UnEarthed

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soar

UNIVERSITY OF PENNSYLVANIA

Letter from the Editors

Dear Readers of UnEarthed,

On behalf of UnEarthed's Executive Board and our student-led team of writers, editors, and designers, we are incredibly excited to present SOAR to you as the eighth issue of UnEarthed. In Soar, you will find articles about some of the most diverse and awesome ideas that our team chose especially for you. After reading this edition, we sincerely hope that you are inspired to soar to new heights, prepare to take on new challenges and to try your best to succeed. We are so thrilled to share UnEarthed's newest edition with you.

In this magazine, you will find articles about how planes fly, the types of clouds that they fly through, and a special type of plane that flew faster than the speed of sound. You can also read articles about birds that soar in the sky near you, and cool animals that fly without even having wings! Beyond this literal definition of soar, there are also articles about music that makes our hearts soar, followed by stories about people like Evel Knievel and characters like Aladdin who soared in special ways. Whether you are interested in reading about amazing outer space phenomena, fascinating flight facts, or riveting scientific explanations, you are sure to find an article that piques your interest!

It was a joy for us to put together this issue of UnEarthed for you, and we hope you enjoy reading these articles. Be on the lookout for new editions of UnEarthed that are published twice every year, always with a new and exciting theme specifically chosen to spark the curiosity of our readers! And if that sounds like too long of a wait, UnEarthed has a digital edition too! Visit www.unearthedpenn.com to explore digital-only articles, fun quizzes, and informative videos—all uniquely made by our amazing Digital team! All of our print magazines are also uploaded to our website, so you can read them online if you missed previous issues.

You are always welcome to fill out the Suggestion Box on our website (https://www.unearthedpenn.com/suggestion-box) with any recommendations to improve the publication or any article topics that you would like to see in future issues. And if you happen to be on social media, you can "Like" us on Facebook at "UnEarthed Penn" and follow us on Instagram @unearthed.penn to stay up-to-date on all things UnEarthed.

We believe that each and every article in this edition teaches you something new and that the interactive pages encourage you to keep learning about the topics that interest you. Even more so, our dream is that Soar reminds you that the sky is the limit when it comes to your biggest goals and aspirations. We hope you enjoy this edition of UnEarthed, and we wish you a fun spring and summer where you soar to new heights!

Grace Martens
EDITOR IN CHIEF

Emily Sheng
MANAGING EDITOR

UnEarthed
ISSUE N°8 • FALL 2021

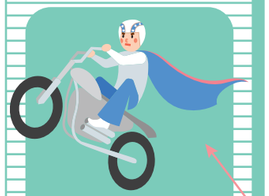
table of CONTENTS

FEATURED IN THIS ISSUE

MORE COOL STUFF

FUN FACTS!

SPOTLIGHT ARTICLES



Did you know the stuntman Evel Knievel broke over 433 bones in his career?!
Page 21

Read about your favorite superheros and their triumphant theme songs!
Page 4

Find out how to make your own paper airplane!
Page 7

Learn the legend of Aladdin!
Page 16

Soaring Superhero Themes

Writing by **SHELBY ABAYIE** • Design by **VANESSA LIEW**
Editing by **LUKE ELEGANT** & **ALHENA ISLAM**

If you've ever seen a superhero movie, then the swelling, triumphant sound of a classic superhero theme is a familiar signal that the hero is about to beat the villain and save the day! But what makes the superhero theme, a superhero theme?

The classic sound began centuries ago with conch shells—likely the first brass instruments. Conch shells create roaring, mystical sounds that can be heard for miles. If a conch is large or has a long spiral, it can produce deep, booming musical notes. Conches were used in a variety of ways including as a war horn, in spiritual ceremonies, and for general musical fun. They were found all around the world, from Europe, India, China, Oceana, Japan, Tibet, to the Americas!

Eventually, people discovered that any conch or horn-like shaped object could produce a mystical tone. For example, hunters hollowed out the horns of their caught animals and used them to signal their success and location to other hunters. Eventually, the horn sound became associated with success and was used in battle to maintain formations and signal victory.

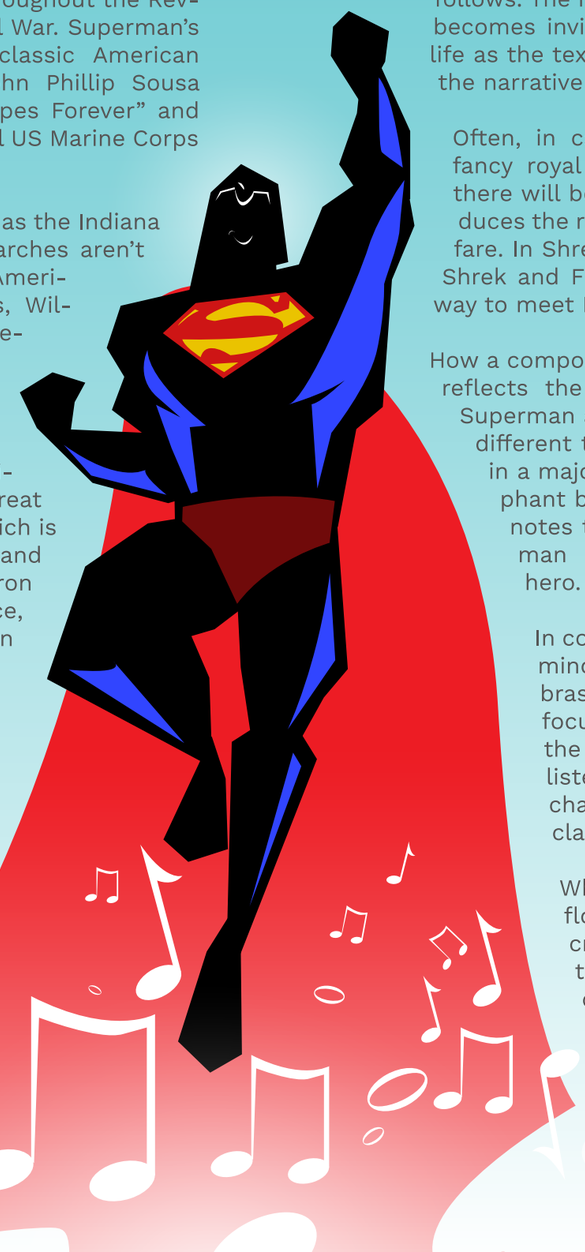
However, a memorable superhero theme musically expresses what the superhero represents. For instance, in Superman (1978), Superman stands for, "Truth, Justice, and the American Way." Composer John Williams decided to represent Superman with a march.

In American culture, martial music, or music played during a march, is everywhere from battlefields, football games, to even circuses. Martial music was originally used in a military setting on and off the battlefield. Martial music remained popular throughout the Revolutionary War and the Civil War. Superman's theme was inspired by classic American marches composed by John Phillip Sousa such as the "Star and Stripes Forever" and "Semper Fidelis," the official US Marine Corps march.

Williams also used a march as the Indiana Jones' theme. However, marches aren't always used to represent American triumph. In Star Wars, Williams used a march to represent the evil force of The Empire.

A march and brass alone don't make a classic American superhero theme. A great theme also needs color, which is known as tonality, style, and dynamics. Composer Aaron Copeland created the piece, "Fanfare for the Common Man", that changed the composing game. This piece introduced the Fanfare style effect to composing. Fanfare is a common brass and percussion coloring tactic often used to convey celebration or something important occurring.

For instance, the Star Wars theme begins with Fanfare that builds up excitement as the prologue follows. The music starts off slow and then becomes inviting and eventually bursts to life as the text speeds past the screen and the narrative begins to unfold.



Often, in cartoons and movies when a fancy royal person is being introduced, there will be a marching band that introduces the royal with grandiose brass fanfare. In Shrek 2 (2004), a fanfare plays as Shrek and Fiona are in a carriage on the way to meet Fiona's royal parents.

How a composer changes the theme's style reflects the purpose of the superhero. Superman and Batman have significantly different themes. Superman's theme is in a major key. The theme uses triumphant brass, martial form, and bright notes to show listeners that Superman is a wholesome, American hero.

In contrast, Batman's theme is in a minor key, has less reliance on brass and martial themes, and focuses on the lower register of the orchestra and band to show listeners that Batman is a dark, chaotic, twisted version of the classic American superhero.

While marches, brass, and style flourishes are common ways to create a superhero theme, there are other methods to create a superhero theme, especially if the superhero's motivation is abstract. For example, take Spider-Man. As a superhero, Spider-Man's motivation is summed up in one sentence, "With great power comes great responsibility." Although Spider-Man's motivation is a short phrase, there are several ways to represent responsibility.

In Sam Raimi's Spider-Man (2002), composer Danny Elfman decided to use a recurring leitmotif to familiarize audiences with the sound of responsibility. A leitmotif is a musical element within a score that represents a concrete aspect of the narrative. A leitmotif could represent a character, phrase, setting, or anything of significance. In the Raimi films, Elfman used a recurring leitmotif anytime Spider-Man or Peter Parker have to act responsible—deciding to not avenge Uncle Ben's death, saving the New York City train passengers, and countless other instances. After establishing the sound of responsibility, Elfman then used the leitmotif in the overall theme so listeners know that responsibility is very important to the hero's motivation.

Chances are the next superhero theme you hear will have some elements such as brass, martial influence, stylistic flourishes, leitmotifs, and more. But, there are several ways to compose a superhero theme. Perhaps when you watch the next blockbuster, you can ponder the musical elements that appear and discover something new!

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HIGH FLYING FLAGS

Writing by MOHAMAD HAZIM | Editing by FAIZAH SAADMIM & SINAIA KEITH LANG | Design by FIONA WU

You've all seen Betsy Ross' original U.S. flag design, but what about these other cool flags? Have you ever wondered how some unique flags came to be? How did other places come up with their designs? Here are seven cool flags and their origins!

Nepal: Nepal's flag is the only national flag that isn't rectangular! The two triangles represent the Himalayan Mountains as well as the country's two religions: Hinduism and Buddhism. The flag also features a sun and a crescent moon.

Sicily: Although Sicily is not its own country - it's a region of Italy - the island still has a pretty cool flag! The red and yellow flag has a head in the middle of it with thorns of wheat and three legs coming out of it!

Bhutan: This flag is similar to Sicily's in that it also has two diagonal colors: orange and yellow. Unlike Sicily's flag though, the Bhutanese flag has a black-and-white dragon in the middle known as the Druk. The Druk and his coloring symbolize purity of thought!

Brazil: Brazil's flag features a green background with a yellow diamond and a blue globe inside of the diamond. The globe has 27 stars (one for each of its states) and is divided in two by a band that states the country's motto "Order and Progress.". Only one star is above the band, representing Pará, the only Brazilian state in the northern hemisphere.

Cambodia: The Cambodian flag is one of a handful of national flags that features a building! The temple on the flag is Angkor Wat, a name that translates to "temple city" in Cambodia's Khmer language. Angkor Wat is believed to be the biggest religious monument in the world!

Lebanon: Lebanon's flag contains a tree! The Lebanese cedar tree is often mentioned in the Bible and is meant to represent living a long, healthy life while the white background represents peace. The two red bands at the top and bottom of the flag symbolize the blood that was shed while fighting for the country's independence.

Albania: Albania's flag is made up of a red background and a black, two-headed eagle. The red represents strength and courage while the eagle shows off the country's pride in its Byzantine origins!

Building Airplanes

Writing by **KYLE HUANG**
Editing by **ALHENA ISLAM** and **JANET LEE**
Design by **GRACE LEE**

Have you ever wondered what it would be like to soar through the skies? Two brothers, Wilbur and Orville Wright, once wondered the very same thing!

The Wright Brothers were determined to be the first ever humans to successfully build and fly a heavier-than-air plane! They chose to test and build their first prototype in Kitty Hawk, North Carolina because of the city's strong winds.

Wilbur and Orville got to work figuring out how to design a plane that would allow controlled flight. Controlled flight is when a pilot can control the plane's movement in 3-dimensional directions!

They began by modeling their plane's wings after that of a bird's wings, developing a concept called "wing warping," which utilizes a bird's capability to balance and control their flight. Wing warping is the twisting, or warping, of a plane's wings to control the roll. The Wright Brothers used a system of cables to control the vertical movement of their plane's wing tips to roll their aircraft to the right or left.

When you build your own paper airplane you can adjust the tips of your plane's wings up and down to make it turn to the right or the left!

However, the brothers continued having problems controlling the plane. They faced a control-reversal problem known as the adverse-yaw effect, where the plane would roll (up and down movement of the wings of the plane) in one direction but yaw (movement of the nose of the plane to the left or right) in the reverse direction, spinning it into the ground. To solve this problem, the Wright brothers designed a moveable rudder that connected the plane's roll and yaw movements. Thus, a pilot could operate both controls with a single motion!

After adding the moveable rudder, the two brothers found they had discovered the secret to human flight! On December 17, 1903, the Wright Brothers achieved the first free, controlled flight of a power-driven, heavier-than-air plane! Orville and Wilbur flipped a coin to decide who would take the first flight. Wilbur won the coin toss and flew their plane for 59 seconds over a distance of 852 feet!

How far can your airplane go?

Here are some quick tips on building your own paper airplane!

Method 1: Basic Paper Airplane

1. Fold the paper in half hot dog style.
2. Unfold and then bend the upper corners to the center line like dog ears.
3. Fold the upper edges to the center line once again.
4. Fold your plane in half along the same crease as earlier.
5. Fold the wings down to meet the bottom edge of the plane's body.
6. Throw your airplane and enjoy!

Method 2: The Buzz

1. Fold the paper in half hamburger style.
2. Unfold and then fold the top corners to the center line like dog ears.
3. Fold the tip of the plane back onto the previous fold.
4. Fold the upper sides to the center line.
5. Fold the top half inch of the plane back away from you.
6. Fold the plane in half along the first crease you made.
7. Fold both flaps out to create the wings. The body will be about a half inch tall. You may want a small piece of tape on the top to keep the wings from popping up or separating.
8. Experiment with throwing at different speeds and enjoy!

The Wright Brothers built their plane from scratch because they were amazing engineers. Maybe you could be an incredible engineer as well! Try experimenting with paper airplanes of your own design and see how far they can go!

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WINGED CREATURES of THE WORLD:

BIRDS, FISH, & SO MANY MORE!

Writing by ANUSHREE ANEJA • Design by HOLLY EAVEY
Editing by MICHELE MELINE and GRACE QIAN

If I were to ask you to name animals that fly, what would be the first ones to come to mind? Maybe a pigeon soaring across the skyline of New York City, or a seagull squawking as it ascends from the sands of a beach. Maybe it's the cardinal that comes to your backyard every day in search of bird seed, or the hummingbirds you see flitting around at the zoo. What do all of these animals have in common? They're birds! But did you know there are so many other animals besides birds that can reach these great heights? They may not have a pair of wings or fly in the traditional sense, but they have so many other ways they're able to soar through the air! And they're animals that you wouldn't even expect!

Flying Fish

The first animal is contained to the depths of the ocean rather than the clouds of the sky. These are flying fish. Over 40 different species of these unique sea creatures exist! These animals have a specific strategy for their flight. They often leap out of the ocean in order to avoid predators that may end up eating them. They don't necessarily fly in the traditional sense of flapping a set of wings and flying for miles and miles like birds do. Instead, they use strong pectoral muscles to launch themselves out of the water and glide along wind currents to keep themselves going. Sometimes, they can glide for lengths of up to 650 feet at 35 miles an hour!

Flying Snake

The second animal is one that we typically associate with slithering rather than flying. This is the flying snake that is contained to the regions of Western India and Indonesia. The snake works by first hanging off a branch, forming itself into a shape of a "J". It then curves into a concave shape and leaps off the branch, simultaneously flattening its body so it can glide through the air on its directed path to land on the next tree branch. The flying snake also uses the method of flight to escape its predators, but I think any animal that crosses its path would be pretty freaked out by it too!

Flying Squirrel

The next animal is a cute, furry critter that we may think we only see in our backyard, munching away on acorns. But there's a whole other type that flies. That's right, it's the flying squirrel! In fact, there are over 50 different flying species of this woodland creature. These animals actually look like they have a pair of wings. When they take flight, it's almost as if they are paragliding. They stretch out their limbs so that a thin layer of skin is extended outwards and acts to catch gusts of wind to carry them where they need to go. These squirrels can even go greater distances than our flying fish friends. Sometimes, they go as far as 1,500 feet. Next time you see a squirrel scampering up a tree and think about how fast it's going, just think how there's one that goes even faster through flight.

Parachute Frog

You may think this next animal only hops to get from place to place, but there are species of frogs that fly too. The Wallace's flying frogs, also known as the parachute frogs, are native to the rainforests of Malaysia and Indonesia. What's interesting about them is that they don't use a pair of wings or even their arms; they use their webbed feet to fly! Their feet also have an adhesive on the bottoms so that they can land smoothly and stick to the trunks of trees to make sure their periods of flight are stabilized.

Ballooning Spider

The last animal, but quite possibly the strangest, is the ballooning spider. It's pretty scary to think about spiders just being able to walk across a floor. It's even weirder to picture a spider soaring through the air! This arachnid doesn't use its legs but rather the silky web it produces to take it the distance it needs. This animal is truly quite extraordinary for its size as it can reach distances of up to two miles above the surface of the Earth. That's the distance from the Capitol steps to the Lincoln Memorial!

It's surprising to think about how many more animals than just birds depend on flight as their primary way of travel. It's pretty incredible that humans are able to fly with helicopters, planes, parasails, and even skydiving. But isn't it more incredible that animals without wings have adapted to soar to great heights as well? Think about that next time you see that sparrow flying outside your window!

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BIG CITY BIRDS

AND WHAT THEY TELL US

Chances are you have seen a few birds today. Maybe, there was a robin searching for food, a sparrow flying around, or some pigeons walking around on the sidewalk. While these birds are fun to watch, their behavior also reveals how your city and surroundings are changing!

Let's start with everyday pigeons, also called rock pigeons. You can recognize them by their dark, blueish-gray head, gray feathers, wings with two black stripes, and greenish-purple neck. These pigeons help show how big of an issue air pollution is within cities. For instance, more chemicals are released into the air by cars and factories in cities than in forests. Because of this fact, pigeons living in cities like Philadelphia are usually darker in color than pigeons living elsewhere. This dark color indicates that city pigeons have more of a substance called melanin in their feathers. Melanin lets the feathers absorb dangerous poisons, protecting the rest of the pigeon's body — almost like a shield! Meanwhile, pigeons living in forests do not need this protection against air pollution, so their feathers are usually lighter in color.

House sparrows are another type of bird commonly seen in Pennsylvania and can be recognized by their small size, brown and black striped wings, and gray bellies. Unfortunately, these birds often fly into the tall glass skyscrapers of the city. Sparrows cannot see glass like you can — they only see a reflection or the room inside — so they often fly right into it. From such heights, the fall can kill them. In fact, flying into windows is one of the most dangerous threats to city birds, but there are solutions! For example, some buildings have started using fritted-glass windows, or glass made with patterns like small white dots. This material lets birds know that there is something there through which they cannot fly.

Another local bird is the American kestrel. Males are orange with blue heads and wings entirely covered with black spots. Females have orange heads, brown and black striped wings, and white bellies with brown spots. These birds often perch high up on top of railroad wires or hunt in parks. Unfortunately, kestrel populations have been decreasing. Kestrels get food from open fields, so as more buildings have been built on open land in Philadelphia and the surrounding area, the number of kestrels has gone down. Efforts to help kestrel populations recover include protecting open spaces such as parks and building nesting boxes. Nesting boxes are helpful because kestrels do not make their own nests—they use nests left behind by other birds or these boxes.

These are only three of the many birds in Philadelphia, but they represent how pollution and poor city designs affect the environment. By improving building designs and preserving open spaces, these fascinating birds can continue to thrive!

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Writing by MIRANDA MENG

Design by BRYNN LILLEY

the story of ICARUS

Writing by **DAVID TODARO**
Editing by **SINAIA KEITH LANG** and **MICHELE MELINE**
Design by **GRACE LEE**

Have you ever wanted to be able to fly so high that you could touch the Sun? If you answered "yes," then you can relate to Icarus, a character in Greek mythology. However, what bad things could happen if you flew too close to the sun? What does this mean symbolically? Let's explore the ancient story of Icarus and his father Daedalus to think about these questions.

Daedalus was a craftsman and inventor known for pushing the boundaries between the mortal and divine worlds. He invented things that changed the way Greeks lived, including the ship's sail and mast and the first dance floor. However, Daedalus often let his pride get the better of him. For instance, he was sent to Crete as punishment for the murder of his nephew Talus, committed out of jealousy for his invention of the saw and compass. During his time in Crete, he further abused his role as a mortal when he helped King Minos' wife give birth to the minotaur (half-human, half-bull) that was the result of a love curse placed upon her by Poseidon. In frustration and rage, King Minos forced Daedalus to build an inescapable labyrinth to lock away the minotaur and then decided to trap both Daedalus and his son Icarus atop a tower forever.

Like helping with the birth of the minotaur, Daedalus used his intelligence and wittiness as justification for completing tasks that mortals normally couldn't. He used the birds he observed during his time on top of the tower as inspiration for a contraption he would make to get both himself and his son Icarus to freedom. Using wax and feathers, Daedalus was able to create wings, but they came with important responsibilities. Daedalus warned his son Icarus that flying too close to the Sun would cause the wax to melt while flying too close to the ocean would increase chances of being swallowed up by the sea. Icarus, like his father, however, underestimated his own capabilities and pridefully chose not to follow his father's path during the excitement of the flight. He flew too close to the Sun and ultimately perished as he fell into the sea and drowned.

This story led to the popular idiom "don't fly too close to the Sun." The meaning behind this phrase comes from Icarus's recklessness and ignorance of his own limitations. Given that both he and his father Daedalus were mortal, they were already testing the limits by being able to fly. Nevertheless, Icarus' carelessness when it came to following his father's instructions led to his ultimate downfall. This was a clear display of hubris, which is when someone has too much pride for their own good! An example of where this idiom is put into practice is with leadership opportunities. When someone is put in a position of power, it is in their best interest to be bold and excited about a project they may be working on, but it can be bad if they let this go to their heads. The idea of not flying too close to the Sun therefore involves knowing your limits and sticking to them. Only then can you soar to your greatest potential!

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How Planes Fly!

Writing by **RICHA PATEL** • Design by **VANESSA LIEW**
Editing by **JANET LEE** & **ALHENA ISLAM**

Every time you look up at the sky, chances are that you'll see something flying around. Maybe it'll be a bird, stretching its wings wide, or it's a plane zooming across the sky. Airplanes are thousands of times bigger than birds, and yet they can travel with the same amount of ease. How exactly do these big, bulky, metal gadgets manage to lift off into the air and bring so many of us all the way across the world?

The answer is actually pretty simple.

Airplanes are built of three main parts. First, is the airframe — the structure of the plane. That includes the wings, the tail, and all of its body. The airframe is usually made up of metal like aluminum or magnesium. What's interesting about these pieces of the plane is that they're made to move! The wings can grow larger or smaller based on their folds, which helps it balance in the air. Meanwhile, the tail has stabilizers that can move up or down and stop the plane from shaking from side to side.

Another part of the plane is the power system; here, the engines turn to move the plane forward. This is called thrust. This works alongside the flight controls inside the plane, which allows the pilot to steer the plane and make sure it gets to the right destination! These also let the pilot control the other parts of the plane, like the wings, tail, and power system.

But how exactly does the plane launch into the air? Gravity drags them down with a force called weight. But once the engines start to roar and the plane begins to roll down the runway, the wings go into action. They are curved at the top and flat on the bottom, which means that the air travels differently between the two parts of the wing. Because of this difference in path and shape, the air underneath the wings will be able to hold the plane up with a force called lift. This is a theory called Bernoulli's Principle.

Think about pinching a water hose. When you block off part of the opening, there's less space for the water to get through and it'll try to pass through the opening faster. When it's open, it'll go through slower because it experiences less resistance. The faster the air moves, the lower its pressure will be. If the pressure on the bottom outweighs the pressure on the top, it'll be as if the air is holding the plane up. Then, the plane can fly!

As the plane continues to move through the air, though, the air wants to push back against the plane's movement. Imagine what you'd feel if you were to stick your hand out of a moving car window: this is a force called drag. This is where the engines come into play yet again, because they push the plane forward through the air past the drag.

We know that airplanes are large and heavy, though, so how are they staying up? The pilot can change the amount of lift that the airplane has by opening holes in the wings or lifting up flaps. When they raise these flaps, the amount of lift that the plane has changes, and the plane can start to fall or rise again. It's like moving a ping pong paddle through a swimming pool horizontally — you'll be able to do it fine. But if you tilt the paddle diagonally, the paddle will try to move upward toward the surface. In this case, air is water and the plane is the paddle.

The next time you catch a plane soaring through the sky, or maybe sit in one yourself, remember what's keeping you up: lift (which lifts up the plane), drag (which drags the plane back), weight (which weighs the plane down), and thrust (which pushes the plane forward). And, of course, you can't forget the pilot!

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FLYING IDIOMS

Writing by SADIE SMITH | Editing by TED DAVIS & SINAIA KEITH LANG | Design by FIONA WU

Have you ever wondered how some of our most common phrases — called idioms — come about? Idioms are made up of words that seem like they mean one thing but actually represent something else. They are figures of speech like metaphors and oxymorons. For instance, when we say, "It's raining cats and dogs," we don't literally mean that cats and dogs are falling from the sky.

Instead, we mean that it is raining really hard. Idioms make spoken and written language more whimsical and fun. Many even have to do with flying. They use imagery such as soaring through the sky in order to make comparisons between ideas and more vivid descriptions.

On the fly

The idiom, "on the fly," means to do something while in motion. It can also mean that something is rushed or being done at the last minute. It is typically used to describe someone who is not being careful about what they are doing.

Fly on the Wall

A "fly on the wall" is someone who observes or spies on a situation without being seen.

Pass with flying colors

To "pass with flying colors" means that someone has been really successful. People often use the phrase when someone has gone above and beyond in their effort in achieving a goal.

When pigs fly

The phrase "when pigs fly" is used to describe something that will never happen. For example, if someone says they will never go skydiving, they might say, "I will go skydiving when pigs fly!"

Flying high

The idiom, "flying high," usually means that someone is in a state of happiness. They might be "flying high" if they feel successful or otherwise joyful.

Fly the coop

Finally, to "fly the coop" means to leave or escape from something.

Listen for these flying idioms in different contexts. You'll probably hear them quite often! And, remember, idioms don't literally mean what they say. Instead, they represent something else.

DIFFERENT TYPES OF CLOUDS

Writing by SHUNMEL SYAU | Editing by FAIZAH SAADMIM & JANET LEE | Design by EJUN HONG

Look up! Gaze at the sky! Do you see the clouds that look as fluffy as a stuffed animal? Or, maybe the clouds are so ferocious they even block out the sun. Have you ever wondered what different types of clouds exist? Clouds come in so many different shapes and sizes, all of which are associated with different weather patterns. If you get the chance, go cloud gazing and try to identify the following types:

ALTOCUMULUS

Grayish-white clouds that tend to clump together. If you see these in the sky — even on warm, humid mornings — watch out for thunderstorms.

ALTOSTRATUS

Gray or blue-gray clouds that look like a haze covering the sky. These clouds could signal incoming storms of rain or snow.

STRATUS

Gray clouds that cover most, if not all, of the sky. They can bring a mist or drizzle.

STRATOCUMULUS

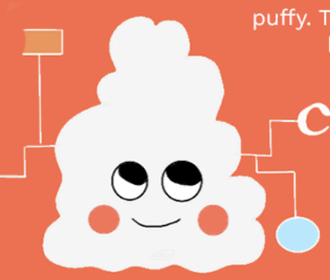
Gray clouds that look bumpy. They can be in rows or spread out across the sky. Bring an umbrella in case of light rain!

NIMBOSTRATUS

Dark gray clouds that can cover all of the sky. These clouds can bring rain or snow.

CUMULUS

White or light gray clouds that look large and puffy. These are indicative of rain if their tops look particularly bumpy (like broccoli).



CUMULONIMBUS

Clouds that appear very tall and full-bodied, taking up much space in the sky. They're clouds warning you of thunderstorms and potential severe weather.

Who knew there were so many categories of clouds? The appearance of clouds doesn't necessarily mean an incoming storm or rain. As you've seen, clouds can appear on a sunny day, too. All in all, these are just some of the common types of clouds and their potential signals.

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HUMANS WHO CAN FLY

Writing by SAM HIRSHHORN | Design by MINJU KIM
Editing by MICHELE MELINE and TED DAVIS

Have you ever wished you could fly? Does the idea of sailing through the atmosphere at 15,000 feet above Earth's surface sound exciting? For skydivers, this dream is reality! Skydiving, also known as parachuting, is an extreme sport where risk-seeking participants launch themselves from a plane and, with the help of a parachute, fall safely down to Earth's surface.

The earliest origins of skydiving trace back to 12th century China, where athletes began using parachute-like equipment to jump safely from cliffs. The modern parachute was not invented until 1797, when Andre Jacques-Garnenin created a canopy out of canvas and used suspension cords to attach it to a basket. The first recorded free-fall jump was performed by Leslie L. Irvin in 1919, and parachuting gained popularity after its use in World War II as both an invasion and escape tactic. One of the most well-known instances of parachute usage in World War II was during the Allied invasion of Normandy, France, also known as D-Day. Following the war, parachute jumping became a popular activity among military personnel that eventually spread to the rest of the population. Today, skydiving is both a professional sport as well as an exciting attraction for ordinary, thrill-seeking people. It is estimated that around 350,000 people perform approximately three million flights each year!

Skydiving can be divided into three major parts: freefall, parachute floating, and landing. Each part is equally important for a successful trip down to the ground. The freefall phase occurs immediately after the skydiver jumps out of the plane. At this point, the parachute is still closed, so the skydiver feels as if they are falling freely to the earth. Skydivers in free fall travel at an average speed of 200 feet per second! This is the part of the trip that is most exciting since it allows the skydiver to achieve the weightless, flying feeling for which the sport is known. Next, the skydiver opens their parachute and enters the second phase. The skydiver begins to slow down in order to safely land. Skydivers describe this stage as feeling as if they are floating slowly to the ground. Lastly, after slowing down to a safe speed, the skydiver adjusts their legs into a seated position and lands bottom first! In order to successfully accomplish these three phases, skydivers must consider many different factors including proper equipment, a flat surface for landing, and clear weather conditions.

One interesting aspect of skydiving is the science behind it. The skydiver must time their parachute-opening perfectly, which requires understanding the physical workings of the skydiver's flight. The two most important physics concepts a skydiver must consider are air resistance and gravity. Air resistance is the force that acts upwards against a falling skydiver. To help remember this component, you can think of the name as signaling that the air "resists" the falling skydiver's motion, pushing the skydiver upwards. Gravity, on the other hand, is a force that pulls all objects towards the center of Earth. Imagine you are holding an ice cream cone and accidentally let go. What happens? It falls! This result is from gravity acting on your dessert. In the case of skydiving, gravity acts to pull the skydiver down towards Earth. A skydiver's most important job is to balance the pushing force of air resistance and the pulling force of gravity. The skydiver wants gravity to propel them down to Earth but also for air resistance to make sure the fall is not too fast! For this reason, it is important to open their parachute at precisely the right time! When the parachute opens, it adds air resistance to the falling skydiver that slows down the flight for a safe landing. You might be wondering: where is that sweet spot? The average time when skydivers open their parachutes is 45 seconds into free fall.

Now that you know all of the details about skydiving, do you want to try it? The good news is just about anyone can skydive! All legal adults over eighteen years old are eligible to participate in the US. If you cannot wait until you turn eighteen (or if jumping out of a plane simply is not for you), you can try indoor skydiving! Companies like iFly have created indoor wind tunnels that simulate skydiving without the risk. With permission from your parents, you can skydive indoors. So would you try skydiving?

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IT'S MORE THAN JUST A RUG!

ALADDIN'S MAGIC CARPET

Writing by ROBIN HU
Design by EJUN HONG
Editing by ALHENA ISLAM and GRACE QIAN

A thousand years ago, a legendary sorcerer and carpet maker named Khuriya created 100 magical carpets, each distinct in color and pattern. Before his passing, Khuriya ordered for all 100 of these carpets to find masters to serve in the world. One of these carpets, the Magic Carpet, found his way into the Cave of Wonders, a hidden cavern filled with riches and magical artifacts, including the Genie's magic lamp. The Magic Carpet was trapped in the treasure room, waiting for the day when he would meet his master.

One day, the charming Aladdin and his fun-loving monkey Abu found their way to the Cave of Wonders in search of the Genie's magic lamp. In the cave, they encountered the Magic Carpet. While Abu was initially reluctant to agree to letting the Magic Carpet join their group, the trio eventually become best friends. As the Magic Carpet helped Aladdin and Abu escape the cave after locating the wish-granting Genie's magic lamp, the cave began to tremble. The Magic Carpet was pinned by a falling rock but he escaped just in time to save Aladdin and Abu. The trio were ultimately trapped in the cave until they rubbed the Genie's magic lamp to unleash a Genie. With the Genie's help, the trio finally exited the cave and soared into the sky.

Unlike the typical carpet found in any home or store, the Magic Carpet flies around the sky, carrying Aladdin on his magical trips, possessing a human-like level of loyalty, adventure, heroism, and care. The Magic Carpet is noticeably intelligent and perceptive, able to figure out what is going on before Aladdin's other companions.

It is the Magic Carpet's compassion that stands out the most. The Magic Carpet serves as Aladdin and Abu's companion. His kindness and willingness to help his friends forms the foundation of his undeniably strong bond with Aladdin. While Aladdin spent much of his childhood scraping for food and stealing to survive, Aladdin's good heart motivates him to donate the things he steals to others in need. But Aladdin's poor upbringing left him feeling worthless and undeserving of love, particularly that of Princess Jasmine. The Magic Carpet helps Aladdin win the heart of Princess Jasmine and save the kingdom from evil forces.

While this is the story of the Magic Carpet in the story of Aladdin, the Magic Carpet is a common character found in other fantasy stories. For example, in One Thousand and One Nights, a collection of Middle Easter folktales, Prince Husain travels to Bisnagar in India and purchases a magic carpet. In another story, King Solomon, already a powerful monarch, was given a green and gold flying carpet which allows Solomon to travel incredibly long distances and carry thousands of men at a time. Unlike Aladdin's Magic Carpet, which is presented as a loyal friend, the magic carpet for Solomon is added power. There are many variations of the magic carpet in fiction stories, but the significance of the magic carpet is clear.

From his creation a thousand years ago to his daily adventures with Aladdin, Abu, and Princess Jasmine, Aladdin's Magic Carpet is more than a legendary form of transportation. Aladdin's Magic Carpet is a symbol of adventure and exploration. Hopefully, you can find your own magic carpet to guide you as you soar around the world on a magic carpet ride!

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THINGS TO SPOT IN THE NIGHT SKY

Writing by LEAH LEVIN Design by BAYLEY EAVEY
Editing by JANET LEE and LUKE ELEGANT

VENUS

Also known as "Earth's twin," Venus is the closest planet to Earth and is very similar in size. It is the second planet from the Sun, and its thick atmosphere also makes it the hottest. Unlike Earth, which spins in a counterclockwise direction, Venus rotates in a clockwise direction, called retrograde. It takes 243 days for Venus to complete one rotation around Earth and 225 days to complete rotation around the Sun. This makes Venus's days longer than its years! Venus is also the brightest planet in the night sky. It emits a bright yellow-white light, which can be best seen closely after sunset.

METEORS

Meteors, also known as shooting stars, are streaks of light we see in the night sky. They appear when meteoroids, pieces of rock from space, enter Earth's atmosphere. The brightest meteors are called fireballs. Meteoroids that successfully reach the ground without burning up are called meteorites. The largest meteorite on Earth is the Hoba Meteorite in Namibia, Africa, and it weighs 60 tons! The best time to spot a meteor is during a meteor shower. The Perseid Shower, one of the easiest to find in the Northern Hemisphere, peaks on August 12. Look to the Northeast on this day to catch up to 100 meteors falling through the sky per hour!

MOON

The Moon is the brightest and largest object in the night sky, and it is the only place in space where humans have set foot. Because of its unique rotation, we only ever see one of its sides. There are eight phases of the moon, including the waxing crescent and full moon, which are determined by Earth's position between the Sun and Moon. In a total lunar eclipse, the Earth blocks all sunlight, casting a red shadow on the moon. This is commonly called the Blood Moon, and it occurs about twice a year.

SATELLITES

A satellite is an object that orbits, or circles, around a body in space. The International Space Station, about the size of a football field, is the largest man-made Earth orbiting satellite! It belongs to five organizations from 15 countries. Astronauts have traveled to the station since November 2000 to conduct research and rest during their travels. At the station, astronauts have collected data on more than 100 billion particles from space. The station orbits the Earth every 90 minutes, so it travels around the Earth 16 times per day. It is best seen from Earth before sunrise and after sunset, and it will appear like a bright streak of light, moving faster than an airplane across the sky.

BIG DIPPER

Asterisms are small patterns of stars, and they typically make up larger clusters called constellations. The Big Dipper, a well-known asterism, is part of the third largest constellation, called Ursa Major. The Big Dipper is also known as the Plough and the Saucepan, and it is composed of seven stars. Three stars form the "handle," and four form the "bowl." This asterism is also a compass. Once you find the Big Dipper, you can draw and extend an imaginary line connecting the two rightmost stars of its bowl. This line will connect to Polaris, the North Star, which is located at exact North!

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FLIGHT in THEATER

Writing By **JULIET DEMPSEY**
Editing By **ALHENA ISLAM & FAIZAH SAADMIM**

"A whole new world,
a dazzling place I never knew.
But when I'm way up here,
it's crystal clear
that now I'm in a whole new world with you.
Now I'm in a whole new world with you."

Dashing across the resting night sky, past the glowing pinks and oranges of the setting sun, over the Egyptian pyramids and the vast Arabian desert, Aladdin and Jasmine see the "unbelievable sights" of "a whole new world" from their magic carpet ride.

The animators who created the magic carpet scene in Aladdin were able to draw and animate Aladdin and Jasmine flying and soaring across the sky to bring the magic to life. But how does the magic carpet fly in the play version of Aladdin that is performed live in theaters like on Broadway? The techniques and machines that create the illusion of flight go back almost 2,500 years to the ancient Greek theater in the 5th and 4th centuries BCE!

The terms used to describe the flight machinery in Greece were mechane or aiorima. These machines were cranes made of wooden beams and pulley systems that could lift people or objects up into the air. Also, often referred to as "Deus ex Machina", or God from the machine, the pulley system was used to bring the Greek Gods—like Zeus, Athena, and Aphrodite—into the play so they could share their wisdom and help the characters fix their tragedies.

Look out for the term "Deus ex Machina" in the world! It can be used to refer to a situation where someone or something dropped in at the last minute to fix a problem! For example, "The hero's sidekick swooped in at the last minute as the deus ex machina to save them."

Today's theaters use fly systems also called theatrical rigging systems. These systems are very similar to the ancient ones. They share the foundational concept of raising and lowering items with a pulley system. However, these modern ones are far more advanced because of the technology and materials available in the world today.

As for Aladdin's magic carpet, it's still a mystery! The cast and crew have been sworn to secrecy over the magic of the carpet's flight. Is it a motorized drone? Are there fans propelling it in the air like a rocket? Wires dangling it from the ceiling? Magic?! For now, the theater's curtains veil the secrets behind the carpet's mechanisms. What do you think?

"Soaring, tumbling, freewheeling
Through an endless diamond sky"

Design By **CHEAVLAY PHAT**

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SUPERSONIC FLIGHT AND THE CONCORDE

Writing by EMILY SHENG • Editing by GRACE MARTENS • Design by ANGELA SONG

How fast do you think planes can fly? Can planes fly faster than the speed of sound or even the speed of light? While nothing can travel faster than the speed of light, supersonic flight is when you travel through air faster than the speed of sound. The speed of sound is also called Mach 1 and it depends on the pressure and temperature of the surrounding air. When it's 68 degrees Fahrenheit outside on the ground in Philly, sound travels at 767 miles per hour—or one mile in 4.7 seconds!

The first supersonic flight was on a Bell X-1 rocket plane in 1947. Rocket planes are first powered by rocket engines for a few minutes, and then they glide down like a paper airplane. Later, many military aircraft were built for supersonic flight, but the first supersonic airplane that anyone could buy a ticket on was the Concorde, built and invented in 1976.

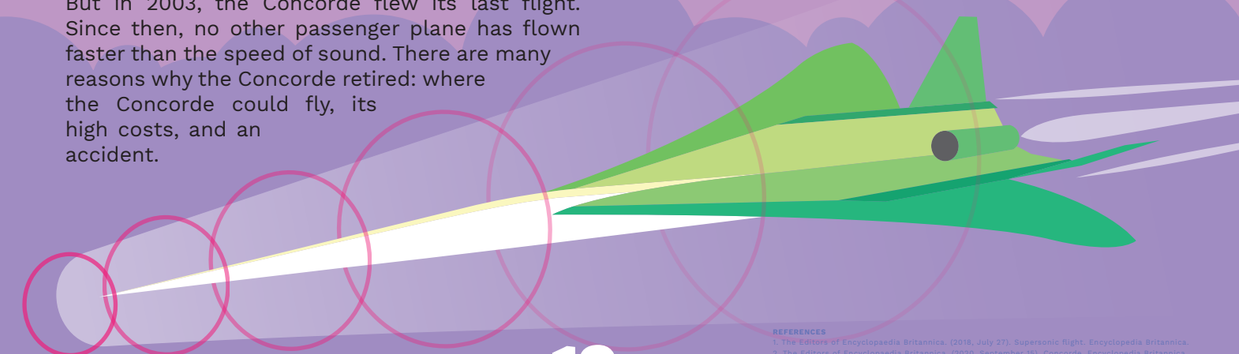
The Concorde was created from a partnership between the British and French governments after more than ten years of research. It crossed the Atlantic Ocean, connecting cities like New York City and Paris. While other passenger planes fly around 570 miles per hour, the fastest the Concorde could fly was 1,354 miles per hour. In other words, the Concorde could fly at more than twice the speed of sound! This meant that you could fly from London to New York City in about three hours, a trip that usually takes about eight hours.

But in 2003, the Concorde flew its last flight. Since then, no other passenger plane has flown faster than the speed of sound. There are many reasons why the Concorde retired: where the Concorde could fly, its high costs, and an accident.

Traveling at supersonic speed causes a sonic boom, which sounds like a super loud explosion or thunderclap. This shock wave is created by air molecules being pushed really hard together in front of the plane like a boat paddle creates a wave in the water. These loud noises meant that the Concorde could not fly over where people lived. The Concorde could also not fly more than 4000 miles because it burns a lot of fuel to fly so fast. This flight range meant it could not fly across the Pacific Ocean to connect cities in America and Asia.

The research costs to build and operate the Concorde were so high that the British and French governments never profited. Plane tickets were also very expensive. A one-way ticket from London to Washington, D.C., cost about $575 in 1977, or $3245 in 2021. In 2000, a Concorde flight from Paris to New York City disastrously crashed and all 109 passengers died.

Today, there are many startups (newly created businesses) that focus on creating new supersonic passenger jets that try to fix some of the Concorde's problems. For example, research is being done to turn the sonic boom into a sound like closing a car door so the planes can fly over land. With this research, maybe one day, we can fly faster than the speed of sound on vacations again.



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SOARING THROUGH TIME AND SPACE

Writing by SRUTHI SRINIVAS • Design by BAYLEY EAVEY
Editing by GRACE QIAN & LUKE ELEGANT

Black holes, defined as parts of space where gravity is so powerful that not even light can escape them, are quite fearsome. When you think of a black hole, you generally think of a vacuum - swiping up everything around it, chomping on stars. That's not too far from the truth, though scientists often describe black holes to be less active than that, since they're too massive to move.

That description is because of basic principles set by physicist Isaac Newton way back in the late 1600s. Newton's first law of motion emphasizes that an object that is at rest will remain at rest unless acted on by a large enough outside force. And for an object as large as a black hole, well, there aren't a lot of outside forces that are up to the task of moving it, so we're likely not going to see one flying towards Earth anytime soon.

But say you were able to find a black hole regardless and jump through one - what would happen? Based on the theories we have so far, a person could soar through one and move so far that they end up moving backwards in time.

To make a bit more sense of that idea, we need to look at another set of old theories laid out by a scientist named Albert Einstein. His revolutionary theory of general relativity states that large enough items can bend the space-time fabric and connection that exists all around us, which we observe as gravity. When you bend something, like a rubber ruler for example, you decrease the distance between its two opposite ends — in space, that's decreasing the distance between the passage of time itself.

Astrophysicist Ethan Siegel calls this "time dilation." The further you move in a black hole, and the faster you move in a black hole, the greater your traveled space, and the less your traveled time. But how far, really, could you go back in time using this apparent phenomenon?

Sadly, there are limits — if a wormhole (like a black hole, but one that doesn't lead to a dead end when you travel through it) was made forty-five years ago, and someone decided to enter it now, they could travel back to the 1970s and not a decade earlier. It doesn't seem like we'll be able to hang out with the dinosaurs anytime soon. However, the fact that any idea of time travel isn't just a fantasy anymore means that the possibilities are endless, so who knows? Might as well get your caveman outfit ready just in case.

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THE STORY OF
EVEL KNIEVEL

Writing by GRACE MARTENS • Editing by EMILY SHENG • Design by ANGELA SONG

Evel Knievel was a stunt performer that amazed thousands of spectators in the mid-20th century. He performed over 300 dangerous and exciting motorcycle jumps during his 15 year-long career. In his first stunt, Evel jumped over a 20-foot-long box of rattlesnakes and 2 mountain lions. Even with the snakes hissing and the mountain lions growling below him, Evel was able to successfully land and launched his career as a stuntman.

After this first success, Evel decided to put together a daredevil show and invited fans to come and see his incredible stunts. In his first official performance at the National Date Festival, Evel jumped over two entire pick-up trucks, a stunt about 45-feet long. The audience was stunned, and Evel's popularity quickly grew.

Evel began to travel all over the world to perform crazy stunts dressed in his iconic red, white and blue leather jumpsuit. His performances became more thrilling and even riskier as the years went on. In 1971, he cleared a total of 19 cars which were lined up to be 129 feet long! But this wasn't even his longest jump! Evel's longest successful stunt was soaring over 14 Greyhound buses that stretched over 163 feet! After this performance, Evel held the record for jumping the most buses on a Harley-Davidson motorcycle for 24 years.

However, not all of Evel's stunts were successful. He had many crashes, resulting in a total of 433 broken bones and countless bone fractures. But, Evel became even more famous for his crashes! When jumping over the fountains at Caesars Palace in Las Vegas, Evel did not fly far enough and crash-landed. Even though he had a broken pelvis, a broken femur, four fractures, and a concussion because of this crash, this jump is still known as the most famous motorcycle crash in history.

Crashes like these did not stop Evel from inspiring and surprising fans for years, and even influenced him to become a huge supporter of helmet safety. During the time Evel was alive, not everyone wore a helmet when they rode a motorcycle. So, Evel appeared in a few public safety videos encouraging riders to stay safe by always wearing their helmets. In 1987, Evel also publicly supported the adoption of a new law in California that would require all motorcycle riders to wear a helmet.

Evel Knievel was one of the most dazzling daredevils who soared to amazing heights during his career! He was determined to achieve his goals, and always thought it was important to keep his word. If Evel promised to try a new stunt, he would always follow through with it. Even when he thought that a stunt was too risky or very difficult, he persevered and worked hard to make it happen.

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HE SOARED OVER WHAT?!

Soaring High & Low on ROLLERCOASTERS

Writing By **SHIVANI PATEL**
Editing By **GRACE QIAN & MICHELE MELINE**

If you have ever been on a roller coaster, you have certainly experienced what it feels like to soar in the air! Roller coasters often bring you this thrill by flipping you upside down or letting you fall freely. How do they do this while keeping you safe?

Different types of energy are responsible for a roller coaster's movements. When still, energy in the cars is in the form of potential energy, and when moving, the energy is a combination of potential and kinetic energy. Potential energy is energy that is kept in an object because of its position while kinetic energy is energy that an object has due to its motion. There are different forces, or push or pull, on the object that can change how fast it moves. The force that pulls the roller coaster down to the ground is called gravity. Countering this force is the force due to the acceleration, or changing velocity, of the roller coaster. All of these forces add or subtract from the total force, causing the roller coaster to move.

The loop-the-loop in a roller coaster acts similarly to a merry-go-round: initially, while gravity keeps you on the tracks, the force that is inputted to move the ride can sweep you forward, allowing you to inch up the loop. When you are completely upside down, now gravity is pulling you downwards while the acceleration is keeping you on the tracks! A combination of these two forces guides you to complete the loop. Passengers often feel weightless due to these competing forces. Depending on how small the loop is, the acceleration force can change, allowing you to feel more or less weightless. An interesting fact is that you would likely stay in the roller coaster seat even if there was no harness or seat belt! This is all due to physics and these special forces.

For roller coaster rides that drop freely, physics also dictates the feeling and safety of the ride. The weightlessness, similar to a loop-the-loop, is caused by the gravitational and acceleration forces. If there was no acceleration force, you would just crash into the Earth as you made your way down. Unlike the loop-the-loop, the harness is definitely necessary, as the gravitational force pulling you down is not as large as that of the seats. Therefore, you would not make it to the ground at the same time as the seat.

Overall, roller coasters allow us to touch the sky and soar amongst the clouds due to the harmony of different forces through physics! Next time you reach these heights, think about what is making your stomach feel funny while keeping you intact throughout the ride.

Design By **CHEAVLAY PHAT**

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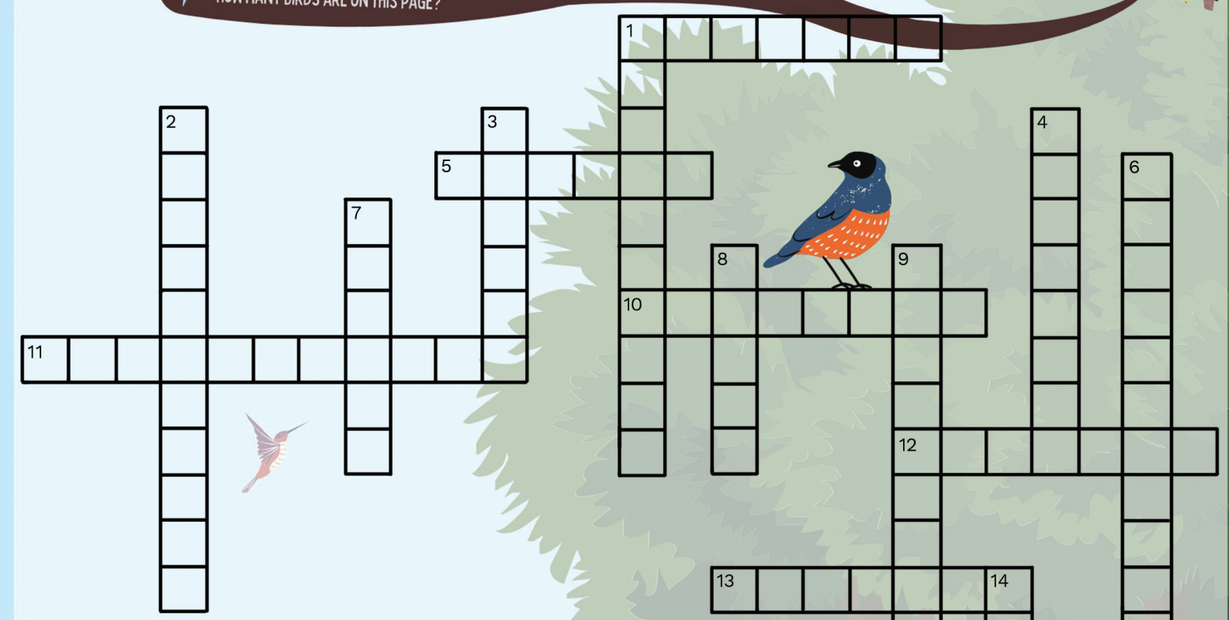
CROSSWORD PUZZLE

DESIGNED BY SYDNEY EAVEY

HOW MANY BIRDS ARE ON THIS PAGE?



ACROSS

1. A style of music that uses brass and percussion to convey celebration or something important is occurring
5. This country's flag has a blue globe that has 27 stars
10. The first phase of skydiving
11. The object that Aladdin uses to soar through the night sky
12. Energy that an object has due to its motion
13. White or light gray clouds that look large and puffy

DOWN

1. This animal leaps out of the ocean in order to avoid predators
2. An expression that describes something that will never happen
3. These brothers successfully flew the first heavier-than-air plane
4. The first supersonic airplane that the public could buy a ticket for
6. A stuntman that jumped over 14 Greyhound buses!
7. The character in Greek mythology that flew too close to the Sun
8. This planet is also known as "Earth's twin"
9. A part of space where gravity is so powerful that light cannot escape it
14. A local Philly bird that has brown and black striped wings with a gray bell

What happens when you wear a watch on a plane?
TIME FLIES

What's the difference between a fly and a bird?
A BIRD CAN FLY BUT A FLY CAN'T BIRD

What kind of pet did Aladdin have?
A FLYING CAR-PET

What do you call a sheep with no legs?
A CLOUD

SOAR MADLIBS

DESIGNED BY SYDNEY EAVEY

Dear _____ (**noun**),

Today I'm packing for my first ever plane trip to visit grandma in Alaska. I can't wait for this vacation!

My mommy told me that the government has super strict rules about what we can and cannot bring on the airplane. She told me that my _____ (**noun**), _____ (**noun**), and tablet can go in my backpack, but I can't bring _____ (**adjective**) juice or _____ (**noun**)! Won't I be thirsty and get _____ (**noun**) ? My sister told me to just pack everything I want anyways. She is really _____ (**noun**) and I always trust her.

As daddy _____ (**verb**) us to the airport, I look outside the car window and see these large planes soar so close to the _____ (**noun**). How do they not _____ (**verb**) into the ground? What holds them in the sky like _____ (**noun**) that fly? Would I _____ (**adverb**) be flying up in a plane today?

I stared at the _____ (**adjective**) screen by the _____ (**adjective**) machine. The security scanning machine was really _____ (**adjective**) and could identify every single thing I packed. It was like I had _____ (**adjective**) vision!

My mom was right about the security check and my sister was wrong. They took away my juice _____ (**noun**) and my _____ (**noun**). I guess I can't use them or show my grandma how _____ (**adjective**) the things I have are.

Well, I'm still _____ (**adjective**) for this trip! After we left behind our forbidden bug spray and body lotion, we _____ (**adverb**) made it to the boarding gate. I can't wait to soar into the sky and fly at _____ (**number**) miles per hour!

From,
_____ (**your name**)

How many airplanes are on this page?

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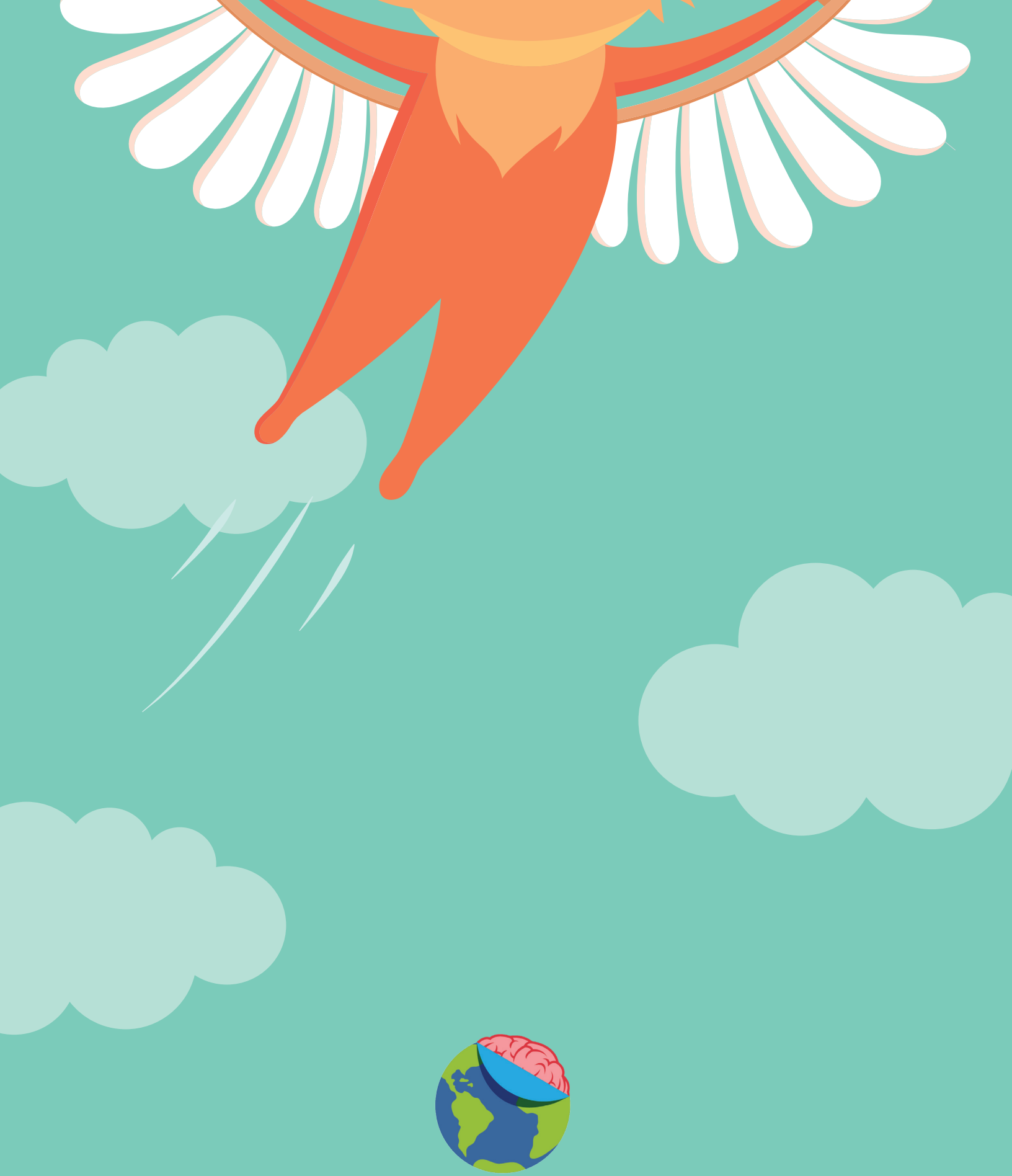

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