WARNING!

NOT SUITABLE FOR CHILDREN UNDER 8 YEARS. FOR USE UNDER ADULT SUPERVISION.

READ THE INSTRUCTIONS BEFORE USE, FOLLOW THEM AND KEEP THEM FOR REFERENCE.

DO NOT ALLOW CHEMICALS TO COME INTO CONTACT WITH ANY PART OF THE BODY, PARTICULARLY THE MOUTH AND EYES.

KEEP SMALL CHILDREN AND ANIMALS AWAY FROM THESE EXPERIMENTS.

KEEP THE EXPERIMENTAL SET OUT OF REACH OF CHILDREN UNDER 8 YEARS OLD.
It may sound worrying, but this is the standard legal wording we must include in this leaflet:

**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 of age.
- 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 activity 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.
- If any experiment starts to grow mould, dispose of it immediately in household waste and wash your hands.

**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, burns or irritation: Wash affected area with plenty of water for at least 10 minutes.
- In case of doubt, seek medical advice without delay. Take the chemical, its container and this leaflet with you.
- In case of injury always seek medical advice.

**SAFETY RULES**
- Read these instructions before use, follow them and keep them for reference.
- Keep younger 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.
- Make sure that all containers are fully closed and properly stored after use.
- Ensure that all empty containers and/or non-reclosable containers 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 eyes or mouth.
- Dispose of all components in household waste unless otherwise stated in the instructions.
Contents
a. Brain in 4 sections
b. Zinc rods x 4
c. Copper rods x 4
d. Bungs x 4
e. Connection wires x 3
f. Clock
g. Clock housing front
h. Clock housing back
i. Clock buttons
j. Leaflet

Welcome
Thinking Time...the only clock powered by brain chemistry. Fill the brain with water, add electrodes, connect the wires and see your clock spring into life.
So let’s get started...

Safety First
These kits are completely safe when used in the way we describe in this instruction leaflet. Always read the instructions before starting and ask for adult help when requested.

If your project starts to look, feel or smell strange, grow mould, pink stuff, purple stuff, or any other “stuff”, throw away. When in doubt...throw it out!!
Some facts about your brain:

- The human brain is the largest brain of all vertebrates relative to body size.
- An average adult brain weighs about 1.5 kilograms.
- The brain makes up about 2% of a human's body weight but uses 20% of its total energy and oxygen intake.
- Your brain is 73% water. It takes only 2% dehydration to affect your memory and concentration.
- A piece of brain tissue the size of a grain of sand contains 100,000 neurons and 1 billion synapses, all communicating with each other.
- Babies have big heads to hold rapidly growing brains. A 2-year-old's brain is 80% of adult size.
- Your brain generates about 12-25 watts of electricity. This is enough to power a low-wattage LED light.
- The average brain is believed to generate up to 50,000 thoughts per day.
- The brain produces a half cup of fluid every day. It floats in this bath of cerebrospinal fluid which acts as a shock absorber to keep the brain from being crushed by its own weight.

The brain is composed of three parts: the brainstem, cerebellum, and cerebrum. The cerebrum is divided into four lobes: frontal, parietal, temporal, and occipital.

- The cerebrum is the largest part of the brain and is composed of right and left hemispheres. It performs higher functions like interpreting touch, vision and hearing, as well as speech, reasoning, emotions, learning, and fine control of movement.
- The cerebellum is located under the cerebrum. Its function is to coordinate muscle movements, maintain posture, and balance.
- The brainstem includes the midbrain, pons, and medulla. It acts as a relay centre connecting the cerebrum and cerebellum to the spinal cord. It performs many automatic functions such as breathing, heart rate, body temperature, wake and sleep cycles, digestion, sneezing, coughing, vomiting, and swallowing.
**Building your Brain Clock:**

1. Slot the 4 pieces of the Brain (a) together.
2. Fill each section of the Brain with cold tap water.
3. Push a Bung (d) into the hole in each Brain section.
4. Place the Clock (f) and the Clock Buttons (i) into the Clock Housing Front (g).
5. Press on the Clock Housing Back (h).
6. Separate the silver-coloured Zinc Rods (b) from the gold-coloured Copper Rods (c).
7. Take 1 of the Connection Wires (e) and thread the tip of one bared end through the small hole at the top of one of the Zinc Rods.
8. Twist the bared wire around the Zinc Rod.
9. Thread and twist the other bared end of that Connection Wire through the hole on a Copper Rod.
10. Repeat steps 7, 8 & 9 with the other 2 Connection Wires.
11. You should have 1 Zinc and 1 Copper Rod remaining. Thread and twist the bared end of the black wire from the Clock through the hole in the remaining Zinc Rod and thread and twist the bared end of the Clock’s red wire through the hole in the remaining Copper Rod.
12. Now it is time to connect up your circuit. Gently push the Zinc and Copper Rods through the holes cut in the Bungs and place the Clock Housing on top of the Brain as shown below:

**IMPORTANT:** the Rods bends easily, so push gently to make sure you don’t damage them.

**IMPORTANT:** make sure the Rods don’t touch each other inside each Brain section.
What’s happening in this experiment? Electrical current is the movement of charged particles, through a conductor.

When the copper and zinc rods are placed into the water, a chemical reaction occurs and electrons, which are negatively charged particles, move from the zinc to the copper to from an electric current. The water helps conduct the electricity.

Think of voltage like pressure from an electrical power source that pushes charged electrons around a circuit. The zinc and copper rods create around 1 volt in each section (cell) of the brain. The 4 sections are joined together to make a 4 volt battery.

Once the battery is connected to the clock, you’ve completed a circuit. As the electrical current passes through the clock, it powers the clock and then passes back through all of the sections of the brain, before repeating.

Clock functions
To set the date and time on the clock’s display, press and hold the left button for a couple of seconds. Press the left button again to scroll between Month > Date > Hour > Minute > End. Advance to the required number on any of these screens by pressing the right button.

To scroll between the time, date and seconds from the HOME screen, press the right button the required number of times.

Troubleshooting
If your clock doesn’t work:
• check to make sure the rods are inserted in the order mentioned on the previous page.
• make sure the bared ends of all the wires are making contact with the rod they are wrapped around.
• swap the clock’s black and red wire connections so that the clock’s black wire is now connected to the copper rod and the clock’s red wire is connected to the zinc Rod.

If the display on your clock fades:
• give the brain gentle shake from side to side.
• if that doesn’t wake the clock up, refresh the water.

Also available from Gross Science:

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