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GAME CUTSCENES

CANCER BIOTECH

WHAT ARE REDSHIFTS?

and more...

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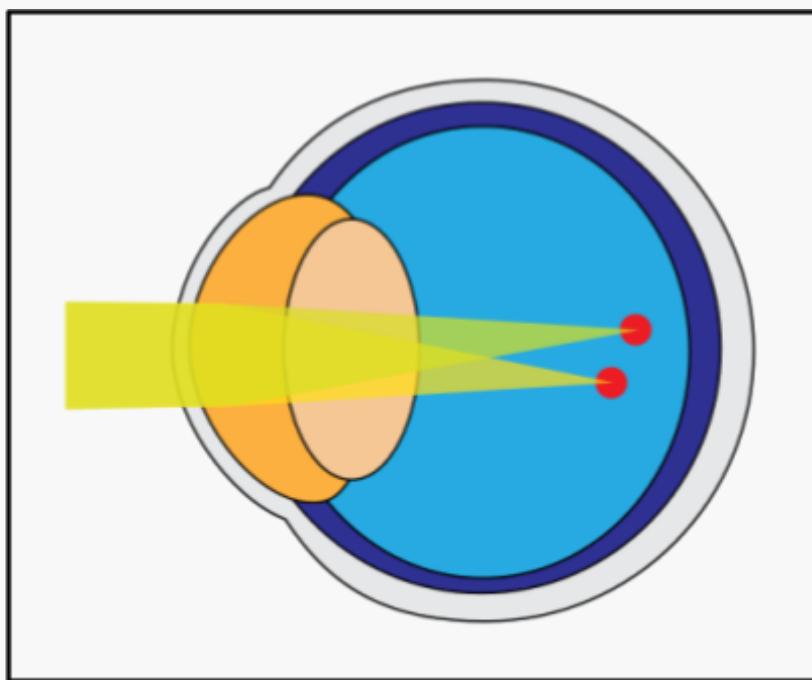
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What is Astigmatism?

Arthur Liang

Complicated names aside, astigmatism is an incredibly common condition that affects hundreds of millions worldwide. Around every 1 in 3 people suffer effects from astigmatism. But what is it exactly?

Astigmatism is a common eye disturbance caused by a refractive error when light enters your optical construct. The root cause of the issue is due to irregularities in the shape of the cornea or lens. In a normal eye, these structures are smooth and evenly curved. However, in individuals with astigmatism, the cornea or lens may be more pointy and football-shaped than spherical. This irregular shape causes light entering the eye to focus on multiple points on the retina, leading to blurred vision.



"Corneal Astigmatism" by Akiyao. Licensed by Wikimedia Commons, under CC BY-SA 3.0
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Common symptoms of astigmatism include distorted vision at all distances, eye strain, headaches, and difficulty seeing at night. Many people with astigmatism may also experience a combination of nearsightedness or farsightedness.

While the disorder is common, it is also fairly easy to treat. Treatment options for astigmatism start with eyeglasses and contact lenses. These specially designed lenses can fix astigmatism by compensating for the irregular corneal or lens shape. Other more permanent treatments include LASIK (Laser-Assisted In Situ Keratomileusis) and PRK (Photorefractive Keratectomy). These are surgical procedures that can reshape the cornea to correct astigmatism. An additional, more obscure treatment is orthokeratology. This is a non-surgical method that involves wearing special rigid contact lenses at night to reshape the cornea temporarily for clearer vision during the day.

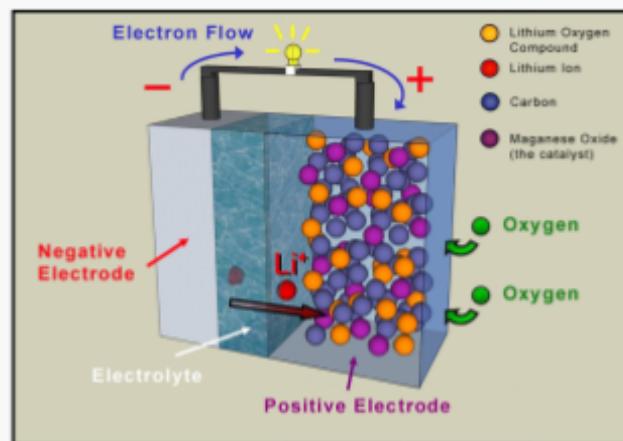
The Science Behind Batteries

Edward Huang

In any place where there is electricity, there are batteries. As one of the most useful and widespread inventions, the battery's ability to store and release electrical energy is what makes our technology useful. But how does a battery work exactly? The answer lies in chemistry.

Batteries typically have 3 parts, known as the cathode, the anode, and the electrolyte. The cathode and anode are the positive and negative ends of the battery respectively, while the electrolyte is in between. The electrolyte is an important substance that reacts to the metal at the anode to produce excess electrons. The opposite happens at the cathode, where chemical reactions occur with the electrolyte that gives the cathode the ability to accept electrons. No electrons are actually being created, just exchanged in the form of a redox reaction.

To harness the energy of our battery, we need to give electrons at the anode the ability to move towards the cathode. Currently, this is blocked by the electrolyte solution, but if a conductive wire was connected to both the anode and cathode, this would finally allow electrons to flow between them. At the same time, positively charged ions, or molecules that have a positive charge and are missing an electron, travel from the anode to the cathode through the electrolyte to accept the incoming electrons.



"Lithium-air battery" by Argonne National Laboratory. Licensed by Flickr, under CC BY-NC-SA 2.0
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We can use the flow of electrons through the wire to our advantage. If a lightbulb is placed in the circuit, the electrons will flow through the lightbulb's thin metal filament, experiencing resistance. The lightbulb's resistance will produce heat, which results in the release of photons, or light. The flow of electrons can also be used to power motors. This happens when electrons flow through a coil, causing the coil to spin under the presence of a magnetic field.

An extra benefit of batteries is that they are rechargeable. As electrons flow from the anode to the cathode and energy is harnessed, the potential energy slowly decreases. Eventually, the battery will reach a state of equilibrium, where no electrons flow, making the battery flat. But, if energy is externally supplied to the circuit, the reactions can now happen in reverse, recharging the battery. By the end, the anode will have reaccumulated extra electrons, making the battery ready to be used again.

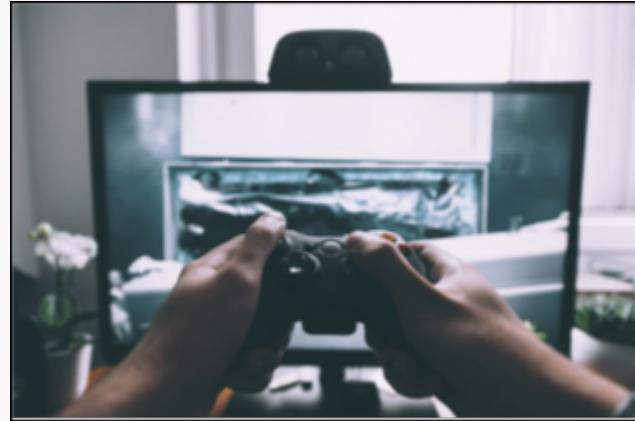
Whenever we use electricity in any way, there is chemistry in action. Chemical reactions are what drives the flow of electrons in a battery, and by exploiting this flow, we can harness electrical energy in our devices.

The Art of the Camera: Cutscenes

Brian Wang

Within a realm full of action, many cinematographers ponder what captivates an audience, and in what way the camera showcases all the context around it. Movies, video games, YouTube videos, and many types of entertainment all rely on the camera, which is considered a “magical tool” of the cinematic world. Within the many forms of camera movements, two prominent types include self-controlled and pre-determined, which are used mainly to give off a certain effect in different scenarios for both video games and films.

Since the classical video game era, there have been fixed cameras that produce a user-enhanced experience for the players. Whether it be fixed camera angles, or follow-fixed camera angles, both produce angles that form the surroundings in a virtual world for players. In games such as Animal Crossing, cameras are fixed at a set amount of units in front of a player, which gives context to the surroundings all around the player. The benefits of such produce a feeling of connection to everything around the player instead of just the character itself, which gives a third-person perspective. Usually, this kind of camera movement can also be used in movies, some of which include Harry Potter, which has fixed cameras set at specific angles to produce the optimal setting for an audience to watch. In a more game-centered world, this term is referred to as pre-determined, which is a form of cinematography that “describes” its entire surroundings in one video set. This is usually



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used for action-packed situations, where the entire scene needs to be seen for an audience to understand the events that are unfolding.

A self-panned camera angle gives a feeling of disconnection to the surroundings, which produces a first-person effect, a more egocentric self-centered form of cutscenes. Usually, entertainment that discourages surroundings from being seen by the audience, such as horror films, uses a first-person effect. This can be for a variety of reasons, such as enhancing the “unknown”, or amplifying the effect of a hidden creature suddenly appearing on the corner of a camera. In a film such as *The Conjuring*, a film series that recently released a sequel in 2016, a more self-panned camera angle is used, which envelops the audience around one person and events this person sees. In such a movie, outside information is rarely given, which makes this specific type of cinematography the perfect element for horror films.

In this way, cinematography is utilized in the entertainment industry for not only video games, but also movies, films, and videos. The art of cameras truly brings the essence of the surroundings for spectators and reveals the true potential of the cutscene.

The Newton-Leibniz Controversy: A Duel Between Mathematicians

Cody Duan

The war of Calculus is the defining event that makes up today's math. In the late 1600s, a large-scale debate known as the Newton-Leibniz Controversy arose between two individuals over the true founder of Calculus: Issac Newton and Gottfried Wilhelm Leibniz. This argument lasted throughout the founder's lifetimes and even went beyond. The question at hand is, who did it first?

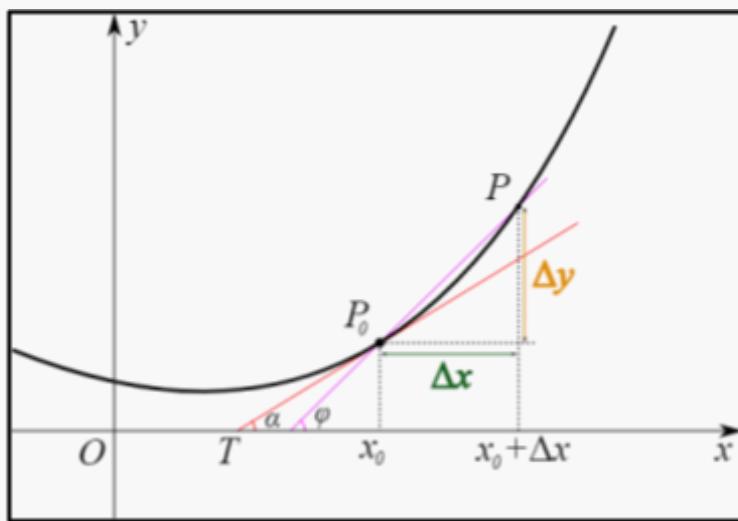
Both Newton and Leibniz discovered similar ideas to Calculus. Newton's version of Calculus included his idea of fluxions and fluents. In 1669, Newton found that moving a secant line through two points closer and closer together would eventually create a tangent line that would give a function to find the instantaneous rate of change at any point of the curve. He termed the rate of change fluxions and the function of the rate of change fluxents. Newton discovered that the fluent and the original function are inverses. Based on this information, he created the Fundamental Theorem of Calculus.

On the other hand, Leibniz created the modern notation of Calculus that we know. Like Newton, Leibniz realized that the integral is the area under the curve, found by summing the area of an infinite amount of rectangles under that curve. Although he



"Statues of Isaac Newton and Gottfried Leibniz" by Andrew Gray & Alexey Gomankov. Licensed by Wikimedia Commons, under CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=51521808>

discovered the same thing Newton did, Leibniz had the superior notation seen today. He discovered Calculus in 1674 and later published his theory of Calculus in 1684. However, Newton first published his theory in his magnum opus in 1687. As a result, controversy arose over who was the first to discover Calculus. The dispute continued until Leibniz's death when Newton was considered the discoverer of Calculus while Leibniz was the first to publish the theory of Calculus.



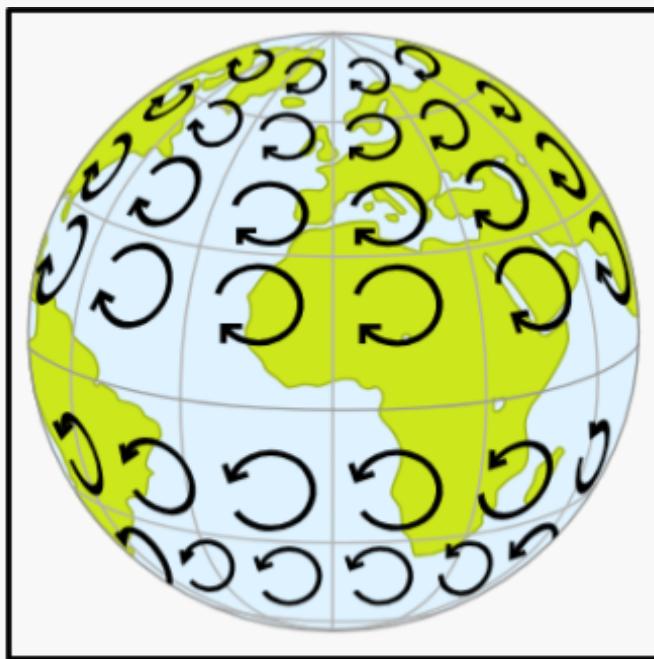
"Derivative - geometric meaning" by Vonvikken. Licensed by Wikimedia Commons, under CC BY-SA 3.0, https://commons.wikimedia.org/wiki/File:Derivative_-_geometric_meaning.svg

The Newton-Leibniz Controversy remains one of the more intriguing debates in mathematics history. The debate stresses the complexities of scientific discovery and the disputes that may arise. Both Newton and Leibniz left memorable marks on the world of mathematics and science, and their legacies are still celebrated today. The controversy highlights the collaborative and competitive nature of scientific achievement, which can give rise to historic rivalries.

Unraveling the Mysteries of Earth's Coriolis Effect

Stephen Hung

The Coriolis effect is one of the most fascinating and pervasive phenomena in our lives, shaping our understanding of weather patterns, ocean currents, and even the trajectories of airplanes. Discovered by French scientist Gustave-Gaspard Coriolis, the Coriolis effect plays a crucial role in the dynamics of the Earth's atmosphere and oceans. The Earth rotates from west to east, and as an object moves closer or farther away from the Earth's axis of rotation, its angular velocity changes due to the conservation of angular momentum, which is apparent through a deflection in its path.



"Coriolis effect" by Kes47. Licensed by Wikimedia Commons,
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The Coriolis effect is dependent on three key factors: latitude, speed of motion, and direction of motion. At different latitudes, the velocity varies since the radius is larger. At the poles, the rotational speed is effectively at zero, while at the equator, the rotational speed is at its maximum, since it is at the farthest distance away from the Earth's axis of rotation. An object at the equator moving toward the north pole will appear to curve eastward because, at the equator, it is traveling at a high rotational velocity. However, as it moves upwards, the distance of the object to the Earth's axis of rotation decreases, resulting in a decrease in the rotational speed of the ground below it. As a result, the object appears to curve towards the right. On the other hand, an object at the north pole moving down towards the equator will curve westward, because it begins with a low rotational velocity since it is a small distance away from the Earth's axis of rotation. As the object moves south, the ground below it begins to speed up, but the object maintains its rotational velocity, and consequently, the object appears to curve towards the left.

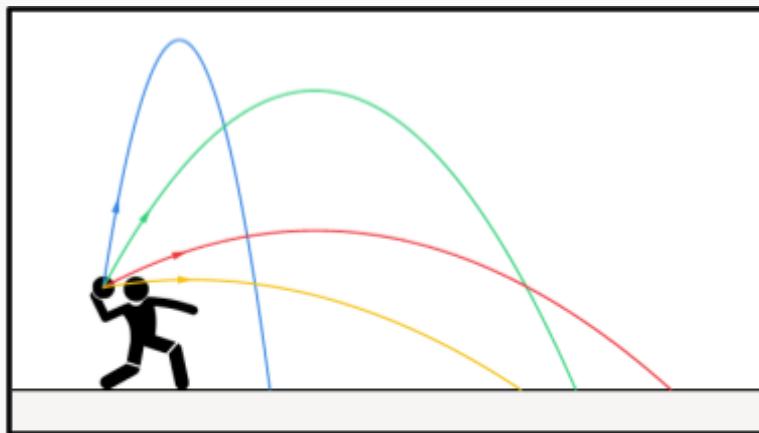
This effect results in many global patterns, such as atmospheric circulation. The uneven heating of Earth's surface due to its curvature causes high and low-pressure areas, combined with the Coriolis effect causes it to curve, producing winds and global wind patterns. Deadly hurricanes are also formed due to the Coriolis effect because when clouds travel north or south due to the wind patterns, the deflection causes the system to rotate and evolve into a cyclonic structure. The Coriolis effect is a critical phenomenon that has a great influence on our globe and our weather patterns, and it is crucial that we understand this fundamental concept such that we may better comprehend the forces shaping our planet and lives today.

Newton's Three Laws

Aidan Hong

If there is one thing constant at all times, it is Newton's Three Laws. Even though you might not notice it, it is always at work. Newton's three laws consist of three parts: inertia, $F=ma$, and that every reaction has an equal and opposite reaction.

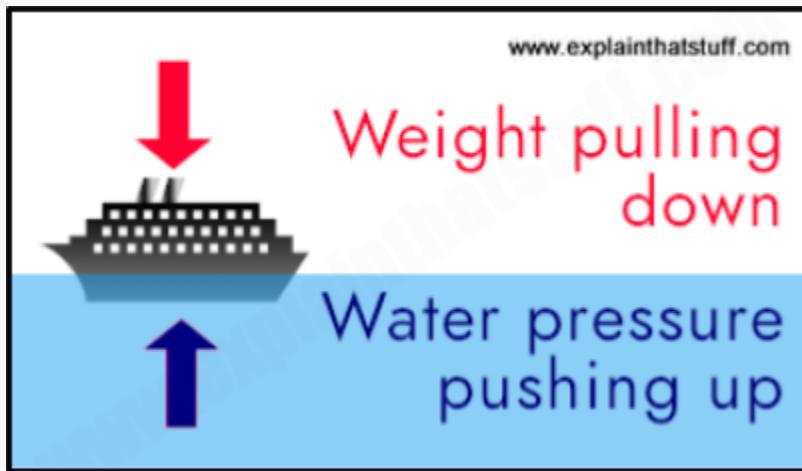
The first law states that an object in motion stays in motion unless another force acts upon it. This explains why in space, things always move in one line – there is no other force acting upon the object. However, when we jump, we come back down and we don't keep going up. This is because there is another force acting upon us – gravity. While the force of our jumping is enough to overcome gravity for a brief moment, eventually, gravity overpowers the force of jumping and brings us back down.



"Ball-projectile-motion-different-angles" by MikeRun. Licensed by Wikimedia Commons, under CC BY-SA 4.0, <https://commons.wikimedia.org/wiki/File:Ball-projectile-motion-different-angles.svg>

The second law states that force is equivalent to mass times acceleration. This is a mathematical expression of force. Typically, when numerous forces are acting on something, we get the net force, which is simply canceling out all the extra forces.

The third law states that every action has an equal and opposite reaction. This is another reason why, despite gravity acting on us, we don't get crushed to the ground. When you are standing, the force of gravity is acting on you, pushing you down. However, the ground is also pushing back up, negating the forces of gravity. There are also other examples of this as well, for example, dribbling a basketball. When you dribble a basketball, your hand pushes off the ball, and when the ball lands on the ground, the ground pushes back up on the basketball.



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<https://www.explainthatstuff.com/how-ships-work.html>

Newton's three laws are always in action. Although you may not realize it, it can be applied to anything at any moment. It also led to numerous other scientific advances related to physics. With this in mind, it is safe to say that Newton's Three Laws are one of the most fundamental and important discoveries of Physics.

Diversity of Leaves

Angela Chin

What are some of the unique features of trees? At a glance, this question may seem simple; however, this essay will mainly go into detail about how types of trees can easily be differentiated from each other by their complexity. These leaf-separating skills are especially useful when considering the sheer amount of tree species on the planet. All leaves can be categorized into one of three morphogenetic classes: simple, compound, and modified. Some complexities that can be seen commonly are simple leaves.

To start, simple leaves: what are they?

They are a basic complexity of leaves on a stem.

According to Steve Nix, a former forest resources analyst for the state of Alabama, “A simple leaf is singular and never divided into smaller leaflet units. It is always attached to a twig by its stem or the petiole.” In short, there’s only one leaflet per twig, usually distinguished by an axillary bud adjoining it. The bud helps determine if the leaf is simple, compound, or any other order; if there’s one leaf per bud, it’s a simple leaf, compound if there are multiple leaflets per bud, and so on. Speaking of which, how else can a compound leaf be defined?

Compound leaves are several simple leaves bundled together. As reported by the authors, experts in the plant science and biology departments, “...the blades are composed of several regularly spaced sessile or petiolate appendages called leaflets that are attached to a central rachis.” In summary, smaller leaves called leaflets surround a central petiole; little stems some leaves have. There are several types of compound leaves, such as palmately, where leaflets stick out from a central point, and pinnately.



"Leaf fractal like" by Curran Kelleher. Licensed by Wikimedia Commons, under CC BY-SA 3.0, https://commons.wikimedia.org/wiki/File:Leaf_fractal_like.JPG

Examine carefully, though, since the shape and arrangement of compound and modified leaves can sometimes be mixed up.



"Palmate and pinnate compound leaves" by Bob Gutowski. Licensed by Flickr,
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<https://www.flickr.com/photos/versicolor/5091156092>

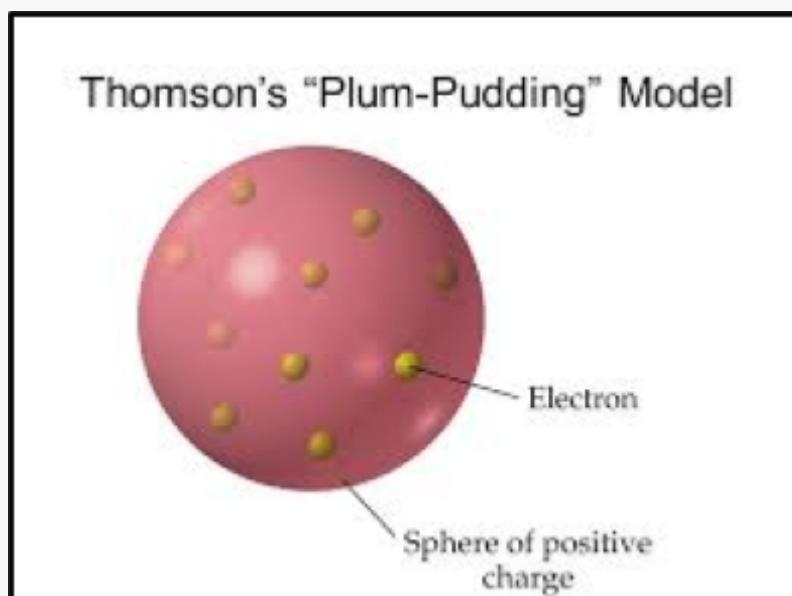
Modified leaves are regular leaves that have developed according to their environment and can include a variety of appearances. Maria Morrow, a professor in the biology department, gives a few examples such as, "Some leaves may be converted to storage structures below ground (as with a bulb) or into plant defense structures (as with a spine)." The scales on onion bulbs and spines on cacti are the modified leaves of those plants, all evolved to suit their needs. Another example, the Joshua tree, may look like a regular tree, but it has modified leaves to conserve water and fend off consumers. To sum it up, modified leaves are a divergent range of leaves that have adapted to their environment.

Rutherford's Gold Foil Experiment

Richard Wang

The world around us contains matter that looks solid; closely this matter is composed of many empty atoms. The Rutherford gold foil experiment, conducted by physicist Ernest Rutherford in 1911, was an innovative experiment that revolutionized the understanding of atomic structure and led to the understanding of the modern atomic model. This experiment is one of the most influential experiments conducted in the field of physics as it provided information in a crucial part of science.

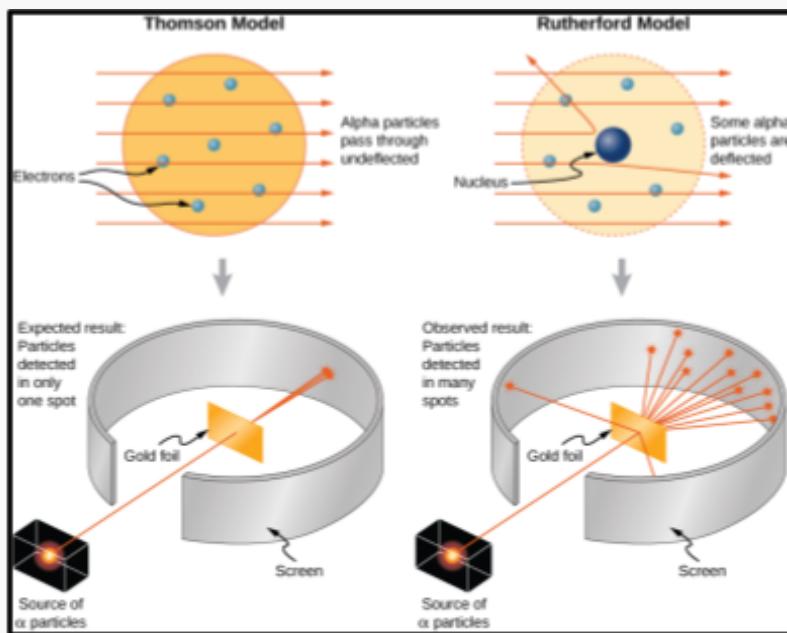
Before the experiment by Rutherford, the accepted atomic model at that time was the Thomson, or plum pudding, model which was proposed by J.J. Thomson. The model proposed that atoms were uniform, positively charged “pudding” with negatively charged electrons embedded within. This model suggests that atoms were indivisible and also had no nucleus.



“Cac91” by Claudecardeusse. Licensed by Wikimedia Commons, under CC BY-SA 4.0
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In 1911, Ernest Rutherford and his coworkers Hans Geiger and Ernest Marsden initiated the gold foil experiment. The experiment involved the bombardment of fast-moving alpha particles, a type of positively charged which are naturally radioactive particles with a mass about four times that of a hydrogen atom, at very thin sheets of gold foil. The previously accepted atomic model showed that the mass and charge of the atoms were evenly distributed and from this, the scientists believed that many of the particles would not be reflected and easily pass through the gold foil.

While most of the particles were not reflected, a small percentage of the particles were reflected by the gold foil. The prior knowledge of these scientists made them not expect this discovery.



"CNX UPhysics 09_04_TvsR" by OpenStax University Physics. Licensed by Wikimedia Commons, under CC BY 4.0
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From this newly discovered information, Rutherford designed a new model of the atomic structure to explain his results. Since most of the alpha particles were able to pass through the gold foil, he explained that atoms were mostly vacant space since barely any particles were reflected. However, the particles that were reflected were explained to have experienced enormous force within the atom so Rutherford said that all of the

positively charged and the majority of the mass was located in the center, which was later called the nucleus, and was composed of protons and neutrons.

Rutherford's atomic model later became known as the nuclear model and it says that the protons and neutrons that comprise most of the mass of the atom in the nucleus at the center of the atom. Subsequent experiments led to a greater understanding that built on the foundation that Rutherford's experiment created. These new experiments led to the understanding of electrons which further helped to understand the properties of atoms.

To summarize, Rutherford's gold foil experiment led to a new idea of the atomic structure which was different from the previously believed plum pudding model. The experiment involved the bombardment of alpha particles on gold foil. Many of the particles went through the foil but some were deflected away.

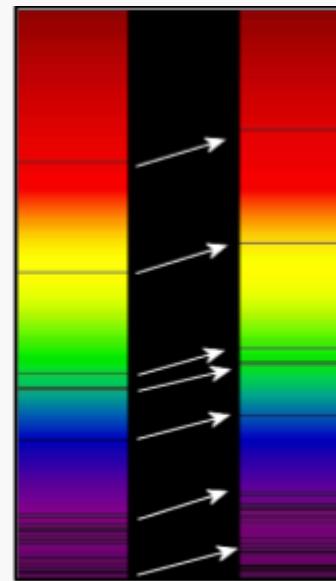
What are Redshifts?

Brandon Pian

The redshift concept is one of the most important discoveries of space. It has tremendously helped scientists with the understanding of space and it provides compelling evidence for the Big Bang theory. Redshifts have a long history in space, astronomical significance, and the information it has provided into the nature of the universe.

Redshifts were discovered by an American astronomer named Edwin Hubble in the early 20th century. Though Hubble was thought to have discovered it, Christian Doppler was originally the first person to discover it in the year 1842. Hubble correlated Doppler's information with his discoveries to create Hubble's Law. Hubble observed that the spectra of galaxies exhibited a systematic shift toward longer wavelengths or the "redder" end of the electromagnetic spectrum. This shift in the wavelengths of light, known as redshift, was a groundbreaking revelation. With this evidence, Hubble was able to state that galaxies were moving away from us.

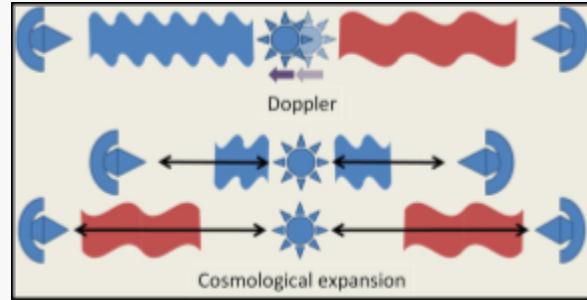
A redshift is a manifestation of the Doppler effect which is a fundamental principle in physics that affects waves, including light waves. The Doppler effect describes how the observed frequency or wavelength of a wave changes when the source of the wave and the observer are in relative motion. In the case of redshift, when an astronomical object, such as a galaxy, is moving away from an observer, the wavelengths of the emitted light get stretched, causing the light to appear shifted toward longer



"Redshift" by Georg Wiora. Licensed by Wikimedia Commons, under CC BY-SA 3.0
<https://commons.wikimedia.org/wiki/File:Redshift.png>

wavelengths. Only nearby galaxies will not emit a redshift. Black holes are also known to cause large redshifts.

The data Redshifts have given scientists has revolutionized our ability to measure cosmic distances. Astronomers use redshifts as a cosmic "speedometer," allowing them to estimate the velocities at which galaxies and other celestial objects are receding from Earth. By applying Hubble's law, they can determine the approximate distance to these objects. This fundamental tool has enabled us to create a three-dimensional map of the universe, charting the positions and velocities of galaxies on a vast cosmic scale.



"Two redshifts" by Brews ohare. Licensed by Wikimedia Commons, under CC BY-SA 3.0
https://commons.wikimedia.org/wiki/File:Two_redshifts.JPG

The study of redshifts has had a profound impact on the field of cosmology. It has allowed scientists to calculate essential cosmological parameters, such as the Hubble constant, which characterizes the rate of the universe's expansion. Also, redshift data have played an important role in our understanding of the structure of the universe, including the distribution of galaxies, clusters, and voids. Redshifts represent a cosmic fingerprint, revealing the universe's expansion and offering a glimpse into its history and future. Edwin Hubble's discovery of redshifts fundamentally reshaped our understanding of the cosmos, providing compelling evidence for the Big Bang theory and paving the way for modern cosmology. Today, redshift measurements continue to be at the forefront of astronomical research, unlocking mysteries of the universe and fueling our quest to comprehend the vastness of space and time.

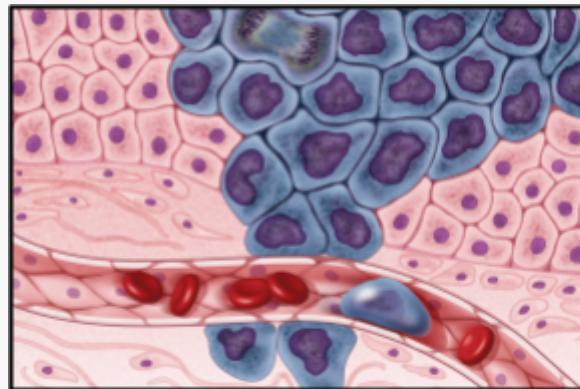
Cancer BioTech

Eddie Zhang

Cancer, one of the leading causes of death worldwide, has long been a formidable adversary in the realm of medicine. However, the field of cancer biotechnologies has witnessed remarkable advancements over the years, providing new hope in our ongoing battle against this devastating disease. Key biotechnological innovations have revolutionized cancer research, diagnosis, treatment, and prevention, highlighting their immense potential in improving patient outcomes and ultimately finding a cure for cancer.

One of the most significant breakthroughs in cancer biotechnology is the development of genomic profiling techniques. By analyzing the genetic makeup of cancer cells, researchers can gain valuable insights into the disease's molecular underpinnings. Genomic profiling enables the identification of specific genetic mutations and alterations that drive cancer progression. Armed with this information, oncologists can tailor treatment regimens to target the unique genetic characteristics of a patient's tumor, leading to more effective therapies and better outcomes.

Liquid biopsies, a non-invasive technique, have emerged as a game-changer in cancer diagnostics. These tests detect cancer-specific biomarkers, such as circulating tumor DNA (ctDNA) and circulating tumor cells (CTCs), in a patient's blood. Liquid biopsies provide real-time information about a patient's cancer status, allowing for early detection, monitoring of treatment response, and the detection of minimal residual

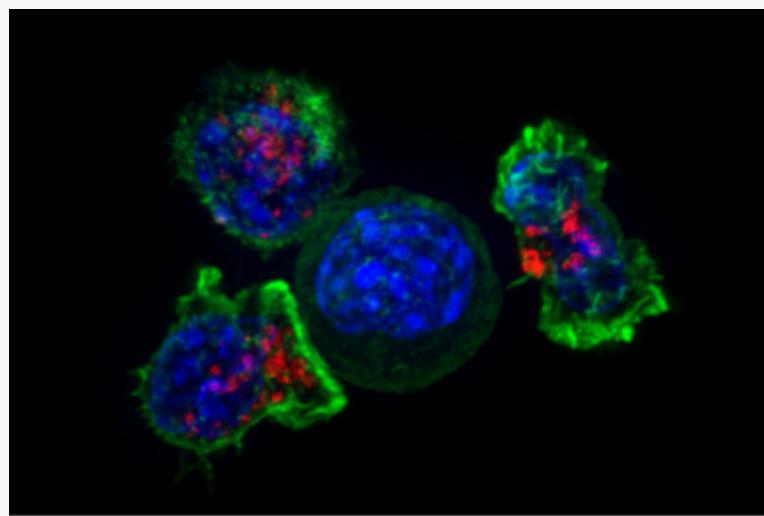


"Cancer cells illustration" by NIH Image Gallery. Licensed by Flickr, under PDM 1.0
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disease. This technology not only reduces the need for invasive tissue biopsies but also holds promise for cancer screening and surveillance.

Immunotherapy represents a paradigm shift in cancer treatment. Biotechnological advancements in this field have led to the development of immune checkpoint inhibitors, CAR-T cell therapy, and cancer vaccines. These therapies harness the body's immune system to recognize and attack cancer cells, offering a more targeted and less toxic alternative to traditional treatments like chemotherapy and radiation.

Immune checkpoint inhibitors, such as pembrolizumab and nivolumab, block the signals that cancer cells use to evade the immune system. CAR-T cell therapy genetically engineers a patient's T cells to target and destroy cancer cells with remarkable precision. Cancer vaccines stimulate the immune system to recognize and attack cancer-specific antigens. These biotechnological innovations have shown remarkable success in treating various cancers, leading to durable responses and, in some cases, complete remission.



"Killer T cells surround a cancer cell" by NIH Image Gallery.

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The concept of precision medicine has gained prominence in cancer research and treatment. Biotechnologies like next-generation sequencing (NGS) and high-throughput screening have enabled the identification of molecular targets for therapy. By analyzing a

patient's tumor at the molecular level, oncologists can select the most appropriate targeted therapies, avoiding the trial-and-error approach of traditional treatments.

Furthermore, artificial intelligence (AI) and machine learning algorithms are being employed to analyze vast amounts of patient data and predict treatment responses. This personalized approach minimizes the potential for adverse effects and enhances the overall quality of life for cancer patients.



"Adenocarcinoma - CT scan" by Dr. Yale Rosen Atlas of Pulmonary Pathology. Licensed by Flickr, under CC BY-SA 2.0
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In conclusion, cancer biotechnologies have ushered in a new era of hope and progress in the fight against cancer. From early detection through genomic profiling and liquid biopsies to the remarkable advances in immunotherapy and precision medicine, these biotechnological innovations have the potential to transform cancer from a life-threatening disease into a manageable condition. While challenges remain, including accessibility and cost, the continued collaboration between researchers, healthcare providers, and biotech companies promises to bring us closer to a future where cancer is no longer an insurmountable foe but a curable and preventable disease. The journey toward this goal is illuminated by the beacon of innovation and driven by the unwavering commitment to improving the lives of cancer patients worldwide.

Acids vs Bases

Wilson Zhu

Most people have probably encountered the pH scale with many different things from cleaners, water, and the human body. People will typically see things as being either acidic or basic from the pH scale and they may wonder how they differentiate, but before that, it is most important to understand what acids or bases are.

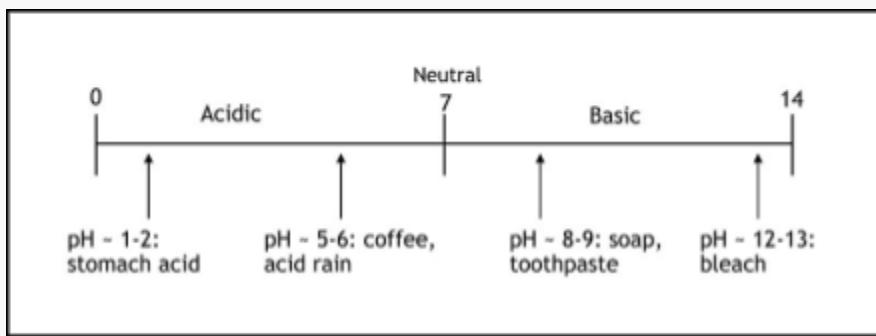
Acids and bases are important terms for different chemical compounds. Acids and bases are defined by how their hydrogen ions react when combined with another substance. Ions are charged particles. For an atom to be an ion, it has to either lose or gain an electron because atoms are neutrally charged. For the atom, hydrogen becomes positive when it loses two electrons, which is called a hydrogen ion. On the other hand, if it gained an electron it would be called a hydrogen anion.

Acids are substances that can lose their hydrogen ions when combined with another substance such as water. When dissolved in water, acids will create a solution that has a higher hydrogen ion activity than pure water (neutral, pH7). On the pH scale, acids will have a pH that ranges from 0-7. When people eat acidic foods such as lemons, they describe it as something with a sour taste. Acids are associated with sourness but there are weaker acids such as vinegar and apples. Stronger acids are used in things such as fertilizers and batteries. Acids can be very low on the pH scale and the more acidic a substance is, the more dangerous it can be. Such dangerous chemicals can cause poisoning and chemical burns when touched.



"Sulfuric Acid" by Zoefkris. Licensed by Wikimedia Commons, under CC-BY-SA 4.0.
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Bases are chemical opposites of acids. They gain hydrogen ions when combined with another substance. Bases create a solution of lower hydrogen ion activity than pure water. In the pH scale, bases are in the range of 7-14. Bases have a bitter taste. Common basic items are toothpaste, detergent, and cleaning supplies.



"pH scale" by Brightyellowjeans. Licensed by Wikimedia Commons,
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Acids and bases overall are fundamental concepts of chemistry. In chemistry, they help in understanding and controlling chemical reactions. In biology, they help to regulate the body's pH. In industry, many products are made such as cleaning chemicals. In environmental science, water can be affected by different pH.

Blockchain Technology

Owen Chen

The internet is a vast space filled with scattered bits of information. Imagine these bits as pieces of a puzzle. Blockchain is like a special puzzle where all these pieces are linked together to form a chain. This chain, called blockchain, is a modern way to record all the transactions that happen with cryptocurrencies online.

A blockchain is made up of small pieces of data that are encrypted, which means they're coded for security. Before one of these small pieces can be added to the chain, it needs approval from most of the network's computers. Once approved, it becomes a part of the digital chain that keeps growing. It records every transaction from the very beginning to the most recent one. Unlike traditional databases, there's no one boss in charge of a blockchain, and it can be accessed from many different computers. This is possible because copies of the same data are stored in various places. These chains are secured with complex math that makes it really hard for anyone to break in.



"Blockchain technology" by TLC Jonhson. Licensed by Flickr, under CCO 1.0 Universal.

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There are two main types of blockchains: public and private. In a public blockchain, anyone can use it to read, write, or check transactions. However, it's almost impossible to change what's been recorded because no single person has the power to alter it. On the other hand, private blockchains are controlled by an organization, and only certain people chosen by the administrator can access the database.

Today, blockchain is mainly known for its role in cryptocurrencies like Bitcoin and Ethereum. These companies use blockchain to record all their transactions, and as more people use digital money, the blockchain grows bigger. This kind of database system is really useful in our future world, especially for moving large amounts of data between different systems.

The Chinese Terracotta Warriors

Riley Lee

It has always been a mystery who are the Chinese Terracotta Warriors and where the Chinese Terracotta Warriors came from. Many people have thought Chinese Terracotta Warriors are from aliens and some thought back then their technologies were really good. The Chinese Terracotta Warriors were found by accident on March 29, 1974. They were found by accident while a farmer called Yang Zhifa was digging a well. The Chinese Terracotta Warriors also made a really surprising discovery because there were no historical items or records of them existing. The Chinese Terracotta Warriors are statues made out of a building material called Terracotta and they were made to accompany a person named Qin Shi Huang in the afterlife.



"Forbidden Gardens - Terracotta Army" by Vybr8. Licensed by Wikimedia Commons under CC BY-SA 3.0.

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Today, the Chinese Terracotta Warriors symbolize China's powerful and rich history and cultural heritage. The Chinese Terracotta Warrior statues have not been sitting underground untouched for about 2,200 years. There are also around 2,000 statues unburied, but around 6,000 statues are still waiting to be found. There are not just warriors or fighters, but horses, musicians, and birds. As a lot of statues were found, there were 40,000 weapons found with the statues. The Chinese Terracotta Warriors are so majestic and amazing that people have been starting to call them the "8th wonder of the world."

The Chinese Terracotta Warriors, with their rich history, exceptional craftsmanship, and cultural significance remain a memory of China's first emperor, Qin Shi Huang. These terracotta soldiers, made more than two millennia ago, will continue to inspire and impress the world as time comes. These statues offer a unique view of ancient China's military, artistic, and cultural achievements. The Terracotta Warriors stand as enduring symbols of China's rich heritage and its enduring contribution to the world's cultural tapestry.

The Dial of Destiny: Archimedes

Denise Lee

What if I told you that in the 2nd Century BC, over 2,200 years ago, their technology was as good as our current technology? The Antikythera mechanism, also known as Archimedes Dial or the Dial of Destiny, is the world's oldest computer. It is a compass created in the 2nd Century BC that can predict eclipses, track the movement of the sun and moon, locate fissures of time, and calculate ellipses.

It was discovered inside an ancient shipwreck by Greek sponge divers on May 17, 1901. According to "The Real History Behind the Archimedes Dial in 'Indiana Jones and the Dial of Destiny,'" by the Smithsonian Magazine, it states that "the Antikythera mechanism employed similarly complex technology—including gear wheels, dials, and pointers—to chart the cosmos.

The ancients used it to predict eclipses, track the movement of the sun and the moon, and even see when sporting events like the Olympics were scheduled to take place." Not only can the Antikythera mechanism predict when the ellipse will appear, but it can also give you the characteristics of the ellipse.

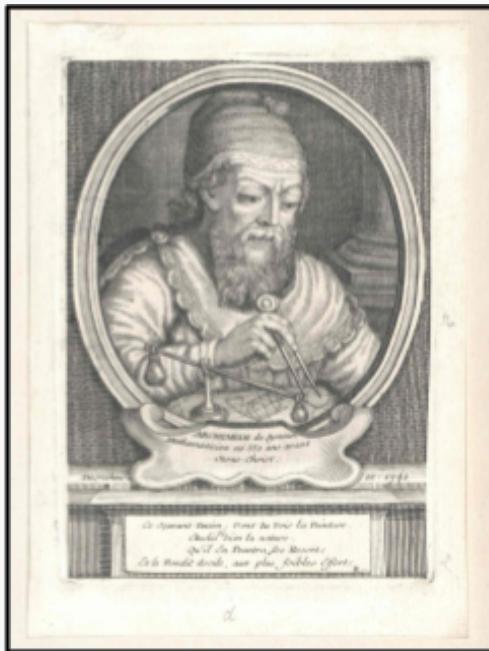
The Antikythera mechanism is a truly remarkable artifact, crafted entirely from bronze and featuring intricate gears that predate their technological counterparts by over 1,000 years. The Antikythera mechanism is theorized to have been created by Archimedes because the device shares a lot of Archimedes's thinking. Archimedes, also



"The Antikythera Mechanism" by Tilemahos Efthimiadis. Licensed by Wikimedia Commons under CC BY 2.0.
https://commons.wikimedia.org/wiki/File:The_Antikythera_Mechanism_%283471171927%29.jpg

known as ‘The Father of Mathematics’, is a Greek mathematician and physicist who is mostly known for his creation of how to calculate the volume of a sphere and cylinder. Archimedes is the greatest mathematician of his age. The Antikythera mechanism is rumored to be a time machine because of its insane abilities.

When the Antikythera mechanism was first discovered it stumped the world. The Antikythera mechanism is so advanced that we still don’t know its full potential. To this day, the Antikythera mechanism remains one of the most intriguing inventions the world has discovered.



Portrait of Archimedes (Public Domain)

Endangered Species

Arick Hong

If one were to journey back to Louisiana in 1850, a remarkable creature would grace their presence, a species now lost to time. Everywhere they cast their gaze, a grayish avian figure with a striking crimson underbelly would flit about, alighting upon trees and emitting a gentle coo as it settled. However, should you find yourself in Louisiana in 2023, this bird would exist only in the annals of history, supplanted by the inexorable march of modern society, which has laid waste to the once-teeming wildlife that once thrived here.

The bird in question is none other than the Passenger Pigeon, a species that has, in all likelihood, vanished from the face of the Earth. Its extinction is a tragic tale, a rapid demise brought about by ruthless hunters and unrelenting trappers, leaving this once-abundant species reduced to nothingness, vanishing into the abyss of extinction, largely unbeknownst to us.

Most of us know about endangered species. People think of this term as animals declining in population and about to become extinct, but every animal has a story behind how it got to that endangered stage. The passenger pigeon mentioned earlier was once plentiful on the East Coast and areas close to it such as Illinois and Louisiana, but hunters came and those poor pigeons were wiped out fast. Tigers in India used to roam in great numbers, but hunters shot them and companies cleared their habitats. Species can also become extinct through invasive species. For example, if we have species A which is a predator to species (or letters) below it (ex: B, F, Y). This species lives in a region where there are a lot of species D and it controls the population by eating it. Once the amount

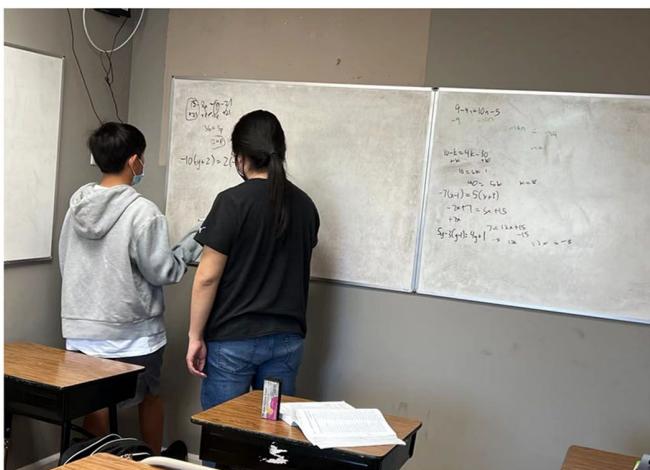


"Ectopistes migratorius (passenger pigeon)" by James St John. Licensed by Flickr, under CC BY 2.0.
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of D declines, then A will decline as well because there is no food to feed it, which results in fewer offspring. Once the amount of D rises again, then A will rise again because there is more food to eat. This is like a cycle where both rise and fall together. Now, if A is introduced in a place where species H is the predator of species T, A will cause a major imbalance in the ecosystem because it is now the predator of both H and T. The problem is that there is a LOT of H and T combined, so A will have a food fest and multiply rapidly until there is very very little H and T. Add the factors that humans kill off a small percentage of each species every year, and H and T can definitely be called endangered.

Another reason why animals become endangered is because of habitat loss. For example, we have 100 specimens of species Q that live in a forest. The forest has more than enough resources for species Q. Now, if people come over and cut down some of the forest, there will be fewer resources for species Q. Now instead of there being more than enough resources, now it is just enough for Q. If this keeps happening, then there will be less than enough resources for Q, which will cause some of its kind to die off. If this keeps happening, then there will be even fewer resources, which will cause even more of Q to die off. This will keep happening until there is no Q left, and they are all extinct.

Endangered species are becoming extinct more and more quickly, and the chance of them recovering is becoming more slim as we continue to introduce new invasive species and remove their habitats. It is only a matter of time before it starts taking a toll on other species and causing a major disaster. We cannot let this continue happening.



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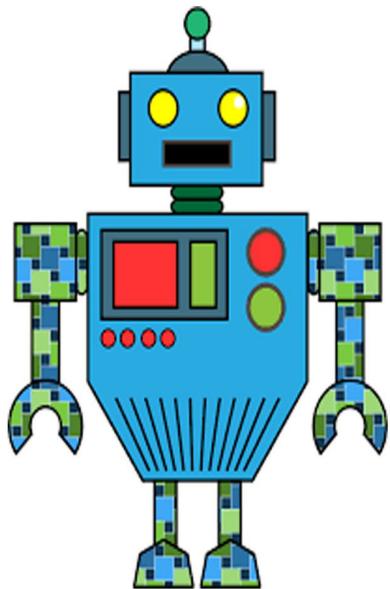
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