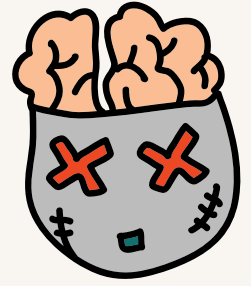




"El saber de mis hijos  
hará mi grandeza"

# TRICK OR TREAT YOUR BRAIN!



## LESSON PLAN

**Title:** Trick or Treat your Brain

**Setting:** In Classroom

**Subject:** Biology-Neuroscience

**Grade Level:** Preschool to 2nd grade

**Time Frame:** 1 hour

## STUDENT OBJECTIVES

- Explore the structure of the human eye and its receptors
- Understand how the brain processes visual information
- Explore how visual illusions arise
- Refine critical thinking skills

## BACKGROUND

The "Trick or Treat your Brain" exercise integrates a hands-on activity with a basic visual system lesson. The instructor first provides a short explanation of the eye and its receptors. Then how the brain processes visual information. Finally, how the brain's shortcuts may trick you. Students will look at different visual illusions and will answer questions about what they see.

## MATERIALS

- Video "Trick or Treat your Brain"
- Printouts of visual illusions
- Clear glass of water
- Coin





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## TEACHER BACKGROUND INFO

### WHAT TO KNOW BEFORE YOU TEACH

Note: This content is primarily for the instructor's reference; the accompanying video presentation will be for the students.

### The Human Eye

In order for us to see things light needs to go through our eyes and be processed by our brain. The light is first detected by tiny receptors in the back of our eyes called photoreceptors. There are 2 main types of photoreceptors: rods and cones. Rod cells help us with night vision, motion detection, and peripheral vision. Cone cells come in three types — red light, blue light, and green light — and they not only help us to see red, blue, and green, but they work together to see all colors. Photoreceptors convert light into brain activity. The brain processes this information and lets us perceive the world around us.

### Occipital Lobe

The occipital lobe is the back part of the brain that is involved with visual processing. The first functional area of the visual system is the primary visual cortex. It has low-level description of the orientation, spatial-frequency and color properties within small parts of a picture. As we move on the brain starts putting things together. But as you can imagine this can take time and we need to see the world around us as fast as possible so the brain takes shortcuts to make it faster. A team of neuroscientists from MIT has found that the human brain can process entire images that the eye sees for as little as 13 milliseconds — the first evidence of such rapid processing speed. That speed is far faster than the 100 milliseconds suggested by previous studies. That is much faster than how long it takes for you to say eye.





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# THE INVISIBLE COIN



## MATERIALS

- **2 transparent glasses**, without color, long and smooth.
- **300 ml** of Water
- Different **figures** and **images** of arrows
- **A coin** (look for it at home or borrow it from an adult)

## TRICK # 1: Procedure

- Add 300 ml of water to ONE of the glasses.
- Put the coin under the empty glass.
- Take a step back and look at the coin (should be seen under the glass).
- Approach again and slowly add the water.
- Take a step back and observe



**Does the coin look the same when the glass is empty than when you have water?**

Write here your answer

**Why do you think this happened?**

Write here your answer



# THE MAGIC GLASS



## TRICK # 2: Procedure

- Place the empty glass near an object or wall (10 cm away)
- Put the image of the arrows behind the glass, laying it on the object or wall. You will need two arrows, one will be placed at the bottom and the other at the top.
- Observe through the glass and notice where the arrow points (right or left)
- Slowly fill the glass with water until it covers entirely the bottom arrow and observe what happens.
- Now look at the top arrow as you continue to add water to the glass





**What happened to the arrows?**

Write here your answer

**Why do you think this happened?**

Write here your answer

**Repeat the same procedure with other figures...**

- Before adding the water to the glass, take a good look! For example:

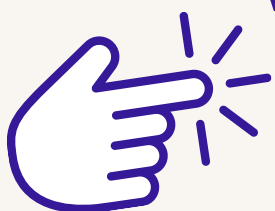
*Where is the duck flying, right or left?*

*Where does the dog's muzzle point?*

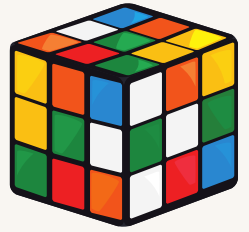
*What direction do the children follow to get to the castle and ask for sweets?*

- Now, add the water and see what happens.

**Which of our senses allows us to enjoy these magic tricks?**



# THE FLOATING CUBE



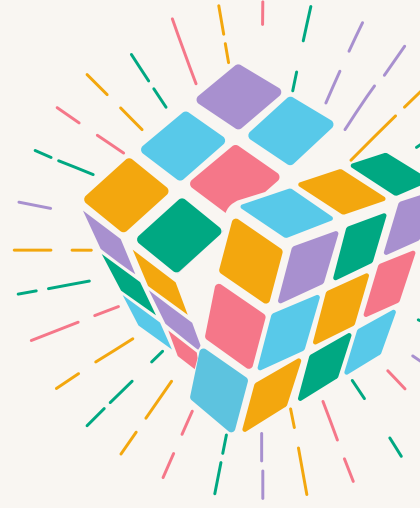
## MATERIALS:

- Rubik's Cube for coloring
- Colors and/or markers: red, blue, green, and yellow (or the ones you like the most)

## PROCEDURE

- Color the Rubik's Cube as you prefer
- Extend the little tabs that are bent behind the cube.
- Place it on a table or flat place
- Walk away and look at the figure
- Then, approach walking slowly while still seeing the cube.





**What happened to the cube?**

Write here your answer

**Why do you think this happened?**

Write here your answer





