00A0 $\nexists$ $\subseteq$ x $\iff$ A $\surd$ B $\sqrt[3]{}$ $\oplus$ $\otimes$

HITwhPhysicsTournament Documentation

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2019 10 11

2019 3 27

Reference Kit(Working Draft) http://kit.ilyam.org/Draft_2019_IYPT_Reference_kit.pdf

CHAPTER 1

CUPT

“ ”

“ ”

CHAPTER 2

2.1

3~5 [**Report**] [**Opposite**] [**Review**]

2.2

IYPT 17 15

2.2.1

- : Explain …
- : Construct …/Design …
- : Investigate how … depends on …
- : Optimize …
-
- : Determine the condition/parameters that …
- : Investigate the phenomenon.

2.3

- IYPT http://archive.iypt.org/
- GYPT https://gypt.org/aufgaben.html
- Reference Kit http://kit.ilyam.org

- IYPT
-
- sci-hub
- Youtube “ ” onlinevideoconverter

2.4

2.4.1

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2.4.2

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- “ ”
- Mathematica
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2.5

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2.6

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- “ ”

CHAPTER 3

3.1

“ ”

“ ” “ ”

: “Not even wrong ”

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“ ” “ ”

“ ” “ ”

A,B,C……

“ ” “ ”

3.2

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CHAPTER 4

4.1

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4.2

Web of Science sci-hub .

1.
2. **(Thesis)** **(Review)**
3.
4. **(Abstract)**
5.

(Introduction) (Conclusion)

1.
2.
3.

CHAPTER 5

5.1

IYPT2018

When a drinking straw is placed in a glass of carbonated drink, it can rise up, sometimes toppling over the edge of the glass.

Investigate and explain the motion of the straw and determine the conditions under which the straw will topple.

5.1.1

(placed)

(topple over the edge) topple

topple (sometimes)

“ ”

5.1.2

“ ”

5.2

5.2.1

1.
2.
3.
4.
5. CCD

5.2.2

1.
2.

5.2.3

1.
2. “ ”
3.
4.

5.2.4

CHAPTER 6

6.1

3~5 (Report) (Opposite) (Review) / /
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6.1.1

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6.1.2

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6.1.3

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6.1.4

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6.1.5

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6.1.6

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6.1.7

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“ ” “ ” “ ”_____

6.2

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CHAPTER 7

7.1 2019

7.1.1 1. Invent yourself

Build a simple motor whose propulsion is based on corona discharge.

Investigate how the rotor's motion depends on relevant parameters and optimize your design for maximum speed at a fixed input voltage.

7.1.2 2. Aerosol

When water flows through a small aperture, an aerosol may be formed.

Investigate the parameters that determine whether an aerosol is formed rather than a jet for example.

What are the properties of the aerosol?

7.1.3 3. Undertone Sound

Allow a tuning fork or another simple oscillator to vibrate against a sheet of paper with a weak contact between them. The frequency of the resulting sound can have a lower frequency than the tuning fork's fundamental frequency.

Investigate this phenomenon.

7.1.4 4. Funnel and Ball

A light ball (e.g. ping-pong ball) can be picked up with a funnel by blowing air through it.

Explain the phenomenon and investigate the relevant parameters.

7.1.5 5. Filling Up a Bottle

When a vertical water jet enters a bottle, sound may be produced, and, as the bottle is filled up, the properties of the sound may change.

Investigate how relevant parameters of the system such as speed and dimensions of the jet, size and shape of the bottle or water temperature affect the sound.

7.1.6 6. Hurricane Balls

Two steel balls that are joined together can be spun at incredibly high frequency by first spinning them by hand and then blowing on them through a tube, e.g. a drinking straw.

Explain and investigate this phenomenon.

7.1.7 7. Loud Voices

A simple cone-shaped or horn-shaped object can be used to optimise the transfer of the human voice to a remote listener.

Investigate how the resulting acoustic output depends on relevant parameters such as the shape, size, and material of the cone.

7.1.8 8. Sci-Fi Sound

Tapping a helical spring can make a sound like a “laser shot” in a science-fiction movie.

Investigate and explain this phenomenon.

7.1.9 9. Soy Sauce Optics

Using a laser beam passing through a thin layer (about 200 μm) of soy sauce the thermal lens effect can be observed.

200

Investigate this phenomenon.

7.1.10 10. Suspended Water Wheel

Carefully place a light object, such as a Styrofoam disk, near the edge of a water jet aiming upwards. Under certain conditions, the object will start to spin while being suspended.

Investigate this phenomenon and its stability to external perturbations.

7.1.11 11. Flat Self-Assembly

Put a number of identical hard regular-shaped particles in a flat layer on top of a vibrating plate. Depending on the number of particles per unit area, they may or may not form an ordered crystal-like structure. Investigate the phenomenon.

Investigate this phenomenon.

7.1.12 12. Gyroscope Teslameter

A spinning gyroscope made from a conducting, but nonferromagnetic material slows down when placed in a magnetic field.

Investigate how the deceleration depends on relevant parameters.

7.1.13 13. Moirread Counter

When a pattern of closely spaced non-intersecting lines (with transparent gaps in between) is overlaid on a piece of woven fabric, characteristic Moiringes may be observed. Design an overlay that allows you to measure the thread count of the fabric.

Determine the accuracy for simple fabrics (e.g. linen) and investigate if the method is reliable for more complex fabrics (e.g. denim or Oxford cloth).

7.1.14 14. Looping Pendulum

Connect two loads, one heavy and one light, with a string over a horizontal rod and lift up the heavy load by pulling down the light one. Release the light load and it will sweep around the rod, keeping the heavy load from falling to the ground.

Investigate this phenomenon.

7.1.15 15. Newton's Cradle

The oscillations of a Newton's cradle will gradually decay until the spheres come to rest.

Investigate how the rate of decay of a Newton's cradle depends on relevant parameters such as the number, material, and alignment of the spheres.

7.1.16 16. Sinking Bubbles

When a container of liquid (e.g. water) oscillates vertically, it is possible that bubbles in the liquid move downwards instead of rising.

Investigate this phenomenon.

7.1.17 17. Popsicle Chain Reaction

Wooden popsicle sticks can be joined together by slightly bending each of them so that they interlock in a so-called "cobra weave" chain. When such a chain has one of its ends released, the sticks rapidly dislodge, and a wave front travels along the chain.

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Investigate the phenomenon.

7.2

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- “ ”

7.3

Mathematica Matlab

Python C++ Arduino

COMSOL Ansys Proteus

Excel Origin Tracker

Powerpoint LaTeX Beamer

Mathematica Matlab

Solidworks 3D AutoCAD 2D