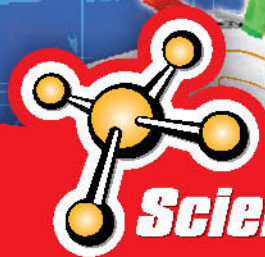


Gadgets Factory

Become a fantastic engineer
while building your own gadgets!



Science4you



VRoom



Play Monster



WARNING:

CHOKING HAZARD - Children under 8 years can choke or suffocate on uninflated or broken balloons. Adult supervision required. Keep uninflated balloons from children. Discard broken balloons at once.



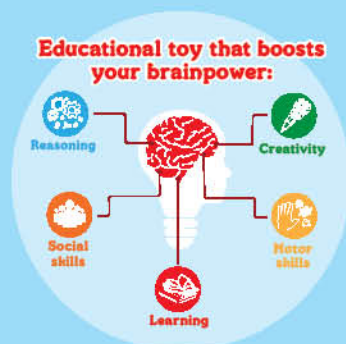
Dear Parents and Guardians:

Through play, children develop different cognitive skills. Scientific studies show that when we are having fun or making discoveries during an experiment, a neurotransmitter called Dopamine is released.

Dopamine is known to be responsible for feelings like motivation, reward and learning and that's why experiences are related to positive feelings. So, if learning is a positive experience, it will stimulate the brain to develop various skills.

Therefore, Science4you aims to develop educational toys that combine fun with education by fostering curiosity and experimentation.

Find out below which skills can be developed with the help of this educational toy!



The educational feature is one of the key strengths of our toys. We aim to provide toys which enable children's development of physical, emotional and social skills.

Find out more about Science4you toys at:

www.playmonster.com

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Author: Inês Martins and Rita Neves

Co-author: Vitória Batista

Scientific review: Flávia Leitão

Conformity revision: Luísa Chocalheiro

Project management: Flávia Leitão

Product development: Inês Martins and Rita Neves

Design management: Marcos Rebelo

Photo: Jorge Faria and Eduardo Brito

Packaging design, Pagination, Illustrations: Jorge Faria



We wanna hear how much fun you had! Get in touch at:
Customer Service
1400 E. Inman Pkwy, Beloit, WI 53511
playmonster@playmonster.com | 1-800-524-4263
For more fun, visit playmonster.com

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



SAFETY RULES

- Read these instructions before use, follow them and keep them for reference.
- Keep young children and animals away from the experimental area.
- Store this experimental set out of reach of children under 8 years of age.
- Clean all equipment after use.
- Wash hands after carrying out experiments.
- Do not use any equipment which has not been supplied with the set or recommended in the instructions for use.
- Do not eat or drink in the experimental area.

Warning. This product contains small magnets. Not suitable for children under 8 years.

Swallowed magnets can stick together across intestines causing serious injuries. Seek immediate medical attention if magnets are swallowed. Not place the magnets near TVs, computers, data storage material (Diskettes, compact discs (CDs) or hard drives), video tapes, credit cards or ATM. The data stored in these can be damaged or lost.

Warning. This toy contains wires without connecting. Wires without connecting are not to be inserted into socket-outlets.

Warning. This toy contains and/or suggests using batteries. Under no circumstances should be used any kind of batteries other than the ones specified in the instructions manual. Do not mix old and new batteries, nor alkaline, standard and rechargeable. Eliminate used batteries appropriately.

- Non-rechargeable batteries are not to be recharged.
- Rechargeable batteries are only to be charged under adult supervision.
- Rechargeable batteries are to be removed from the toy before being charged.
- Different types of batteries or new and used batteries are not to be mixed.
- Batteries are to be inserted with the correct polarity.
- Exhausted batteries are to be removed from the toy.
- The supply terminals are not to be short-circuited.

GENERAL FIRST AID INFORMATION

- In case of doubt, seek medical advice immediately. Take the chemical and/or product together with the container with you.
- In case of injury always seek medical advice immediately.

ADVICE FOR SUPERVISING ADULTS

- Read and follow these instructions, the safety rules and the first aid information, and keep them for reference.
- This experimental set is for use only by children over 8 years.
- Because children's abilities vary so much, even within age groups, supervising adults should exercise discretion as to which experiments are suitable and safe for them. The instructions should enable supervisors to assess any experiment to establish its suitability for a particular child.
- The supervising adult should discuss the warnings and safety information with the child or children before beginning the experiments.
- The area surrounding the experiment should be kept clear of any obstructions and away from the storage of food. It should be well lit and ventilated and close to a water supply. A solid table with a heat-resistant top should be provided.

In case of poisoning by any of the components used in the experiments of this toy, contact your local poison control center or the nearest hospital. Please consult the following link for more information: <https://www.poison.org/>



In case of emergency dial:

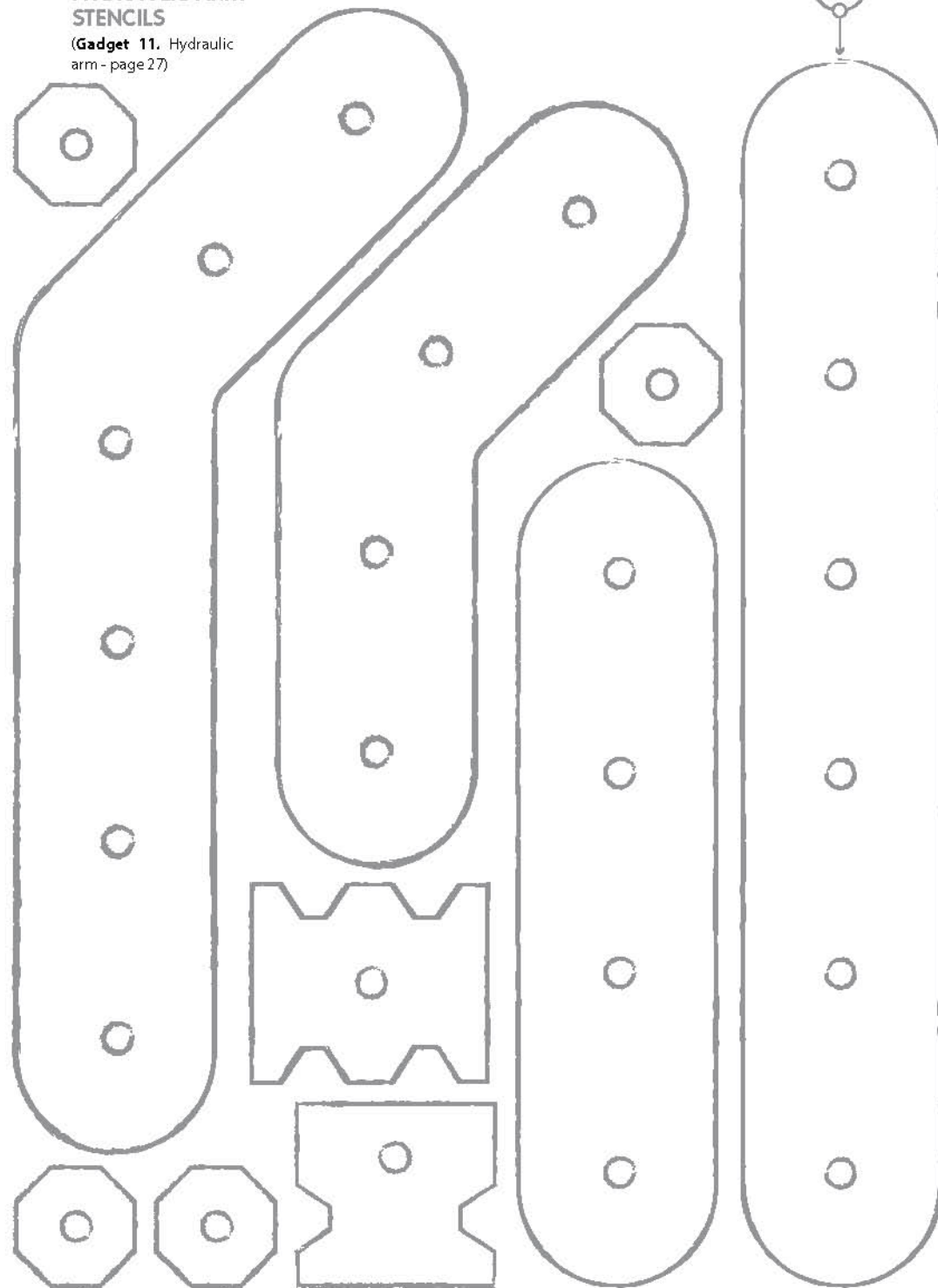
9-1-1 or Poison Control: 1-800-222-1222



HYDRAULIC ARM STENCILS

(Gadget 11. Hydraulic arm - page 27)

2x





KIT CONTENTS



Motor



Cardboard tube



Paper straws



Card with space robot



Craft wires



Paper clips



Connecting wires with crocodile clips



Spoon



Balloons



Syringes



Paper cups



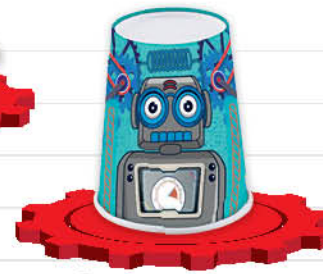
Yarn bundles



Magnetic marble



Transparent tube



Scribble bot body



Balls



Cotton balls



Card with graphic elements



Wooden sticks



Rubber bands



Card - balloon car



Fishing line



Wooden stirrers



Thick rubber band



Origami sheets



Tip: if you want, you can color the stirrers with markers or washable paint, so that your constructions become colorful and even more incredible!



Pulley



1. Gadgets and Engineering

Engineering

What is a gadget?

We can associate the word **gadget** with **engineering**! In engineering we design, test and create things to improve our day-to-day lives, and even to improve the world. To create such **gadgets**, **engineers** use mathematics, as well as the other sciences: physics, chemistry, materials... and of course, their imaginations!

How do gadgets do this?

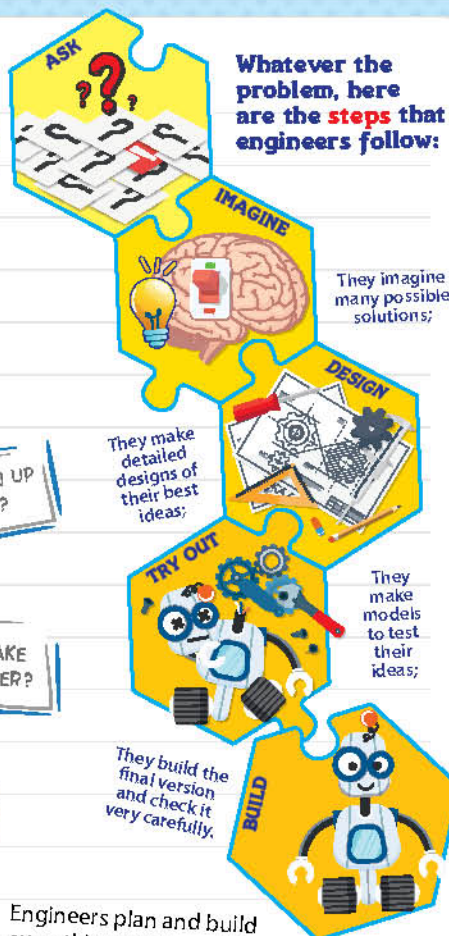
The engineering world is endless and full of new opportunities. Engineers invent new technologies and improve existing ones! They basically work as a team to solve **problems**.

These problems can be anything...

Engineers plan and build everything, from machines to specific materials, large constructions to microscopic devices, from production systems to computers!



Some of the engineering areas.





2. Gadgets Factory



Are you ready to become an incredible engineer?

Remember that, like a real **engineer**, you will have to use all your **imagination** and **creativity**. Therefore, there are no right or wrong ways to construct gadgets! In the following pages, we show you how you can create some fun gadgets and what is their scientific principle.

When you're building your gadgets, you may not be able to get them working at first, and they may need some **adjustments**. Do not be discouraged, do not be afraid to test or create other ways to make them work with your own ideas!

Let's start building gadgets!



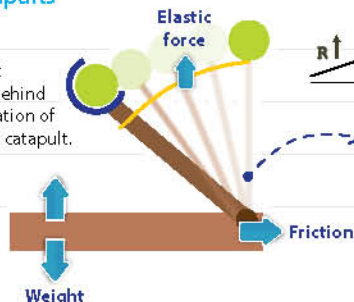
2.1. Levers

Machines make our work easier. Levers do that! These are simple machines that help us by reducing the force or energy required to perform a task. For example, scissors, nutcrackers, and **catapults** are levers.

Levers consist of three fundamental elements: the center of rotation (support point, axis or fulcrum), the point where the force is located (the load) and the point where the force is exerted.

a) Catapults

The basic physics behind the operation of a voltage catapult.



Catapults were invented to assist humans in wars by launching projectiles. These work through the physical principle of force movement, and it is possible to throw quite heavy objects, using relatively small force.



GADGET 1 Catapult

What you will need:

Tools included in the kit:

- Rubber bands
- Wooden stirrer (10)
- Spoon
- Ball

How to make it:

1. Stack 8 wooden stirrers and use 2 rubber bands to secure at each end.



2. Now place two more stirrers on the stack of stirrers that you created, as shown here.



4. With another rubber band, secure the stirrers in the middle, as shown. Wrap the rubber band around all the stirrers.



5. Now to finish the catapult:

(a) Slide the spoon handle under the rubber band that is holding the two wooden stirrers at the bottom.



(b) With another rubber band, fasten the upper part of the spoon handle to the stirrer.



Try the catapult!

Place the ball on the spoon, press it down a little and then release it.

How does it work?

When you press down on the spoon, you are loading the catapult launcher with energy (**potential elastic energy**). Thus, when released, that energy is released and converted into energy of movement (**kinetic energy**), most of which is transferred to the ball which is fired by the air at a certain speed.



2.2. Magnetism

GADGET 2 Magnetic maze

What you will need:
Tools included in the kit:

- Cardboard box
- Paper straws
- Magnetic marble
- Paper clips

Extra items you will need:
Adhesive tape • Scissors
Pencil or marker • Ruler

Always ask an adult for help!

How to make it:

1. With the help of a ruler and a pencil or marker, start by drawing a maze on the cardboard box.



Example of a maze.

2. Cut the straws according to the straight-line segments you drew.



3. With the adhesive tape, attach the straws to the box.

4. At the starting point put a paper clip: pierce the box and fit the clip.



5. If you want you can create obstacles in the course:

• Place more paper clips along the maze and watch what happens;

• Make holes the size of the marble, so that it can get stuck.



6. Put the marble in the maze and have fun!



Move the marble in the maze!

How does it work?

The marble is magnetic, that is, it is a material that is attracted by magnets, through a force called **magnetism**! As such, it is easily attracted by the obstacles of the maze — the clips, since these are also magnetic materials.

DO YOU KNOW THAT...

The science that relates electricity to magnetism is called **electromagnetism**? This science is widely used by scientists and engineers.

These trains do not have wheels or rails; they are replaced by an electromagnetic system capable of supporting the weight of the train without any physical contact!

Day to day gadgets

Levitation trains (MagLev)





2.3. Flying machines

GADGET 3

Spinning cups

What you will need:

Tools included in the kit:



• Paper cups



• Rubber bands

Extra items you will need:

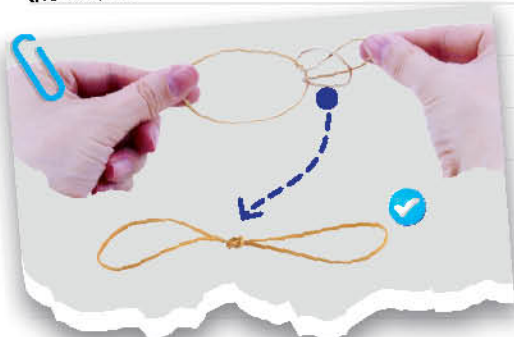
• Adhesive tape

How to make it:

1. Start by taping the 2 cups together with the adhesive tape, as shown.



2. Prepare a chain with 5 rubber bands: pick up 2 rubber bands, pass one inside the other and pass the last, inside itself.



3. Repeat this step with the other rubber bands, so that they are all part of the chain.

4. With your thumb, hold one of the ends of the rubber band chain in the joint area of the 2 cups. Then, by stretching the chain of rubber bands, wrap it around the cups.



Launch: hold the spinning cup with one hand (close to the body). With the other hand, stretch and pull the other end of the rubber band chain forward (away from the body). This should come out from the bottom of the spinning cup.



How does it work?

The cups fly because of the **Magnus effect**! While the cups spin, they create a kind of whirlwind in the air, causing differences in pressure (of the air) at the top and bottom. This difference is enough to keep the cups in the air, so that they will glide gently to the ground, instead of falling immediately.

Try and adjust:

- Use different sizes of cups;
- Add more cups to the spinning cup.



Meaning of the arrows:



Fold and unfold

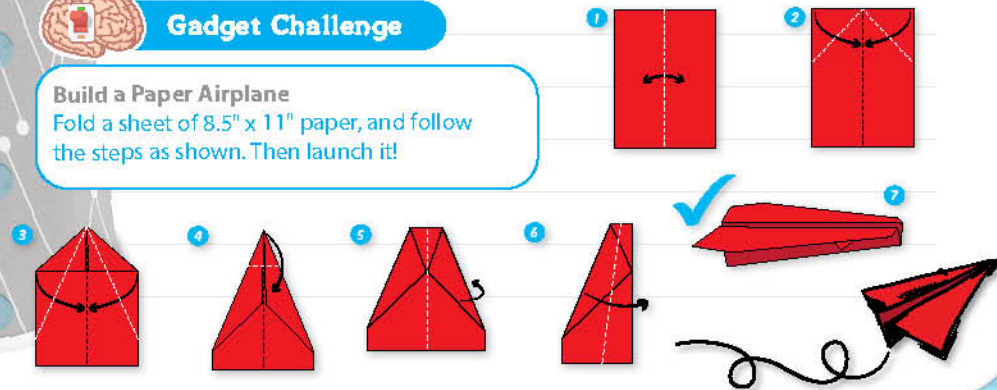


Fold in this direction

Gadget Challenge

Build a Paper Airplane

Fold a sheet of 8.5" x 11" paper, and follow the steps as shown. Then launch it!





2.4. Elasticity

Let's use a very important physical property: **elasticity**. Materials exhibiting this property, such as a rubber band or balloon, have the ability to return to their initial state even when deformed by an external force. For example, when stretching a rubber band this always returns to its original size and shape, regardless of the number of times it deforms.

GADGET 4 Launcher

What you will need:
Tools included in the kit:

• Cardboard tube

• Balloon

• Ball

• Cardboard box

Extra items you will need:
• Adhesive tape • Scissors

Always ask an adult for help!

3. Secure the balloon to the tube with the help of the adhesive tape (a). Tie a knot at the end of the balloon (b).

How to make it:

1. Begin by cutting off the closed end of the balloon.

2. Put the larger part of the balloon over the end of the tube, as shown.



Prepare the target: draw a target on a piece of cardboard box and position it on a flat surface.



Launch:

place the ball inside the launcher, stretch the tip of the balloon and release it.



Try to hit the target!

GADGET 5 Alligator arm

What you will need:
Tools included in the kit:

• Cotton balls

• Alligator (card with graphic elements)

• Rubber bands

• Wooden sticks

Extra items you will need:
• Scissors • Adhesive tape

Always ask an adult for help!

4. Line up the 2 sets of sticks as shown here.

5. Join the ends of each stick with a rubber band.

6. At one of the free ends, secure the two parts of the alligator's head with a bit of adhesive tape.

7. Now open and close the ends to work the alligator's mouth and pick up the cotton balls. Were you able to get the cotton balls? You can make more than one alligator arm and challenge your friends!

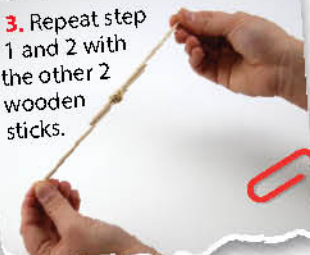
How to make it:

1. Put two wooden sticks together and secure them with a rubber band.



2. Slide the wooden sticks apart as shown in step 3.

3. Repeat step 1 and 2 with the other 2 wooden sticks.



Now, let's catch the cotton balls!



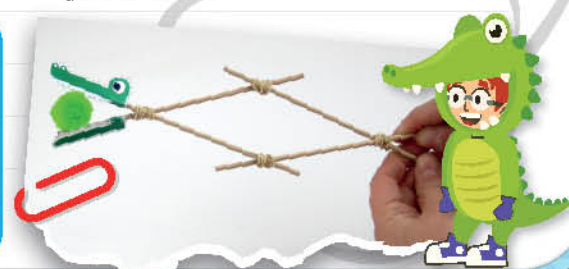
DO YOU KNOW...

Sometimes, when engineers are trying to find a way to solve problems, they are inspired by nature?



Burrs

Velcro





GADGET 6

Rubber band car

What you will need:

Tools included in the kit:

- Pulley
- Wheels of the rubber band car (card with graphic elements)
- Paper straw
- Rubber band
- Wooden stick
- Character (card with graphic elements)
- Extra items you will need:
 - Scissors
 - Adhesive tape



Always ask an adult for help!

How to make it:

1. Cut out and attach the two wheels to each side of the pulley with tape.



2. Break the wooden stick to match the same width as the pulley.



3. Thread the rubber band through the pulley and attach the piece of wooden stick, as shown. With the adhesive tape, attach the stick to the pulley.

4. Cut out the cardboard character and attach it to the straw.

5. Place the paper straw inside the rubber band, as shown, and tie a knot at the tip of the rubber band to secure the straw.

step 3



step 4



step 5

6. Rotate the straw as shown in order to twist the rubber band on the inside of the pulley.



7. Put the rubber band car on a surface and release it!

How it works:

By twisting the rubber band, you supply energy to the car, creating **potential energy** — energy stored in the “car.” Rubber bands are composed of long chains of molecules — polymers — which in their “normal” state, are all rolled up and twisted together.

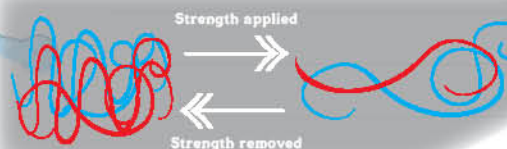
By twisting the rubber band, when you drive the car, you are “straightening” these polymer chains, which eventually creates elastic **potential energy**.

As soon as you let go of the car, the elastic tends to return to its initial state, releasing the energy you need to set it in motion (converting elastic potential energy into **kinetic energy**).

?

Try and adjust:

Figure out the distance to the finish line, then measure the distance that your car actually travels. How can you improve your performance?



Wind it up and watch it go!

Wooooooo





2.5. Energy

Energy is the ability to produce work or perform an action. There are various types of energy and various ways to create it.

GADGET 7

Explosive boomerang

What you will need:

Tools included in the kit:



• Cardboard box

• Wooden stirrers

Extra items you will need:

• Pen or pencil

How to make it:

1. Start by numbering the wooden stirrers from 1 to 4.

How it works?

When we construct the boomerang, we are storing energy (**potential**) in the wood fibers of the stirrers. This is transformed into **kinetic energy** when the boomerang is thrown at the target. All manifestations of energy can be summed up to two basic forms:

Potential Energy

Energy stored in a body and ready for use.

Kinetic energy

Energy acquired by a body when it is in motion.

2. Layer the wooden stirrers together to create a boomerang.

Follow the steps below:



Throw the boomerang against the cardboard box target and have fun!



Test Gadget 7 and 8 with two different types of wooden stirrers!

GADGET 8

Explosive chain

What you will need:

Tools included in the kit:



• Wooden stirrers

How to make it:

1. Organize the wooden stirrers as shown in the following illustrations:



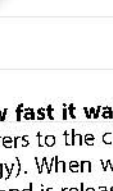
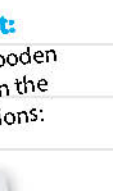
How it works:

Wow! Did you see how fast it was? With this gadget you have created a **chain reaction**. As we add wooden stirrers to the chain, we are harnessing energy in the wood fibers of the stirrers (potential energy). When we release the chain, the stored energy becomes kinetic energy that is released and is released along the entire chain.

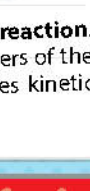
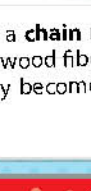
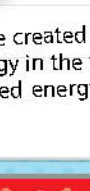
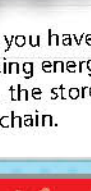
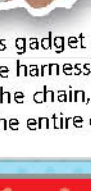


If you want you can add more stirrers to the explosive chain!

Release your chain to explode it!



Secure the structure well, so it does not explode prematurely!





2.6. Movement

When a body or a system changes position, in relation to time, we can say that we are facing a **movement**! Physics, more specifically mechanics, studies this phenomenon.

GADGET 9

Balloon car

What you will need:

Tools included in the kit:



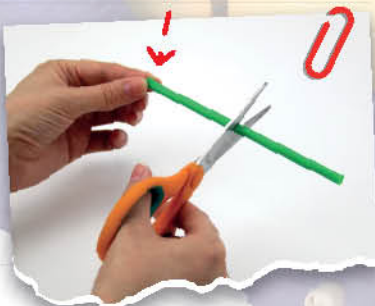
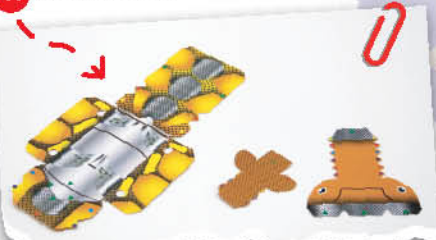
Extra items you will need:

- Scissors • Adhesive tape • Needle
- 4 matching plastic caps (ie., from a water bottle) • Ruler

Always ask an adult for help!

How to make it:

1. Detach the balloon car from the cardboard.



2. Fold it where indicated.



3. Match the same symbols and tape them together.



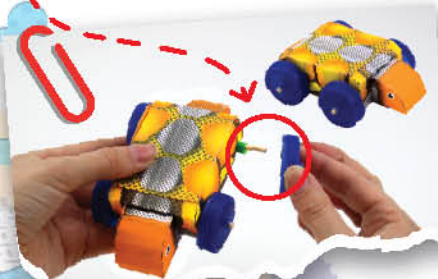
5. Fit the straws into the side holes of the balloon car.



6. Ask an adult to cut 2 pieces of wooden stick to about 3.25 inches each. Next, slide the pieces of wooden stick inside the straws of the balloon car.

7. Ask an adult to poke a hole in the 4 plastic caps with a needle. These will be the wheels of the balloon car!

8. Place a bottle cap on each end of the wooden sticks.



9. Put a straw in the mouthpiece of the balloon and attach it with adhesive tape. To make sure the air does not escape, fill the balloon with the straw and then cover the end of straw (pressing it with your fingers). If you see that the balloon loses air, secure with more tape.



10. With the adhesive tape, secure the straw with the balloon to the top of the car.

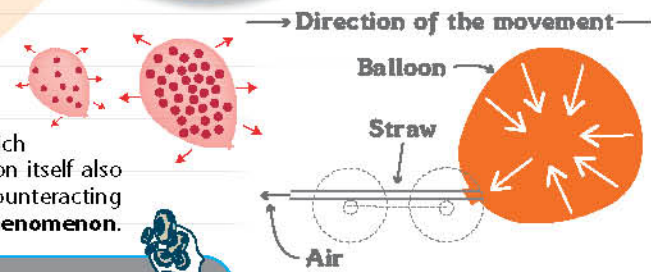
11. Fill the balloon with the straw and, without letting the air escape, put the balloon car on the ground.

12. Start a countdown and release the straw.



How it works:

When filling the balloon, the molecules of air press against its walls. It is this pressure that allows the balloon to grow, by stretching the rubber from which it is made. However, the balloon itself also exerts counter-pressure, counteracting the force air - **propulsion phenomenon**.



DO YOU KNOW...

If a body exerts force on another body, it reacts and exerts on the first a force of equal intensity but in the opposite direction? This is the basic principle of Newton's 3rd law - simultaneous action-reaction.

When you release the straw, the air that is inside the balloon comes out through its mouthpiece. Thus, the car is forced to move in the opposite direction that the air is traveling.



a) Motion transmission

GADGET 10

Up and down - pulleys

What you will need:

Tools included in the kit:



• Pulley



• Yarn

Extra items you will need:

• Pencil • Books • Small object

The **pulley** is a simple machine widely used in engineering! Pulleys help us lift large, heavy objects.

How to make it:

1. Place a pencil between a table top and a heavy object, such as a stack of books.



2. Attach the pulley to the pencil through its center hole.



3. Tie a small object to one of the ends of the yarn, for example a toy. Pass the free end over the pulley and wrap it around.



4. Pull (down) the end of the yarn that does not have the object attached until you can lift it.



How it works:

Pulleys are made by a wheel, or by a set of wheels, with a groove, through which a rope or steel cables circulate.

In a simple pulley, the energy you need to lift the object is exactly the same as you would need if you did not have help to lift it, yet as the direction of the forces is opposite, the process is facilitated. Pulleys are simple machines that allow you to change the direction and intensity of a force.

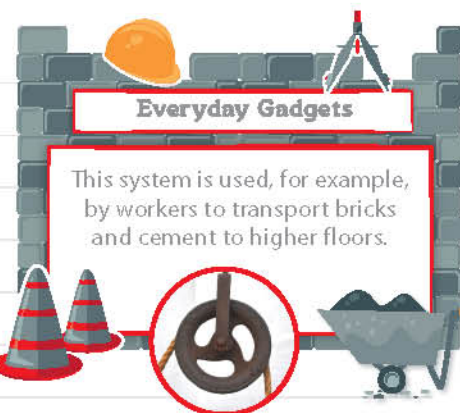


Gadget challenge

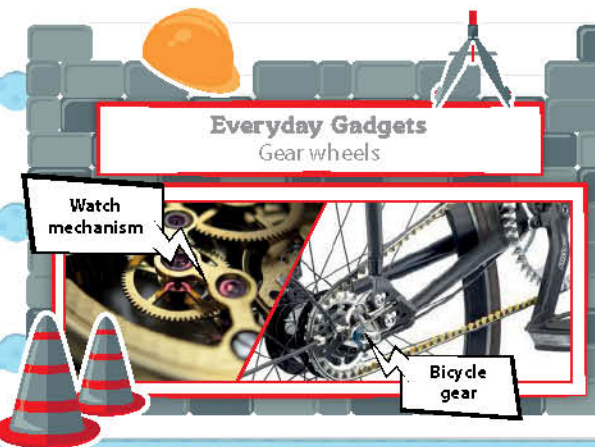
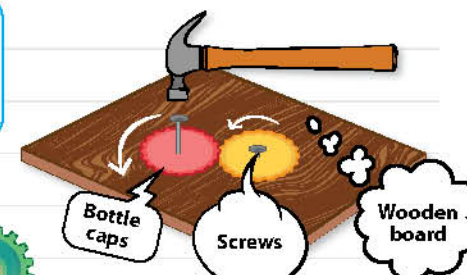
Gear wheels

Gear wheels are used to boost the movement of machines. These are designed to produce energy and transmit movement to one another without great efforts.

You can also test this system with the cut-out gear wheels from the card with graphic elements. You can attach them with paper fasteners to a piece of cardboard.



Build a gear wheel system like the image and test it!





2.7. Hydraulic machines

The hydraulic system uses a liquid to generate movement or force. The force applied at one point is transmitted to a second point using an incompressible fluid, i.e. a constant-density fluid, such as water or oils.



In the next gadgets we will use the syringes to create a **hydraulic system**.

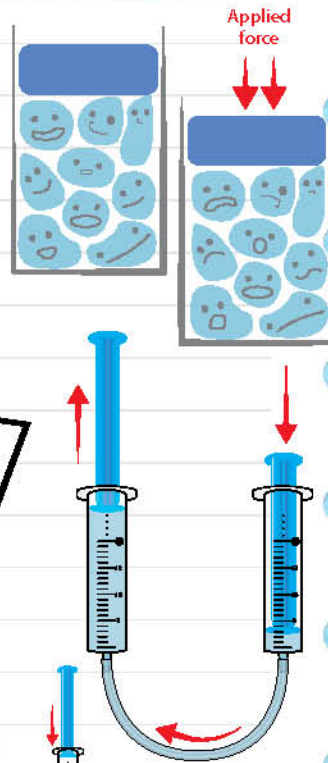
Preparing the hydraulic system:

- Put one of the syringes in the tube;
- Remove the plunger from the other syringe and put it on the tube as well;
- Fill the syringe without the plunger with about 20 milliliters (ml) of water;
- Now insert the plunger into the syringe and push it until the tube is filled with water.

DO YOU KNOW...

Hydraulic energy and pneumatics are the two main forms of energy used in machines?

Scientist!
Let's put into practice the principles of the hydraulic system!



GADGET 11

Hydraulic arm

What you will need:

Tools included in the kit:

• Plastic tube

• Hydraulic arm stencils (page 5)

• Syringes

• Craft wires

Extra items you will need:

• Cardboard • Scissors • Pencil • Water • Glue • 5 paper fasteners
• Tracing paper (optional) • Sheet of paper (optional)

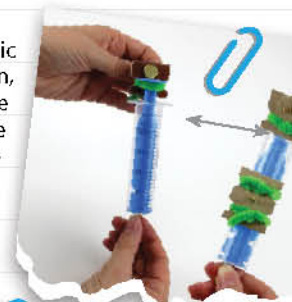
Always ask an adult for help!

How to make it:

1. Ask an adult to make a copy of page 5 of this book (you can also use tracing paper to trace the stencils from this book onto another sheet of paper).
2. Glue the sheet from the stencils to a thick card (do not forget to duplicate one of the pieces). If you want you can reuse the toy box to glue the stencils.
3. Cut out the cardboard stencils.
4. Place the paper fasteners in the indicated locations to build the hydraulic arm.



5. Prepare the hydraulic system (see page 26). Then, with the craft wire, secure the smaller parts to one of the syringes. Use the scissors to cut the amount of wire you need.



7. Activate the hydraulic system: push the plunger of the syringe, let loose and observe the movement of your hydraulic arm!



6. With paper fasteners, attach the syringe to the rest of the hydraulic arm structure.



GADGET 12

Hydraulic elevator

What you will need:

Tools included in the kit:



• Character
(card with graphic elements)



• Origami sheet



• Cardboard box



• Craft wire



• Plastic tube



• Syringes

Extra items you will need:

- Cardboard cutter
- Scissors
- Pencil or marker
- Modeling clay or adhesive tape
- Water

How to make it:

1. Prepare the hydraulic system (see page 26). Then secure one of the syringes to the carton with the craft wires, as shown. This syringe will be your elevator.

2. Place the plunger of the syringe elevator down. Secure the origami box (see instructions on the right*) on top of the plunger, with clay or adhesive tape, and, with a marker, trace its outline in the carton.

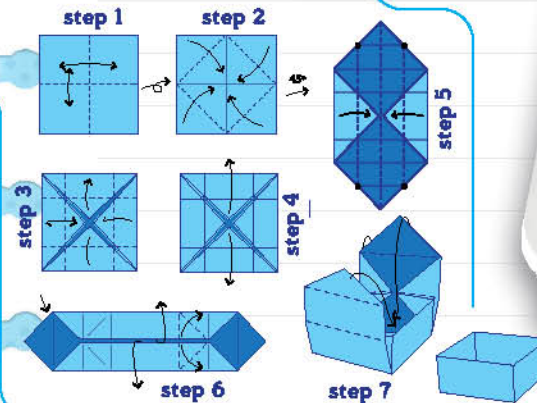
ATTENTION:
ask for help
from an adult.

3. With the other syringe, push the plunger of the syringe elevator upwards. Trace the contour of the origami box in the carton again.

4. With the cardboard cutter, and the help of an adult, cut out the square you traced last. From the other square you have to cut only 3 sides to make the entrance door of the elevator (if necessary, remove the plunger from the elevator syringe).

5. **Activate the hydraulic system:** push the plunger of the syringe, and observe the elevator moving! You can decorate the box to your liking and put the character in the elevator to transport it!

* Prepare the elevator box:
build the following origami (use the origami sheet from the kit):



Fix the box to a
surface, with the help
of adhesive tape.



2.8. Robots

GADGET 13

Robot hand

What you will need:

Tools included in the kit:



• Robot hand
(card with graphic elements)

• Paper straws



• Ruler (page 31)



• Fishing line

Extra items you will need:

• Marker • Scissors

Always ask an adult for help!

2. With the marker, the ruler on **page 31** and the scissors, cut the straws into pieces at the following sizes:

size	quantity
7 cm	1
5.5 cm	1
5 cm	2
4 cm	2
2 cm	5
1.5 cm	3
1 cm	6

Caption: cm - centimeters.

3. Cut 5 pieces of fishing line to about 40 cm each.

4. Secure the strings at the end of the fingers (back of the hand) with adhesive tape.

How to make it:

1. With the scissors, start by cutting the robot hand from the sheet of graphic elements. Then fold the paper hand as marked (joint area).



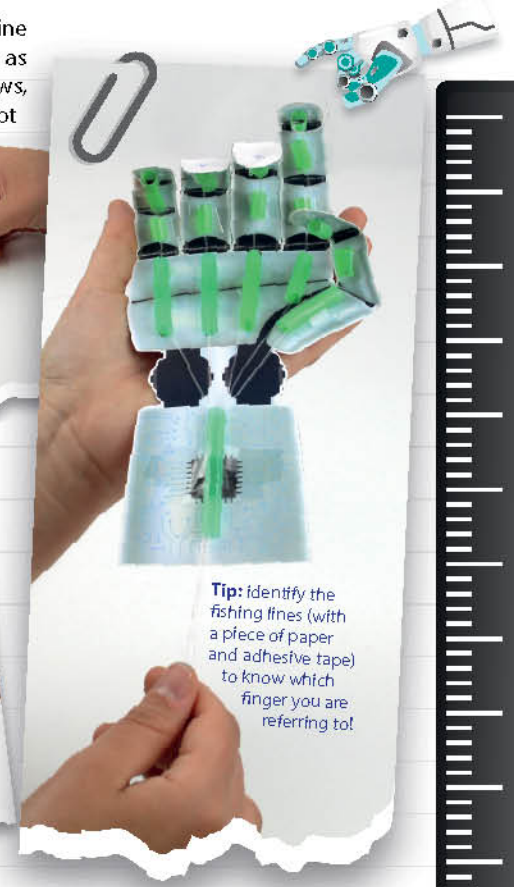
5. Now you will have to pass each fishing line through the corresponding pieces of straw, as indicated, and continue connecting the straws, with adhesive tape, to the fingers of the robot hand.



6. Finally, pass all of the fishing lines through the 7 cm piece of straw and tape the straw to the wrist area.



Tip: identify the fishing lines (with a piece of paper and adhesive tape) to know which finger you are referring to!



7. Pull the fishing lines individually and in combination to explore the fantastic mechanism of this robot hand.

How it works?

This mechanism is an articulated system, in which you can move it individually or together depending on the mechanism you activate.

In fact, we can say that this gadget was inspired by the functioning of our hands! The fishing line simulates our tendons.

Everyday Gadgets

Robotics and Biomechanics

Robotics can be a great asset to make our everyday lives easier. There are already robots that help human beings every day! Biomechanics studies forces and movements and how we can apply them to robots.





GADGET 14 Scribble bot

What you will need:

Tools included in the kit:

- Motor
- Rubber band
- Thick rubber band
- Scribble bot body
- Connecting wires with crocodile clips
- Wooden stirrer

Extra items you will need:

- Battery of 1.5V C size (LR 14)
- 4 colored markers
- Adhesive tape
- Sheet of paper to draw
- Cork (or rubber eraser)

How to make it:

1. Gently tape the thick rubber band and the battery to the side of the scribble bot body (in the indicated place).



2. With the help of the adhesive tape, attach the 4 colored markers.



3. Attach the engine to the tip of a wooden stirrer with a rubber band.

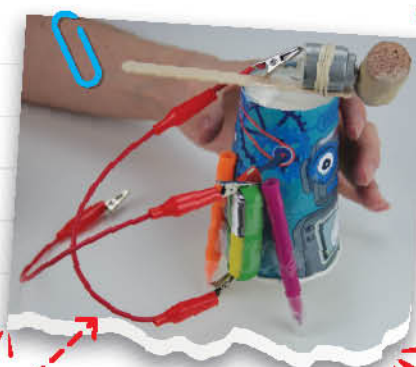


Always ask an adult for help!

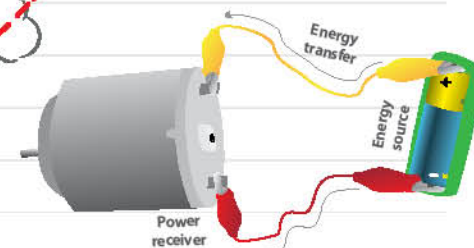
4. Now, tape the wooden stirrer with the motor to the base of the scribble bot body, as illustrated.



5. In order for the motor to have enough strength to move the scribble bot, attach a cork or an eraser to its axis securely.



How does it work?

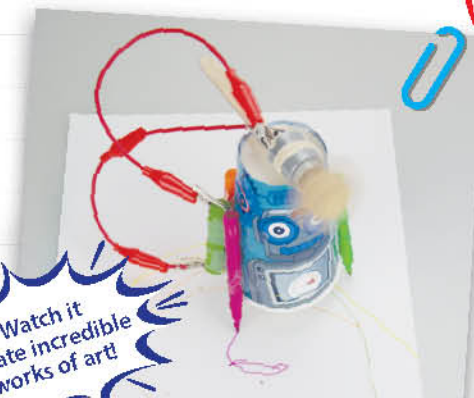


6. Prepare the electric circuit of the robot: fasten the connecting wires with crocodile clips to the battery and to the motor, as shown here.



Be sure to keep a connection free, or else the robot will automatically start working!

7. Remove the cover from the markers and place the robot on a sheet of paper.



8. Activate the electrical circuit: carefully reconnect the free connecting wire with crocodile clips to the engine.



CAUTION
The battery will heat up.

Watch it create incredible works of art!

Scientist! Whenever it is necessary to change anything on the robot, disconnect the wiring of the motor and/or the battery.





GADGET 15 Space robot

What you will need:

Tools included in the kit:

- Wooden stirrers
- Thick rubber band
- Yarn
- Connecting wires with crocodile clips
- Motor
- Balls
- Rubber bands
- Card with space robot

Extra items you will need:

- Battery of 1.5V C size (LR 14)
- Glue
- Cork (or rubber eraser)

CAUTION
The battery will heat up.



2. With another piece of yarn, attach another wooden stirrer to the others, so that you form a triangle.

How to make it:

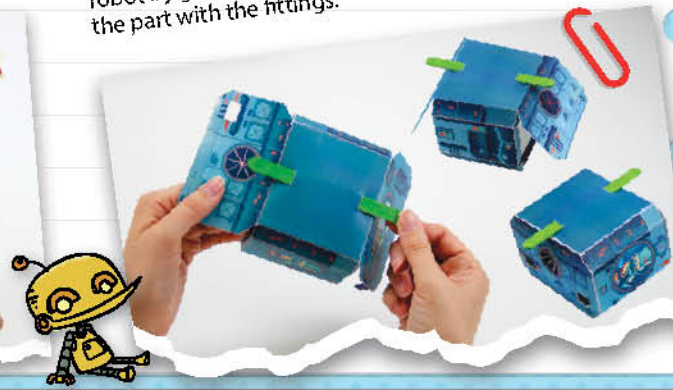
1. With a piece of yarn, fasten the stirrers as indicated.



3. Put a ball on each end of your triangle. Secure them with the rubber bands.



4. Put a wooden stirrer in the slot of the space robot, as indicated. Then close the robot by gluing the indicated sides. Don't glue the part with the fittings.



5. Secure the connecting wires to the engine and place the engine and the free crocodile clips of the wires in the indicated locations.



6. With a piece of yarn, attach the wooden stirrer of the robot to the triangular base that you created.



7. Put the battery in the thick rubber band and attach it to the structure.

8. Attach a cork or an eraser to the motor shaft. Secure it well. Now, glue the robot head in the indicated place.

9. **Activate the electric circuit:** connect the wires to the battery and get your robot moving!



How it works?

In these robots, it's the electric motor that will allow the movement. The motor has a decentralized weight (the cork or rubber), which causes it to vibrate and it is this same **vibration** that will make the robot move.

This is the same technology that makes electric toothbrushes, cell phones, or the video game joysticks that vibrate. Inside of them, these have small rotating motors with coupled weights.

Everyday Gadgets



Challenge gadget

Added weight will influence the movement of the robot. What do you think happens if the item is out of the center? You can also add other small items to give you more weight.

Check out more COOL
experiments!



Science4you



Find out more at www.playmonster.com



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