DELTA KNOWLEDGE

A MISSION TO SHARE SCIENCE

Cheng-You Ho

Abstract

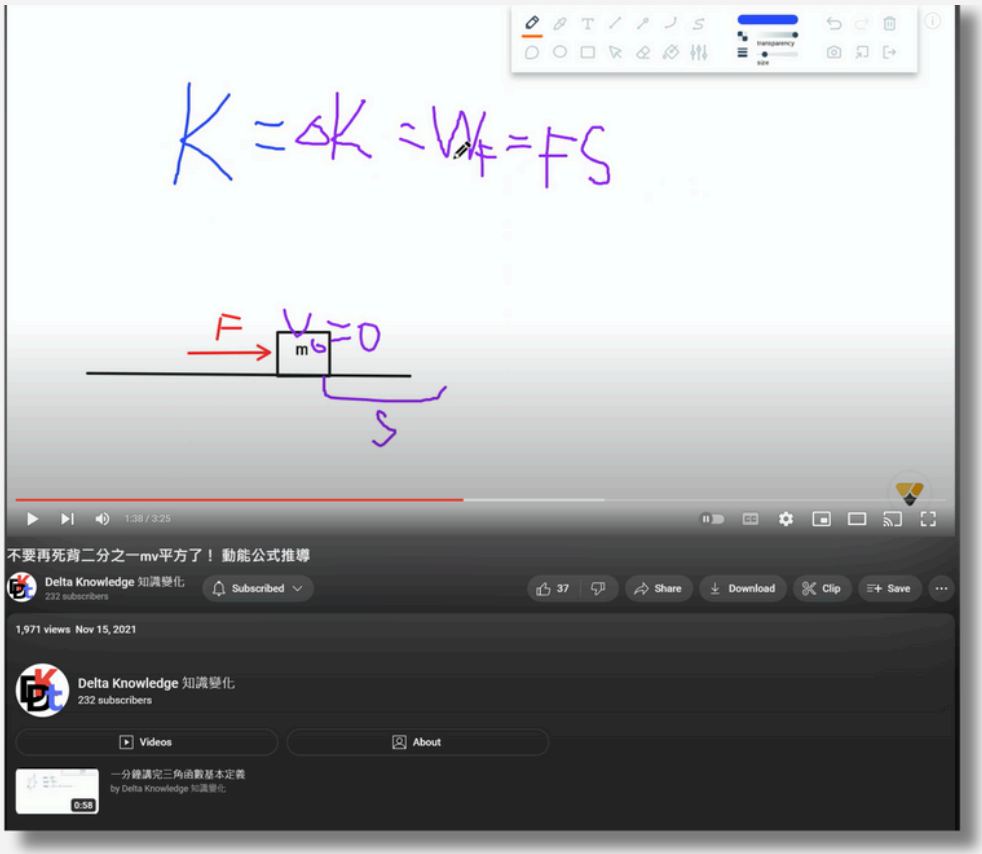
In 2022, I launched the YouTube channel "**Delta Knowledge**" to inspire change ("Delta") in viewers' understanding through engaging science videos. Initially, I taught physics concepts using my iPad, drawing on knowledge from undergraduate textbooks and my physics Olympiad preparation. Later, I adopted PowerPoint animations to explain ideas more effectively. In spring 2024, 3 friends joined the team, and we expanded to Instagram, designing science infographics (posts) to share knowledge. Our content now spans topics from physics, astronomy, to earth science and real-world events like the recent earthquakes in Taiwan. This summer, we organized an infographics design challenge, inviting audiences to create science posts. The event attracted nationwide sponsors and successfully built a community among the participants. The channel now has 12k+ followers and over 6 million views combined across platforms. Moving forward, I aim to design more science content of various forms on multiple platforms and host similar initiatives, inspiring even more people to join us in the pursuit of science.

YOUTUBE INSTAGRAM WEBSITE

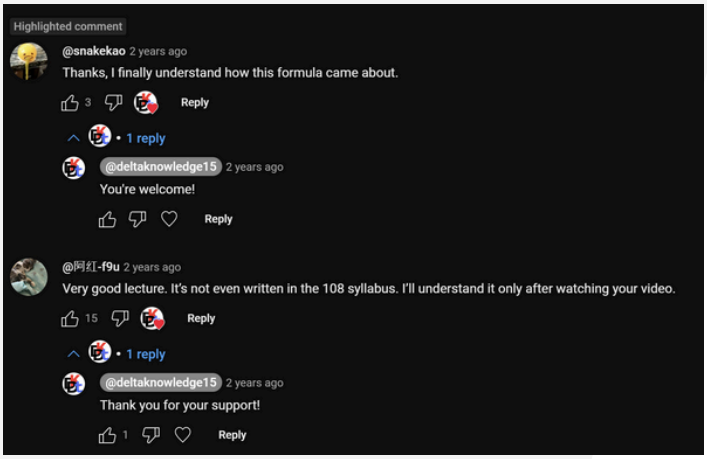
youtube.com/@deltaknowledge15
instagram.com/deltakphy
deltaknowledge.github.io

The VERY FIRST Video

In middle school, I learned the formula for kinetic energy, **$K=\frac{1}{2}mv^2$**, but I was curious why it wasn't simply **$K=mv^2$**, given that both have the same dimensional units and the latter seems more straightforward. After some research, I discovered its connection to the equations of uniformly accelerated motion. Using my Chromebook, I recorded a three-minute video explaining the derivation of $K=\frac{1}{2}mv^2$ using kinematics and dynamics. This became my very first video: **Stop Memorizing $K=\frac{1}{2}mv^2$! Deriving the Kinetic Energy Formula.**



Through audience feedback, I experienced a sense of achievement for the first time from creating educational videos. And just like that, my channel was born!



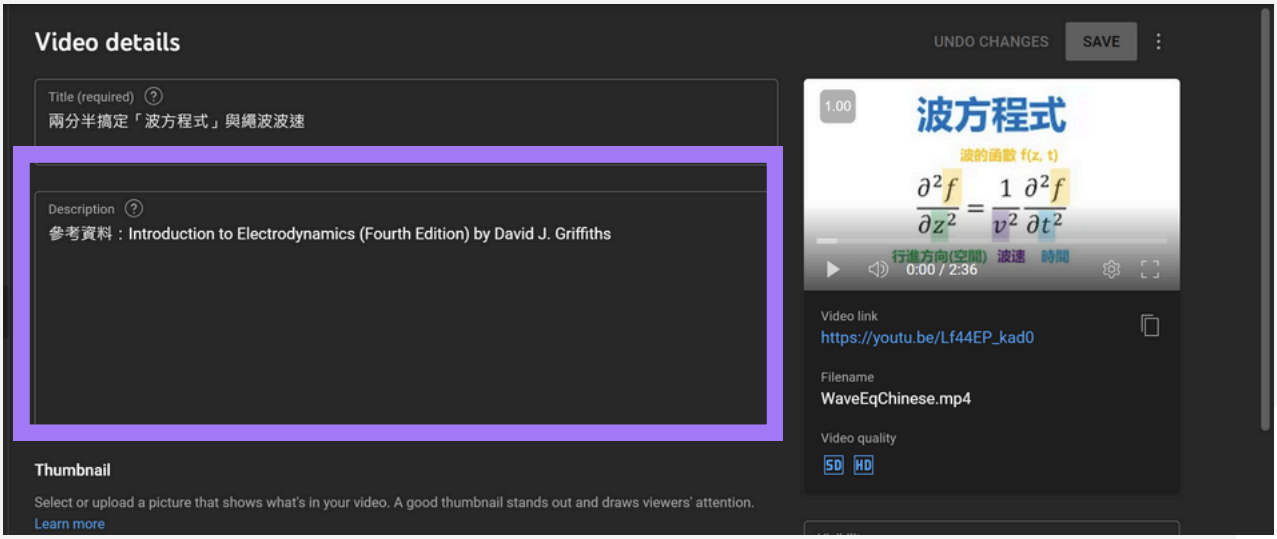
My First Attempt: Olympiad Physics

To create engaging content, I delve into advanced physics textbooks, organizing concepts suitable for video production. After thoroughly understanding the material, **I ensure I can explain it fluently—without relying on notes—before recording** (just like Feynman wrote, “What I cannot create, I do not understand.”)

Here are some of the resources I’ve referenced:

- Introduction to Classical Mechanics by David Morin
- Introduction to Electrodynamics by David J. Griffiths
- Fluid Dynamics by Richard H. F. Pao
- 2009 Taiwan Physics Olympiad Training Material, Volume 1

While creating videos, I also study the material in-depth, turning the process into a learning journey. Knowing that my work helps others gain new knowledge makes video production meaningful to me.

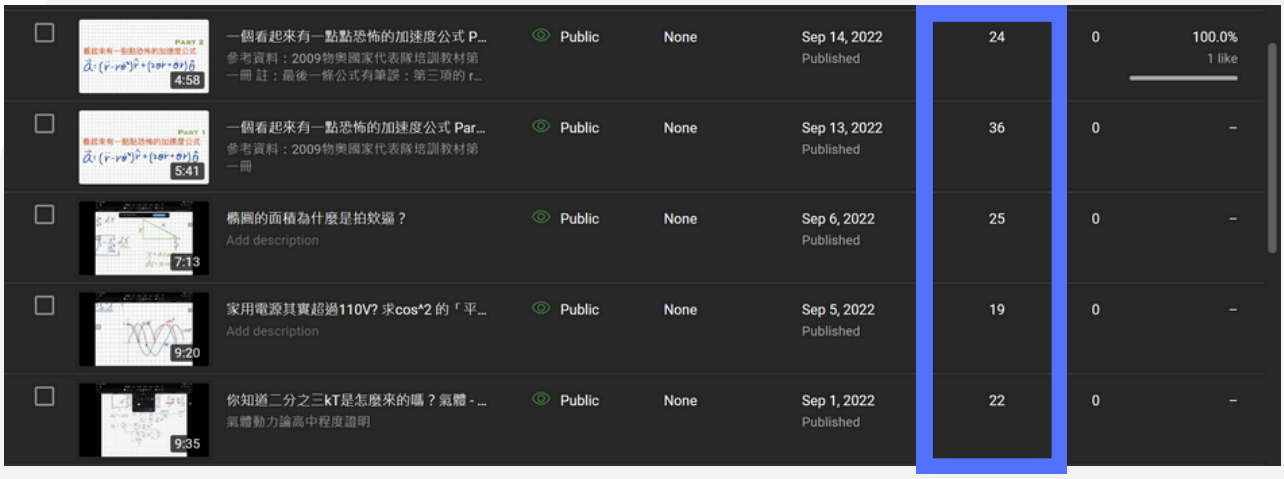


Clear citation in the video description

Improving My Content

In the early days, I recorded most videos on a tablet in a single take. While this approach was convenient and quick, it often led to errors that needed corrections in the video description. Additionally, audience feedback on these videos wasn't satisfactory.

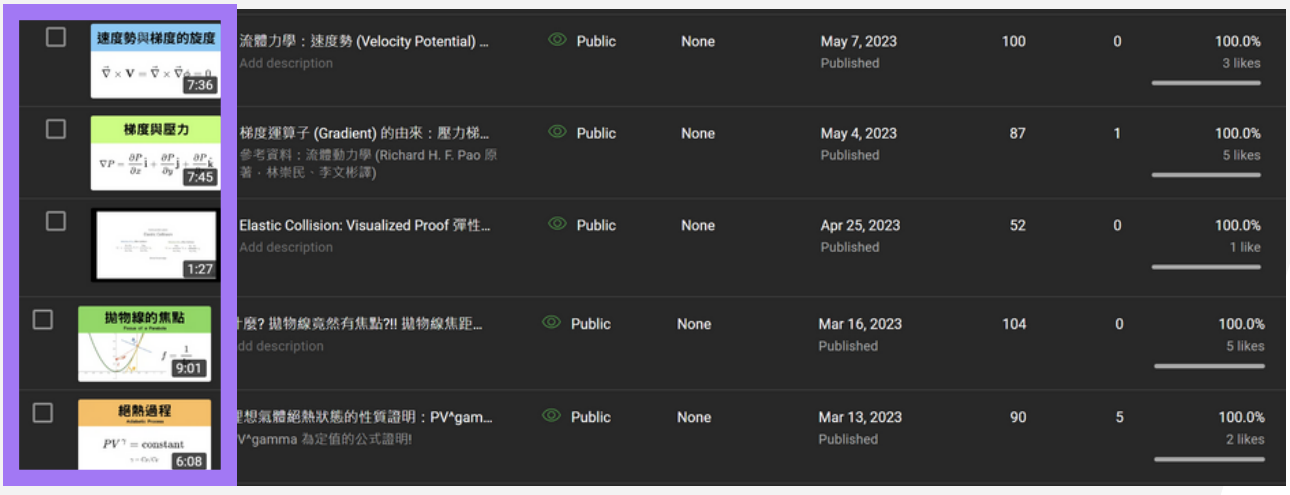
Not much views...



4:58	一個看起來有一點點恐怖的加速度公式 P... 參考資料：2009物奧國家代表隊培訓教材第一冊 註：最後一條公式有筆誤：第三項的 r...	Public	None	Sep 14, 2022 Published	24	0	100.0% 1 like
5:41	一個看起來有一點點恐怖的加速度公式 Par... 參考資料：2009物奧國家代表隊培訓教材第一冊	Public	None	Sep 13, 2022 Published	36	0	–
7:13	橢圓的面積為什麼是拍欸逼？ Add description	Public	None	Sep 6, 2022 Published	25	0	–
9:20	家用電源其實超過110V? 求cos^2 的「平... Add description	Public	None	Sep 5, 2022 Published	19	0	–
9:35	你知道二分之三kT是怎麼來的嗎？氣體 - ... 氣體動力論高中程度證明	Public	None	Sep 1, 2022 Published	22	0	–

audience doesn't like it :(

After discussing with my peers, I realized one key factor might be the lack of appealing thumbnails. So, I used photoshop software to design thumbnails that effectively convey what the video is about.



7:36	流體力學：速度勢 (Velocity Potential) ... Add description	Public	None	May 7, 2023 Published	100	0	100.0% 3 likes
7:45	梯度運算子 (Gradient) 的由來：壓力梯... 參考資料：流體動力學 (Richard H. F. Pao 原著，林崇民、李文彬譯)	Public	None	May 4, 2023 Published	87	1	100.0% 5 likes
1:27	Elastic Collision: Visualized Proof 彈性... Add description	Public	None	Apr 25, 2023 Published	52	0	100.0% 1 like
9:01	麼? 拋物線竟然有焦點?!! 拋物線焦距... dd description	Public	None	Mar 16, 2023 Published	104	0	100.0% 5 likes
6:08	想氣體絕熱狀態的性質證明：PV^gam... V^gamma 為定值的公式證明!	Public	None	Mar 13, 2023 Published	90	5	100.0% 2 likes

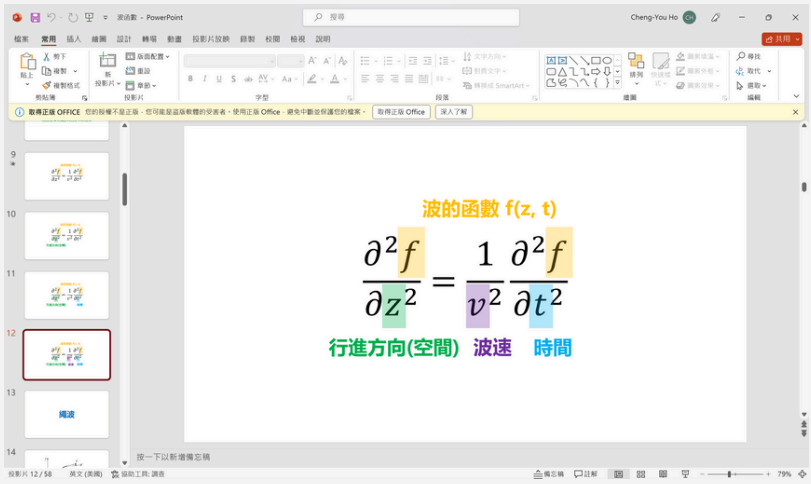
After making neat thumbnails for each video, I received more positive feedback from my audience!

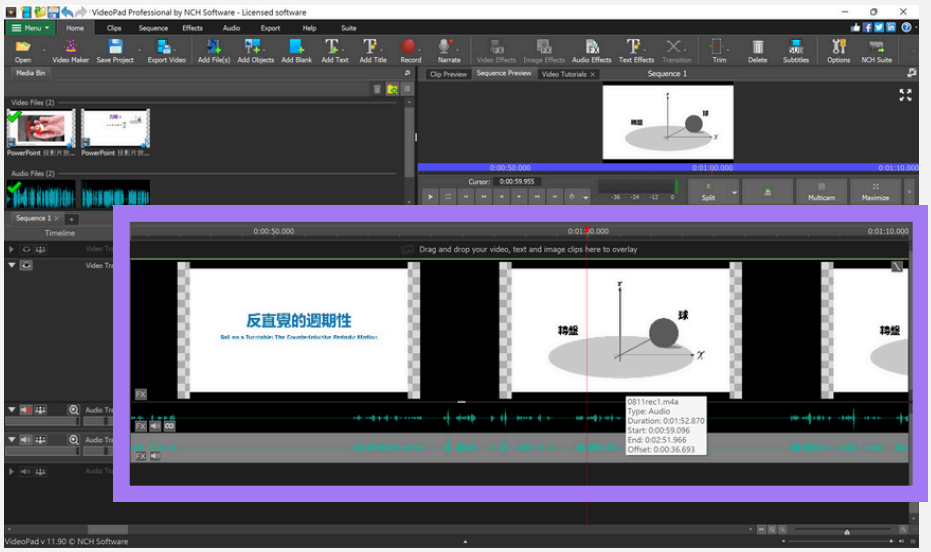
After careful consideration, I realized that recording in a single take was a flawed approach. Viewers seeking instructional videos on YouTube typically want quick access to the process and conclusions, rather than being limited by the pace of my handwriting on a tablet. This approach wasted their time.

To address this, I transitioned to using PowerPoint for content creation, focusing on the **key physics conclusions** while **skipping lengthy mathematical derivations**. I incorporated transitions and animations to make the videos more engaging. Additionally, I started using VideoPad editing software to **remove redundant parts**, significantly streamlining the videos and improving viewer retention.

Making videos with PowerPoint

Through trial and error, I gradually learned how to manage an educational YouTube channel, **finding a balance between content quality, production time, and viewer experience**.

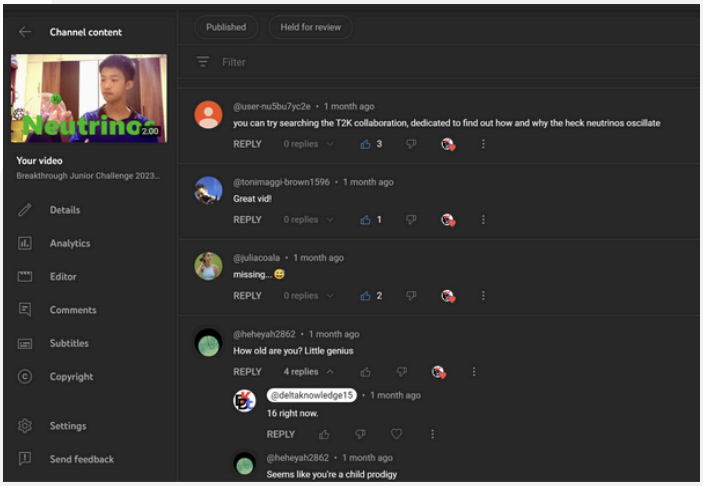




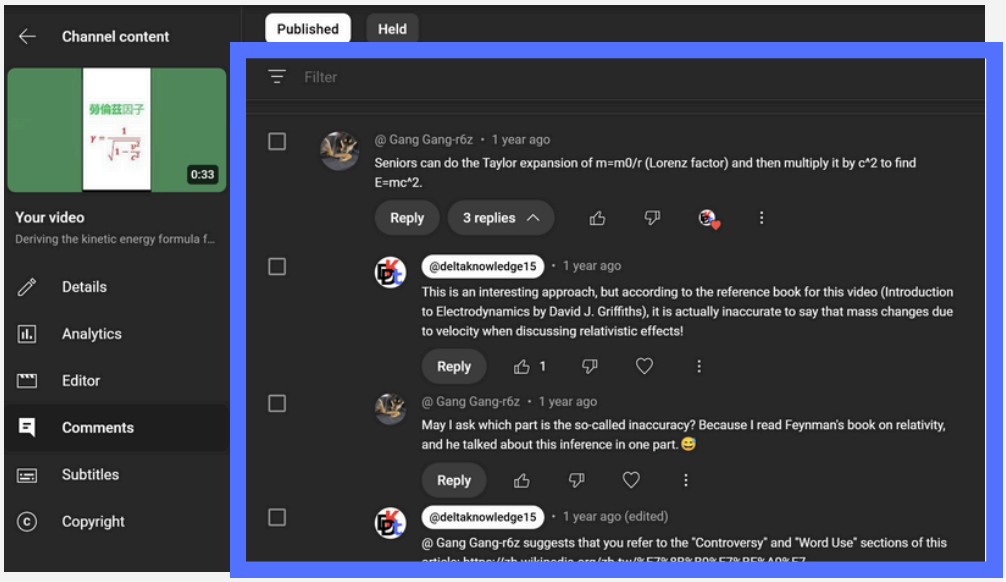
Editing my videos instead of recording in a single take. More dedication, but better results.

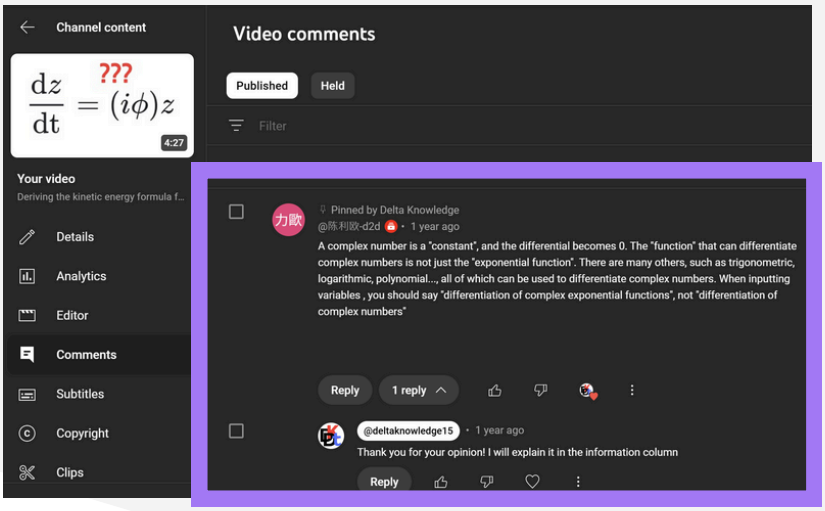
Audience Feedback

Like most YouTube channels, audience feedback is one of my main sources of motivation. Beyond encouraging comments, some dedicated viewers actively ask questions about the content and even point out my mistakes!



Academic Discussions in the Comments (Regarding relativistic mass)



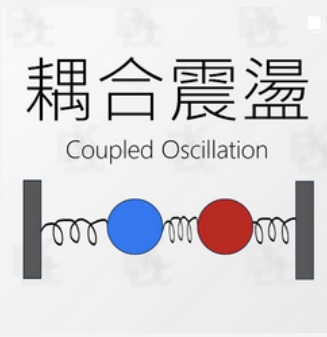


An audience spotted my mistake!

Infographics Design Challenge

In spring 2024, three friends of mine joined me in creating content for Delta Knowledge. With their help, we ran an Instagram page and decided to launch an infographics design challenge during the summer.

Some of our posts:

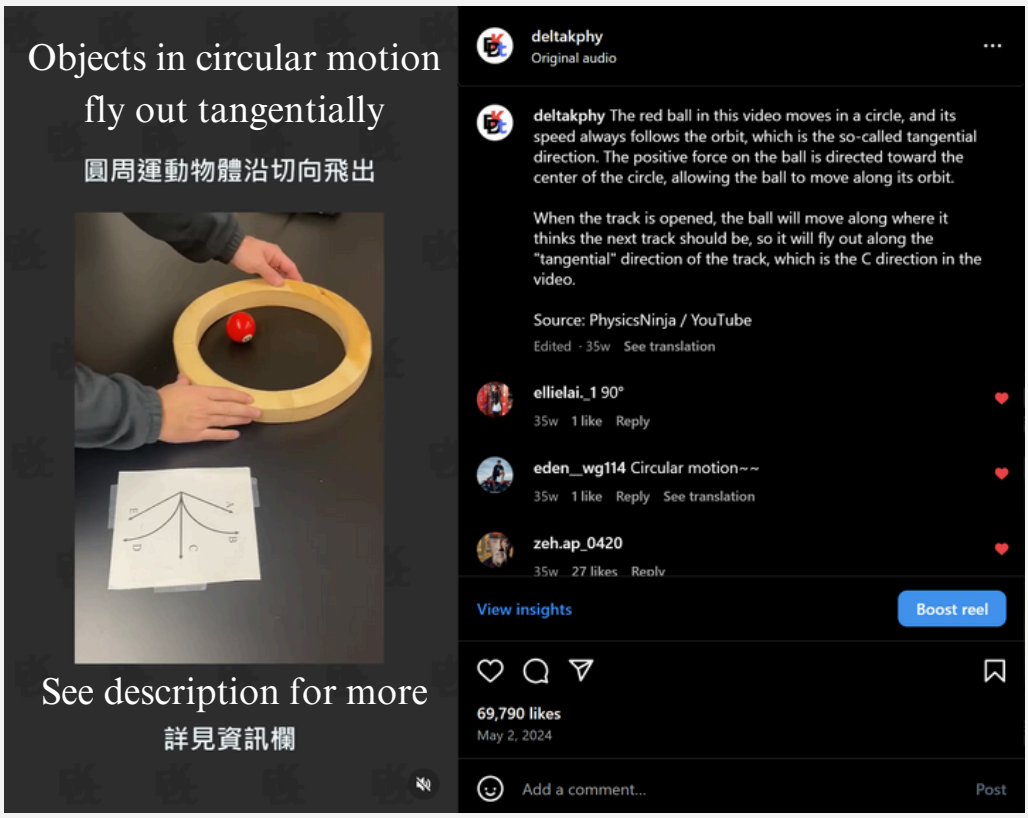


Just like how we made science posts, we invited our audience to do the same. We reached out to book publishers, educational foundations, and some individuals that might be passionate about this event, and successfully raised around 3000 New Taiwan Dollars (~$100 USD) in sponsorships.

Local teacher sponsored 1000NTD in gift cards!!

Finalist project "Earth Science v.s. Flat Earth Science"

Beyond infographics and videos, we shared interesting **physics demonstrations** found online, providing **clear explanations** to help the audience understand the phenomena accurately. We always credit the original sources and ensure our content remains **non-commercial**.



Looking ahead...

Three years have passed since I launched Delta Knowledge. Moving forward, I aim to continue hosting competitions like the infographics design challenge, which fostered enthusiastic engagement from our audience. I plan to expand the team, streamline workflows for creating videos and posts, and strengthen fact-checking through collaboration. I hope to inspire even more passionate audiences in our shared pursuit of science.

PARTIAL LIST OF DELTA KNOWLEDGE CONTENT

- Physics Olympiad: Prism Refraction (Ep. 1 & 2)
- Inverse-Square Interactions: Dipole Field and Potential
- Understanding the Wave Function
- Wave Power and Amplitude Reflection Problems
- Introduction to TYPT: Physics Debate Competition
- Probability and Collisions
- Analyzing Collisions from a Probabilistic Perspective
- The Unexpected Periodicity of a Rolling Ball on a Disk
- Wave Equation and Rope Wave Speed in 2.5 Minutes
- What is Internal Energy? Detailed Physics Olympiad Explanation
- Differentiation of Complex Numbers: Using i
- Essential Dielectric Formulas
- Electromagnetic Induction and the Betatron Accelerator
- Fluid Dynamics: Velocity Potential and Gradient Curl
- The Gradient Operator and Pressure Force Relationships
- Elastic Collision Formula Proof
- Kinetic Energy Formula: Calculus Derivation
- The Focus of a Parabola – Formula Derivation
- Adiabatic Properties of Ideal Gases: PV^γ=const.
- Lensmaker Formula Derivation
- Equilibrium of Ideal Gas Equation with Partition
- Carbon Neutrality Explained
- Fundamentals of Capacitors
- Why Does Temperature Drop During Adiabatic Expansion?
- Simple Pendulum Period Formula via Torque
- Unique Proof of the Pendulum Period Formula
- Kinetic Energy Formula Derivation Simplified
- Explaining Trigonometric Definitions in One Minute
- Generator 3D Sketch (0°-90° and 90°-180°)

PARTIAL LIST OF DELTA KNOWLEDGE CONTENT

- Dynamics of Pure Rolling on an Inclined Plane (Two Episodes)
- Doppler Effect Formula Proof
- Rocket Equation Derivation
- Proof of Kepler's Second Law
- Acceleration Formula with Complex Derivation (Two Parts)
- Why is the Area of an Ellipse πab?
- Household Electricity: More Than 110V?
- Applying Physics Concepts to the Taipei Metro
- Earthquake magnitudes
- "Fake Earthquakes": the Power of Low Frequency Sound Waves
- Planet 9 (Part 1&2)
- Earthquake Forcasts: How They Work
- Sonic Boom
- Coupled Oscillation
- Relativistic Velocity Addition
- Building a Dam could Cause Earthquakes?
- Length Contraction (Relativity)
- Time Dilation (Relativity)
- The Postulates of Special Relativity
- Internal Kinetic Energy
- Perpetual Machines
- Infographics Design Challenge: Finalists' Projects
  - Pascal's Triangle
  - Wet-and-dry Bulb Thermometer
  - Earth Science v.s. Flat Earth Science

More can be found on the Delta Knowledge YouTube page and Instagram page.

BEAVER BREAKROOM

Please describe your submission:

This is a portfolio of my YouTube channel, Delta Knowledge. In 2022, I launched the channel to inspire change ("Delta") in viewers' understanding through engaging science videos. Initially, I taught physics concepts using my iPad, drawing on knowledge from undergraduate textbooks and physics Olympiad preparation. Later, I adopted PowerPoint animations to explain ideas more effectively. In spring 2024, 3 friends joined the team, and we expanded to Instagram, sharing concise infographics (posts) to enhance learning. Our content now spans topics from physics to astronomy and real-world events like earthquakes in Taiwan. This summer, we organized an infographics design challenge, inviting audiences to create science posts. The event attracted nationwide sponsors and successfully built a community among the participants. Moving forward, I aim to design more science content of various forms on multiple platforms and host similar initiatives, inspiring even more people to learn more about science.

What was your specific contribution to the submission?

I founded Delta Knowledge over three years ago, independently creating 70+ YouTube videos from scratch. Since spring 2024, I've led a team of four, producing 70+ infographics and short-form videos for Instagram and securing sponsors for a self-organized competition. The channel now has 12k+ followers and over 6 million views combined across platforms.