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# The Effects on the Period of Compound Pendulum due to Liquid Damping

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# CONTENTS



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- **Background**
- **Objectives**
- **Research Process**
- **Timeline**



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# BACKGROUND

- Pendulum is important
  - Simple pendulum?
  - Compound pendulum?
  - With damping
- Not major
- Ideal model
- Liquid

# OBJECTIVES



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**Compound pendulum + Liquid damping**

**Calculation + Experiments: Verify formula**

**Liquid friction:**  $f = \frac{1}{2} \rho C v_s^2$

**Pendulum period:**  $T = 2\pi \sqrt{\frac{I}{mgL}}$



# RESEARCH PROCESS

## ➤ Basic assumptions

- Cross area: a square
- g value constant
- No extension
- Be soaked in liquid
- No rolling friction
- Same type of liquid: water

## ➤ Research method

- Quantitative research, Control Variables Method

## ➤ Resource needed

- Mainly from websites



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# RESEARCH PROCESS

- **1. Read papers.**
- **2. Deduce formula.**
  - extreme, normal, and boundaries
- **3. Experiment.**
  - Design, list cautions
- **4. Analyze data.**
  - plot data, draw formula answers, compare
- **5. Conclude.**
  - Mistakes? How to improve?

# TIMELINE



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2023.09-10:  
Collect references,  
work out the first  
version of formula  
about the pendulum

2023.12-24.01:  
Design experiment,  
make theoretical  
expectations, calculate  
various answers

2024.03-04:  
Analyze data, finish  
the essay, submit to  
tutor for final revision

2023.07-08:  
Determine research  
topic, make the first  
step to the question,  
have a basic  
understanding

2023.11-12:  
Study how to plot graph  
and how to meet the  
needs of experiments(e.g.  
python+3d design)

2024.01-02:  
Complete experiment,  
check if any mistakes,  
Draw graphs and  
compare the  
expectations with reality



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# Thank you for your listening

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