

Lively Physics and Exciting Experiments 1

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- In Japan
- Many Japanese high school students **don't like Physics.**
 - They say "Physics is **difficult, uninteresting and trifling.**"
 - They **believe in supernatural phenomena.**
 - But they are strongly **interested in environmental problems.**
 - Not only students but **citizens are less interested** in science

◆ What is important to make physics classes worth learning for every student?

(1). "Lively Physics Exciting Experiments"

It is important to show "Physics is fun,"
"Physics exists everywhere,"
"Everybody can enjoy Physics"

The IEA says that many junior high school students in Japan get high scores in science tests, but don't like science.

OECD says that many adults (citizens) in Japan are less interested in science than those of any other 13 nations in the world.

These investigations show that science education in Japan has failed.

Children should be educated so that they will grow to be good citizens, shouldn't they?

(2). Challenging Unscientific Thinking

Many students believe in ghost, curse, and super natural power. (Fig1)

They are interested in unscientific phenomena and invisible unsolved scientific phenomena. It is important to discuss "What is the scientific thinking." using magic, superstition etc. For example in Japan, birth-rate decreased 25% in 1966. This year was the year of HINOEUMA.* Now is the time when we need scientific and rational judgment (scientific recognition).

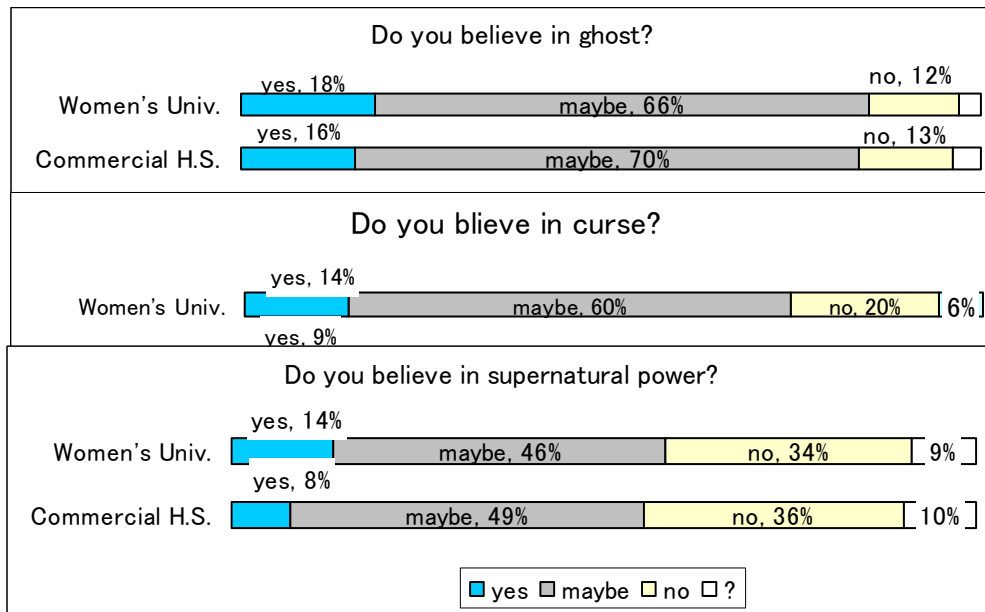
*HINOEUMA: a kind of superstitions that a girl who was born in that year has misfortune

(3). Entropy and Environmental Problems

There are two main natural laws. One is the law of 'Materials and Energy Conservation.' The other is the law of 'Materials and Energy Diffusion'.

We haven't taught the latter one enough in high school in Japan. To teach the latter (the Principle of Increase of Entropy) will be more and more important in physics education in relation to the environmental problems.

Civilization of mass production, mass consumption, and mass waste in the 20th century cause environmental problems and began to threaten our survival.



(Fig1) Investigation: Women's Univ. by Iida 2002; Commercial H.S. by Toda 1999

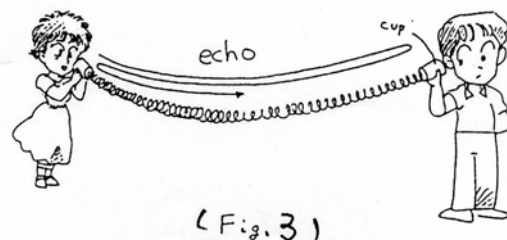
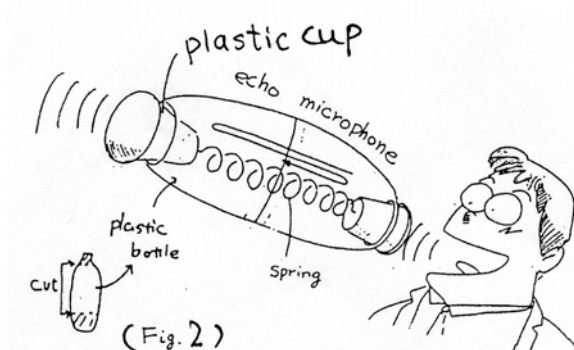
The 21st century is the time when we should be asked about mankind's wisdom and ability, in order to solve these problems.

(4) Especially the roll of women who bring up their children is very important.

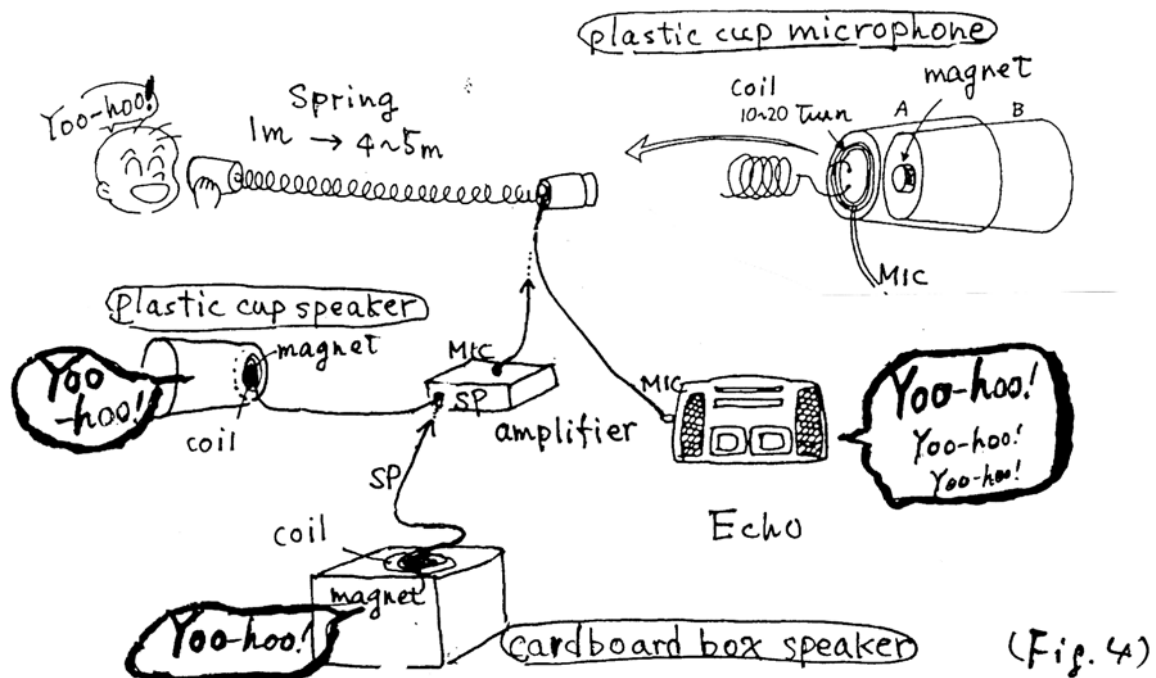
I am teaching "science introduction" in the women's university through simple interesting experiments using daily materials and showing magic etc. They are strongly interested in above (1) ~ (3).

◆ Some Examples for "Lively Physics Exciting Experiments"

(1) "Karaoke" Microphone

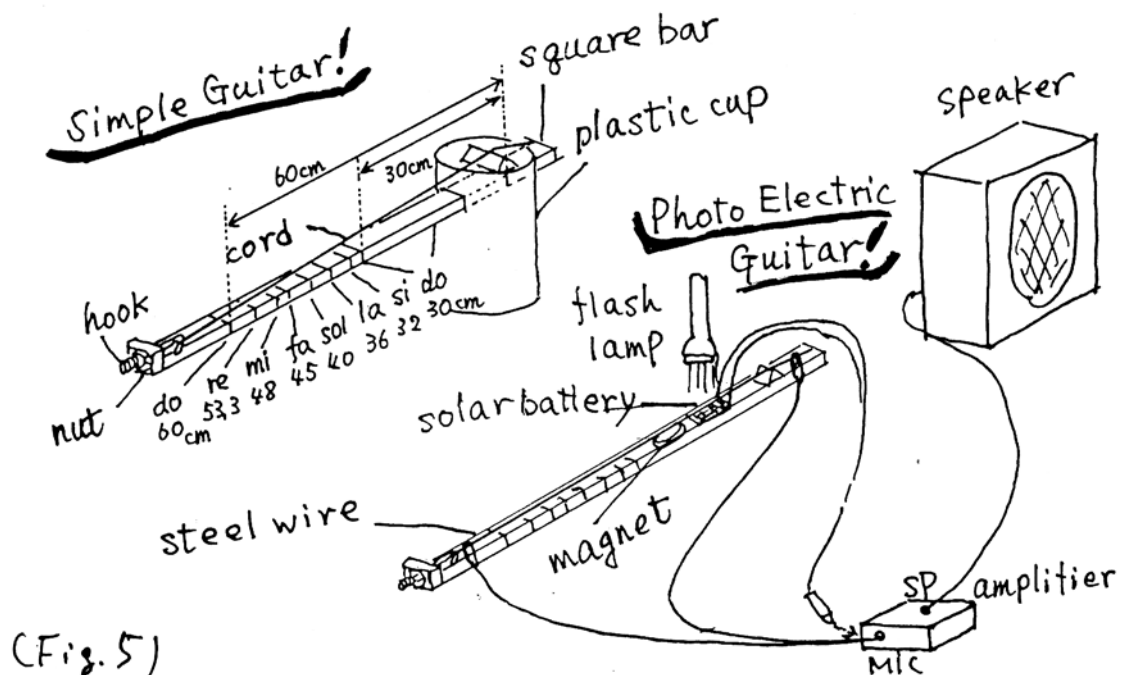


(2) Microphone and Speaker made in Plastic Cup



(Fig. 4)

(3) Plastic cup Guitar, Electric Guitar and Photo Electric Guitar

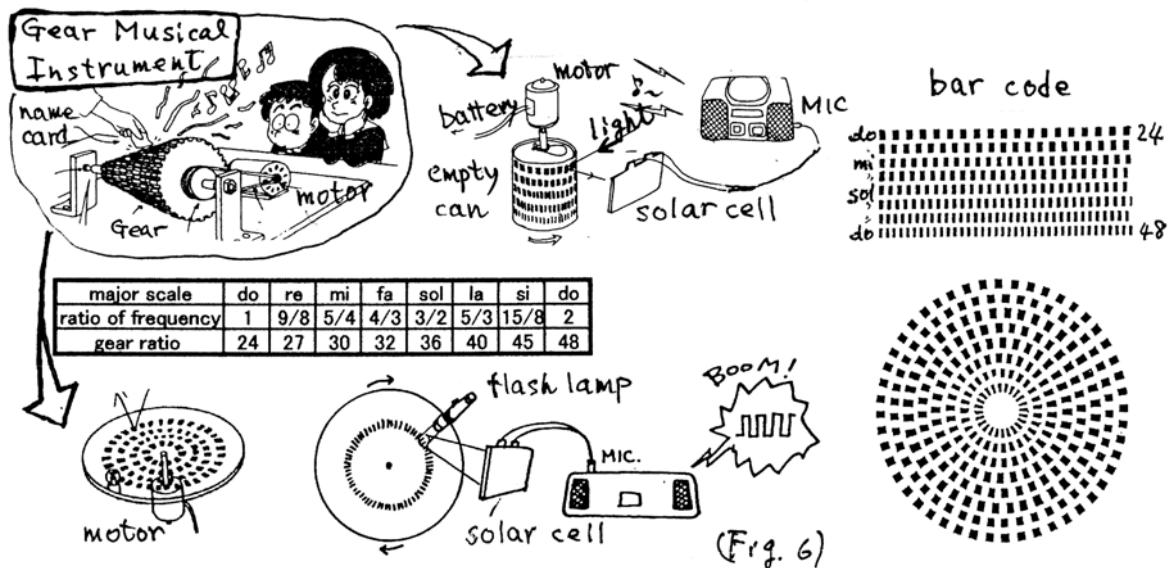


(Fig. 5)

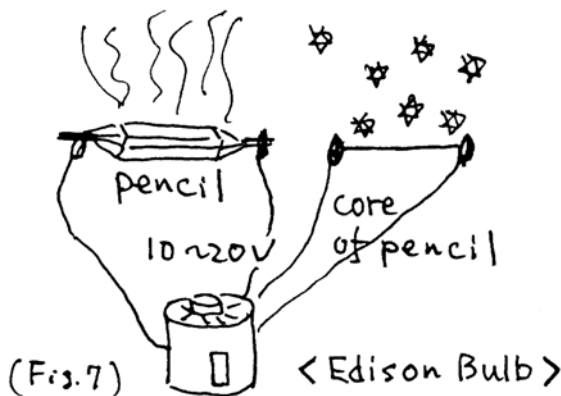
major scale	do	re	mi	fa	sol	la	si	do
ratio of frequency	1	9/8	5/4	4/3	3/2	5/3	15/8	2
integral ratio of freq.	24	27	30	32	36	40	45	48
ratio of chord length	1	8/9	4/5	3/4	2/3	3/5	8/15	1/2
chord length 60cm	60	53.3	48	45	40	36	32	30

Electric Guitar!

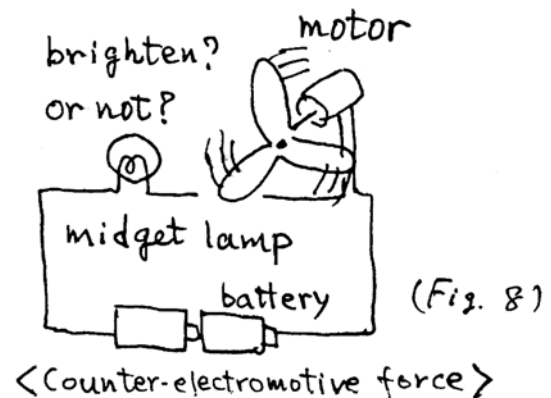
(4) Photo Musical Instrument (Development from Gear Instrument)



(5) Burning Pencil, Bright Core of Pencil



(6) Does the Bulb Brighten, or not?



(7) Simple Safety Water Rocket

Students really enjoy physics classes launching their water rockets.

These are made of PET-bottles, which are wrapped in a tube of soft plastics.

One third of the bottle is filled with water. The bottle is then closed with the help of a garden hose connector and a bicycle valve. Then a bicycle pump is used to fill the bottle with air to create high pressure.

When the garden hose connector is released, the rocket takes off.

Two Stage Water Rocket: see

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