

Proposals for future IYPT problems

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1. Honey coils

A thin downward flow of viscous liquid, such as honey, often turns itself into circular coils. Study and explain this phenomenon.

2. Coast waves

Waves on water near the coastline of large ponds move to the shore, regardless of the wind direction. In small ponds, however, waves move along the wind. Study and explain this effect. How the wave pattern depends on relevant parameters?

3. Ballpoint pen

A ballpoint pen may perfectly write on one side of a copybook page, but write badly on the other side of the same page. Explain the phenomenon and suggest how to overcome this problem.

4. Misty

In a mist, visible colors of distant objects may appear different from their natural colors. Investigate how the effect depends on relevant parameters.

5. Drill bit

A jet flowing from a paper carton of juice has often a spiral-like shape resembling a drill bit. Explain this phenomenon.

6. Pan frying

Oil on a heated frying pan often spatters and produces noise. Explain this phenomenon and study how it is influenced by presence of water.

7. Shower in a hostel

Temperature of water in a shower may sharply change if someone turns the tap in a nearby room. Investigate how the temperature surge depends on relevant parameters.

8. Energy saving light

When an energy saving fluorescent lamp is switched on in the vicinity of loudspeakers, an unexpected squeaky sound can be heard. Sometimes, the sound continues as the lamp glows. Explain this phenomenon.

9. Cooler

Despite rotating very fast, after some period of operation blades of a laptop fan are covered with a thick layer of dust. Explain this phenomenon and investigate how the thickness of dust coating grows with time.

10. Fingerprints

Fill a glass with liquid and take it in your hands. If you look from above at the inner walls of the glass, you will notice that the only thing visible through the walls is a very bright and clear image of patterns on your fingertips. Study and explain this phenomenon.

11. Light bulb in a microwave

Place a light bulb into a glass with water so that all metal contacts are below the water level. When placed into a microwave oven, the lamp in the glass will start to glow. Study and explain this phenomenon.

12. Latex glove

Fill a latex glove with sand, connect it to a vacuum pump via a filter, and carefully evacuate air from the glove. Study the mechanical properties of such a "hand".

13. Giant soap film

Propose a method to make a soap film of maximally possible surface and obtain it in a convenient room. Study the mechanical and optical properties of the film, as well as its stability.

14. Pressure and temperature

Temperatures of air inside and outside of a building may be considerably different, while pressures of the gas are equal or rapidly equalize. Study and explain this phenomenon.

15. Laser pointer

A laser pointer makes a bright spot on a screen. Study the parameters of the spot in dependence of the distance from the laser pointer. How does the spot look like if the distance reaches several kilometers (in open air)?

16. Flow direction

Water flows in a transparent tube. Propose a contactless method to determine the direction of the flow. What would change if you take a non-transparent tube?

17. Tree in the snow

In winter, there is often no snow on the ground surrounding a tree trunk, even if the snow layer is quite deep farther from the tree. Study and explain this phenomenon.

18. Vacuum in a syringe

What minimum pressure can be achieved in a common medical syringe?

19. Domino tiles

Study the propagation of the wave of falling domino tiles.

20. Brush car

Fix an eccentric vibrator on the top of large cleaning brush. When put on a table with bristles down, the brush will start moving ahead. Study and explain this effect.

21. Spot on the glass

Even in a warm room, a spot of condensate forms if someone breaths on a glass. Investigate how does the spot disappear and explain why it disappears from the edge.

22. Vinyl disk

Investigate how the quality of sound evolves after numerous playbacks of a vinyl record.

23. Paper glue

When one sheet of paper is put on top of another and ironed, the two sheets are pasted together. Investigate how this effect depends on relevant parameters, such as presence of moisture.