

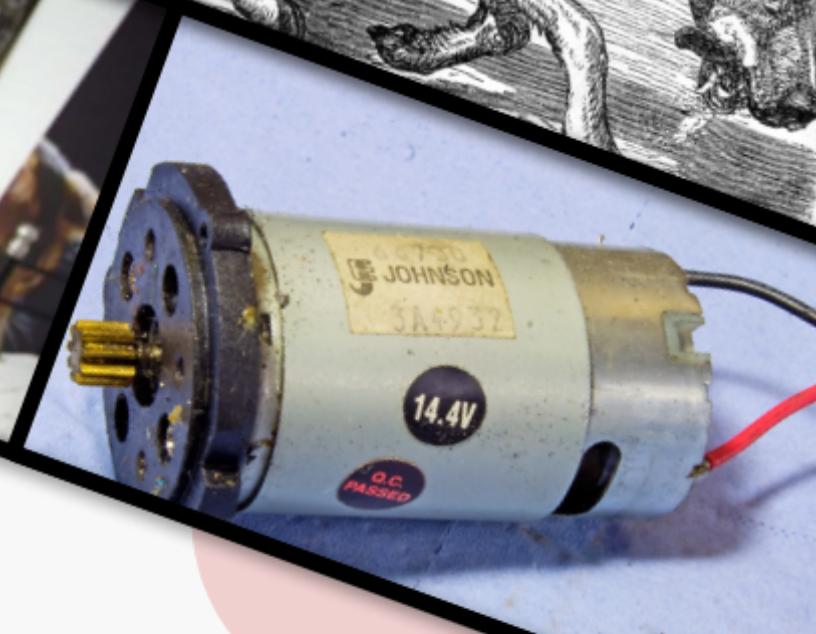
MARCH 4TH, 2023

Seeking Science VOL 20

SEEKING SCIENCE

by STEM Action Teen Institution

A MONTHLY
STEM NEWSLETTER



THE COLOR OF MEAT

HYPERBOLIC GEOMETRY

THE GLOWING SEA

and more...

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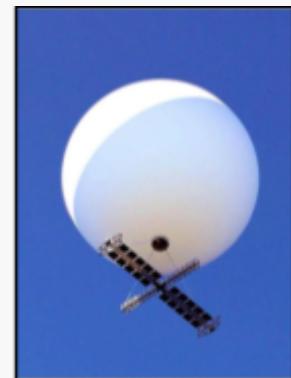
How Spy Balloons Work

Aidan Hong

On February 4, people in South Carolina woke up to an unusual sight – a white, round balloon floating in the sky. Upon further investigation, it was determined that it was a spy balloon, originating from China. In a few hours, this unusual sight came to an abrupt end, the balloon bursting, and a white cloud of helium soon dissolving into nothing. What came after was devastating – tensions between the United States and China rose, and politicians demanded more information on whether events like these occurred before. One may think, why do spy balloons exist, when more modern technology exists today?

A key goal of spy balloons is to take images of their target. The balloon also connects wirelessly to the host, and sends the images over. Balloons can have two different types of orbit - low Earth and geosynchronous. Low orbit can provide better photos, but can be detected easily. Geosynchronous, on the other hand, can't be detected as easily, but the image quality is worse as it is higher than normal balloons. To compensate, since the balloons are very high, they move at a rate equivalent to the Earth's orbit. As a result, they can stay in the same place for a long time, taking numerous photos. In terms of traveling, the balloon is at the mercy of the wind. Spy balloons, unlike hot air balloons, aren't manned. Since balloons have little to none control, wind is the main factor for travel. However, small propellers or guiding apparatuses can help guide their path.

Due to the balloon's capability of reaching high altitudes, balloons can't be detected easily. This is why, despite modern technology being available, and lack of



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control for balloons, balloons are still used to spy. Sometimes, old technology can perform better than modern technology.



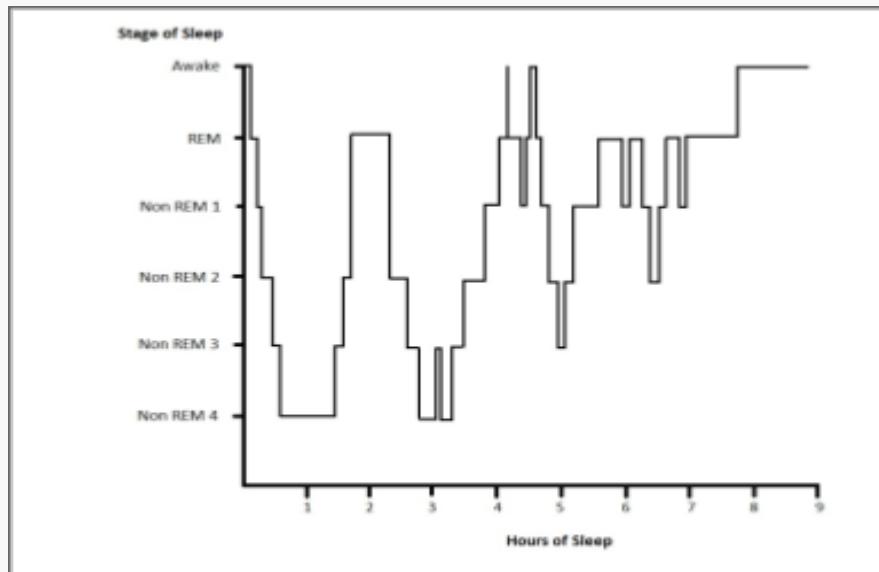
"File:Chinese surveillance balloon over Billings, MT.jpg" by
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Behind Sleep Talking

Anna Dai

Sleep talking, also known as somniloquy, is a common occurrence affecting many people worldwide. It's a phenomenon that occurs during sleep, where a person talks in their sleep without being aware of doing so. Sleep talking may be both amusing and alarming for those around them, and it has been the subject of scientific research for many years.

The science behind sleep talking still needs to be completely understood, but there are a few theories that try to explain it. A theory suggests that sleep talking is just a reflection of the dream state. When humans sleep, we experience different stages of sleep like Rapid Eye Movement (REM) sleep, which is from vivid dreaming. It is during the REM sleep that sleep talking occurs. The dreamer may be speaking out loud in response to the events in their dream.



Tash510 (https://commons.wikimedia.org/wiki/File:HYPNOGRAM_created_by_Natasha_k.jpg),
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Another theory suggests that sleep talking may be a symptom of a sleep disorder. Sleep disorders, such as sleep apnea, can disrupt the normal sleep cycle and cause the person sleeping to talk in their sleep. Other psychological or medical conditions such as anxiety, fever, or substance abuse may also affect sleep talking.

Speech during sleep is often nonsensical, with random phrases and words that sound disconnected. So, sleep talking is not always a direct reflection of the context of the dream although sleep talking is often associated with dreaming. During sleep, the part of the brain that is responsible for logic and language is not fully active. It is possible for a person to engage in a conversation while sleeping, although they will have no recollection of said conversation when fully awake.

In conclusion, sleep talking is a fascinating and mysterious phenomenon that occurs during the REM stage of sleep. The science behind it is unable to be explained properly but it is theorized to be related to dreaming or sleep disorders. Sleep talking is generally harmless, but it may cause concerns of others around the sleep talker. If someone is sleep talking and is accompanied by other symptoms, it is important to speak to a healthcare professional to prevent any medical conditions.

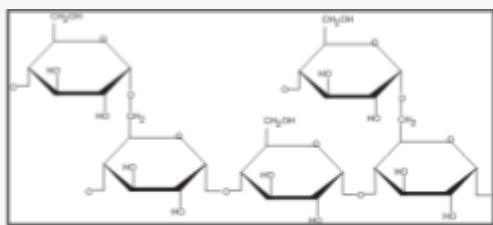
Why Does Meat Change Color When Cooked?

Edward Huang

Meat supplies us with essential proteins and vitamins, making them a staple in meals. However, raw meat alone is unsafe to eat, due to the possibility of containing harmful bacteria and parasites, which is why we must cook them before eating. But, you may have wondered, why does raw meat change color after being cooked? Raw chicken, for example, changes from a light pinkish white color to a yellowish color. Raw beef goes from a dark red hue to a dark brown. The secret lies in the molecules themselves, where chemistry dictates what color the meats are.

There are two main types of meat: red meat and white meat. Red meats consist of “slow-twitching” muscles, and can be found in products like beef, lamb, pork, and veal. These muscles store oxygen in a molecule called myoglobin. Myoglobin supplies oxygen to muscle cells, but also has a pigmentation that is a deep red color due to containing iron. The more myoglobin there is, the redder and darker the muscle is. High concentration of myoglobin in certain animals makes them a source of red meat. But, why does it turn dark brown after being cooked? Increasing the temperature to 140° F, or 60° C, results in myoglobin molecules losing electrons, as well as the production of a tan colored molecule - hemicrome. This is the stage where rare meat becomes medium-done. Myoglobin molecules continue to destabilize until the temperature reaches 170° F, or about 77° C. At this point, basically all myoglobin molecules have lost their electrons, or become oxidized, and have become metmyoglobin. Metmyoglobin is dark brown in color, which is why cooked red meats like steak have this color.

White meat is different, in that their way of storing and supplying oxygen is in glycogen. White meat is characterized by “fast-twitching” muscles, which are used for



"File:Glycogen bonds.png", by Wikimedia Commons, licensed under CC 3.0
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fast bursts of energy, and are usually found in chicken and seafood. This glycogen content results in raw white meats looking shiny and glossy, but low amounts of myoglobin add to a pinkish hue. This property can be seen in raw chicken breasts or raw fish. When temperatures are raised, proteins denature, or break apart,

and coagulate forming a whitish, opaque color. Due to having much less myoglobin than red meats, white meats do not turn the same brownish hue after being cooked.

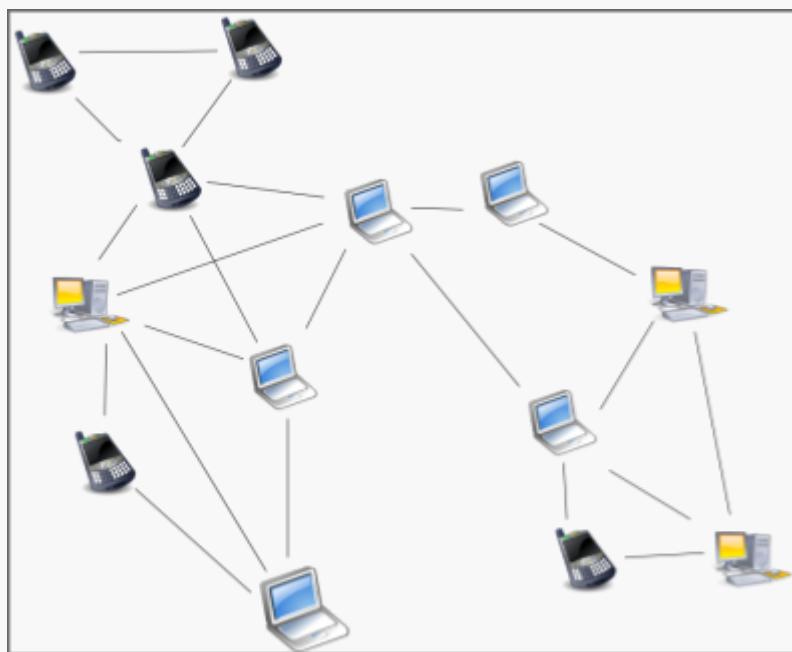
Other chemical reactions also occur when cooking food, such as caramelization or the Maillard reaction. Caramelization is when the heating up of sugars and starches turn them golden brown. The Maillard reaction occurs between amino acids and sugars, which can also contribute to browning. However, these reactions are not specific to meat, unlike the denaturation of myoglobin.

All foods have one property in common, however, in that they turn black when completely burnt. Charred vegetables or grill marks on meat are examples of this, and they come from the fact that foods are organic compounds, meaning they contain carbon. When burnt, molecules in organic compounds break down, showing the dark black color from burnt carbon. This is the same reason why coal is black, as it contains high amounts of burnt carbon.

In Another Light: Computer Networks with Hyperbolic Geometry

Brian Wang

From one node to another, computers worldwide are connected under a single umbrella: The Network. However, as millions of computers all fall under the same housing, this entity's simplicity is nonexistent. How will the data be interpreted, learned from, and improved on, if humans can't even begin to unravel what is going on in this web of interconnections? Well, Serrano and Boguñá, from the Institute of Complex Systems of the UB, and Almargo, from the Higher Technical School of Engineering of the University of Sevilla, were able to figure out a model using Hyperbolic Geometry using only 7 dimensions.



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With a new geometric model, written as S[^]D, the nodes of complex networks are able to be related by gravitation, meaning nodes that are closer in similarity space of D dimensions are likely to establish connections with each other. Statistical techniques allow network maps to have patterns that can simplify the complexity down to a hierarchical architecture of networks. The hidden symmetries of these now-revealed abstractions are reduced at large scales with higher-order cycles (triangles, squares, pentagons).

In a normal analysis of data networking, the connectivity of nodes based on the shortest paths or distances are calculated, though they are not reliable and don't provide the needed range of values, under the umbrella of Euclidean. With hyperbolic geometry, thousands of nodes are able to be measured, and while most math taught in Euclidean explains how parallel lines are equidistant and the sum of angles in a triangle are equal to two right angles, Hyperbolic geometry directly opposes this. In fact, exponential numbers in Euclidean geometry can be represented by polynomials instead in hyperbolic geometry. These two methodologies are the direct polar oppositions of each other.

Under a new light, complex systems are able to be simplified to be much easier to understand and improve on for later generations. While this provides effective discovery in computer networking, this can also branch out to other industries by viewing data in another method than what is present. The uncovering of this idea contributes to not only one, but hundreds of other systems and ideas that may be complex for people to analyze.

Augmented Reality

Richard Wang

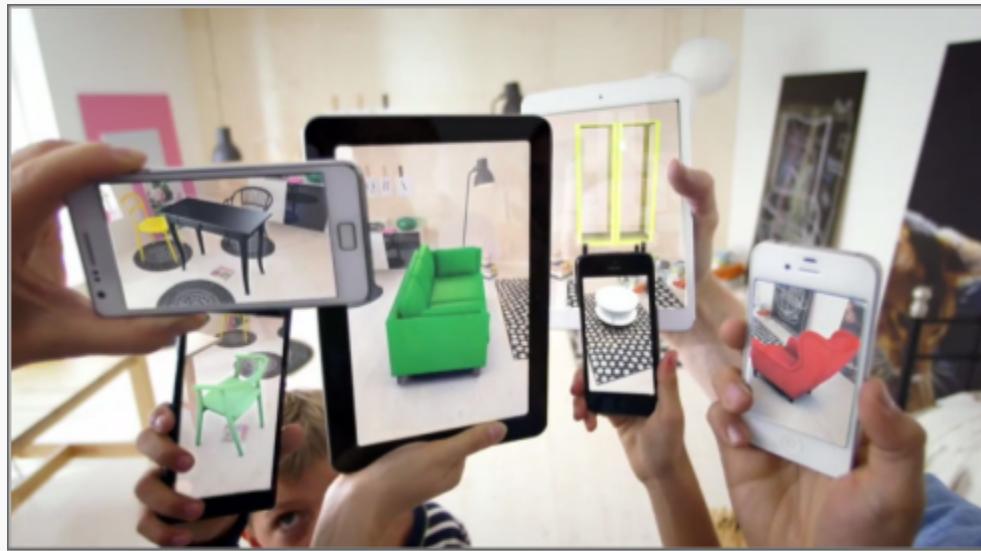
Augmented reality is a technology that has been significantly gaining traction in recent years and has the potential to be utilized heavily in the future. Augmented reality, not to be confused with virtual reality, blends the physical and virtual world. The definition of AR is self explanatory as it is essentially an augmented version of reality. This immersive world can be experienced through glasses, mobile devices, and AR headsets. Interactions are real time and it allows for interaction of visual elements, sounds, and other sensual stimuli.

The key components of augmented reality include hardware with sensing capabilities and software that can process and render digital content in real-time. Sensors digest data of their surroundings and the captured information is sent to the AR software. Lenses are also important for how realistic objects will appear on your screen.

Although augmented reality is not new, it was not popularized until the rise of smartphones, which allowed it to be used with mobile devices. A modern application of augmented reality that is very popular is the mobile game Pokémon GO. With tens of millions of players, this game allows its players to capture virtual creatures called Pokémons which appear in the physical world. The application of AR through games shows that it can be immersive and engaging.

In addition to games, AR has vast potential in many other areas. Augmented reality is often used in the NFL to analyze the field and the plays happening on the field. In store catalog apps, it can help customers understand how something would look in different places, such as furniture in a room. In healthcare, doctors can overlay patient data which assists in procedures such as surgery. Architects can use this technology to visualize buildings designs.

In summary, augmented reality is a cutting-edge technology that has the potential to become a part of daily life in the future. It offers a new way to interact with the world and has exciting applications in various fields. With advancements in hardware and software, we can expect even more innovative and exciting AR experiences in the future.

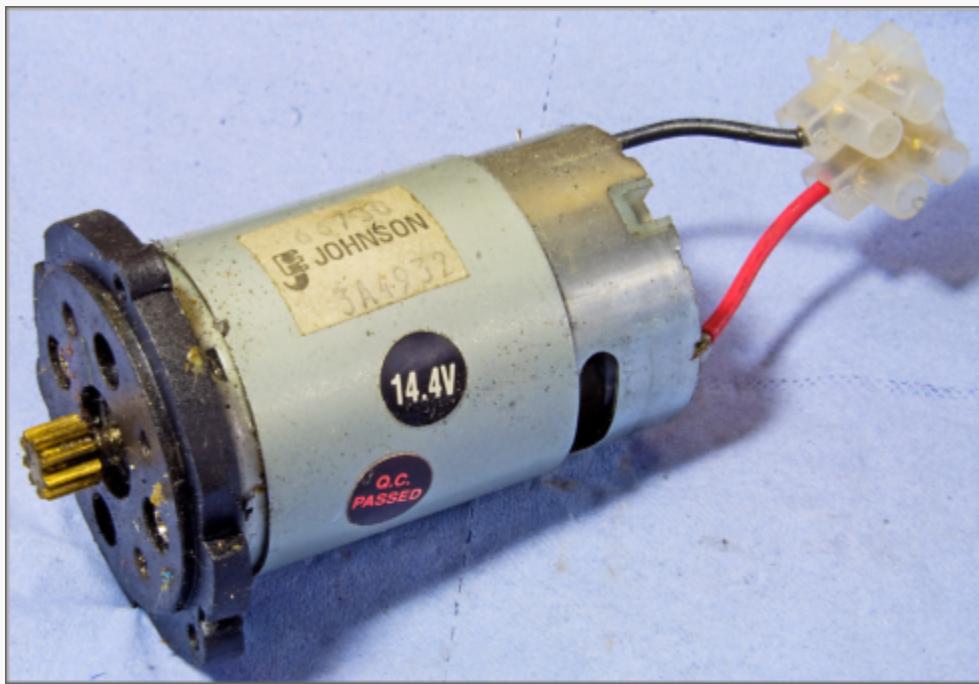


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How Electric Motors Work: The Science Behind Powering Modern Technology

Stephen Hung

One of the most revolutionary inventions of all time is the electric motor. They are a common and necessary component of modern technology. They power everything from your home appliances to the cars on the road. But how do electric motors actually work?



"DC Electric Motor 14.4 V", by Tudor Parker, licensed under CC BY-NC-SA 2.0
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Every electric motor contains an armature, which is a coil of wire surrounded by a magnet. A magnetic field is created when an electric current is passed through a wire.

The magnetic field created by the magnet surrounding the wire interacts to produce a force that causes the armature to rotate. To keep the rotation going, the current must be switched on and off constantly, causing the armature to spin indefinitely. A commutator, which is made up of a series of metal contacts that connect the armature to the power source, performs this switching. The amount of force produced by the motor is proportional to the strength of the magnetic fields and the current flowing through the wire. The motor's speed and torque can be controlled by adjusting these factors.

Electric motors are classified into several types, each with its own set of characteristics and applications. The most common type is the AC (alternating current) motor, which can be found in most household appliances as well as industrial machinery. The DC (direct current) motor is another type that is commonly used in electric vehicles and robotics.

Ultimately, electric motors are a critical component of modern technology, powering everything from household appliances to industrial machinery. They function by producing a magnetic field that interacts with a nearby magnet, causing an armature to rotate. The speed and torque of the motor can be controlled by adjusting the strength of the magnetic field and the amount of current flowing through the wire. Electric motors will continue to play an important role in powering the world for years to come due to their efficiency, dependability, and durability.

Solar Eclipses

Cathie Zhu

A solar eclipse is a natural phenomenon that occurs when the Moon passes directly between the Sun and the Earth, causing the Moon to cast a shadow on the Earth's surface. The alignment of the Sun, Moon, and Earth is a rare occurrence that only happens a few times a year, requiring very specific conditions for a solar eclipse to take place.



"Total Eclipse 2017" by Bernd Thaller, licensed under CC BY 2.0
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There are three types of solar eclipses: partial, annular, and total. During a partial solar eclipse, the Moon partially covers the Sun, while during an annular eclipse, the Moon covers the center of the Sun, leaving a bright ring of light visible around the Moon. During a total solar eclipse, the Moon completely covers the Sun, and the Sun's outer atmosphere, or corona, becomes

visible as a glowing halo around the Moon. The path of a total solar eclipse is known as the "path of totality," and it can only be seen from a specific location on Earth, making it a rare and sought-after event. People who are in the path of totality can witness the spectacle of the Moon completely blocking the Sun.

It is crucial to take proper safety precautions when viewing a solar eclipse. Looking directly at the Sun during an eclipse can cause permanent eye damage, so special eclipse glasses or filters should be used to protect the eyes. In addition, viewers should never look directly at the Sun without the appropriate protective gear. In short, a

solar eclipse is a natural occurrence that only happens a few times a year. The alignment of the Sun, Moon, and Earth creates an incredibly rare phenomenon that is an unforgettable experience for those that witness it.



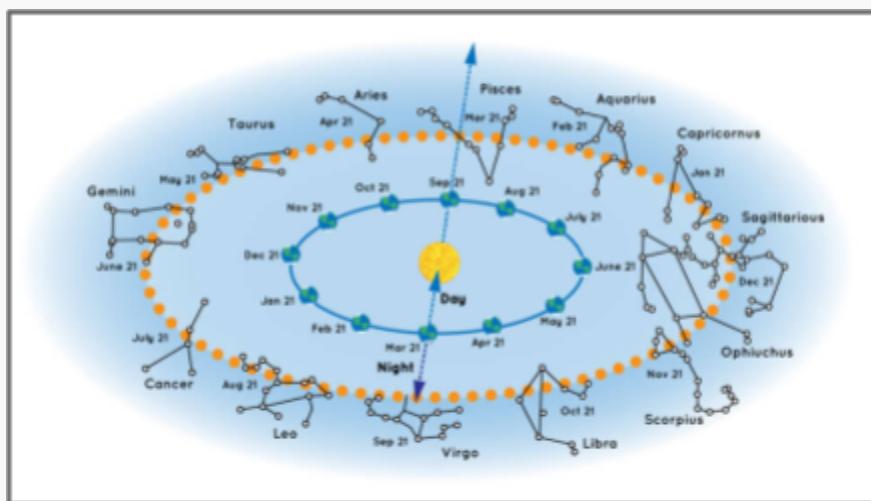
"Perfect Ring of Fire - Annular Solar Eclipse" by Kevin Baird, licensed under CC BY-NC-ND 2.0.
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What Are Constellations?

Aimee Fan

Periodically, patterns of stars will appear among the universe, known as the Constellations. These are groups of stars that resemble particular shapes in the sky and has been given names for each of their unique patterns. Those stars are far away in the universe, and not connected to each other at all. They form a shape when you imagine lines that connect those stars, which then would look like an object, animal, or person. Over time, people around the world with different cultures have their own names for the constellations based on what they saw. Today, 88 official constellations are introduced.

Different constellations can be seen throughout different times of the year. Earth orbits around the sun every year, and our view of the night sky changes as we orbit. Your location on Earth also influences what constellations you might see. For example, if you are in the Northern Hemisphere and looking up at the sky on August 21, you will most likely be able to see the constellation Aquarius, but you won't see Leo since the constellation is on the other side of the Sun.



"What Are Constellations?", by NASA Science Space Place,
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Constellations are not just beautiful, they also serve a very useful function for us. Well-known stars, or well-known constellations, can be used for sea navigation. For many years, sailors used stars to determine their location on the open ocean. This practice is known as celestial navigation. In a way, patterns of stars are as helpful today as they were to ancient navigators.

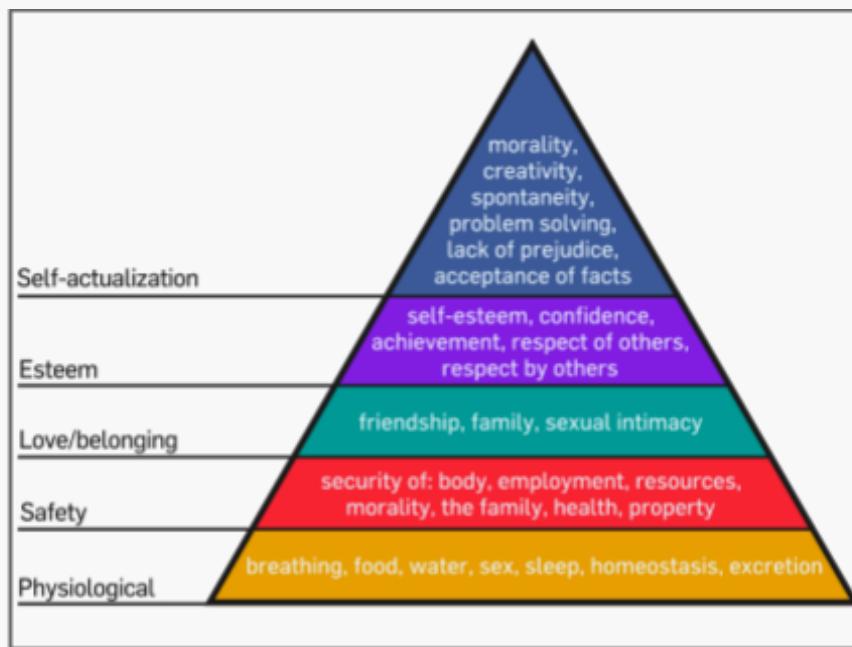


"File:Orion constellation with star labels.jpg", by WIKIMEDIA COMMONS, licensed under CC BY 3.0
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Maslow's Triangle: Human Fulfillment

Cody Duan

Maslow's Triangle or Maslow's Hierarchy of Needs was first proposed in 1943 by the psychologist Abraham Maslow. The triangle is a model of a human's needs and motivation; furthermore, it is arranged in hierarchical order from the most basic needs on the bottom to the deeper motivation on the top. Maslow's triangle is split into five levels, physiological, safety, love and belonging, esteem, and self-actualization.



User:Factoryjoe (https://commons.wikimedia.org/wiki/File:Maslow's_Hierarchy_of_Needs.svg), "Maslow's Hierarchy of Needs", Licensed under CC BY-SA 3.0

The lowest level of Maslow's Triangle is physiology needs. This level contains the most basic needs, such as food, water, shelter, and any other requirements for survival. The following level concerns safety. For example, security, stability, and protection from

physical and emotional harm. Once the needs of safety have been met, the next level is about the needs of being loved and belonging. This level mainly prioritizes social connections and how the person feels about fitting in society.

The upper two levels of Maslow's Triangle are more focused on oneself. The second to the top level, esteem needs, includes the needs for self-esteem, respect, recognition, and achievements. The apex level is self-actualization. This level is obtained after all other levels are achieved. The human finds the need for personal growth, reaching his or her potential and finding a purpose in life. Abraham Maslow believed that self-actualization is a key lifelong process that each human being has. Self-actualization is unique, in the fact that each individual has different goals in life.

Maslow's Hierarchy of Needs can show how a person is doing in life. A person must satisfy the lower levels of Maslow's Triangle before moving onto the next. The goal is to reach the level of self-actualization, ultimately achieving the best version of oneself.

The Effects of Stress

Owen Chen

Stress is a temporary everyday event that happens periodically in our life. It's a feeling triggered by our hormones, due to various situations. However, there are times when stress becomes a long-term effect on a person. When a body is unable to cope with stress, it begins to develop a serious effect on the human body.



"Why does stress in relationships affect parenting?", by Michael Clesle, licensed under CC BY-NC 2.0
<https://www.rochester.edu/newscenter/wp-content/uploads/2016/08/fea-stressed.jpg>

One of the most significant symptoms of stress on your body is an increase in heart rate and blood pressure. When we experience stress, our body releases hormones such as cortisol, glucagon, and prolactin. These hormones tend to increase your heart rate and narrow your blood vessels. Over time, this can cause clogged vessels that are risks to having a heart attack or a stroke.

Furthermore, long-term stress can also weaken the immune system. This is caused by the fact that when stress hormones are constantly being released in your

body, it can suppress alertness in parts of your immune system, making it less efficient to fight off infections and viruses. As a result, this can affect the possibility of getting minor illnesses such as the flu, or even worse, something more serious over time.

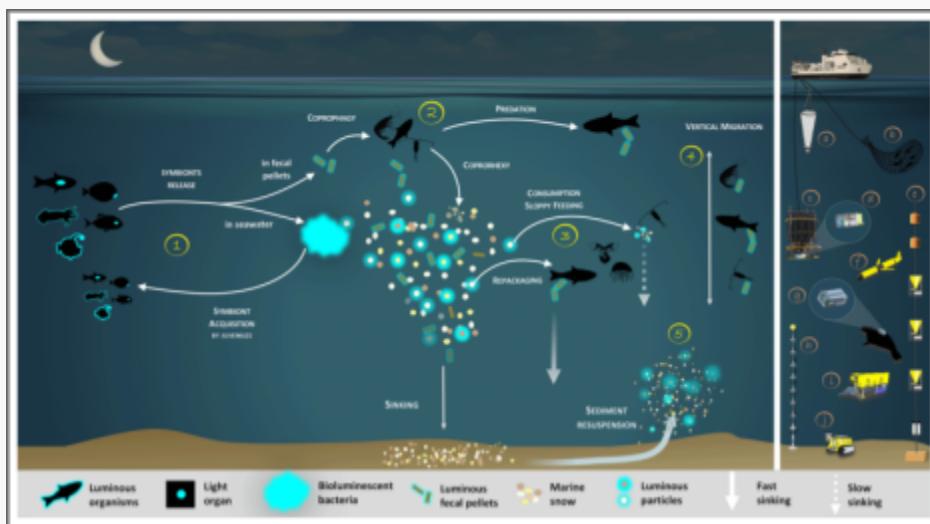
Finally, a large amount of stress could have an influence on your mind and memory formation. With extensive amounts of high-level stress, the hippocampus can be damaged, linking to memory problems such as difficulty with learning, recall, and spatial memory. In your mind, the feeling of depression and anxiety has been other symptoms of stress. Constantly being in a state of negative thinking and worrying is the reason why people develop depression. Chronic stress can cause changes in brain chemistry, leading to an increased risk of mental health problems.

In conclusion, stress can have a serious effect on a person's body. However, you can minimize its impact by finding a healthy way to cope with it. By taking care of yourself and thinking positively you can live an average life, without too much stress to worry about.

The Glow of the Sea

Denise Lee

As you feel the soft sand on your feet as darkness fills the sky, all you can hear are the beautiful, glowing, blue waves splashing on the beach. These stunning waves are called bioluminescent waves. Bioluminescent waves are natural wonders and it is when the ocean sparkles in blue at night. Bioluminescence is nearly impossible to spot in daylight with the naked eye. WINDY.APP states that “the glow is due to the unicellular *Noctiluca scintillans* algae, which release light in response to external stimuli — in this case to the coastal waves throwing them from side to side.” Bioluminescent waves usually happen during late summer when algae bloom of plankton produces a chemical reaction that includes luciferin and luciferase.



“Bioluminescence shunt in the marine carbon pump”, by Lisa Tanet, Séverine Martini, Laurie Casalot and Christian Tamburini. Licensed under CC BY-SA 4.0
https://commons.wikimedia.org/wiki/File:Bioluminescence_shunt_in_the_marine_carbon_pump.png,

Although the glow of the sea is extremely gorgeous, it can be quite dangerous. According to WebMB, it states that the bioluminescent waves produce toxins that can

sometimes harm marine life, humans, and anything that comes in contact with it. It may also cause skin irritation and burning in the eyes. Swimming or fishing in bioluminescent waves is highly unrecommended. If you eat shrimp, fish, or other marine life that has eaten the algae bloom, you may get food poisoning. Eating a lot of marine life that has been affected by bioluminescence can affect brain functions and memory.

Scientists have been studying bioluminescence to see if it can be used as a light source and an eco-friendly alternative to fossil fuels. Bioluminescence may be another solution to save our planet from climate change or global warming. Bioluminescent waves are one of the beauties on Earth. All in all, the glow of the sea is as beautiful as the starry nights, but it is as dangerous as it is beautiful.

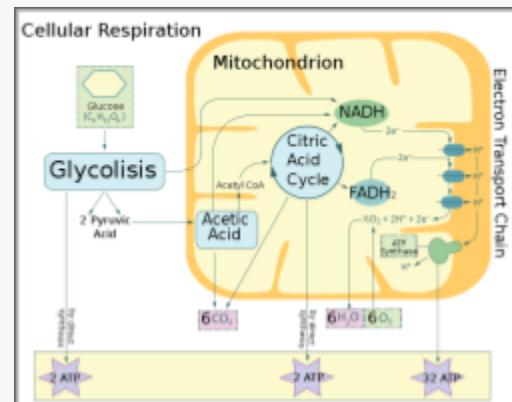
Cellular Respiration Basics

Eddie Zhang

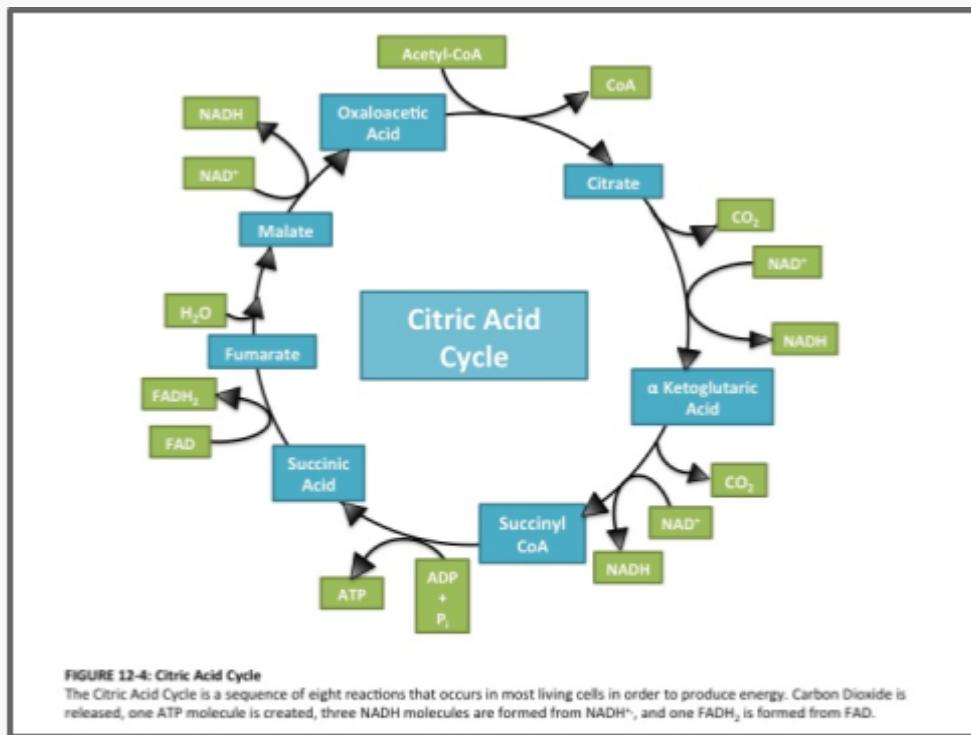
Cellular respiration is an essential metabolic process that occurs in all living organisms. This process transforms the energy stored in food molecules into ATP (adenosine triphosphate), which cells can use to derive energy. This is shown with the equation: Glucose + Oxygen \rightarrow Carbon Dioxide + Water + ATP. There are various stages involved in cellular respiration, including glycolysis and the citric acid cycle. Each process takes place in a different part of the cell and requires different proteins (more specifically enzymes).

The first process is Glycolysis, which occurs in the cytoplasm of the cell. It involves breaking down glucose into two smaller pyruvate molecules, which release a small amount of energy in the form of ATP. This stage is anaerobic ("without-oxygen"), meaning that it takes place without the presence of oxygen.

The citric acid cycle, the Krebs cycle, or tricarboxylic acid cycle, is the next stage of cellular respiration and takes place in the mitochondria of the cell. During this process, a series of chemical reactions convert the pyruvate produced in glycolysis into carbon dioxide and water. This reaction releases a large amount of ATP, which cells can use to derive energy. This stage is aerobic ("with-oxygen"), meaning it requires oxygen.



"File:Cellular respiration EN.svg", by Zlir'a,
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"File:Citric Acid Cycle Graphic.jpeg" by Wikimedia Commons, licensed under CC BY-SA 4.0
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The third stage of cellular respiration is the electron transport chain. During this stage, electrons are transferred through a series of electron carriers to oxygen, which generates a proton gradient (more protons on one side of the mitochondrial membrane) and produces water as a byproduct. This gradient is then used to produce ATP via oxidative phosphorylation.

Overall, cellular respiration is a crucial process that allows cells to transform the energy stored in food into usable energy. The process consists of three main stages: glycolysis, the citric acid cycle, and the electron transport chain. Each process takes place in a different part of the cell. The final result is the production of ATP for cells to use.

Photosynthesis Basics

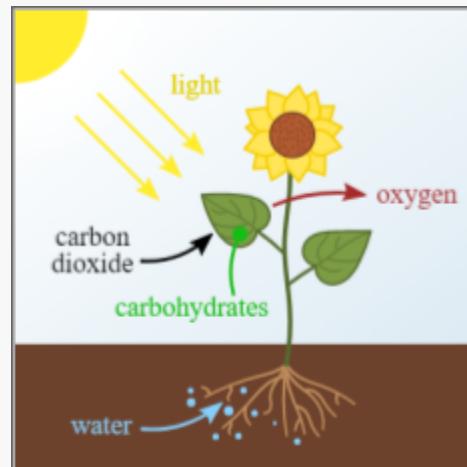
Ryan Zhu

Photosynthesis is how plants make their food using sunlight. It is the process by which plants convert light energy into chemical energy in the form of glucose. This process takes place in chloroplasts, which are organelles found in plant cells. There are two main stages of photosynthesis: light-dependent reactions and light-independent reactions.

In light-dependent reactions, light energy is absorbed by chlorophyll molecules in the thylakoid membranes of the chloroplasts. This energy is used to divide water molecules into oxygen and hydrogen ions, which are used to power the production of ATP, the energy currency of cells. The oxygen is released as a waste product.

In the light-independent reactions, also known as the Calvin cycle, carbon dioxide from the air is used to build glucose molecules. This process takes place in the stroma of the chloroplasts, and it uses the ATP and hydrogen ions produced in the light-dependent reactions. The glucose molecules can be used by the plant as an energy source, or they can be stored as starch for later use. Photosynthesis is important not only for plants, but also for all living organisms on Earth. Without photosynthesis, there would be no source of food or oxygen for animals, including humans.

Photosynthesis is also responsible for removing carbon dioxide from the atmosphere, which helps to reduce the effects of climate change. In addition to its practical importance, photosynthesis is also a fascinating subject of scientific study.



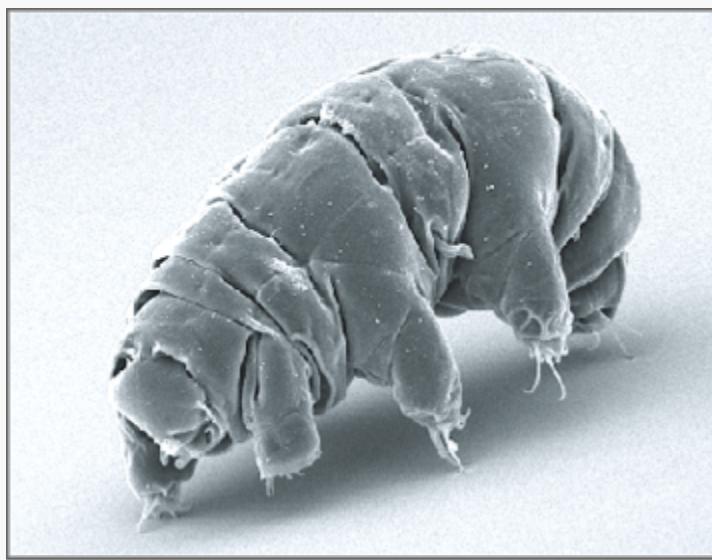
"File:Photosynthesis en.svg" by WIKIMEDIA COMMONS, licensed under CC BY-SA 4.0
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Scientists are constantly working to understand the molecular mechanisms that underlie photosynthesis, as well as the ways in which photosynthesis has evolved over time. In conclusion, photosynthesis is one of the most important processes that allow plants to convert light energy into chemical energy. By learning about photosynthesis, we can better understand how all living things on Earth depend on each other.

Tardigrade: A Creature That Can Survive in Space

Eason Fan

The Tardigrade, also known as a water bear or moss piglet, is a microscopic animal that has captured the fascination of scientists and nature enthusiasts for its ability to survive in the most extreme conditions. Despite being just 0.1-1.5 millimeters long, Tardigrades have been found in almost every habitat on earth, from the depths of the ocean to the highest mountain peaks.



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Unlike other animals that we know, Tardigrades rely on a process called "anhydrobiosis" to survive. The organism becomes completely dry and enters a state of suspended animation, to which it curls up, not exposing its legs and head, and fills up

with a chemical that creates a matrix to keep the water-sensitive parts from moving. The creature is most resilient in this state, and once exposed to water, it comes back to life as if nothing had happened.

Some scientists have suggested that Tardigrades could be of extraterrestrial origin, though there is no evidence to support this claim. Nevertheless, experiments have shown that Tardigrades can survive in the vacuum of space, extreme temperatures, and radiation exposure. In 2007, a European team of researchers sent 3,000 Tardigrades to orbit the earth on the outside of a spacecraft for 12 days, and 68% of them survived. In another experiment, Tardigrades were shot out of a gun at speeds of up to 900 meters per second (about 2,000 mph), and they were later revived.

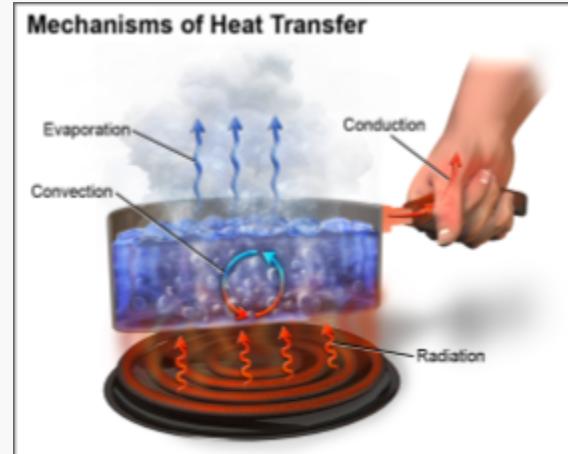
The Tardigrade's resilience has inspired researchers to investigate how this tiny animal can survive in such harsh conditions. The findings could lead to the development of new technologies that help humans adapt to challenging environments, such as making crops more tolerant to drought or stabilizing vaccines for diseases like COVID-19. Tardigrades might hold the key to the next scientific breakthrough.

What is Thermodynamics?

Kenny Wu

A key area of physics called thermodynamics is concerned with the examination of energy and its processes. It is a fundamental part of modern technology and consists of a substantial impact on areas including environmental engineering, materials science, and energy production. The laws of thermodynamics clarify how energy behaves and sheds light on the effectiveness of energy systems.

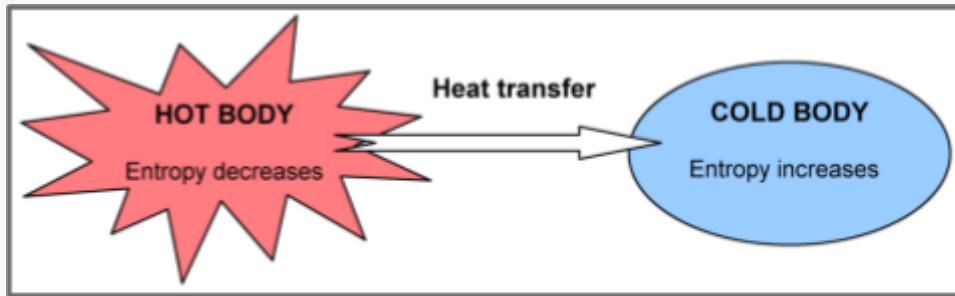
To begin, the first law of thermodynamics, also known as the law of conservation states that energy cannot be created or destroyed. Energy can, yet, be changed from one form to another. This principle is essential for understanding how energy systems function since it allows us to calculate the amount of energy in a system and track its evolution. The law of conservation of energy, which is particularly important in the process of energy generation, is used in the design and optimization of energy systems for maximum efficiency and the least waste.



"Mechanisms of Heat Transfer", by BruceBlaus, licensed under CC BY-SA 4.0, https://upload.wikimedia.org/wikipedia/commons/d/de/Heat_Transfer.png

Furthermore, The second law of thermodynamics pertains to the idea of entropy and outlines the behavior involved in heat transmission. According to the second law, an enclosed system's entropy increases with time. Entropy is a metric for a system's disorder or unpredictability. This means that energy systems have the propensity to degrade over time as energy is lost to waste heat and the system's entropy increases. The second rule of thermodynamics has important ramifications for the design and operation of energy

systems because it emphasizes the importance of energy conservation and the development of increasingly sophisticated technology.



"File:Entropy Hot to Cold.png" by Wikimedia Commons, licensed under CC BY 3.0.
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All in all, thermodynamics is a key component of contemporary physics and technology, offering knowledge about the behavior of energy and its transformations. The rules of energy conservation and the growth in entropy, among other thermodynamic principles, are used to design and optimize energy systems for maximum effectiveness and little waste. The insights afforded by thermodynamics will continue to be crucial for developing sustainable, effective, and inventive energy systems as we develop new technologies and deal with new energy concerns.

Bullet Trains Explained

Riley Lee

Ever since a new invention called the Bullet Train came out, a main question people asked was, "How fast can a Bullet Train travel?" Bullet Trains came out on August 5 2022. When the Bullet Train came out they were known to be one of the fastest trains in the world. The first Bullet Train to be made is from Kawasaki Heavy Industries and in a country called Japan.

Bullet Trains are powered by electricity and are known to be more eco-friendly. Most people love bullet trains, but some hate them. People hate bullet trains because it makes train travel more expensive and less flexible. It also costs a lot to build the train and to build the rails of the train. Another reason why people don't like Bullet Trains is because they get motion sickness. Most people support Bullet Trains because it is 8 times more energy efficient and it improves air quality. Some more reasons why people support Bullet Trains is because it is fast, it is comfortable while sitting in it, and there are less delays.

It is shown by drivers and by recorders that bullet trains can travel up to 200 mph. Bullet Trains can achieve their speed because they use superconducting maglev. There are about 35 Bullet Trains in the world. All in all, bullet trains can travel up to 200 mph because they use superconducting maglev and they are powered by electricity.

The Deadliest Virus: Lyssavirus

Arthur Liang

Lyssavirus, also known as rabies virus, is a viral disease that affects the nervous system of mammals, including humans. It is named after Lyssa from Greek mythology, god of mad rage. The virus is transmitted through the saliva of infected animals, usually through bites. Once the virus enters the body, it travels through the peripheral nerves and neurons to the brain, where it causes inflammation and swelling. Symptoms of rabies typically appear within three to eight weeks after exposure, but can sometimes take longer. The initial symptoms can be similar to those of the flu, including fever, headache, and general weakness or discomfort. As the disease progresses, however, symptoms can become more severe and include anxiety, agitation, confusion, and hallucinations. Eventually, the virus can lead to paralysis, coma, and death.

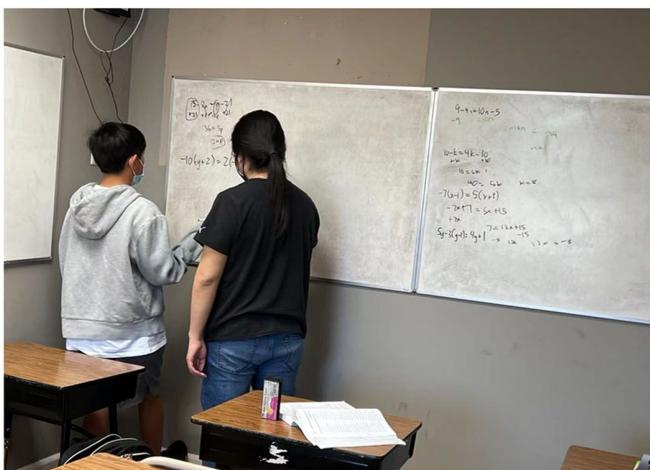


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There is no cure for rabies, but prompt treatment after exposure can prevent the virus from causing illness. Treatment involves injections of rabies vaccine and

immunoglobulin, which can help your immune system fight the virus. However, once symptoms appear, the disease is almost always fatal.

Prevention of rabies involves avoiding contact with potentially infected animals, including wild animals such as bats, raccoons, and skunks, and sometimes even domestic animals such as dogs and cats. Pets, especially dogs, should be vaccinated against rabies to reduce the risk of transmission to humans. Overall, lyssavirus is a serious and often fatal disease that poses a risk to humans and animals alike. It is important to take precautions to prevent exposure and seek prompt treatment if exposure does occur.



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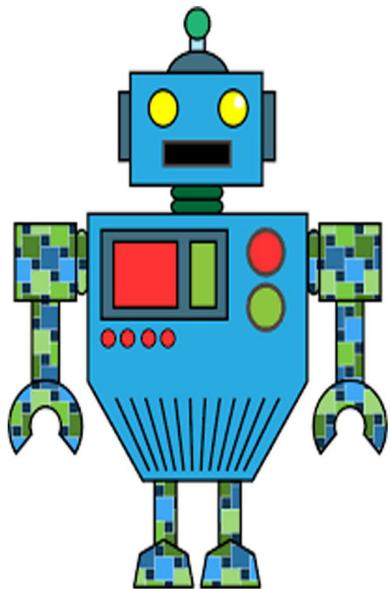
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