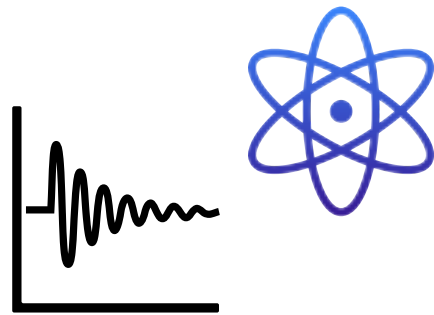


# SCIENTIFIC ANSWERS

4



# Content



<b>Chapter</b>	<b>Theme</b>	<b>Page</b>
Chapter 1	Caves	3-6
Chapter 2	Robots	7-10
Chapter 3	The human brain	10-15
Quiz	Memory	17-18
Craft	Cell	18



# Caves

## Caves in Greece

Caves are natural cavities inside the Earth that can be accessed by humans. In Greece, there are many impressive caves worth visiting. Here are some of the most well-known ones:

1. Cave of Lakes in Achaia: A unique cave with cascading lakes on three levels.
2. Melissani Cave-Lake in Kefalonia: A lake-cave with crystal-clear waters and a partially collapsed roof that creates a stunning spectacle.
3. Alistrati Cave in Serres: One of the largest and most beautiful caves in Europe, featuring a rich interior decoration.
4. Diros Cave (Vlychada): One of the most beautiful lake caves in the world, with impressive stalactites and stalagmites that create a magical underground landscape.

## Diros Cave

Below are details about caves in general, but with a focus on the Diros Cave.

The Diros Cave is located in Mani and is one of the largest caves in Greece. It features large underground lakes, stalactites, and stalagmites.

### Submerged Stalagmites

Beneath the surface of the water, there are large stalagmites. Since these form from dripping water falling from cave ceilings, it is evident that they were created when the cave was dry due to lower sea levels. At that time, the underground river flowed through galleries located at much deeper levels.



### Stalactite Waterfall



Behind the large “waterfall” lies a lake section with a low ceiling, filled with thin stalactites that reach down to the water’s surface.

On the tourist route of approximately 1,600 meters, visitors are taken on boats through the lake section before disembarking onto dry land and walking along a pathway that leads to an artificial exit.

## The Depths of the Cave

To visit the parts described here, one must swim for about an hour after completing half of the tourist route, passing through labyrinthine lake chambers. At one point, there is a section where the ceiling touches the water's surface, requiring one to hold their breath to pass through.

### Risk of Dehydration

Due to the presence of lakes inside the cave, the humidity level is close to 100%. This keeps the stalactites and stalagmites “alive.” However, the high humidity causes speleologists to rarely feel thirsty, which poses a risk of

dehydration if they don't make a conscious effort to drink water frequently.



Source for Diros Cave Information: “Earth & Water, Wonderful Greece”

### Cave of Lakes

The Cave of Lakes is truly a natural wonder. It is located near the village of Kastria in Achaia, about 17 kilometers from Kalavryta. The cave is

known for its 13 consecutive cascading lakes spread across three levels, making it unique compared to other caves in Greece.

The cave used to be a riverbed and spans about 2 kilometers, although only 500 meters are accessible to the public. Visitors enter through an artificial tunnel that leads directly to the second level. Elevated bridges allow them to walk over the lakes, admiring the stunning stalactites and stalagmites.

Additionally, the cave has significant archaeological value, with fossils of animals such as hippopotamuses and elephants having been discovered. It's a destination that combines natural beauty with historical interest.

### Melissani Lake-Cave

The Melissani Cave-Lake is located on Kefalonia, about 2 kilometers northwest of Sami. The cave is famous for its natural





beauty and turquoise waters, creating a breathtaking scene. The cave's natural entrance is vertical, measuring 40x50 meters, and was formed by the collapse of a section of the roof.

The cave consists of two sections: an open and bright area and a closed section with a small island in the center. Sun rays enter through the roof opening and illuminate the water, creating dazzling colors that shift depending on the sun's position. Visitors can enjoy a boat ride on

the lake, marveling at the stalactites and stalagmites decorating the cave.

The lake's water is brackish \*, supplied by various sources, including the "Katavothres" spring near Argostoli. The lake's depth ranges from 10 to 30 meters, and the water temperature remains stable throughout the year. The cave also has archaeological significance, with artifacts depicting nymphs and other elements that highlight its mythological importance.

A visit to the Melissani Cave-Lake is a unique experience that combines natural beauty with historical interest. Visitors can reach the cave by car or taxi from Sami or Argostoli. The best time to visit is between May and October. If you're in Kefalonia, this is a must-see destination to witness its unparalleled beauty.



\*Brackish water is a mix of freshwater and seawater. Areas with brackish water are rich in nutrients and oxygen, supporting high biodiversity.





# Robots

Robots are among the most exciting achievements of modern technology. But what exactly is a robot? A robot is any mechanical device that can substitute for humans in various tasks. A robot can operate under the direct control of a human or autonomously under the control of a programmed computer.

Robots can be used to perform tasks that are either difficult or dangerous for humans to do directly. In other cases, they are used to perform tasks faster or cheaper than humans. Thus, they can be used in the automated production of large quantities of a product at a lower cost (for example, in production lines).

Here are some interesting facts about robots:

1. Automation and Precision: Robots are widely used in industry to perform tasks with consistency and precision that are difficult or dangerous for humans.



2. Flexibility: With technological advancements, robots have become more flexible, able to adapt to various tasks and environments.

3. Automated Assistants: Robots are also finding applications in our daily lives, such as robotic cleaners and personal assistants that can help with household chores.

4. Exploration: Robots are used for exploring hard-to-reach or dangerous areas, from the depths of the oceans to outer space.

5. Artificial Intelligence (AI): The integration of AI in robots allows them to make more complex decisions, learn from their experiences, and communicate with humans in a more natural way. In the future, we might see robots assisting in even more daily activities, such as cooking our meals or taking care of the elderly.

Robots are designed to perform specific tasks automatically or under human control. There are many types of robots, and they are used in various fields. Below you will find some basic information about robots:

1. Types of Robots:

- **Industrial Robots:** Used in industry for manufacturing products in factories. They have mechanical arms and can perform repetitive tasks, such as welding or assembly.
- **Service Robots:** These robots help people with daily tasks. They can be cleaning robots, like robotic vacuums, or robots that assist in medical procedures.
- **Rescue Robots:** Used in dangerous situations, such as disasters, to help search and rescue people.
- **Humanoid Robots:** Designed to resemble humans and perform tasks such as speaking, walking, and interacting with their environment.
- **Exploration Robots:** Used to explore areas that are difficult for humans to reach, such as space or deep oceans.

## 2. Characteristics of Robots:

- **Sensors:** Robots have sensors that allow them to perceive their environment. These sensors can measure light, sound, movement, or even temperature.
- **Actuators:** These are mechanisms that allow robots to move or manipulate objects, such as mechanical arms or wheels.
- **Software and Artificial Intelligence (AI):** The most advanced robots have software with AI that allows them to make decisions and learn from their environment.

## 3. Uses of Robots:

- **Industry:** Used in factories for assembling and producing products. Robots can perform complex processes with precision and speed.
- **Healthcare:** Robots assist (a robot cannot perform surgery alone) in surgeries, distribute medications, or even care for patients.
- **Military:** Used for surveillance, bomb disposal, or even combat.
- **Space:** Robots like NASA's Rover explore Mars and other planets, collecting data that humans cannot obtain.

Scientists and engineers working on these technologies are developing robots that can move naturally like humans, but this remains a significant challenge. They are also working on

developing AI systems that will allow robots to understand complex instructions and make independent decisions. This is an area of ongoing research.

#### 4. The Future of Robots:

The future of robots includes devices that can operate entirely autonomously, without the need for human intervention, known as Autonomous Robots. Robots that can interact with humans naturally and provide social companionship, known as Social Robots. Additionally, tiny robots that can be used in medicine to enter the body and repair cells or deliver drugs.

Many robots have left their mark on history. One of the most famous is Honda's ASIMO, the first humanoid robot that could walk and perform tasks like serving coffee. Also, NASA's Mars Rover, a robot exploring the surface of Mars, has provided us with valuable information about the Red Planet.

Do you want to build **your own robot**? You can start with simple tools like Scratch or LEGO Mindstorms. There are also kits that contain materials such as wheels, motors, sensors, microbits, etc. Alternatively, there are robotics classes in afternoon workshops throughout the year. Robotics is very interesting and fun! You can program your robot to perform a simple command, like following a line or avoiding obstacles. It's like giving your robot a small 'brain' that tells it what to do!

#### **How to Create a Simple Robot Using Everyday Materials**

You can build a simple robot using everyday materials such as cardboard, small motors, and batteries. For example, you can create a robotic arm that moves when you press a button. It's a fun way to learn how robots work!

#### **Conclusion**

Robots are more than just machines—they're the mechanical friends of our future. Whether they're helping to build cars or exploring space, robots are here to stay. Who knows? Maybe one day, you'll create your own robot that changes the world!



## **The Ethical Dilemma of Robots: Should We Make Robots Look Like Humans?**

As robots become increasingly intelligent, an important question arises: should robots look and behave like humans? It's essential to consider the consequences of creating robots that closely resemble us. Could this help humanity, or might it introduce new challenges?



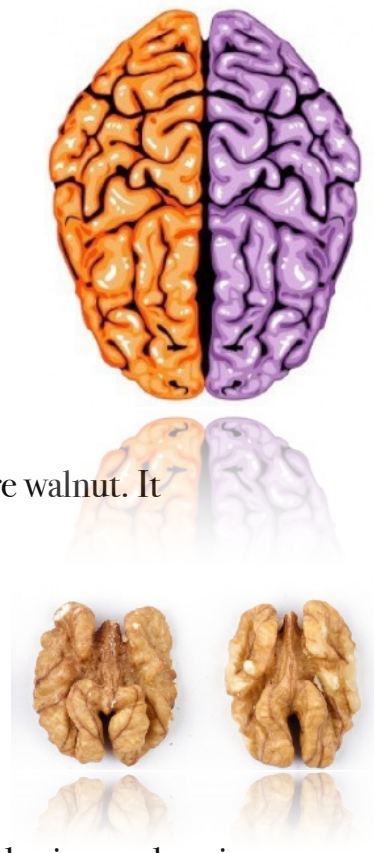
# The Human Brain

The brain is the control center of our body. It is located inside the skull and floats in a liquid called cerebrospinal fluid. Its shape resembles a large walnut. It communicates with the rest of the body through “wires” called nerves and through hormones. Neural signals can travel at speeds of up to 428 km/h.

The brain is roughly the size of two fists and weighs between 1,250 and 1,600 grams. Heavier individuals tend to have heavier brains. Men’s brains are heavier than women’s, but the weight of the brain has no connection to intelligence. About 60% of the brain consists of fatty acids.

The brain is divided into three parts: the cerebellum, the brainstem, and the cerebral cortex.

- The cerebellum is responsible for balance, movement, and coordination.
- The brainstem controls digestion and ensures that the heart and breathing do not stop.
- The cerebral cortex is the outer layer that consists of neurons, which you’ll read about below.



parietal lobe,  
Frontal lobe,  
temporal lobe,  
occipital lobe.



The brain is also divided into two hemispheres, the right and the left. Each hemisphere controls the opposite side of the body.

- The left hemisphere is responsible for calculations, numbers, analyzing why something happens, and speech.
- The right hemisphere governs intuition, emotional thinking, creativity, art, and music.

This applies to right-handed people. For left-handed individuals, the roles are reversed.

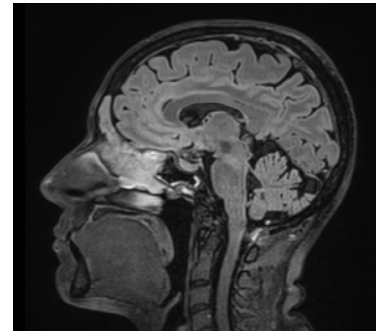
The two hemispheres are further divided into four lobes, each responsible for specific functions:

- The frontal lobe helps us plan, control emotions, and coordinate movements.
- The parietal lobe interprets bodily sensations and gives meaning to what we feel.
- The temporal lobe is responsible for memory, recognizing people, and recalling what we've learned.
- The occipital lobe processes visual information.

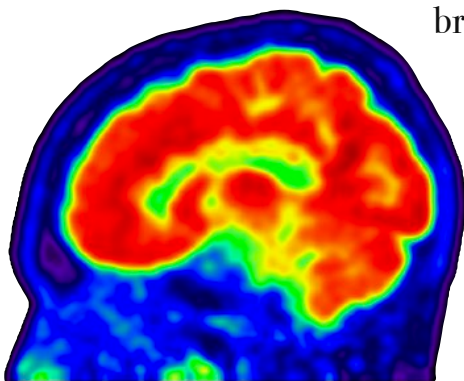
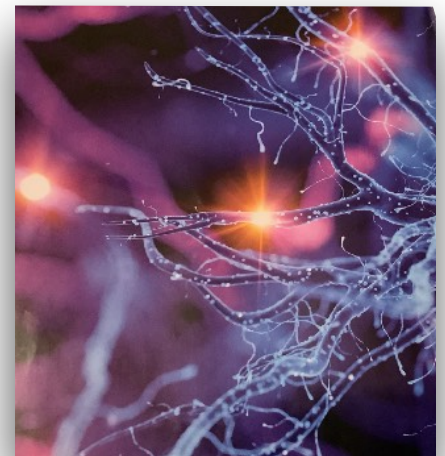
The brain (cerebral cortex) is made up of millions of nerve cells called neurons. The more we learn, the more neurons connect with each other. Learning something new, therefore, changes the brain's structure!

Note: New nerve cells cannot form in adulthood. So, if a neuron ages or gets damaged, it cannot be replaced.

The brain uses about 20 watts of energy per day—equivalent to the energy required to power a simple household light bulb. This energy comes from the food we eat. The more we eat, the more energy we gain, which we then expend through activities like exercising or walking.



The Anatomy of the Brain as Seen in Magnetic Resonance Imaging (MRI)



The Function of the Brain as Seen in Positron Emission Tomography (PET Scan)





# Sleep

## Extra Mini Chapter



No one truly knows why we need sleep. It's believed that the brain requires it to organize experiences from the day and enhance learning.

Good sleep is directly linked to good health. It affects many bodily, mental, and emotional functions. For example, difficulty remembering something or feeling irritable is often due to poor sleep quality. Sleep also impacts performance, recovery, and even weight. For instance, someone who eats well and exercises might struggle to lose weight simply because they don't sleep enough.

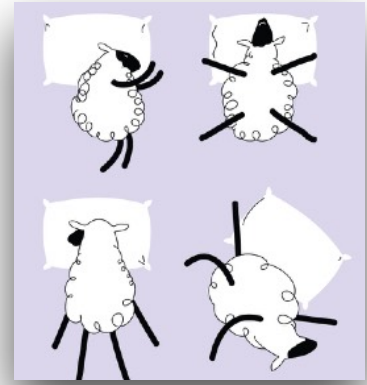
On average, a person needs 8 hours of sleep, though this varies with age. During developmental stages, children require more sleep. Additionally, specific situations, such as recovering from surgery or dealing with stress, may increase the need for sleep. Lack of sleep has been linked to strokes, diabetes, and even cancer. Genetics also play a role—some people are predisposed to need more or less sleep, regardless of their habits.

## How to Sleep Well

The position in which we sleep significantly impacts the quality of our sleep. There's no single ideal position for everyone:

- About 75% of people sleep on their side, 10% on their stomach, and 15% on their back.
- Sleeping on the left side usually aids digestion.

- Sleeping on your back can be very beneficial, especially for those recovering from surgery, as it provides proper spinal alignment. However, it may worsen snoring or sleep apnea.
- Sleeping on your stomach is generally not recommended, as it can cause back and neck pain.



Additionally, your mattress and pillow are crucial for good sleep. Their quality and lifespan should be considered. A mattress should be replaced every 8–10 years. Synthetic pillows should be replaced every six months, while natural ones every 2–3 years.

**Pro Tip:** Drinking milk, eating cheese, or snacking on pistachios can help induce sleep.

# Quiz!

1. Where are underwater stalagmites found in a cave?

- A) At the bottom of the lake.
- B) Below the water's surface.
- C) On top of rocks.

2. Due to the presence of lakes, the humidity in caves approaches...

- A) 100%.
- B) 76%.
- C) 50%.

3. Do “autonomous robots” exist today?

- A) Yes, but only in America.
- B) Yes (in all countries).
- C) No.

4. Should we build robots that resemble humans?

- A) No one knows; no definite decision has been made, only various opinions.
- B) No, because they might launch a campaign against us.
- C) Yes, to help us with tasks and provide companionship.

5. What does the right hemisphere of the brain control in a left-handed person?



A) The right side of the body.

B) The left side of the body.

C) The whole body.

6. How much energy does the brain use in 24 hours?

A) 50 watts.

B) 10 watts.

C) 20 watts.

7. If we sleep... we aid digestion.

A) On the left side.

B) On the right side.

C) On our back.

8. ...% of us sleep on our stomach.

A) 75%.

B) 15%.

C) 10%.

# Answers

1. = B

2. = A

3. = C

4. = A

5. = B

6. = C

7. = A

8. = C

## Sneak Peak!

See the image that will be on the cover of issue 5, before it is released!

The topics will be about: human eyes, the poles of earth and one more topic...



## Craft

Make a Brain Cell Decoration!

### Materials:

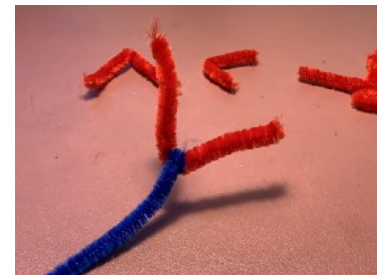
- 2-3 pipe cleaners (it's recommended that one is a different color from the others)
- Scissors



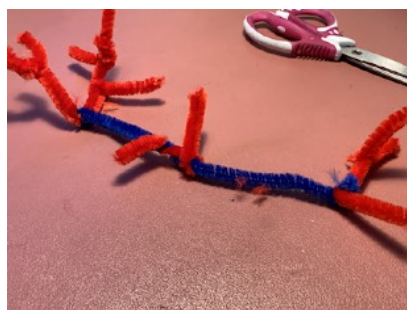
Cut the pipe cleaners of the same color so that you have at least 6 small pieces.



Bend the small pieces in half.



Place the bent pieces onto the large one.



It's ready!

# Scientific Answers

## 4

In our magazine, you will find useful information about caves, robots, and the human brain, as well as a small extra chapter. By reading it, you will discover things you didn't even know existed! Keep the information in mind because there will be a quiz.