
DK
The Magic of
Seasons
A Fascinating Guide
to Seasons Around the World
VICKY WOODGATE

THE MAGIC OF SEASONS

Written and illustrated by
Vicky Woodgate

About this eBook

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CONTENTS

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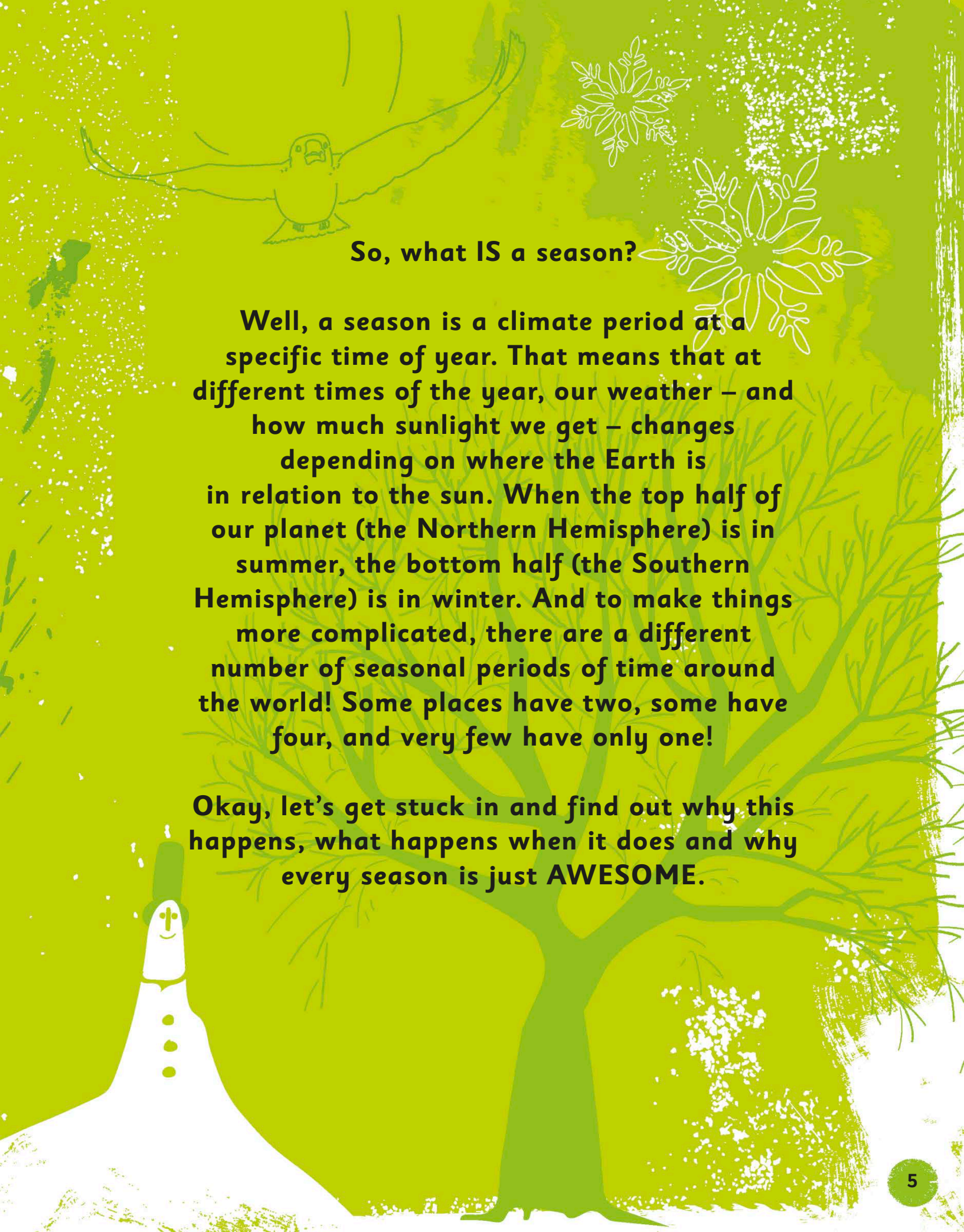
The largest snowball fight EVER involved 7,861 players!

WHAT ARE SEASONS?

The purrrfect weather expert

Cats are very good at predicting changes in the weather. This is Mimi cat, she will accompany us on a seasonal adventure across our planet.



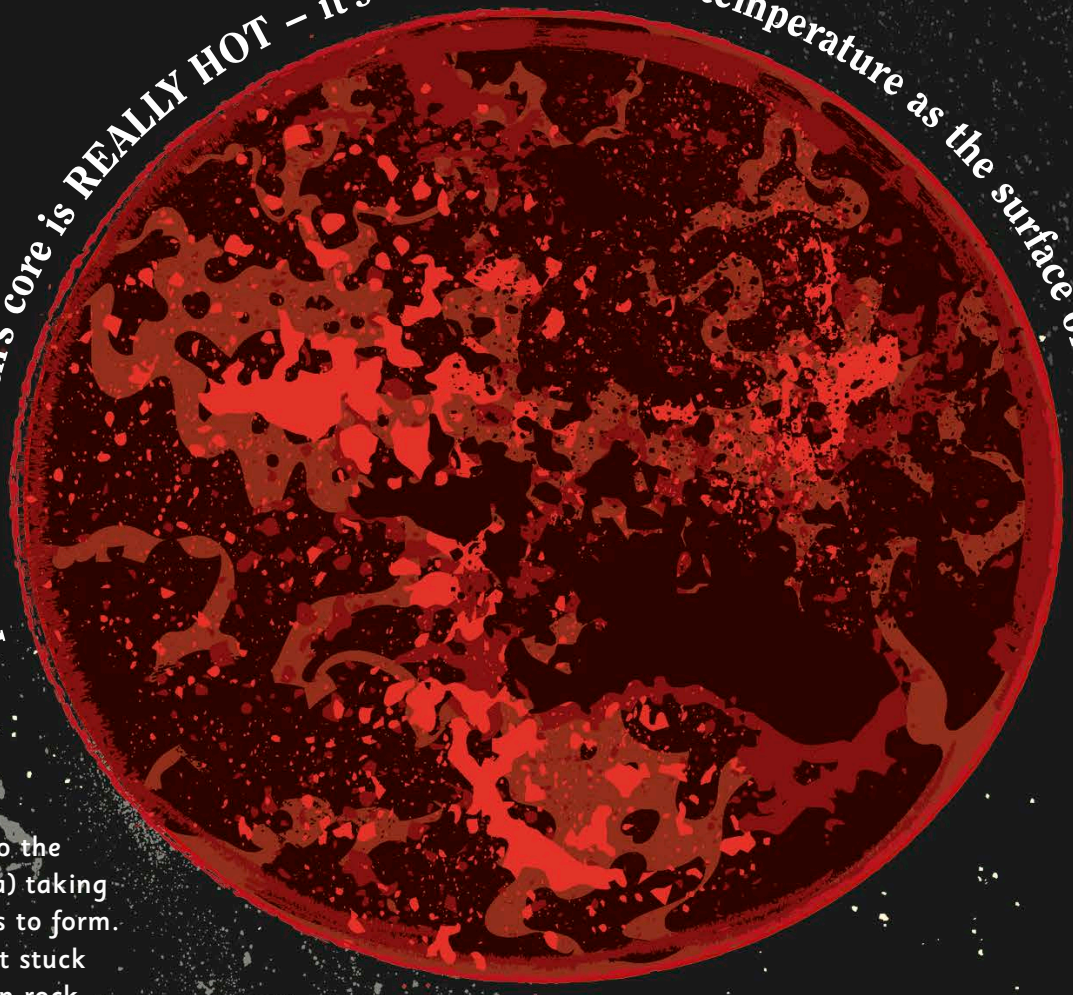
So, what IS a season?

Well, a season is a climate period at a specific time of year. That means that at different times of the year, our weather – and how much sunlight we get – changes depending on where the Earth is in relation to the sun. When the top half of our planet (the Northern Hemisphere) is in summer, the bottom half (the Southern Hemisphere) is in winter. And to make things more complicated, there are a different number of seasonal periods of time around the world! Some places have two, some have four, and very few have only one!

Okay, let's get stuck in and find out why this happens, what happens when it does and why every season is just AWESOME.

HOW IT ALL BEGAN

Around 4.5 billion years ago, our Earth was a very young planet when Theia, another planet, collided with it. Theia's iron core merged with the Earth, turning them into one big planet made of molten rock. Some scientists think that the water we have on Earth originally came from Theia and that debris from the impact created our Moon.

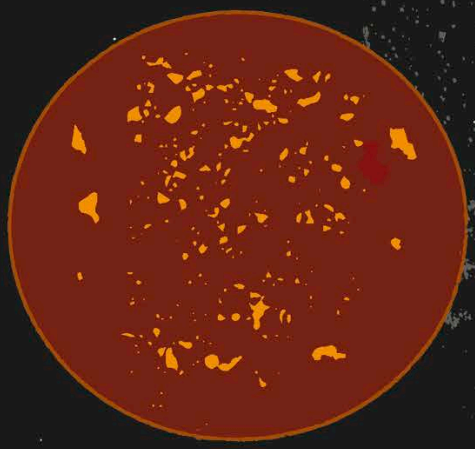


Proto-Earth

Recent thinking points to the early Earth (before Theia) taking around five million years to form. Clumps from cosmic dust stuck together to create molten rock. Though five million years may seem like a long time to us, for a planet that is REALLY fast!

BLAST!

The force of the impact that brought these planets together was around 100 million times stronger than the asteroid crash that hit the Earth 66 million years ago, wiping out the dinosaurs!

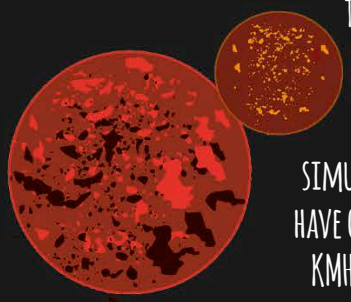


Theia

This planet orbiting our sun was around the size of Mars. Some theories say that gravitational pulls from Jupiter and Venus may have caused it to collide with our very young proto-Earth.

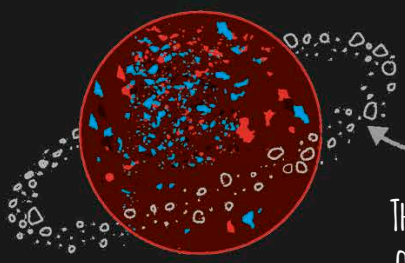
Mimi says...

"As we were not there (after all it was a LONG time ago), we can't be completely sure what happened, but this is the most widely accepted explanation to date."



Scientist computer simulations show that Theia may have only been travelling at 14,323 kmh (8,900 mph) when she struck Earth at a 45% angle.

Theia merged into proto-Earth, our earth. Parts of Theia are thought to be in the Earth's mantle.



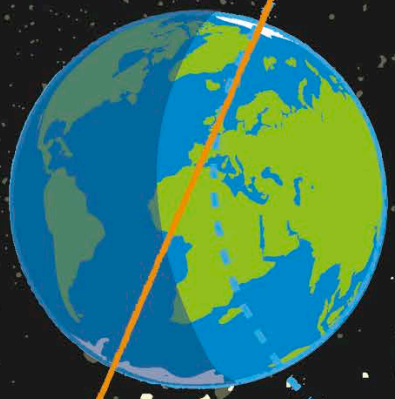
The chunks of rock and dust left over from both planets swirled around the earth's orbit.

Out of those pieces, the moon was created – it took around 100 million years to form.

IT'S ALL IN THE ANGLE

The angle, or tilt, of the Earth stays the same as it moves around the sun. Different parts of the planet get hit by direct sunlight as it rotates over 365 days, creating seasons.

Every 24 hours, the Earth spins once on its axis.



THE EARTH

March

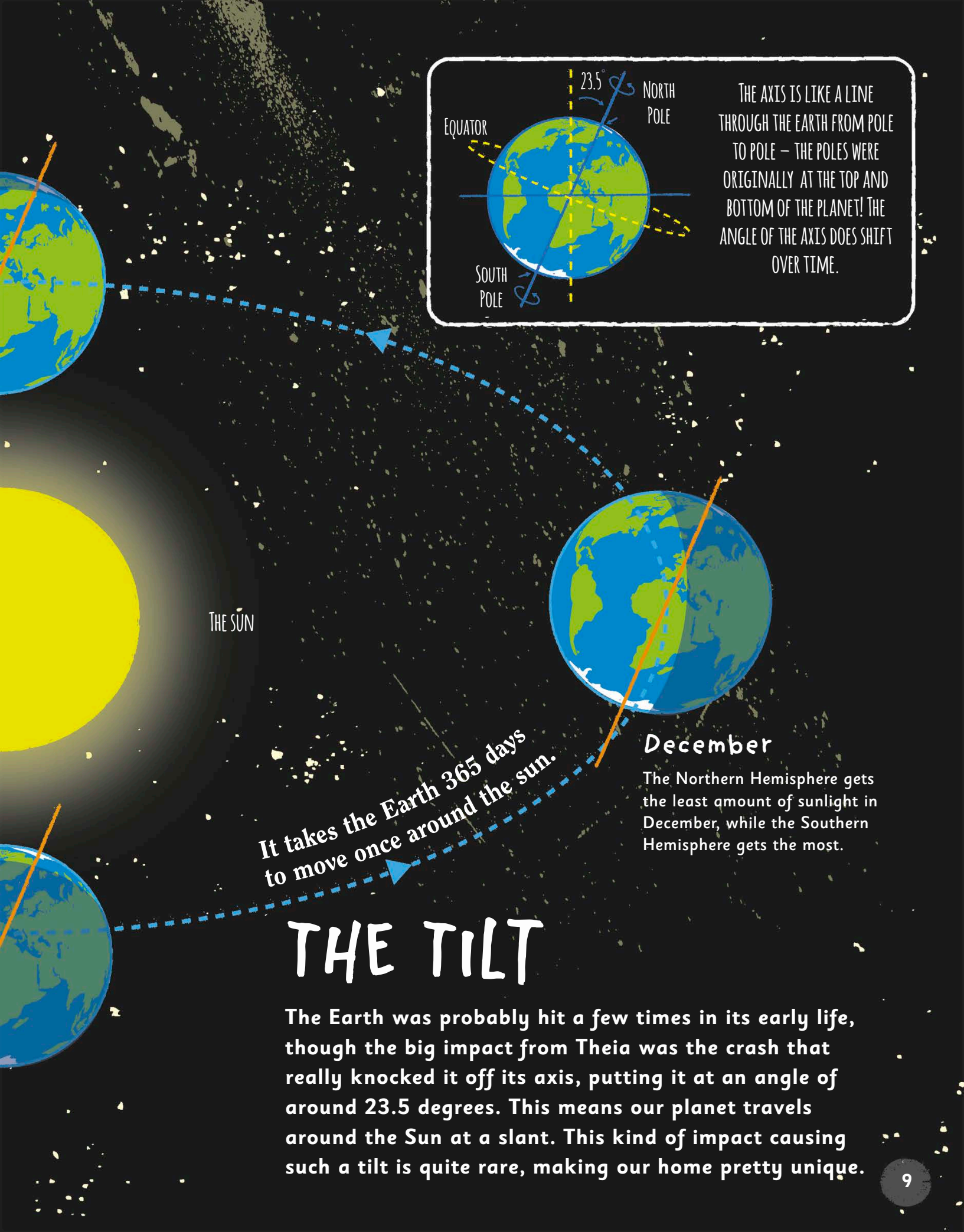
All the regions on the planet receive the same number of sunlight hours during this time.

June

The Northern Hemisphere gets the most amount of sunlight in June, which means that the Southern Hemisphere gets the least.

September

All the regions on Earth receive about the same number of sunlight hours around this time.



THE TILT

The Earth was probably hit a few times in its early life, though the big impact from Theia was the crash that really knocked it off its axis, putting it at an angle of around 23.5 degrees. This means our planet travels around the Sun at a slant. This kind of impact causing such a tilt is quite rare, making our home pretty unique.

SPRING

A time of new beginnings, the first buzzing insects reappear, noisy baby birds are born, flowers start to bloom, tree leaves bud and grow, brighter weather warms our faces, and leaping lambs gambol in the fields. Yippee!

Swoop Attack

During the spring, some Australian magpies go on a swooping frenzy, dive bombing anyone or anything that they think might be a threat to their young. Watch out!

Clock Change

In many countries, each spring the clocks move forward one hour – this is called Daylight Saving Time. The clocks go back again in the autumn. Countries close to the Equator do not do this as the daylight stays pretty much the same throughout the year.

SUMMER

Longer days and shorter nights, summer holidays and beach delights, what a time of year! With deep blue skies and bright yellow sun, fields full of flowers and the smell of fresh cut grass, it's a great time for fun with friends and family – but don't forget the sunscreen!

Where's Summer?

In April 1815, there was a HUGE volcanic eruption on Mt. Tambura in Indonesia. It shot so much ash into the upper atmosphere that it covered the Earth like a cloak. The following year the sun still struggled to shine, causing a year of freezing temperatures!

Growth Spurt

The magnificent Eiffel Tower in Paris grows taller every summer! How? It is made of metal, which expands in the summer sun, growing about 15 cm (5.9 in). That's about the size of a hot dog! It shrinks again in the winter.

BULB EXTORTION

Tulips grow in lots of places around the world during the spring. In 17th-Century Holland, tulips were worth their weight in gold. One bulb could cost up to £1500 in today's money!

It's Party Thyme

Spring is an excellent time to get outside, get on your raincoat and grab those wellies in case of a quick spring shower. It's fun to spot busy buzzing bees, hear loud birds singing, and plant some seeds to watch them grow.

Beech tree

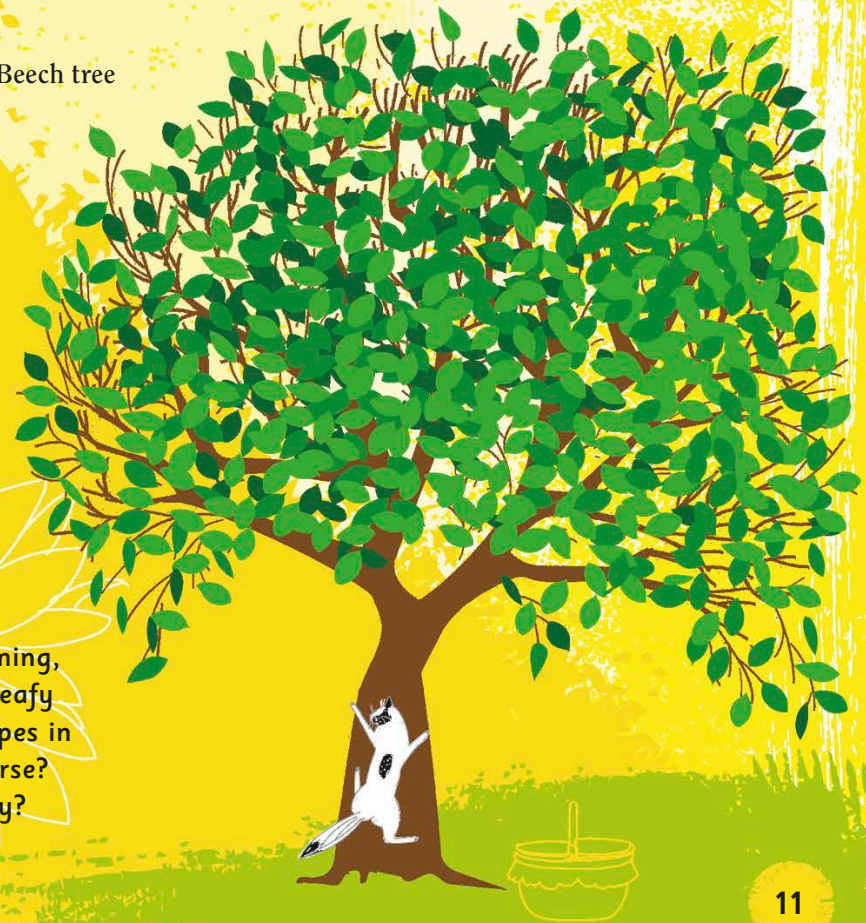
SURE FOOTED

Every summer in Morocco, local goats climb the Argan trees to reach the tasty fruit on their higher branches. They are able to climb up to 10 m (30 ft) – no kidding!

Fluffy Clouds

Time to get outside! Walking, swimming, cycling, sitting with a picnic under leafy lush trees checking out the cloud shapes in the sky... Is that a dragon? Or a horse? What can you spot high in the sky?

Beech tree



AUTUMN

A beautiful season, the autumn is full of rich golden colours. The air becomes crisper and cooler as we transition toward winter. It is a time of change, in nature and in our lives as we return from summer holidays, ready for the fun autumn months ahead.

Back to School!

In most countries, the new school year starts in the autumn. It's time for a brand-new pencil case full of goodies and squeaky new shoes. Are you ready to see old friends and make new ones?

Harvest Time!

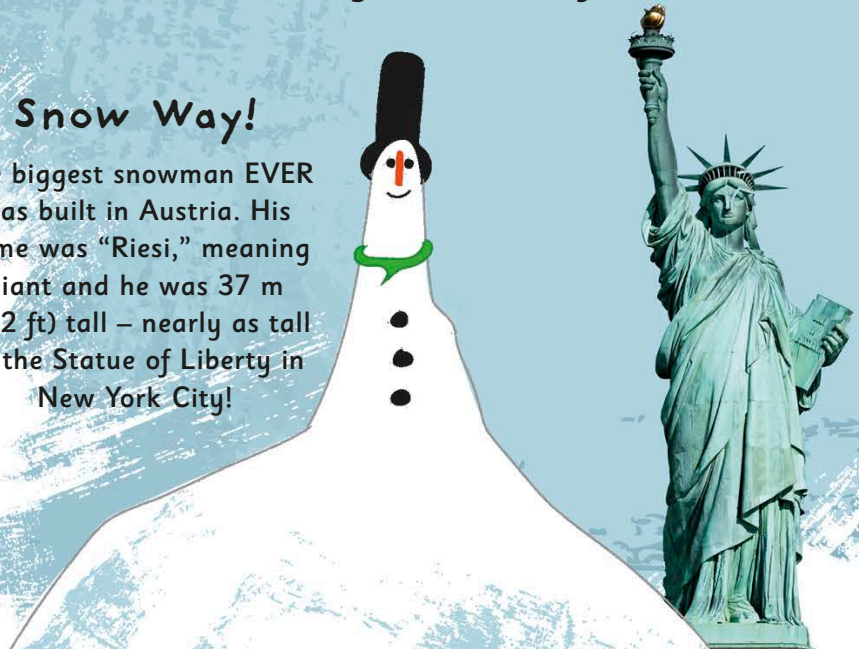
Lots of yummy ripened crops are ready to be picked. Sweet apples, bright pumpkins, and corn on the cob. Yum! Pumpkin pie and toffee apples, anyone?

WINTER

The coldest and darkest season of the year. The days are shorter and the nights longer. Lots of animals have gone to sleep or migrated to warmer places, the trees are bare, and the bees are snoozing. Time to snuggle up under a blanket with a good book... just like this one!

Snow Way!

The biggest snowman EVER was built in Austria. His name was "Riesi," meaning giant and he was 37 m (122 ft) tall – nearly as tall as the Statue of Liberty in New York City!



Flake-tastic

In 1887, soldiers in Montana saw a huge snowflake fall from the sky. It measured 38 x 20 cm (15 x 8 in) – that's bigger than a dinner plate!

BOB ALONG

Apple bobbing started out in medieval England as a popular romantic tradition where one would attempt to bite into an apple assigned to the person they desired. Una-peeling to some!

Beech tree

Leaf Kicking

Time to get your jumpers out and your boots on, take a trip to the park and look at all the colourful leaves. In North America, the changing of the colours of the leaves is known as fall foliage.

HAIR FREEZE

Believe it or not, there is a yearly hair freezing competition in Canada. Players sit in a hot spring, holding their wet hair in different shapes while it freezes. The spikier and more outrageous the hair looks, the better!

Beech tree

Brrr!

Wrap up warm with scarves, hats, and gloves. It's a perfect time to go bird watching with all the bare trees around. Watch out for the different types of snow on the ground – wet, dry, and even slush!

WET

In warmer places, the four seasons blur. Many places in the tropics have just two seasons: wet and dry. It is during the wet season when most of the region's yearly rainfall happens.

Cyclones, Typhoons, and Hurricanes

What's the difference? Well, they are all tropical storms, but they are named for what part of the world they formed in. Cyclones start over the South Pacific and Indian Oceans and typhoons over the Northwest Pacific Ocean. Hurricanes don't occur in regions that experience wet and dry seasons!

Hurricane Mimi?

In 1953, the US started naming hurricanes to stop confusion when more than one storm was active at the same time. The names are alphabetical, and each new storm gets named for the next in the list. In the 1970s, there was even a Hurricane Mimi!

SWEEPING CHANGE

A monsoon is a change of wind direction which brings big storms. India relies on the wind change to bring water droplets from the ocean to mix with air from the mountains to then create huge rainstorms to feed the dry earth. This is called monsoon season.

Fish Rain?

Yes, it's a thing! During late spring in the village of Yoro in Honduras, it rains tiny silver fish. One theory is that the fish are swept up from the ocean by water spouts and carried in the winds, but some locals think it could just be a fishy gift from God!

It's Wet Out There

It's important to wear some good wet weather gear to stay dry as well as to protect yourself from biting insects like mosquitoes who just love rainy season! Keep hands clean and stay away from dirty, stagnant, or flood waters.

Wildfires

Hotter, drier weather lasting longer is causing many more wildfires across the planet. In fact, wildfire season in some places is now three and a half months longer than it was only a few decades ago.

DRY VS. DESERT

Though the tropics have a dry season, these are not deserts. Deserts can be hot or cold but get less than 25 cm (10 in) of rain each year. While the tropics in the dry season will see little to no rainfall, during the wet season they could see up to 250 cm (100 in) of rain a year! Woah!

It's Dry Out There

Stay safe in the sun! Drink LOADS of water, try to stay out of the sun between 10 am and 4 pm, when the sun is highest in the sky, and pop on some sunglasses to keep eyes safe from the sun's bright glare.

Dust Devils

A dust devil is a whirlwind that creates a funnel of fast moving dust on the surface of the dry earth. You can even get dust devil on Mars, some there are so big they reach 8 km (5 m) high!

DRY

The rest of the year in the tropics is spent in the dry season. It doesn't get cold, but this is their winter! Dry season is a period of low rainfall, and in some places it gets so dry that there are droughts. This can last up to eight months of the year, much longer than the wet season.

ASTRONOMICAL VERSUS METEOROLOGICAL

Scientists classify different types of seasons differently; an astronomical season depends on four points in the Earth's journey around the sun; the two solstices and the equinox, on specific dates. A meteorological season broken down into groupings of three months that vary a little depending on the temperature.

It's All in the Stars!

Astronomical seasons are marked by four important events called solstices and equinoxes. The equinox marks the time when the sun passes directly over the equator and is when day and night are the same length. A solstice occurs on the longest and shortest days of the year.

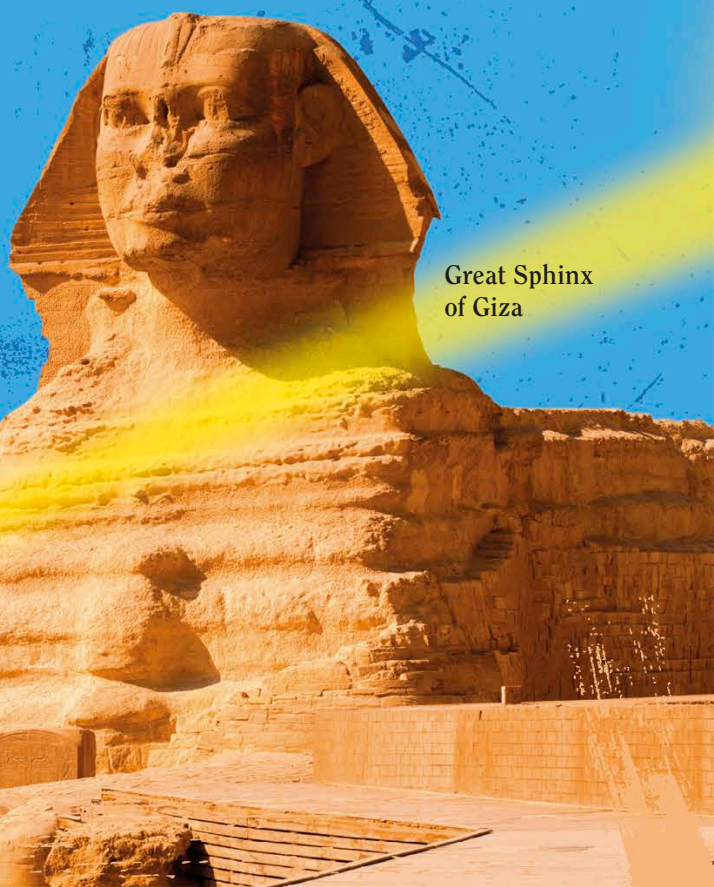
Meteorological Seasons

Winter	1st December – 28th February
Spring	1st March – 31st May
Summer	1st June – 31st August
Autumn	1st September – 30th November

Remember, in the Southern Hemisphere these are reversed!

Spectacular Cat

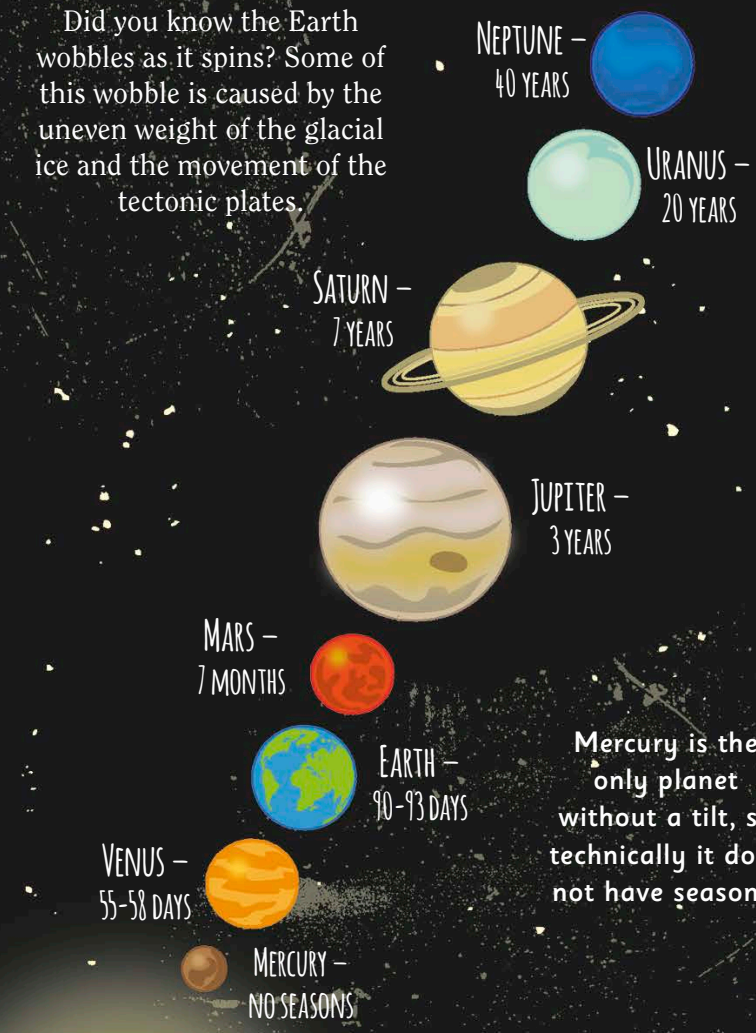
This mythical half-man, half-lion sphinx was built thousands of years ago to capture a perfect moment when the sun sets on his shoulders during the spring and autumn equinoxes. It's Egypt's very own Stonehenge! Meow-tastic.



Great Sphinx of Giza

WOBBLE PLANET

Did you know the Earth wobbles as it spins? Some of this wobble is caused by the uneven weight of the glacial ice and the movement of the tectonic plates.



Mercury is the only planet without a tilt, so technically it does not have seasons.

SEASONS ON OTHER PLANETS

Most of the planets in our solar system have some form of seasonal change. There are two factors that cause this – the axis tilt on each planet and how far from the sun it is.

Quiz

Test your seasonal knowledge!

1. How long does it take the Earth to go around the sun?

a. 275 days
b. 500 days
c. 365 days

2. What is the name of the planet that crashed into early Earth?

a. Venus
b. Theia
c. Mercury

3. In what year was there NO summer?

a. 1744
b. 1922
c. 1816

4. In which season do trees drop their leaves?

a. Spring
b. Summer
c. Autumn
d. Winter

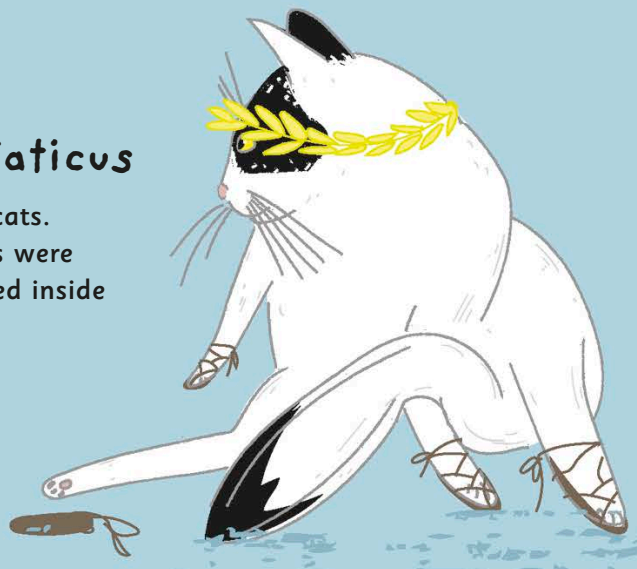
5. How many solstices are there in one year?

a. 2
b. 5
c. 4

Answers

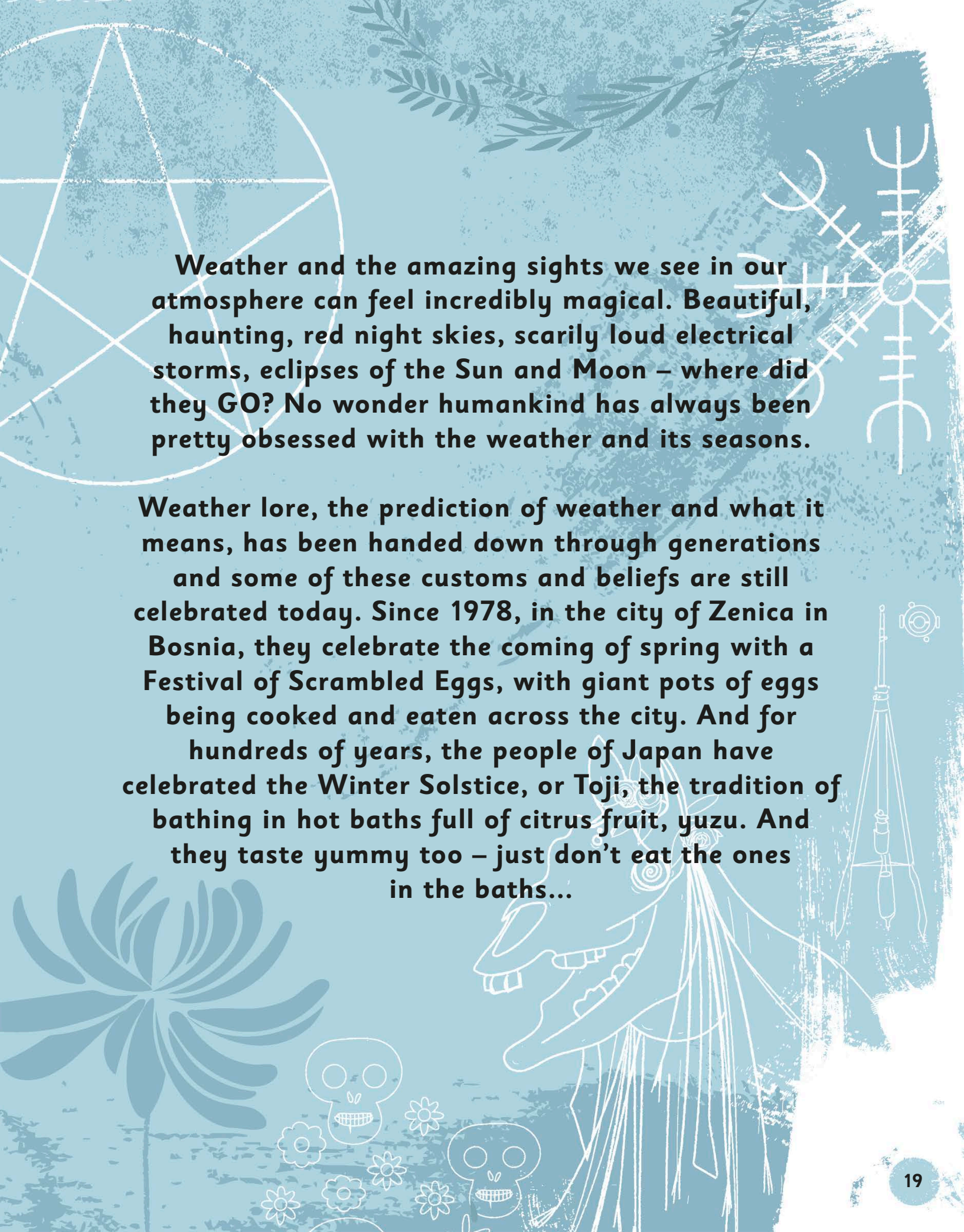
1.C 2.B 3.C 4.C 5.A

HISTORY, MYTHS, AND CUSTOMS



Fantasticus Caticus

Romans REALLY liked cats. Did you know that cats were the only animals allowed inside Roman temples?



Weather and the amazing sights we see in our atmosphere can feel incredibly magical. Beautiful, haunting, red night skies, scarily loud electrical storms, eclipses of the Sun and Moon – where did they GO? No wonder humankind has always been pretty obsessed with the weather and its seasons.

Weather lore, the prediction of weather and what it means, has been handed down through generations and some of these customs and beliefs are still celebrated today. Since 1978, in the city of Zenica in Bosnia, they celebrate the coming of spring with a Festival of Scrambled Eggs, with giant pots of eggs being cooked and eaten across the city. And for hundreds of years, the people of Japan have celebrated the Winter Solstice, or Toji, the tradition of bathing in hot baths full of citrus fruit, yuzu. And they taste yummy too – just don't eat the ones in the baths...

Beautiful Egyptian calendar paintings, printed on papaya paper

Ancient Egyptians

The ancient Egyptian calendar was based around the sun, with a 365-day year, divided into three seasons, made up of 120 days each (with every season divided into four months of 30 days).

Missing Months?

The very first ancient Roman calendar followed the cycles of the Moon and the planting of crops. Their year was ten months long, beginning in March and ending in December.

Jurassic Climate?

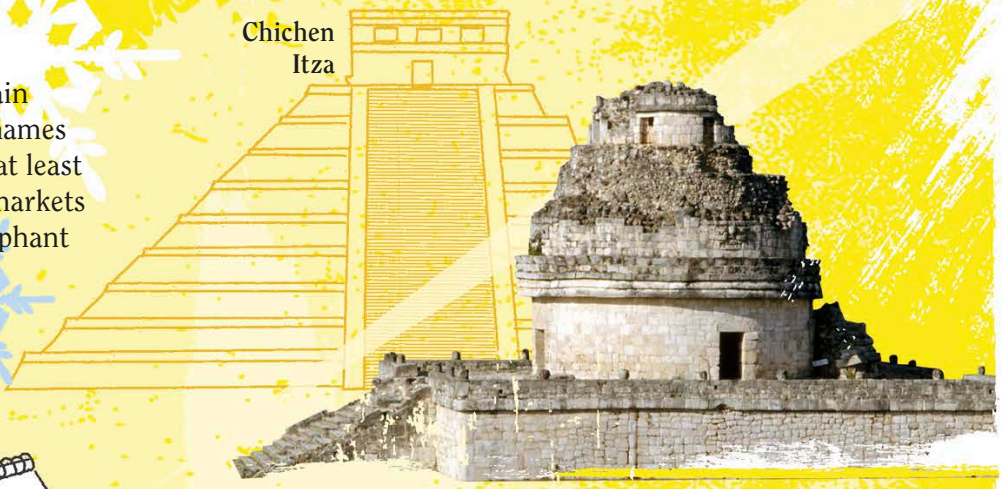
The dinosaurs likely lived in a world with a variety of different climates and seasons – just like we do!

Blooming Lovely

In East Asia, ancient art depicted their seasons as beautiful plants. Orchids for spring, the lotus flower for summer, chrysanthemum for autumn and plum blossom for winter.

FREEZING THAMES

From about 1300 to 1800, Britain experienced a mini ice age. The Thames river in London actually froze over at least 23 times, leading to frost fairs and markets being held on the ice. Once, an elephant even walked across it!



Chichen Itza

Watchtower

The ancient Mayans of Central America built watchtowers to observe the equinoxes and solstices. They used narrow slits to capture the angle of the sunlight and determine the best times for farming corn.

Gregorian Calendar

The Gregorian calendar was introduced by Pope Gregory XIII in 1582. Today, 168 of the world's countries, cultures and societies still accept this civil calendar.

Vikings

Old Norse calendars followed the moon and only had two seasons, Dark days – Skammdegi (winter) and Nightless days – Nottleysa (summer).

HISTORY

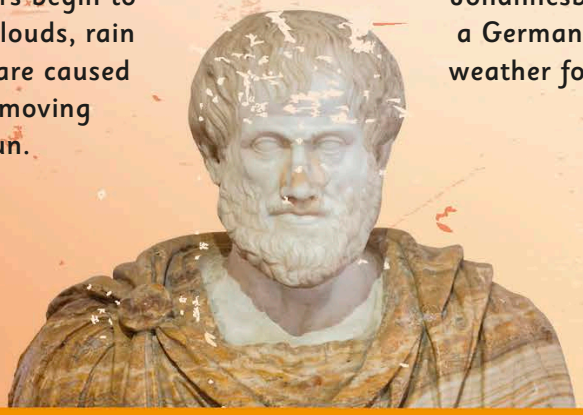
Throughout history, humans created calendars to keep track of time. Many cultures, including Islam, used the phases of the Moon and some, like the ancient Egyptians, followed the sun. Climate and weather changes (seasons) were and are big influences on how we mark the passing of time.

FORECASTING THROUGH TIME

Meteorology studies the forecasting of weather. As far back as 350 BCE, famous Greek philosopher Aristotle wrote "Meteorology", a work filled with theories on climate and weather. Today, weather forecasts are a fascinating, important part of our everyday lives.


Barometer

3000BCE
Indian scholars begin to debate that clouds, rain and seasons are caused by the Earth moving around the sun.

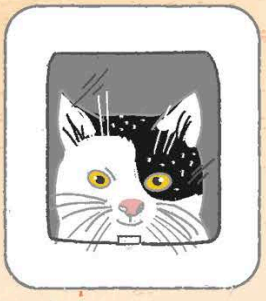

Aristotle

1488
Johannesburg Lichtenberger was a German astrologer. He linked weather forecasting to the stars.

1653
The barometer was invented by Evangelista Torricelli, an Italian physicist. It measures air pressure and can predict short term weather changes.

600 BCE
The Greek philosopher Thales was the very first meteorologist, predicting a seasonal crop forecast.

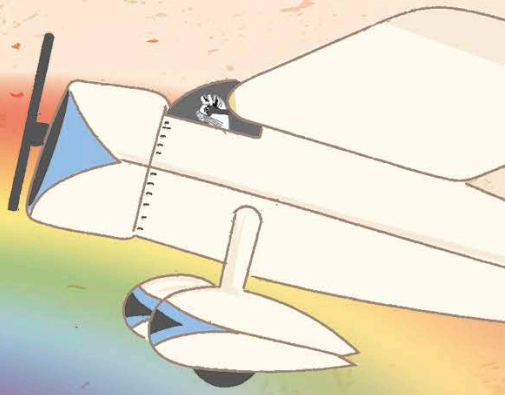
80CE
Wang Chong (27–97 CE) of China proposed that clouds are formed by water drawn up from the Earth then returned as rain, and not magically appearing from the heavens.



1687
Sir Isaac Newton, British genius (and cat lover), used his work on the laws of motion to understand how weather actually worked. Guess what – he also invented the cat flap!

25 CE
Pomponius Mela was a Roman geographer, and he was the first to map out and record the Earth's climate zones.

1267 AD
Medieval scientist Roger Bacon AKA Dr. Mirabilis, delcared that rainbows cannot appear higher than 42 degrees above the horizon.



FLY ME TO THE MOON

Birds migrate to the Moon in winter, right? Well, in the 17th century Charles Morton, an English minister, thought so and published a paper that yes, when all the birds disappeared in winter they OBVIOUSLY went to the Moon!

Moon

Tiros 1

1817

Alexander Von Humboldt published a map showing the average temperatures around the globe, creating the first world climate study.

1922

Lewis Fry Richardson proposed a mathematical solution to predicting the weather that is still used today – though today it is done by computers.

1960

Tiros-1 was NASA's first successful weather satellite to launch into low-Earth orbit. It was designed by RCA – Radio Corporation of America – and only weighed as much as around 30 cats!

The advance of technology and bright minds can only help us better predict the more erratic weather we may face in the future.

1902

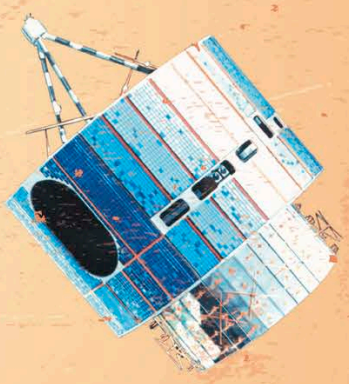
Both Richard Assmann and Leon Teisserene de Bort discovered the stratosphere – the second layer of the atmosphere of the Earth

1933

US pilot Wiley Post was the first person to fly solo around the planet. On his adventures he discovered the existence of the jet stream.

1975

Geostationary Operational Environmental Satellite, or GOES, launched and supported cutting edge weather forecasting around the world.

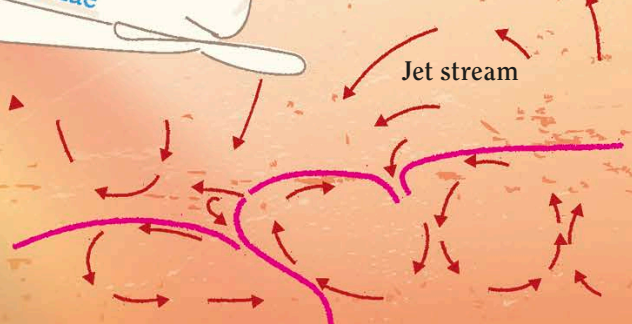


GOES 3

1980

As technology advanced, so did the networks of weather radars. The Doppler radar is used to calculate the motion flow of rain, hail, and snow.

Doppler radar



Jet stream

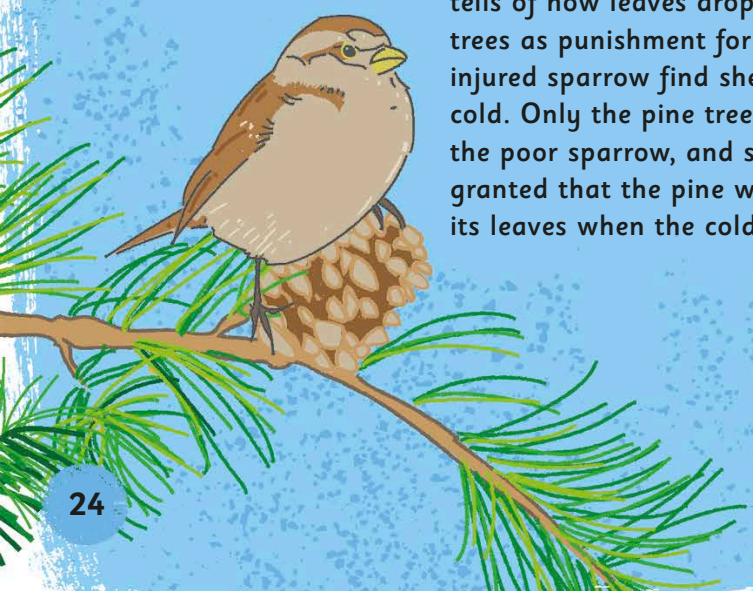
Jet streams are fast flowing air currents that wrap around the Earth.

MYTHS AND LEGENDS

Myths and legends can be loosely based on history or religious beliefs. How the world began, why our seasons change – across the world, there are many amazing stories passed down to us through the ages. For instance, some Hungarians believed that on December 21st a Miracle Deer carries the sun in its horns across the river to begin the new year!

The Horae

In Greek mythology the Horae (meaning hours) were the goddesses of the seasons. Some described them as four handmaids of Hera (the goddess of women) and oversaw the seasonal passage of time throughout the year.



The Grateful Sparrow

This North American Cherokee legend tells of how leaves dropped from the trees as punishment for not helping an injured sparrow find shelter from the cold. Only the pine tree would help the poor sparrow, and so the creator granted that the pine would never lose its leaves when the cold came.

Wheelie Good Time

The Wheel of the Year is a symbol of the eight Sabbats (religious festivals) of Paganism and Wiccans – witches! Pagans believe in a deep spiritual connection with nature. They light huge bonfires to celebrate the longest day and the shortest day of the year.

THE EASTER BUNNY

Rabbits and eggs were originally celebrated in spring by pagans. In the 1600s , the Germans turned the pagan rabbit into Oschter Haws, a rabbit that laid a nest of coloured eggs as a gift for good children. Rabbits laying eggs – who'd have thought?!

Jack Frost

When it's cold and icy, watch out for a fairy sprite called Jack! You can spot his handiwork of beautiful frosty patterns on your windows.

Zhulong the Candle Dragon

It is thought that this impressive torch dragon from Chinese mythology created the seasonal winds when breathing. Whoosh... When he breathes out, it's winter and when he breathes in, it is summer.

Punxsutawney Phil

Groundhog Day

In Pennsylvania, every February 2nd since 1887, a groundhog weather specialist predicts the coming spring. Phil – yep, that's his name – comes out of his home and checks for a shadow. If there is no shadow, it's an early spring. If he sees one, it's six more weeks of winter! Brrr...

Hanami

For just one or two weeks in spring, Japan is bathed in a fragrant pink glow, with the arrival of beautiful cherry blossoms. Families gather to observe the blooming, coming together to picnic and rejoice.

Holi

It's an explosion of stunning colour! This Hindu spring festival celebrates love and life. People take to the streets and have ENORMOUS powder paint throwing fights!

Baba Marta

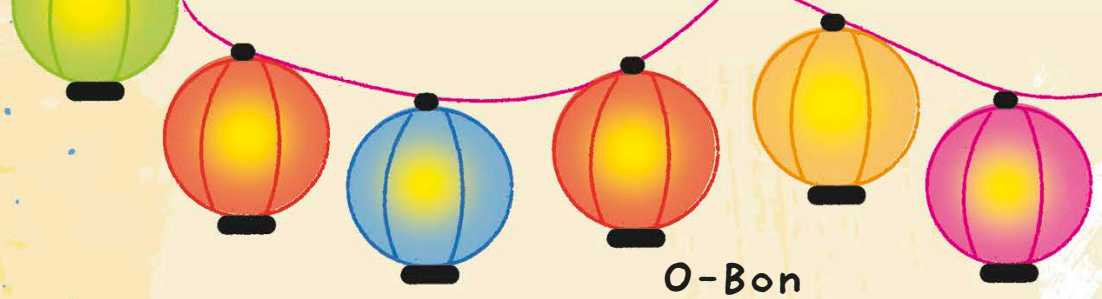
"Grandma March" takes place in March in Bulgaria, the streets a sea of tiny red and white dolls. Yarn bands and dolls also adorn the wrists of the people, honouring the old lady of March who chased away the grumpy February weather.

CUSTOMS AND FESTIVALS

Seasonal festivals have been taking place for thousands of years, whether it's the celebration of new life in spring or the welcoming of summer with the lighting of huge bonfires. Amazing, colourful, weird and wonderful, these customs continue to delight and surprise, bringing people together all over the world.

WET WET WET

In April, Thailand has a MASSIVE water fight! It's called Songkran, the tradition of the Thai New Year, and it's a great excuse to have fun and get soaked!



O-Bon

Taking place in the summer month of August, this traditional Buddhist event salutes past generations. The lighting of beautiful paper lanterns help guide the spirits.

The Scarlet Sails

School's out! Millions gather in St Petersburg, Russia to witness fireworks, music and a very cool red sailboat, celebrating the summer midnight sun (part of the White Nights festival) and the end of school term. Yippee!

Summer Solstice

Celebrating the longest day of the year, this magical time also marks the beginning of summer. Stonehenge in England is thought to have been used as an ancient Druid Solstice site (though it was there thousands of years before the druids!).

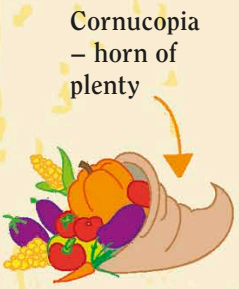
Stonehenge

Día de los Muertos

Also known as the Day of the Dead, this festival is a celebration of life and death. Originating in Mexico, on 2nd November, the colourful autumnal festival welcomes back the souls of departed family for a brief get-together.

Bunny Moon

Mid-autumn festivals in Asia celebrate stories of the Moon Goddess and her faithful buddy, the noble Moon Rabbit.



Thanksgiving

The hugely popular North American harvest festival is celebrated with family and friends every year with a feast of turkey, potatoes, cranberries, and yummy pumpkin pie. A cornucopia (wicker horn) is sometimes filled with food and placed on the Thanksgiving table.

Diwali

A five day festival of light in October or November is celebrated by Hindus, Sikhs, and Jains. Honouring good over evil and light over dark, lights and oil lamps are lit on the streets and in homes.

Mari Lwyd

During winter in South Wales, Mari (a horse skull decorated with bells and ribbons) is taken from door to door, exchanging Welsh language songs and rude rhymes with the families within. If Mari enters your home, it's good luck!

Inti Raymi

Still celebrated today by indigenous people in the Andes of South America, colourful costumes and food sharing mark the winter solstice and the Inca New Year.

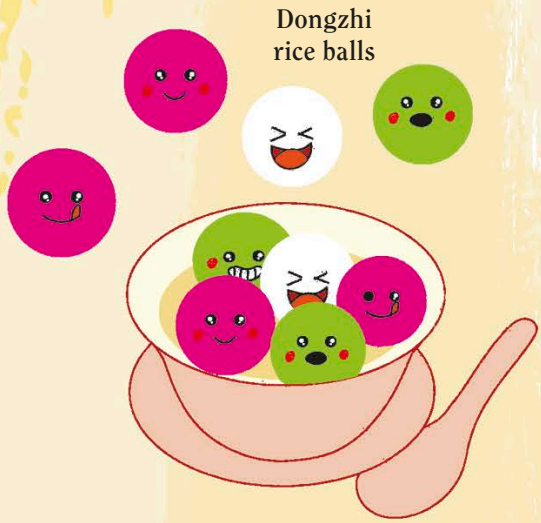
Ancient Inca festival

EXPLODING SNOWMEN

The Swiss snowman, Böögg, is set on fire every winter – he's filled with straw and dynamite! The quicker his head explodes, the closer we are to spring. Boom!

Winter Solstice

The world celebrates the shortest day and the LONGEST night known as the winter solstice. In China it's called the Dongzhi festival and honours the yang – the positive force to yin and yang which becomes dominant after the shortest day. Tangyuan, a sticky rice ball in a syrup soup, is eaten on this day. Sounds lush!



Dongzhi rice balls

St. Lucia's Day

Young girls in Scandinavia wear white robes with red sashes and candles on their heads, bringing light to the darkness of mid-winter on December 13th. Don't try this at home!

Wolf Moon

The name is thought to have originated from early indigenous tribes of North America, as they observed prowling, howling, HUNGRY wolves around that time of year.

Moon Names

Each full Moon has some REALLY cool nicknames. Many of these names come from Native American culture and were based on the seasonal time of year, starting from January, through to December. Here are some of the more commonly used today.

Northern Hemisphere

1	Wolf	7	Buck
2	Snow	8	Sturgeon
3	Worm	9	Corn
4	Pink	10	Harvest
5	Flower	11	Beaver
6	Strawberry	12	Cold

Southern Hemisphere

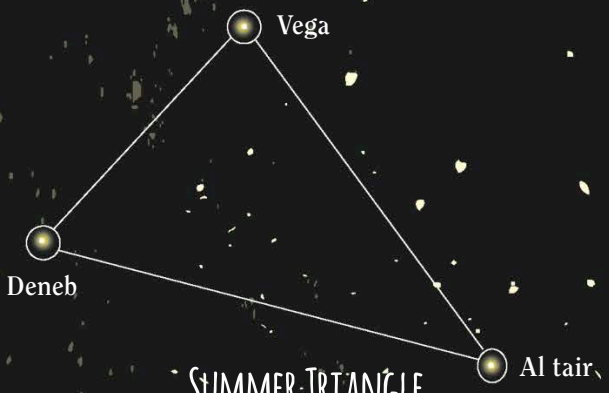
1	Buck	7	Wolf
2	Sturgeon	8	Snow
3	Harvest	9	Worm
4	Hunter's	10	Pink
5	Beaver	11	Flower
6	Cold	12	Strawberry

FARMER'S STARS

Early farmers used star formations to help predict the coming seasonal changes, allowing them to plan when to plant and harvest their crops. Clever!

Hydra

Named for the sea serpent, it's the biggest constellation in the sky. Best spotted in the Southern Hemisphere in winter.



Summer Triangle

Made up of three super bright stars that form a triangle pattern, you can spot this in the Northern Hemisphere during summer. Just look eastward for this awesome sight.

Scorpius

Named after a scorpion, look at its tail! You can see it in the summer skies of the Southern Hemisphere.

Orion

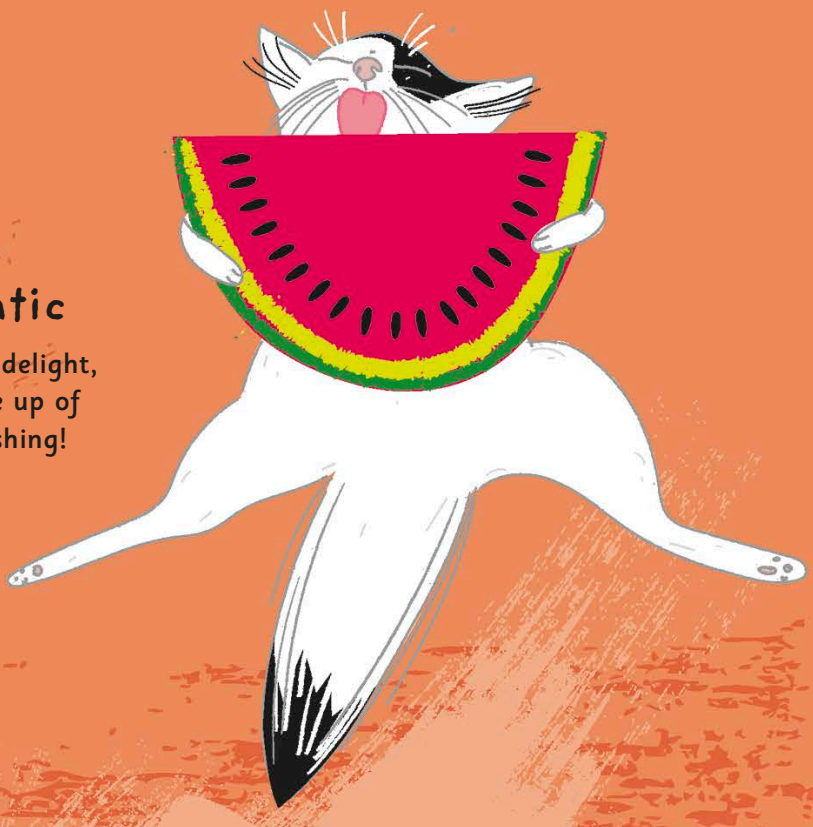
Known as the hunter, this amazing constellation is one of the most recognisable in the sky, best seen shiny and bright in the winter months in the Northern Hemisphere.

THE MOON AND THE STARS

Did you know the night sky changes from season to season? As the Earth moves around the sun, we get to see different star patterns above us, many named after wondrous Greek mythical figures. This is a brilliant way to track time and seasonal changes – just look up!

★ Star constellations not to scale

SEASONS AND US



Melon-dramatic

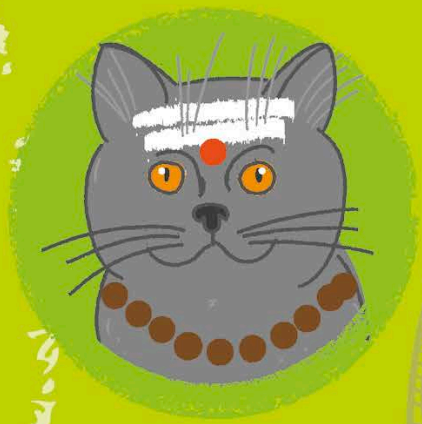
Cats LOVE this seasonal delight, the watermelon is made up of 92% water. Yum, refreshing!

Obviously, the seasons directly affect our everyday lives. What we wear, for instance. Is it a bit chilly? Time for hats, scarves, and gloves! Or is it sunglasses, t-shirt, and flip-flop weather? Even what we eat can depend on what time of year it is.

Our homes have to be built to accommodate seasonal differences too. With climate change upon us, shifting seasons are being linked to warmer global temperatures. A slight change in temperature is enough to bring in spring earlier and delay the first frost in winter. Seasons also mark the passing of time and can bring us joy. Whether it is hot, cold, wet, dry, light, or dark, there is always something to be amazed by.

John Dalton (1766-1844)

The earliest existing weather records in the UK were written up by John Dalton, recorded from his homemade instruments over a period of 57 years.



Varahamihiva (505-587)

A sixth century astrologer and astronomer. Varahamihiva from India wrote extensively on many subjects including seasons, cloud formations, rainfall, agriculture and mathematics. What a genius!

Eunice Foote (1819-1888)

An American scientist, women's rights campaigner and first person to understand the warming effects of sunlight – greenhouse gases, as we know them today.

June Bacon-Bercey (1928-2019)

An expert on weather from the United States, June Bacon-Bercey became the first African American woman to earn a degree in meteorology.

James Edward Hanson (1941)

An American professor who raised awareness of climate change and global warming for the first time back in 1988!

WEATHER PIONEERS

The study of meteorology goes back thousands of years, with many bright minds attempting to figure out how to predict the weather and why we have it in the first place! Here are a few cool cats who dedicated their lives to understanding this fascinating science.

BALLOON ADVENTURES

Throughout recent history. balloons have been used to gather meteorological information, like atmospheric pressure and wind speeds. The British meteorologist James Glaisher made a series of ascents by balloon during the 1860s, reaching a height of 9 km (5.6 miles) – that's higher than Mount Everest!

Admiral Robert Fitzroy (1805-1865)

Made correct daily weather predictions and invented the term "weather forecast". He created the Met Office in the UK in 1854 and was the Captain of HMS *Beagle* – the ship made famous by its passenger Charles Darwin!

Ander Celsius (1707-1744)

A Swedish astronomer who became famous when developing the weather temperature scale, which was then named after him!

COLD

ARCTIC
TWO SEASON

NICE

MID-LATITUDE
FOUR SEASONS

BIT HOT

TROPICS
TWO SEASONS

EQUATOR

NICE

MID-LATITUDE
FOUR SEASONS

COLD

ANTARCTIC
TWO SEASONS

Fantastical light shows sometimes glow in the northern skies...

Aurora Borealis

Aurora Borealis (or Northern lights) are actually caused by electrons (subatomic particles) from solar winds. They are attracted to the poles by the magnetic fields found there, where they mix with gases in the atmosphere, causing the gases to glow green, red, blue, and purple!

Ghost Apples

This bizarre sight can be seen when rain lands on apples and freezes. When the fruit rots, it drops out, leaving behind a spooky ghost fruit shape made of ice. Cool!

Boiling Hot

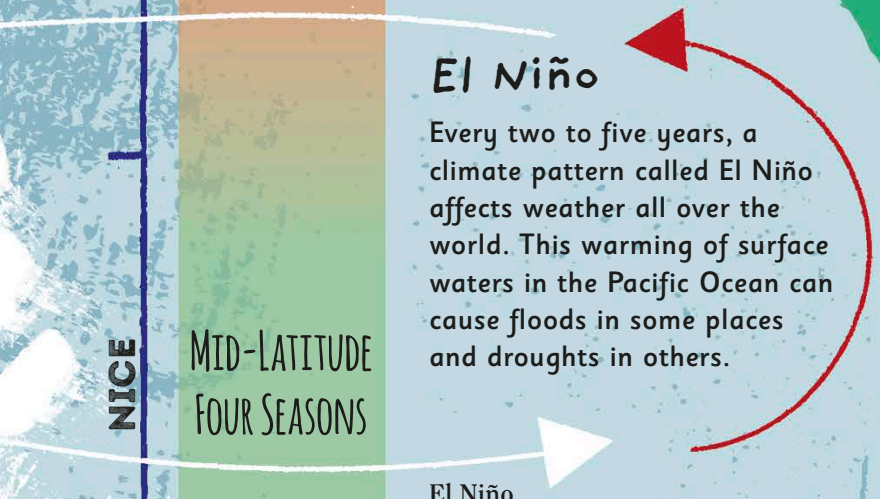
The hottest place on the planet is in Death Valley in California. In July 1913, it reached 56.7°C (134 °F)!

Super Dry

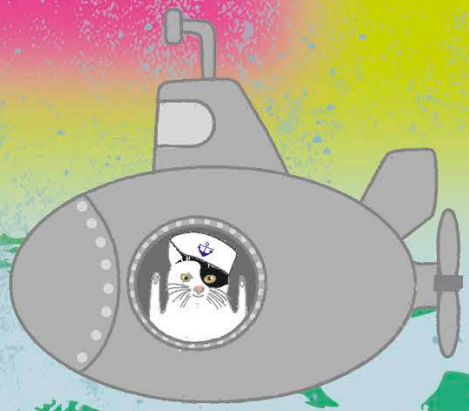
The driest place on Earth is in the Atacama Desert spanning Northern Chile and Southern Peru.

El Niño

Every two to five years, a climate pattern called El Niño affects weather all over the world. This warming of surface waters in the Pacific Ocean can cause floods in some places and droughts in others.



WHAT SEASONS WHERE?



HMS NAUTILUS

In 1958, Operation Sunshine sent *HMS Nautilus* on the perilous journey to the North Pole. As they passed underneath, they discovered that there was no land mass, just ice!

Raging Fires

As the world heats up, more uncontrolled wildfires are cropping up around the world, including in the Arctic Circle.

Spider Rain

Small spiders leap into the air, using their web-silk like parachutes as they migrate. This is known as ballooning. Spidey powers!

Soaking Wet

The wettest place on Earth is in Mawsynram, India. Their average yearly rainfall once reached 11,871 mm (467 in). That's taller than two giraffes!

Mawsynram

NORTHERN HEMISPHERE

SOUTHERN HEMISPHERE

El Niño

There are five different climate zones on planet Earth and each zone has a set amount of seasonal weather changes. The Arctic and Antarctic have two – winter and summer. Mid-latitude areas experience the more traditional four seasons, and areas closer to the middle of the planet on the equator (in a band called the Tropics) experience two seasons – wet and dry.

Freezing Cold!

Vastok Research Station in Antarctica was built by the Soviet Union. It recorded a temperature of -89.2°C (-128.56°F) in July 1983.

Vastok Station

SEASONAL FOOD

Most fruit and vegetables grow at different times of the year (and in different parts of the world!). Seasonal food is super fresh and full of flavour – yummy strawberries in June, tasty pumpkins in October, and zingy oranges in December. The seasons are a good way to help us remember to vary our diet, too.

Bananas!

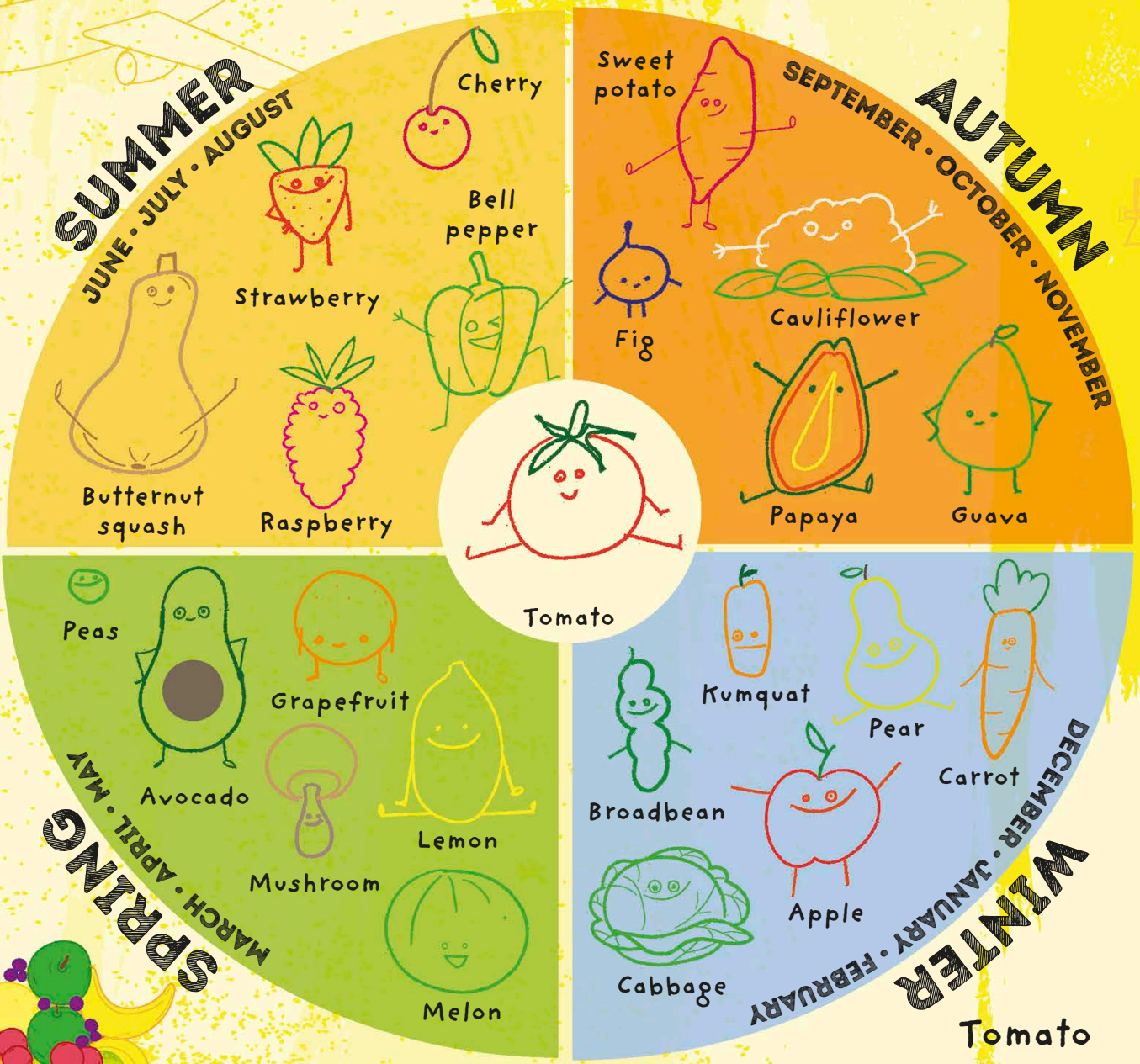
Luckily for all you banana lovers, bananas grow year round and ALWAYS taste fantastic!

Northern Hemisphere

When it is winter in the Northern Hemisphere, it is summer in the Southern Hemisphere. During their winter, citrus fruits like oranges and lemons come into season.

LOCAL V GLOBAL

Though we can get almost any food from around the world in our local supermarkets, it might be better for the environment if people were able to eat food grown closer to home. Food imported from around the world uses many travel miles to get to your plate, so if you're able, go on – give some local produce a try!

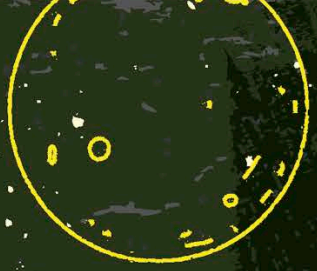


Southern Hemisphere

In the Southern Hemisphere, luscious tropical fruit like papaya and guava grow in autumn. At the same time of year in the Northern Hemisphere, they harvest root vegetables like pumpkin and carrots.

Tomato

You can get tasty tomatoes all year round. Did you know it's really a fruit, NOT a vegetable?



Warming Poles

Polar sea ice helps regulate the Earth's climate and the white ice reflects more of the sun's energy back into space. With less ice, the Earth is absorbing more solar radiation and making our climate even warmer.

GETTING BIGGER?

The Tropics, a climate zone around the middle of the Earth is actually expanding at about 48 km (30 miles) every ten years. This means that more places around the world will get less seasonal changes, just like the tropics (who only really experience wet and dry seasons.)

Unpredictable Weather

Within our seasons there has ALWAYS been unpredictable weather, though as our climate changes, even more severe weather events are taking place. Heatwaves, floods, intense wildfires, stronger hurricanes, and colder or wetter winters – we will have to adapt to prepare for these new climate episodes.

Shifting Seasons

Summers are getting longer and winters shorter. That may sound awesome for some, but our ecosystem is very finely balanced. These changes affect the timing of many lifecycle events, such as when flowers bloom or when bees and butterflies appear. Why is this worrying? Because lifecycle events of species rely on one another to thrive and survive.

CLIMATE CHANGE

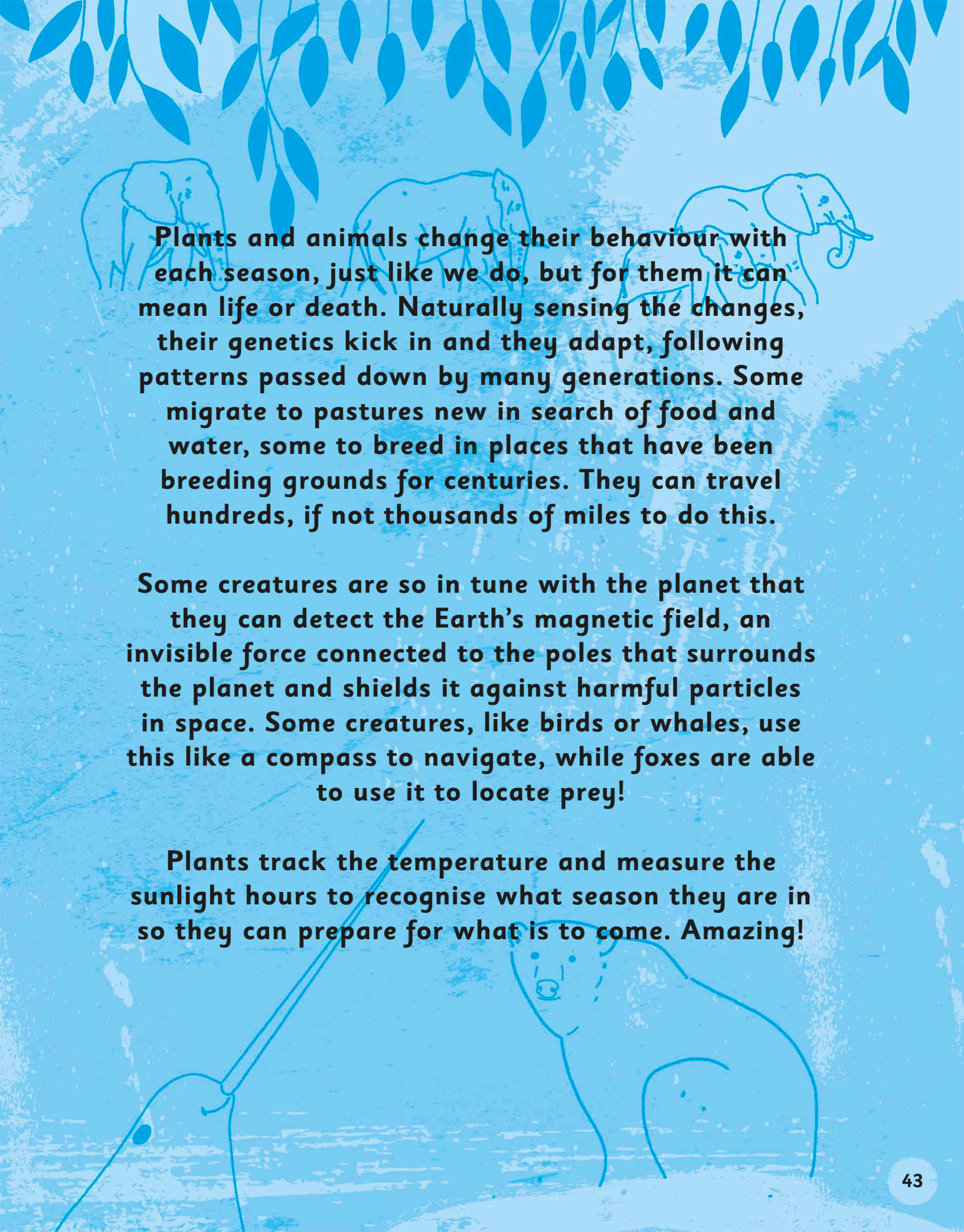
Human activity is causing rapid changes to our global climate. Reducing our emissions (gases and particles) by using renewable energy and cutting down waste can help, as can preparing for the challenges ahead. It's not too late if we all pull together as a planet and make a change.

OUR BEAUTIFUL PLANET EARTH

SEASONS IN NATURE

Spring Fever

Ever noticed our furry companions going loopy in spring? That's because their senses are going crazy with all the new smells!



Plants and animals change their behaviour with each season, just like we do, but for them it can mean life or death. Naturally sensing the changes, their genetics kick in and they adapt, following patterns passed down by many generations. Some migrate to pastures new in search of food and water, some to breed in places that have been breeding grounds for centuries. They can travel hundreds, if not thousands of miles to do this.

Some creatures are so in tune with the planet that they can detect the Earth's magnetic field, an invisible force connected to the poles that surrounds the planet and shields it against harmful particles in space. Some creatures, like birds or whales, use this like a compass to navigate, while foxes are able to use it to locate prey!

Plants track the temperature and measure the sunlight hours to recognise what season they are in so they can prepare for what is to come. Amazing!

SPRING IN NATURE

It's the busiest and most exciting time of year for nature. Leaves grow on trees, flowers pop open and many baby animals are born. Bugs stir and emerge from their winter slumber and the skies are full of returning birds.

A New Leaf

Trees that lose their leaves in winter are covered with new leaves come spring. The leaves capture sunlight, air, and water to produce food for the tree. This is called photosynthesis.

Baby Animals

The offspring of many animals and birds are born in spring. There is lots of food around, the days are longer, and the weather is warmer – lovely.

Rabbit "happy hops" are called binkies!

Bunnies!

Although rabbits breed all year, they are particularly fertile in spring – it's a baby bunny extravaganza!

Fawn

Rabbit

Barn swallows return from long migrations during springtime.

Sweet

Beautiful, sweet smelling blossoms bloom on stone fruit trees, like cherry, peach, and plum. In North America, the iconic red cardinal LOVES to eat the flowers.

Red cardinal

A Chorus of Tweets

Birds sing more in spring, especially at dawn and dusk. It's a shouting match to attract a mate!

Chiffchaff

Hello Friend

Baby sheep, called lambs, are born during spring. Did you know sheep can recognise the faces of up to 50 other sheep?

Lamb

SUMMER IN NATURE

As the days get warmer and longer, young animals grow bigger and stronger, and baby birds begin to leave their nests. Leaves on trees and plants grow thick and lush, and insects are abundant, providing food for birds, mammals, reptiles and fish.

Buzzin'

Pollinators, like bees, reach their highest populations in summer. The long days give them plenty of time to forage for nectar. A honeybee produces one teaspoon of honey in her lifetime – cherish that honey on your toast!

Blooming

Hot sun encourages beautiful flowers to bloom, creating a riot of colour, and plenty of food for insects, mammals, and reptiles.

Small copper

Honeybee

Monarch butterfly

Bees have five eyes!

Minibeasts

Insects LOVE the summer. Being coldblooded, they thrive in the heat and become very active.

Bumblebee

Angling

Dragonflies perch with their belly at a 90-degree angle to shield themselves from the sun's rays.

Otter

MIDNIGHT SUN

In the north of places like Canada, Greenland, Alaska, Iceland, Russia, and Scandinavia, you can see the sun still shining at midnight. This helps local wildlife to find and eat more food, continue to breed and get even stronger and healthier, creating bigger populations.

Marbled white

Keeping Cool

Some animals sweat to keep cool. Rabbits actually sweat from their lips, and cats from their paws. When animals pant, they expel hot air and breathe in cooler air.

Bear Necessity

Bears love to eat berries and apples in the summer months. The cubs born that winter get stronger and more playful. They stay with their mum until they are about three years old.

Brown bear

Sun Lover

Lizards live everywhere except Antarctica – too cold! They are cold-blooded and relish the warm sunny days of summer.

European green lizard

Antlers

In the autumn, a stag's antlers are strong and sharp, the velvet covering them has shed, and they are ready to battle! After they rut (fight), their antlers will fall off and the cycle starts again. A stag's antlers grow back every year during the spring. They experience a rush of testosterone, a growth spurt and the new antler is covered by a soft velvet.

Spider Time

It's mating season for spiders! Males can be seen hunting for their perfect partner!

Red stag

Caught in a Rut

A deer rut is a magnificent spectacle! Stags clash antlers to claim dominance over the herd and rivals strut their stuff, sizing up their opponents.

AUTUMN IN NATURE

A time of preparation, autumn welcomes colour changes, shorter days and colder nights. Bountiful harvests of nuts and berries are gorged on by birds, animals, and insects to fatten them up before the cold winter days ahead, and the important task of stockpiling food starts in earnest for non-migrating animals.

Changing Colour

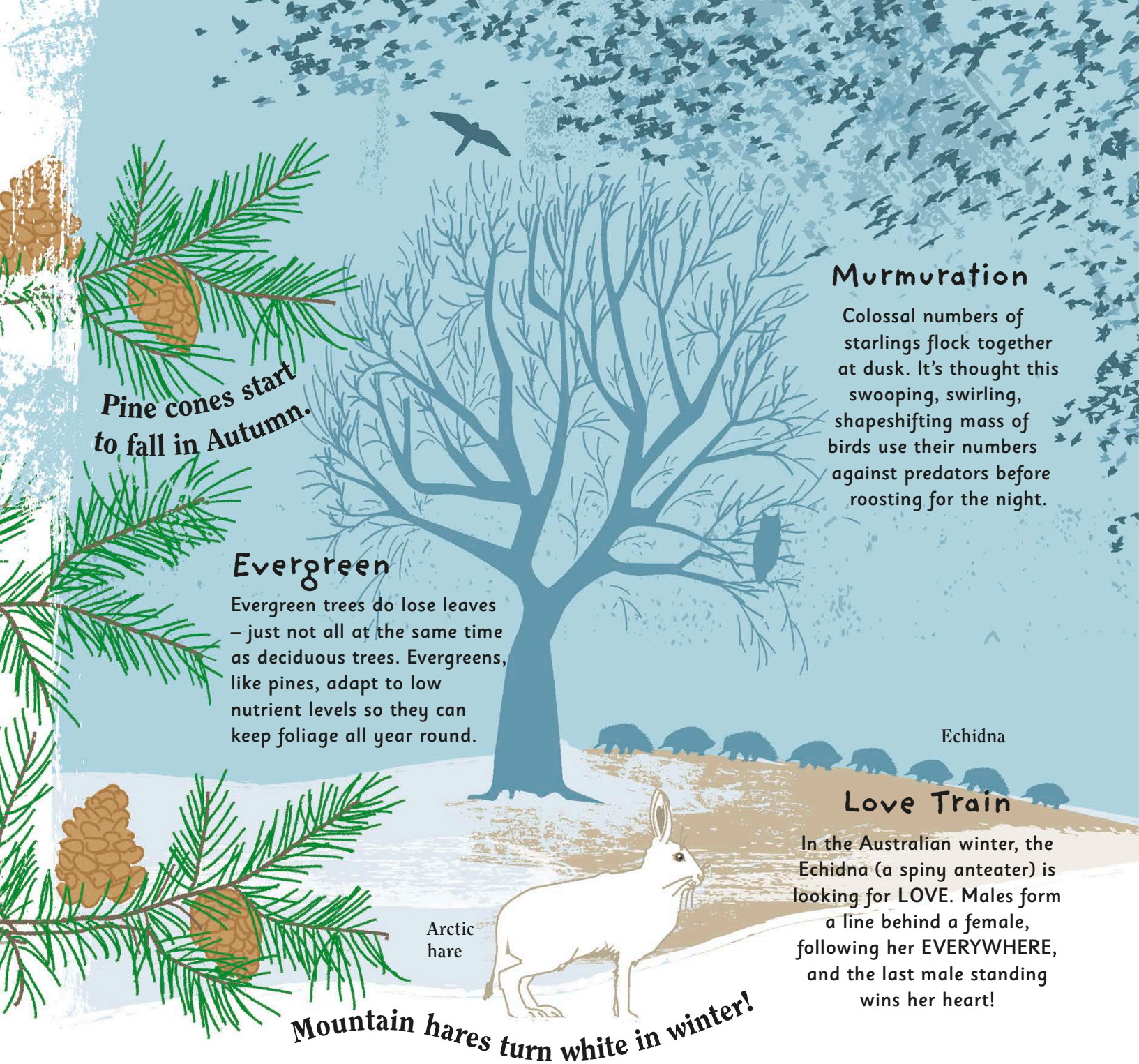
Trees that lose leaves shut down photosynthesis in autumn. Chlorophyll (the green pigment that aids photosynthesis) retracts, revealing other chemicals in the leaf – yellow flavonoids, red anthocyanins, and orange carotenoids. These protect the leaves from cold for a little longer before they eventually drop off.

Squirreling Away

It's time to stash those nuts! Tree squirrels are famous for scatter hoarding food, using hundreds of hiding places. They often forget where they put them, and trees eventually grow from the hidden bounty.

Fabulous Fungi!

Fungi feed on dead leaves and decaying matter. The perfect recycling buddy for trees.



Pine cones start to fall in Autumn.

Murmuration

Colossal numbers of starlings flock together at dusk. It's thought this swooping, swirling, shapeshifting mass of birds use their numbers against predators before roosting for the night.

Evergreen

Evergreen trees do lose leaves – just not all at the same time as deciduous trees. Evergreens, like pines, adapt to low nutrient levels so they can keep foliage all year round.

Echidna

Love Train

In the Australian winter, the Echidna (a spiny anteater) is looking for LOVE. Males form a line behind a female, following her EVERYWHERE, and the last male standing wins her heart!

Arctic hare

Mountain hares turn white in winter!

WINTER IN NATURE

It's cold, dark, wet, and sometimes snowy. Many plants and trees are dormant and some creatures just sleep their winter away. The mammals that are awake grow thick fur, birds a warmer feather coat, and some even change colour to blend in with their new surroundings.

Pounce

The fox's powerful hearing detects the rustle of tiny rodent feet, then, using the Earth's magnetic field, they are able to search out the exact spot of their prey. Then... POUNCE!

Red fox

Snow Fleas?

Springtails can leap up very quickly using – you guessed it – their tails, not their legs. These insects (who are not actually fleas) feed on bacteria and mainly hang out on snowy surfaces. Everybody JUMP!

Underground Horrors

Shrews' brains, skulls and livers shrink in winter! They store LIVE food in a winter larder, using a venom to paralyse their victims... Yikes!

Hoarders!

Cute chipmunks wake up every few days to eat, so they need plenty of snacks to hand. Some species can cache over 60,000 food items for one winter!

Food stash

Shrew

Chipmunk

Food stash

WET SEASON

In wet season, most of the annual rainfall happens. It's a great time for animals to find plenty of food and water, plants, and trees to grow, and water sources to fill up.

African elephants

Elephants

Roaming in herds in constant search of food, elephants eat loads of roots, grasses, bark and fruit. They use their trunks to suck up water.

DRY SEASON

When it gets dry, many animals and birds roam and migrate to find water and food as everything starts to dry up. It's a tough time of year and lasts many months.

Giraffe

Zebra

Fair Weather Friends

During the dry season, there are limited food sources. Herds of different (plant-eating) animals normally stick together for safety. At this time of year they usually stay with their own breed.

Savannas have distinct wet and dry seaons.

Waterholes

Areas where water below ground comes to the surface are called waterholes. In wet season they fill up high.

Blood Sweat!

Hippopotamuses sweat red! They produce a red and orange pigment; the red pigment contains an antibiotic while the orange protects them from UV rays. Essentially a hippo sun cream!

Hippopotamus

Flock to It!

Birds are lucky in that they can fly to find water. Sometimes huge flocks gather over waterholes. Birds of prey will often feed on animals that have perished in the harsh, dry weather.

Tawny eagle

A Roaring Success

Lions adapt well to the dry season. They feed on carcasses and catch prey that gather near limited water sources.

During the dry season, the waterhole is the only source of water for many species.

Lion

The Toughest

Travelling hundreds of miles across tough terrain in the Arctic Circle from summer to harsh winter, caribou also face wolves that want to eat them!

Caribou

Blue grouse

The Shortest

The blue grouse from North America lives on the top of pine tree forests. Each spring, it migrates to the bottom of the tree to feed – that's about 300 m (984 ft).

The Coolest

At the end of autumn, nearly one hundred thousand red-sided garter snakes slither up to 32 km (20 miles) to hibernate together in massive dens in Manitoba, Canada.

Red-sided garter snake

The Prettiest

These vibrant butterflies are tiny flight marvels, travelling 4,828 km (3,000 miles) south to Mexico to breed in winter, literally millions of them!

Monarch butterfly

Corn leaf aphid

The Tiniest

Corn leaf aphids migrate north, arriving in parts of North America during the summer in search of, yep, you guessed it, corn!

Spiny lobster

The Weirdest

Lining up like a conga, spiny lobsters march in single file into deeper, calmer waters every summer to escape the stormy Bahamas weather.

MIGRATION

Springtime is when a lot of creatures that migrate make their move. The primal urge to return to breeding grounds and get fresh food and water is very strong. Many of their journeys are long, epic, and dangerous. Come autumn, it is time for many to return to their winter home.

King of Migration

Arctic tern

The Nuttiest

This Scandinavian rodent migrates every few years in mass herds when their population is too great. Legend has it if they got angry, they would explode – luckily that is just a story!

Lemming

Grey whale

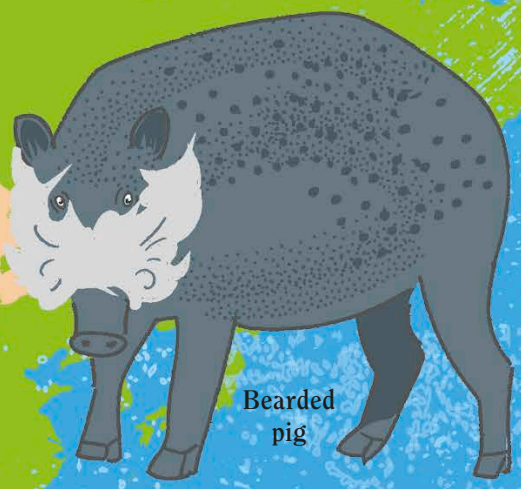
AMAZING WHALES

Latest research suggests one of the reasons whales migrate to warmer waters is to moult their skin to keep it healthy! That's a long way for a spa!

Straw coloured bat

The Biggest

Ten million fruit bats migrate from the Congo to Zambia to feast on fruit! This is the biggest mammal migration on the planet.



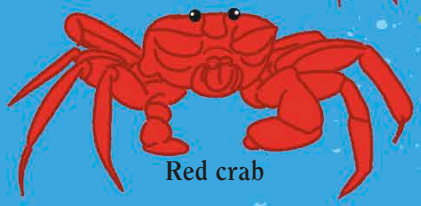
Bearded pig

The Beardiest

In Borneo, thousands of bearded pigs migrate once a year. We don't really know why, but they do! They are the only pig in the world that migrates.

Cats don't migrate, they are too busy sleeping...

Christmas Island



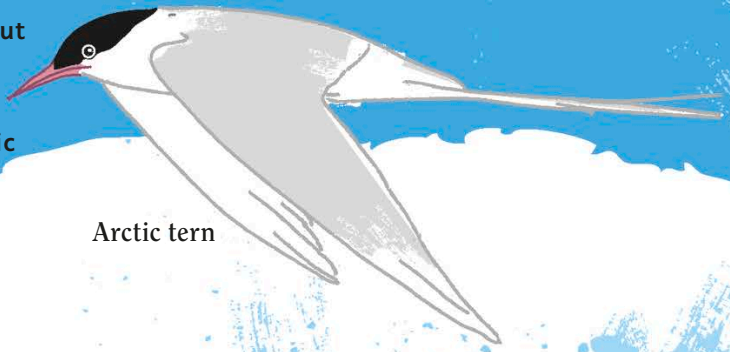
Red crab

The Most Spectacular

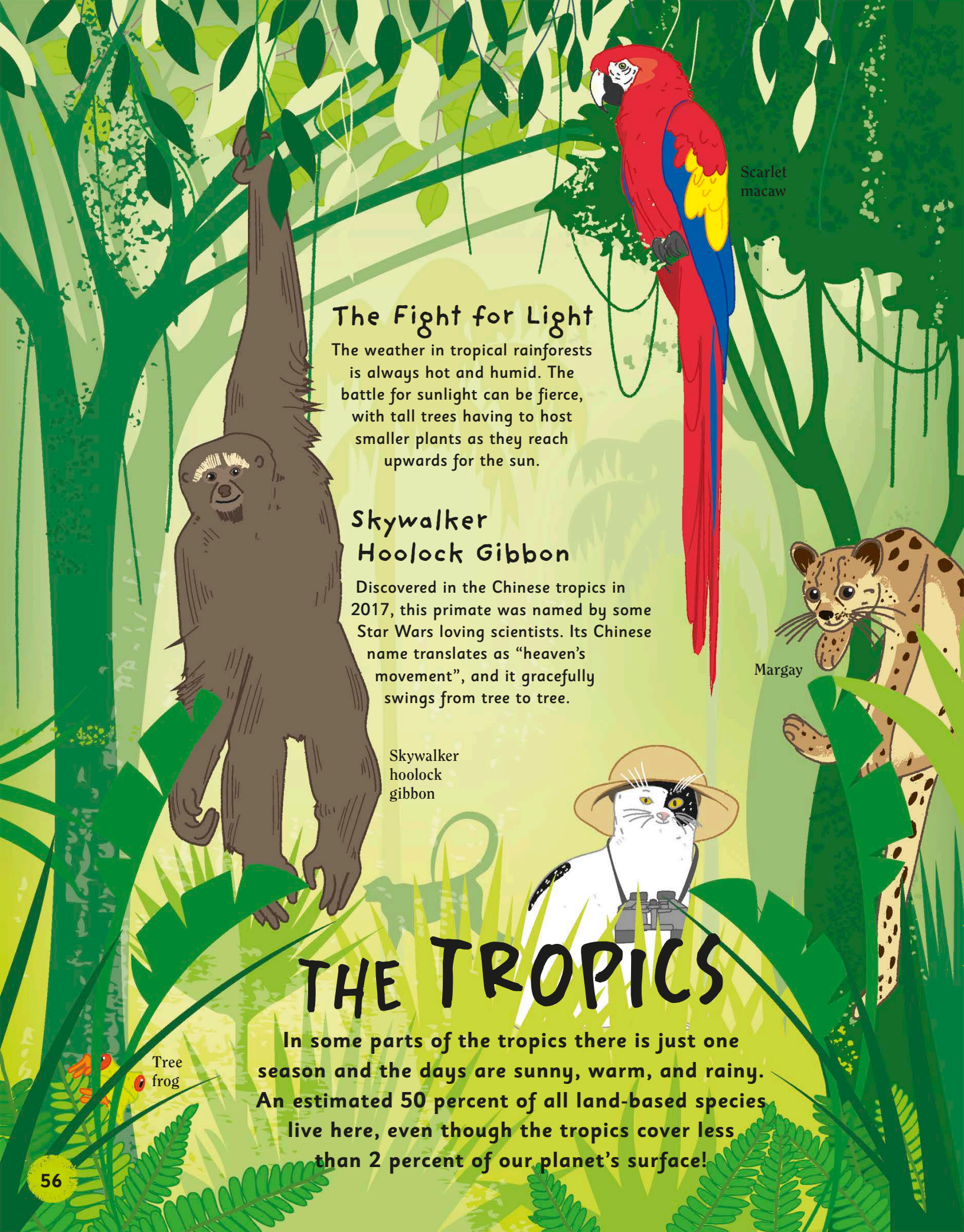
Bright red crabs troop together towards the ocean from their forest homes on Christmas Island in wet season. With a population of 40-50 million, that's a really spectacular sight!

The Longest

This slight, black headed seabird is without a doubt the king of the migrations, travelling from the top of the planet to the bottom every year. The average Arctic tern's life span is 34 years, so its flying milage is the equivalent of flying to the Moon and back three times!



Arctic tern



The Fight for Light

The weather in tropical rainforests is always hot and humid. The battle for sunlight can be fierce, with tall trees having to host smaller plants as they reach upwards for the sun.

Skywalker Hoolock Gibbon

Discovered in the Chinese tropics in 2017, this primate was named by some Star Wars loving scientists. Its Chinese name translates as "heaven's movement", and it gracefully swings from tree to tree.

THE TROPICS

In some parts of the tropics there is just one season and the days are sunny, warm, and rainy. An estimated 50 percent of all land-based species live here, even though the tropics cover less than 2 percent of our planet's surface!

THE POLES

The Arctic and Antarctic only experience two seasons, summer and winter. During summer at the poles, the sun does not set, and in winter the sun does not rise.

Wandering albatross

Antarctic midge

Frozen Solid?

This tiny, wingless insect lives on Antarctica and is the only native land animal in the continent. The Antarctic midge is actually frozen solid for nine months of the year – their blood has a natural anti-freeze that keeps them alive.

Adèlie penguin

Krill

Hair grass

ANTARCTIC

Famous for its penguin and seabird colonies, this huge continent sits at the bottom of our planet. It is much colder than the North Pole, and is an important diverse breeding ground for sea mammals, fish and, of course, birds.

Northern lights

Polar Bear

Polar bears can be HUGE and weigh around 450 kg (990 lbs) – nearly the same as 100 cats! The bears live and roam on the ice pack and hunt for seals. During the winter they hole themselves up into a cosy den.

Polar bear

Arctic fox

Narwhal

Sea anemone

ARCTIC

Right on top of the world, the North Pole is a huge pack of ice. This is surrounded by the Arctic circle – the tops of places like Russia, Greenland, and Alaska. Here you can find amazing creatures like narwhals, polar bears, and arctic foxes!

Anchovies' Tails

Anchovies travel together in huge groups called schools. In spring, they rise to the surface of the oceans to release eggs and sperm. The eggs bob on the surface until they become fertilized by sperm that floats past.

Anchovy

Bowhead whale

Bowhead Whales

In 2019, possibly for the first time, bowhead whales did not migrate from the icy waters of the Arctic. With the rising temperatures and more food sources, there was no need for them to leave.

Spawning Fish

Fish are sensitive to changes in daylight and day length. When spring arrives, there is more light, which gives some fish the cue to start spawning – eggs develop quicker when the water temperature rises after winter, so this is the perfect time.

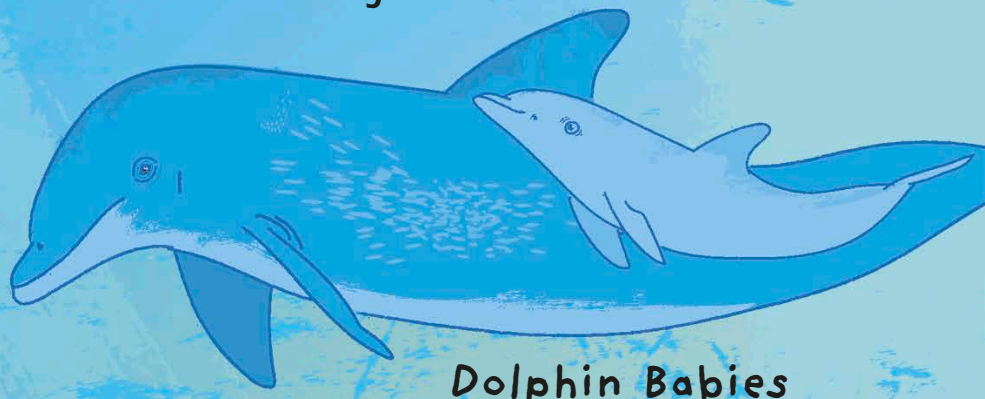
MEATLOAF

A mollusc known as a chiton looks like meat loaf AND has metal teeth! Called the wandering meatloaf, its teeth are made of one of the hardest known materials in nature – magnetite!

Chiton

OCEAN SEASONS

Marine life respond to ocean currents (which can be dictated by our land-based seasons) just like we respond to weather patterns. The amount of sunlight can also trigger a response, as more sunlight means warmer water – a good time to breed.



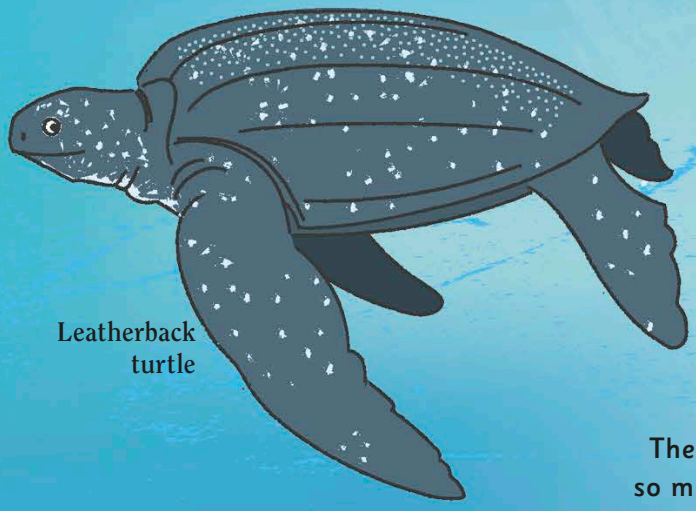
Bottlenose dolphin

Leatherback Turtle

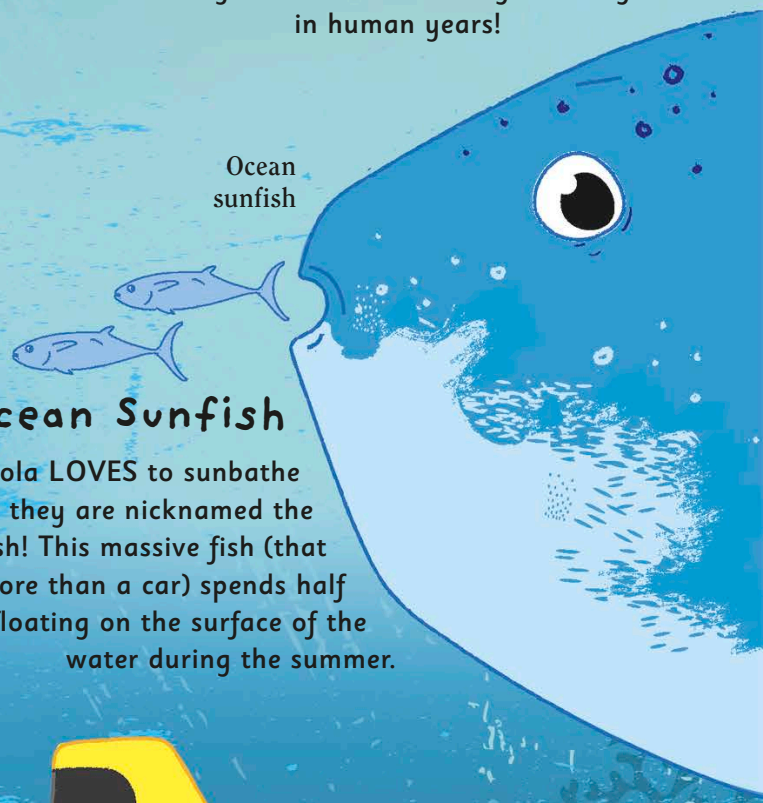
The biggest turtle in the world (weighing nearly as much as two grizzly bears!) will sometimes migrate over 16,000 km (10,000 miles) in search of food and places to nest.

Dolphin Babies

Most baby dolphins are born in early spring, and stay with their mothers for 5–10 years. That's like being a teenager in human years!



Leatherback turtle



Ocean sunfish

Ocean Sunfish

The mola mola LOVES to sunbathe so much that they are nicknamed the ocean sunfish! This massive fish (that can weigh more than a car) spends half their time floating on the surface of the water during the summer.

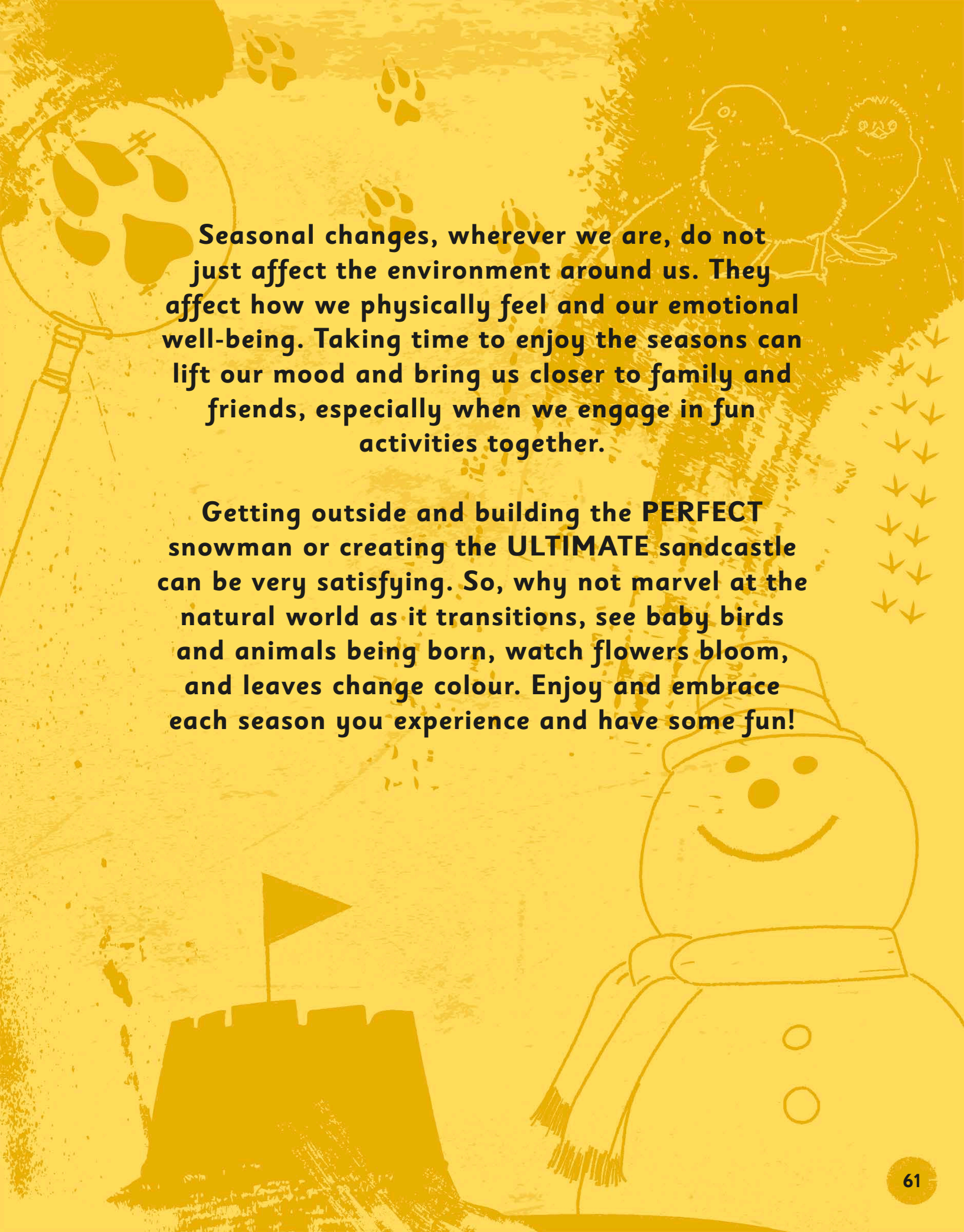
Grub's Up!

Microscopic plants called phytoplankton need sunlight and nutrients to grow. During the winter, stronger currents drag up nutrients from deeper ocean beds. During the spring, more light penetrates the water, helping phytoplankton to grow quickly, feeding all the species that rely on it.

MIND, BODY, AND SOUL

Static-cat

Cat fur becomes static just before a storm, so, if you see your adorable puss frantically grooming, it's time to take shelter!



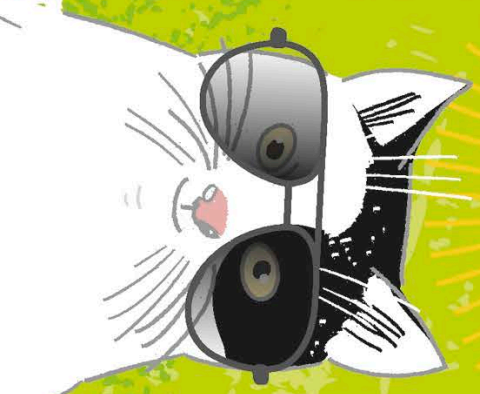
Seasonal changes, wherever we are, do not just affect the environment around us. They affect how we physically feel and our emotional well-being. Taking time to enjoy the seasons can lift our mood and bring us closer to family and friends, especially when we engage in fun activities together.

Getting outside and building the PERFECT snowman or creating the ULTIMATE sandcastle can be very satisfying. So, why not marvel at the natural world as it transitions, see baby birds and animals being born, watch flowers bloom, and leaves change colour. Enjoy and embrace each season you experience and have some fun!

The Earth is closer to the sun in summer.

False

The Earth in the Northern Hemisphere is actually closest to the sun during WINTER!



Monkeys have snowball fights

True

Japanese macaques, known as snow monkeys, just love to frolic in the snow. The younger, more playful monkeys in the troop even pelt each other with snowballs!

Everywhere has four seasons

False

Many parts of the world only get two seasons – wet and dry, and in the poles it's either just winter or summer.

Red squirrels hang mushrooms out to dry

True

That's right! These furry stockpile experts leave mushrooms out to dry in the sun. Once dried, the mushrooms stay fresh and tasty in the long winter months.

TRUE OR FALSE

Rain is 100% made of water

False

It also contains dissolved gases from the atmosphere, along with dust particles.

Your sense of smell can be stronger in spring

True

We smell things better during the spring due to extra moisture in the air.

Reindeer eyes change colour in winter

True

Reindeer's eyes change colour from golden brown in the Arctic summer months to deep blue in the short, dark days of winter.

It snows on Mars

True

High above Mars, in the atmosphere, snow has been detected, though it vaporises before it hits the ground. Boo, no Martian snowmen.

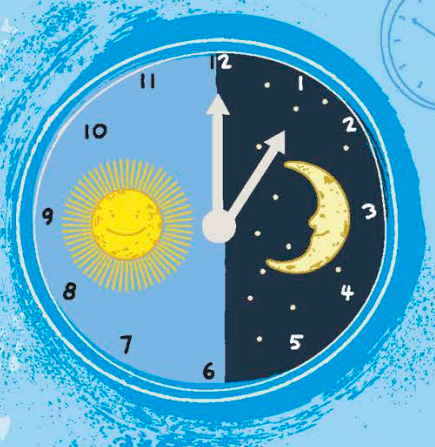
Did you know maple syrup tastes sweeter in spring and that it can get so cold in Siberia that your breath can turn to ice? Did you know that vultures poo on their legs in the summer to keep cool? Stinky sunscreen!

WEATHER MOODS

Weather can directly affect how we feel. Warm sunshine can make us feel happier whereas winter, when it is cold and dark, can make us feel tired and down in the dumps. Even a change in air pressure, like right before a storm, can cause a headache!

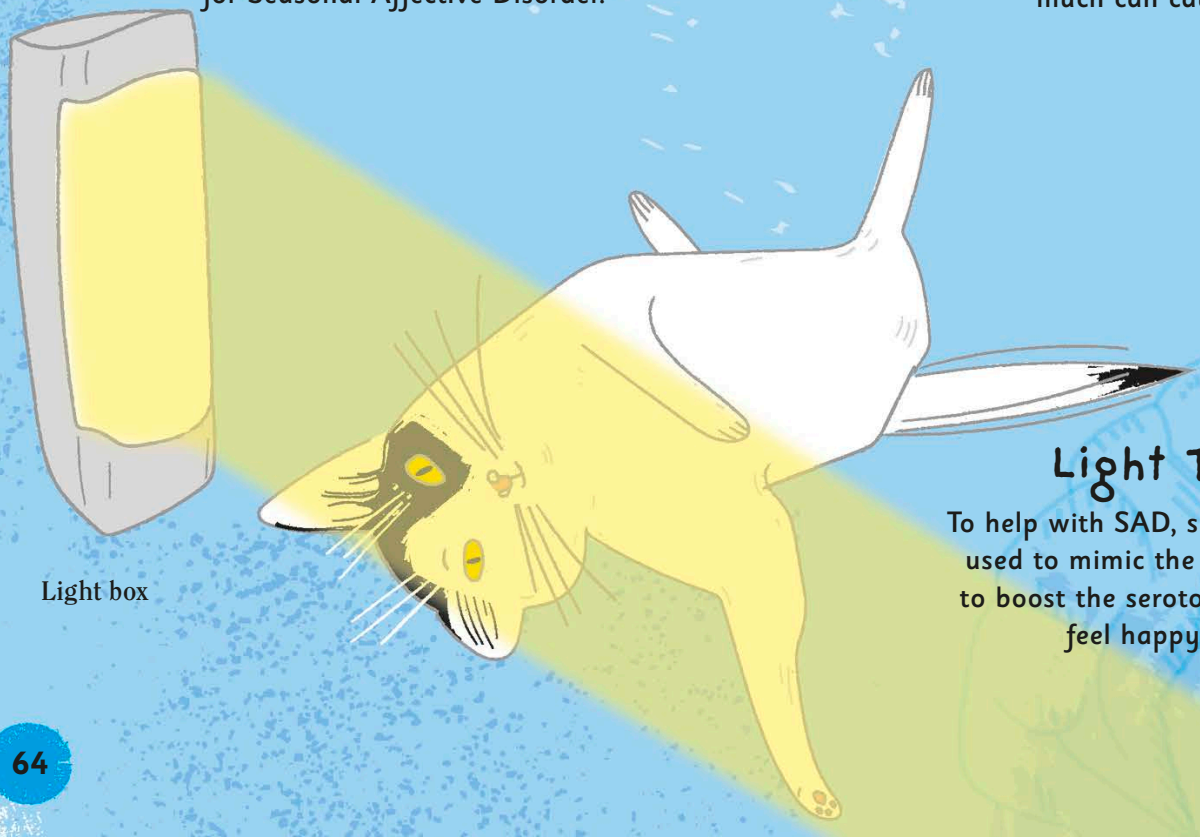
Winter Blues

Some people can get very depressed in the winter, which can be due to the brain's response to getting less daylight. This affects two chemicals in the brain – melatonin and serotonin. This condition is called SAD, which stands for Seasonal Affective Disorder.



The Right Balance

The brain makes more melatonin when it is dark. Higher melatonin levels in winter can cause a person to feel sleepy and less energetic. Higher levels of serotonin in the summer boost feelings of happiness and well-being, but too much can cause anxiety.



Light box

Light Therapy

To help with SAD, special light boxes are used to mimic the sunlight. This helps to boost the serotonin that we need to feel happy and active.

Practical Tips

Try these tips on keeping happy, healthy and energetic throughout the year.

Exercise

Try and exercise every day – even better if you can do it outside! Try going for a walk or playing ball games with friends.

Food

Eating lots of delicious, healthy foods can really help your mood, and so does drinking plenty of water every day.

Friends

Make plenty of time for friends. Having a giggle with your pals can do wonders for mood and energy.

Fun

Do your favourite things and make plans with friends and family to enjoy each season.

Sun Screen!

Don't forget when you are out enjoying the sun to put on sun screen – don't forget to protect your face!

LIVING UP HIGH

Children who live in high altitudes are more likely to develop SAD. This is because seasonal changes are more extreme at higher altitudes.

Quiz

What season are you?

1. What is your favourite footwear?

a. Sneakers
b. Flip flops
c. Shoes
d. Boots

2. Which colour do you prefer?

a. Green
b. Yellow
c. Orange
d. Blue

3. When it's rather chilly...

a. Sit with a hot cocoa by a warm fire
b. One ticket to Barbados please!
c. Wrap up warm in lots of layers before going out
d. Snow boots on and head out for some fun!

4. When it's really hot...

a. Put on a hat and stay in the shade
b. Lap it up like a lizard on a hot rock
c. Phew... find a dark room to chill in
d. OMG, get me some ice!

5. What season do you ENJOY the most?

a. Spring
b. Summer
c. Autumn
d. Winter

Answer:

Mostly As	Spring it on!
Mostly Bs	Summer is your bag
Mostly Cs	Autumn rocks your world
Mostly Ds	Snow joke, you LOVE winter

SPRING

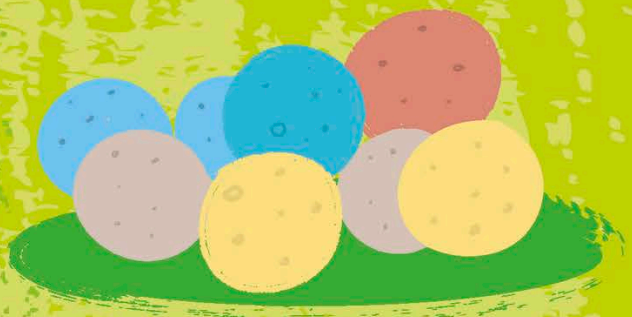
Activity Ideas

Go on a Nature Hunt

Go for a walk in the park, take a notebook, jot down all the birds, animals, plants, and trees that you spot!

Make a Seed Bomb

Mix together one cup of seed with five cups of compost and three cups of clay powder. Slowly mix in water with your hands until everything sticks together. Roll into firm balls. Leave the balls to dry in the sun. Plant in the ground and watch them grow!



Spray a Rainbow

On a sunny day, stand with your back to the sun, spray a hosepipe of light, misty water into the air, and watch the rainbow appear!

SUMMER

Activity Ideas

Make a Daisy Chain

Create a slit in the stem under the flower head, take another daisy and pull the stem through the slit of the original daisy. Keep repeating to create the chain.

Identify Leaves and Trees

Go check out some tree leaves and see if you can identify what they are.

Go on a Bug Hunt

Dark damp spots under rocks and logs are good places to spot bugs.

AUTUMN

Activity Ideas

Fungi Spot

Autumn is the very best time to go in search of fungi when the spores start to grow in the moist dampness. Look under fallen leaves and the bottom of tree trunks – but NEVER eat any!

Calculate the Age of a Tree

Measure around the trunk of the tree at about 1 m (3 ft) from the ground. Divide by 2.5 to give an age in years. Why not give the tree a hug while you are there?

Apple Prints!

Ask an adult to cut your apple in two, making it as flat as possible. Fill a paper plate with paint, dip the apple, then stamp it on some paper. Why not paint on some leaves after? Keep stamping to create a cool pattern.

WINTER

Activity Ideas

Look for Animal Tracks

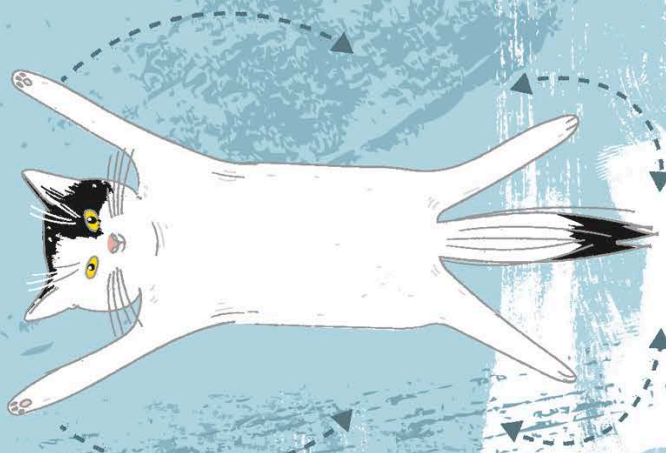
Become an animal track detective! When it's really muddy or snowy outside, it's the purrrfect time to go and spot some animal tracks. Who do you think has been here?

Bored Games?

When the weather is too cold and wet to play outside, it's the perfect time to settle in with your friends, family, and some hot cocoa and play some fun board games!

Create a Snow Angel

It's snowed – YIPPEE! Find some nice, deep, clean snow, lay on your back, extend your arms straight, move your arms and legs up and down. Stand up carefully and see your angel in the snow!



GLOSSARY

ASTEROID
A small, rocky object that orbits the sun

ASTRONOMICAL SEASONS
The position of the Earth in relation to the sun

ATMOSPHERE
The blanket of gases that surrounds Earth

AXIS
The invisible line around which Earth rotates

CLIMATE
Area that has particular weather conditions

CLIMATE CHANGE
Change in temperature and weather across the Earth that can be natural or caused by human activity

CONSTELLATIONS
Clusters of stars in the night sky

DESERT
An area with a very low annual rate of rainfall

DUST DEVIL
A small whirlwind that sucks up dust

EQUINOX
A day occurring twice a year, where day and night are equal lengths

EQUATOR
An imaginary line around the Earth, between the North and South Pole

GRAVITATIONAL PULL
The gravity of a planet or astronomical body that pulls objects towards it

HEMISPHERE
Top or bottom half of the Earth

JET STREAM
Strong currents of wind that encircle the Earth

JURASSIC
The second period of the Mesozoic Era. It occurred 200-145 million years ago

MAGNETIC FIELDS
The areas near a magnetic part of the Earth

MELATONIN
The chemical that helps your brain regulate sleep

METEOROLOGICAL SEASONS
Seasons separated by the weather; usually spring, summer, autumn and winter

METEOROLOGY
The science of weather

MET OFFICE
The Meteorological Office, the UK's national weather service

MONSOON
Heavy tropical rain

MURMURATION
A flock of starlings flying together

PHOTOSYNTHESIS
The process through which plants turn sunlight into energy

POLES
The top and bottom of the Earth

POLLINATION
When pollen is transferred from one flower to another, often by insects

PROTO-EARTH
The Earth at an early stage of its development

SAVANNA
A grassy plain in hot regions of the world

SEROTONIN
A chemical that helps your brain stabilise your moods

SOLAR WINDS
The flow of charged particles from the sun to Earth

SOLSTICE
The longest and shortest days of the year

STRATOSPHERE
The second lowest layer of Earth's atmosphere, where planes fly

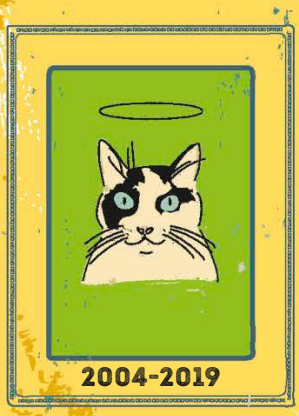
TECTONIC PLATES
Massive chunks of the Earth's crust, which move very slowly towards and away from each other

THEIA
The planet that scientists believe crashed into Earth 4.5 billion years ago

TROPICAL STORM
an intense storm formed over tropical oceans with heavy winds

WEATHER FORECASTING
Predicting the atmosphere and the weather for a specific time and location

INDEX



Mimi
(Winter aficionado)

Vicky Woodgate

Moka
(Spring fan)

About the author

Summer lover, Vicky Woodgate shared her life with two VERY important life guides, Moka and Mimi. They are the inspiration for our seasonal mentor Mimi Cat. Vicky continues to write and illustrate more books from the blustery south coast of England with her husband, an autumn addict, and newly discovered garden hedgehog, Bert.

For

My super siblings,
Lee, Steve, Dan, and Carly. X

Thanks Fay, Di, and Sonny.
What a team! X

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Answer: 59 Mimis