

KidzLabs Cosmic Rocket



Contents:
1 transparent rocket body, 3 rocket fins, 1 connecting ring, 1 launching station, 1 measuring spoon, 1 booklet of fun rocket science with detailed launching instructions.

Not included in this kit:
Vinegar and baking soda. Please get them from the kitchen. Colours and contents may vary from those illustrated.



Flies up to 50 feet

KidzLabs™ Cosmic Rocket

A hands-on rocket launching science kit for the whole family. Includes a booklet of fun rocket science with detailed launching instructions and a rocket that flies up to 50 feet. A unique experimental kit that inspires young scientists.



- FUSEE COSMIQUE
- KOSMISCHE RAKETE
- COSMIC ROCKET
- LAZZO COSMICO
- COHETE ESPACIAL
- コスモロケット

WARNING:

This is a rocket science experiment kit for use with parental guidance. Rocket launching should be performed by parents or by ages 14 & up. Not intended as a toy for young children. Choking hazard - small parts. Not for children under 3 years.

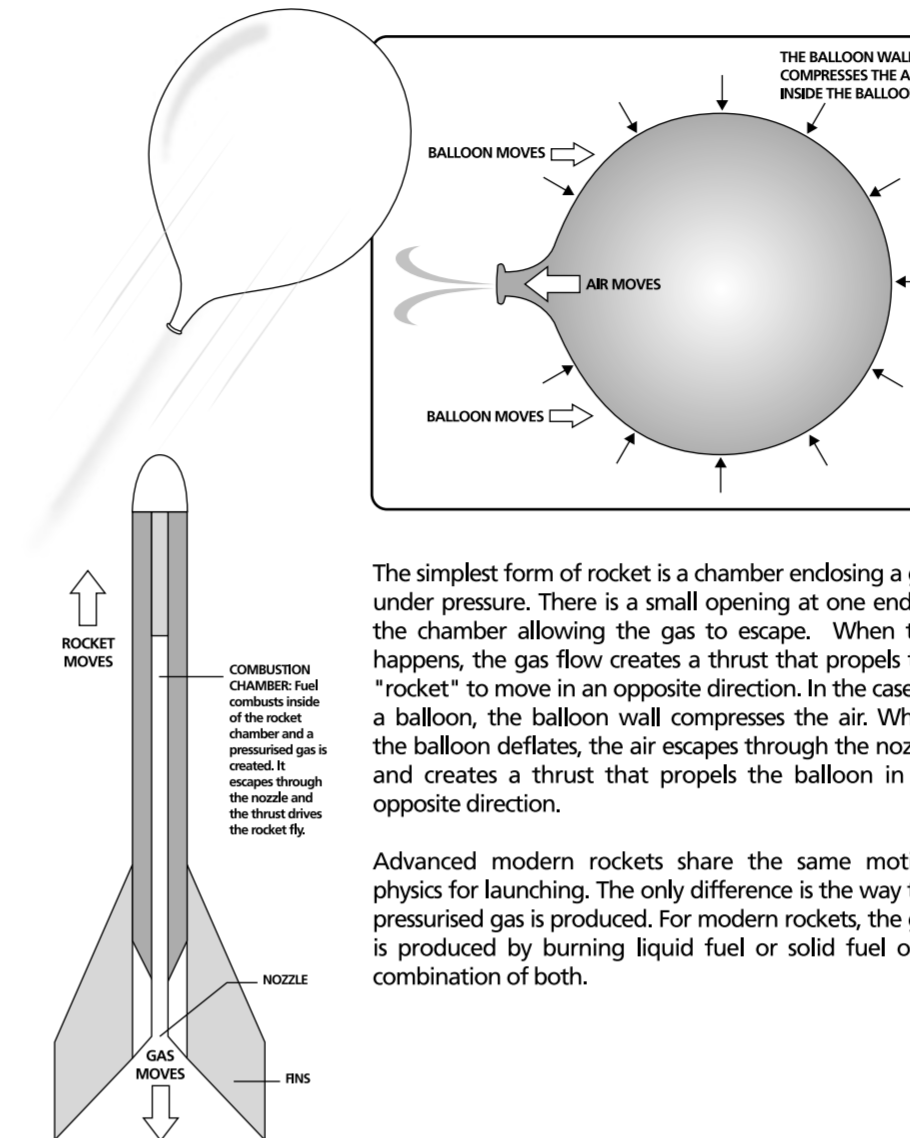


©2003-2015 4M INDUSTRIAL DEVELOPMENT LIMITED. ALL RIGHTS RESERVED. COSMIC ROCKET™ IS A TRADEMARK OF 4M INDUSTRIAL DEVELOPMENT LIMITED.

FUN ROCKET SCIENCE

HOW DOES A ROCKET WORK?

The rocket is without doubt one of the greatest inventions of mankind and which made our space exploration possible. When we think of rockets, we normally think of high-tech space rockets that we see in most space mission launches. Rarely do we think of a deflating balloon that demonstrates the same basic principle of rocket science.



The simplest form of rocket is a chamber enclosing a gas under pressure. There is a small opening at one end of the chamber allowing the gas to escape. When this happens, the gas flow creates a thrust that propels the "rocket" to move in an opposite direction. In the case of a balloon, the balloon wall compresses the air. When the balloon deflates, the air escapes through the nozzle and creates a thrust that propels the balloon in an opposite direction.

Advanced modern rockets share the same motion physics for launching. The only difference is the way the pressurized gas is produced. For modern rockets, the gas is produced by burning liquid fuel or solid fuel or a combination of both.



SIR ISAAC NEWTON

The first real rocket prototype was invented 2000 years ago. The Chinese filled a small bamboo tube with gunpowder. When it was ignited, it released gas and launched the little "rocket" up into the sky. It was the first fire work. However, it is only in the last three hundred years that rocket experiments have become a science. In 1687, great English scientist Sir Isaac Newton published his three Laws of Motions that set the theoretical ground for modern rocket science. The simple form of the three laws is as follows:

NEWTON'S FIRST LAW: THE LAW OF INERTIA

The law states that an object at rest will remain at rest; or an object in motion will keep moving in a straight line. They will only change their state or direction when a force comes to act upon them. For rocket launching, a force must act on a resting rocket to make it lift off from a launching station. Once the rocket is launched, it moves in a straight line in space and to change its direction and speed, another force must be exerted.

NEWTON'S SECOND LAW: FORCE = MASS X ACCELERATION

Force is a product of mass and acceleration. The rocket body is heavy. To lift off, the rocket requires a strong thrust that is determined by the mass of the burning fuel and the speed of the escaping gas.

NEWTON'S THIRD LAW: ACTION = REACTION

For every action, there is always an opposite and equal reaction. When the gas escapes and shoots out from the fuel chamber, it creates a thrust (action) that propels the rocket to fly in a different direction (reaction).

HOW DOES YOUR COSMIC ROCKET™ WORK?

When the vinegar is mixed with baking soda, a gas, "carbon dioxide" and a chemical, acetic and water are made. All of them are harmless. With the chemical reaction continuing to take place inside your Cosmic Rocket™ chamber, more and more of the carbon dioxide is produced, up to the point when the cavity of the rocket cannot hold any more of the gas, the accumulated gas will escape from the bottom of the rocket, resulting in an opposite "thrust" which forces the rocket to fly. The tighter you connect the rocket to the launching station, the more gas will be accumulated and the bigger thrust force produced and the higher your rocket will fly.

IMPORTANT SAFETY MESSAGES

YOUR COSMIC ROCKET™ LAUNCHES WITH A POWERFUL THRUST. STRICTLY OBSERVE THE FOLLOWING SAFETY RULES FOR LAUNCHING. NEVER LEAN OVER THE TOP OF THE ROCKET. LAUNCHING SHOULD ONLY BE PERFORMED BY PARENTS OR BY AGES 14 AND UP. THE COSMIC ROCKET™ IS NOT INTENDED AS A TOY FOR YOUNG CHILDREN.

- Please read through these instructions before you start.
- Adult supervision and guidance required.
- This kit contains small parts that may cause suffocation if misused. Not intended for children of ages 3 or below.
- Check every accessory is securely installed before launching.
- Only launch the rocket outdoors and where it can land in an open space or on the grass.
- The use of eye goggles is recommended when you are performing the rocket launch.
- Never point the rocket at people, animals, windows, cars etc. Launch the rocket from level ground.
- Quickly move back from the launching station once the rocket has been installed and filled with the vinegar and baking powder. Alert all people who are watching the launch to stay away from the launching station by about 20 feet and watch out when the rocket is falling back to the ground. Never try to catch the falling rocket.
- Do not use any fuel other than that recommended in these instructions.
- Depending on a variety of conditions (e.g. temperature, amount of fuel added etc, see TROUBLE SHOOTING below), it can take between a few seconds to a few minutes for the vinegar and baking soda solution to generate sufficient gas for launching. **CAUTION:** Never lean over the top of the rocket. If the launching is apparently delayed or unsuccessful, ask an adult for assistance. If checking or refueling the rocket is required, hold the rocket body firmly, tilt the launching station outwards, away from you and quickly detach the rocket from it.



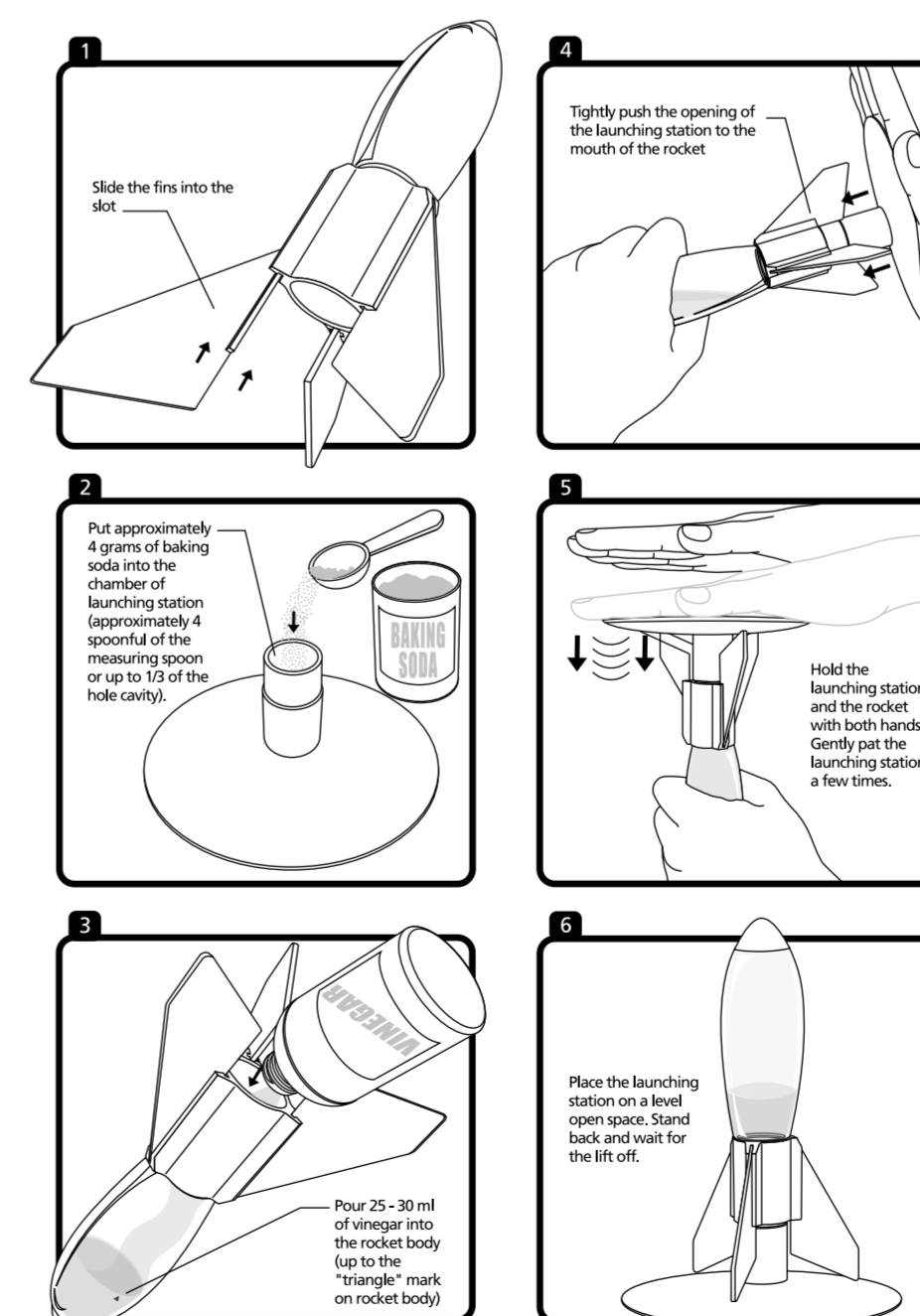
OTHER ATTENTIONS

- Clean the rocket and the launching station thoroughly with soap and water and dry it every time after use. Vinegar is acidic. It will affect the plastic structure of the rocket if it is not cleaned thoroughly.
- The fuel (vinegar and baking soda) will splash out from the rocket during launching, stay away from launching place or wear old clothes.

LAUNCHING (DIAGRAM 1-6)

- Slide in the fins. Check all rocket structures are securely installed, especially the screw ring, which should be tightly screwed to prevent air leaking.
- Adding fuel: the fuel for your rocket is baking soda and vinegar. Get them from the kitchen with an adult's assistance. Put approximately 4 gms of baking soda into the hole of the launching station. (Approximately 4 spoonful of the measuring spoon or up to 1/3 of the launching station hole)
- Pour 25 - 30 ml of vinegar into the rocket chamber. Approximately up to the "triangle" mark on the rocket body.
- Hold your Cosmic Rocket™ with its head pointing slightly downward so that the vinegar will not flow out of the rocket body. With your other hand, tightly push the opening of the launching station to the mouth of the rocket. (Caution: The rocket will pop out at any time after it is fueled and is installed on the launching station. Always hold the rocket body firmly with one hand and the launching station with the other hand until it is placed onto the launching site. Do not point the rocket and launching station at anyone when you are holding them.)
- Invert the rocket and the launching station, and pat the launching station a few times so all the baking soda falls into the vinegar.
- Quickly place the rocket and the launching station on a flat, level surface for launching. Do not lean over the top of the rocket when you are placing it onto the ground. Stand back immediately and wait for lift off. Once the vinegar and baking soda are mixed you can see a bubbly chemical reaction is taking place inside the rocket. A gas, carbon dioxide is released. Depending on various conditions, it may take between a few seconds to a few minutes for the fuel to generate sufficient gas for launching. If your Cosmic Rocket™ does not lift off after 3 minutes, the launch should be aborted. Do not inspect the rocket by leaning over the top of it. Ask an adult for assistance. Hold the rocket body firmly, tilt the launching station with the rocket pointing outwards, away from you and quickly detach it from the launching station. You may experience some kind of "popping" similar to the opening of a champagne cork.

DIAGRAM (1-6)



TROUBLE SHOOTING

Launching time too long or the rocket does not lift off:

With the above steps followed, your Cosmic Rocket™ should be able to blast off in seconds. If you find the launching time too long, please check the following:

- Check if the correct quantity of fuel has been added in accordance with the instructions. Or try with adding some more baking soda to increase the extend of chemical reaction.
- Check if all structures are air tight; if the screw ring is tightly screwed; if there are any cracks on the rocket body. If any of the above has happened the gas will leak out and will not build up sufficient pressure for a successful "lift off". If you find the screw ring becomes loose a while, it might be due to the acidic action of the vinegar acting on the plastic. Simply apply some glue to make them air tight again.
- Check that the baking soda and vinegar have been thoroughly mixed to enable the chemical reaction to take place.
- Check if the cavity inside the hole of the launching station has been cleaned and dried after the last launch. If the hole is damp, the baking soda will stick to the bottom and side surfaces and will not fall into the vinegar. This will affect the extent of the chemical reaction.

launching station accidentally pops out or launching time too fast:

If your rocket or launching station pops out accidentally before the launch starts or the rocket launches too fast, please check the following:

- Check if the correct quantity of fuel has been added in accordance with the instructions. Or try with reducing some baking soda to decrease the extend of chemical reaction.
- Check that the launching station and rocket have been installed tightly.
- Check that the vinegar and baking soda have not been shaken too hard or for too long.

Rocket does not fly high enough:

- Check if the rocket and the launching station are tightly installed. With them tightly installed, your cosmic rocket will need a greater gas pressure inside to push away from the launching station and fly, thus creating a bigger thrust for a higher flight.
- Try with adding a bit more baking soda

Temperature affects the launching time:

The temperature will affect the launching time too. Your Cosmic Rocket™ will launch more quickly on a warm day than on a cold day as the chemical reaction will take place more quickly with a higher temperature and vice versa. Try adjusting the amount of baking soda in this case. The rocket will launch faster with more baking soda and vice versa.

Be Patient, scientists did not have great success the first time they launched their rockets. It is normal to experience some unsuccessful launches when you first start. Try a few more times and record your findings, you will get to understand more how your Cosmic Rocket™ functions the best. It will blast off in front of you and fly up to 50 feet or more. The fun is unlimited. And be reminded again, **SAFETY FIRST!**