EXPERIMENT MANUAL

IGNITION SERIES

PHYSICS

FORCE & PRESSURE

THAMES & KOSMOS

Contents

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- 7 balloons
- 3 die-cut cardboard sheets
- 1 balloon clamp
- clay
- 1 blue string
- 1 measuring cup with lid
- 1 syringe
- 1 plastic bag
- 4 tubes

You will also need:
effervescent tablets, two empty half-liter plastic drink bottles (16 ounce bottles, soft plastic material), flat box or box lid, tape, glue, water, bowl, two chairs, books

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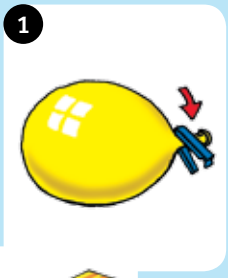
Countdown to liftoff

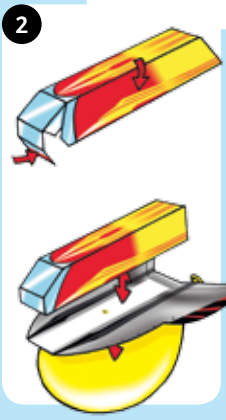
EXPERIMENT 5

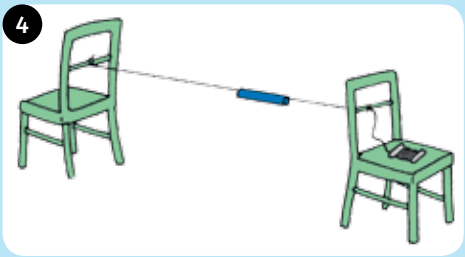
YOU WILL NEED:

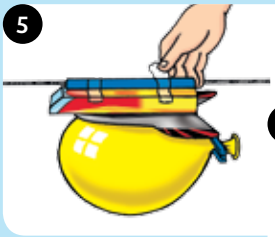
› Balloon, balloon clamp, blue string, tube, rocket (die-cut cardboard sheet), *tape, 2 chairs*

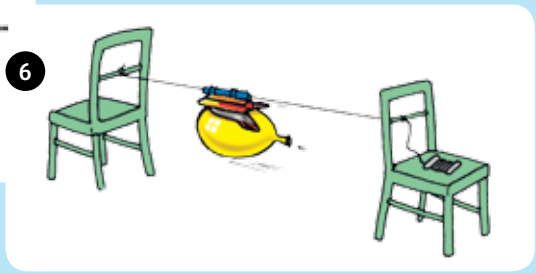
1. Inflate the balloon and seal the neck shut with the clamp.
2. Assemble the rocket and tape the balloon to it.
3. Thread the string through the tube.
4. Stretch the string between two chairs.
5. Tape the balloon rocket to the tube.
6. Now you can release the clamp and let your rocket go!











WHY? The air flows out with plenty of force, propelling the balloon and the rocket in the opposite direction. This **recoil** is something that space rockets use as well, except instead of air they expel large quantities of hot combustion gases through their nozzles.

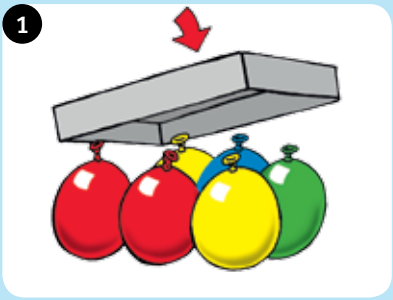
Balloons under pressure

EXPERIMENT 7

YOU WILL NEED:

› 6 balloons, *shallow cardboard box or box lid, various heavy loads (such as books)*

1. First blow up all six balloons and tie their openings closed. Then stick as many balloons under the box as possible. The edges of the box should keep the balloons from shooting off to the side.



2. Carefully stack a load, such as heavy books, onto the box. The box will hold them without any problem. Do you think it might even be able to carry your weight if you sit on it carefully?

WHY? Compressed air can hold an astonishing amount of weight. You may be familiar with that fact from air mattresses, which can hold up the weight of a sleeping person with nothing but air.

3. Fill the bottle halfway with water and fit the balloon over the bottle's neck. Lift the balloon so the effervescent powder trickles into the bottle. Hold the balloon tight around the bottle's neck as you do this!

Caution! After the experiment is over, you should throw the balloon away!

WHY? The balloon will inflate as if by magic! But what's filling the balloon isn't ordinary air. It's another gas called **carbon dioxide.** That's the same gas that gives soda drinks their fizz. The effervescent tablet releases this gas when it combines with water.