romania-Limitless 3.0

13. Naming colors
Propose an experiment which factors influence a healthy human's perception of color.

14. Wave optics
Study Young's interference experiment (the classical wave optics formulation of the Double- slit experiment). Find parameters and optical instruments (such as convergent lenses or mirrors) that influence the interference pattern. Can this principle of interference be applied to other areas of physics unrelated to optics?

15. Biological clock
The question arises: is there an equivalent of people's perception of the time zone in the case of plants?

16. Flying seeds
What are the parameters that have an impact on the flight of a maple seed?

17. Principle of least effort
Find parameters that influence the decision time in regards to the principle of least effort applied to a cat's positioning of food.

Romania-Starry Night

13. Naming colors
Examine hue, saturation, and brightness to determine which combination of them most attracts the eye.

14. Wave optics
Analyze the pattern produced by Young's double slit experiment in function of the relevant parameters.

15. Biological clock
Flowers have their own rhythm and timings based on their own biological clocks. Investigate what happens when this cycle is disrupted.

16. Flying seeds
Investigate the aerodynamic mechanisms of the Acer platanoides (maple) seeds and describe the particularities of their flight.

17. Principle of least effort
Prove through 3 different experiments that the principle of least effort has always played a major role in human evolution and behavior. Investigate all possible circumstances in which the principle is present in the environment and beyond.

Uganda-Ignites

13. Naming colors
Investigating the factors that affect colour naming in humans.

14. Wave optics
Studying effects of unpolarised light on eyesight.

15. Biological clock
Analyse the time perception when a human is deprived of external cues for a long period of time.

16. Flying seeds
Investigate the flight of dandelion seeds.

17. Principle of least effort
Propose an experiment to investigate the path of ants in sugar. To study the individual perception of different colors using the example of different age groups and draw conclusions.

Uganda-Neptunes

13. Naming colors
Investigate color blindness with Munsell's color chart.

14. Wave optics
Analyse uses and everyday life applications of polarization.

15. Biological clock
Investigate the circadian rhythm on stomatal opening in plants specifically beans.

16. Flying seeds
Study how maple seeds cause weed problems.

17. Principle of least effort
Study how ants follow the path of least resistance.