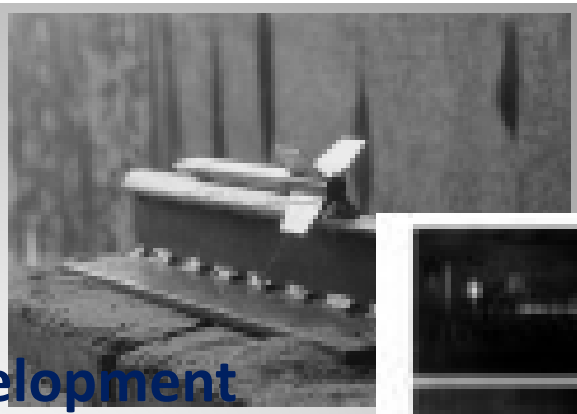
Dropper Rocket

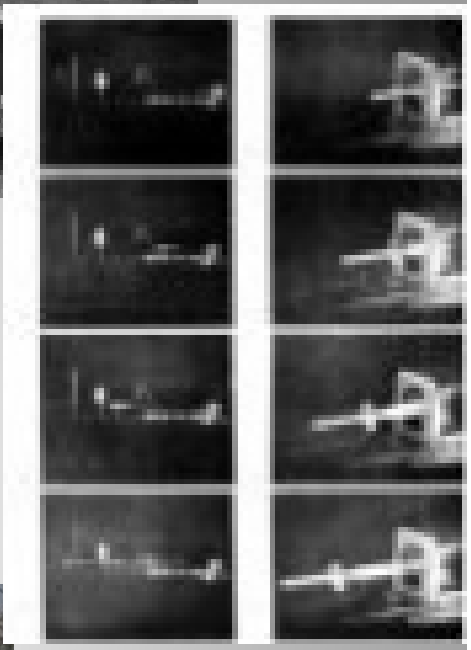
—Having fun with handmade rockets-

Masato Kan

Mitaka City 5th Junior High School, Tokyo

Where I live





・The birthplace of Japanese space development
- Japan's first horizontal launch pencil rocket -

・Development of Japan's high-speed "shinkansen“ (bullet train)
- Birthplace of "Hikari", the first shinkansen -

I live in a town that has been involved in the development of Japanese scientific technology

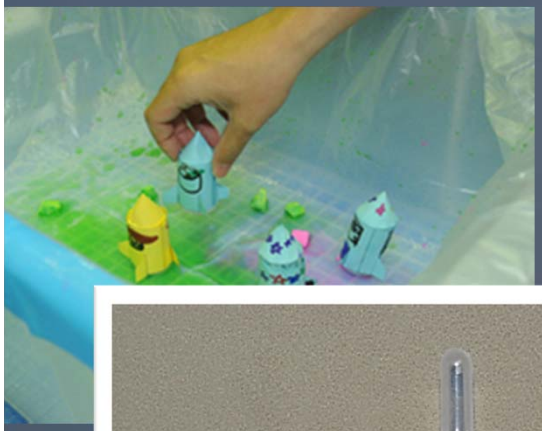
My activities

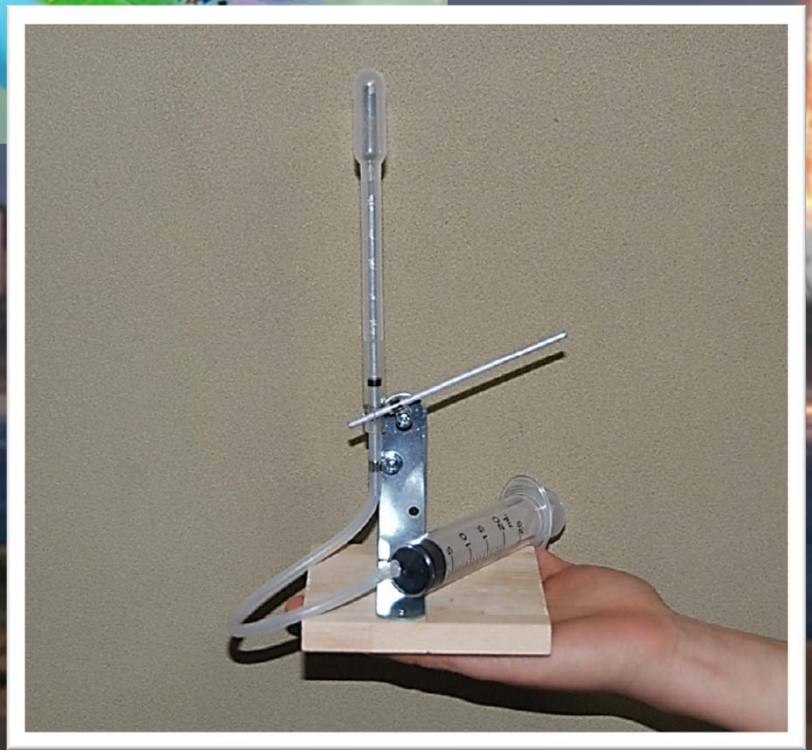
While teaching mathematics and science at a junior high school I am also involved in space education such as:

- **Science for elementary school students**
- **Development of space education materials**
- **Space education program for parents and kids**
- **Training teachers/Insturctors on space education**

Dropper Rocket

—Having fun with handmade rockets-



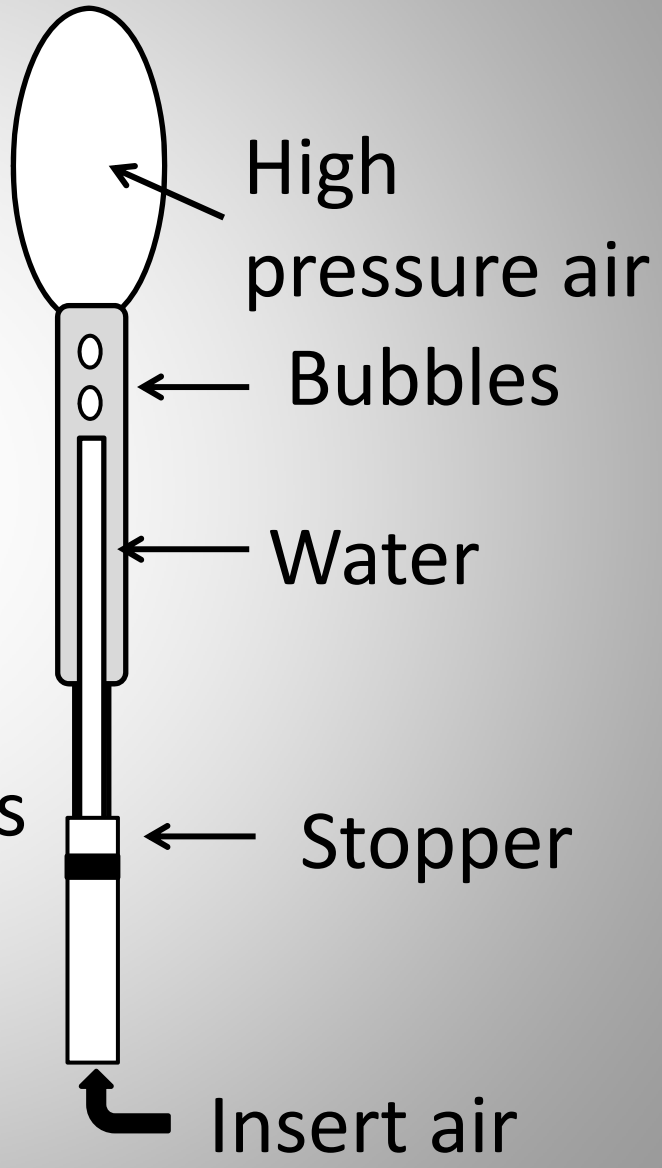


Flight mechanism

The flight mechanism is the same as a PET (plastic) bottle water rocket

(1) Insert air into the dropper using a syringe

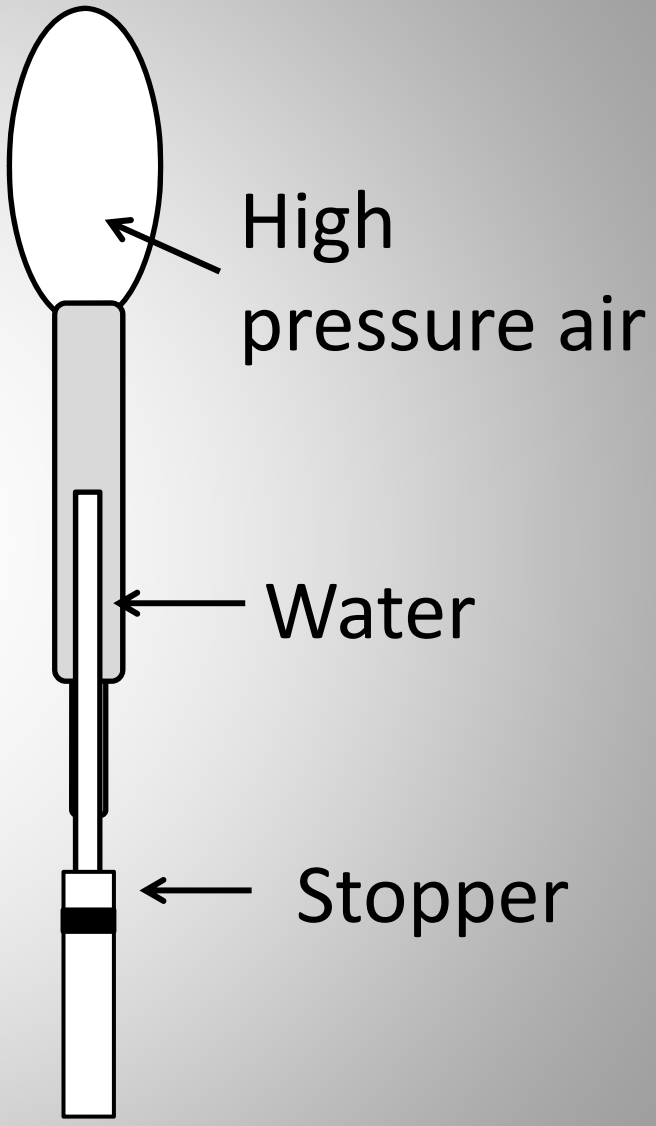
The air in the dropper becomes high in pressure



Flight mechanism

The flight mechanism is the same as a PET (plastic) bottle water rocket

(2) Remove the stopper



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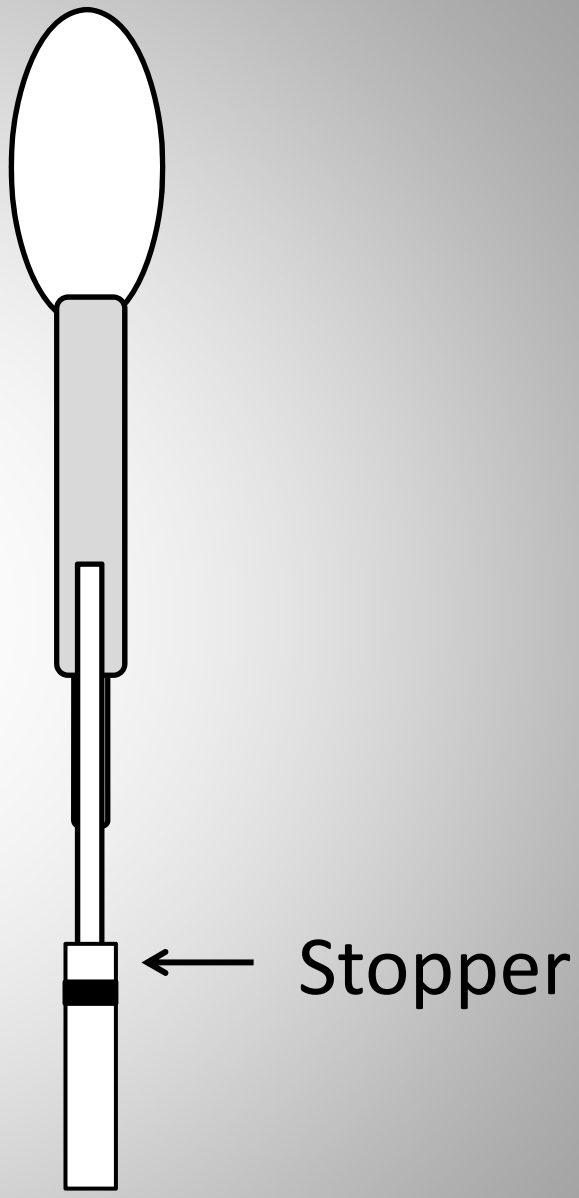


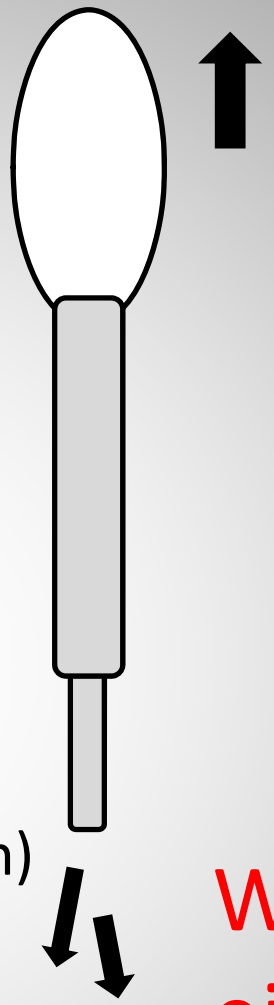
Flight mechanism

The flight mechanism is the same as a PET (plastic) bottle water rocket

(2) Remove the stopper

Water is ejected from the bottom (action)

Rocket launches with this kick back (reaction)



Launch (reaction)

Water ejected (action)

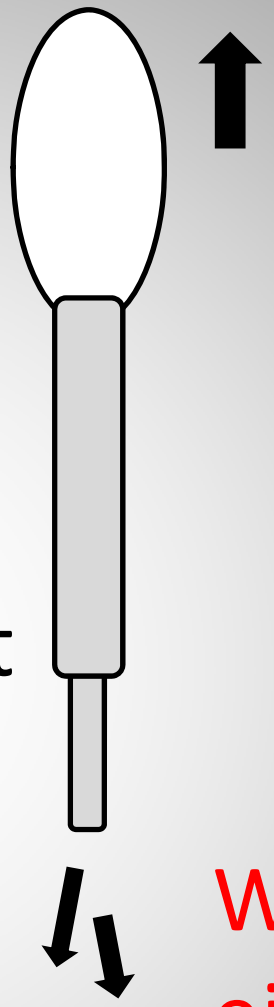
Characteristics

(1) Small launcher

(2) Easy to construct

(3) Dropper is light and soft

(4) Short flight distance

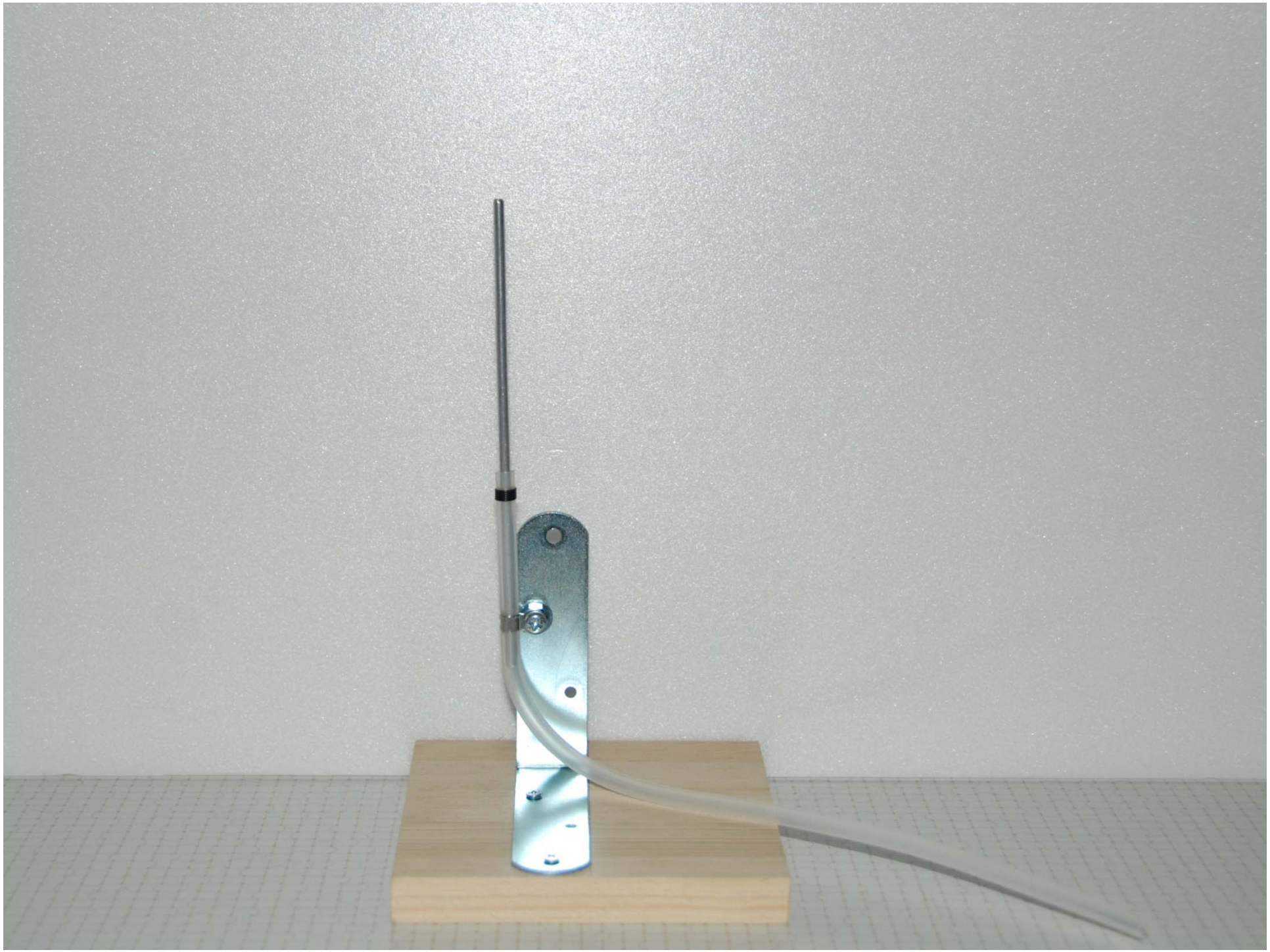


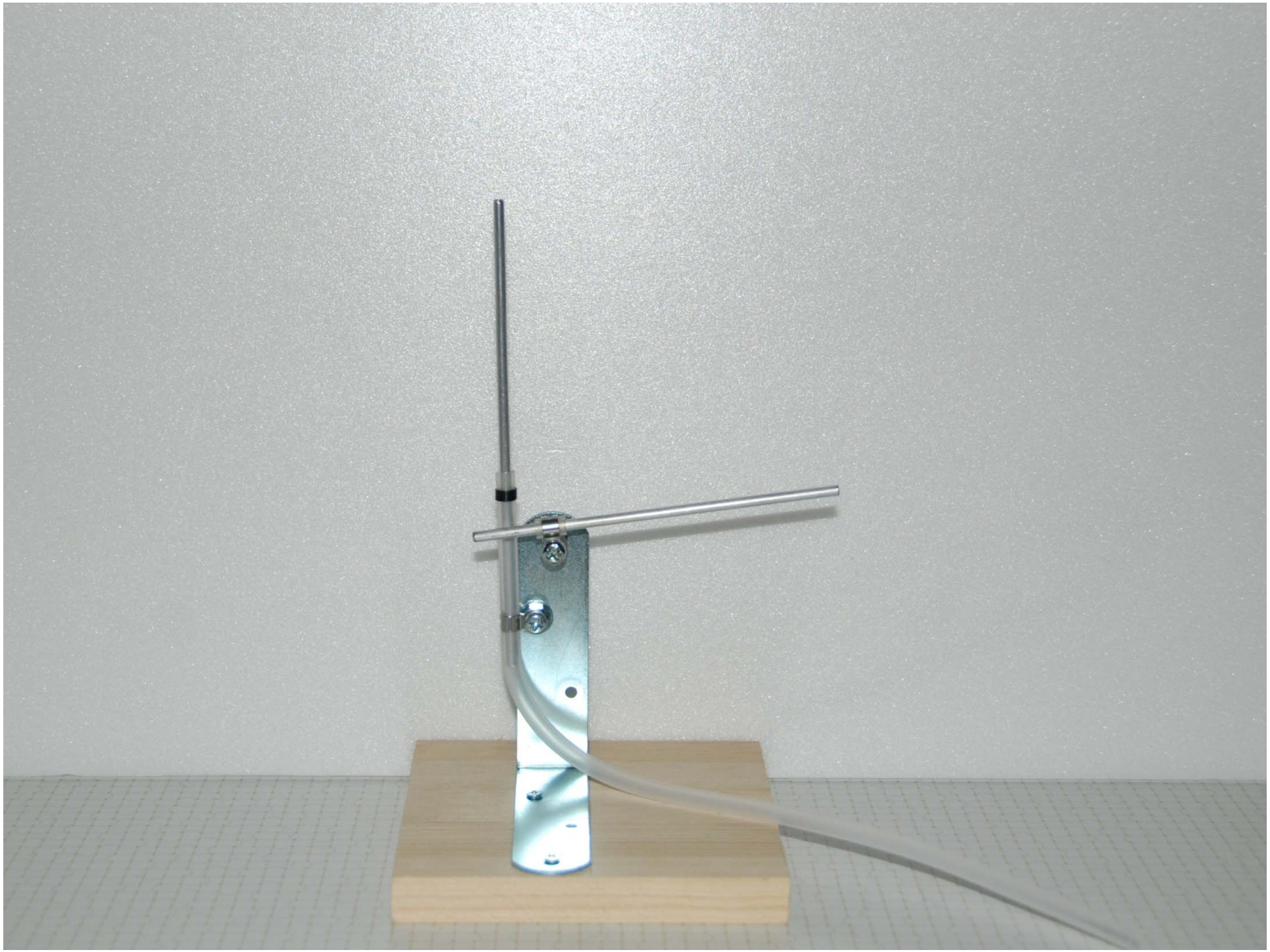
Launch (reaction)

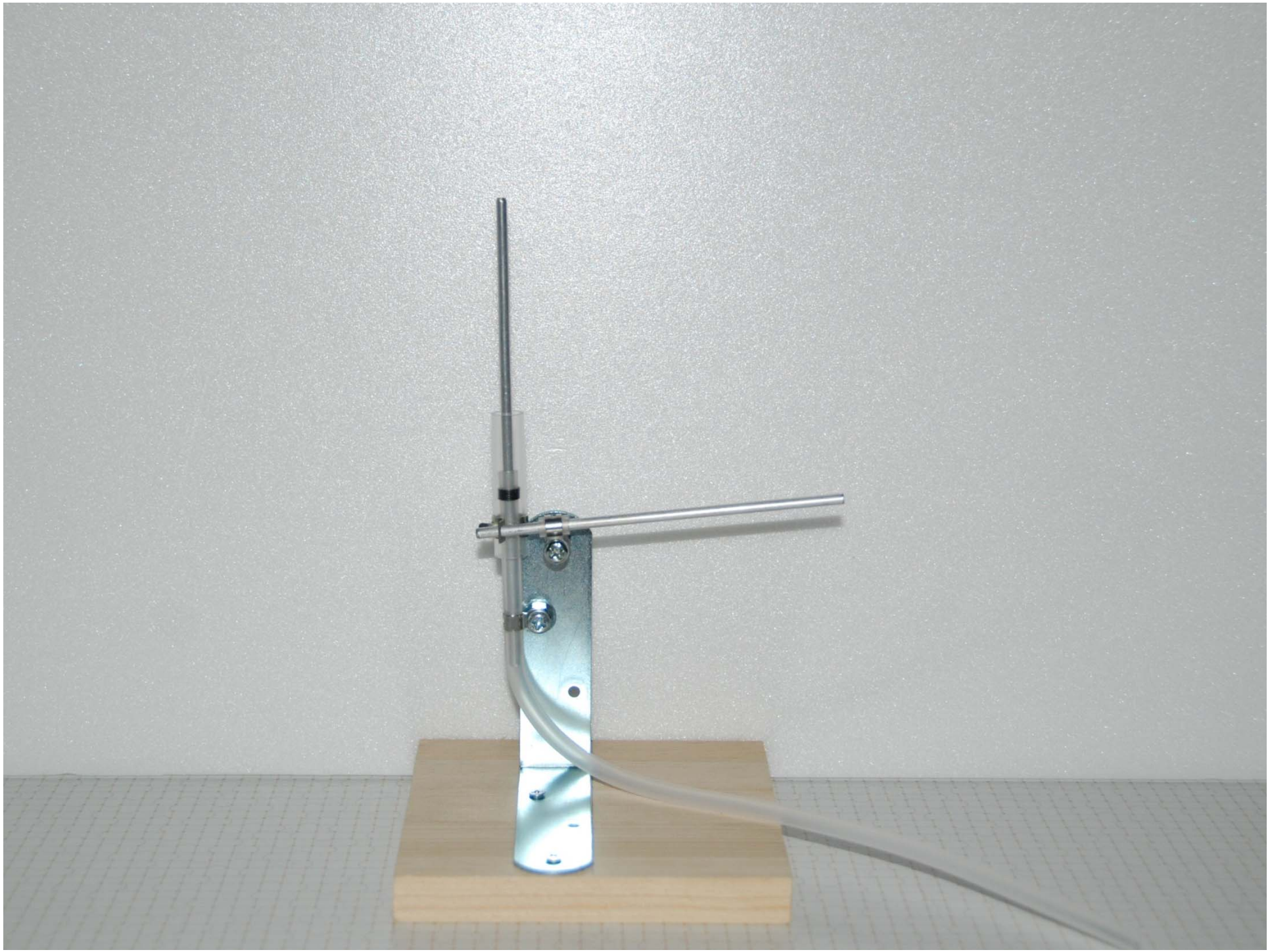
Water ejected (action)

Can be launched indoors e.g. gymnasium

Assembling the launcher



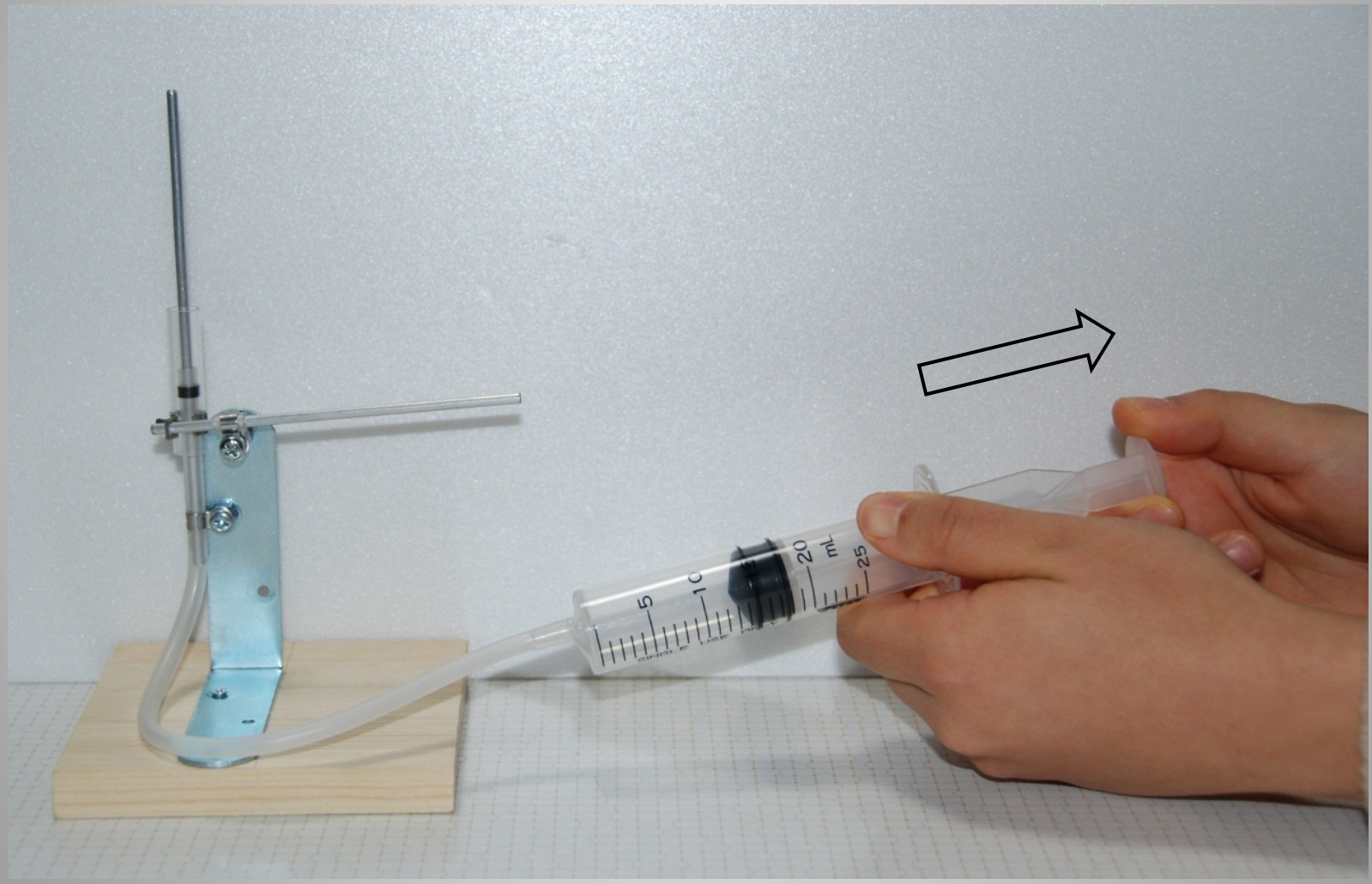




Completion of launcher

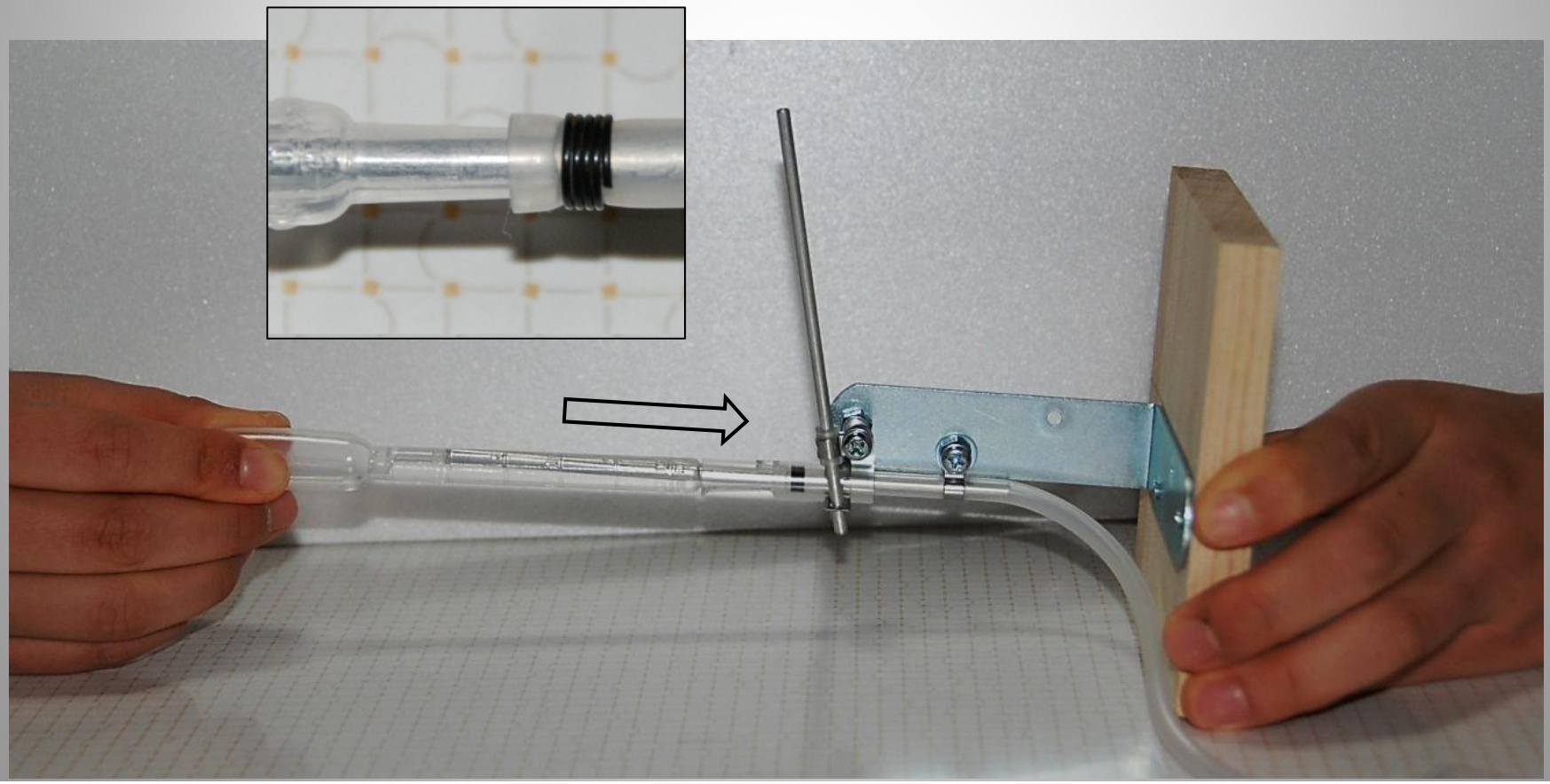
Next: How to launch the dropper rocket

(1) Pull the syringe

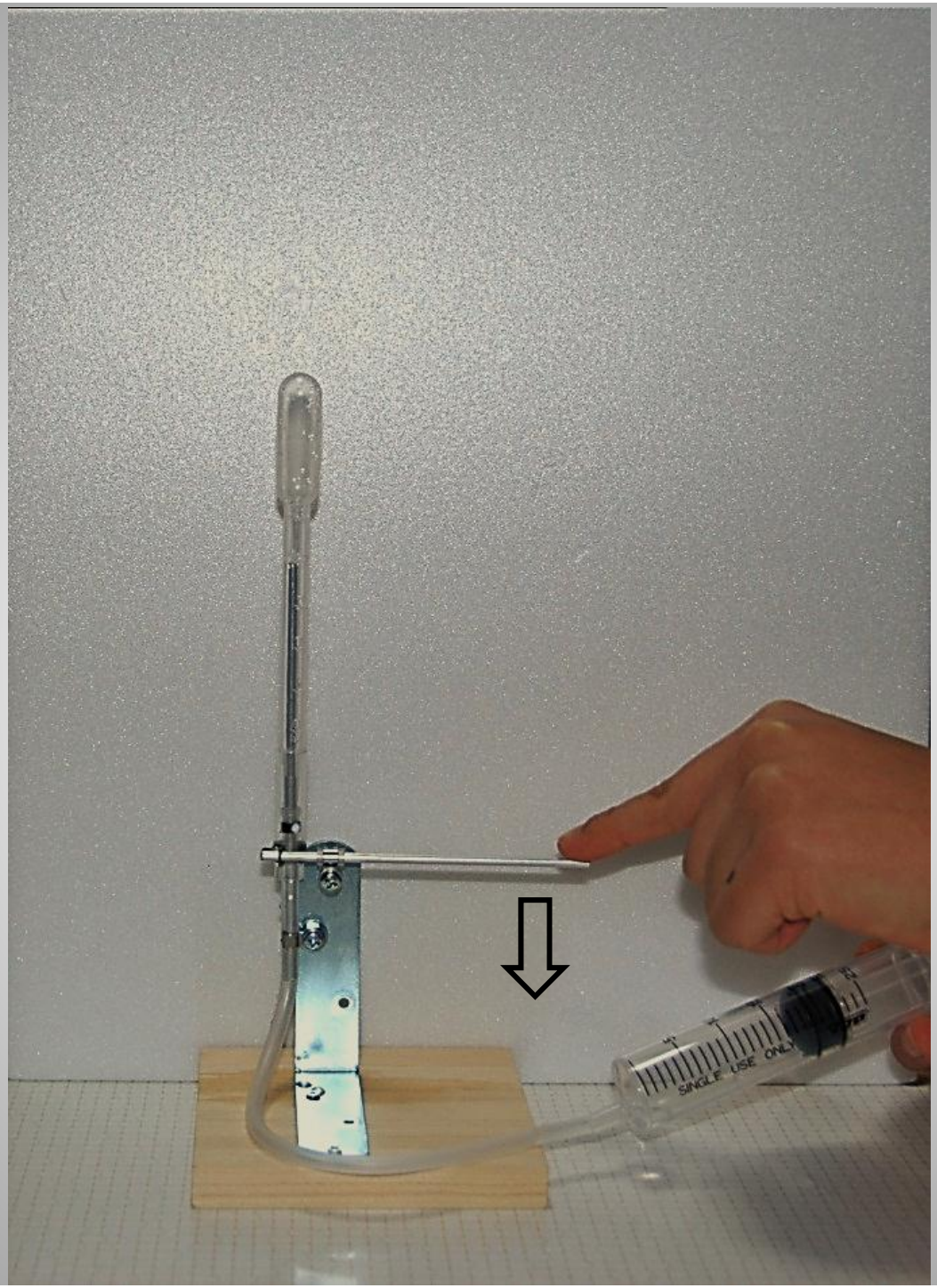


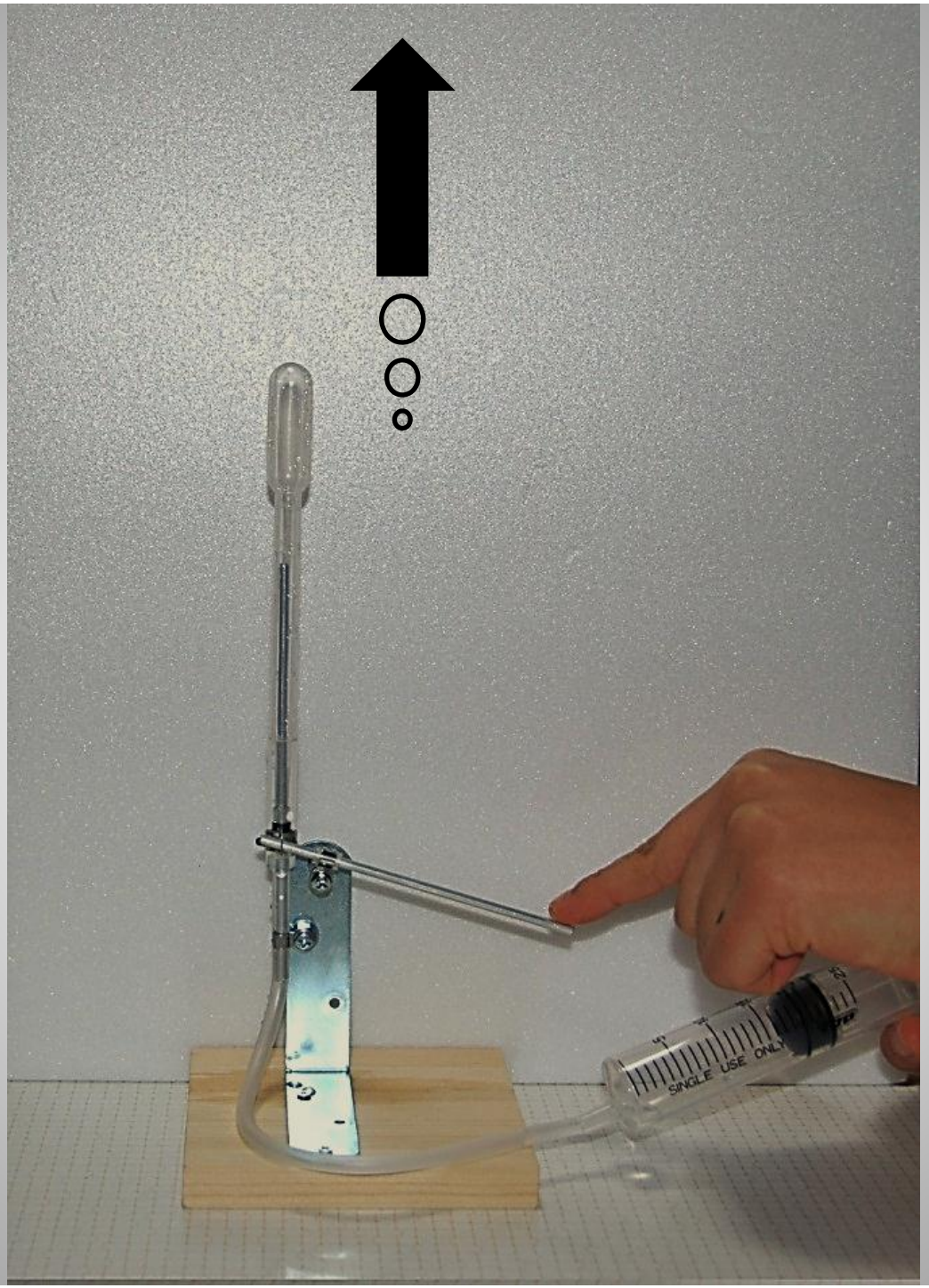
(2) Insert water into dropper

(3) Turn the launcher on its side, insert the dropper into the guide (aluminum pipe) and insert the tip of the dropper between the aluminum pipe and silicon tube.

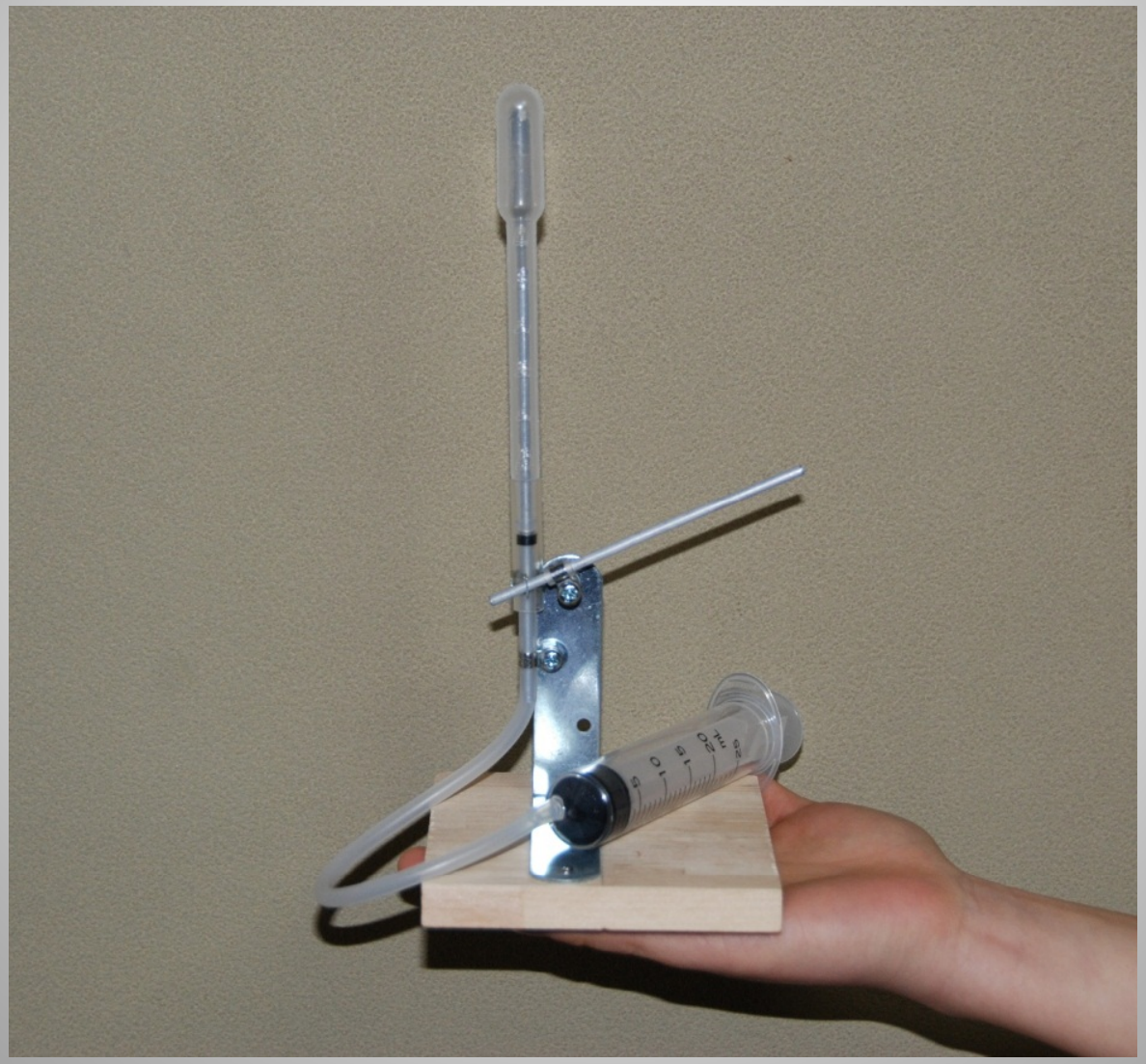


(4) Push the syringe


SINGLE USE ONL


SINGLE USE ONLY

Let’s have fun launching our rocket safely!



Putting it into practice

Let's see what happens when we launch it under two different conditions.

(1) Launching using only air in the dropper

(2) Launching using water in the dropper

Did you notice?

Ejecting water, which has more mass,

results in better flight

Try it for yourself

Feel free to try it again,
launching it under different conditions.

You are bound to discover something new.

Though it wasn't long,
I had a really
good time with you!

Thank you!

Masato Kan

SEEC Presentation Script (Kan) 30th November 2012

Thank you very much for coming here today, my name is Masato Kan from Japan.
Today I would like to introduce to you my "dropper rocket", one of the teaching materials I normally use in my space education activities.
We don't have long together, but I hope you all have a good time.

First allow me to introduce myself.
I live in a city called Kokubunji in Tokyo.
This is where Japan's first horizontal launch of a small "pencil rocket" took place which signaled the start of Japanese space exploration, as well as the home of the development center of the Japanese "Shinkansen" high-speed train.
So, I live in a town that has been involved in the development of Japanese scientific technology.

Next, let's have a look at my space education activities.
I teach science and mathematics at a junior high school and I am also involved in space education.
I am very happy to be involved in space education and I enjoy my work a lot.

Right, let's move to today's topic.
Film-case rockets, syringe rockets, umbrella-cover rockets, and straw rockets can all be made into enjoyable rocket-related activities in space education. The "dropper rocket" that I will introduce today fits into this category.

As you can guess from the name, a dropper rocket is a cheap and affordable dropper that is made into a rocket and launched. I developed this to see if it was possible to launch something that uses the same mechanism as a PET plastic bottle water rocket safely and simply indoors.

It launches by inserting air into a dropper containing water to increase the pressure then removing a stopper which causes the water to be ejected (action) and the flight happens due to the reaction.
I struggled a bit during development with the stopper and its release.

As I mentioned, the characteristic feature of this activity is that you can safely launch the rocket in an indoors environment such as a gymnasium.

Right, let's take an up close look at the rocket.

First, we'll examine the assembly of the launcher.

(Build the base -> attach the guide/stopper -> attach the launch lever -> attach the stopper release tube->completion)

(Hand out launchers)

I have brought with me some pre-assembled launchers, please take a look at how it works paying special attention to the stopper and the release tube.

Next, how it launches.

(Pull the syringe-> draw water into the dropper -> set the dropper on the launcher -> press the syringe-> press the launch lever->launch)

Usually it launches straight up, but because today's venue has a low ceiling I have set it to launch at an angle.

Please be careful not to hit anyone with it! Just after launch it has quite a lot of power.

(Hand out droppers)

OK, let's give it a go.

We are going to do two launches under different conditions.

How far do you think it will fly?

(1) Not drawing water into the dropper and launching the rocket using only air

(2) Drawing water into the dropper and launching the rocket with water

(After the experiment)

Did you see the difference in flight?

I think you could see how it flew better using water, which has a greater mass than air.

Feel free to change the conditions and launch the rocket, I think you can make new discoveries.

So have you had fun? Did you make the connection between this and the way a real rocket flies?

I hope that many people around the world use this material, so I am going to hand out some dropper rocket pamphlets for you to use.

(Hand out dropper rocket pamphlets)

We didn’t have much time together, but I had a really good time with you!
Thank you very much!

Masato Kan
30th November, 2012