

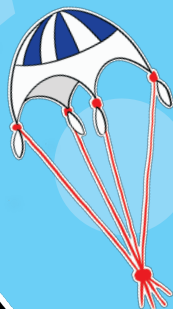
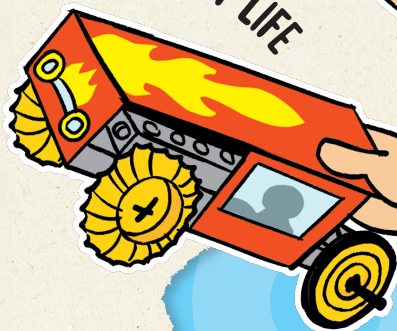


INTRO TO ENGINEERING

Yay!

Here we go!

*Phenomena
IN EVERYDAY LIFE*



STEAM

5+
AGES

56
PIECES

21
EXPERIMENTS





— TABLE OF CONTENTS

Table of Contents	1
Kit Contents	2
Safety Information	3

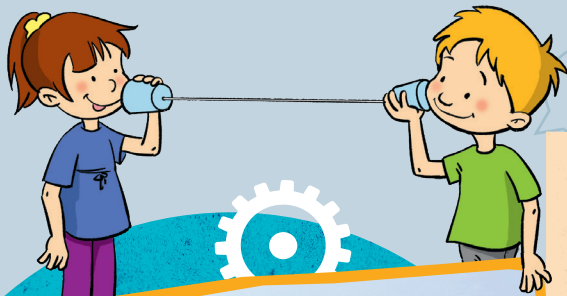
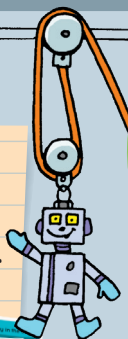
THE EXPERIMENTS:

Technology Tricks.....	5
Technology on Land.....	11
Technology in the Air	21
Technology in the Water	31
Technology at Home	39



TIP!

YOU CAN FIND ADDITIONAL
KNOWLEDGE HERE:
PAGES 10, 20, 29, 30, 38, 49.



Dear Children,

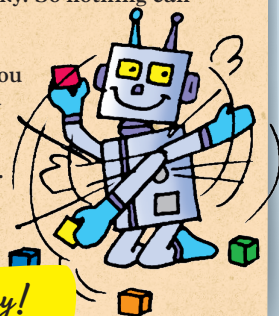
Do you like technology? Do you want to know how vehicles work - on water, on land and in the air? Do you always want to build a robot? Then get started!

Your parents will surely be happy to support you: Have everything ready with you that you need for an experiment. Discuss every important thing for the experiment with you. And read the information from the boxes to you.

They are sure to help you when the experiment get tricky. So nothing can really go wrong!

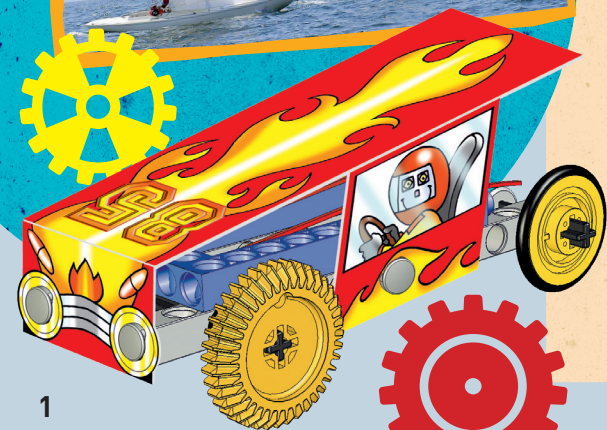
Difficulties make you strong - you can try it out by yourself in the first attempt.

Have fun!



Yay!

— Here we go !



What's inside your experiment kit:



Checklist: Find - Inspect - Check off

The parts which are not contained in the box are marked with this symbol "+".

✓ NO.	Description	Qty.	Item No.	✓ NO.	Description	Qty.	Item No.
<input type="radio"/>	1 P-DIE CUT CARD	1	K16#7076-K	<input type="radio"/>	15 C-3 HOLE ROD	2	7026-W10-Q2W
<input type="radio"/>	2 P-DIE CUT CARD	1	K16#7076-K-1	<input type="radio"/>	16 C-40T GEAR	2	7346-W10-C1Y
<input type="radio"/>	3 O-900mm THREAD	1	R39#7076-K	<input type="radio"/>	17 C-OD23mm PULLEY	2	7344-W10-N3Y
<input type="radio"/>	4 O-DRINKING STRAW	2	R31#7076-K	<input type="radio"/>	18 C-OD33mm PULLEY	2	7344-W10-N2Y
<input type="radio"/>	5 O-PIPETTE [3ml]	1	R31#7076-K-1	<input type="radio"/>	19 C-OD36 O-RING	2	R12-07S
<input type="radio"/>	6 P-PARACHUTE MATERIAL	1	K16#7076-K-2	<input type="radio"/>	20 C-70mm AXLE II	2	7061-W10-Q1D
<input type="radio"/>	7 C-200mm RUBBER BAND	4	R10-34	<input type="radio"/>	21 C-30mm AXLE II	1	7413-W10-N1D
<input type="radio"/>	8 C-PADDLE WHEEL	1	3695-W10-A1B	<input type="radio"/>	22 C-HOOK	1	7900-W10-H2SK
<input type="radio"/>	9 C-50mm PADDLE AXLE	1	3695-W10-A2B	<input type="radio"/>	23 C-ROLLER	1	7900-W10-H1SK
<input type="radio"/>	10 F-BUOY	2	7403-W14-A1	<input type="radio"/>	24 C-LONG PEG	8	7061-W10-C1R
<input type="radio"/>	11 B-PEG REMOVER	1	7061-W10-B1Y	<input type="radio"/>	25 C-SHORT BUTTON FIXER	4	7061-W10-W1W
<input type="radio"/>	12 C-5X10 FRAME	1	7413-W10-I1B	<input type="radio"/>	26 B-SHORT PEG	4	7344-W10-C2D
<input type="radio"/>	13 C-15 HOLE DUAL ROD	2	7413-W10-Z1W	<input type="radio"/>	27 C-AXLE	2	7026-W10-H1O
<input type="radio"/>	14 C-5 HOLE ROD	2	7413-W10-K2W	<input type="radio"/>	28 C-20mm AXLE CONNECTOR	2	7413-W10-T1B



YOU WILL ALSO NEED:

Paper, pen, glue, scissors, thumbtack, coin, glass, bowl, 2 empty and small cups, 2 wooden spoons, long package rope, kitchen paper, water, sink, bathtub, long wooden board, books, marbles and toy figures.



— SAFETY INFORMATION



WARNING!

Not suitable for children under 3 years. Choking hazard — small parts may be swallowed or inhaled. Danger of strangulation if the long rope is placed around the neck.

Store the experiment material and assembled models out of the reach of small children.

Keep packaging and instructions as they contain important information.

Warning! Only use water models in shallow water under adult supervision.

→ Small children and animals should be kept away during experimenting.

→ You should neither eat nor drink during experimenting.

→ After the experiments, the used materials should be dried with kitchen paper, and then return to the position in the box.



— SAFETY INFORMATION

Dear Parents!

Children want to understand and create something new. They want to try everything and do it by themselves. They have a passion for learning new things. You can support all of this with our experiment kits, and during the fun, you will see them grow.



Children are curious: they want to discover and understand the world! Even 5-year-olds can carry out their first exciting experiments with this experiment kit.

Experiment, amazement and play are combined into one, so that learning is not boring anymore. In this way, children have an understanding of the basics of technology and stimulate the fun of experiment.

The experiments are mostly simple, but some doesn't work without support. Support your little explorers, as the children's thirst for knowledge and comprehension are often better than their manual skills. And if something doesn't work right away, encourage your children to try again.

If experiments are marked with this symbol, your help is required to ensure the experiments safely and successfully.

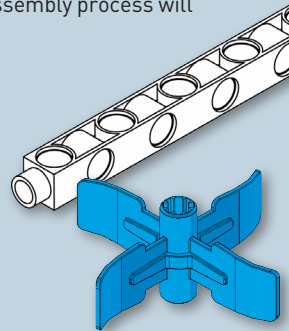


Together with your children, look for a wide place where they can experiment undisturbed. Like real researchers, it is recommended to wear old clothes during experiments. We also recommend to ensure all the materials ready so that you don't have to look for something during experiments. Since the experiment kit was developed for very

young researchers, the descriptions of the experiments and explanations are kept short and as simple as possible. They should try to work out and read out together so that the children can carry out the experiments independently and understand the background.

Attention: The correct position of the components is important! If you pay attention to this from the start, your assembly process will be easier.

Have fun!



- ✂ — = To cut
- = Adhesive surface
- = Line remains visible when folding
- — = Line disappears when folded inwards

?

Clever...
This is how
technology makes
you strong!



TECHNOLOGY TRICKS

EXPERIMENT 1

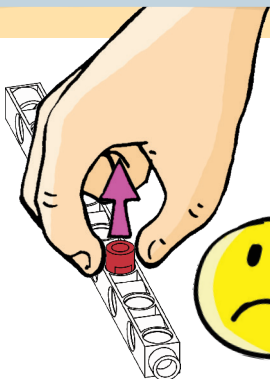
LEVER

YOU NEED:



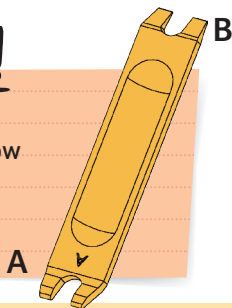
Start

1

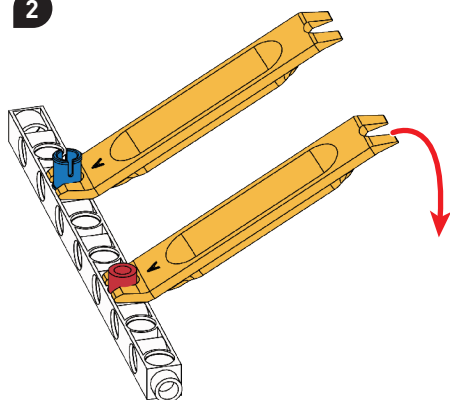


TIP!

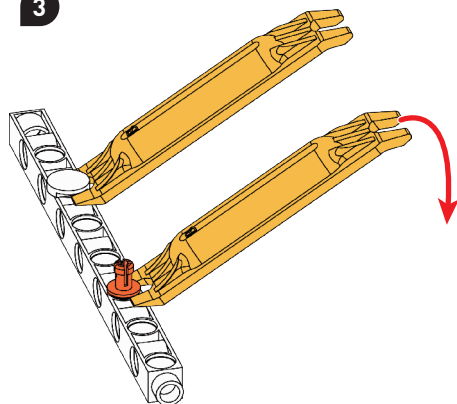
Side A = narrow
Side B = wide



2



3



WHAT'S HAPPENING?

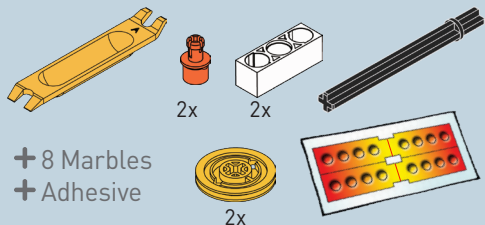
You can use the PEG REMOVER to pull the pegs out of the holes much easier than with your fingers. It is a lever. The farther you push, the less force you need. The seesaw is also a lever!



EXPERIMENT 2

SEESAW

YOU NEED:

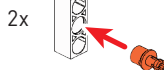


Start

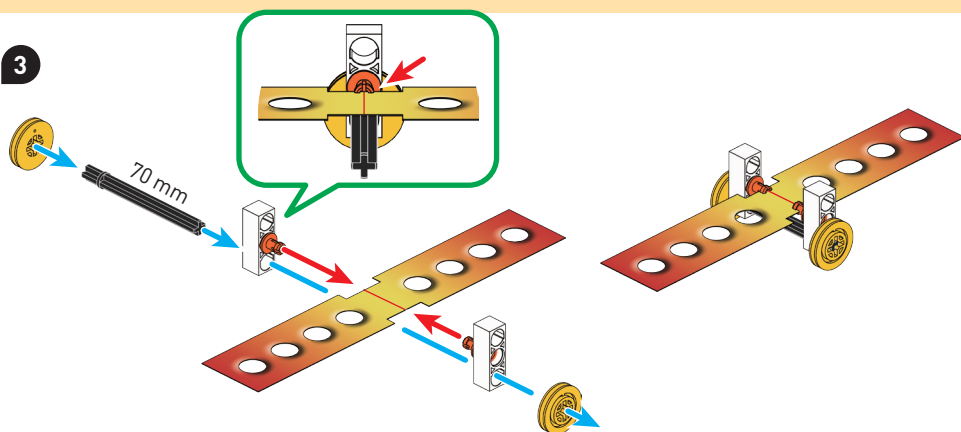
1



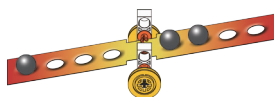
2



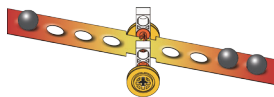
3



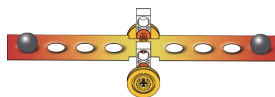
4



5

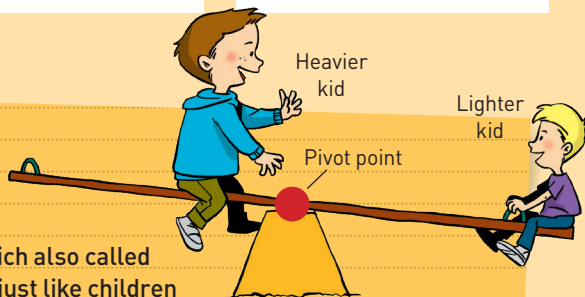


6



WHAT'S HAPPENING?

The seesaw always tilts to the side that is more heavily loaded. The position and number of marbles are crucial: the further a marble is from the center, which also called pivot point, the stronger the leverage - just like children on the seesaw!

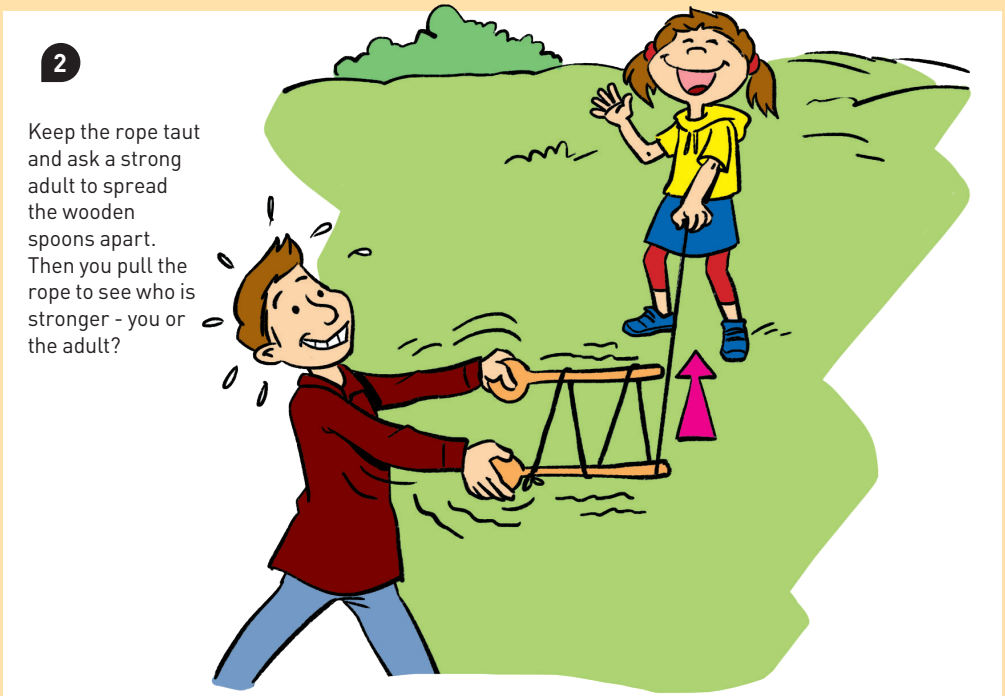
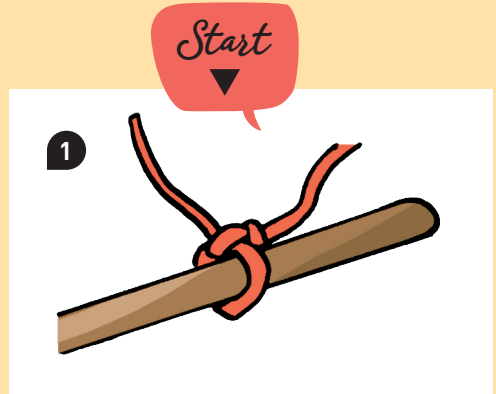


EXPERIMENT 3

MUSCLE KIDS

YOU NEED:

- + 2 wooden spoons (Avoid using plastic spoons)
- + 2–3m long package rope
- + A strong adult



Keep the rope taut and ask a strong adult to spread the wooden spoons apart. Then you pull the rope to see who is stronger - you or the adult?



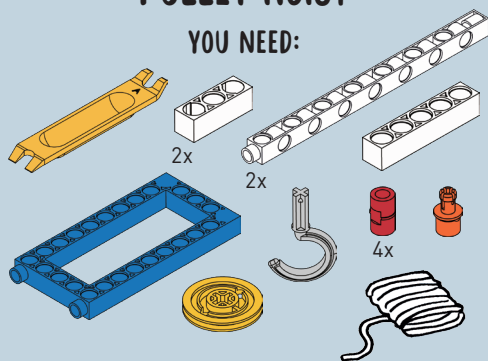
WHAT'S HAPPENING?

Is this magic? NO! It is a great trick in engineering that you only need less force when you stand in a long distance. This means that you need to wind the rope between the two wooden spoons several times before you pull on it. So the adult has no chance to win!

EXPERIMENT 4

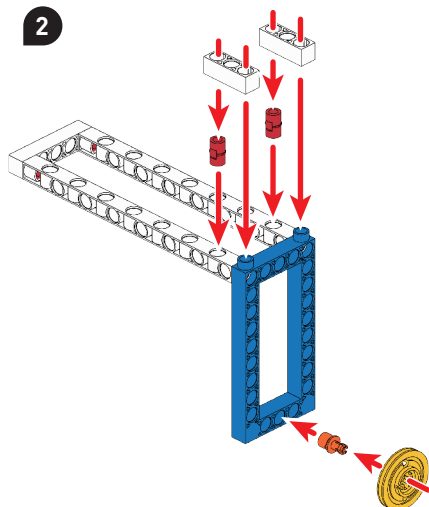
PULLEY HOIST

YOU NEED:



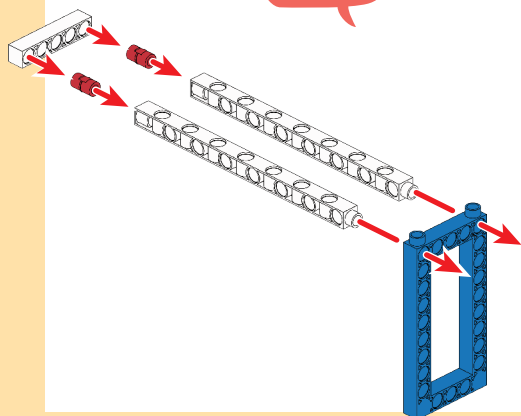
- + Some thick books
- + Toys (e.g. handle buckets, stuffed animals)

2

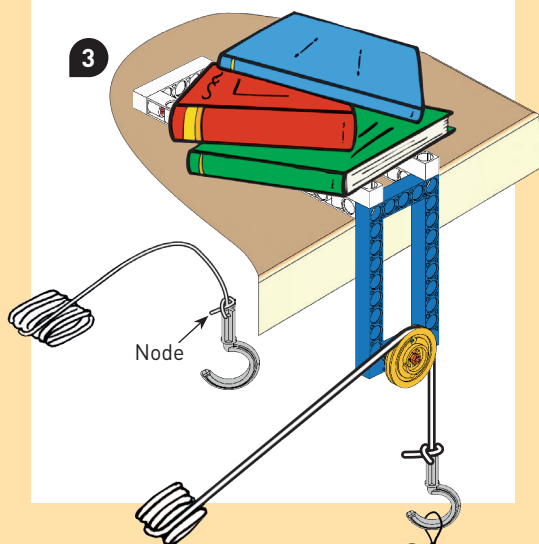


1

Start



3



WHAT'S HAPPENING?



Do you find it difficult to lift heavy objects? As long as you use pulleys and ropes, you can use the same force, but it can be pulled down more easily and the effect of pulling back is better! Now, the direction of the force is just the opposite. This is how the painter quickly gets a bucket of new paint on his scaffold!





CHECK IT OUT



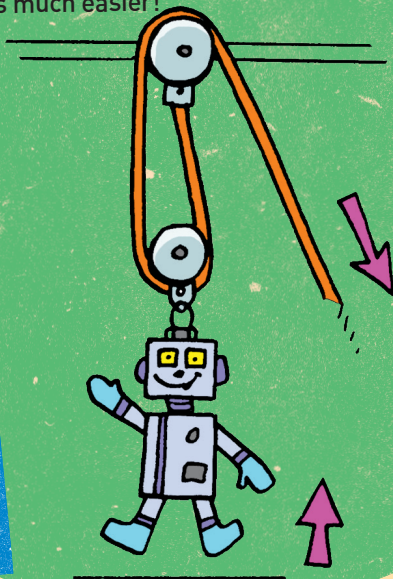
STRONG CRANE

The crane hook is suspended from a pulley systems: This means that the crane can lift even heavy beams and large walls on a construction site.

What is a PULLEY SYSTEM?

A pulley system is used to provide us with a mechanical advantage, where the amount of input effort is multiplied to exert greater forces on a load.

You already know the benefits of this: like the wooden spoon experiment, the pulley requires less force because you have to travel a longer distance. Although pulleys require longer ropes and greater patience, it is much easier!



STRONG EXCAVATOR

A lever is a simple machine: it ensures that all work can be done with one force.

Levers are often part of larger and more complicated machines. The arm of an excavator is also a lever!





Technology ON LAND

Let's go...
Let the cars
whiz!

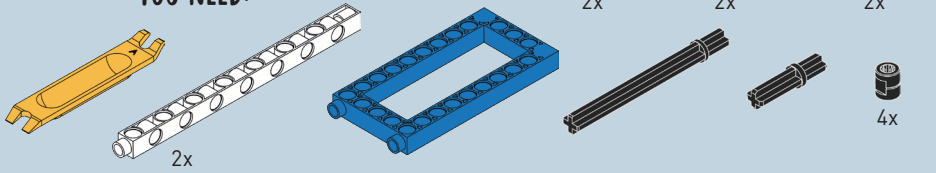


EXPERIMENT 5



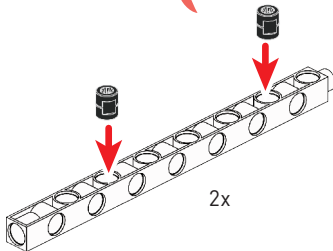
SPEEDY RACE CAR

YOU NEED:

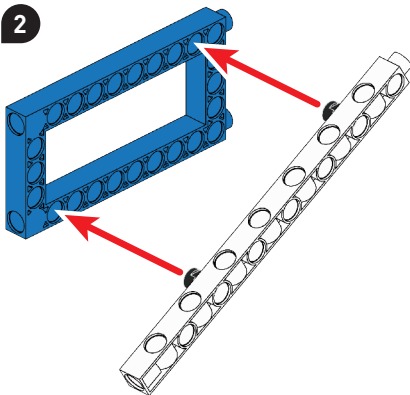


1

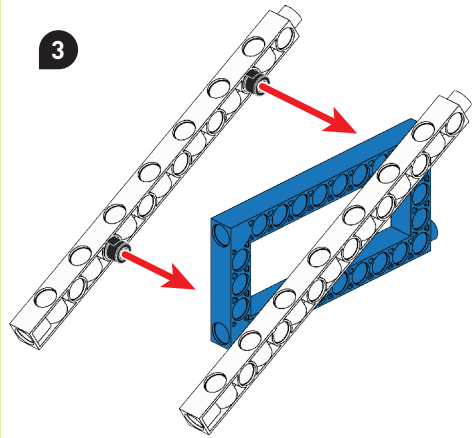
Start



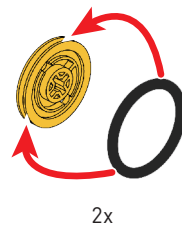
2



3

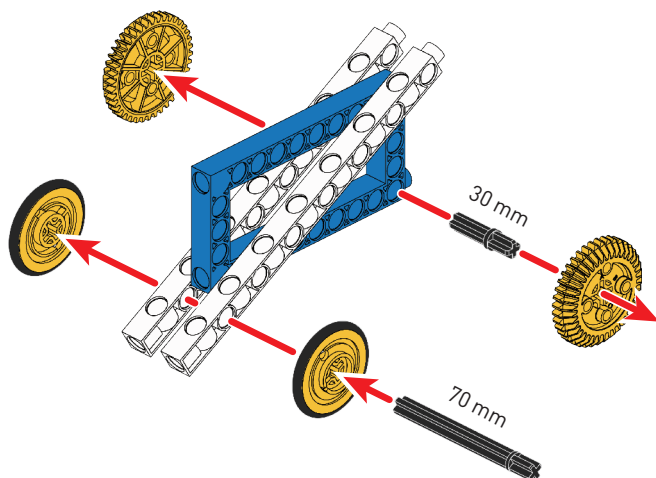


4

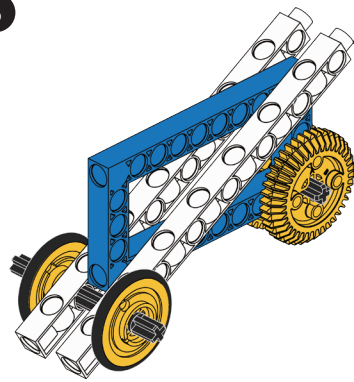




5



6



★ TIP!

Before playing, check all wheels can be turned smoothly! Does your car tip over? If so, you can add the small rollers between the front wheels and rods!



WHAT'S HAPPENING?

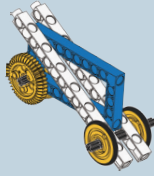
Your car is ready! It drives really fast - but not by itself: you have to push it. Now we will let it slide down the mountain. Take a look at the next page!

EXPERIMENT 6

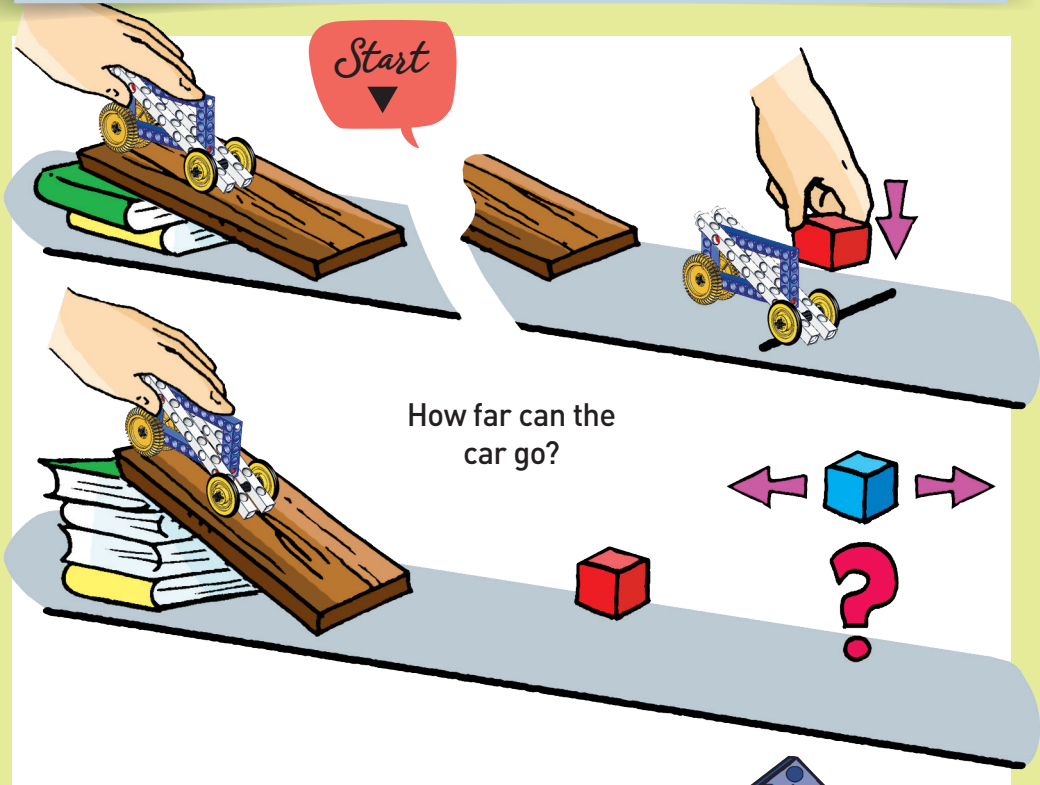
RAMP RACING

YOU NEED:

Car from the previous experiment

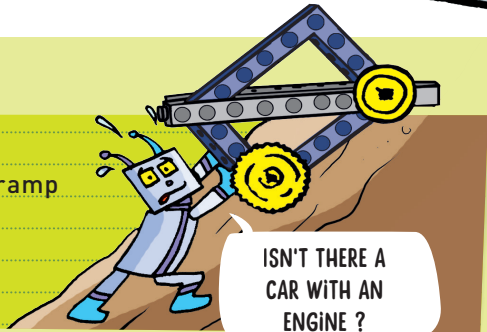


- + Wooden board
- + Several books
- + Building blocks for marking



WHAT'S HAPPENING?

Try it out : How steep does your ramp have to be for the car to go the furthest?



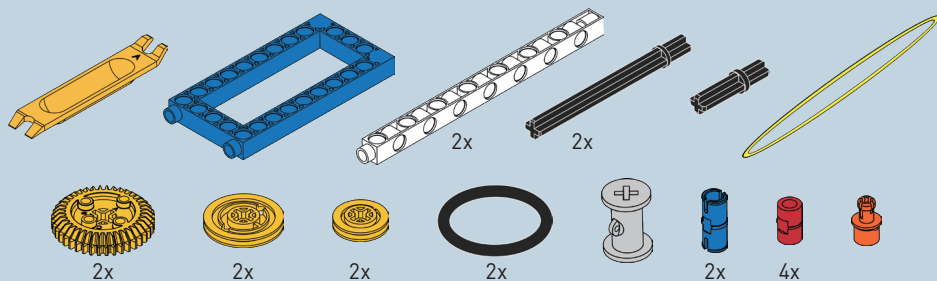
ISN'T THERE A CAR WITH AN ENGINE ?

EXPERIMENT 7



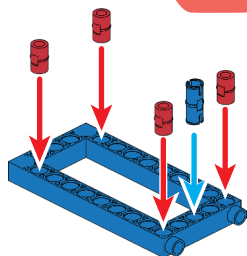
WIND-UP CAR

YOU NEED:

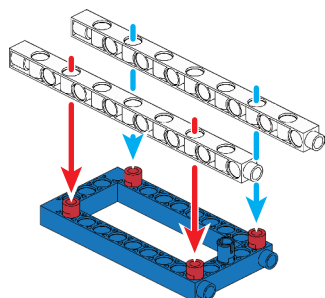


+ Scissors

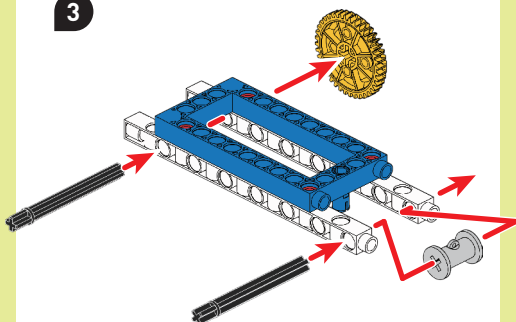
1



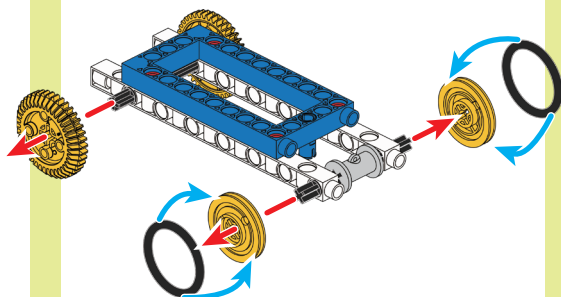
2

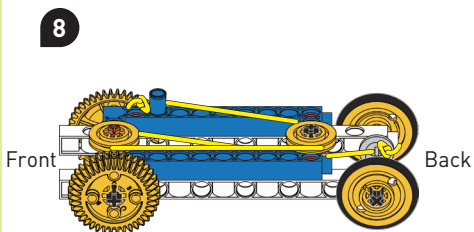
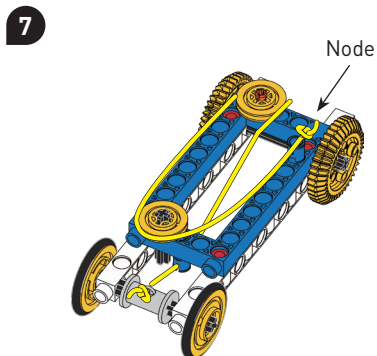
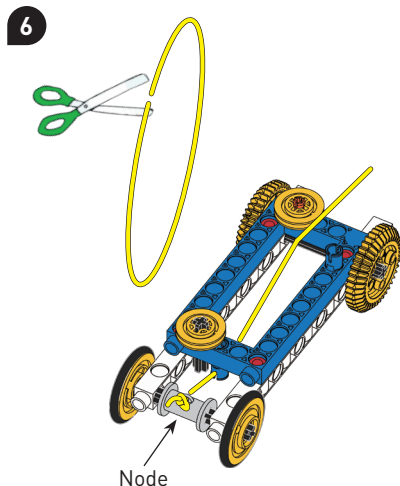
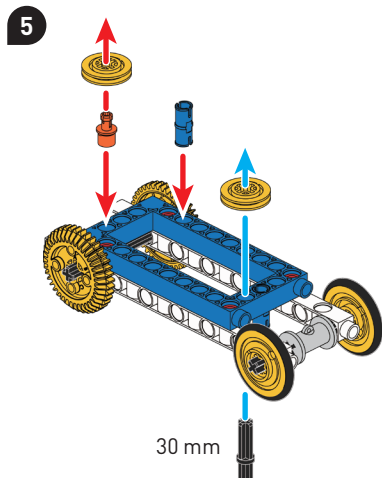


3



4



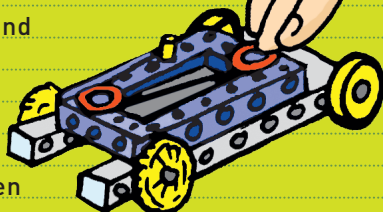


Check all wheels are not too close to the rods so that they can turn smoothly!

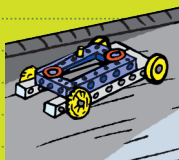
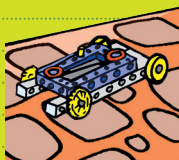
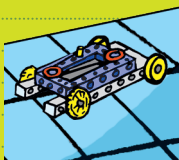
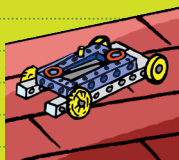
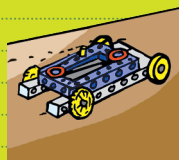


WHAT'S HAPPENING?

Pull your car backwards on the ground. The rubber band will be wound onto the spool and tensioned. Is the resistance getting bigger? Then stop so the rubber band doesn't tear. If you let go of the car now, it will move forward - all by itself! When you tighten the rubber band, you have stored energy in the car. When you let go, this energy is released and the car drives until the elastic is slack again.



Where does your car go farthest? Test different floors!



TIP!

When the wheels are spinning:

Check: Have you attached the black rubber tires to the pulleys? This is where the drive is located. And will give the car a slight push to start!

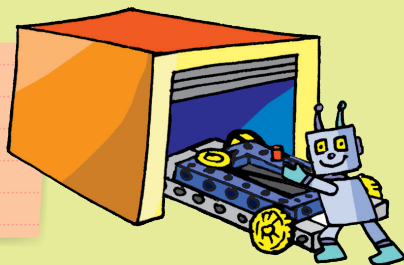
You want the rubber band to be very loose before you play the car.

You can also move the AXLE into another hole.



TIP!

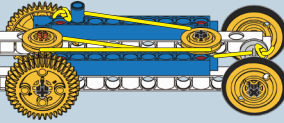
— The Rubber band will be aged and become brittle in the light!



EXPERIMENT 8

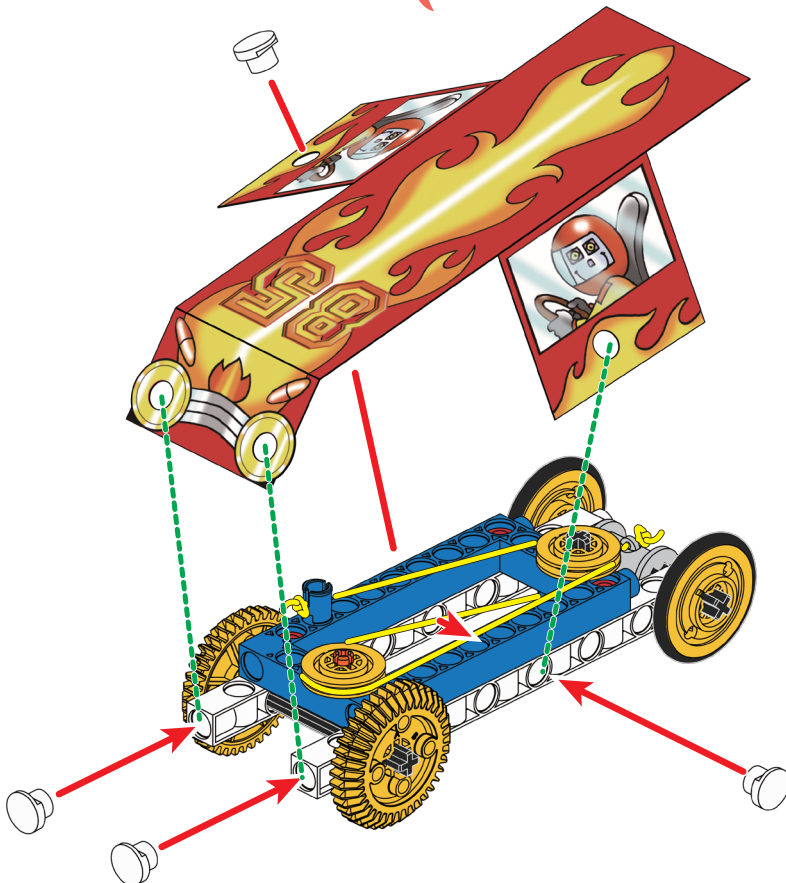
AUTO BODY

YOU NEED:

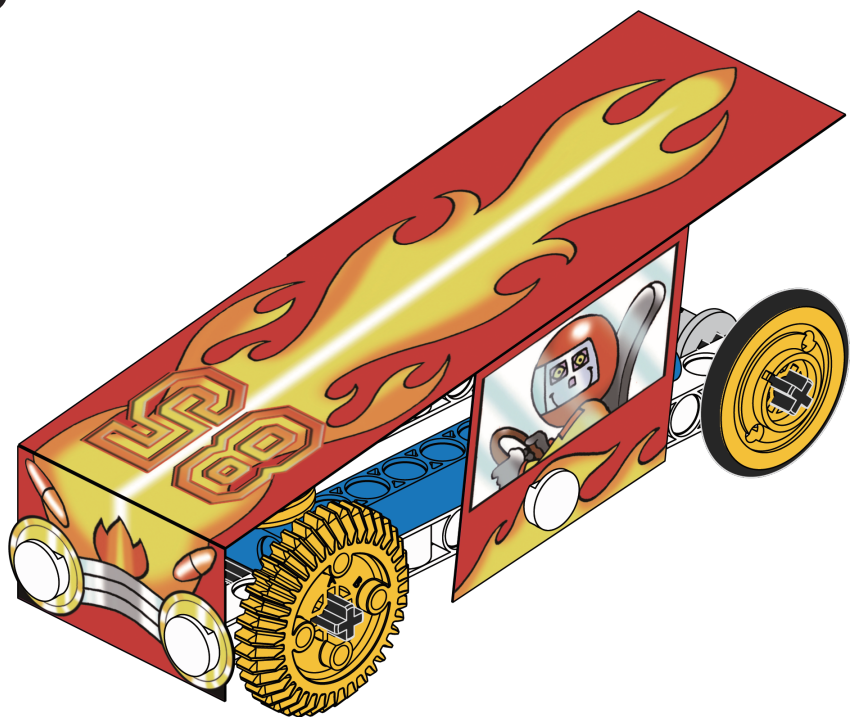
Car from the
previous
experiment

1

Start



2



WHAT'S HAPPENING?

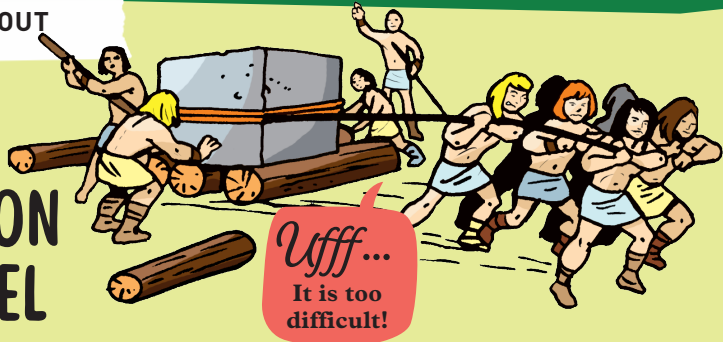
Do you like your new car? The shape of the car body is not only important for its appearance, but also affects the speed and energy consumption of the car.

Tall, angular cars drive slower and use more energy than flat cars. You can find out the reason on the next page!



CHECK IT OUT

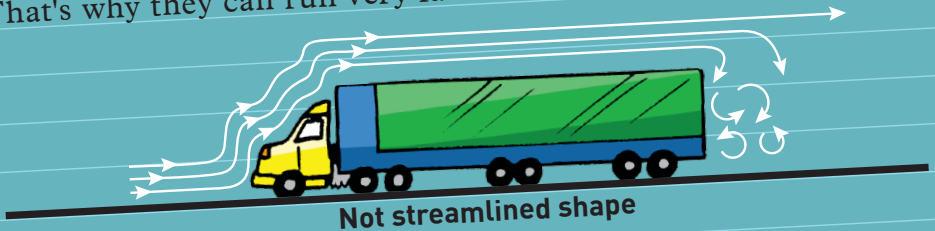
THE INVENTION OF THE WHEEL

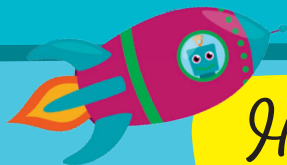


Did you know that the invention of the wheel was a revolution in human history? Large loads can be easily transported from one place to another with wheels. Before the invention of the wheel, for example, people would put tree trunks on the ground, and then put a block of stone on top, and pull it forward with ropes. The tree trunks had to be brought from the back to the front so that it could go a few meters further. This is definitely a tedious work!

Air resistance

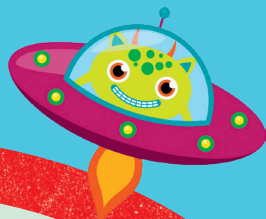
The resistance of the air works like a brake on the car. The strength of this brake depends on the size and shape of the body, such as a tall truck, with many corners and edges, has great air resistance. Racing cars, on the other hand, are low and little surface. The air can flow easily along its streamlined shape. That's why they can run very fast.





Hurray...

Now
it's flying!



Technology
IN THE AIR



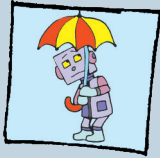
EXPERIMENT 9



WATER GLASS TRICK

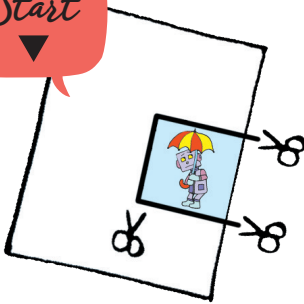
YOU NEED:

- + Scissors
- + Glass
- + Water

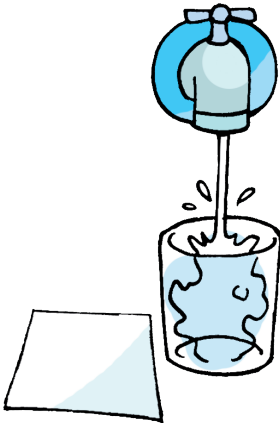


1

Start



2



3

**TIP!**

Only do this experiment in the sink!
The paper must put well all on the edge of the glass and protrude a bit from the edge of the glass!

4

**WHAT'S HAPPENING?**

Air is strong! You can't see it, but it still exists - and it's pressing against the paper from below. Even if you pull your hand away, the paper will not fall off and the water will stay in the glass.

EXPERIMENT 10

PUFF-POWERED WHEEL

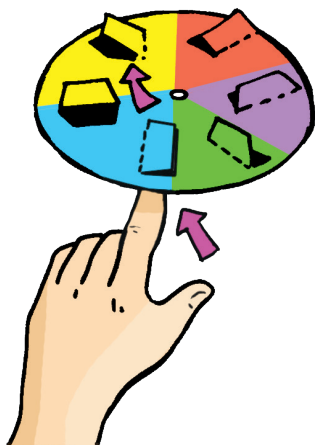
YOU NEED:



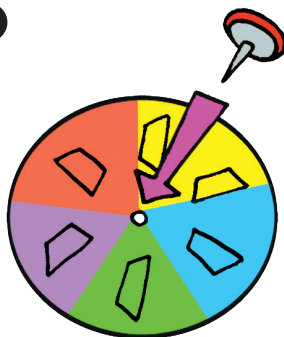
+ Thumbtack

1

Start



2



3



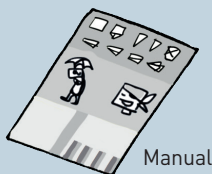
WHAT'S HAPPENING?

This spinning top is powered by air! Blow under the flaps with the straw, then the top will start moving. Did you find it? Wind can also be used to drive large wind turbines and generate electricity.

EXPERIMENT 11

GLIDER

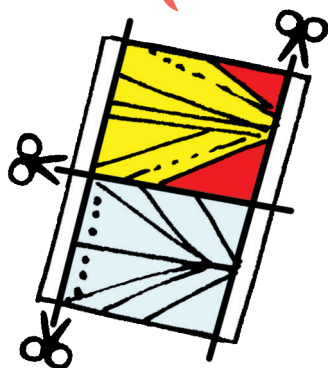
YOU NEED:



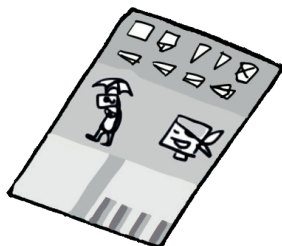
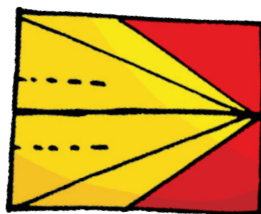
+ Scissors

1

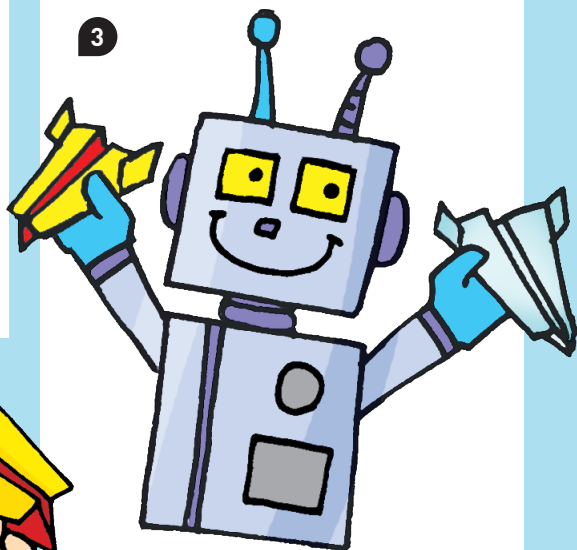
Start



2



3



WHAT'S HAPPENING?

Hold the glider from below and let it fly!



This is what the model looks like! You can find the instructions from an extra sheet. The lines on it are all numbered. In each step, please fold along the red line.

EXPERIMENT 12



PARACHUTE

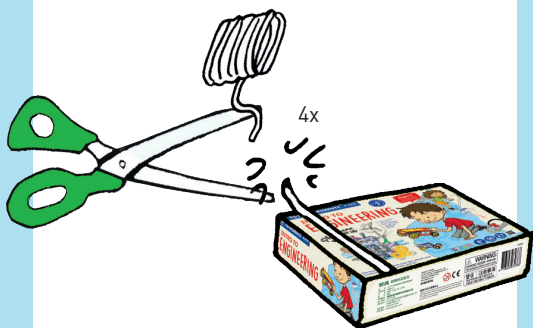
YOU NEED:



+ Scissors

1

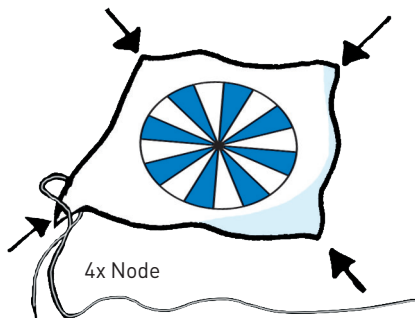
Start



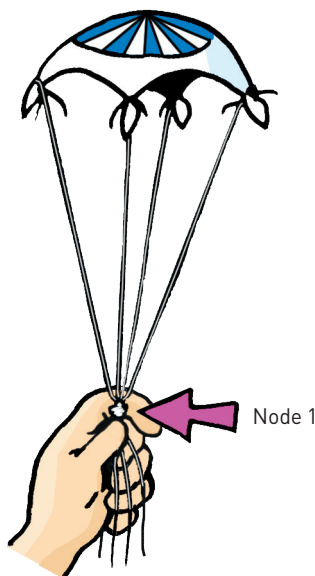
2



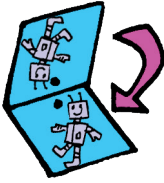
3



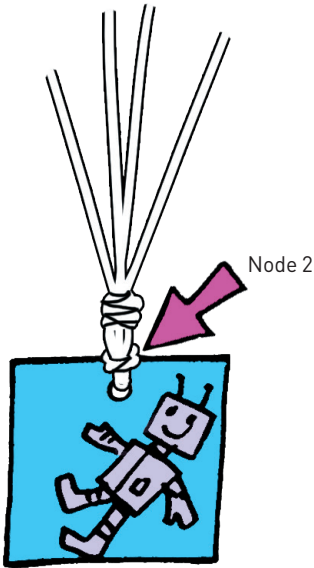
4



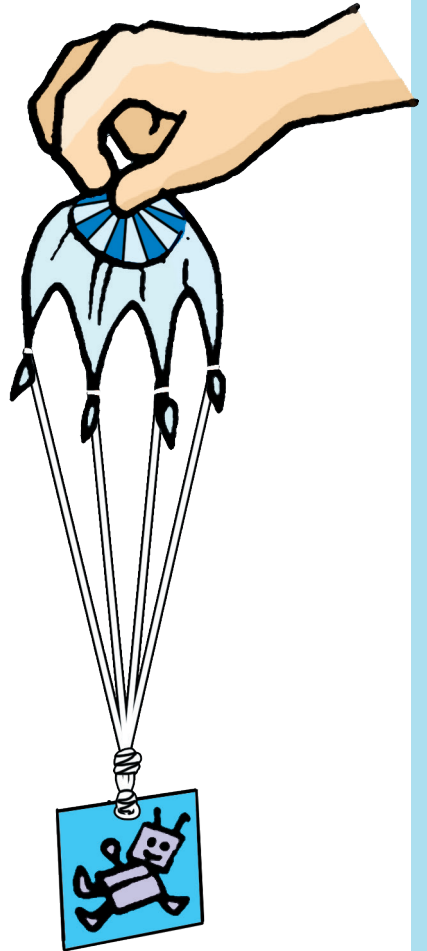
5



6



7



WHAT'S HAPPENING?

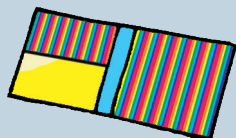
Hold the top center of parachute and then release it. You can also throw it to make it fly longer. The parachute spreads and the parachutist glides gently to the ground: the air under the umbrella acts as a brake. Without a parachute, it would fall instantly like a rock.

EXPERIMENT 13



HELICOPTER

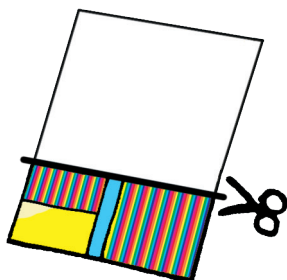
YOU NEED:



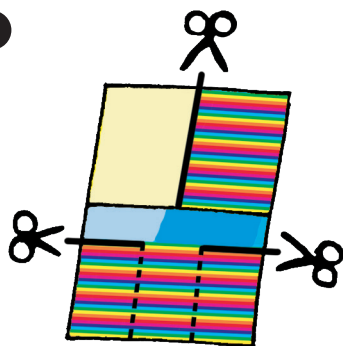
+ Scissors

Start

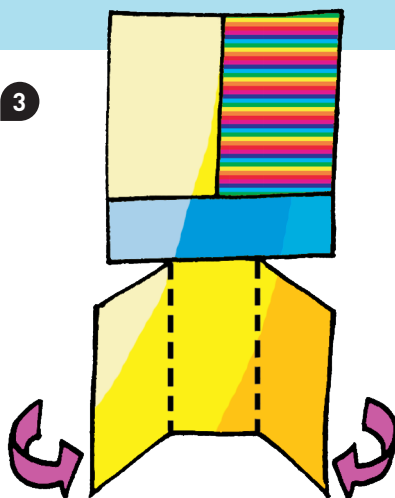
1



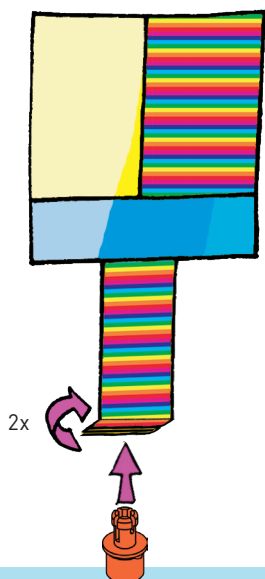
2



3



4

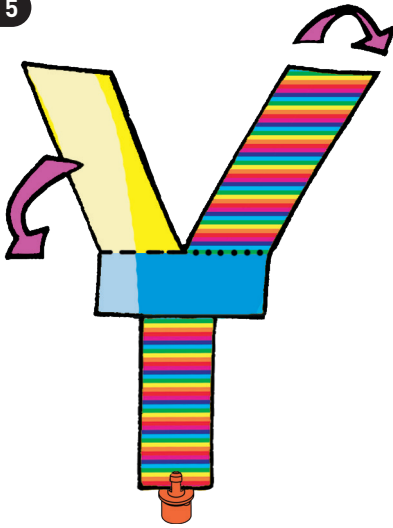


TIP!

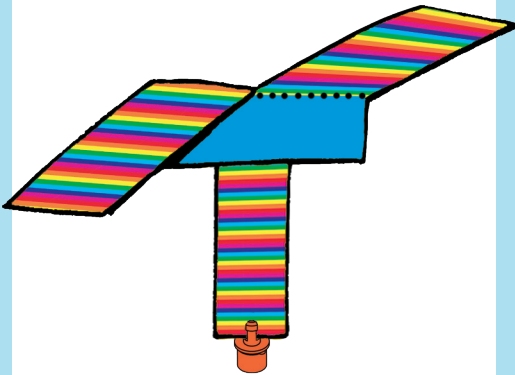
Dotted lines..... it still visible after folding.

Dashed lines ----- it will disappear after folding.

5



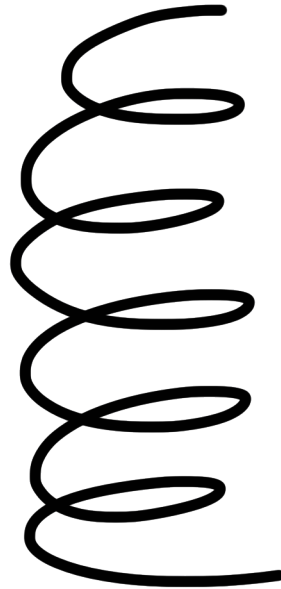
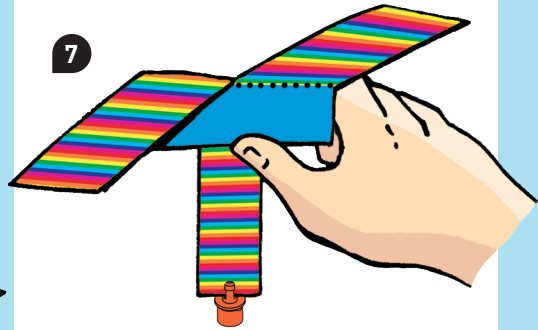
6



WHAT'S HAPPENING?

Hold the position close to the helicopter wings, and then release. It will begin to spin and slowly slide down to the floor.

7





CHECK IT OUT



All-rounder

Did you know that helicopters can not only fly forwards, but also can fly sideways and backwards? It can even stop in mid-air! In addition, a helicopter does not need a runway because it can move vertically up or down. Because it is so agile, it is often used in difficult terrain: for patient transport after an accident, for mountain rescue services or to rescue people in distress at sea.

Wind Becomes Electricity

You have probably seen something like this before: if many pinwheels are standing next to each other, it is called a wind turbine.



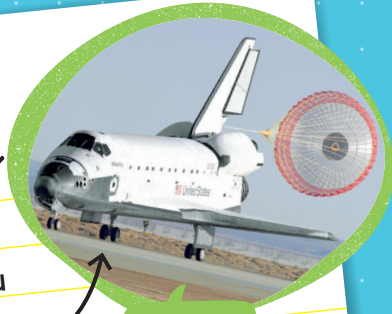
The wind drives the wind turbines and the kinetic energy of the wind turbines is converted into electricity. So at first it was wind-but eventually there is electricity from the socket!

— Start

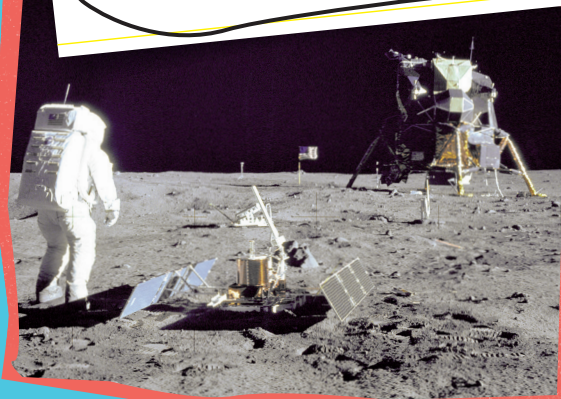


Space Explorer

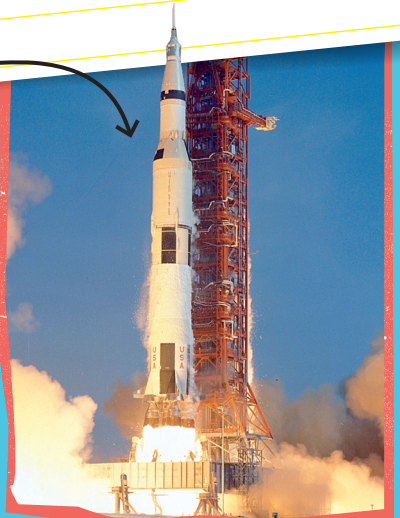
If you want to fly into space, you don't need an airplane, but a rocket. And if you want to go back to earth, what you need is a shuttle! Because the shuttle starts like a rocket, but can return to earth and land like an airplane. That is why a shuttle can fly into space many times. A rocket can't do this: it can only enter space once, and once it was deployed, it can't be used again.



Landing



JOURNEY TO THE MOON



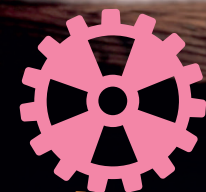
Did you know that the American "Neil Armstrong" was the first person on the moon? When he landed there in 1969, he said a famous

saying: "That's one small step for man, one giant leap for mankind." - and then he set foot on the moon.



Splash - Splash

From swimming to
diving!



Technology IN THE WATER



EXPERIMENT 14

THE DIVING BELL

YOU NEED:



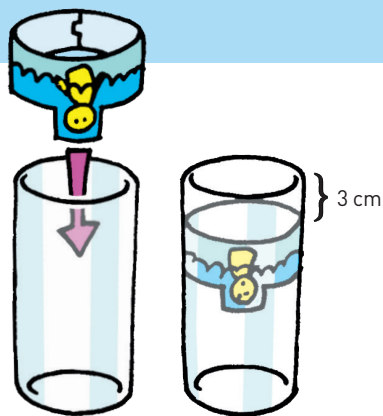
- + Straight glass cup
- + Mixing bowl (made of plastic)
- + Water

1

Start

Water to fill
2/3 of a
bowl

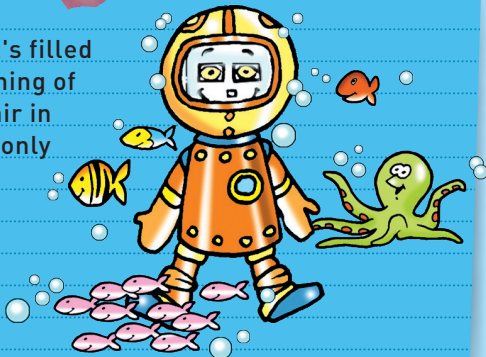
2



3

**WHAT'S HAPPENING?**

Your glass looks empty, but it's filled - with air. If you keep the opening of the glass straight down, the air in the glass cannot get out. It is only slightly compressed by the pressure of the water. So the robot can go diving - and still stay dry!

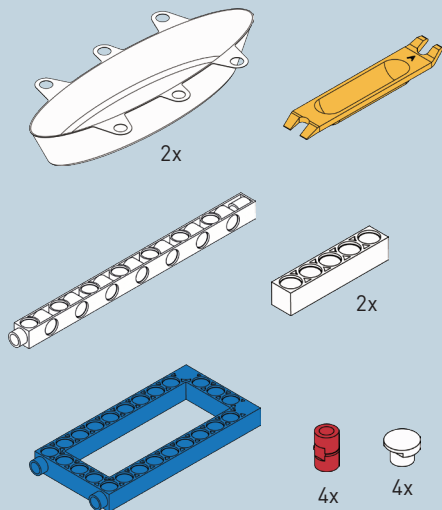


EXPERIMENT 15

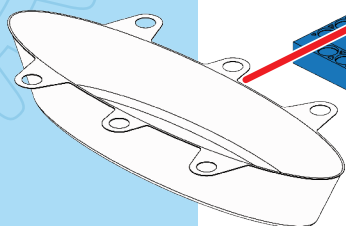
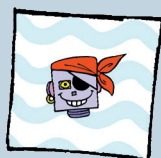


SAILBOAT

YOU NEED:

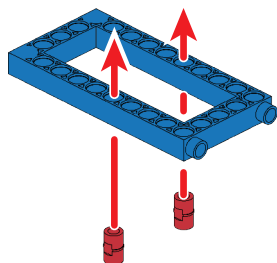


- + Scissors
- + Sink
- + Water
- + A captain

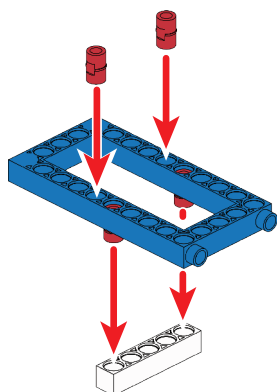


Start

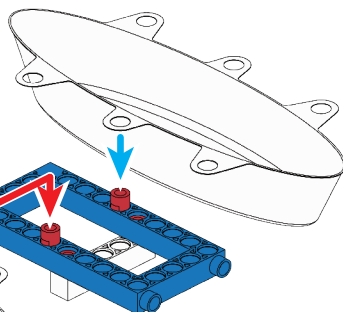
1

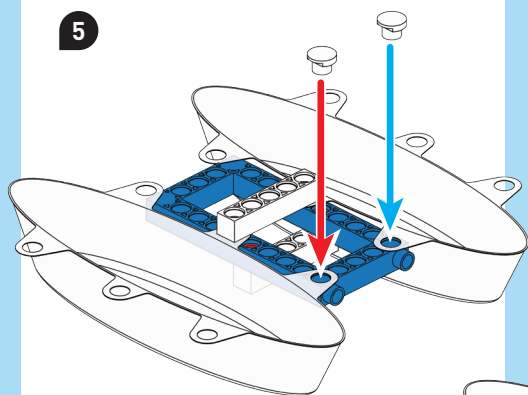
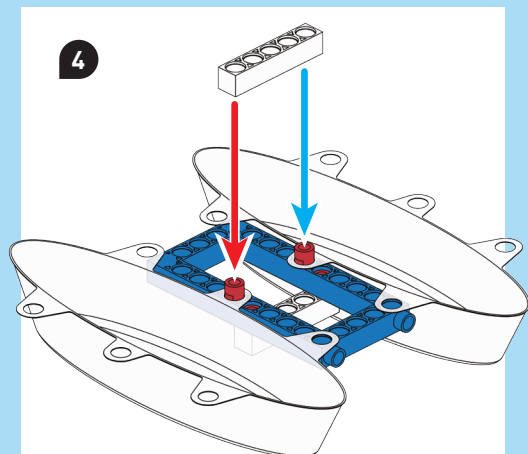


2

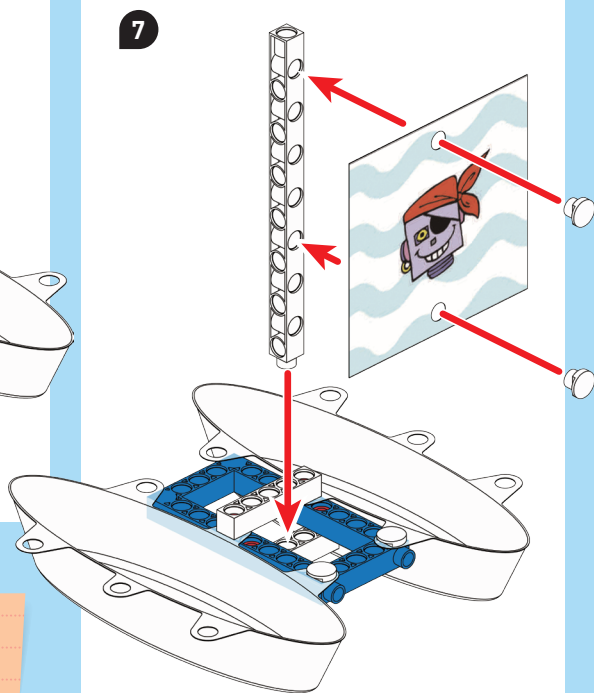
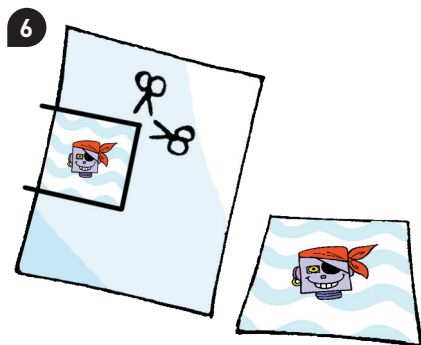


3



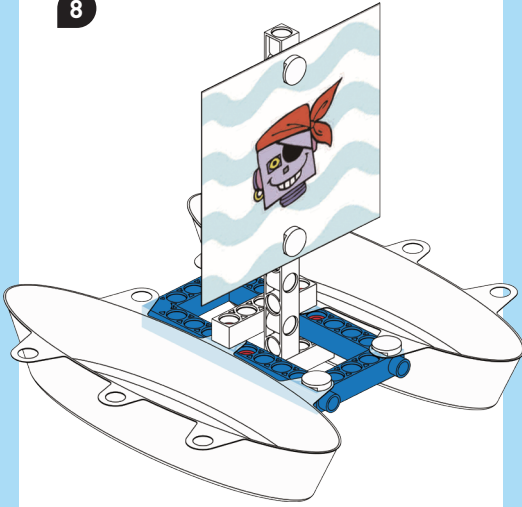


Always pay attention to the correct position of the rods and count exactly in which holes is the **SHORT BUTTON FIXER** belong!



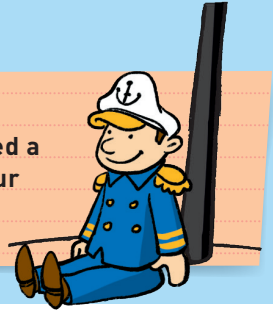


8



TIP!

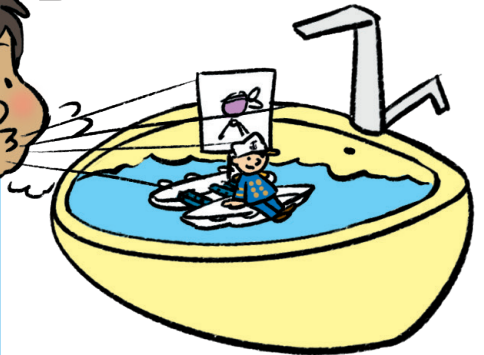
Maybe you need a captain for your sailboat?



9



10



WHAT'S HAPPENING?

Blow the sail and the journey begin! The air you blow puts pressure on the sail. The pressure is transferred to the mast and hull and pushes the sailboat forward.

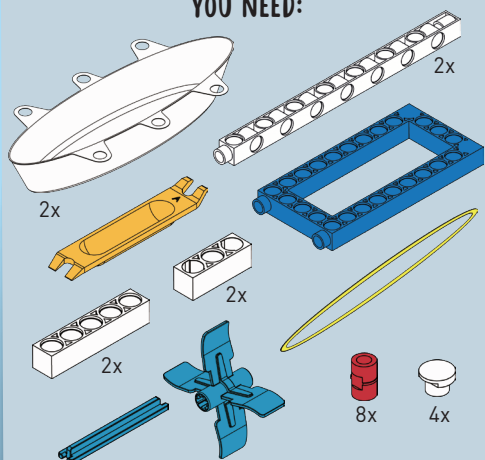


EXPERIMENT 16



PADDLE-WHEEL BOAT

YOU NEED:

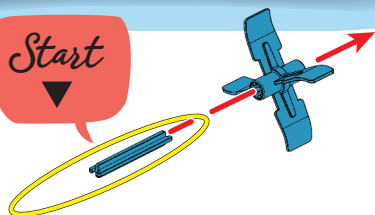


+ Scissors
+ Bathtub

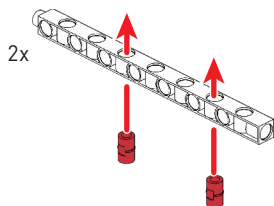
+ Water
+ A captain

Start

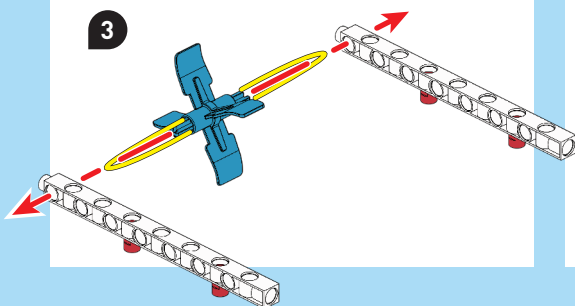
1



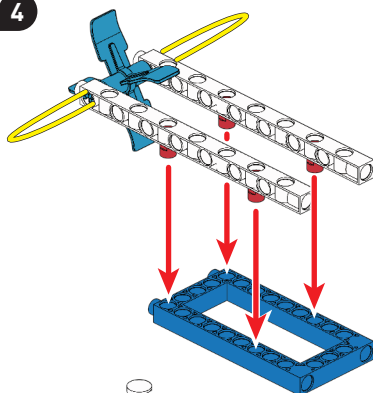
2



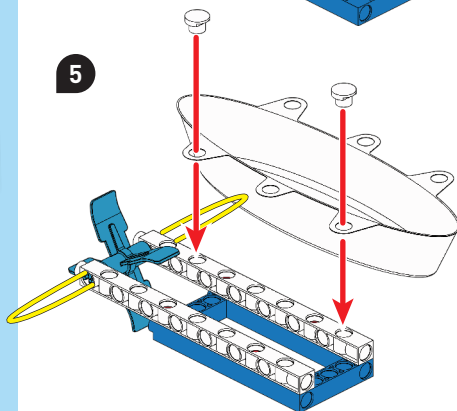
3



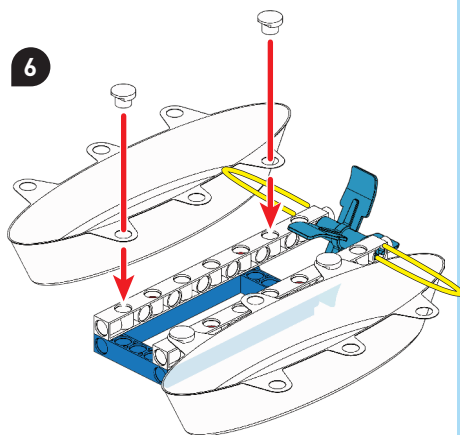
4

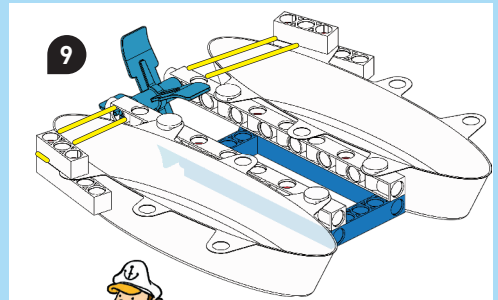
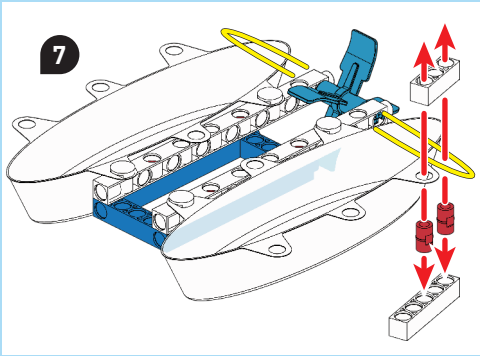


5



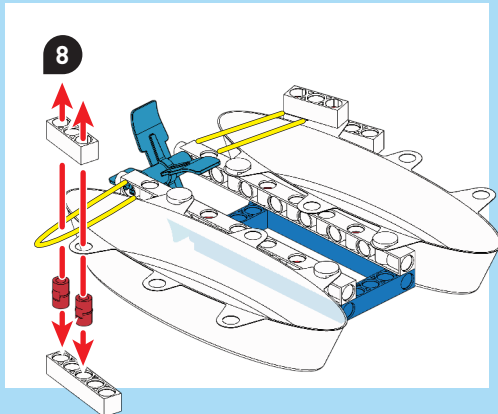
6





TIP!

If the rubber band is very loose or protrudes a lot on the sides, you can shorten it with a knot at one or both ends.



Filled with about 10 cm of water



WHAT'S HAPPENING?

Energy is stored in the rubber band - you already know that from the wind-up car model. As soon as you release the PADDLE WHEEL, it will start turning. The paddle wheel's blades push the water backwards and propel the boat.



CHECK IT OUT

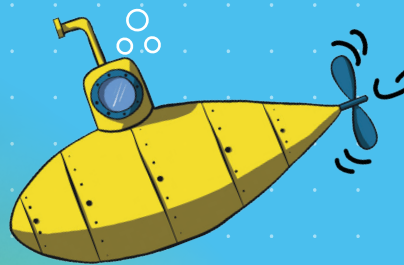
WIND COME FROM THE WRONG DIRECTION?

Did you know that a sailboat can find its way back to the harbor even in a headwind?

As long as the sail is at a certain angle to the wind through clever manipulation, the sailboat can bend towards the destination.



Submarine



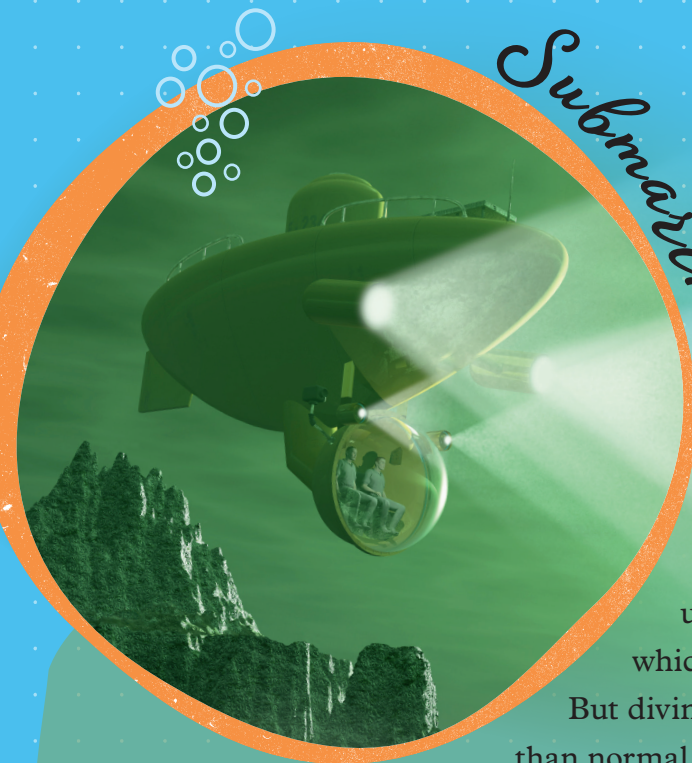
If you want to explore the under water world, you need a submarine!

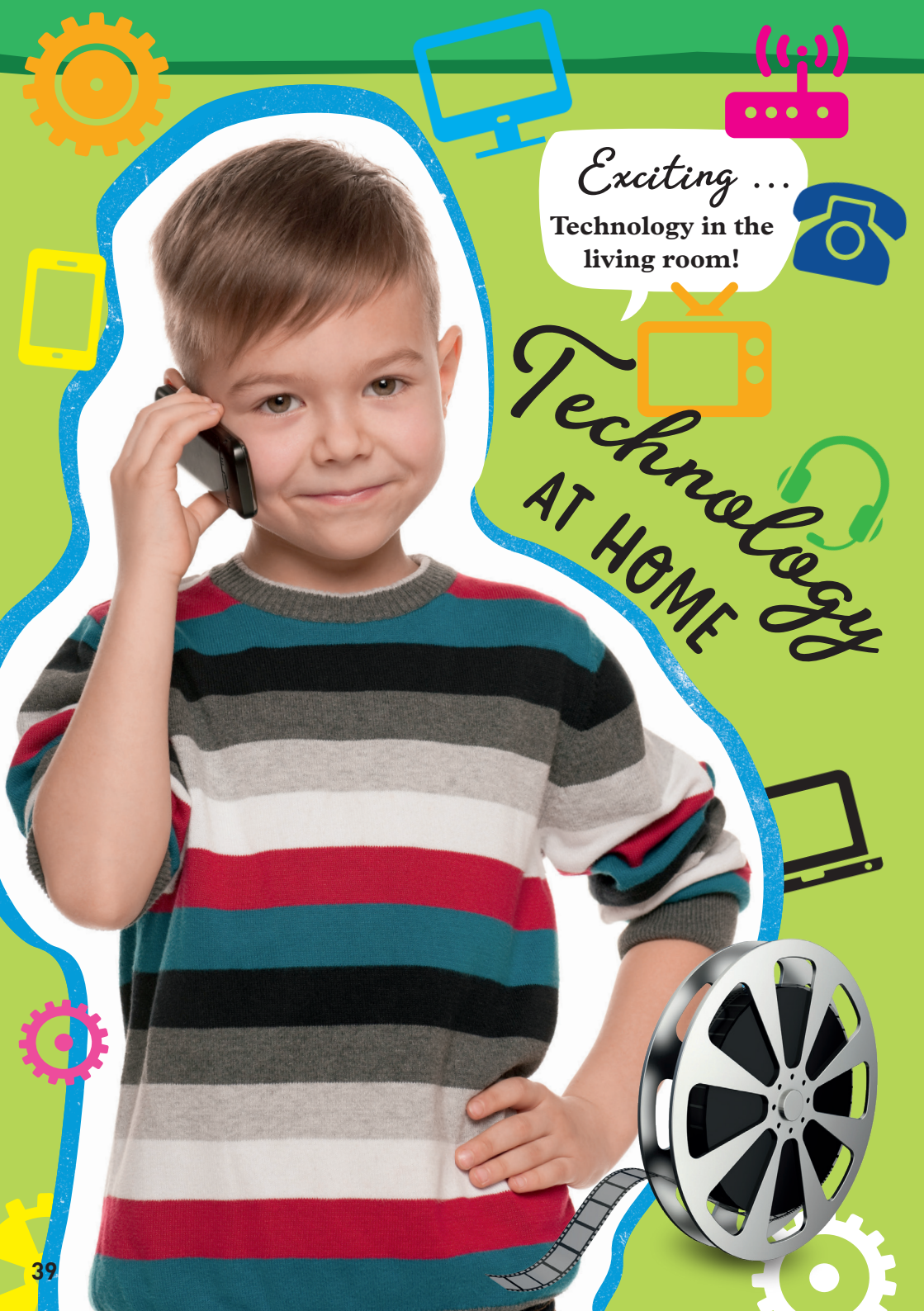
There are even

unmanned diving robots: which is no people on board.

But diving robots can dive deeper than normal submarines. They are

smaller and more agile for rescue services, for example, shipwrecks.

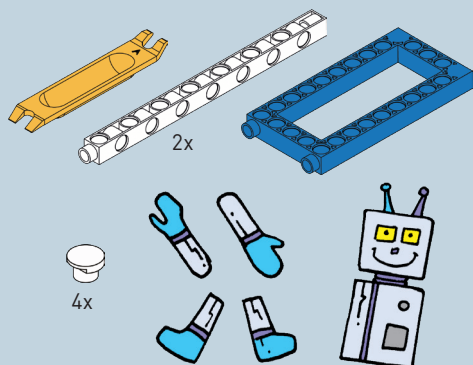




Exciting ...
Technology in the
living room!

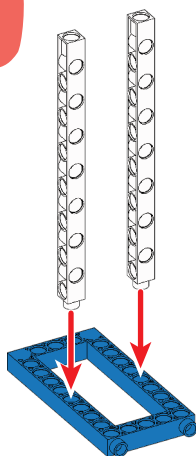
Technology AT HOME

YOU NEED:

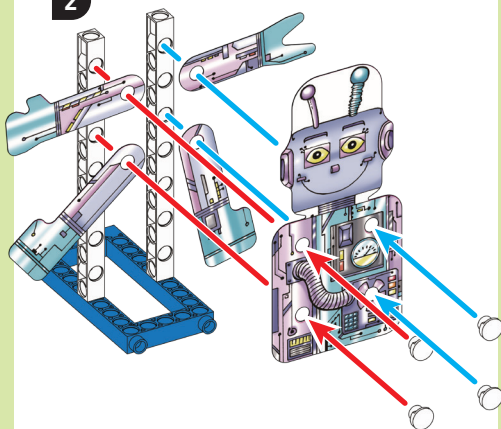


Start

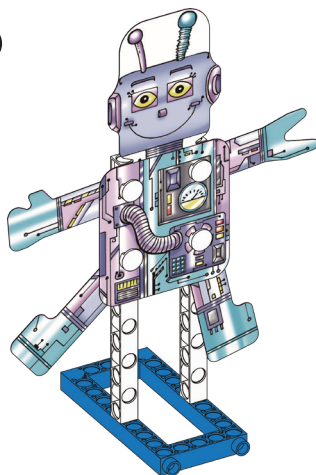
1



2

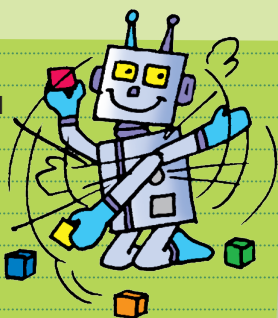


3



WHAT'S HAPPENING?

Robots are machines and can do many things faster and more precisely than humans. This fantasy robot is already looking forward to becoming your little helper: Tidy up building blocks? Calculate how many days until your birthday? Or get balls from the roof with his telescopic arm?



EXPERIMENT 18

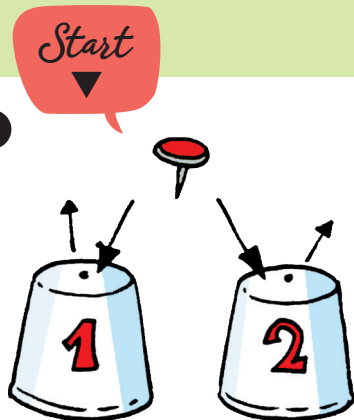
STRING TELEPHONE

YOU NEED:

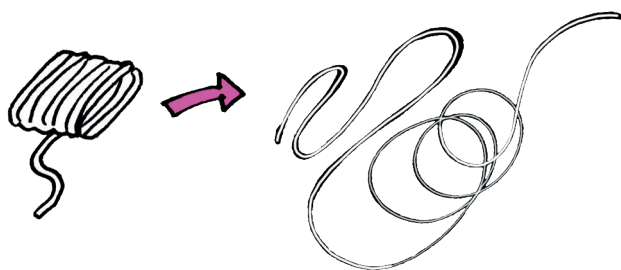


- + 2 empty and small cups
- + Thumbtack

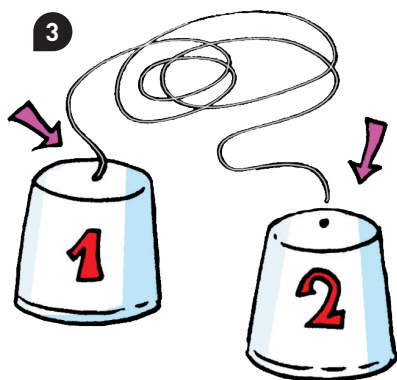
1



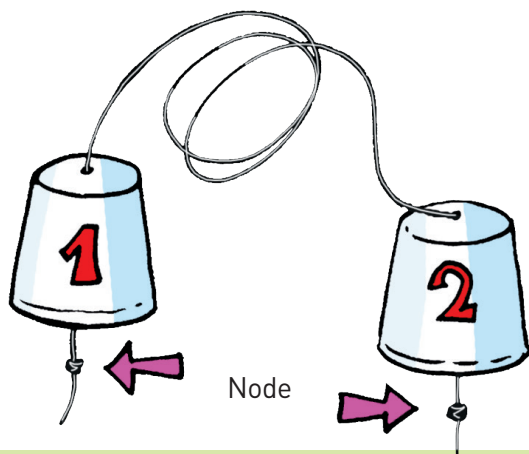
2



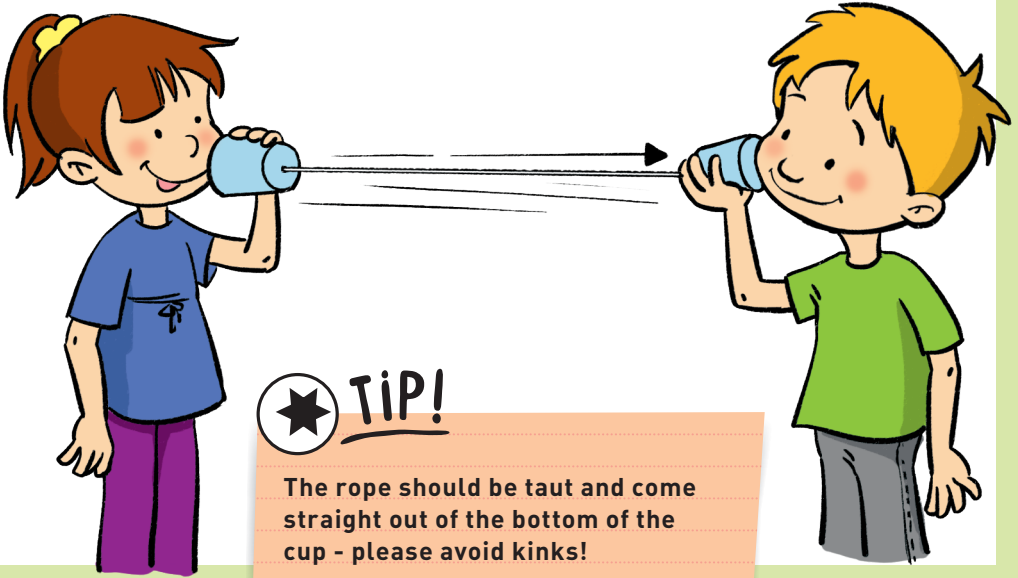
3



4

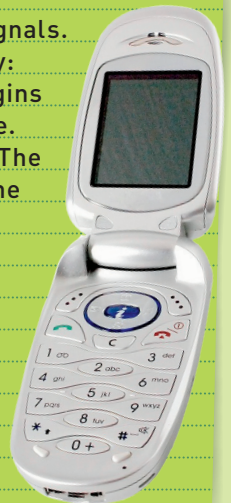


5



WHAT'S HAPPENING?

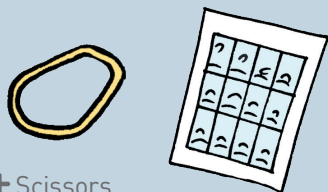
In real telephones, the tones are converted into electrical signals. But this phone works completely without electricity: When you talk to the cup, the bottom of the cup begins to vibrate. This vibration is transmitted to the rope. The louder the sound, the stronger the vibration. The higher the pitch, the faster the vibration. Then, the rope transmits the vibration to the bottom of the second cup. So the other person can hear what you are saying.



EXPERIMENT 19

FLIP BOOK TV

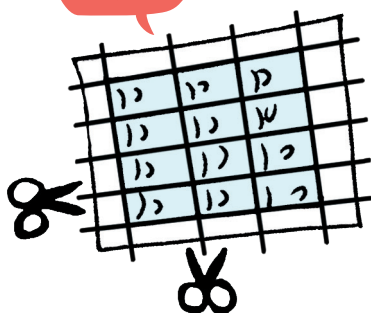
YOU NEED:



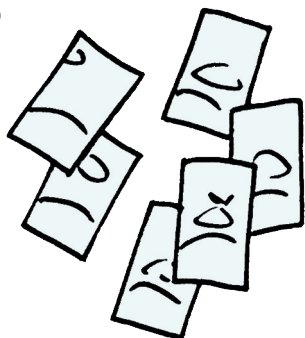
+ Scissors

Start

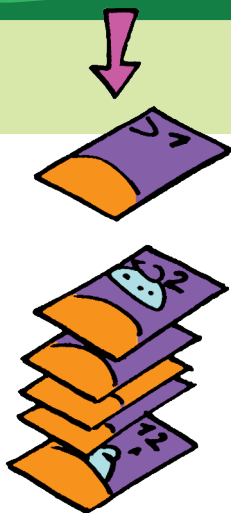
1



2



3



4

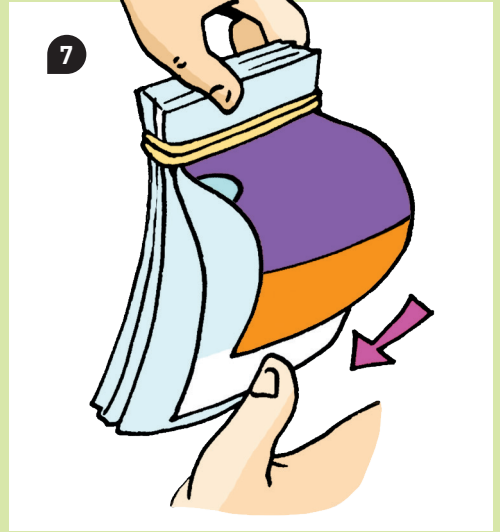
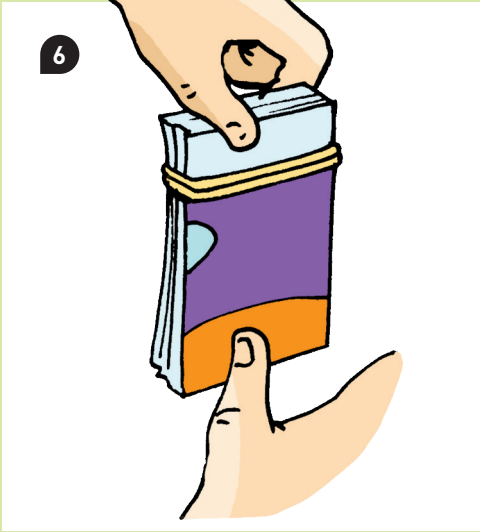


5



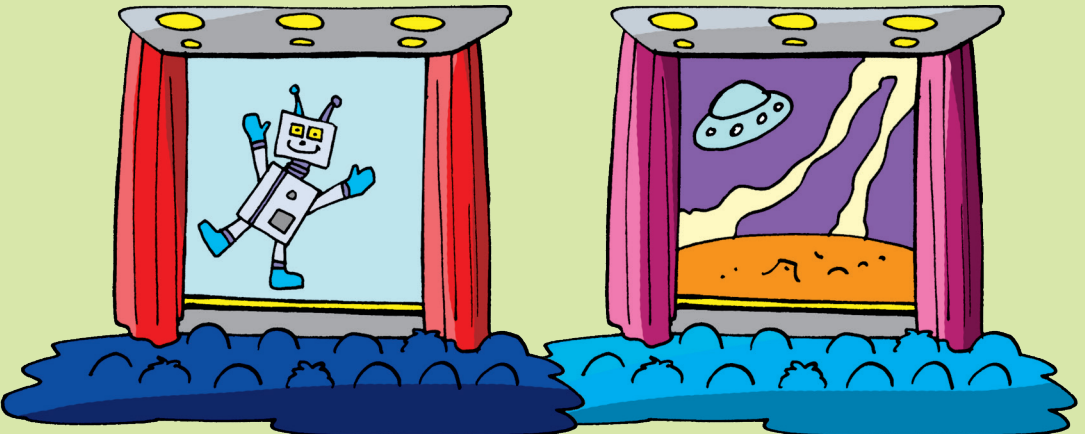
TIP!

Before you attach the rubber band, stack the cards evenly first!



WHAT'S HAPPENING?

In the flip book, you can see a lot of pictures in a row - like a real film! From one picture to the next, there is only one little thing changes. If your thumb flip along the edge, you can flip very quickly. But your eyes are too slow to see the individual images - so they blur into a flowing movement.



EXPERIMENT 20

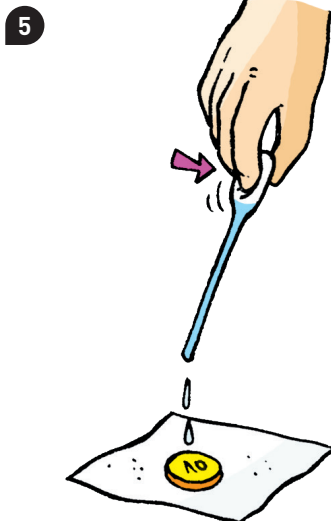
MOUND OF WATER

YOU NEED:



- + Coin
- + Glass
- + Water
- + Paper towels

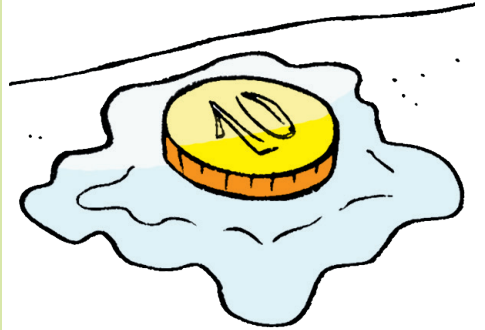
Start



7

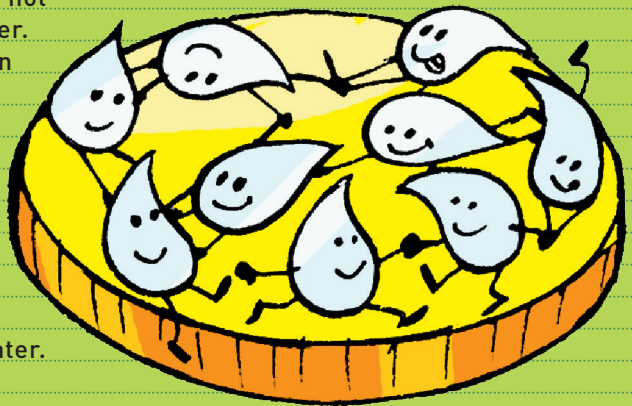


8



WHAT'S HAPPENING?

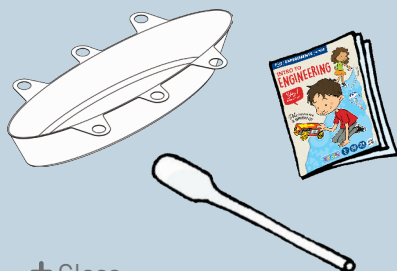
Water is made up of many tiny particles, they are so tiny that you cannot see them. But they have an interesting property: they attract each other-as if they will not separated from each other. When you drop a water on the surface of coin, its particles will cling to the other water particles on the coin - it is so strong that the water arches upwards, but no water flows down. This is called the surface tension of the water.



EXPERIMENT 21

WATER-DROP LENS

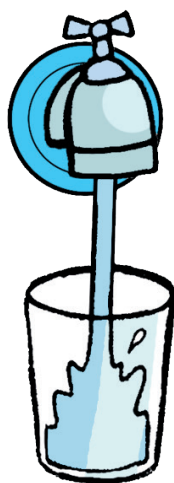
YOU NEED:



- + Glass
- + Water
- + Kitchen paper to dry off

Start

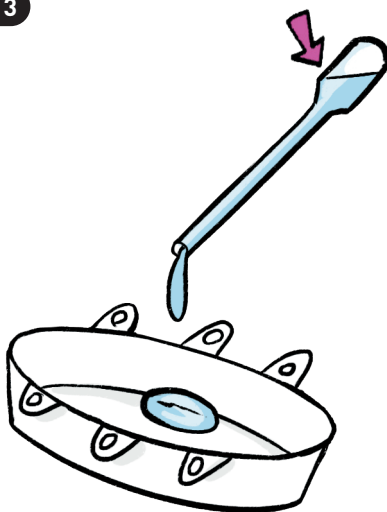
1



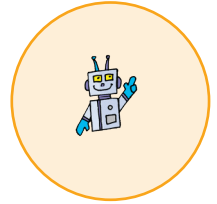
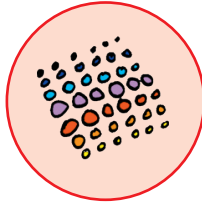
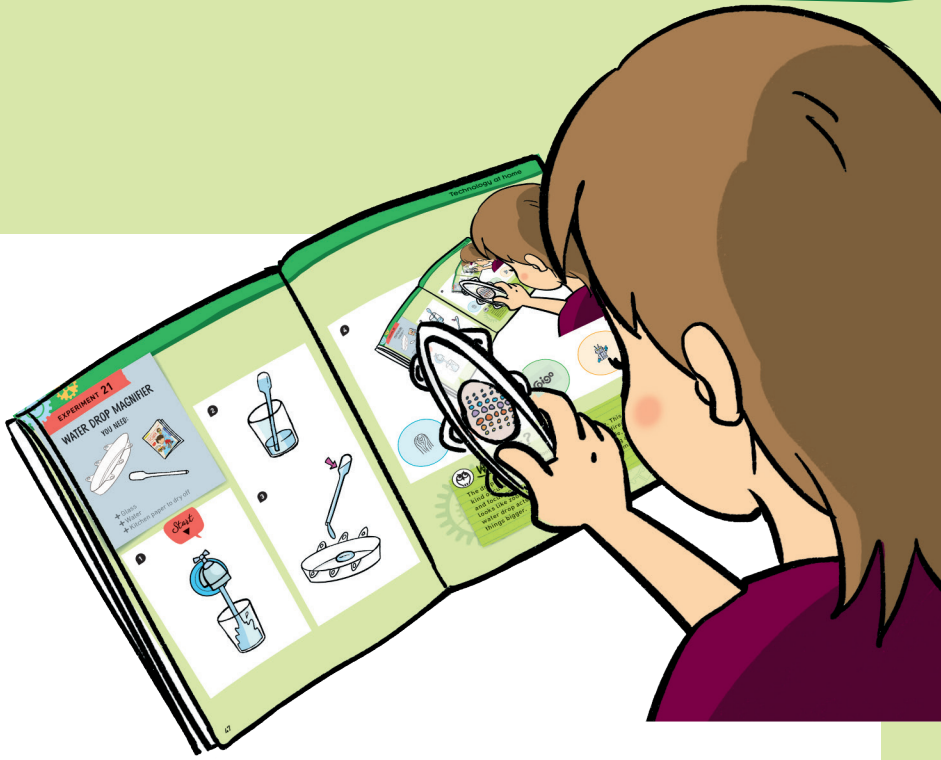
2



3



4



WHAT'S HAPPENING?

The drop of water on the boat has a domed shape. This kind of curve causes the incident light to change direction and focus on the focal point. From your perspective, this looks like zoom in the object which you are looking at. The water drop acts like a magnifying glass, making small things bigger.



CHECK IT OUT



PLEASE DO NOT EAT THESE LENTILS!

Did you know that the lens in a magnifying glass has the same shape as the mountain of water you made earlier with the pipette? The lens was made of water - and the magnifying glass was made of glass.

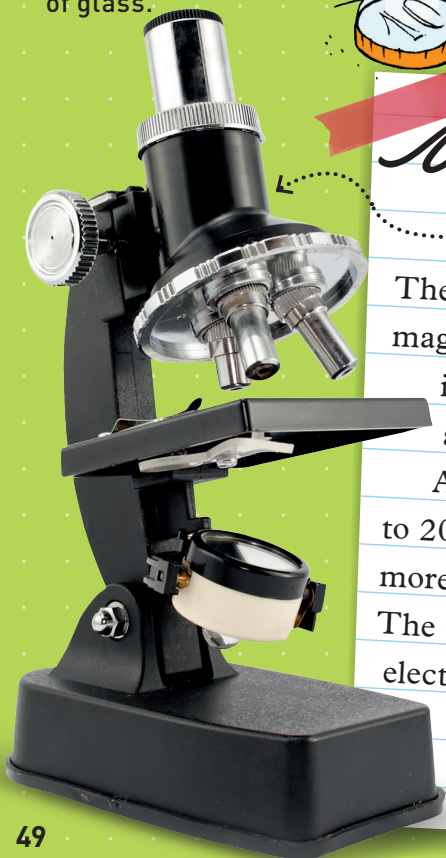


Mega magnifying glass

The function of the microscope is like a magnifying glass, but is much more powerful: it contains several lenses and thus achieves a much higher magnification.

A magnifying glass can magnify things 10 to 20 times, and a microscope can magnify more than 1000 times!

The electron microscope, which uses an electron beams instead of light, is particularly good: its accuracy is 1,000,000 times of the human eye!





Welcome to visit Gigo website!

- English, Traditional Chinese, Simplified Chinese and Russian.
- Brilliant product videos.
- Online manual browsing.

Video Tutorial
Manual online browsing



Gigo website



f Gigo FB



▶ Gigo YT

GENIUS TOY TAIWAN CO., LTD.
www.gigotoys.com

© 2022 Genius Toy Taiwan Co., Ltd. ALL RIGHTS RESERVED

R21#7076