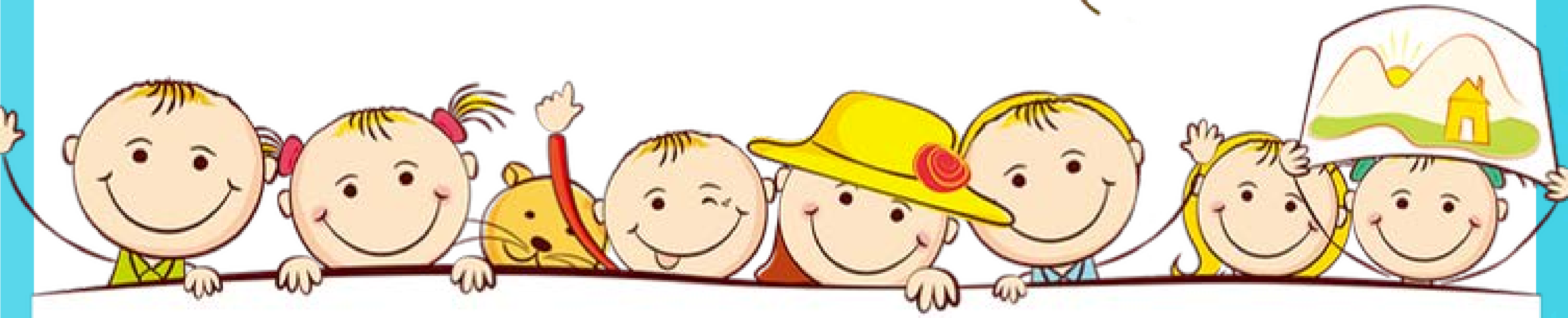
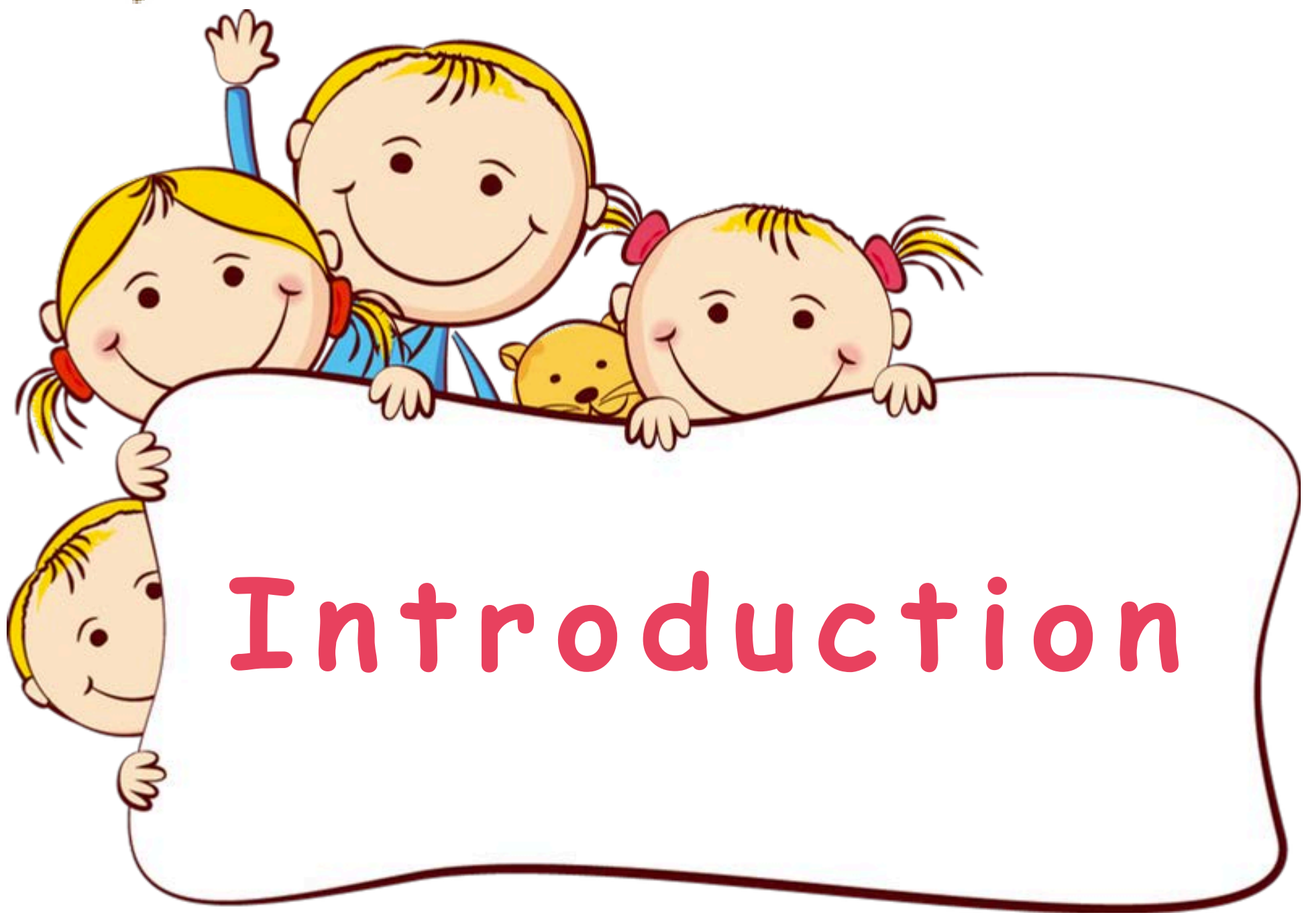
Newton's Cradle



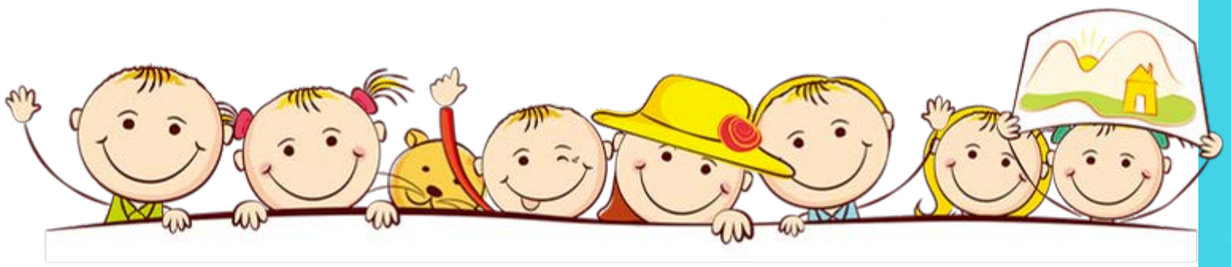


Introduction

When two people push each other on ice, or when one small car collides with another, what phenomenon occurs?

What causes these phenomena?

There's a similar example in real life —
it's called "Newton's Cradle"!



Newton's Cradle was first proposed in 1676 by the French physicist Edme Mariotte.

Newton's Cradle

Newton's Cradle consists of five balls of equal mass suspended by strings and arranged closely in a row.

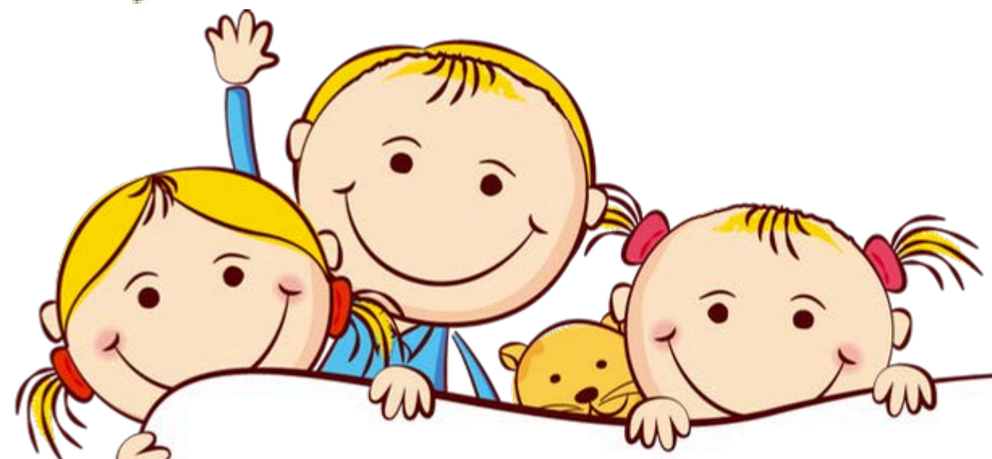
It is also known as: Newton's Balls, Momentum Conservation Balls, Perpetual Motion Balls, Physics Collision Balls, or Clacking Balls.

When the ball on the far right is pulled back and released, it collides with the other four stationary balls. The ball on the far left will swing out, and only that ball moves.

This process is reversible — if the leftmost ball is pulled and released, the rightmost ball will swing out.

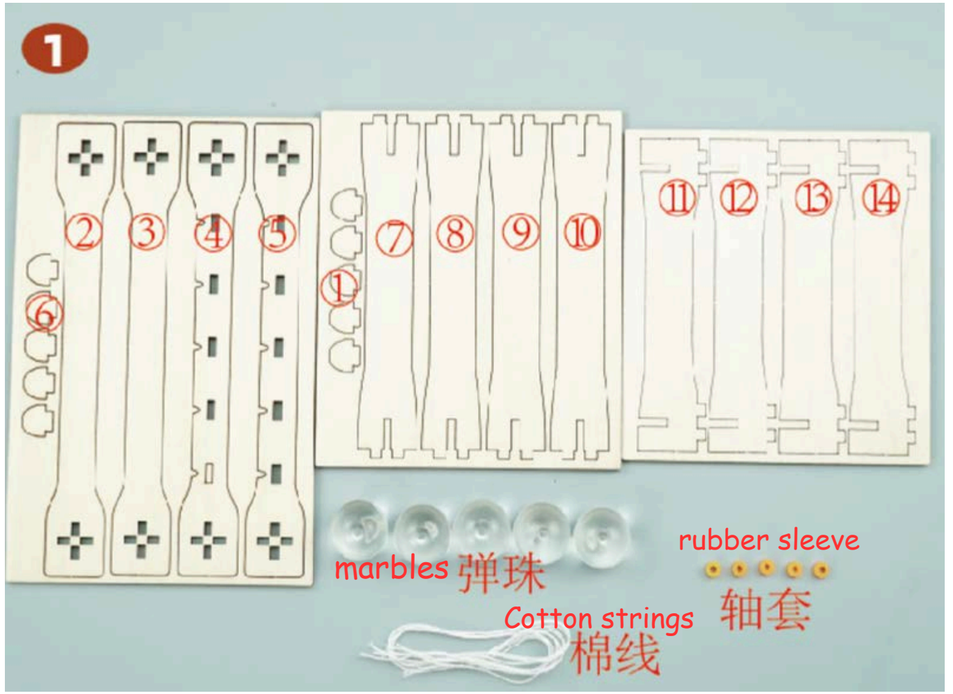
If two balls on one side are pulled and released, two balls on the opposite side will swing out, and so on for three, four, or five balls.

Let's make a Newton's Cradle together!

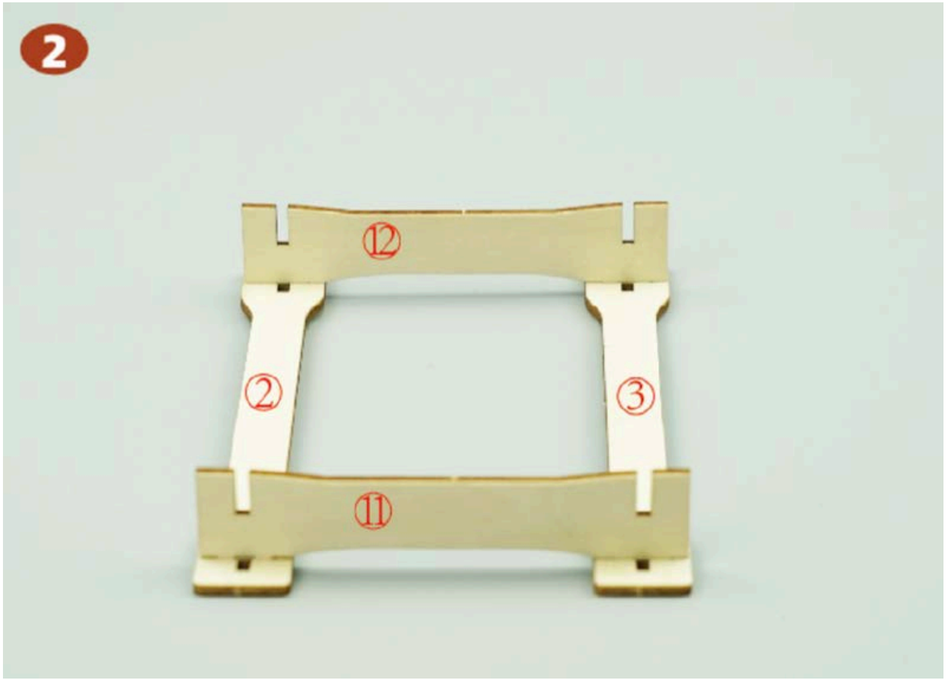


Experiment Steps

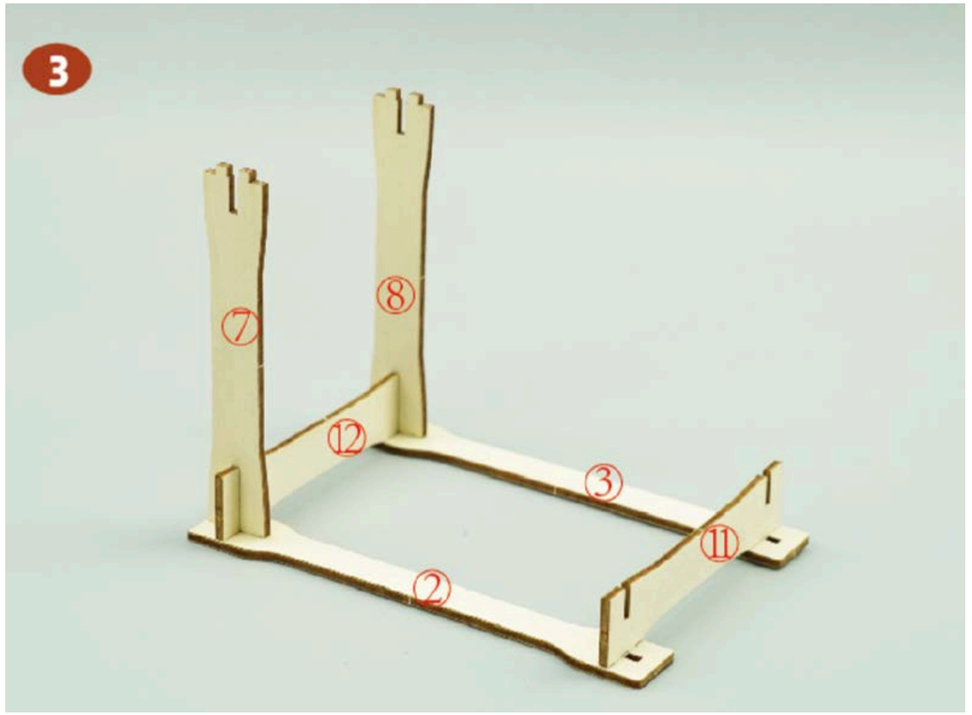
Recognize the materials



Insert boards 11 and 12 into boards 2 and 3.

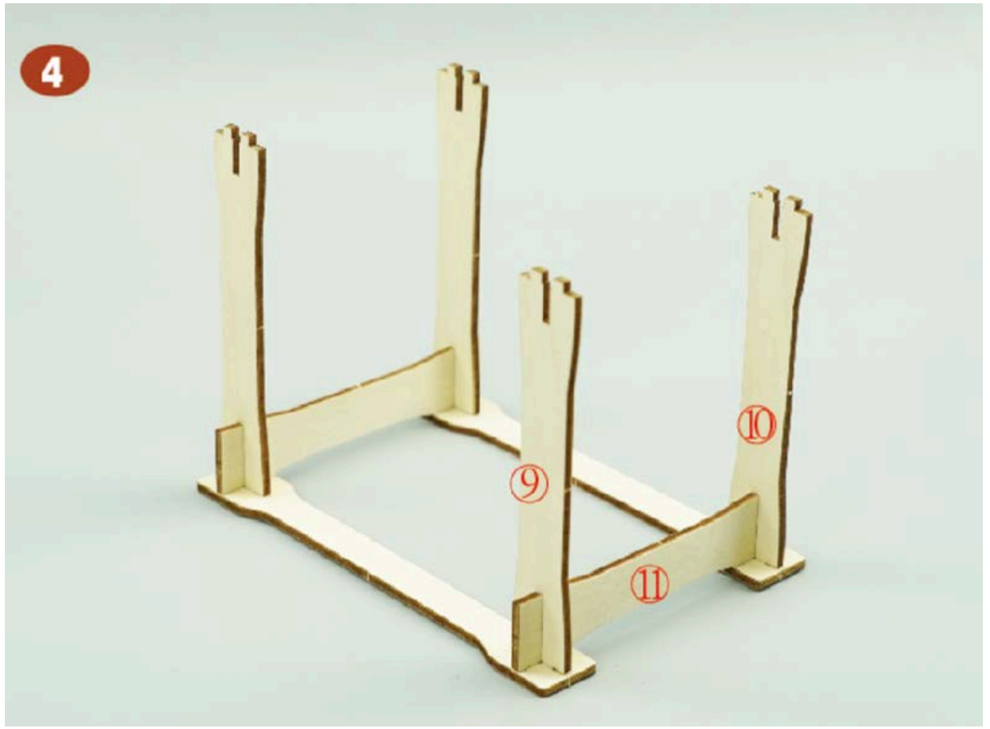


Insert parts 7 and 8 into board No. 12, and insert board No. 11 onto boards No. 2 and No. 3.



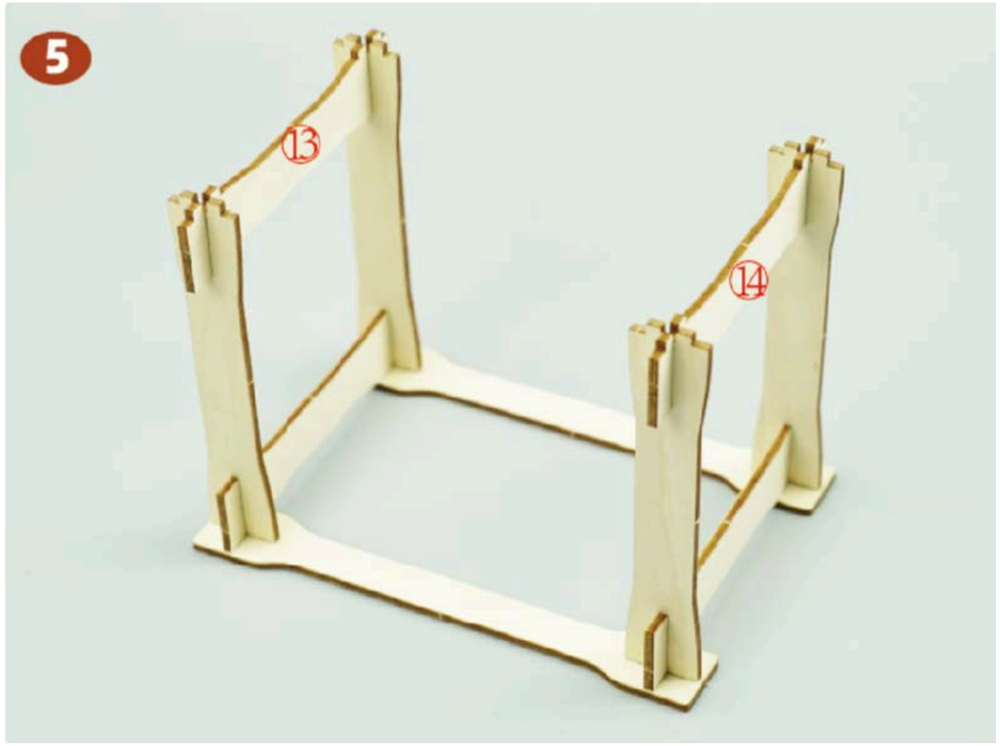
Insert boards 9 and 10

into board 11.



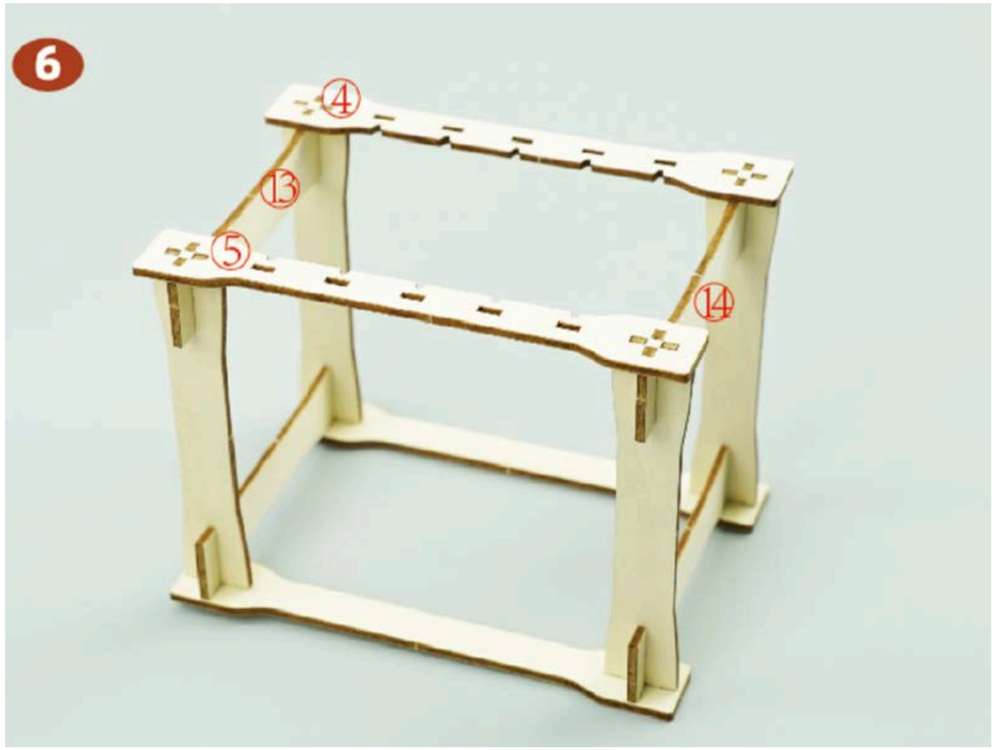
Fix boards 13 and 14

as shown.



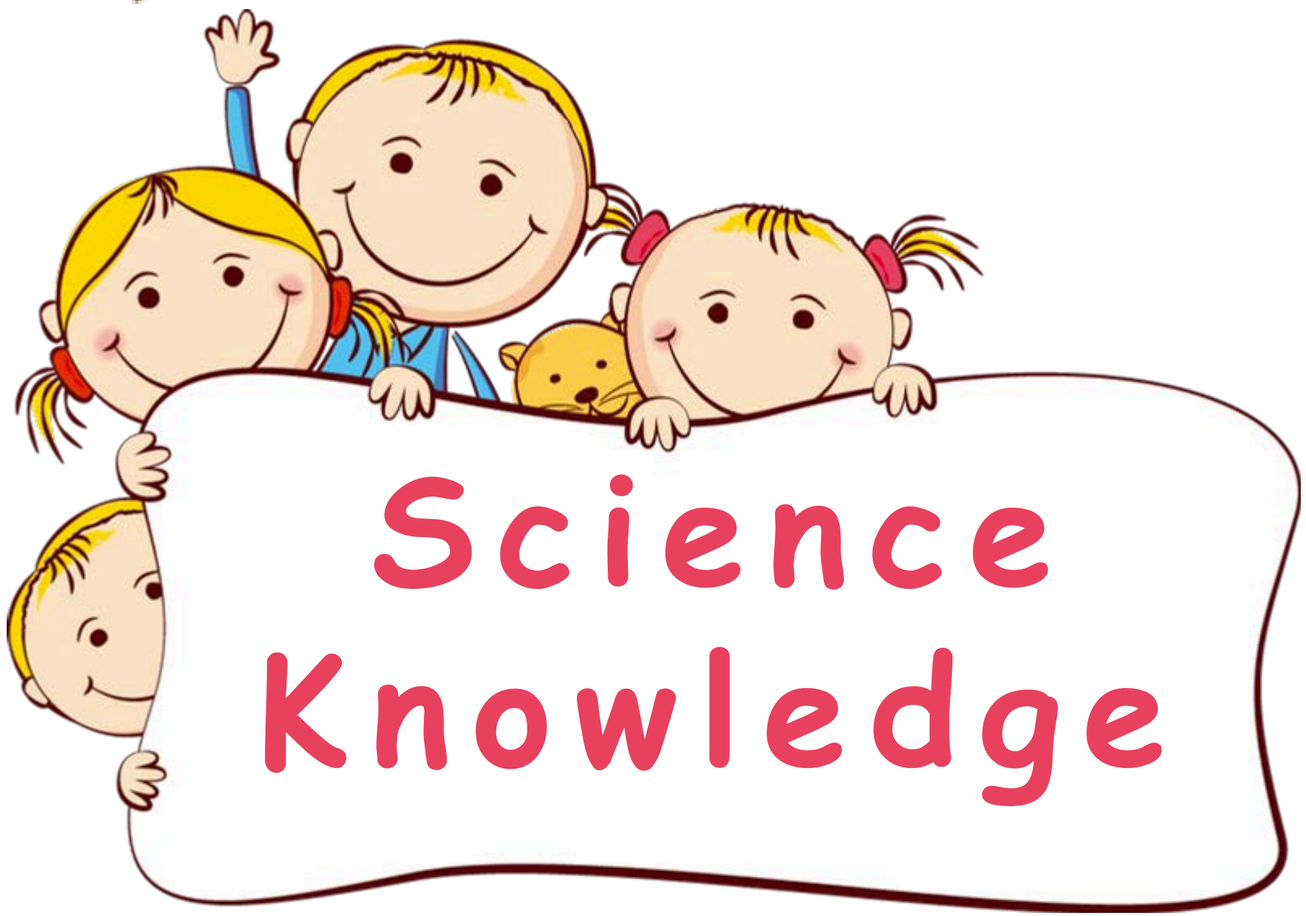
Insert boards 4 and 5

into boards 13 and 14.



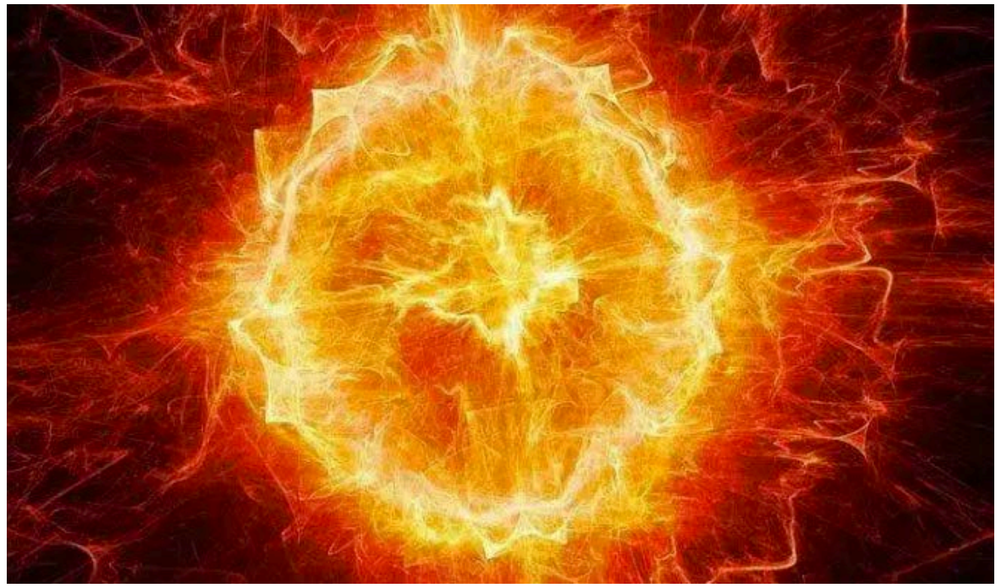
Thread the marbles and sleeves through the cotton strings.

Insert boards No. 1 and No. 6 into boards No. 4 and No. 5, and fix the previous assembly as shown in the picture.


Science
Knowledge

What makes these objects work or move?

Do you know what energy is?

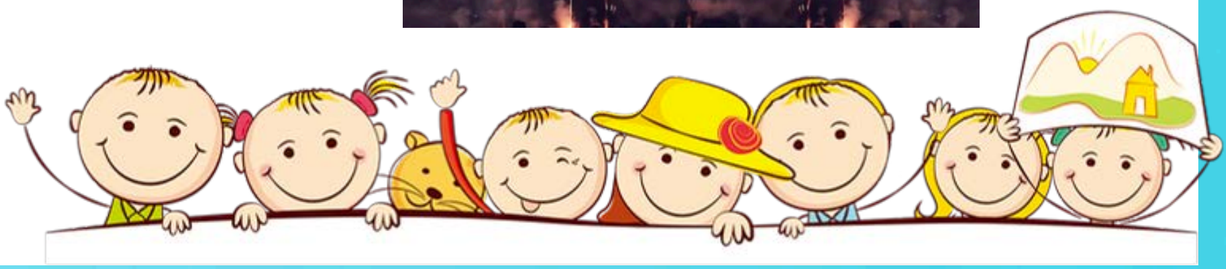


Definition of Energy:

The ability to make an object work or move is called energy.

Although you can't see it, you can feel its effects.

Whenever there is movement, heating, cooling, growth, light, or sound, energy is at work.



The Diversity of Energy

Different forms of motion correspond to different forms of energy.

- The energy of a moving object is called kinetic energy.
- Mechanical energy corresponds to mechanical motion.
- Internal energy corresponds to the microscopic motion of particles.

Common forms of energy include mechanical energy, internal energy, electrical energy, solar energy, chemical energy, biological energy, and nuclear energy

tennis player — kinetic energy

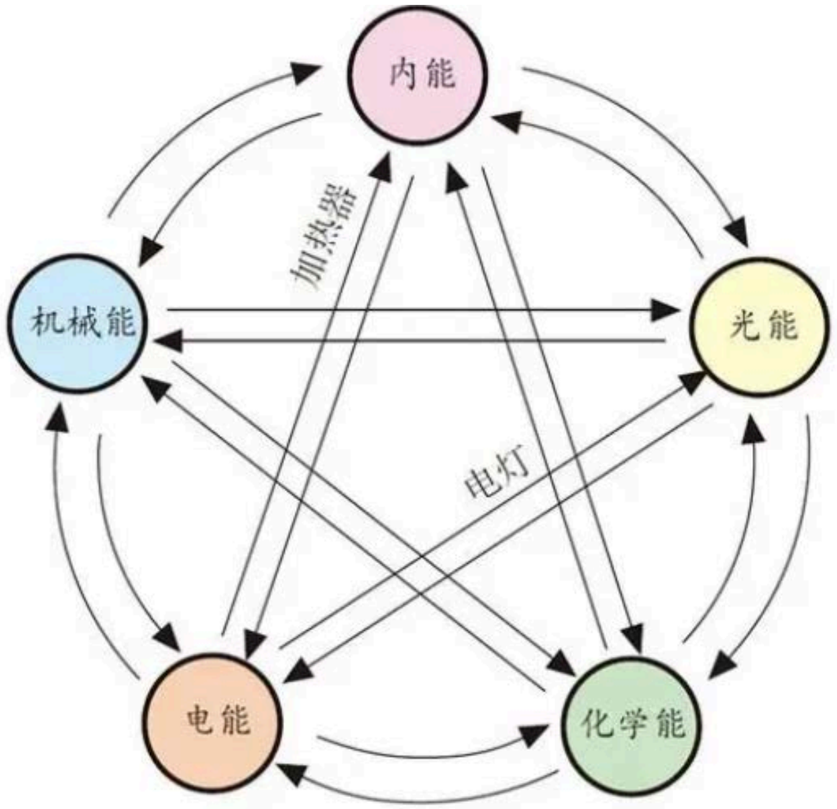
volcano — internal energy

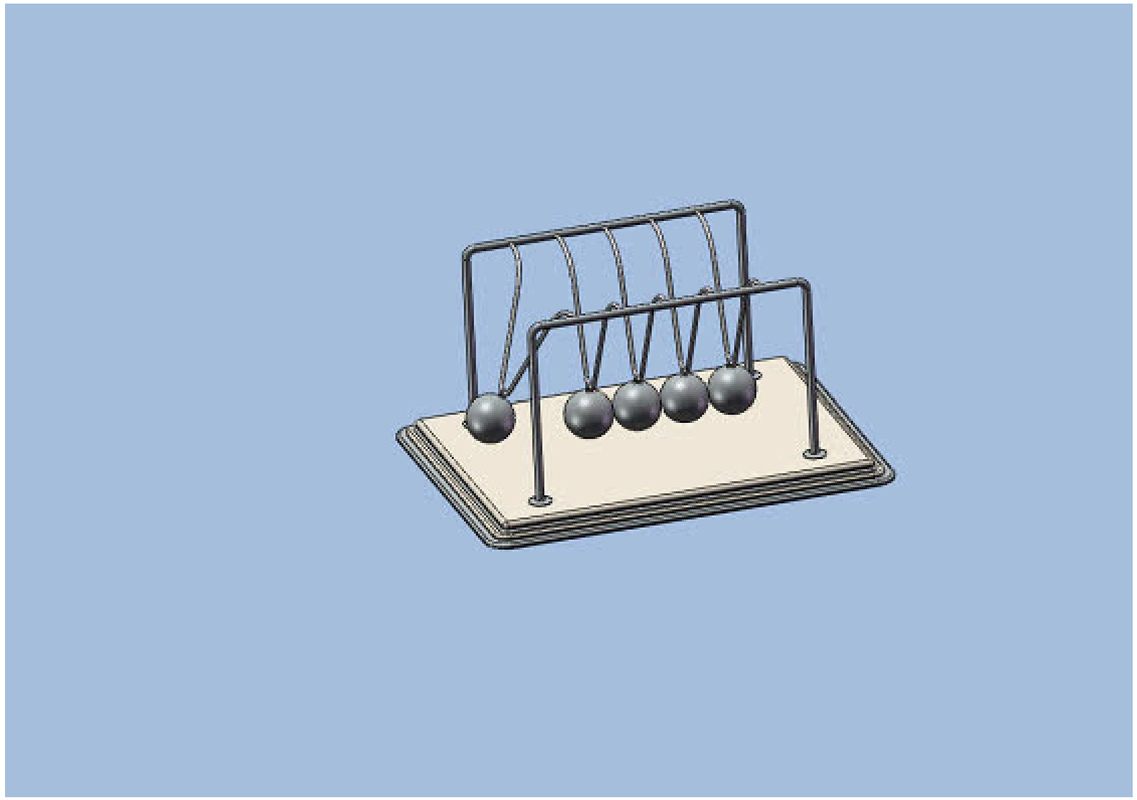
lightning — electrical energy

Can energy disappear?

Law of Conservation of Energy

Energy can neither be created nor destroyed.
It can only be transformed from one form to another, or transferred from one object to another.
During transformation or transfer, the total amount of energy remains constant.





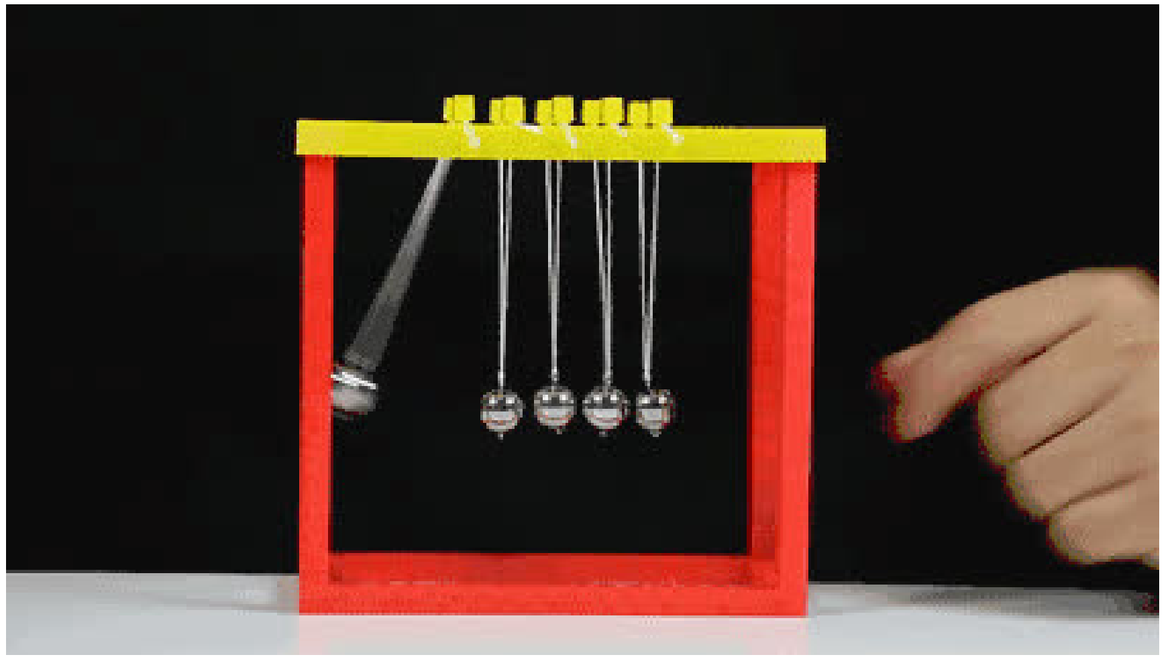
Newton's Cradle

Principle of Newton's Cradle:

According to the law of conservation of energy, in a closed system the total energy remains constant. When one ball on the end collides with the group, its energy is transferred to the ball on the opposite end — it doesn't disappear.

However, for Newton's Cradle to achieve perpetual motion, it must exist in an ideal state — that is, with no air resistance or friction.

In the real world, this is impossible, so the cradle will eventually stop moving.



Energy can be transformed from one form to another.
What are some examples of energy transformation in daily life?

Energy Transformation Examples

Solar Power Generation

Solar energy → Electrical energy

Hydropower Generation

Water's potential energy → Electrical energy

Cooking with Gas

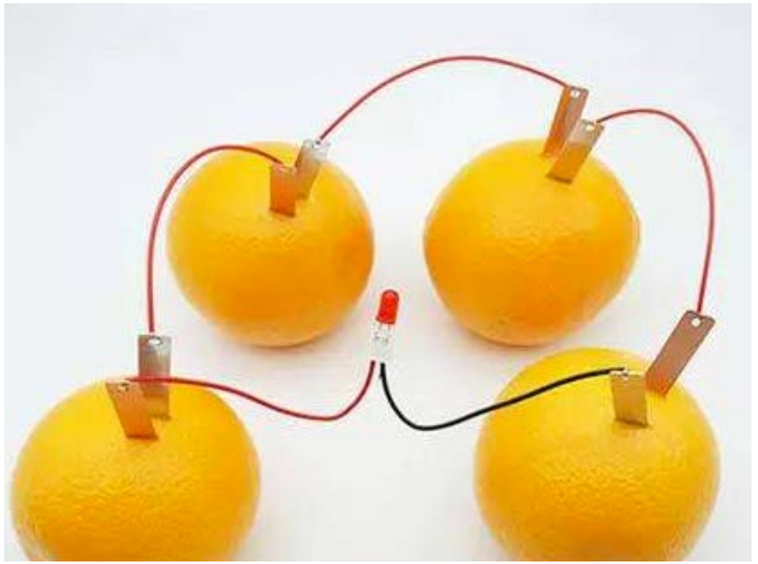
Chemical energy → Heat energy

Friction Produces Heat

Mechanical energy → Heat energy

Internal Combustion Engine

Heat energy → Mechanical energy



Fruit Battery

Chemical energy → Electrical energy

Thank you for Reading!