

Teaching

“How to Make  
a Safe Flying Rocket”

(for elementary schools)

Hidekazu Naruto

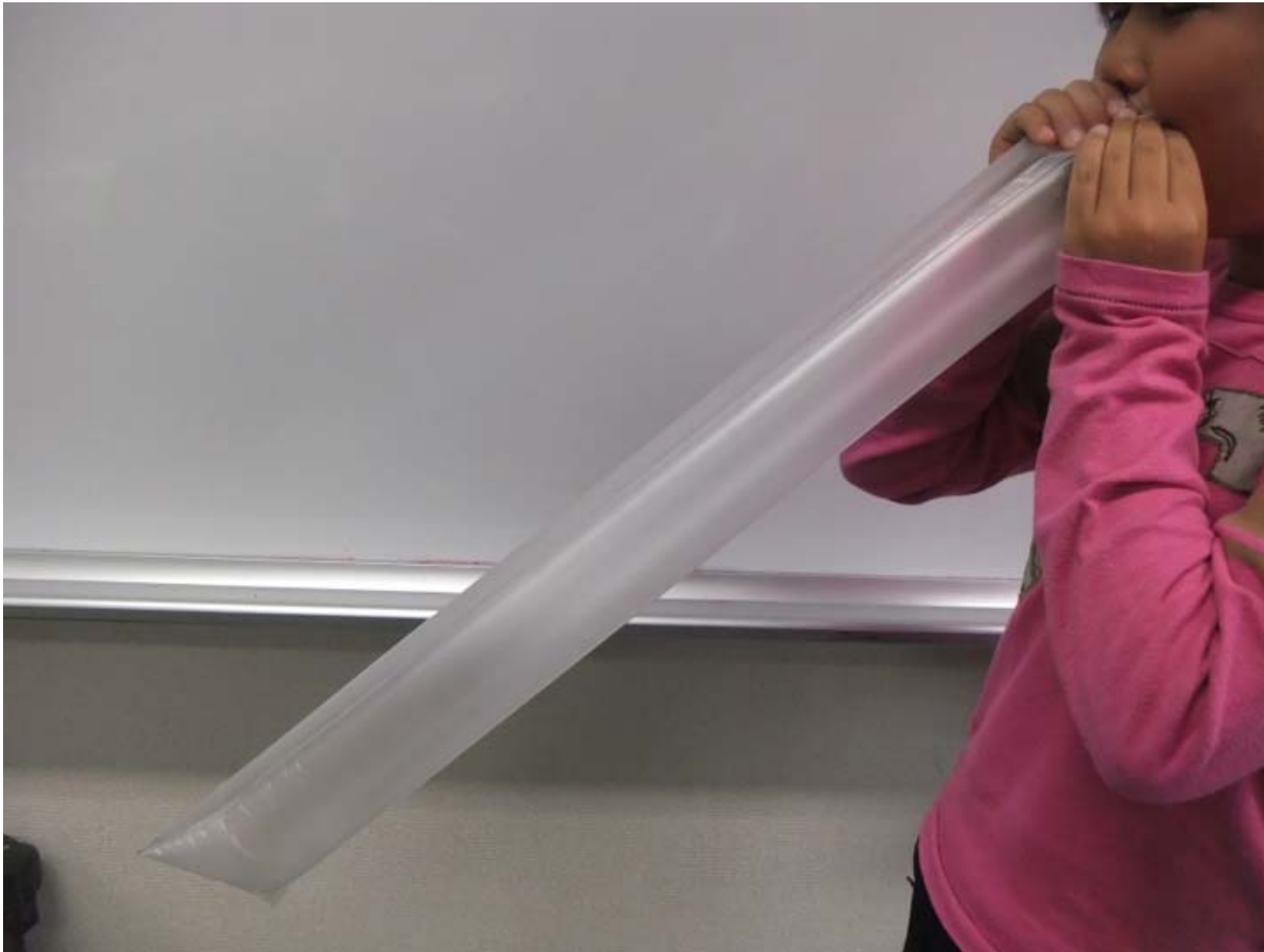
Learn  
through  
experience



Plastic umbrella bag  
“Kasabukuro”



# (1) Inflate



## (2) Twist



## (3) Tape



## Why won't it fly?

- A . There are no wings
- B . The nose isn't pointed
- C . It is unbalanced



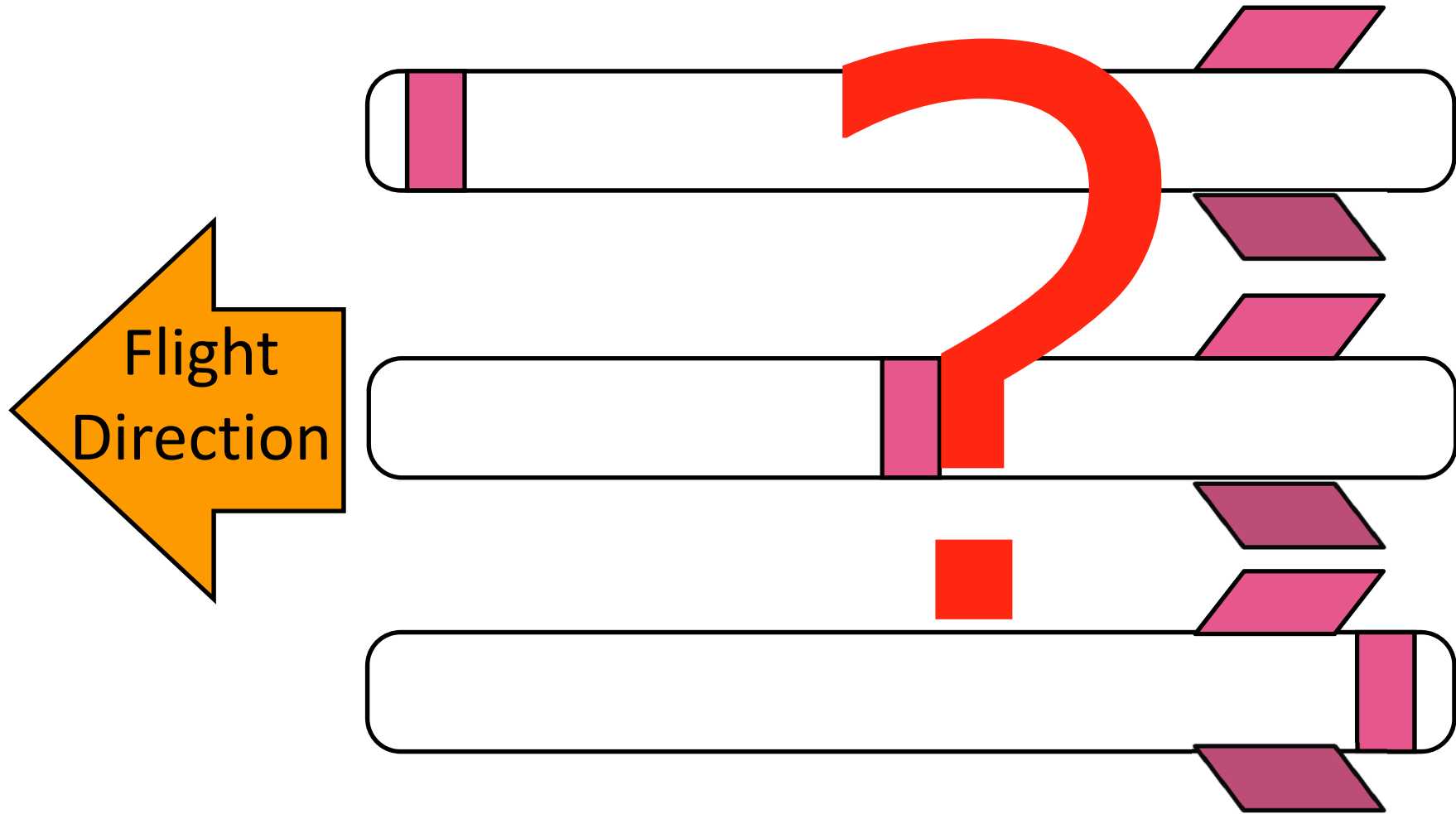
**No wings**

## Why won't it fly?

- A . There are no wings
- B . The nose isn't pointed
- C . It is unbalanced



# Which part should be heaviest?



The center of gravity is at the front





Thank you for listening

## Workshop (Script)

No.	Script (spoken)	Activities etc.
① BK	<p>I am Hidekazu Naruto from Fujitodai elementary school in Japan.</p> <p>Today, I'd like to discuss with you all about how to teach elementary school students about space in a way that they will enjoy.</p> <p>This is the theme of my presentation.</p>	
②	<p>Rockets perform the critical role of carrying people and cargo into space. It is important that a rocket reaches its set destination, so it must fly safely.</p> <p>Gravity and air resistance affect rockets before reaching space, and if they lose balance right after launch, they will stall and fall back to earth.</p> <p>So how do rockets maintain stability?</p>	
③	<p>I think that when teaching difficult physics such as this, having children experiencing it first hand.</p> <p>Through this way of teaching, students can learn not only from knowledge from text books but also through practical experience.</p> <p>OK, let's get started.</p> <p>First of all, we have to make rockets, so I have brought some great materials to help us learn about how rockets fly.</p>	
④ Kasabukuro	<p>This is a plastic umbrella bag, called a "kasabukuro" in Japanese. You can often find these at the entrance to supermarkets in Japan, and they help avoid the floor from getting drenched by wet umbrellas.</p> <p>You can also purchase them easily online.</p> <p>Let's make a kasabukuro rocket.</p> <p>[Activity 1: Making a Rocket]</p> <p>First, we are going to insert a straw and inflate the kasabukuro. Next, hold here so that no air escapes and remove the straw.</p> <p>If you buy umbrella bags from a store or online, you will have to twist it and then secure it with some tape.</p> <p>⑤ ⑥ First, inflate it in the same way, then twist, and apply tape at the base.</p> <p>It's done. Here is a rocket that even kids who can't tie knots can</p>	<p>[If asked]</p> <p>It only costs about \$4 for 100.</p> <p>[Verbal instructions]</p> <p>Inflate the bag full like this until it makes a metallic sound.</p> <p>It is important to tape it up securely to keep the air in.</p>

	make.	
No.	Script (spoken)	Activities etc.
⑦ BK	[Activity 2: Launching a Prototype Rocket]  OK, it's ready, let's throw it straight.  Now let's see what happens when we throw it slightly upwards.  Pay attention to how it flies, and don't throw it towards anybody!	What happens when you throw it slightly upwards?
⑧ 3 Options	It didn't seem to fly well. So what do you think was the reason? A. Because there are no wings B. Because the nose isn't pointed. C. It is unbalanced.  (Yes, people often say the answer is "A", but the correct answer is "C".)	If there are many people who answer (C) give them complements and say "we usually think that the reason is there are no wings, but..." etc.
⑨ H2B  ⑩  Click	Let's have a look at a real rocket. As you can see, it has no wings. Unlike airplanes, most rockets have no wings.  Well is it because the nose is NOT pointed? A pointed nose decreases air resistance so maybe we can say this is correct. But look at this, it's not stable.  Actually, there is something more important than these, and that is "C", the balance of the rocket.. We can find the "center of gravity" by finding the point where if you hold it with your hand the object balances. This point is very important to make a rocket maintain stability in flight.	<del>[Strikethrough in (A)]</del>  [Show a rocket that doesn't fly]  <del>[Strikethrough in (B)]</del>
⑪ Question	So, where should we put the weight? At the front? In the center? At the back?  Let's make three kinds of rockets to check the differences in how they fly.  Here is some rubber, I'm going to use this as a weight.	Audience listens while being shown an actual kasabukuro rocket.

	[Activity 3: Creating and Launching a Weighted Rocket]	[Demonstration of how to make a rocket] [Verbal instructions] Inflate the bag full like this until it makes a metallic sound.
No.		Activities etc.
	What's the difference? (Question)  How about that? What did you notice?	Main point! Listen carefully to opinions!
⑫ VTR	Take a look at this movie where a kid from primary school makes his rocket fly.  If you add weight to the front, the center of gravity moves forward. Even if the wind blows from the front, the rocket adjusts accordingly with the weight at the front. Due to this, rockets fly stably if the center of gravity is placed towards the front.	Demonstration of a [Rocket that doesn't fly]
⑬ Explanation	[Activity 5: Launch the Completed Rocket]  Finally, let's use the things that we have learned and make a rocket that flies even better.  We'll further improve the rocket to which we added weight towards the front.  This time we'll make the tip round to decrease air resistance, and then stick on wings with tape to increase stability.  Now let's try it out.	
	Did you enjoy the demonstration? I hope so.  There are two advantages to making kasabukuro rockets. 1. They are easy to make. 2. Children can learn from experience through playing.  As a matter of fact, school children in Japan still don't learn what "the center of gravity" is, but they can learn through experience by playing like this.  I always believe in the importance of first hand experience when teaching, and I think that children will become more interested in	

<p>⑭</p>	<p>science and technology through playing like this.</p> <p>Thank you for your time.</p>	
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