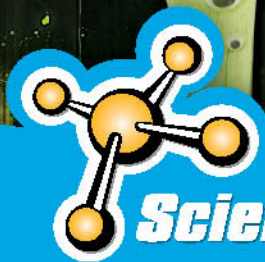


Monsters Factory

Surprise yourself
with monstrous
experiments!



Science4you



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.



WARNING:

This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

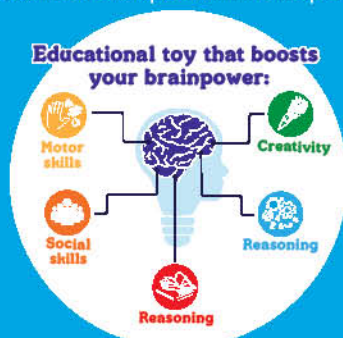
Dear Parents and Guardians:

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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We wanna hear how much fun you had! Get in touch at:
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For more fun, visit playmonster.com

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SAFETY RULES

- Read these instructions before use, follow them and keep them for reference.
- Keep young children, animals and those not wearing eye protection away from the experimental area.
- Always wear eye protection.
- Store this experimental set out of reach of children under 8 years of age.
- Clean all equipment after use.
- Make sure that all containers and/or non-reclosable packaging are fully closed and properly stored after use.
- Ensure that all empty containers and/or non-reclosable packaging are disposed of properly.
- 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.
- Do not allow chemicals to come into contact with the eyes or mouth.
- Do not apply any substances or solutions to the body.
- Do not replace foodstuffs in original container. Dispose of immediately.

GENERAL FIRST AID INFORMATION

- **In case of eye contact:** Wash out eye with plenty of water, holding eye open if necessary. Seek immediate medical advice.
- **If swallowed:** Wash out mouth with water, drink some fresh water. Do not induce vomiting. Seek immediate medical advice.
- **In case of inhalation:** Remove person to fresh air.
- **In case of skin contact and burns:** Wash affected area with plenty of water for at least 10 minutes.
- In case of doubt, seek medical advice immediately. Take the reagent and its container with you.
- In case of injury always seek medical advice.

ADVICE FOR SUPERVISING ADULTS

- Read and follow these instructions, the safety rules and the first aid information, and keep them for reference.
- The incorrect use of chemicals can cause injury and damage to health. Only carry out those experiments which are listed in the instructions.
- 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 commencing the experiments. Particular attention should be paid to the safe handling of acids, alkalis and flammable liquids.
- 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.
- Substances in non-reclosable packaging should be used up (completely) during the course of one experiment, i.e. after opening the package.
- This experimental set contains colorings. Colorings can stain. Keep them away from delicate objects and fabrics.

PROTECTIVE GOGGLES INSTRUCTIONS

General Applications (EN 166:2002-04)
PROTECTIVE GOGGLES MODELS JG-101, JG-123, MERKOR 101, MERKOR 101 and WY-5001. Can protect against basic impacts or low energy, but not against dust or liquid splashes or even against cast metals.

PANORAMICS: Against low or medium energy impacts, dust, liquid drops and cast metals. Not against liquid splashes or electric short-circuit.

FACIAL VISORS: Can protect against low medium and high energy liquid splashes, cast metals and hot solids. Not against dust and gases.

1 - IDENTIFICATION
Manufacturer Identification:
J. Justinas, MEDOR MERKOR, WEVINCO, or the anagram.
* Optical class, according with EN166 (Just for neutral lens)

OPTICAL CLASS	SPHERICAL POWER (D) D1, D2 (D, m ⁻¹)	CYLINDRICAL POWER (D) D1, D2 (D, m ⁻¹)	DIFFERENCE IN REFRACTIVE INDEX (Δn, cm ⁻¹)			
			Horizontal		Vertical	
1	±0.06	0.06	0.75	0.25	0.25	0.25
2	±0.12	0.12	1.00	0.25	0.25	0.25
3	±0.12 -0.25	0.25*	1.00	0.25	0.25	0.25

Notes: D1 and D2 are the refractive powers of the two main meridians.
* The main meridian axes of the two lenses will be parallel between ±10°.

- Symbol of mechanical resistance, with the letters:
Without letter: Minimal robustness.
S: Robustness increased (steel ball from 22mm to 51 m/s).
F: Impacts of high speed and low energy (steel ball from 5mm to 45 m/s).
R: Impacts of medium energy (steel ball from 4mm to 120 m/s).
A: High energy impacts (steel ball from 5mm to 190 m/s).

- Marking of the frame:
- Identification of the manufacturer: J. MEDOR MERKOR, WEVINCO.
- The number of Standard EN 166, which covers this protector.
- A letter indicating the field of use (See table).
- Symbol of resistance to particles of high speed:
- Low energy impact: F
- Medium energy impact: R
- High energy impact: A
Note: If protection against high velocity particles and extreme temperature is required, the eye protector used must be marked with the letter T and immediately after the letter of impact (F, R, A). If the letter of impact is not followed by the letter T, the eye protector should be used against particles at high speed and at room temperature.

2 - USE:
It must be ensured that the risk present in the working environment corresponds to the field of use of the protective eyewear, which is deduced from the marks printed on them.
To adapt the protective eyewear to user dimensions, you only need to modify the length on the extension tabs. If the goggles have non-extendable tabs, you must change the curved position of each tab by hand. This operation is made easier by gently heating the tab first with warm air from a radiator, hot water, etc.
The helmet-adaptive visors are adjusted by inserting the frame at the edge of the helmet and securing it with the rear elastic closure.
All equipment is manufactured with materials that do not produce allergies, irritations, etc. However, they can produce allergic reactions in especially sensitive people.
They are for personal use and therefore should not be used by several users, even after they have been carefully cleaned.
The prescription glasses should be worn under the conditions for which they were prescribed.
Fields of use:

SYMBOL	DESIGNATION	FIELD OF USE DESCRIPTION
Without symbol	Basic use	Mechanical hazards not specified
3	Liquid	Liquid (drops and splashes)
4	Thick dust particles	Powder particles larger than 5 microns
5	Gases and fine dust particles	Gases, vapors, sprays, smoke and dust particles with a size of less than 5 microns
6	Elastic short circuit Arc	Electric arcs, dusts short circuit in electrical equipment
7	Hot melt and solid materials	Splashes of molten materials and penetration of hot solids

3 - MAINTENANCE
3.1. Care and Cleaning
Full protective goggles should be cleaned at intervals with clean, soapy water. Then dry them carefully with a soft, clean and absorbent cloth. For greater cleaning (disinfection) use a dry cloth impregnated with alcohol. In no case should other types of solvents be used.
3.2. Replacement
With prolonged use, these protective glasses can be scratched and dropped and, in the case of plastic lenses, yellowing. Therefore, it is necessary to do a periodic review of the state of the protective eyewear and replace it if it exhibits these defects, although apparently still allow the revision and replace the product. In any case, the product must be replaced every 5 years.

3.3. Spare Parts
Spare lenses are available for all face screens. There are also spare lenses for binocular glasses and welder glasses.

3.4. Conservation
Protective goggles should be stored in an dry and cool place, avoiding humidity, dirt and dust. It is recommended to use a protector or a plastic bag to transport the glasses.
Disposal considerations: must be handled in accordance with local regulations.

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



LIST OF SUBSTANCES SUPPLIED

Corn starch

CAS # 9005-25-8

Psyllium

CAS # 84961-55-7

Green Coloring

INGREDIENTS: CI19140, CI42090, POTASSIUM SORBATE, SODIUM BENZOATE

Precautionary Statements:

- P202** Do not handle until all safety precautions have been read and understood.
- P233** Keep container tightly closed.
- P234** Keep only in original container.

Recommendations for substances and mixtures: Do not ingest. Avoid contact with the eyes and mouth. Use only according to the instructions. Store in tightly closed containers. Keep in a cool, dry place. Protect from moisture, direct sunlight and heat sources.

DISPOSAL OF USED SUBSTANCES

Do not dispose of substances and / or mixtures together with household or other waste. Please recycle packaging materials where local recycling programs exist.



KIT CONTENTS



Protective goggles



Corn starch



Spheres



Brain mold



Plastic scoop



Pipette dropper



Craft wires



Balloons



Large measuring cup



Wooden sticks



Bowl



Eye mold



Small measuring cup



Psyllium



Green coloring



Plastic eyes



Wooden stirrer

EXTRA CONTENT

Lab bench

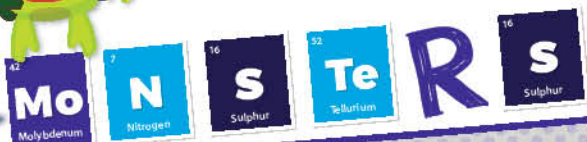
Look at the lab bench design! This will help you to always have your "lab" ready to work. Cut out the dashed lines and place the material that you will use during the experiments in their respective spaces.

Suggested setup

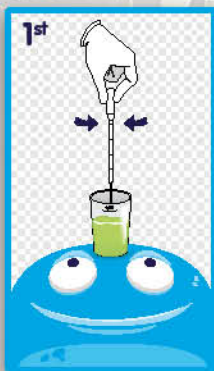


1. Monsters and Science

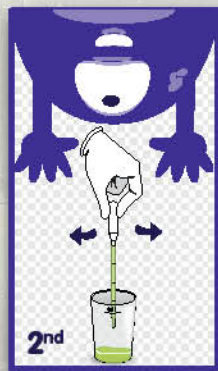
Hey, scientist!
Are you prepared to
enter this frightening
Monsters Factory?



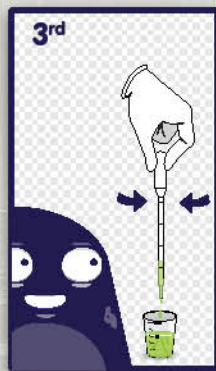
Before you begin your monstrous experiments, learn to use an instrument widely used by scientists — the **Pipette dropper**:



Squeeze out the air from the top of the Pipette dropper



Release the Pipette dropper inside the liquid to fill it



Squeeze gently until drops start falling one at a time

1 ml

0,5 ml

Legend:
ml - milliliters

Ground rules in the laboratory

- Before you begin any experiment, you should cover your desk with a towel or old newspapers. That way you can make sure you don't stain the table!
- Every time you finish an experiment, wash and pack up all the material.
- If you use cooking oil in experiments, use always dish soap to clean it more thoroughly.
- Always wash your hands before and after each experiment.
- If you want to do an experiment but the recommended material is being used in another one, you can use similar materials that you can find at home.



What are
monsters
after all?

We call
any scary fictional
character we encounter
a "monster!"

Monsters appear in almost all mythology, legends and stories from every culture. Many of these stories and legends originated a very long time ago. In the Middle Ages, the term "monster" was used to describe unfamiliar **different characteristics** in some people — like for example 6 fingers on one hand as a witch (Polydactyly); discolored hair or skin as a vampire (Albinism), or many hairs all over the entire body as a werewolf (Hypertrichosis). But in truth, nowadays we know that **science explains all of these conditions** and that "monsters" really only exist in our imagination!

Learn more about these
differences in the next page!



Scientists call these differences **mutations**!

Mutations can occur in various ways. For example, genetic mutations are changes in the structure of deoxyribonucleic acid (DNA). DNA is like a code that gives instructions for the development and functioning of all living organisms. Sometimes when there is an error in this code, there are changes in the appearance or behavior of people and animals.



Image 1: Illustrative image of a DNA molecule with modified gene.



Image 2: Illustration of the 16th century of one of the first documented Hypertrichosis cases.

The word "science" comes from Latin and means *knowledge*.

Science helps to understand, how and from what, the world is made and how it all works! It helps to understand life, the universe, the phenomena of nature ... and almost everything else that surrounds us!



With these experiments you'll learn how to make your own monsters and find out that science isn't scary at all!
Are you ready?!

EXPERIMENT 1

Worms: Monsters' breakfast

What you will need:

Materials included in the kit:



Extra items you will need:

- Medium plastic straws • Metal spoon • Milk
- Chocolate or coffee powder • Water • Microwave
- Refrigerator • Plate • Rubber band • Spoon • Jelly • Flour

Always ask an adult for help!

Steps:

- 1 Add 10 ml of jelly to the small measuring cup. Then transfer to the large measuring cup.
- 2 Using the small measuring cup, add 20 ml of hot water (can be from the tap) to the large measuring cup. Don't forget to ask an adult for help.
- 3 With the plastic scoop, add 6 tablespoons of milk and 2 tablespoons of chocolate or coffee powder! Blend well with the plastic scoop.
- 4 Place the mixture in the microwave for 10 seconds continue to mix until you have a homogeneous mixture. If necessary, continue to microwave (at half power) in 10-second increments.
- 5 Now, secure several straws with a rubber band.

- 6 Add some flour to the (clean and dry) small measuring cup. Place the straws so they stand upright in the measuring cup.
- 7 Use the metal spoon to carefully fill the straws with your jelly mixture. Make sure that the straws are standing up and touching the bottom of the glass securely. This keeps the mixture from leaking out through the bottom of the straws.
- 8 Now put the glass with the straws in the refrigerator for at least an hour.
- 9 After this time, all you need to do is squeeze the jelly out of the straws so that you have some disgusting worms. Put them in a dish to scare your friends!

ATTENTION: When you finish the experiment, throw away all used food.

Monstrous fact:

Worms are known to be viscous creatures, but they are only viscous because of their incredible adaptations to survive! In fact, they have many qualities beneficial to Earth's soil. They are invertebrate animals, they have a soft body, slender and elongated. They breathe through the skin and that's why they must keep constantly damp, so that they can absorb oxygen from the air.

EXPERIMENT 2

Viscous Super Monster

What you will need:

Materials included in the kit:

• Pipette dropper

• Plastic scoop

• Protective goggles

• Green coloring

• Psyllium

• Wooden stirrer

• Small measuring cup

• Plastic eyes

Extra items you will need:

• Water • Bowl for microwave • Microwave

Always ask an adult for help!

Steps:

1

With the help of the plastic scoop, measure 2 ml of psyllium into the small measuring cup, then put it in the bowl.

2 ml

2

Pour 50 ml of water to the small measuring cup and add it to the same bowl.

2 x 25 ml

3

With the help of Pipette dropper, add a few drops of green coloring.

7

Put the bowl back in the microwave for 60 seconds.

8

Wait 20 seconds and mix it again with the wooden stirrer.

9

Finally, add eyes to your monster and wait for about 5 minutes until the mixture cools down.

4

Mix everything with the wooden stirrer.

5

With the help of an adult, put the bowl with the mixture in the microwave (at half power) for 60 seconds.

6

After that time, ask an adult to remove the bowl from the microwave oven and wait 20 seconds until the mixture cools down. Then, mix again with the wooden stirrer for about 20 seconds.

Viscosity is a property of fluids that determines the capacity to resist the change of form, and to his own movement.

Psyllium

Psyllium is derived from the shell of the *Plantago ovata* seed, a plant that grows mainly in the African and Asian countries.

Plantago ovata



Image 3. Psyllium.

The monster explains:

Psyllium

is made up of long molecules that can absorb more than 20 times its own weight in water. So, when you put the psyllium in water and this mixture goes into the microwave, like there is an accelerated rise in temperature, the absorption of water is much faster and you can get a viscous mass, sticky and elastic!

EXPERIMENT 3

The monster that grows

What you will need:

Materials included in the kit:

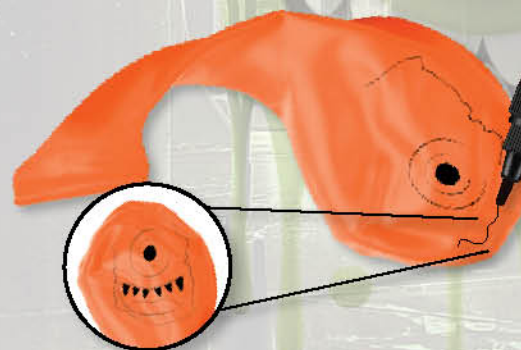


Extra items you will need:

- Small plastic water bottle
- Vinegar
- Baking soda
- Funnel
- Permanent marker

Steps:

- Start by drawing a monster on your balloon, using a permanent marker.



- Put 100 ml of vinegar in the bottle (or approximately $\frac{1}{3}$ of the bottle).

- With the help of the plastic scoop, put 3 spoons of baking soda inside the balloon. Use the funnel to help you.

- Attach the balloon nozzle to the small bottle, so that it is well attached. Be careful not to spill baking soda inside the bottle.



Observe how the carbon dioxide produced fills the balloon!



- Lift the balloon and drop the baking soda inside the bottle all at once.



DID YOU KNOW...

Baking powder contains a chemical compound called sodium bicarbonate? It is this compound that makes cakes grow! Try repeating your experiment using baking powder instead of baking soda. What happens?!



ATTENTION: When you finish the experiment, throw away all used food.



The monster explains:

The reaction of baking soda or sodium bicarbonate with an acid (in this case, with the acetic acid of the vinegar) leads to the production of **carbon dioxide** (CO_2). It is this gas that fills the balloon! Try changing the concentrations of the two components, you will notice that the higher the more production of gas!



EXPERIMENT 4

Cyclops Eye

What you will need:

Materials included in the kit:



Extra items you will need:

• Water • Milk • Gelatin • Porcelain mug • Refrigerator

Always ask an adult for help!

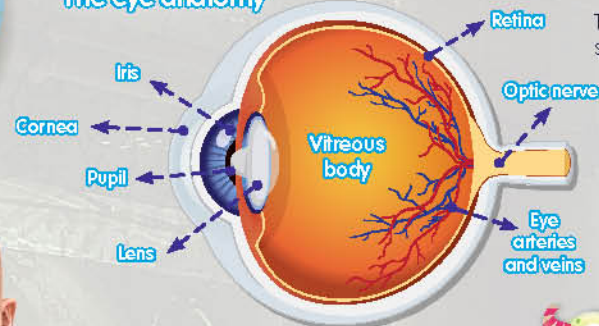
Steps:

- 1 Ask an adult for help and warm up a little amount of water in the porcelain mug. You can use the microwave.
- 2 With the small measuring cup, measure 10 ml of warm water, and 5 ml of gelatin, and place them in the large measuring cup. Mix well with the wooden stirrer.
- 3 Place the base of the eye mold inside the bowl. Use the Pipette dropper, and add a drop of green coloring in the center of the mold.
- 4 Then, with the small measuring cup, add 2 ml of the gelatin mixture you made. Close the mold with the other part and place it in the refrigerator to complete the final steps.
- 5 Now, prepare the rest of your Cyclops eye. With the small measuring cup, add 3 ml of milk to the leftover gelatin mixture. Mix well with the wooden scoop.

- 7 Now we must wait! Put the mold in the refrigerator and wait about an hour before you open and check it out!

ATTENTION: When you finish the experiment, throw away all used food.

The eye anatomy



The eye is a spherical structure that contains sensor receivers for vision.

Some of the constituents of the eye:

Retina - is an extremely active layer of nerve tissue, contains millions of light receptors (photoreceptors)

Sclera - protects the eyeball and is composed of dense fibrous tissue

Cornea - acts as a window through which light passes to the eye

Iris - the colored part of the eye

The rays of light travel from the object to our eyes

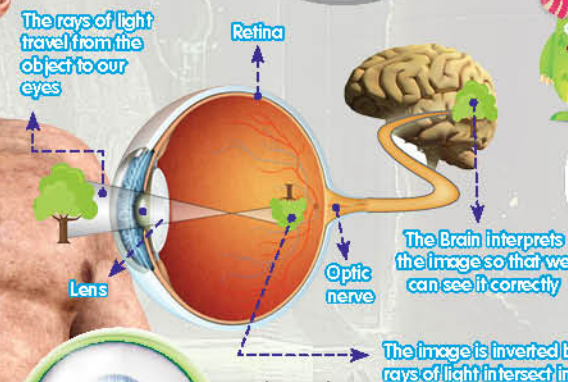


Image 4. Image formation in the human eye.

The image is inverted because the rays of light intersect in the eye

Note:
Keep your Cyclops eye in the refrigerator, inside a plastic bag, when you're not using it!

Monstrous fact:

In Greek mythology Cyclops were immortal giants, with one big eye on the center of the forehead and massive strength. Real monsters!

DID YOU KNOW...

Images reach our eyes (retina) upside down? The images we observe are then sent to the brain by the nerve where all this information is processed so that you don't see the world upside down.

The monster explains:

The gelatinous eye of Cyclops is also a bouncing ball! Due to gelatine structure properties together with the milk you can make it bounce!

EXPERIMENT 5

Magical witch's cauldron

What you will need:

Materials included in the kit:



Extra items you will need:

- Baking soda • Lemon juice (or vinegar) • Water • Bowl
- Dish soap

Always ask an adult for help!

Steps:

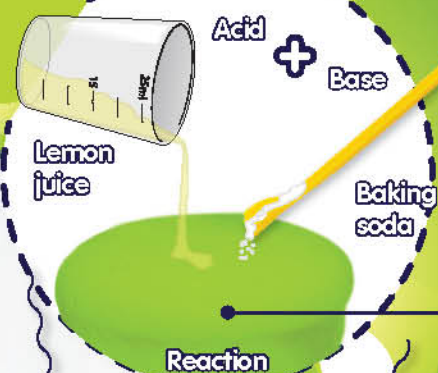
1 Place about 20 ml of lemon juice and 5 ml of dish soap in the small measuring cup.

2 With the Pipette dropper, add 2 drops of green coloring to the solution of vinegar and dish soap. Mix all with the wooden stirrer. Pour this mixture into the large measuring cup — this will be your Witch's cauldron!

3 Pour 20 ml of water into the small measuring cup and, with the plastic scoop, add 3 spoons of baking soda. Mix all with the wooden stirrer.

4 Add this mixture to your cauldron.
Muahahah!

ATTENTION:
When you finish the experiment, throw away all used food.



The monster explains:

In this case the **Acid - Base** reaction that generates **CO₂** and gives rise to foam, when mixing the sodium bicarbonate present in the baking soda with the citric acid in the lemon juice.

Monstrous fact:

Did you know that October 31st is considered Halloween? In legends, witches usually fly on broomsticks, have warts and very large noses, and they have terrible laughter!

Muahahah!

EXPERIMENT 6

Bizarre Monster

What you will need:

Materials included in the kit:

• Eyes (optional)

• Small measuring cup

• Protective goggles

• Green coloring

• Pipette dropper

• Corn starch

Extra items you will need:

• Bowl • Water • Tablespoon • Coffee or chocolate powder • Teaspoon

Steps:

1 Put 5 tablespoons of corn starch in a bowl.



2 Now add 1 teaspoon of chocolate or coffee powder and, with the Pipette dropper, add 2 drops of coloring.



Note:

If your monster gets too solid, add more water with the Pipette dropper; if it is too liquid, add more corn starch.

3 With the small measuring cup, measure water until the 25 ml mark and add it to the bowl.



4 Mix well with your hands until you get the consistency that you want.*

ATTENTION: When you finish the experiment, throw away all used food.

*Hint: the ideal consistency is when the mixture is solid to the touch, yet an object placed on top still sinks.

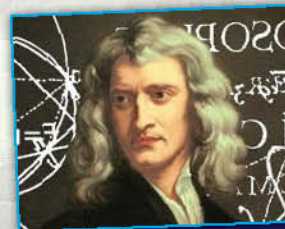
The monster explains:

The bizarre monster, which is both liquid and solid, is a **non-Newtonian** fluid. That is, its **viscosity** varies according to the force that is applied! When you apply too much force, the molecules bind together and form a solid, but when you move slowly, the molecules come loose and behave like a liquid.

Everyday non-Newtonian fluids



Ketchup is very viscous, but when we tilt the bottle it becomes less viscous and slides.



Isaac Newton (1643 – 1727) observed that the viscosity of fluids (e.g. water) was only affected by temperature — Newtonian fluids.

However, there are fluids that do not obey to the model of the Newton's viscosity, that is, they have behaviors of different viscosity depending on the force applied — **non-Newtonian fluids**. Possibly Newton never got to study them or even had a chance to observe any fluid with this behavior!

Monstrous facts:

Quicksand is also an example of a non-Newtonian fluid.



SUPER SCIENTIST:

Sound Monster

What you will need:

Materials included in the kit:



• Protective goggles

• Bizarre Monster from the last experiment (experiment 6)

Extra items you will need:

• Plastic wrap • Sound speaker

Steps:

1 Carefully place the speaker on a table.

2 Place the plastic wrap on the speaker.

3 Carefully spill the bizarre monster of experiment 6 on the plastic wrap.

Note:

Music with more bass, such as electronic music, works better!

4 Connect the speaker to your favorite music, and increase the volume! What happens?!

If you put your bizarre monster on a sound column, the waves will affect their behavior, and it will seem as if it comes to life! Observe the image.

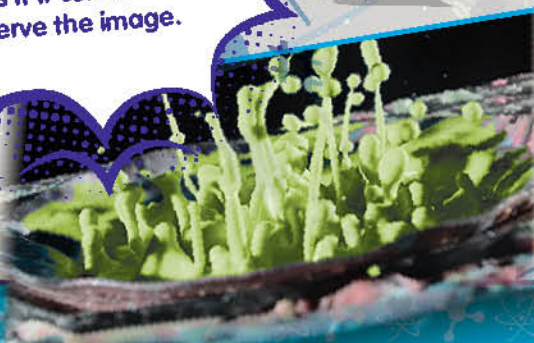
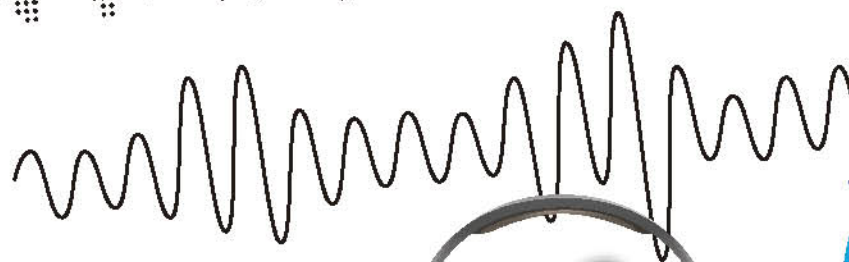
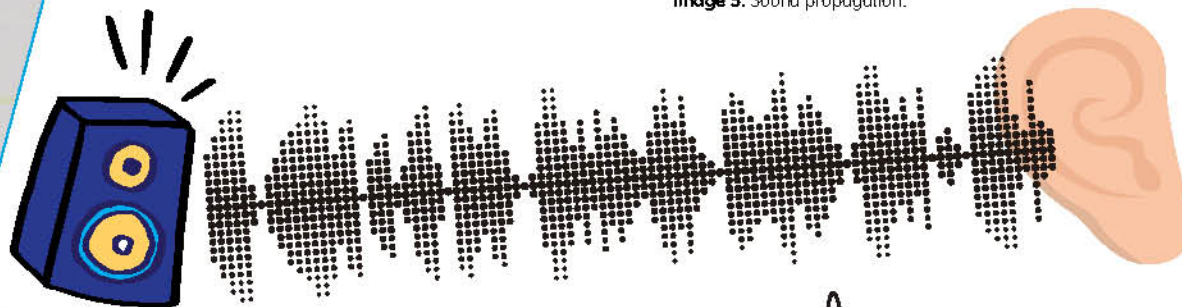


Image 5. Sound propagation.



The monster explains:

The sounds are caused by small movements—**vibrations** (waves), that travel through the air and the particles that surround us, to our own ears.

Monstrous fact:

The normal range of human hearing is between 0 and 140dB, maximum sound intensity value that a healthy person can hear without feeling pain. The loudest scream ever measured was 129dB!

AARGHH!

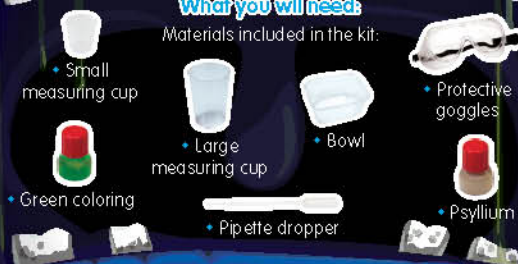


EXPERIMENT 7

Dragon eggs

What you will need:

Materials included in the kit:



Extra items you will need:

- Eggs (2 or 3)
- Vinegar
- Freezer bag with zipper
- Water
- Tablespoon
- Jar or bowl with lid (that can fit 2 to 3 eggs)
- Microwave

Always ask an adult for help!

PART 1 - DRAGON EGGS

Steps:

- 1 Have an adult boil 2 to 3 eggs, ensuring that the shell does not break during cooking.*
- 2 When the eggs are cool, give a few taps against a hard surface so that it cracks slightly.
- 3 With the Pipette dropper, place a few drops of green coloring into a zip-top freezer bag and place the eggs inside.
- 4 Close the bag and submerge the eggs in the coloring. Then let them rest for about 15 minutes.

*Tip: add some vinegar to the water while cooking the egg to keep the shell from breaking.

- 5 Open the bag and some vinegar, to help to weaken the eggshells and to saturate the color. Re-submerge the eggs in this mixture.

- 6 Now, carefully, peel the eggs. Keep them in the bowl until they go into the gooey Gosma bath.



PART 2 - GOSMA BATH

Steps:

- 1 Measure about 300 ml of water with the large measuring cup, and pour it in the jar.
- 2 With the small measuring cup, measure 3 ml of psyllium and add it to the bottle. Stir well with a tablespoon.

- 3 With the Pipette dropper, add a few drops of green coloring to the mixture.

- 4 Put in the microwave (at half power) for 60 seconds. Let it cool down and stir well.

- 5 Put in the microwave again (at half-power) for 60 seconds, and mix everything very well again.

- 6 Next, add about 100 ml of water to the jar.

ATTENTION: When you finish the experiment, throw away all used food.

Monstrous fact:

Do you know that dragons really exist? The **Komodo Dragon** may get up to 9 feet in length and weigh up to 150 pounds; this is the world's largest lizard. It doesn't breathe fire like in the movies, but it does have a highly poisonous saliva in its bite that allows it to hunt its prey! Isn't it incredible?



The monster explains:

The vinegar helps to degrade the skin of the dragon egg because it consists of calcium carbonate. Inside the goo dip, the egg will increase in size because the concentration of solutes inside the egg is greater than in the surrounding solution.

EXPERIMENT 8

Scary snakes

What you will need:

Materials included in the kit:

• Small measuring cup

• Wooden stirrer

• Large measuring cup

• Plastic scoop

• Protective goggles

• Pipette dropper

Extra items you will need:

• Sand • Porcelain bowl • Sugar • Box of matches
• 96% ethanol (or lighter fluid) • Baking soda • Water

Always ask an adult for help!

Steps:

- 1 Using the plastic scoop, put 2 scoops of baking soda and 8 scoops of sugar in the large measuring cup. Put a little ethanol in the small measuring cup, then add 5 drops of ethanol to the large measuring cup with the dropper. Blend well with the wooden stirrer.
- 2 Put some sand in the porcelain bowl and create a small hole in the middle of the sand.
- 3 Add a few drops of water to the hole.
- 4 Carefully add 2 to 3 spoons of the sugar-baking soda mixture to the well.
- 5 Add a few more drops of ethanol over the mixture with the dropper.
- 6 Ask an adult to light one of the matches and place it on top of the sand. What happens?

ATTENTION: When you finish the experiment, throw away all used food.

Monstrous fact:

In Greek mythology there is a monster with a body of dragon and several serpent heads — the **Hydra**. A Hydra was so poisonous it killed men just with his breath and ate them afterwards. The second legend goes like this... when you cut off one head of the Hydra, two grew back in its place! Yikes!

How frightening!

In science there is also an organism called Hydra; it's a cnidarian animal that lives in cold and clear water and is about 1/4 inch in length. The amazing thing about the Hydra is that their cells don't age — they don't appear to die at all — and they have great ability to regenerate... if they lose a part of their body, it grows back!



Hydra

The monster explains:

Sugar consists of sucrose molecules. When sucrose undergoes a combustion reaction, it releases carbon dioxide, water and carbon. The snakes in this experiment come from the carbon! When baking soda is heated, it also releases water and carbon dioxide. It is the dioxide that is responsible for making the snakes grow and fills the entire structure with little holes, causing it to expand. Ethanol is easily flammable which causes the combustion reaction to occur.

EXPERIMENT 9

Sticky Monster

What you will need:

Materials included in the kit:

• Small measuring cup

• Corn starch

• Protective goggles

• Plastic eyes

• Pipette dropper

• Green coloring

• Plastic scoop

Extra items you will need:

• Cooking oil • Dish soap
• Tablespoon • Bowl

Always ask an adult for help!

Steps:

1 Put 4 tablespoons of corn starch in the bowl.

2 Now, add 4 tablespoons of cooking oil and, with the pipette dropper, add some drops of green coloring.



Try throwing your monsters against a smooth surface!

5 Take the dough you created out of the bowl, make a ball and shape it any way you want. You can also add some plastic eyes to your creature!

ATTENTION: when you finish the experiment, throw away all used food.



3 Stir well with the plastic scoop until the mixture becomes homogeneous.



4 Now, with the help of an adult, add 2 tablespoons of dish soap and mix.



There are several ways in which materials can be organized, depending on the arrangement of their molecules:

Solids

The **molecules** are too close to each other, so they can't move much. That's why most solids keep the same shape.



A gold bar is **solid**.

Liquids

The **molecules** can move because they are further apart. This is why liquids do not have a defined shape and can be poured into different containers, taking on the shape of the container in which they are added.



Drinks are **liquid**.

Gases

The **molecules** are in no way connected to each other, they are always in motion and at high speed. Therefore, the gases do not have their own shape and quickly fill any container in which they are inserted. Gases can even be compressed to take up less space!



The air consists of **gases**.

Monstrous fact:

There is also a fourth physical state of matter. It's called **plasma**. A certain part of the particles are ionized because a rise in the temperature in the gas leads to the unbundling of molecular connections. Example: the nucleus of the Sun.

The monster explains:

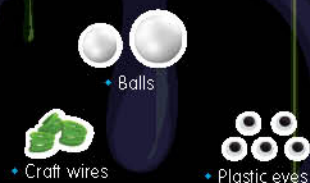
You created a moldable mass, that is, the structure of this mass is not fixed and that's why it's possible to rearrange the molecules in order to be shaped in any way to create a unique monster! The dish soap is what makes the dough sticky, allowing it to stick to any surface like a real monster.

EXPERIMENT 10

Scary Spider

What you will need:

Materials included in the kit:



Extra items you will need:

- Wooden toothpick
- Glue
- Washable paints (optional)
- Scissors

Always ask an adult for help!

Steps:

1 Pierce the smallest ball with a toothpick and leave it in place. Attach the bigger ball at the other end as shown in the image. Connect the balls to make a head and a body.



2 Cut each craft wire into 3 equal pieces. You need 8 pieces to make the legs of your spider.



4 With a little glue, put the eyes on the smallest ball. Now you can paint your spider if you want!



Monstrous fact:

Spiders are not insects! Insects and spiders are **arthropods**, but belong to different classes. All insects have six legs and make up their own class, while spiders have eight legs and belong to a class called **arachnids**. Ticks, mites and scorpions also belong to this class. Scary!

EXPERIMENT 11

Monstrous shadows

What you will need:

Materials included in the kit:



Extra items you will need:

- Flashlight
- Scissors
- Adhesive tape

Always ask an adult for help!

Steps:

1 Use scissors to cut out the monsters from page 35. You can also draw your own monsters!

2 With the tape, attach the monsters to each wooden stick, one by one.

3 Hold a flashlight or point a lamp at the wall. Now, place your monster between the light source and the wall to make some spooky shadows!

4 Try to repeat step 3 using the scary spider of the experiment 10.



Monstrous fact:

Did you know that the fear of spiders is called arachnophobia? Phobias are irrational fears — by just thinking about it, we can become very anxious about situations and very specific objects. Usually, we know there may be no reason why we are so scared, but still we cannot avoid it. We may have phobias of many different things: fear of heights, of the dark, of spaces full of people, planes, bees or spiders.

Note:

You can zoom your monster in and out from the light source, to make the shadows increase or decrease in size.

The monster explains:

A **shadow** is a dark region formed by the partial absence of light. Depending on the source of light, we create shadows, or the formation of the a penumbra. A shadow will appear on the **opposite side of the light source**. The greater the opacity of a body, more light will be blocked, and the more pronounced the shadow will be. A shadow can be different sizes, **depending on the distance** from the body light and how large the item is that blocks the light.

EXPERIMENT 12

Frankenstein's brain

What you will need:

Materials included in the kit:

- Plastic scoop
- Small measuring cup
- Large measuring cup
- Protective goggles
- Brain mold
- Green coloring
- Pipette dropper

Extra items you will need:

- Hot water from the tap
- Gelatin
- Refrigerator
- Porcelain mug

Always ask an adult for help!

Steps:

- 1 Ask an adult to put a little bit of hot water in a porcelain mug.
- 2 With the small measuring cup, measure 40 ml of already hot water and add it to the large measuring cup.
- 3 With small measuring cup, measure gelatin up to the 5 ml mark and add it to the large measuring cup. Mix well with the plastic scoop.



- 4 With the pipette dropper, place a few drops of green coloring in the bottom of the brain mold.

- 5 Now, put the gelatin mixture in the brain mold.

- 6 Put the mold with the mixture in the refrigerator for about an hour.

- 7 Check that your sticky brain is solid.

- 8 Carefully remove the sticky brain from the mold. Look at its texture!

ATTENTION: When you finish the experiment, throw away all used food.

DID YOU KNOW...

If you stretched out all the blood vessels of one brain, you would span the distance of half the moon! That's over 12,000 miles!

The monster explains.

The brain is a mass of nervous tissue located in the skull. This organ is very important because it controls everything we do, from the urge to use the restroom, to the calculations we perform in our math tests! It weighs approximately 2.8 pounds and is composed of billions of neurons!

Monstrous fact:

Frankenstein is one of the best-known movie monsters. The film was inspired by a book from 1818, which told the story of a scientist, Victor Frankenstein, who builds and brings to life a monster in his lab using spare body parts and lightning. **How scary!**

EXPERIMENT 13

Vampire elixir

What you will need:

Materials included in the kit:

- Protective goggles
- Green coloring
- Pipette dropper

Extra items you will need:

- Water
- Cooking oil
- Vitamin C tablet or fizzy tablet
- Tablespoon
- Glass

Always ask an adult for help!

4 With the Pipette dropper add 1 drop of green coloring.

5 Finally add the tablet of vitamin C or 1 tablespoon of fruit salts.

ATTENTION: When you finish the experiment, throw away all used food.

Steps:

1 Fill a glass about 1/4 full.

2 Carefully add cooking oil until the glass is now about 3/4 full.

3 Wait a while and let the two liquids be completely separated.

The monster explains:

The cooking oil floats in the water because a drop of oil is lighter than a drop of water of the same size. In other words, Fizzy tablets are heavier (denser) than water and, therefore, tend to go to the bottom of the glass. However, in this experiment, when you put the salts in the glass, little drops of oil (because it is viscous) are attached to the salt and are also dragged to the bottom of the glass. When the salts dissolve, the oil becomes less dense and rises through the inside of the glass, creating the effect of a magical and monstrous drink!

Monstrous fact:

There are real vampires, but they are not monsters or scary ones! **Vampire Bats** are bats whose source of food is the blood of other animals, a type of diet called hematophagy.



Cut out all the monsters from this page!



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experiments!



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