

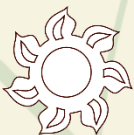


by UGEARS

Learn How Machines and Mechanisms Work



Educational mechanical models for children and grown-ups



NATURAL



NO GLUE
CONNECTION



SELF ASSEMBLY



MECHANICAL



EDUCATIONAL

www.ugears.com.sg

Ugears takes **educational mechanical models for children and adults** to the next level with its latest range created with advance learning techniques in mind and loads of fun-time at their heart.

STEM, the term that's been used a lot these days, stands for **Science, Technology, Engineering, and Math**. And the reason why it's been all over the place, is because it is a large part of the mainstream curriculum in education. In practice, this means that educators set aside individual disciplines and instead **focus on skills-and project-based approach**. In other words – **making learning more interesting and engaging**.

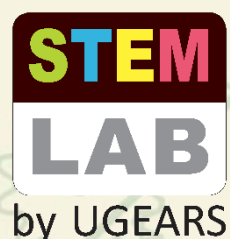
Ugears new range of models adopts the STEM name and the main idea. With each model you get a **STEM project tool-kit** and a challenge to face. You have all you need in the box, so the only thing left to do is to decide **who you want to invite to your project team: parents, siblings, or friends?**

STEM-lab models are an intelligible and exciting way to learn about widely-used mechanisms, types of gearing and connections **as well as their practical applications in real life**. Moving step-by-step through the stages of the Ugears STEM project, **you become familiar with different mechanisms – literally – in the details**. And as a result, what seemed to be strange mechanical magic becomes clear and comprehensible. Each of the mechanical models of the STEM-lab series is an **interactive study guide to a mechanism**. Assembling it with your own hands **you will get a full, in-depth understanding of the principles of how it works**.

Extend your learning experience even further **with the Ugears augmented reality application**. Point your tablet or mobile phone at a fully assembled STEM-lab model and **the app will show you various applications of the mechanism you've just built**. You will see how it is used in machines, buildings and engineering constructions; explore it at different angles, zoom it in and out.

Face the STEM-challenge, **assemble your knowledge, discover how clever you are and how creative you can be**. Have fun working together with a team. Explore, develop and enjoy with Ugears STEM-lab models!

Truly yours, UGEARS Team

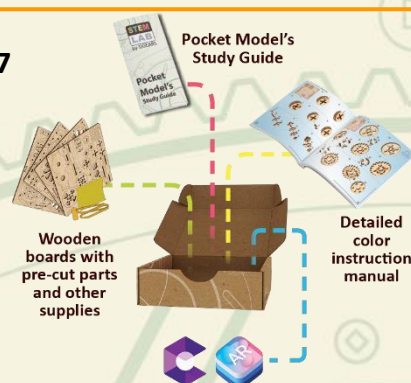


Unlimited Ugears Engineering Support 24/7

customerservice@ugearsmodels.com

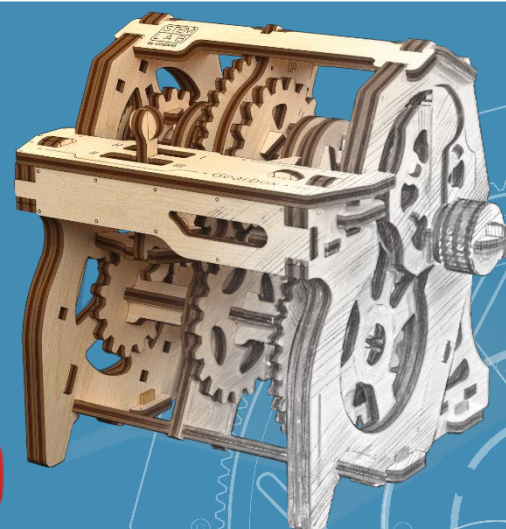
Unique AR-Experience and real-life usage:

1. Build your model
2. Download App
3. Point and align the image on the screen with the model
4. Interact in Augmented Reality



GEARBOX

- **Assemble it and discover** the principle of working of the **4-speed Manual Gearbox**.
- **Experiment:** the model comes with a **Pocket Model's Study Guide** with a creation story and mechanism design as well as engaging and interesting tasks.
- **Immerse yourself in Augmented Reality (AR)**, find out how the Gearbox is used in a car, and interact with it via the dedicated Ugears AR-application.



Build & get unique
learnings in AR



YouTube

Learn how the manual GEARBOX works:

The Gearbox is a stylised educational model, an interactive study guide to the mechanism, only for learning its essentials and principles of working. A mechanical gearbox is a reducer that provides speed and torque conversions from a motor to the driving wheels. After assembly, you can experiment with the Ugears manual Gearbox, by turns, choose I, II, III, or reverse with a kinematic pair of gears with different ratios and, rotating the actuator handle clockwise, you can watch and control the rotation speed of the layshaft and drive shaft. In a **Position "N" – idle** in which both clutch gears of layshaft remain uncoupled and idling; the **First Gear** makes the layshaft and gears rotate with the lowest speed; the **Second Gear** lets the drive shaft along with the flywheel rotate with an average speed and the **Third Gear** allows the layshaft and all gears rotate with the highest speed. Switch on the Reverse gear and see how the driving clutch gear moves to the left towards gear "R" and connects to it transferring the rotation to the lower gear arrangement and propelling the layshaft and all gears to rotate in reverse.

When and who invented it:

The invention of the gearbox belongs to the famous German engineer Karl Benz.

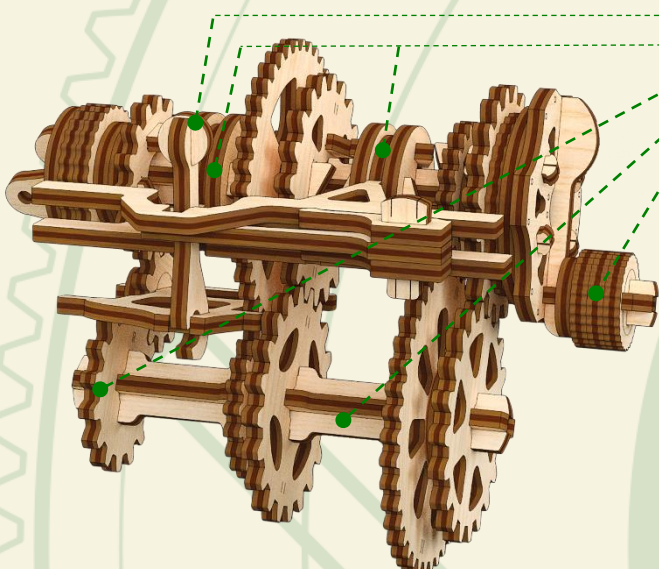
Usage:

A gearbox is mainly used in the automobile industry as a part of the car transmission mechanism that transfers torque from the engine's shaft to the wheels.

The mechanism of the Gearbox is composed of:

- Gear shifting lever
- Layshaft with gear couplings
- Reverse idle gear bearing
- Drive shaft
- Actuator handle

Self-assembly from the parts, pulled out from wooden boards, according to easy-to-follow manual instruction. No glue or cutting needed



Model size:	5.1 * 3.9 * 4.3 in (13 * 10 * 11 cm)
Package size:	8.1 * 7.4 * 2.5 in (20.5 * 18.8 * 6.3 cm)
Parts count:	120
Assembly time	1-2 hrs

MECHANICAL MODEL

PENDULUM

ENGINEERING

MATHE

MATHE

ENGINEER

- **Assemble it and discover** the principle of working of the **Pendulum**.
- **Experiment:** the model comes with a **Pocket Model's Study Guide** with a creation story and mechanism design as well as engaging and interesting tasks.
- **Immerse yourself in Augmented Reality (AR)**, find out how the pendulum is used in a clock mechanism, and interact with it via the dedicated Ugears application.

Build & get unique learnings in AR



YouTube



Learn how the PENDULUM works:

The Pendulum is a stylised educational model, an interactive study guide to the mechanism, only for learning its essentials and principles of working. The pendulum is one of the basic and most reliable time measuring mechanisms. Its working principle is based on the model's constant amplitude oscillation under the force of gravity (weight) and potential energy (tension force) of the rubber band. The rubber band powers the mechanism of the model and compensates for the pendulum's oscillations' kinetic energy loss. The device is animated by means of gear unit with a windup wheel.

The model has an anchor escapement controlling the frequency of oscillations, a weight, a scape-wheel, gearing, rubber band, ratchet and pawl reducing operation error. The model has several means to control the frequency of oscillations: the weight of the pendulum bob, the vertical position of the weight on the pendulum, and the tension of the rubber band.

When and who invented it:

The first study of the pendulum was implemented by Galileo Galilei, an Italian engineer in the end of the 16th century. He described the property of the pendulum to preserve the consistency of the oscillations. The first person to use a pendulum in a mechanical clock and ensure a steady rate was a Dutch physicist Christiaan Huygens back in the 17th century.

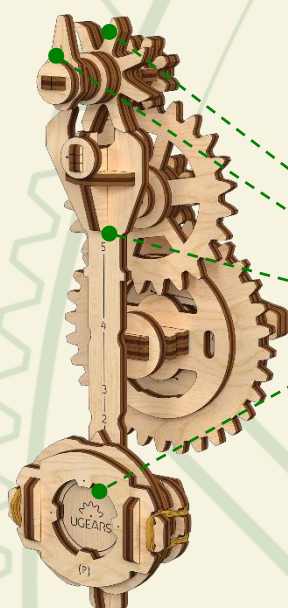
Usage:

Pendulums are mainly used in mechanical clocks as an element of a launch mechanism and the way to provide a steady rate. In the musical sphere, metronomes that have pendulums as their chief constructional element, help musicians practice playing to a regular tempo. Pendulums are also used in geological surveying, seismography, sports, and laboratory research in mechanics and physics.

The mechanism of the Pendulum is composed of:

- Escapement wheel
- Needle indicator
- The pendulum with the anchor
- Pendulum bob

Self-assembly from the parts, pulled out from wooden boards, according to easy-to-follow manual instruction. No glue or cutting needed



Model size:	4.5 * 3.3 * 6.6 in (11.5 * 8.3 * 16.7 cm)
Package size:	8.1 * 7.4 * 2.5 in (20.5 * 18.8 * 6.3 cm)

Parts count:	92
Assembly time, hrs.	1-2

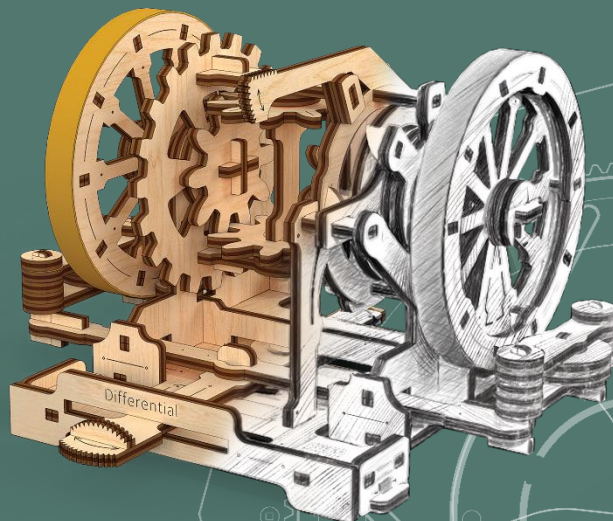
DIFFERENTIAL

- **Assemble it and discover** the principle of working of the **Car Differential**.
- The model comes with a **Pocket Model's Study Guide** with a creation story and mechanism design as well as engaging and interesting tasks.
- **Immerse yourself in Augmented Reality (AR)** and find out how the Differential is used in a car rear axle, and interact with it via the dedicated Ugears AR-application

Build & get unique learnings in AR



YouTube



Learn how the DIFFERENTIAL works:

The Differential is a stylised educational model, an interactive study guide to the mechanism, only for learning its essentials and principles of working. The Differential was designed to ensure that the drive wheels sitting on the same axle rotate with a different rate and cover different distances at the same time. This mechanism allows the car to make turns without the wheels skidding, prevents wheel-slip, reduces tyre wear, and makes entering and going out of turns easier for the driver. Having assembled the Differential, you can unblock it pushing the lever in position 1 (Up) and set both wheels in motion by rotation of the drive gear or the wheel. The Control lever regulates the smooth locking of the left and right wheels independently by turning left or right respectively. In the "down" position of the lever, both wheels are linked in a rigid coupling and can either rotate together (propelled by the drive gear or a wheel) or lock simultaneously (by the lever of the wheel).

When and who invented it:

The car differential was invented by French engineer Onesiphore Pecqueur in 1825. In the 1930s of the 20th century, German automotive engineer Ferdinand Porsche made significant improvements to the device.

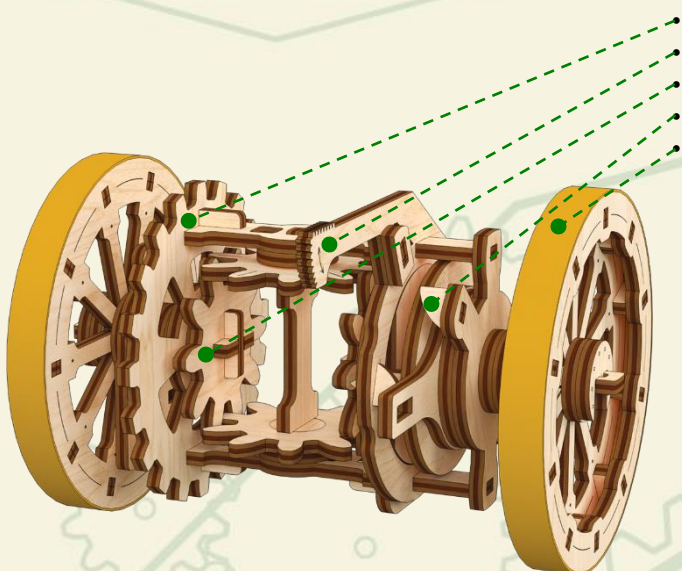
Usage:

Differentials are used mainly in cars as a part of the transmission mechanism. They improve manoeuvrability and performance of a car.

The mechanism of the Differential is composed of:

- The drive gear
- The locking lever
- The side gear
- The locking clutch
- The wheel

Self-assembly from the parts, pulled out from wooden boards, according to easy-to-follow manual instruction. No glue or cutting needed



Model size:	6.9 * 5.3 * 4.1 in (17.5 * 13.5 * 10.5 cm)
Package size:	8.1 * 7.4 * 2.5 in (20.5 * 18.8 * 6.3 cm)
Parts count:	163
Assembly time	1-2

MECHANICAL MODEL

COUNTER

ENGINEERING

TECHNOLOGY

MATHEMATICS

MATHEMATICS

SCIENCE

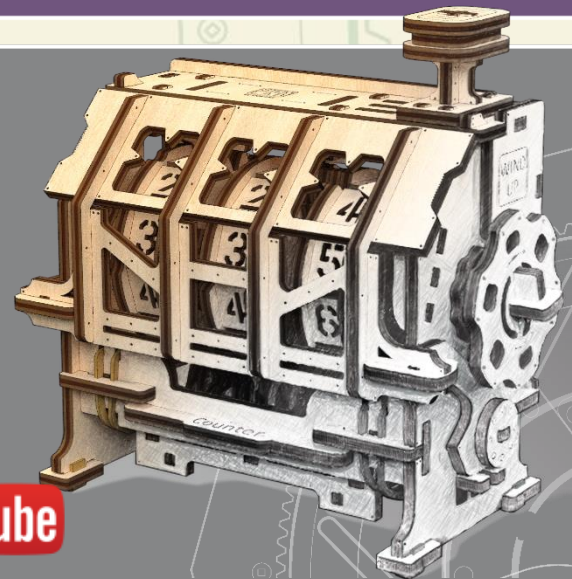
ENGINEERING

- **Assemble it and** discover the principle of working of the **Three-digit Clicker-Counter**.
- **Experiment:** the model comes with a **Pocket Model's Study Guide** with a creation story and mechanism design as well as engaging and interesting tasks.
- **Immerse yourself in Augmented Reality (AR)**, find out how the Counter is used in a production line, and interact with it via the dedicated Ugears application.

Build & get unique learnings in AR



YouTube



Learn how the COUNTER works:

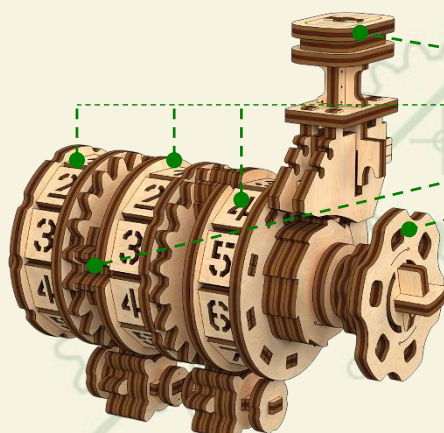
The «Counter» model registers repetitive actions. It is an integral part of a device called an «Odometer». The model has three cylinder gears with numbers from 0 to 9 and a Geneva Drive. This combination allows you to see an interesting mechanical feature: when the reciprocating motion of the click-button using the Geneva Drive mechanism turns into the rotary motion of the cylinder gears with numbers. The Counter provides two options of data registering: click-button on the roof of its body, and a turn handle on its side. Pressing the click-button or turning the handle makes the Counter shift by one place. When the count passes 9, the Geneva Drive catches the next register cylinder and adds it to the count. Altogether, the three-digit display of the Counter can register values from 1 to 999. You can open the front panel of the counter and reset it manually. Try counting steps on your way home. Or how many people you meet on a stroll through the park. How about, the number of blue cars passing by your house during one hour? Count stairs at home, at school or at a friend's house.

When and who invented it:

A counter, as a key part of odometer mechanism, was invented by an Ancient Greek mathematician and engineer Hero of Alexandria who lived in 10-70 AD. It measured the length of the path by counting the number of rotations of the wheel. Later, the counter was improved and completed with a reducer that reduced the number of the wheel's revolutions depending on the measuring system (miles, leagues, kilometers) and showed reduced data on the display.

Usage:

These days, counters are used to count the number of passengers, visitors of different events, cars passing through certain check point, sets and scores in sport, items on a production line, etc.



The mechanism of the Counter is composed of:

- Click-button to register values
- Cylinder gears with numbers
- Geneva Drive
- A Turn handle to register values

Self-assembly from the parts, pulled out from wooden boards, according to easy-to-follow manual instruction



Model size:	5.3 * 2.6 * 4.8 in (13.5 * 6.5 * 12.2 cm)	
Package size:	8.1 * 7.4 * 2.5 in (20.5 * 18.8 * 6.3 cm)	
Parts count:	157	No glue or cutting needed
Assembly time	1-2 hrs	

Ugears STEM-lab model kits are not precision measurement devices or “utilitarian” (practical) mechanical devices, but represent the stylised interactive study guides to the mechanisms. All STEM-lab models are result of the UGEARS engineering team’s collective imaginations. All of them are inspired by real-life mechanisms. Currently, UGEARS has 4 mechanical models in our STEM Lab collection. 5 new STEM models are in development and will be released in August, 2020. And this is just a beginning. We have more than 50 ideas of mechanisms for the future.

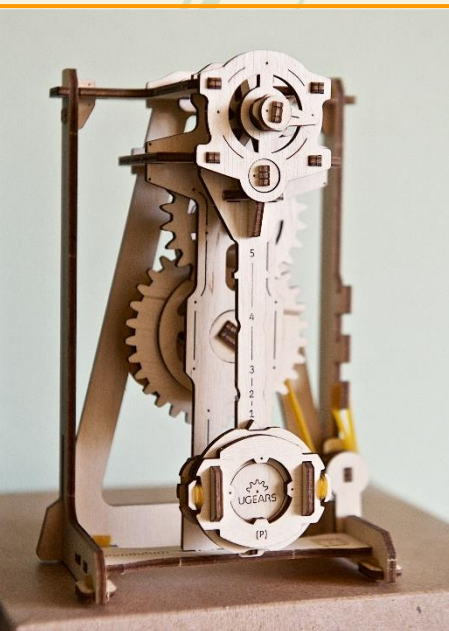
We have patented several ways to assemble the parts in our models, which allow to build a mechanical self-moving construction without the use of glue.

Our products have certificates of compliance with health and safety regulations.

Information on the packaging is translated into 7 different languages: English, Ukrainian, German, French, Polish, Spanish, Russian.

All UGEARS model kits include the wooden boards and other supplies, the detailed paper color assembly instructions, the Pocket Model’s Study Guide with description of the mechanism, principle of working, main characteristics, definitions, formulas, tasks in English (German, French, Spanish, Japanese, Ukrainian, Polish, Russian, Italian, Chinese and Korean versions in .pdf-formats are available on www.ugears.com.sg) and the access to the unique AR-experience with the model you built.

Produced in Horenka Village, in a suburb of Kyiv, Ukraine. A production cycle running from raw materials to finished products has been established, including a two-level quality control. Today UGEARS team consists of more than 200 enthusiastic people. They invest their creativity and love in their craft which you receive in each of the models.



Let's get it started!

Science

Hands-on, exciting educational projects

Technology

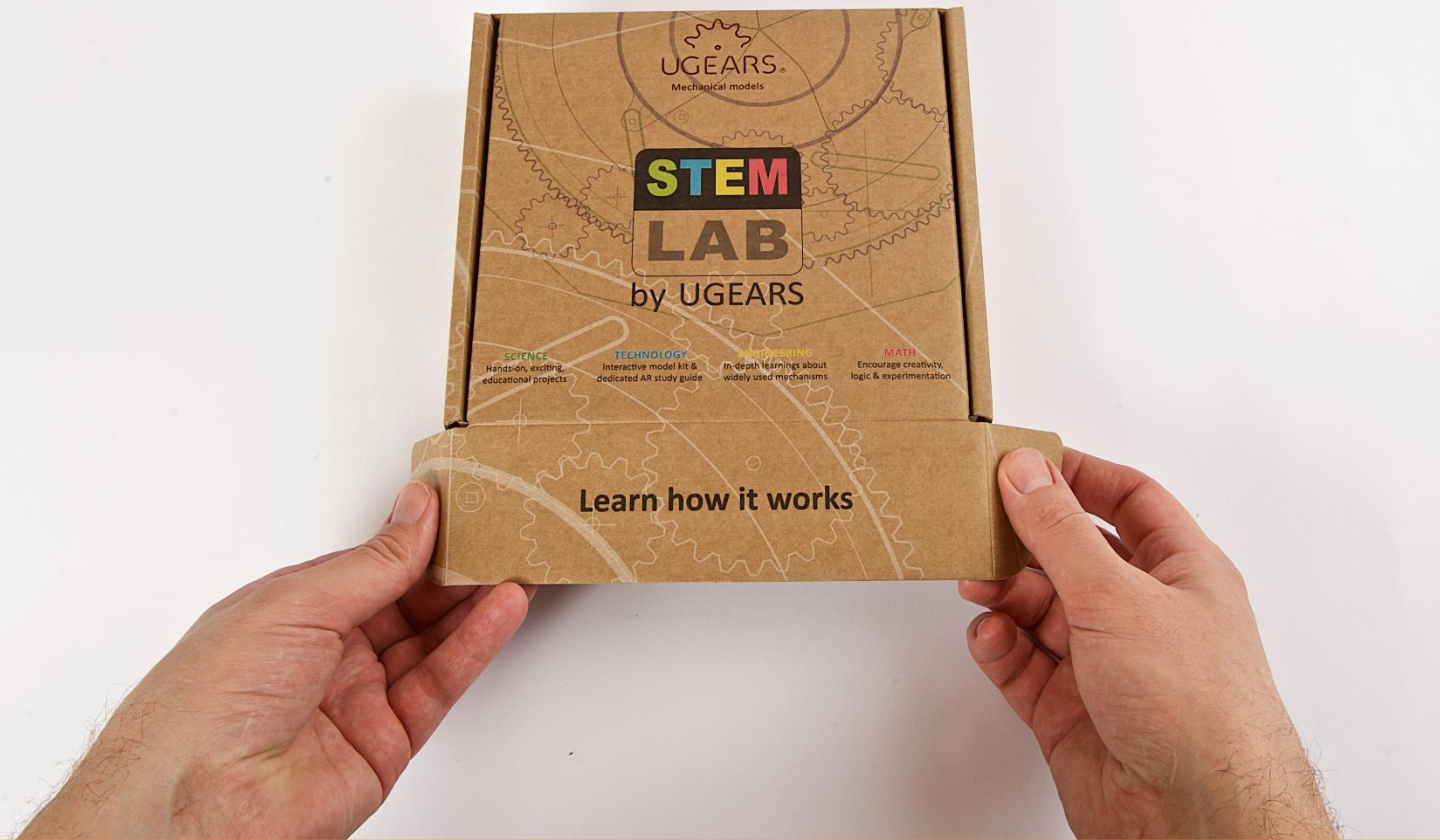
In-depth learnings about widely used mechanisms

Engineering

Interactive model kit & dedicated AR study guide

Math

Encourage creativity, logic & experimentation



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