Show your parents

Saxby and William Pridmore

Show your parents is a series of short chapters aimed at helping children (under 12 years) master a little general knowledge and science.

Some of this material may need input from an adult – some words and ideas may be a bit difficult.

But, the need for a bit of adult/parent input is not a bad thing – such interaction between the generations may be helpful to both. See what you think.

It is a not-for-profit endeavour.

Dedicated to

Helen Stephen [pictured]

[William's pre-school teacher; many thanks to Sarah Stephen for the photograph]

Contents

26. Larry
27. More atoms
28. Flags
29. Moscow
30. Some carbon
31. More carbon
32. Photosynthesis
33. Pisa
34. Toes and energy
35. Water and energy
36. Craters
37. Animals, mainly
38. Old rocks

Show your parents
Chapter 1.

['Show your parents' is a series of short chapters aimed at helping children (with input from their parents) learn some stuff. It is a not-for-profit endeavour.]

Start here…

Show some of these words and pictures to your parents – they might be interested. And they might be able to help with some of the harder words.

[Wikipedia advises – Public domain: https://upload.wikimedia.org/wikipedia/commons/6/62/Lunch_atop_a_Skyscraper.jpg]

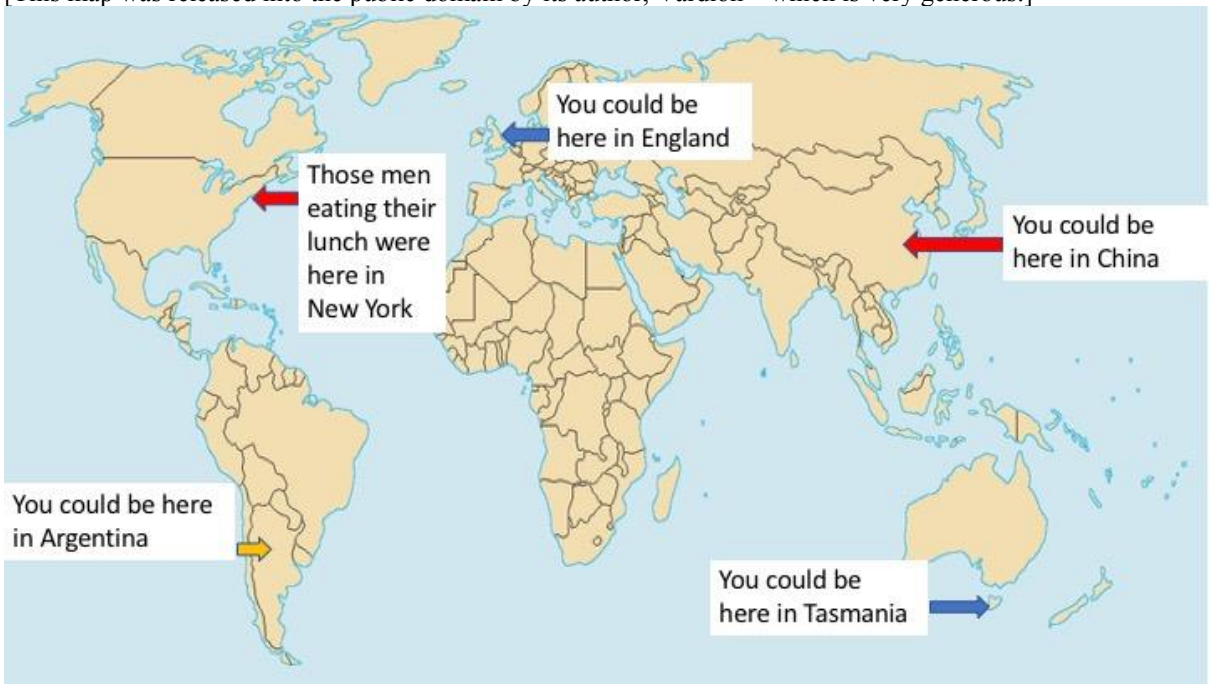
"Lunch atop a Skyscraper" – This is a real photograph which was taken a long time ago (1932) in New York City.

These men were building a very tall building. It is amazing – they don't seem to be scared. But, they have done this many times before.

Your job is to learn hard words and then you won't be scared of them.

Show your parents
Chapter 1.

[This map was released into the public domain by its author, Vardion – which is very generous.]



White Swans and Black Swans

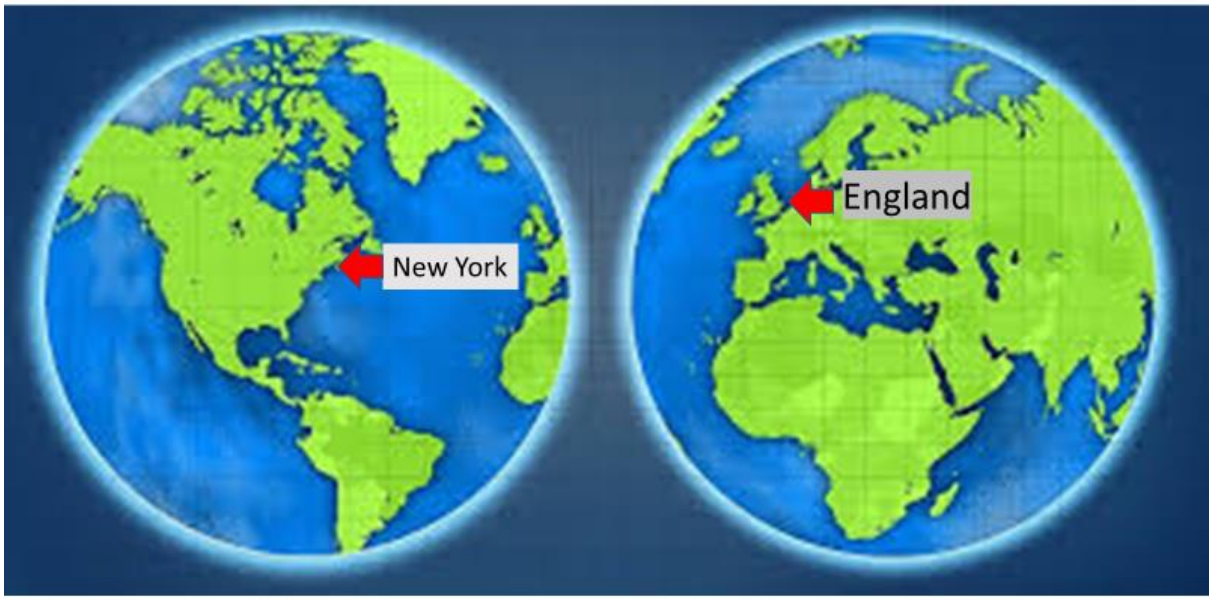
In England they only have white swans. Before the explorers came from England to Australia, the people of England thought that ALL the swans in the world were white.

But, when the English explorers got to Australia, they found black swans!! They never imagined swans could be black!!

That was a huge surprise – it taught the explorers that you can never know everything. Nobody knows everything.

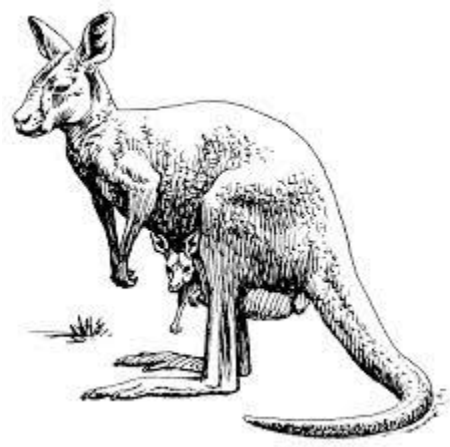
Q: How do all the oceans say hello to each other?
A: They wave!

Q: What did one wall say to the other wall?
A: I'll meet you at the corner!



OK, well, the world isn't really flat, like that other map. It is round like a ball. So, when you look at it you can only see some places – other places are on the other side of the ball. This is funny. Here we can see the side which has New York [where those men were having lunch] and another side, where you can see England.

But, you can't see Australia!!! So, Australia is on another side. Never mind.



Q: Can a kangaroo jump higher than your house?
A: Of course! Your house can't jump!

[This picture comes from Clean Public Domain – Doodlebug. Marvellous generosity.]

Maps are good. BUT – this is what the world really looks like!!!
Some people thought the world was wearing a diamond ring – but, the shiny thing is the Sun coming up around the side of the world.

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Chapter 1.

Q: How much does it cost a pirate to get his ears pierced?
A: A buck an ear.

This picture is from Japan. It is called, "The Great Wave".

[Public domain in USA for Jan 1, 2019.]

Can you see Mt Fuji? [It is a volcano, in the distance.]

Milly asked

1. Q: "What games do crocodiles like playing?"
   A: Swallow the leader!

2. Q: "What music do balloons hate?"
   A: Pop music!

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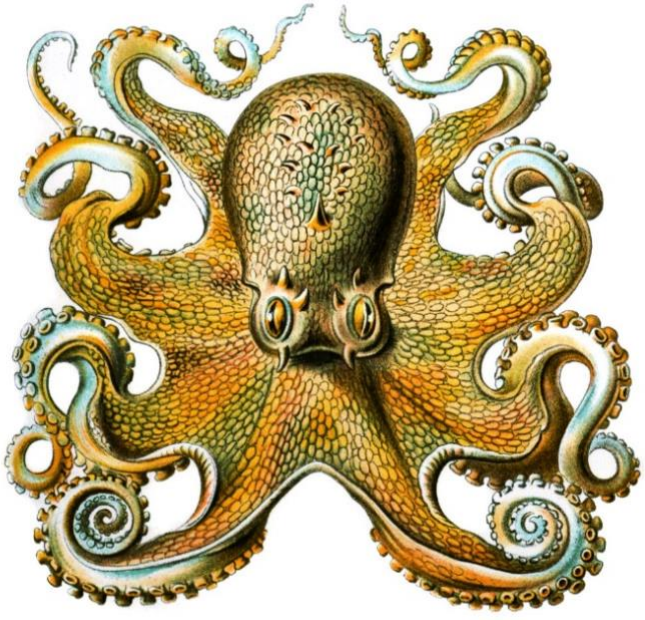
Chapter 2.

Here, pussy, pussy…

[Carl Offterdinger, 1829-89]

If this is Puss in Boots,



and this is an octopus,

what is a platypus?

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Chapter 2.

This is a platypus.

A platypus is a very strange animal which is only found in Australia. Its babies come in eggs, but it feeds them with milk. It has fur, but it has a bill and feet like a duck. [It is NOT a sort of a cat.]
There are many strange things in life.

If two platypuses were talking, and you walked past, one would probably say to the other, “There are many strange things in life”.

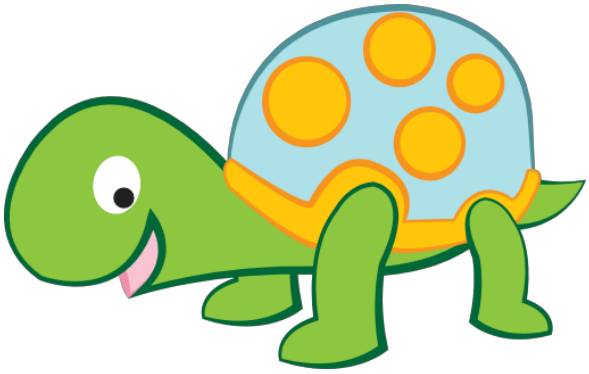
OK. This is a Magic Square:

4	9	2
3	5	7
8	1	6

It does not matter which way you add these numbers up, it always comes to 15.
Across the top: 4+9+2 = 15.
Down the middle: 9+5+1 = 15.
From the top left down to the bottom right: 4+5+6 = 15.
Any way you go, it is always 15. That **is** magic!

You can even make ones with more numbers across the top and down the middle.

Show your parents
Chapter 2.



Q: What does a turtle do on its birthday?
A: It shellebrates!

Q: What kind of photos does a turtle take?
A: Shellfies.

Primates

The primates are the family of animals to which monkeys, apes and humans belong.
There are some very small primates, like this one [called a tarsier].

[Public domain – thanks, copyright holder.]

The biggest ones are gorillas,

which can weigh twice as much as a man!!!

[This free from Clker.com. Many thanks.]

Q: What is fury, goes fast and has wheels?
A: A cat. I lied about the wheels.

Knock, knock.
Who's there?
Amanda
Amanda who?
A man da fix your sink!

I hear music coming from the printer… I think the paper is jamming.

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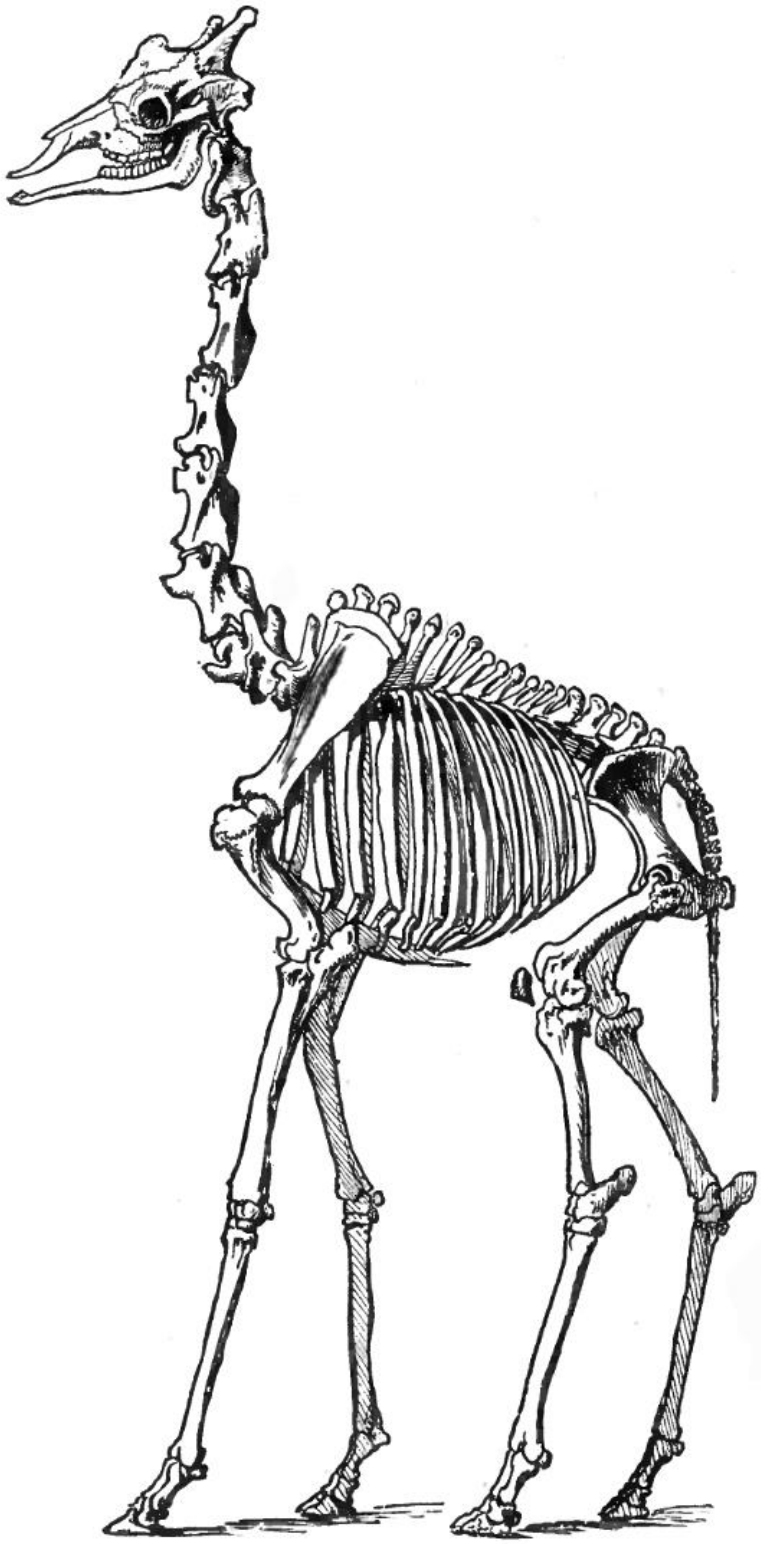
Chapter 3.

Bones



[Artist: R Lydekker (1849-1915). Public domain.]

This is a skeleton of what animal?

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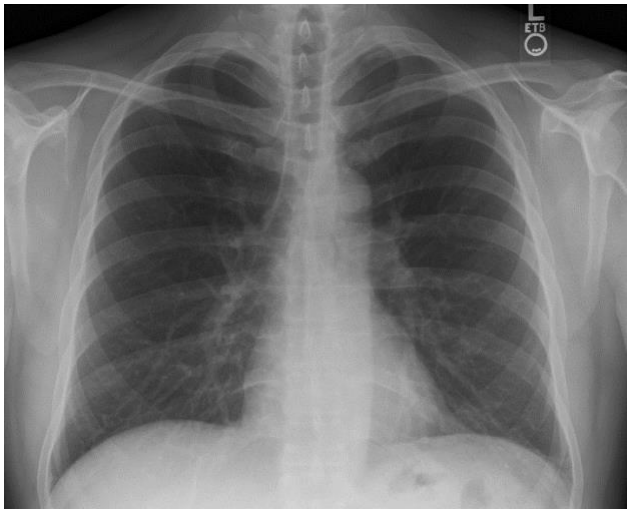
[Creative Commons: Public domain.]

This is an X-ray picture – a way of seeing inside our bodies. This is a picture of the inside of a chest.
We can see white lines going sideways. These are ribs. You can feel your own ribs with your fingers.

The drawing on the first page is of the bones of a giraffe.

So, humans and giraffes and most other animals have bones inside their bodies.

[You need bones so you can move – if you didn't have bones in your legs you wouldn't be able to walk.]

But, do any animals have their bones on the outside?


The answer is yes!! An animal once lived inside this shell – the shell was its bones. It had no bones inside it. It didn't get out and go for a walk.

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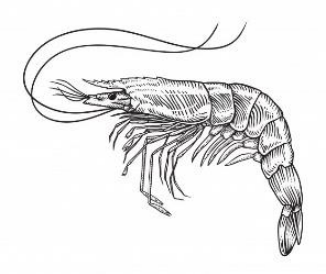
Chapter 3.



Then there are sea creatures like shrimps which have a hard shell, but they can move around – go swimming and have picnics and stuff. Their shell is made up of lots of small pieces of shell, and so they can move.

When the skeleton is outside the body or an animal or insect it is called an exoskeleton.

Here is an animal we all know, who has its skeleton outside its body. This one is able to move – he or she is going on an adventure.

We won't talk about this creepy spider for too long. But, you can see he/she has a hard shell. When we look at the legs, we can see that they are hard on the outside – spiders have no bones inside.

Q: What do geeky spiders like to do?
A: Make websites.

So, none of these creatures have bones inside – instead, they all have hard shells – which are like bones – so their shells are called **exoskeletons** (‘exo’ means outside – you go through the ‘exit’ to get outside).

So, bones, whether they are outside or inside our bodies, let us walk and swim and dance and go camping. Having your bones outside your body has one other advantage. They give you protection.

Interestingly, a few hundred years ago soldiers wore suits of armour to protect them against sword cuts and sharp arrows. These suits did not help soldiers move (instead they made them slow and clumsy and tired), but they **did** protect them, a bit like the exoskeleton of some animals and insects.


[Public domain: ireland-information.com]

Q: Who is the most famous French skeleton?
A: Napoleon bone-apart...

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Chapter 3.

Q: Why can’t Cinderella play soccer?
A: Because she’s always running away from the ball.

Did you ever think you should get a T-shirt like this?

[http://clipart-library.com/clipart/fish-clip-art-7.htm]

Nope!

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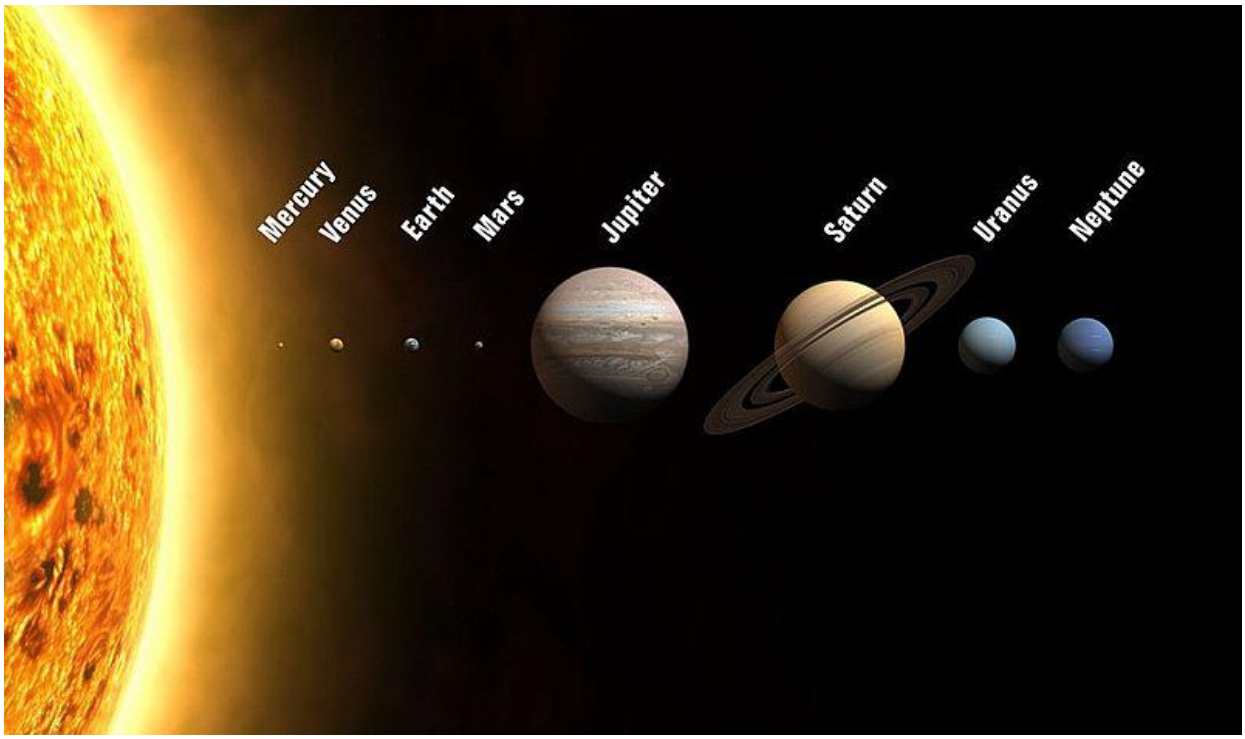
Chapter 4.

Space opportunity



[From Wikimedia Commons, the free media repository
https://commons.wikimedia.org/wiki/File:Planets2013.jpg]

OK, on the left, above that "OK" you see a white and yellow blob. That is the Sun.

The Earth [the planet on which we live] goes around the Sun.
7 other planets also go around the Sun.
You can see the Earth – it looks a little bit blue [which comes from the oceans].

The closest planet to the Sun is called Mercury. Then comes Venus. Then us on Earth.

Next is Mars [No, no, no – this is NOT where Mars bars come from].

No person has ever been to Mars – but it is important that we know about the place [even if they don't have Mars bars].

Show your parents
Chapter 4.

So, we sent a space ship to Mars. It took half a year to get there and arrived in 2004 [a long time before you were born].

When it landed, a robot on wheels got out. This robot was called "Opportunity" – some people just called it "Oppy".

Well, for 14 years Oppy drove around on Mars and sent pictures back to Earth. Oppy also dug holes in the ground and sent messages back to Earth telling us what it found, and stuff like that.

[Wikipedia says this is in the public domain.]

Oppy got its energy/electricity from the Sun. Recently [after about 14 years] there was a big sandstorm and Oppy got covered with sand. This sand stopped the rays of the Sun getting into its batteries, and so Oppy ran out of energy and stopped – it no longer drives around or digs holes or sends pictures back to Earth.

You will be able to tell people you were alive when Oppy was driving around and doing stuff on Mars – and you were alive when it stopped working.

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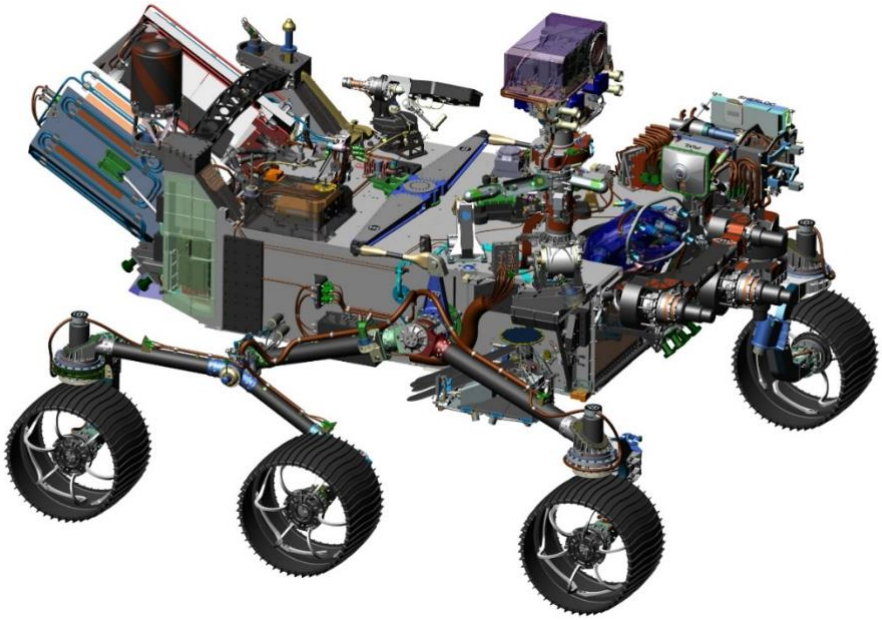
Chapter 4.

No more whizzing around.

[Wikipedia says this is in the public domain.]

They will be sending another robot to Mars to replace Oppy…



[Credits: NASA/JPL-Caltech.]

And this is it – NASA plans to send a robot like this to Mars in 2020.

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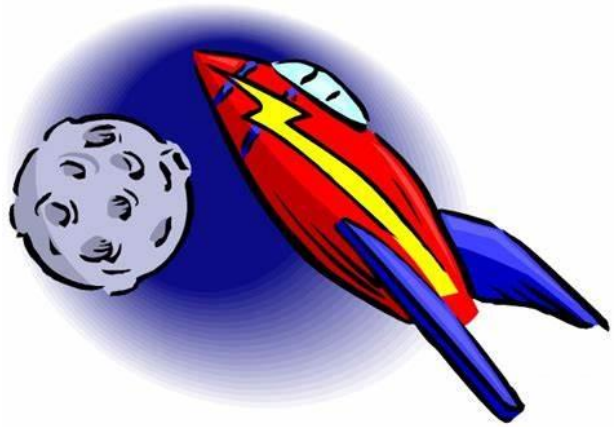
Chapter 4.

Q: What should you do when you see a green alien?
A: Wait until it's ripe!

Q: What did the astronaut say when he saw bones on the moon?
A: "Oh, so the cow didn't make it."

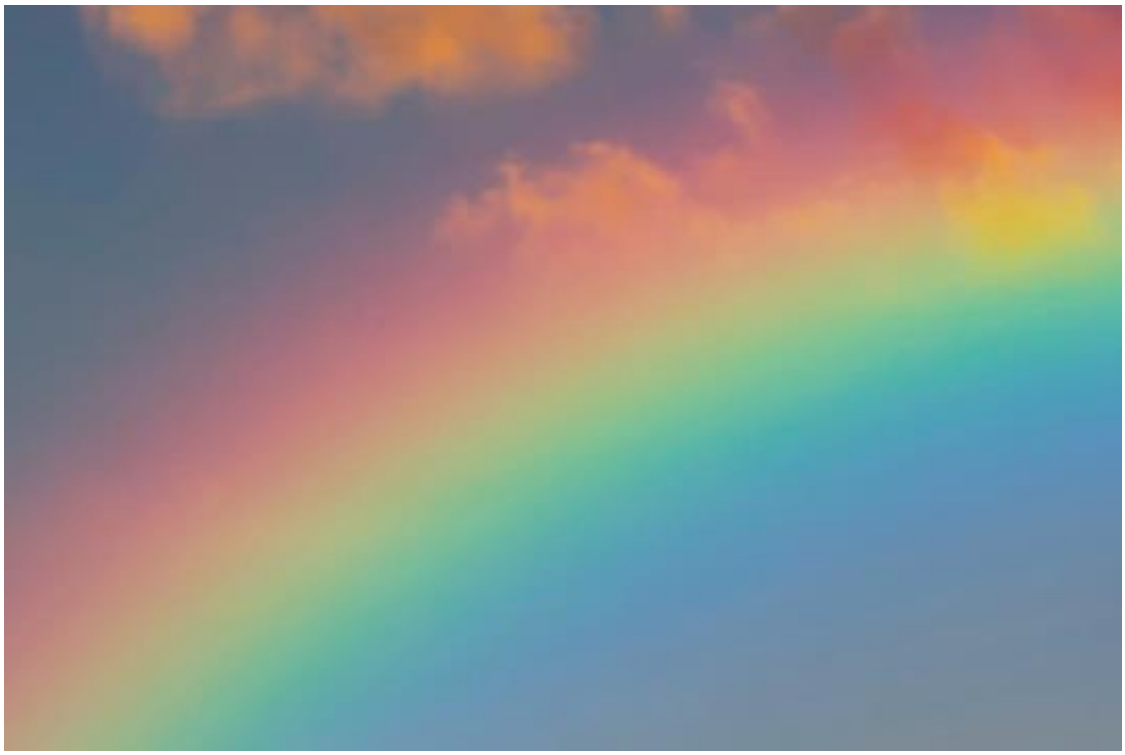


[Public domain.]

Q: What do you get when you cross a lamb and a rocket?
A: A space sheep!

Show your parents
Chapter 5.

Rainbows



[Public domain: Tumblr. Many thanks.]

[Clean Public Domain. Many thanks.]

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Chapter 5.

[ABSFreePic.com. Many thanks.]

Rainbows. It is hard to believe they exist, until you see one.

These pictures are very beautiful. But it is sometimes hard to see all the separate colours – so, let's look at a drawing.

[Clean Public Domain. Many thanks.]

Rainbows are made up of 6 different colours

1. Red
2. Orange
3. Yellow
4. Green
5. Blue
6. Indigo/violet

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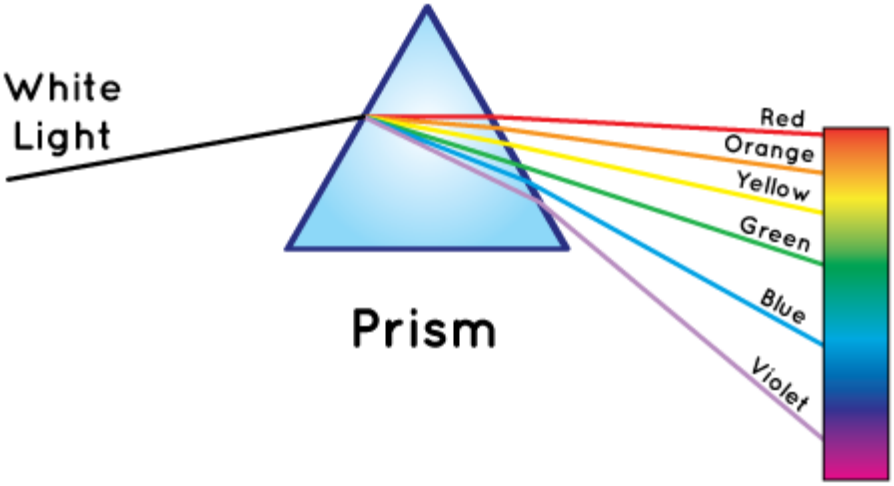
Chapter 5.



[Source: NASA Science
Image: Courtesy NASA/JPL-Caltech.]

Normal light which is there during ‘daylight’ is called white [we don’t really notice it]. But, it is made up of 6 different coloured lights. [Some people think there are 7]

Anyway, when white light gets bent, you can see the different coloured lights which make it up.

The best way to see this happen is to shine a white light on a triangle of glass, which is called a prism.

If the light hits the glass at an angle the light is bent. When it gets to the other side, it gets bent again. This makes the different coloured lights fan out, and you can see them.

[Free Raindrops Clipart. Many thanks.]

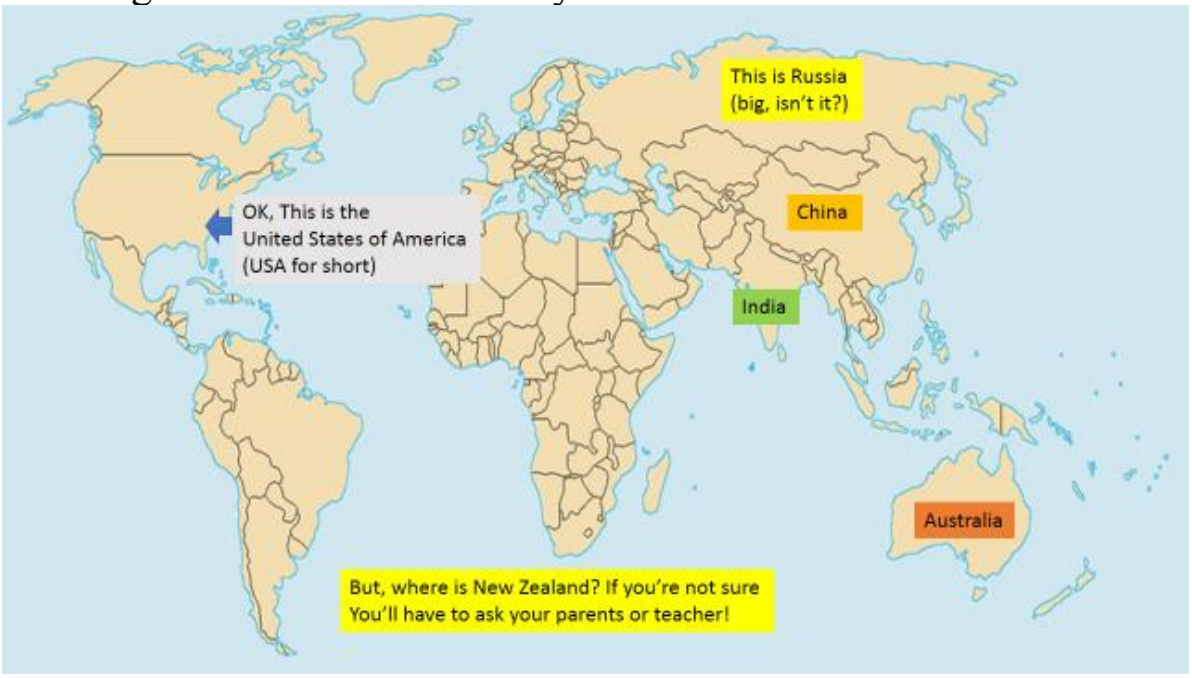
Raindrops or other moisture in the air is like millions of tiny prisms. When white light goes through them it is bent and the colours of the rainbow come out. Pretty cool!

Q: What vegetables do librarians like?
A: Quiet peas.

Show your parents
Chapter 6.

Where is New Zealand?

OK, this is a map of the world. But, where is New Zealand?
You might have to ask somebody.



[Map released into the public domain by its author, Vardion – which is very generous.]

This is the Federal Parliament House of Australia, where the Prime Minister and those people who make the laws of Australia do their work.

OK, but, where is this Parliament House? Well, it is in a city called Canberra. But, where is this city called Canberra?

Show your parents
Chapter 6.

A U S T R A L I A

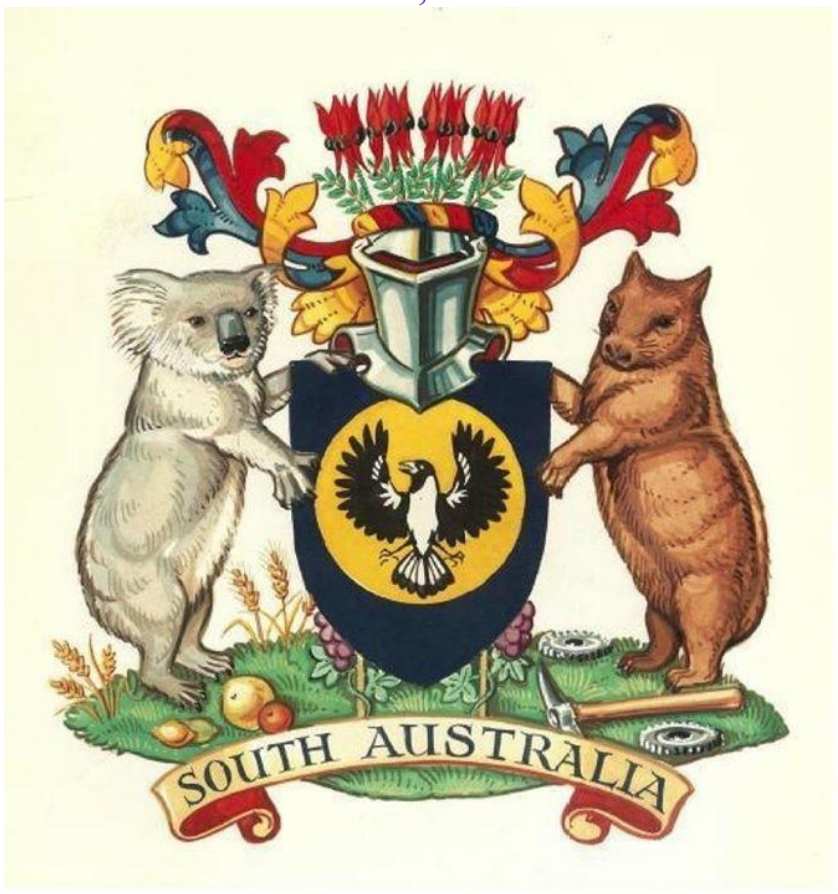
[Public domain – thanks to https://ian.macky.net/pat/map/aunz/aunz.html]

Canberra is a bit hard to find. It is marked with a red star on this map. In the bottom right-hand corner you will find "Tasman Sea". Above that you will find "NEW SOUTH WALES". And above that you will find "Canberra".

OK, this is the coat of arms or crest or badge of Australia – with an emu and a kangaroo.

Show your parents
Chapter 6.

This is the coat of arms or crest or badge of South Australia – they have 2 different animals, a koala and a wombat.



Well, here is the coat of arms of Hobart – it has the emu and the kangaroo but they seem to have forgotten their manners and won't look at each other.

Show your parents
Chapter 6.

[Public domain: Comic Vine]

If this is a kangaroo, it is a very funny looking one. This animal seems to be late for a very important date. He seems to be lost – perhaps you can help by remembering what story he comes from?

Knock, knock.
Go away!!!!

[We can't remember where we found the picture, and will take this picture down if those who took the picture object.]

This is an unusual bicycle, don't you think? There are two seats [one nearly hidden by a black post] and two sets of pedals. Pretty cool!

Q: What did the green grape say to the purple grape?
A: Breathe! Breathe!

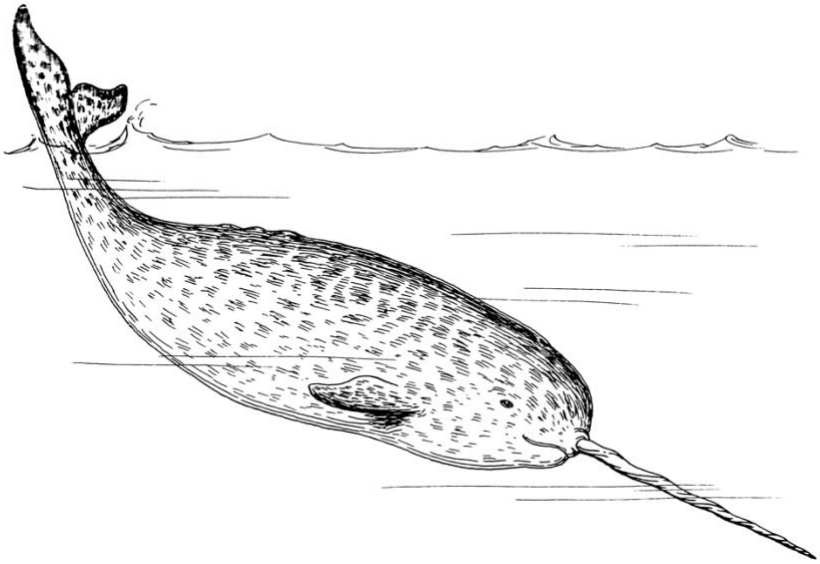
Q: What do you call a country with only pink cars?
A: A Pink car-nation.

Show your parents
Chapter 7.

[Clker.com FREE CLIPART. http://www.clker.com/clipart-426535.html - Many thanks]

The narwhal

This is not a creature out of Star Wars or a Harry Potter story. It is not a dinosaur which went extinct hundreds of thousands of years ago.
The narwhal is a medium-sized whale which lives in the cold waters around Greenland, Canada and Russia.
It is different from other whales because it has a long tusk coming out of its head. That tusk is actually a tooth. [Strange but true]



[Released into the public domain by Pearson Scott Foresman
https://commons.wikimedia.org/wiki/File:Narwhal_(PSF).png]

Show your parents
Chapter 7.

[Wikimedia Commons: https://en.wikipedia.org/wiki/File:Narwalschaedel.jpg]

Sometimes skeletons teach us plenty. In the bottom skeleton we see that sometimes [not often] narwhals have two tusks rather than one.

[This map was released into the public domain by its author, Vardion – which is very generous.]

So, narwhals are found in the water around Canada, Greenland and Russia. Are they found around Australia?

A couple of last things about narwhals

1. They are whales – so they are not fish. They don't get their oxygen out of the water – they breathe air – they come up and breathe air in through a hole in the top of their heads. [All whales do, as you know]

2. You would think they would spear things with their tusk – but they don't – it seems to just be there for decoration.

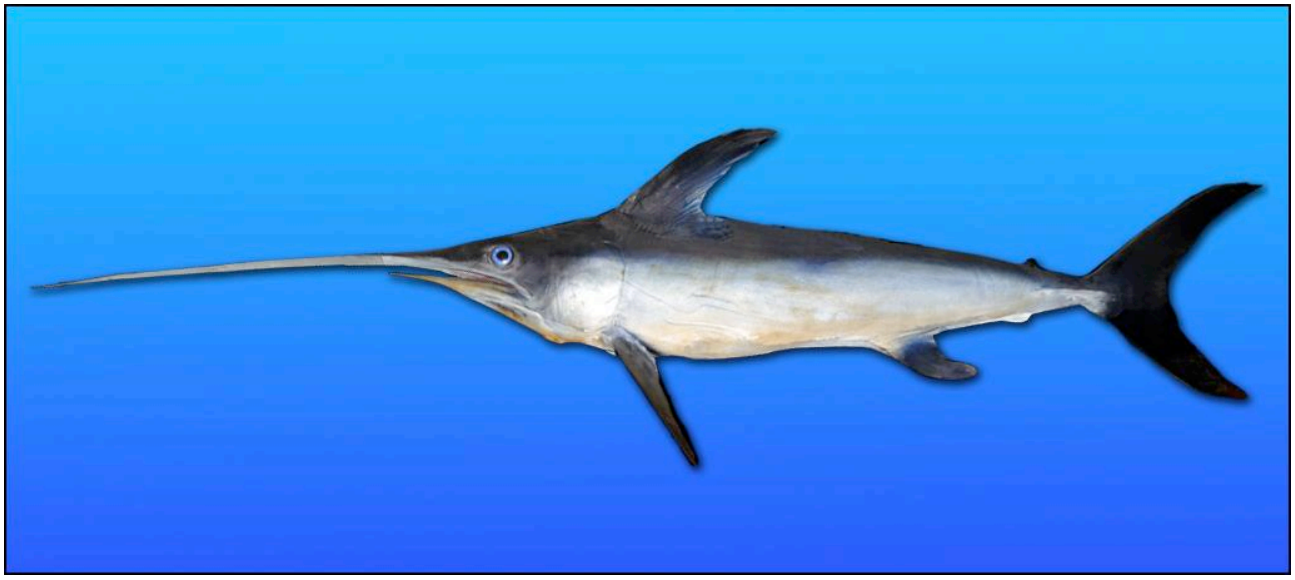
Swordfish

We have to say something about swordfish because they remind us of narwhals. But, they are not related.

But, swordfish are fish – that means they get their oxygen out of the water – and they don't have a hole in the top of their heads.

They have a long pointed bill.

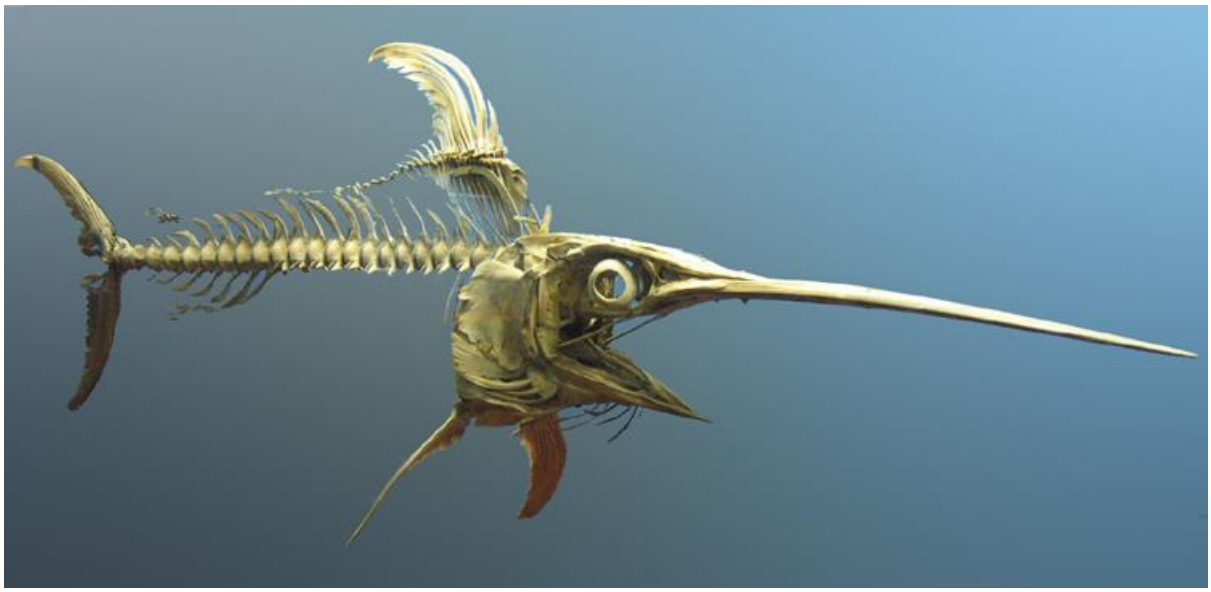
They live not in the cold water of the Arctic region, but in the warm water around the middle of the world.



[From Wikimedia Commons, the free media repository
https://commons.wikimedia.org/wiki/File:Swordfish-0046.jpg]

Show your parents
Chapter 7.

Skeleton of a swordfish.



[From Wikimedia Commons, the free media repository,
https://commons.wikimedia.org/wiki/File:Swordfish_skeleton.jpg]

Do swordfish use their bill to stab things?

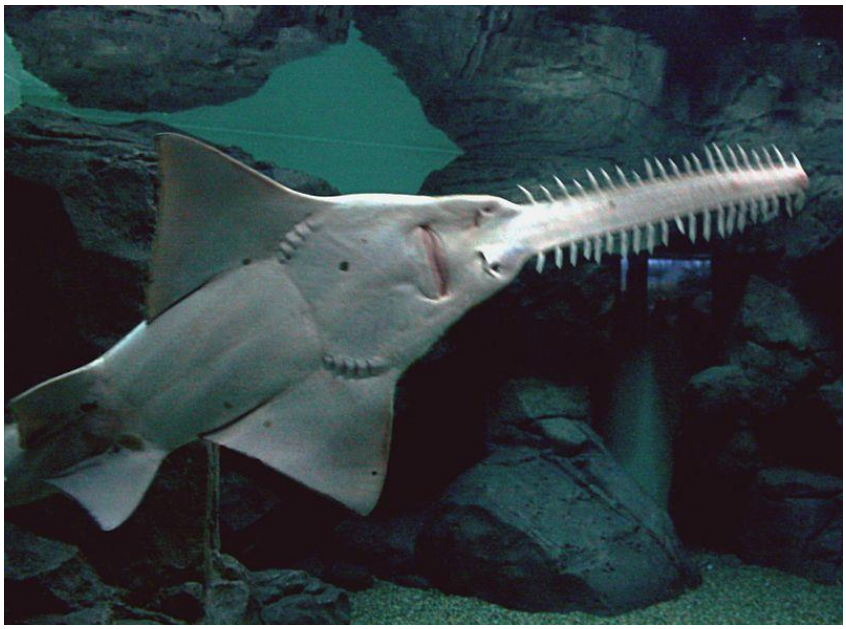
The answer is NO. But, they do slash it about from side to side and injure fish so they can catch them easily and eat them.

Knock, knock.
Who's there?
Howard
Howard who?
Howard you like a kiss?

Knock, knock.
Who's there?
Wendy
Wendy who?
Wendy Easter Bunny coming?

Show your parents
Chapter 7.

Sawfish



[From Wikimedia Commons, the free media repository
https://commons.wikimedia.org/wiki/File:2009_Pristis_microdon1.JPG]

Now, we have to admit – the sawfish is a pretty creepy-looking fish.

It has a long nose extension, and teeth sticking out both sides.

Sawfish were once plentiful – but, there has been a drastic decline and they are now only found around Northern Australia and Florida, in the USA. They have been hunted for their saws and their habitats [where they like to live] have been destroyed.

Yes, like the swordfish, they slash their saws from side to side to injure small fish to they can catch and eat them.

Kangaroos, what they do…

[http://www.animalpicturesociety.com/kangaroo-pictures-4350]

We know what kangaroos do. They eat grass…

[http://suitcaseandpassport.com.au/wildlife-kangaroo.html. Many thanks]

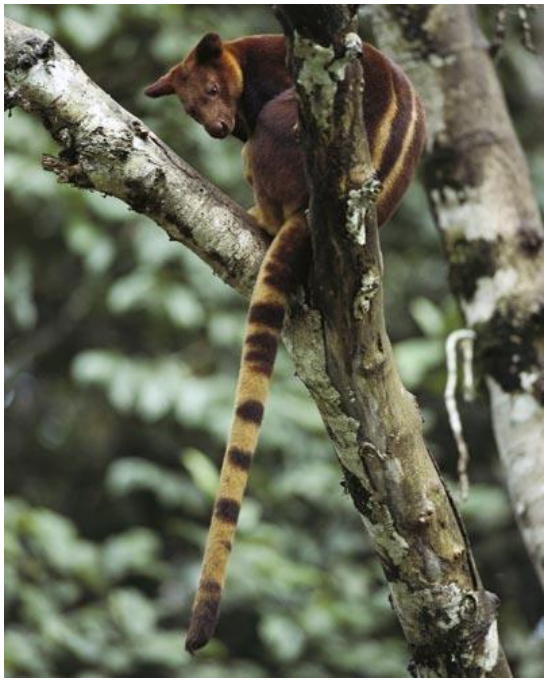
and hop across roads…

Except, some live in trees…

Show your parents
Chapter 8.

[https://upload.wikimedia.org/wikipedia/commons/c/c9/Matschies_tree_kangaroo_Dendrolagus_matschiei_at_Bronx_Zoo_1_cropped.jpg]

This sort lives in trees in Queensland (Australia).



[https://en.wikipedia.org/wiki/Goodfellow's_tree-kangaroo#/media/File:Tree_kangaroo2.jpg]

And this sort lives in trees in Papua New Guinea – which is close to Australia.

So, that's a surprise!! Some kangaroos living in trees!! Strange!!

Show your parents
Chapter 8.

Q: What kind of music do kangaroos listen to?
A: Hip Hop!

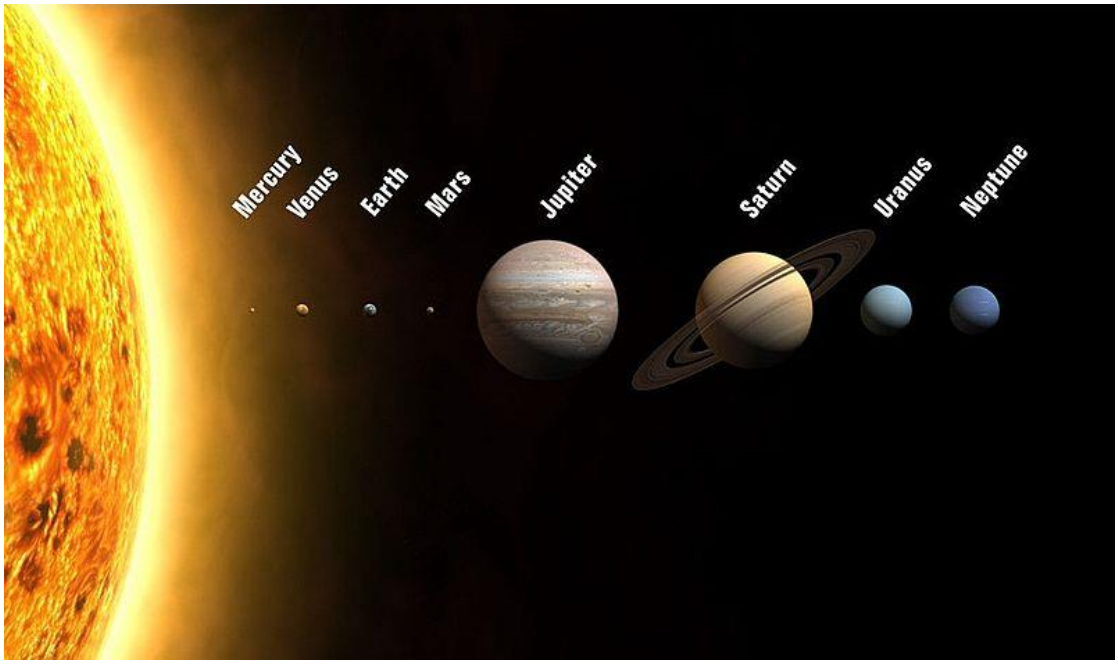
Q: What do you call a lazy baby kangaroo?
A: A pouch potato.

Knock, knock.
Who's there?
Guitar playing tuna!
Guitar playing tuna who?
Don't be silly you can't tuna fish.

Knock, knock.
Who's there?
Kanga
Kanga who?
Actually, it's kangaroo

Show your parents
Chapter 9.

Planets and volcanos



[From Wikimedia Commons, the free media repository
https://commons.wikimedia.org/wiki/File:Planets2013.jpg]

We talked about the planets in Chapter 4 – but, there is a lot to learn.

A lot of planets go around the Sun – 8 [altogether]. We are on Earth, the third furthest away from the Sun.

We made this up to help us remember their names. Think of a mouse which is hungry – if it has nothing in its tummy – it will be Very Empty.

If it found some food it would get excited because it is hungry. It might take the food back to its hole to eat. So, you could say…

My Very Empty Mouse Jumped, Scurried Underground, and Nibbled
Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune.

This is difficult to remember. But, if you can remember “Nibbled”, you might be able to remember the last planets – Neptune.

We can remember the first part of the sentence, “My Very Empty Mouse”. The problem here is that there are two “M”s. One is for Mercury and which is for Mars???

Well, Mars comes after Earth. If it is too hot Mars bars go gooey and you can’t eat them. If they did have Mars bars on Mars you would be able to eat them because Mars comes after Earth, so is further away from the Sun and not too hot (and Mars bars would be easy to eat).

So, we can remember, My Very Empty Mouse – and the first four planets which go around the Sun are – Mercury, Venus, Earth and then Mars. Anyway, way out in space we find Neptune.

Q: How do you organise a space party?
A: You just planet.

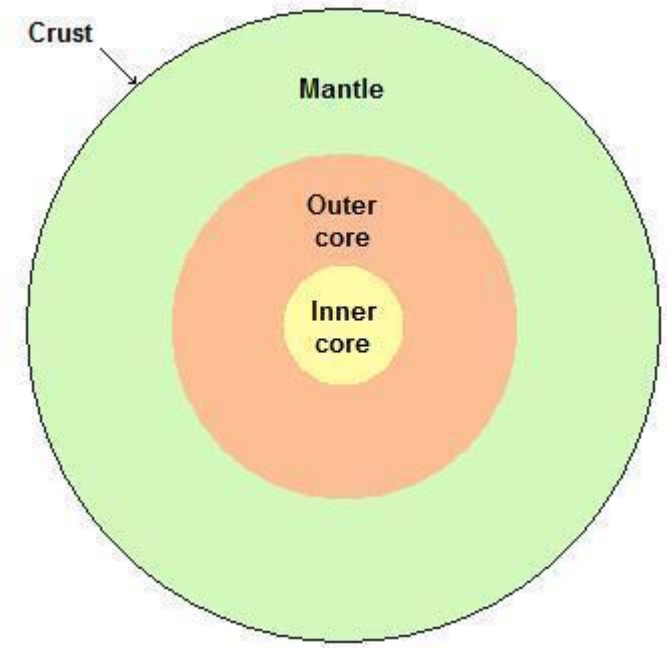
Another crazy sentence

If you want to remember the capital cities of Australia – A bad dude went around Australia and left a magic cake in Hobart. She started in Sydney. But, which way around did she go?

Some Bad Dude Put A Magic Cake Here
Sydney, Brisbane, Darwin, Perth, Adelaide, Melbourne, Canberra, Hobart.

Show your parents
Chapter 9.

A bit about volcanos



[From Wikimedia Commons, the free media repository
https://commons.wikimedia.org/wiki/File:Cutaway_Earth.jpg]

When we walk around outside, we see only the ground [earth] and rocks. But the Earth is not like that all the way through.

We walk around on the crust, which is thin and cool. Further down there are layers called the mantle and the core. Deep down the Earth is very hot, so hot that there is gas and melted rock.

Where there are holes in the crust of the Earth, from time to time, gas and melted rock [lava] sprays out.

We know where these holes are – and they are called volcanos. You don't have to worry; new volcanos don't just pop up. It is known where the volcanos are – if you live near on [there are none in Australia] it is smart to keep away from them – especially when the experts warn that something could happen.

Most of the time volcanos are quiet – they may become active [erupt] and stuff may come flying out for a few weeks – then go quiet again, for many years.

The authors have been close to two volcanos when they were active [erupting] – one was Mt Fuji in Japan, and the other was Mt Etna in Sicily.

[Cyrus Read. https://commons.wikimedia.org/wiki/File:Augustine_volcano_Jan_24_2006_-_Cyrus_Read.jpg]

This is the Augustine Volcano which is in Alaska – it was active more than 10 years ago.

Q: What did one volcano say to the other volcano?
A: I lava you.

Show your parents
Chapter 9.

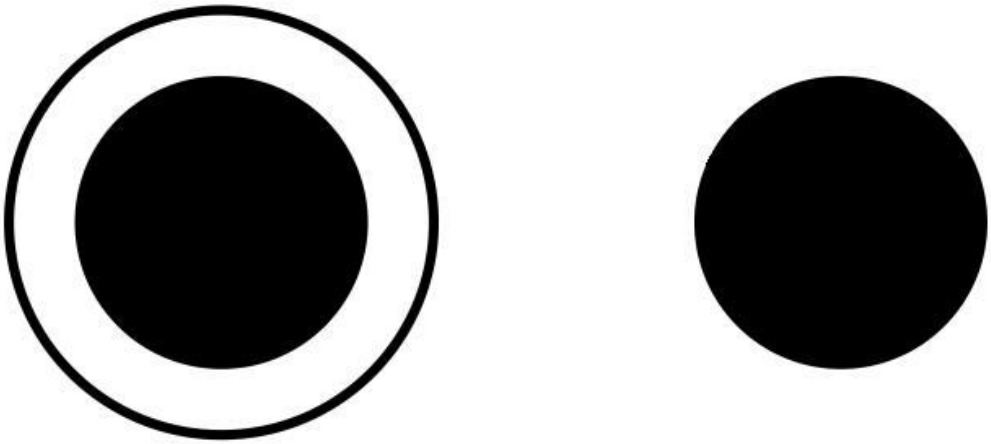
[Kevin Sebold. Creative commons
https://commons.wikimedia.org/wiki/File:Fuego_Eruption,_March_30,_.2013.jpg]

This is the Fuego volcano in Guatemala when it was active more than five years ago. It is very colourful here because this was the middle of the night and the hot rock lit the dark sky up.

Q: What do you call a volcano that doesn't erupt?
A: A mountain.

Optical illusions

‘Optical’ has to do with seeing stuff, and ‘optical illusions’ are when our eyes play tricks on us. For example…



[Wikimedia Commons, the free media repository. Delboeuf illusion https://commons.wikimedia.org/wiki/File:Delboeuf.jpg]

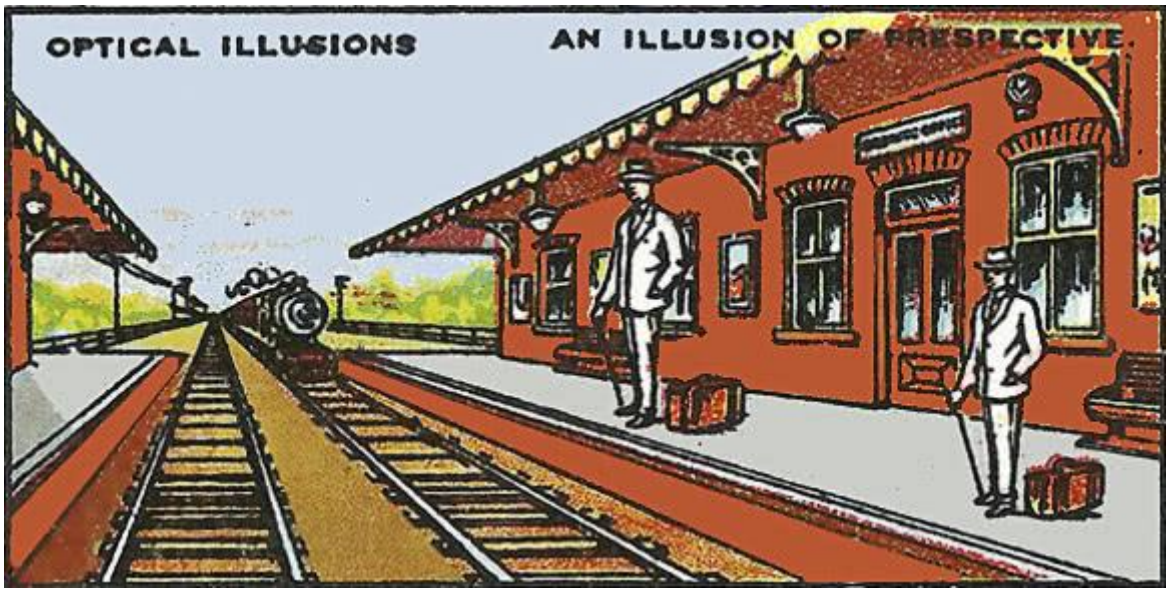
this is called the “Delboeuf illusion”.

So, which black spot looks bigger to you?

Most people say the black spot on the left looks a little bit bigger than the one on the right. But, if you measure them with a ruler, you will find they are the same size.

The circle around the one on the left makes it look a little bit bigger.

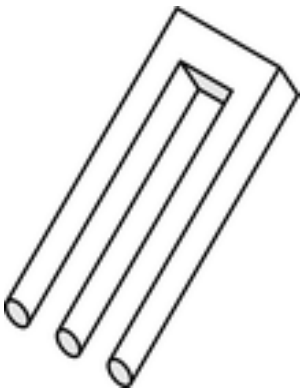
[That is why Saxby never puts umbrellas up, even when it’s raining. Sure, when it’s raining and he is walking down the street with his umbrella closed in his hand, people look at him – but, at least they don’t think he’s fatter than he is!]



[Generously – public domain, courtesy of Images at WPClipart
https://www.wpclipart.com/signs_symbol/optical_illusions/index.html]

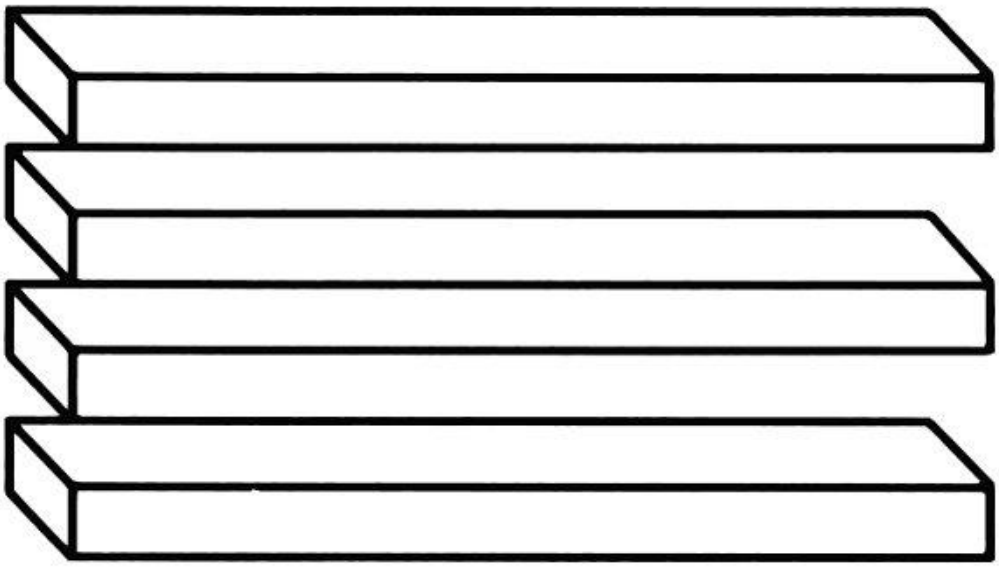
This is one of the most amazing optical illusions we have ever seen. The man halfway down the platform looks like a giant – much bigger than the man closest to us. But, if you measure these men with a ruler, they are exactly the same size!! The man halfway down the platform IS bigger because he is taller than the door behind him – but when you measure him, he is not.

Things that are further away do look smaller – so, this building gets smaller – the man halfway down should be drawn smaller, but to trick us, he has been drawn the same size as the man close to us.



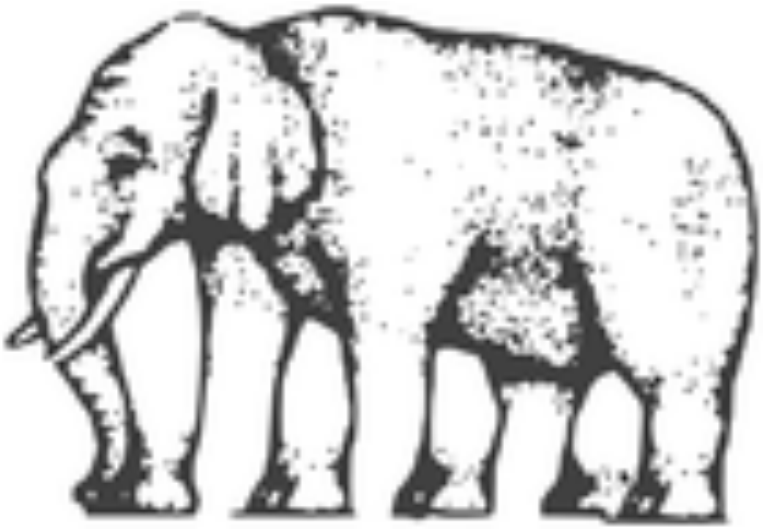
[Generously – public domain, courtesy of Images at WPClipart
https://www.wpclipart.com/signs_symbol/optical_illusions/index.html]

This is a very simple, and puzzling optical illusion. Cover the right side of the figure and there are 3 ends of 3 sticks. But, cover the right side of the figure and there are only 2 sticks.



[Creativity 103.com. Creative Commons Attribution 3.0 License. Many thanks
https://creativity103.com/collections/Graphic/slides/opticalill.html]

Here is the same sort of problem. How many shelves do you see? Cover up the right side of the picture and you will count the ends of 4 shelves. But, cover the left and you will see only 3 shelves.



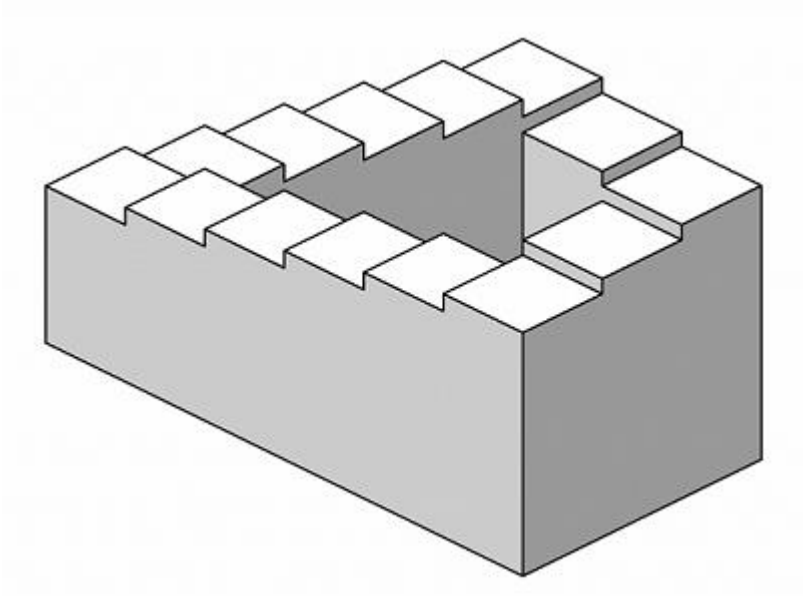
[Generously – public domain, courtesy of Images at WPClipart
https://www.wpclipart.com/signs_symbol/optical_illusions/index.html]

How many legs does this elephant have? You tell us, because every time we count them, we get a different answer!

[Sehtestbilder.de; created by Martin Missfeldt. ‘May be used for free’
https://www.sehtestbilder.de/sehtest-kostenlose-bilder-nutzungsbedingungen.php]

This attractive young woman ages when she stands on her head.

Can you see her as an old lady?



Penrose stairs. Public domain – made available by Wikipedia [https://commons.wikimedia.org/wiki/File:Impossible_staircase.svg]

This is a very famous optical illusion. Imagine you are standing on this wall and you start walking down. Follow where you will go with your eyes. You keep going down, down, down – then you realise you are going around in a circle. If you are going around in a circle you must go up as well as down. But, in this figure, you just keep going down. This is impossible – your eyes are being tricked. Pretty good.

[Painted by Vegmálun GÍH. Image: You Tube]

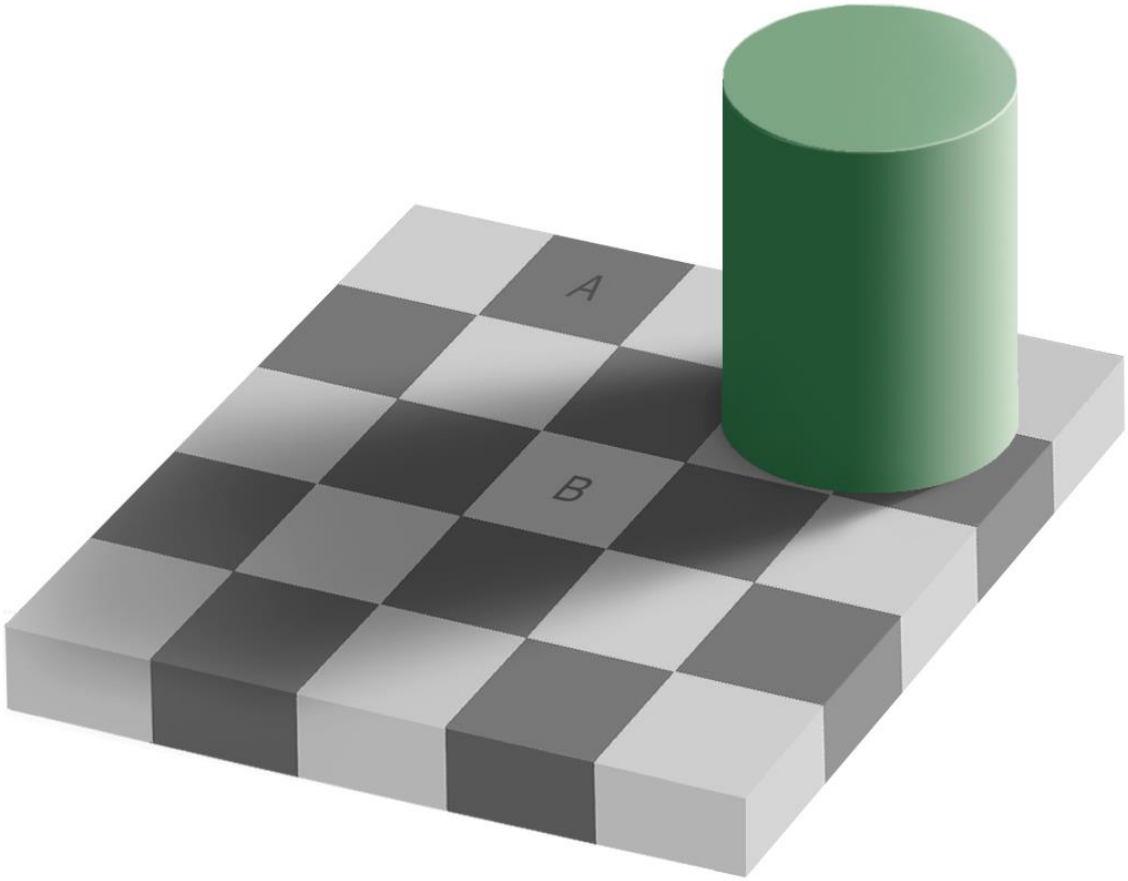
Optical illusions have been used to make pedestrian crossings safer. The stripes are painted on the road to look like they are blocks of wood or concrete. The shadows are also optical illusions [of course].

[925 Bethleham Pike, Colmar.
https://www.solnicklawyers.com/optical-illusions-drivers-slow-down/]

Montgomery County, Philadelphia [USA] has also used optical illusions to cut down road accidents – here they have painted big balls on the highway – to encourage people to slow down.

[Public domain. By Ashley Smith. Many thanks]
https://www.flickr.com/photos/71550027@N07/6495053813]

This is a very interesting illusion – on the left you can see a lion. On the right the lion is turned upside down and you see a mouse.



[File created by Adrian Pingstone based on the original by Edward H. Adelson
https://en.wikipedia.org/wiki/File:Grey_square_optical_illusion.PNG
- "The copyright holder allows anyone to use this for any purpose"]

We believe this is one of the best optical illusions ever created. It is called the checkershadow illusion.

The colour of square A is exactly the same colour of square B. We find this impossible to believe.

The only way to prove it to yourself is to make two small holes in two pieces of paper, so you can just see the A, and a little bit of colour around it, and the B, and a little bit of the colour around it – so you can compare those little bits of colour.

As amazing as it sounds, you will find these bits of colour are the same.

They seem very different – that is because of clever changes in the colour of the background – to make a GREAT optical illusion.

Show your parents
Chapter 11.

First and surprising

Reaching North America

[Public domain
https://commons.wikimedia.org/wiki/File:Portrait_of_a_Man,_Said_to_be_Christopher_Columbus.jpg]

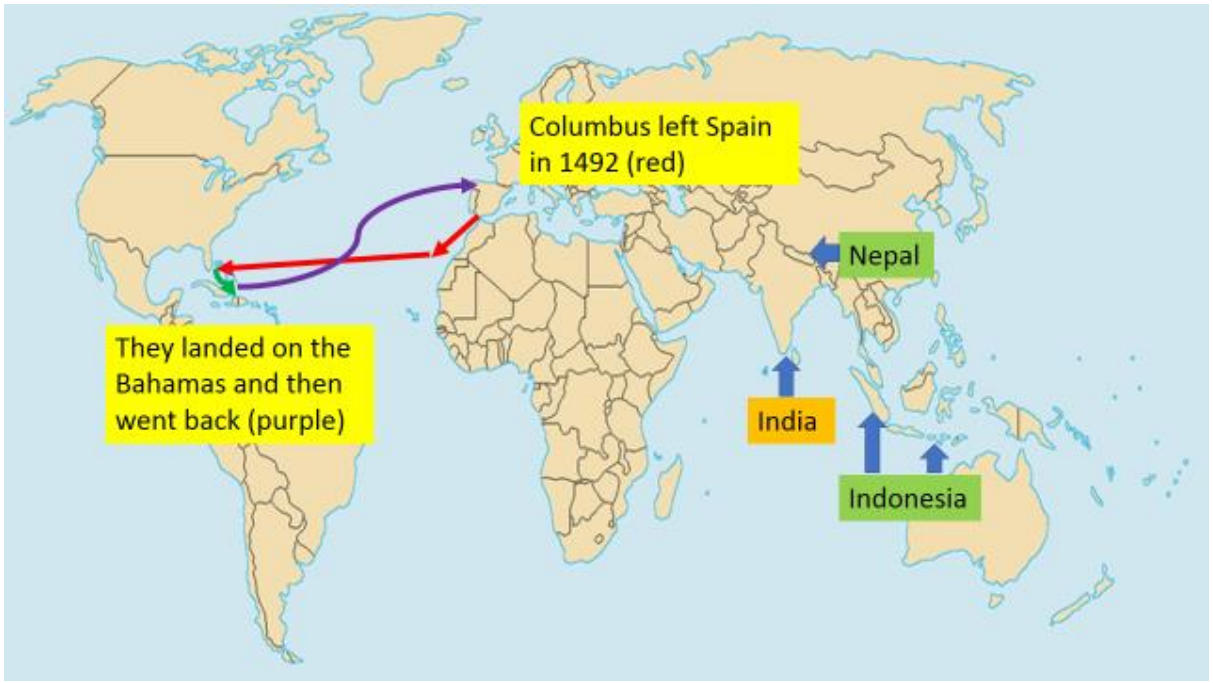
Christopher Columbus was the captain of the first ship to sail from Europe to the North America. This was in 1492.

They didn't know North America was there – when they arrived, they thought they had reached India [which is much further away] – that was why they incorrectly called the people who lived there, "Indians".

He sailed from Spain. He had 3 ships. The main one was the Santa Maria. The picture below is a copy of the Santa Maria.

[Replica of the Spanish carrack Santa María.
https://en.wikipedia.org/wiki/Santa_Mar%C3%ADa_(ship)]

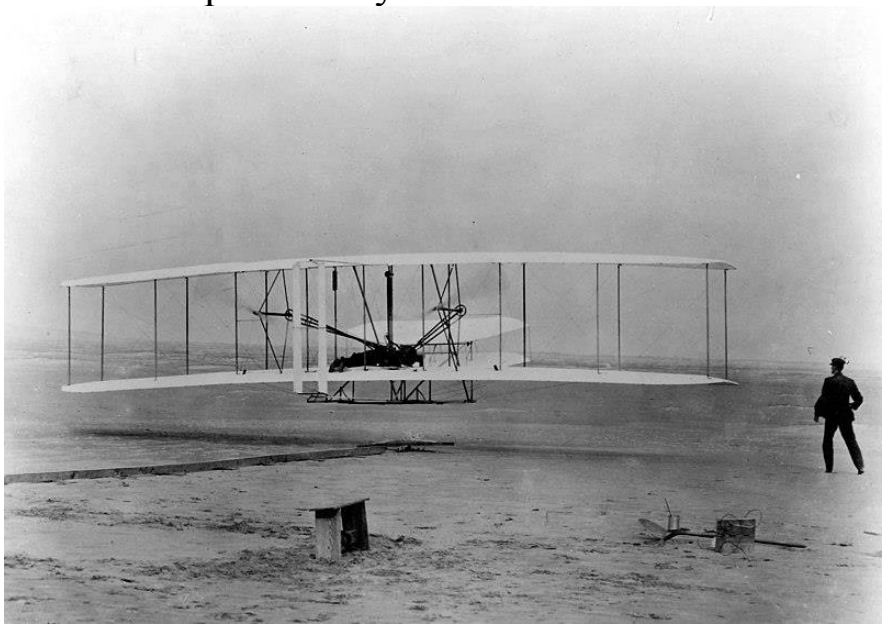
Show your parents
Chapter 11.



[This map was released into the public domain by its author, Vardion. Many thanks.]

First to fly

The first people to design, build and fly an aeroplane were two brothers, Orville and Wilber Wright. The first flight happened in 1903, near a town called Kitty Hawk, in USA. The brothers also called their plane Kitty Hawk.



[Author: John T. Daniels (1873-1848). U.S. Air Force photo First Flight
https://commons.wikimedia.org/wiki/File:Kitty-hawk.jpg]

In this picture of the first flight, Orville Wright is flying the Kitty Hawk, and brother Wilber is watching.

Show your parents
Chapter 11.

First to climb Mt Everest

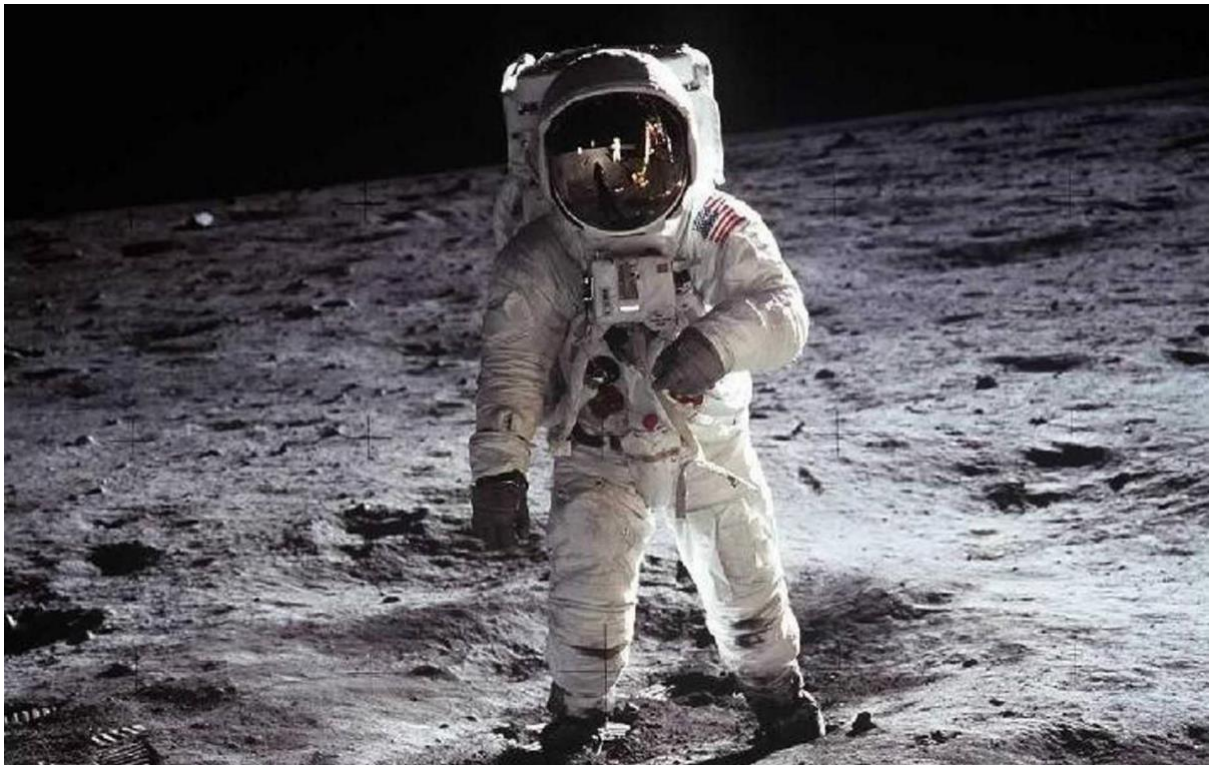
[Copy Free Photos, Images & Artwork – Public Domain. Many thanks.
http://www.copyrightfreephotos.hq101.com/v/nature/mountains_volcanoes/North_Face_Of_Mt_Everest.jpg.html]

Mount Everest is the highest mountain in the world. It is in the tiny country of Nepal, which is marked on the map above.

[From Wikimedia Commons, the free media repository.
https://en.wikipedia.org/wiki/Edmund_Hillary#/media/File:Edmund_Hillary_and_Tenzing_Norgay.jpg]

The first people to climb to the top of Mount Everest were Edmund Hillary [who lived in New Zealand] and Tenzing Norgay [who lived in Nepal]. They got to the top in 1953.

First on the Moon



[File created by NASA. Public Domain.
https://commons.wikimedia.org/wiki/File:Aldrin_Apollo_11_original.jpg]

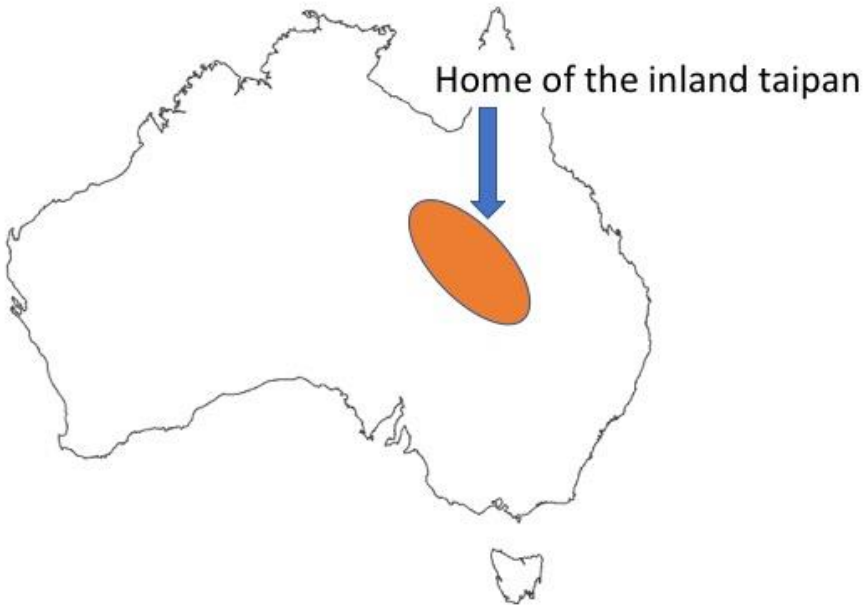
Only 12 men have walked on the Moon [so far].

The first person to step onto the Moon was Neil Armstrong. He was part of the Apollo 11 mission, from the USA – they landed in 1969. This is a picture of Buzz Aldrin, he was the second person to walk on the Moon – he was also on the Apollo 11 mission.

Longest snake

[2013-2019 Publicdomainvectros.org. Many thanks
https://publicdomainvectors.org/en/free-clipart/Snake-illustration/54723.html]

The Australian inland taipan – it is usually at least 2 meters long – so, one of the longest snakes in the world. It is very venomous. The good thing is it is very shy and keeps away from people.



It lives in a part of the country where very few people live – unless you go to its home, there is no chance of being bitten.

Knock, knock.
Who's there?
Amos.
Amos who?
A mosquito.

Knock, knock.
Who's there?
Canoe.
Canoe who?
Canoe come out and play?

Show your parents
Chapter 11.

Biggest plants

Titan arum

[Titan Arum, Royal Botanic Gardens, Melbourne, Victoria, Australia. Creative Commons https://commons.wikimedia.org/wiki/File:Titan_Arum,_Royal_Botanic_Gardens,_Melbourne,_Victoria,_Australia.JPG]

Titan arum is a huge flower – it may grow to be 3 metres high (much taller than a tall person). It is found on some of the islands of Indonesia (a string of islands – see the map above).

An amazing thing is that it smells horrible – like rotting meat. It smells like this to attract flies, which help it make seeds.

Rafflesia

[Author: ma_suska. Creative Commons Attribution 2.0
https://commons.wikimedia.org/wiki/File:Rafflesia_sumatra.jpg]

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Chapter 11.

Did someone say “Flowers are boring?”
Rafflesia is the largest flower on Earth. It grows to 1 metre across. It is also found in Indonesia.

The amazing thing – it has no leaves, stem or roots. It is a parasite – which means it gets its food from other plants. Rafflesia attaches itself to jungle vines and takes food from them.

Show your parents
Chapter 12.

The marsupials

Marsupials are special animals – the mothers have pouches on their fronts where their babies live. After they are born the babies crawl into the pouch. There is a teat in the pouch so they can have a drink of milk whenever they like.

Australia has more marsupials than other country – we have kangaroos, wallabies, possums, wombats and Tasmanian devils. There are some marsupials in South America and one [the opossum] in North America.

[https://it.m.wikipedia.org/wiki/File:Kangaroo_and_joey.jpg]

Here you can see the young kangaroo [joey] in the mother's pouch. This is quite a big joey – it could get out and jump about and eat grass and everything. He/she just likes to be in the pouch where it is nice and warm, and he/she gets carried around. Soon, this one will be too big to get into the pouch anymore.

Wallabies are also found in Australia – they are like small kangaroos.

When this mother wallaby looked away, her joey started eating some grass she was holding.

OK, so we know that these other marsupials have pouches and carry their young ones around in them – but, it is hard to get pictures showing that. But, you can get some pictures of mothers with their young ones.

Show your parents
Chapter 12.

Koala

[https://www.publicdomainpictures.net/en/view-image.php?image=212540&picture=koala-bears]

This is a mother koala with her baby on her back – she has a pouch, but her baby is way too big to ride in it.

Possum

[https://www.publicdomainpictures.net/en/view-image.php?image=2808&picture=brushtail-possums]

This is another Australian marsupial – a mother possum with her baby on her back. Possums climb trees, and maybe, when the baby gets bigger it is easier to have it on her back rather than squashed up against a tree?

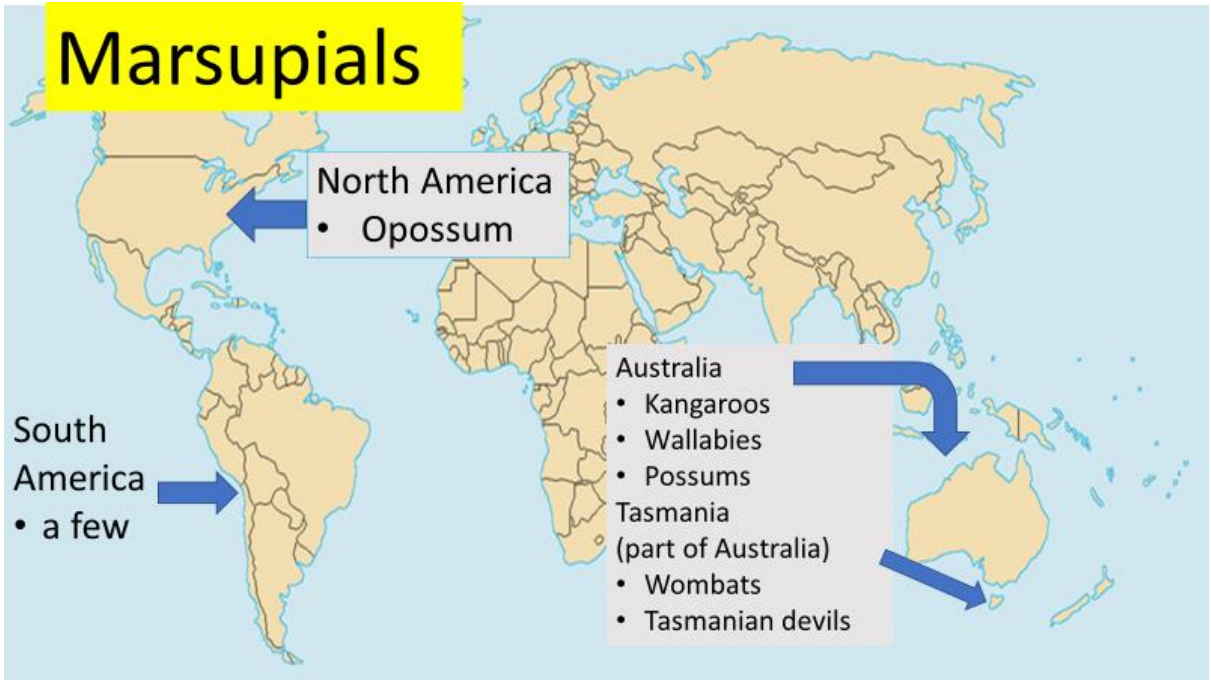
Show your parents
Chapter 12.

Tasmanian devil

[https://commons.wikimedia.org/wiki/File:Tasmanian_Devil_(36313458360).jpg]

The Tasmanian devil is another Australian marsupial. However, they are not very friendly animals and the young ones don't hang around with their parents for very long.

Revision



Show your parents
Chapter 12.

Virginia opossum

[https://commons.wikimedia.org/wiki/File:Opossum_2.jpg Author: Cody Pope]

The Virginia opossum is the only marsupial living in North America. It is about the size of a cat. We don't have pictures of it with its young ones – but, it has a pouch and the young ones live in the mother's pouch until they are old and strong enough to look after themselves.

Show your parents
Chapter 13.

Tree rings and things

Tree rings

[From Wikimedia Commons, the free media repository
https://commons.wikimedia.org/wiki/File:Tree.ring.arp.jpg]

You have seen these rings in wood. You can see them most clearly when the trunk of a tree is cut across. If you look closely, there are dark bands and light bands. Each year the tree gets one light band and one dark band. The light band comes when the tree is growing rapidly – when there is lots of sunlight – the dark band comes from when the tree is growing slowly, during the winter. So, if you count the number of dark [or light] bands you will know how old the tree was when it was cut.

Q: Why did the banana go to the doctor?
A: Because it wasn't peeling well.
[This has nothing to do with trees]

Storks

Storks live in many places around the world – they are very big birds – they can be 2 metres across when their wings are spread out. They like wading in river water and eating frogs and beetles and stuff. They have long legs and long beaks – these are good for wading around on the edge of rivers and in swamps, and catching food in the water.

Most of them ‘migrate’ once a year, that means fly a long distance and stay in another place for a few months – then they come back to where they were.

A funny thing is that although they like wading around in water and flying off to distant places, they quite like being close to people. Interestingly, they build HUGE nests – these can be one metre across and one metre high [or more]. It is surprising to see – but in some places these big birds build big nests in cities, on the top of poles or buildings.

[Author: ivabalk (pixabay.com). Needpix.com. Many thanks. https://www.needpix.com/photo/682259/stork-nest-feeding-nesting-storks-nest-bird-risers-brood-beak]

How do solar panels work?

Well… if you MUST know, we have to talk about some other stuff first.

Atoms

Everything – your hand, the door, Mummy, the car – everything is made of atoms. There are over a hundred different sorts of atoms, but they are all much the same.

Atoms have two main parts. There is a tiny little bunch of bits [particles] which stick together in the middle – this is called a ‘nucleus’. The second part is tiny, tiny pieces [particles] which whizz around the nucleus – these whizzing pieces are called ‘electrons’ – and in most atoms there are quite a few electrons whizzing around.

Electricity

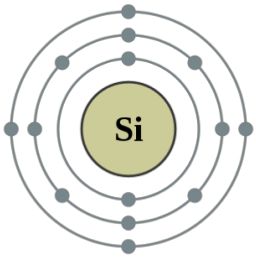
Electricity is when a particle like an electron passes from one place to another. We usually think of electricity passing along a wire – you have seen wires that go from the wall to the heater, or inside computers.

But, what about solar panels?

Yes, well, solar panels are made up of ‘silicon’ [silicon atoms have 14 electrons whizzing around] – and silicon has some special properties.

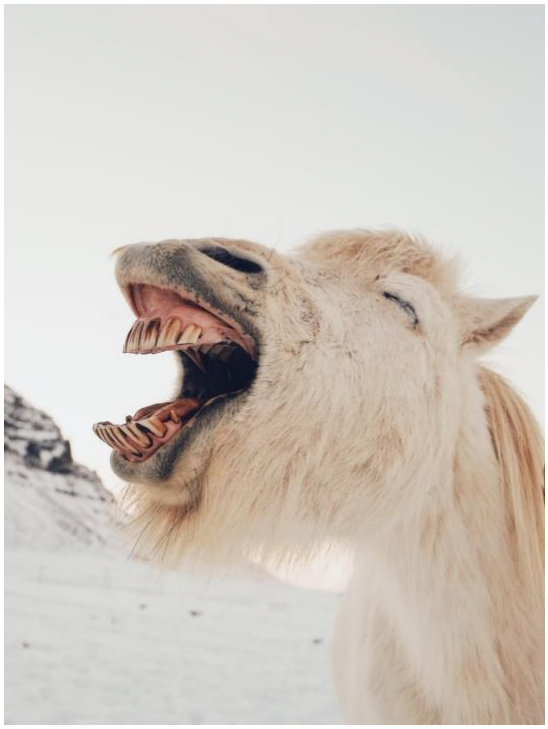
Show your parents
Chapter 13.

14: Silicon **2,8,4**



[Pumbaa (original work by Greg Robson)
https://commons.wikimedia.org/wiki/File:Electron_shell_014_Silicon.svg]

How do solar panels work? Energy from the Sun [light] hits electrons on silicon atoms. Some of these get enough energy to jump off and go along wires – and electrons going along wires is electricity.



[Author: Dan Cook @dan_scape. Many thanks.
https://unsplash.com/wallpapers/cool/funny]

Show your parents
Chapter 13.

Q: What do you call a dinosaur that is sleeping?
A: A dino-snore!

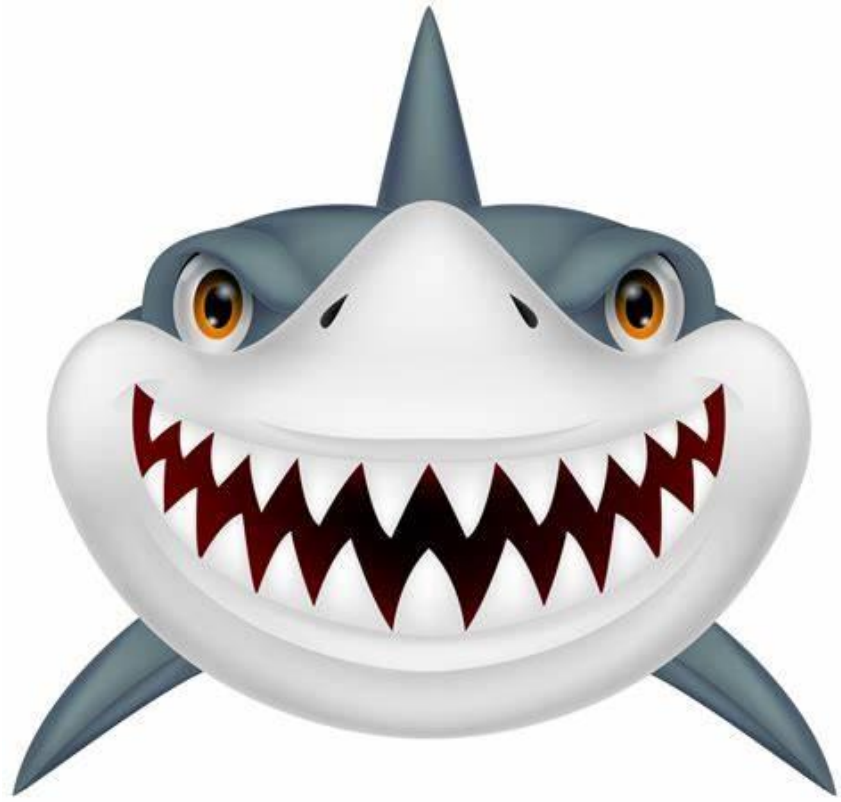
Q: What is fast, loud and crunchy?
A: A rocket chip!

Q: Why did the teddy bear say no to dessert?
A: Because she was stuffed.

Q: Why did the student eat his homework?
A: Because the teacher told him it was a piece of cake!

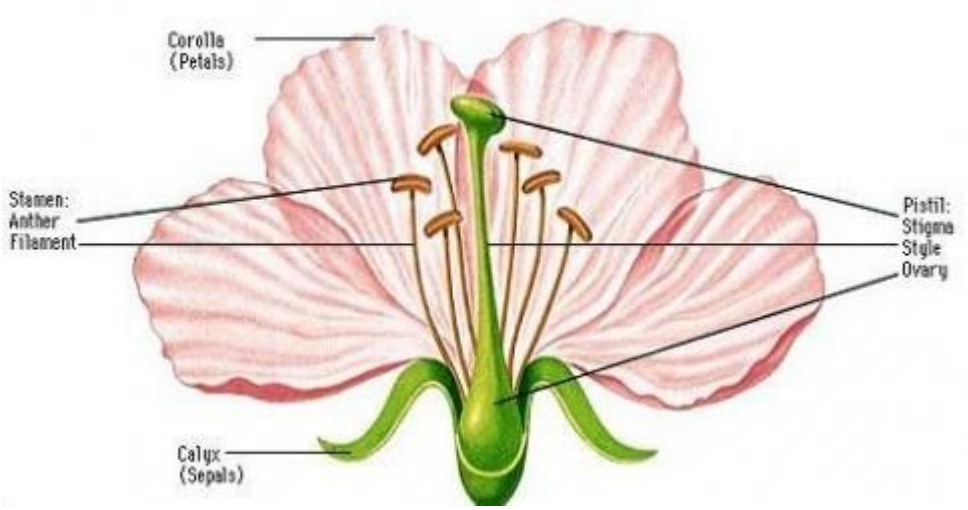
Q: When you look for something, why is it always in the last place you look?
A: Because when you find it, you stop looking.

Q: What is brown, hairy and wears sunglasses?
A: A coconut on vacation.



[https://www.bing.com/images/search?view=detailV2&id=0B4B2DCCE9A42858D70E7178E9CACD40E9C04244&thid=OIP.OcjdFE3yLleYLfIpK9cVTAHaHK&exph=3387&expw=3500&q=Free+Art&selectedindex=63&ajaxhist=0&vt=0&eim=1,6]

Flowers and honey



[Flower nifty. imperfect flowers reproduction. Many thanks. https://flowernifty.com/this-is-how-imperfect-flowers-reproduction-will-look-like-in-27-years-time-imperfect-flowers-reproduction/pictures-of-parts-of-flowers-clipart-imperfect-flowers-reproduction/]

All plants [trees and flowers] grow from seeds.

Seeds are made when two different bits are brought together, and grow together. The same happens in animals – in animals a male [boy] bit and a female [girl] bit are brought together and grow together.

In flowers the seed is formed in the ovary – which you can see in the picture above – it is a little round green room at the bottom of a long green stalk.

One of the bits we have to get together [to make a seed, so we can have another flower] is already in the ovary.

The other bit is called pollen – this is powdery stuff which grows on the top of a part of the flower called the stamen. You can see 6 stamens in this picture.

OK, so the problem is to get some pollen from the top of the stamen over onto a part of the flower called the stigma. Once the pollen gets to the stigma it goes easily down the green tube [called the style] and into the ovary – where the seed is formed.

So, how does pollen get from the stamen to the stigma?

Well, it has to be carried there – it can be carried by the wind, a bird, a bee or a butterfly.

Do you like the smell of pizza, when you go past a pizza shop? To attract the bees and butterflies [and the birds] flowers make a very sweet drink which they like – it is called 'nectar'. The insect comes along to get some nectar and bumps into the top of the stamen.

The top of the stamen is covered with pollen, and some sticks to the insect. Then, as the insect bumps into other parts of the flower, some pollen brushes onto the stigma. That was what we wanted! The pollen then goes down a tube into the ovary – and the seed begins to form.

The pollen may come from the stigma in its own flower, or be from another flower – it doesn't matter – seeds are still made.

Now, this is important – what do bees do with nectar? – the answer is – they make honey.

But, why do bees make honey? Bees make honey because it is food they can eat during the winter when there are hardly any flowers or other food about. Honey is good food for bees because it has lots of sugar and energy.

So, humans get honey to eat for two main reasons, 1) flowers need bees to move pollen from one part of the flower to another [so the flowers can make seeds and there will be some flowers next year], and 2) bees need food for the winter so they collect nectar to make honey [food they can store].

Show your parents
Chapter 14.

There is another problem [for bees]. Bees don't have glass bowls to store their honey…

…honey is very runny, and if you didn't have somewhere to put it, everything would get very sticky, very quickly.

So, they make these little cupboards to put their honey in – these are made out of wax and can be used more than once.

Show your parents
Chapter 14.

[C C Credits: _Pauls. Creative commons. Many thanks.
https://harishanker.net/2009/08/daily-blunder-bee-gees/]

What is this butterfly doing?
It is having a nice drink of nectar!

Will it then go and make some lovely honey?
No, butterflies don't make honey!

The world is like that – some people drink nectar but don't make any honey!

Show your parents
Chapter 14.

You can tell that this butterfly has just had a nice drink of nectar – but, he's not going to make any honey.

Q: Why did the cookie go to the hospital?
A: Because he felt crummy.

Q: Why was the baby strawberry crying?
A: Because her mum and dad were in a jam.

Q: What did the little corn say to the mama corn?
A: Where is pop corn?

Q: What is worse than raining cats and dogs?
A: Hailing taxis!

Happy Birthday!
[Well, we had a 1 in 365 chance. It was worth a try.]

Evolution and waterfalls

Evolution

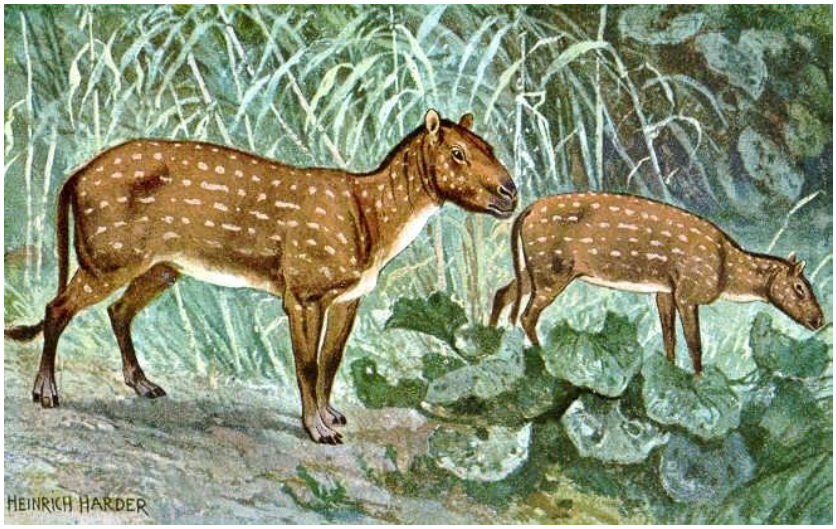
Evolution is the idea that animals and plants have changed over many millions of years.

It was first described by Charles Darwin about 160 years ago [that was when your great-great-great-great-great-great-great grandparents were alive – and don't say you didn't, we all had great-great-great-great-great-great-great grandparents!]

Way, way back in time, life began with very simple little animals and plants in pools of water.

Now, we have huge elephants that live in hot jungles, little feathered penguins that live on freezing ice at the South Pole, birds and bats that fly through the air, lizards that live in deserts, snakes, fish – so many different animals. All different, and because they are different, they can live in different places.

The animals which were on the Earth long ago have changed to become the animals we have at the moment. The horses we have today came from animals which were not bigger than dogs.



[Author: Heinrich Harder (1858-1935). Public domain.
https://commons.wikimedia.org/wiki/File:Hyracotherium_Eohippus_hharder.jpg]

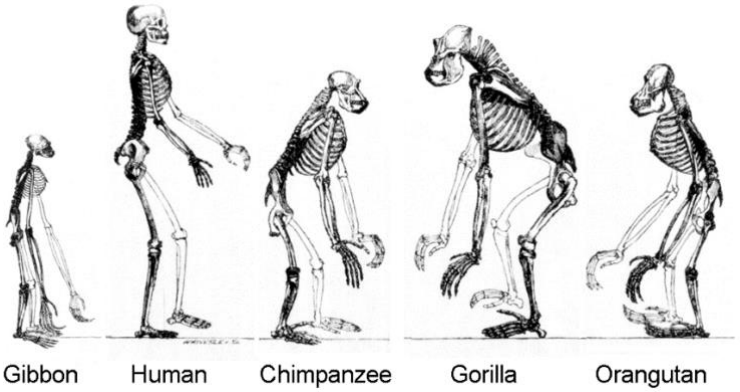
Horses are now much bigger. Look at the foot of the animal in the picture, you will see three or four toes. Look at the end of a horse's leg and you see a 'hoof'.

A hoof is a single toe. So, way back, the animals which evolved into our horses, had three or four toes on each foot – but, now, horses have only one main toe of each leg. So, animals evolve, or change over time.

The rabbits that most of us know are grey or even brown. But, where there is a lot of snow, the rabbits are white. [If they are white they cannot be seen and chased so easily by bigger animals that want to eat them]

Human evolution

Some people disagree with the idea of evolution when it is applied to man/humans.



[Author: The original uploader was TimVickers at English Wikipedia
https://commons.wikimedia.org/wiki/File:Ape_skeletons.png]

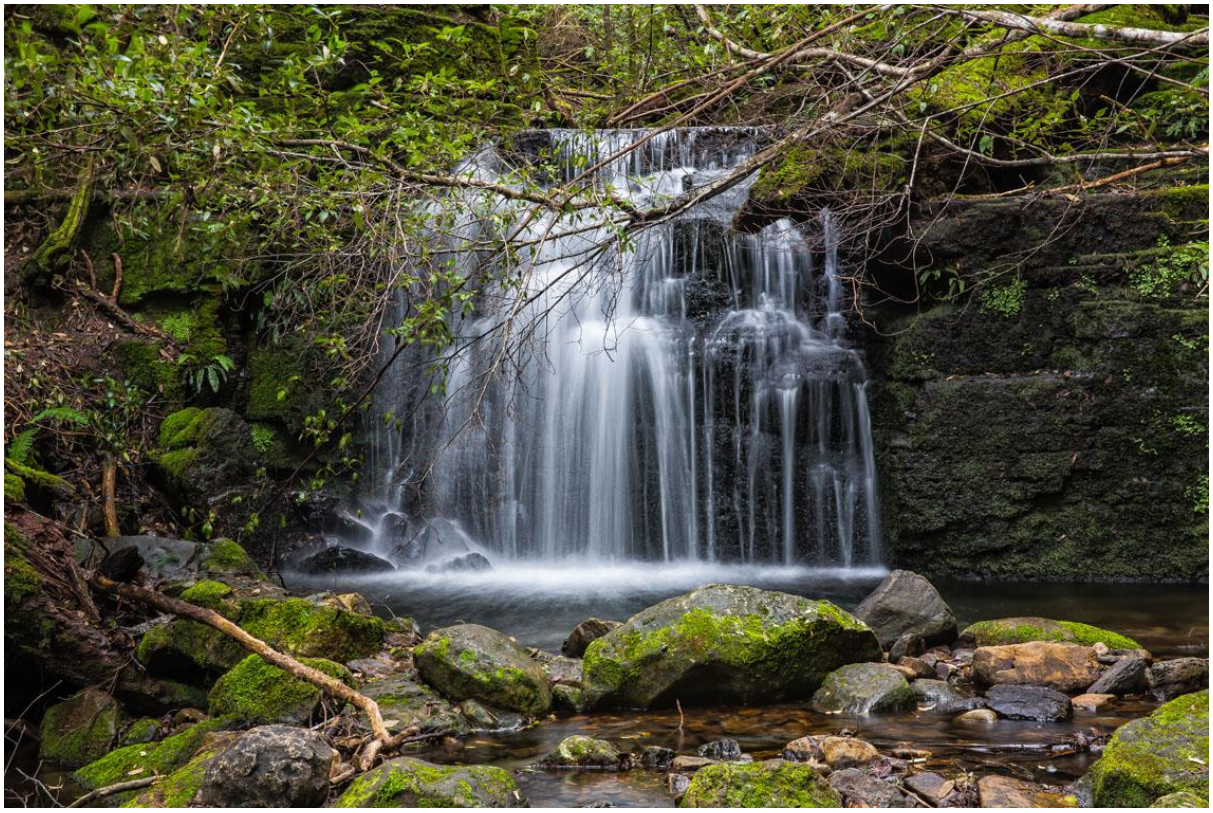
Humans are members of the family of animals called ‘primates’ – others in this group include chimpanzees, gorillas and orangutan.

Evolution does NOT say that humans evolved from chimpanzees, gorillas or orangutans. Evolution DOES say that all the members of this family are related.

Dad: Why are you crying?
Son: Because I wanted to get a dinosaur for my baby sister.
Dad: That's no reason to cry.
Son: Yes, it is. No one would trade me!

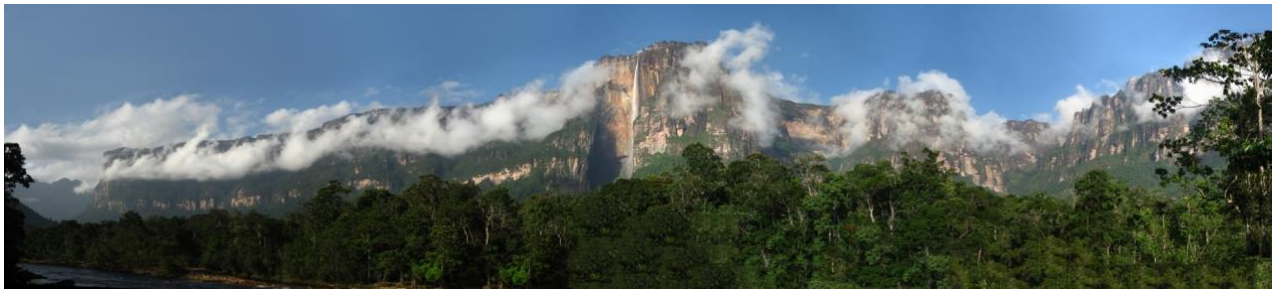
Q: How can you tell there's a stegosaurus in your refrigerator?
A: The door won't close!

Waterfalls [because of gravity]



This is the Strickland Avenue Falls which is also close to Hobart, Australia. Because we don’t have high mountains we don’t have high waterfalls.

Now, Venezuela is a different matter.



This is Angel Falls in Venezuela – you can hardly see the falls from here.

Angel Falls is nearly one kilometre high. Near the bottom most of the water turns into spray because it is blown sideways by the wind. But, then it comes back to form a stream again.

Show your parents
Chapter 15.

The United States of America is where Donald Duck, Mickey Mouse and President Trump come from. It is also where all the people who have gone to the Moon have come from.

If you drop something, you know where to look for it. On the ground. The thing is, the Earth is like a big magnet and it pulls everything to it. This is called gravity. But, what if we didn't have gravity?! If you dropped something then, and you were inside, it would probably float up to the ceiling. But, it wouldn't be hard to get, because you would be able to float up to the ceiling, yourself.

Worse still, we wouldn't have any air to breathe, because it would have floated away into space. So, the next time you fall over and say a naughty word, be grateful for gravity and that you fell DOWN – if it wasn't for gravity you would have fallen UP and been floating past [My Very Empty Mouse] Mercury or Venus or Mars right now!

Knock, knock.
Who's there?
Beets
Beets who?
Beets me.

Catalogue

What do you see in this picture?

[Tortie Cat – Free High Resolution Photo
http://www.photos-public-domain.com/2016/08/21/tortie-cat/]

Yes, a cat. And did you say, “ON wooden steps”?

How are a cat and wooden steps the same? Well, you could paint them both red.

How are they different? Well, if you did paint them both red, the cat would not be happy, and the wooden stairs wouldn’t mind.

Also, the cat eats, goes to the toilet and “meows”. So, the cat is alive.

But the steps aren’t alive – the steps don’t breathe, dance or use a computer.

As the cat is alive, it also does some of the other things you and I do – we grow and we respond to things [such as shiver when we get cold]. You and I [and all the animals] move around and can have babies. [Wooden steps don’t do that.]

Show your parents
Chapter 16.

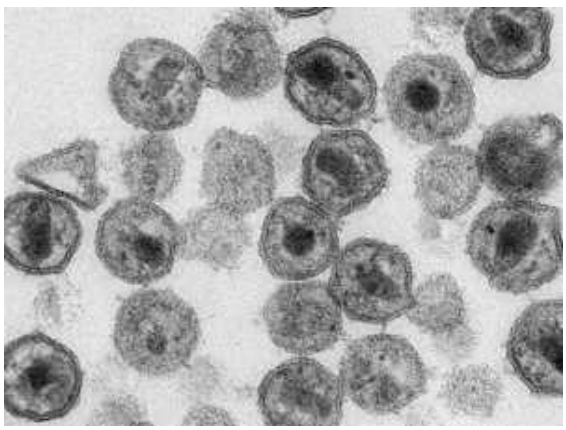
Living things [you can call them organisms] come in different sizes – they can be huge like dinosaurs and elephants, or tiny – so tiny that you can only see them with microscopes [special tools which make things look bigger].

Do you know what this is?

Good guess! A microscope.

The smallest organisms are very simple – they are made up of just a few pieces joined together – we call that a cell. Cells are like jelly and they are wobbly. If you had one on your hand, it would be way too small for you to see it.

So, the smallest living thing [organism] is just one cell. Here is a microscope picture of organisms which are just one cell. You can see they have a wall and a piece of black stuff in the middle – not much else. They don't have ears and they don't wear glasses.



[Public domain]

Show your parents
Chapter 16.

You and I are made of millions and millions of different sorts of cells – different sorts make up our skin and our muscles, our eyes and every part of us.

Come to think of it, you don't have a single-celled organism on your hand right now – you have tens of thousands of them. That's usually fine, some sorts of single-celled organisms are meant to be on your hands – they are helpful. BUT, you can get bad cells on on your hands – and, they can make you sick. That's why when you *are* sick, you wash your hands and try not to pass bad cells [called germs] on to other people.

OK, one way the cat [and you] and the wooden steps are the same is that you are all made of cells. Yes, the wooden steps are dead. But wood comes from trees, and trees are living [until they die, or are cut down]. So, trees are made of cells.

Yes, the cells in the wood which the cat is sitting on are all dead now – but their walls are still there – they make the wood strong.

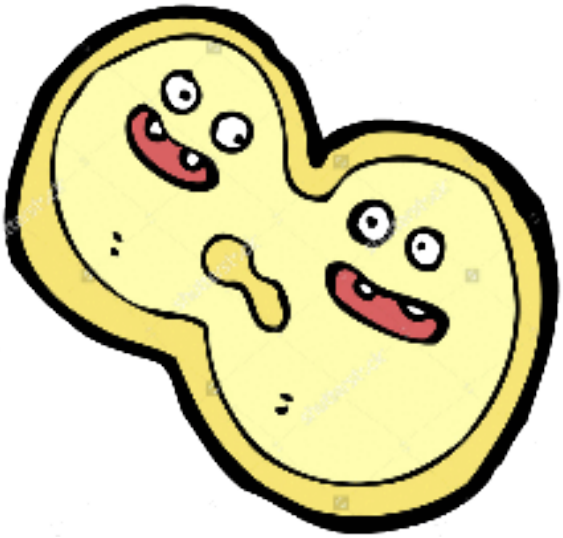
[Wikimedia Commons, the free media repository. Normal gastric mucosa. Many thanks https://commons.wikimedia.org/wiki/File:Normal_gastric_mucosa_intermed_mag.jpg]

This is looking at part of the stomach with a microscope – there are lots and lots of different sorts of tiny bits. And that is only from one small place – what about your muscles and skin? Every part has different sorts of cells.

Show your parents
Chapter 16.

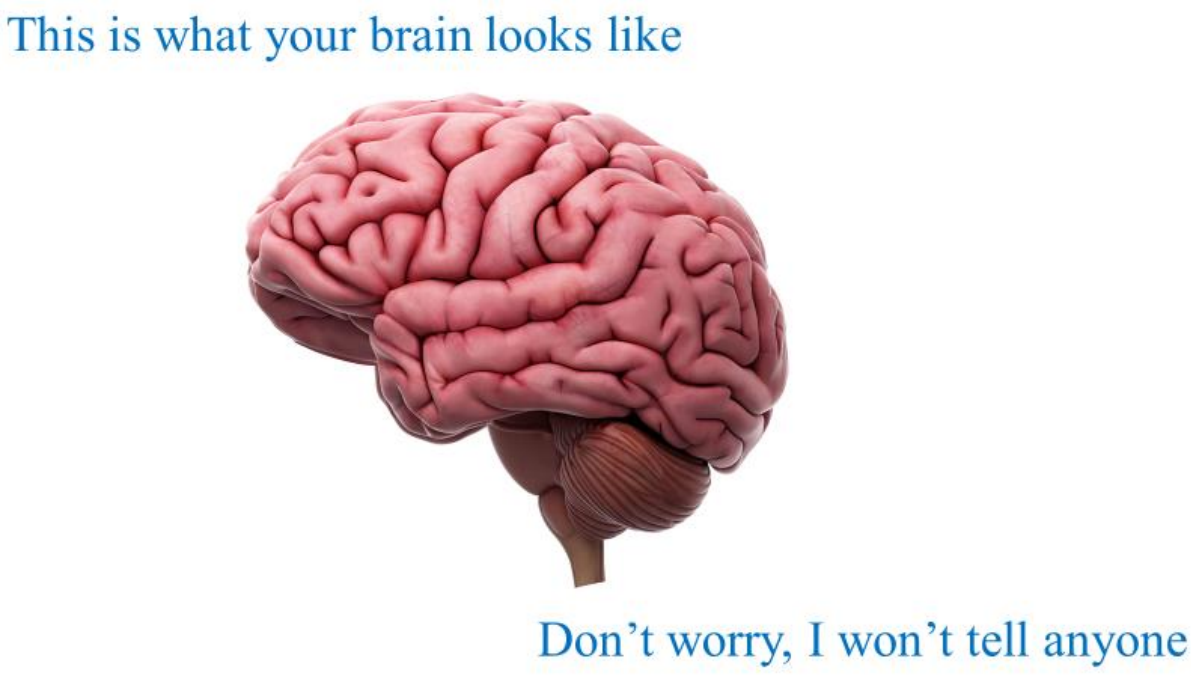
The last hard bit

OK, this is the last hard bit for the day.
Organisms produce more organisms. How do single-celled organisms produce more organisms? Simple, they just break into two.



[Oscar Cell & Friends. Kayla Reece. Many thanks.
https://simplebooklet.com/publish.php?wpKey=1LOoJ4ClXrSIwv7rHdhg79#page=0]

For organisms with lots of different cells, it's a lot more complicated.



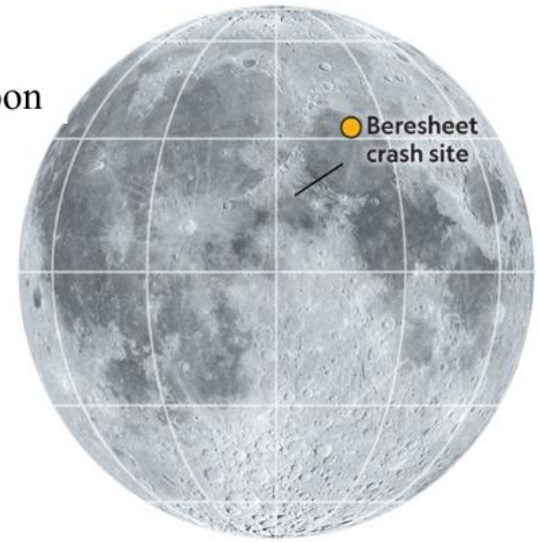
Show your parents
Chapter 16.

Dreams

The only country to have ever landed a spaceship on the Moon is the USA.
In mid-2019 another country, Israel, sent a spaceship [with nobody onboard] to the Moon.
Bad luck. It crash landed.

So, you will always be able to say you were alive when Israel sent a spaceship to the Moon [you don't have to mention that it crashed].

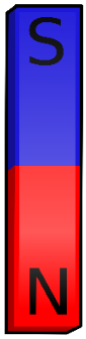
2019
Israel places a
spaceship on the Moon



Q: Where does a penguin go when it loses its tail?
A: A re-tail store.

Q: Which side of a penguin has the most feathers?
A: The outside.

Magnets and unrelated



[By: torisan, Courtesy: Open Clip Art Library
http://www.publicdomainfiles.com/show_file.php?id=13526266824356]

[Shared by: Chris 09—5-2012
http://www.clker.com/clipart-magnet-.html]

The magnets kids play with are made of iron. There are two main types, the straight ones called ‘bar’ magnets and the ones shaped like horseshoes, which [you wouldn’t be surprised] are called ‘horseshoe’ magnets.

There are also ‘fridge magnets’, but we won’t spend much time on them.

In the picture of the horseshoe magnet you see the thing that makes magnets interesting and important. The magnet has pulled three nails onto its ends and is holding them there. If you try to pick up nails with a pencil or a piece of chocolate – it will not work. So, there is something special about magnets.

Show your parents
Chapter 17.

We said before that everything is made of atoms, and atoms contain electrons which go whizzing around a lump in the middle. Now, the electrons are also spinning as they go around. OK, a magnet has most of its electrons spinning the same way. [You can make most of the electrons in a piece of iron spin the same way, and so make a magnet]

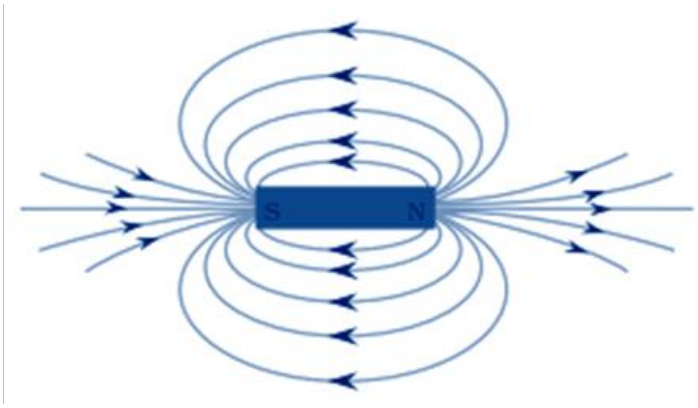
Now, we know that if you bring a piece of iron close to one end of a bar magnet, the magnet will pull that iron up to it. [See the nails and the horseshoe magnet, above]

Now, what happens if you bring one end of a bar magnet up to the end of your bar magnet? The answer is very surprising!

Either they will firmly snap together, or they will jump apart!!

That is because magnets have two different parts – these are called ‘poles’. One is called the ‘north’ pole and the other is called the ‘south’ pole. Well, different poles, a ‘north’ and a ‘south’ pole attract each other – and the magnets jump together with a snap.

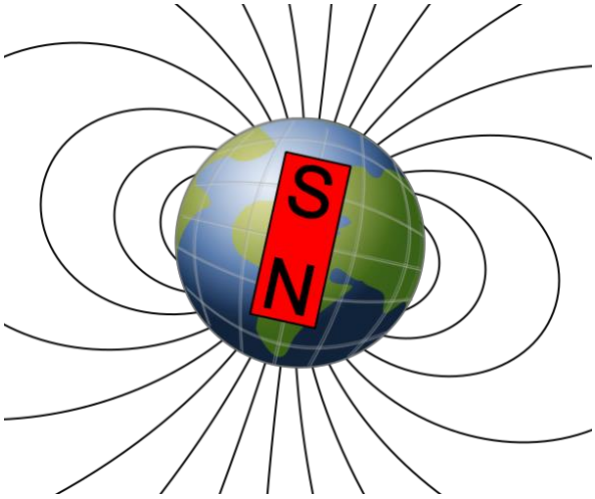
But, the same sort of poles (two ‘norths’, or two ‘souths’) push each other away. Very interesting.



[We offer free download of Magnetic field lines clipart
https://clipground.com/magnetic-field-lines-clipart.html]

So, the north and south pole of a bar magnet are different. This picture has arrows connecting the poles – you can’t see lines connecting the poles, but there is an invisible force field between the two. If you brought together two poles which both had the force field shooting

out, they would push each other apart. But, if you brought together one pole which had the field shooting out, and another which had the field shooting in, they would snap together.



[From Wikimedia Commons. Many thanks.
https://commons.wikimedia.org/wiki/File:Earth%27s_magnetic_field,_schematic.svg]

This section on magnets has been very difficult. Here is the last, hard but interesting, bit.

The Earth has a lot of iron inside. It is as if there is a giant bar magnet inside the world. This picture shows the magnetic force field around the earth. This is very important because it made the compass possible – if it had not been for the compass, we would never have been able to explore the world.

The ‘needle’ [or pointer] in a compass is a tiny magnet. In the Earth’s magnetic field it swings around and always points in the same direction [north].

Golf puzzle

You have seen a few golf balls. Why do they have those little dimples on them?

Well, a golf ball with little dimples on it goes twice as far at a golf ball which is completely smooth.

We can't explain it – but the dimples have an effect on the air, and this lets the ball slip through the air more easily. So, those little dimples are useful after all!!

Snail update

Snails can sleep for up to 3 years.

Important information

You will be pleased to learn…
1. It is impossible to lick your own elbow
2. A hippopotamus can run faster than a man
3. A crocodile cannot stick its tongue out
4. Water covers 70% of Earth
5. The shark is the only fish that can blink with both eyes
6. An ostrich's eye is bigger than its whole brain
7. Kangaroos can't walk backwards

Show your parents
Chapter 17.

Sahara Desert

This is the Sahara Desert – the third largest desert in the world. It is the largest hot desert in the world.

So, this is where it is:

The two bigger deserts are cold deserts, one at the Arctic [North Pole] and one in the Antarctic [South Pole].

Show your parents
Chapter 18.

Cakes first

So, what is this?

[Loving it Vegan. Many thanks.
https://lovingitvegan.com/vegan-cheesecake/]

Correct, a cake.

Now, what are cakes made of?
Correct, cakes are made up of slices of cake.

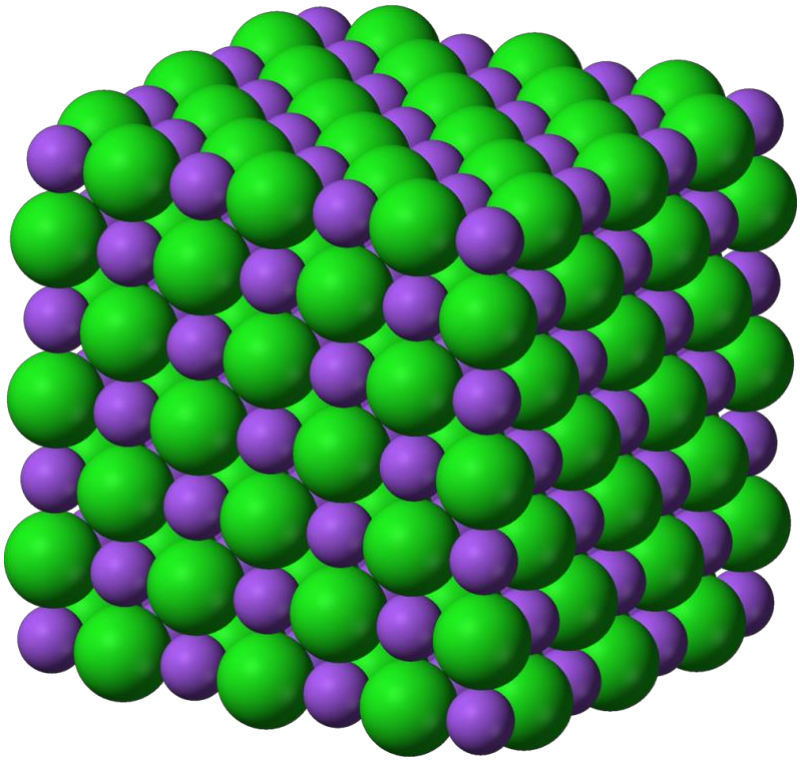
But if we look closer, if we think smaller, what are cakes made of?

[Loving it Vegan. Many thanks.
https://lovingitvegan.com/vegan-vanilla-cake/]

You are absolutely right – cakes are made up of what Mum calls ‘ingredients’ – big word.

But, what are ‘ingredients’ made of? We’re thinking, in particular, of salt and sugar.

OK, salt is made up of 2 very pure types of stuff, one is called sodium and the other is called chloride.



[Benjah-bmm27. Many thanks
https://commons.wikimedia.org/wiki/File:Sodium-chloride-3D-ionic.png]

So, here we have a tiny bit of table salt – and you can see the smallest pieces [atoms] of sodium [purple] and chloride [green] packed together.

Now, here is the big thing, sodium and chloride are examples of ‘elements’ – elements are pure. There is nothing else in sodium, but sodium, it’s an element.

The same goes for chloride.

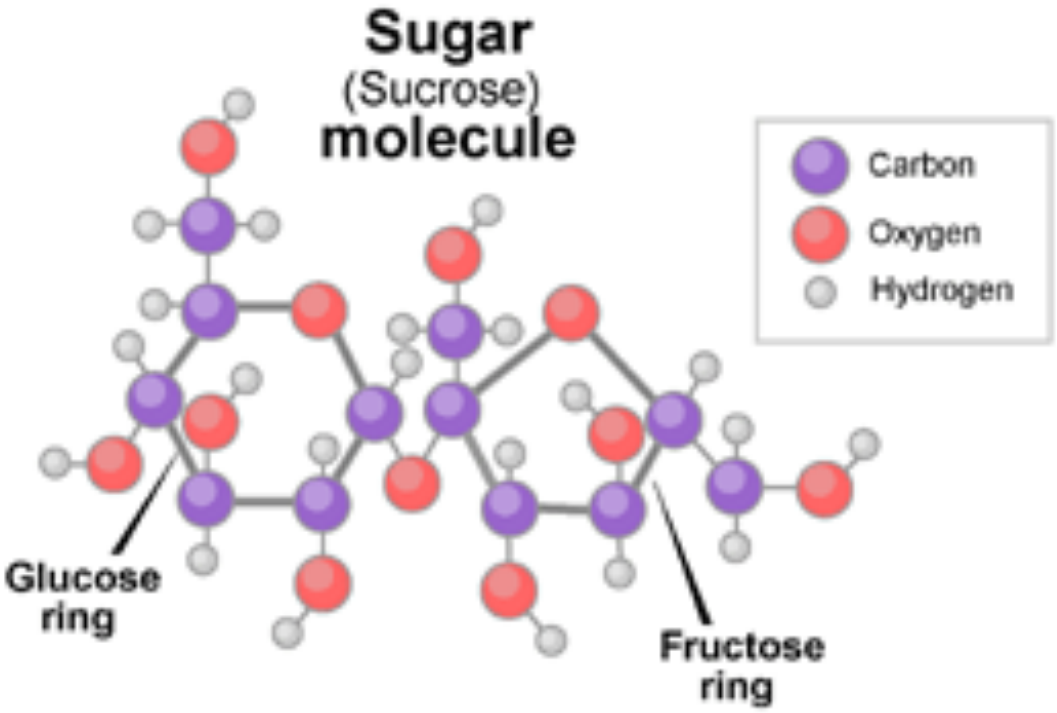
You already know some other ‘elements’. Gold is an element – wedding rings and other jewellery are sometimes gold.

The air has lots of oxygen in it – oxygen is an element. We need oxygen to live – and we breathe so we will get the oxygen we need out of the air.

Who brought up gold? You can't eat gold! We are supposed to be talking about cake, which has got sugar in it…

Speaking of sugar – it is made up of three elements: carbon, oxygen [we just talked about oxygen] and hydrogen.

There are all joined together in a special way…



[Beth's Blog: Nonprofits and Social Media
https://beth.typepad.com/beths_blog/2004/02/happy_valentine.html]

Q: You can you serve it, but never eat it. What is it?
A: A tennis ball.

Show your parents
Chapter 18.

A red moon or a ‘blood moon’ happens about every year and a half. So keep your eyes open. It has to do with the way light passes through our air.

When you look at the stars at night, one is always brighter than all the others.

The brightest star in the sky is Venus.

We always thought that this was because it was the closest to us. First there is the Sun, then Mercury, then comes Venus and Earth. So, Venus and Earth are close. BUT, that is not the whole answer – and the whole answer is REALLY boring.

Q: What's the difference between a guitar and a fish?
A: You can't tune a fish.

Q: What is it called when a cat wins a dog show?
A: A cat-has-trophy.

Q: What do you call a sleeping bull?
A: A bulldozer.

Q: Why did the bird go to hospital?
A: To get tweetment.

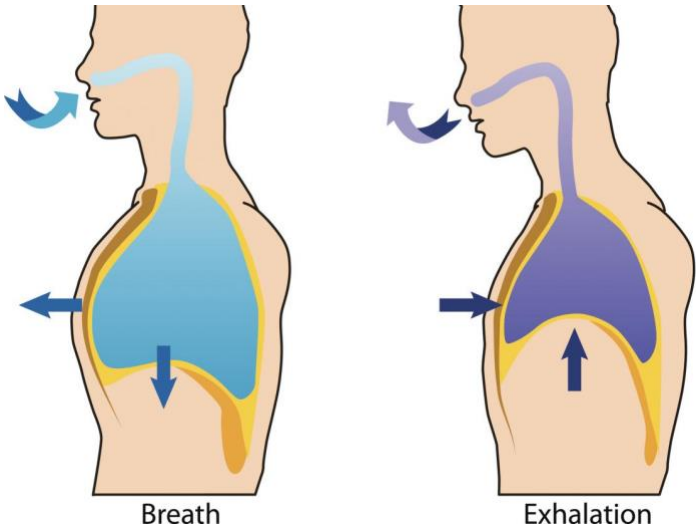
[Barnorama. Many thanks. https://www.barnorama.com/funny-pictures-vol-633/]

This would not be boring

Q: What do you call it when your parachute doesn't open?
A: Jumping to a conclusion.

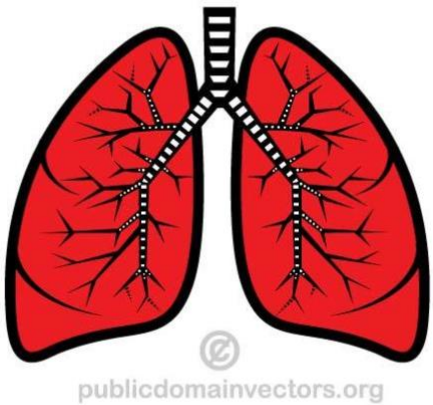
Take a breath

You can hold your breath for a while. But soon you have to take another breath in.



[Royalty Free Breathing Clipart. Many thanks.
https://www.clipart.email/download/3491190.html]

When air goes in, your chest gets bigger. It goes into your lungs – there is one on each side of your chest.



[Public Domain Vectors. Many thanks
https://publicdomainvectors.org/en/free-clipart/Vector-illustration-of-lungs/18340.html]

From there, oxygen from the air goes into your blood and then gets carried to every part of your body.

We need the air because we need the oxygen which is in the air. [Oxygen is an element, by the way.]

It is not just your mouth and nose that wants oxygen, it's your toes and your ears and your tummy – every part of you needs oxygen to stay alive.

What were those other 'elements'…?

Here's a hint about one of them.

You are correct!! Gold is an element.

Iron

We talked about iron when we talked about magnets – iron is an element.

We also talked about iron when we talked about the centre of the Earth being a hot metal core [most of this is iron]. Iron is a very hard metal – it is used to make very hard things like railway tracks and bridges.

[https://www.maxpixel.net/Fire-Metal-Heat-Molten-Pour-Hot-Iron-Foundry-4455451]

Amazingly, when iron is made really, really hot, it becomes a liquid and you can pour it to make things like railway tracks. [Ice is the same of course, when you heat it up it becomes runny water.]

Mercury

Mercury is an element – but a very unusual one.

[USGS. Public domain. Many thanks
https://www.usgs.gov/media/images/mercury-only-metal-liquid-normal-temperatures]

It is a metal, but it is a liquid – so, runny like water, even when it is not heated up – if there was some in the room where you are now, it would be runny, and you could pour it into your hand – no problem.

Show your parents
Chapter 19.

We have used the word ‘Mercury’ before – do you remember?

Yes, it is the name of the planet which is closest to the Sun [then comes Venus and Earth].

Thousands of years ago the people who lived in Greece and Rome believed in a lot of different gods. One was called Mercury. He could get from one place to another very fast – so, he carried messages.

[Free Download Transparent PNG.
https://www.pnglot.com/downpng/TRhbiwJ_greek-god-mercury-mercury-hermes/]

Mercury was good at carrying messages because he was very fast. If you look closely, you can see why he was very fast. Yes, he had little wings near his ankles [and on his helmet]. It looks like he was so fast he didn’t have time to put his pants on. So, don’t go too fast.

Show your parents
Chapter 19.

Knock, knock.
Who's there?
Boo.
Boo who
You don't need to cry, it's just a joke!

The capybara – is the largest living rodent [related to mice and squirrels] – it lives in South America.

Dolphins and

OK, what is this…?

It isn’t a big fish.

It’s a dolphin – yes, it lives in the sea and looks like a fish – but it isn’t a fish. It’s a mammal. Mammal mothers feed their babies with milk – so yes, dolphin mothers feed their babies milk.

Fish mothers don’t give milk – because, fish are fish.

[Whales are also mammals, by the way.]

Mammals and fish and all living animals and plants need oxygen to live.

Another difference between fish and mammals is, how they get their oxygen. Fish have special parts [which you can see] on their neck called ‘gills’ – these get oxygen out of the water.

Show your parents
Chapter 20.

Mammals are like you. You have to breathe in air and get oxygen out of the air in your lungs.

But, how do dolphins which are under the water, get enough air? Well, dolphins are not under the water all the time.

They have special holes in the top of their heads called ‘blowholes’ – these are like noses. They are holes which let air in. [Whales also have blowholes]

To get air, dolphins keep coming up to the top of the water – when the top of their head pops out of the water they take a breath of air.

Dolphins can hold their breath for a long time. But when they are going for a long swim they come up and down, up and down, in a straight line and you can see where they are heading.

[Dolphin Watch Cruises. Permission. Many thanks.
https://www.dolphinwatch.com.au/jervis-bay-dolphins-behaviour-tail-slapping/]

This fabulous picture was lent to us by Dolphin Watch Cruises. Look closely and you can see some bubbles – so this dolphin is breathing air out [making bubbles].

Sometimes, you can also see some water spurting out of the blowhole. When dolphins [and whales] go under the water, some water runs into their blowhole. When they come up they have to spray that water out before they can take a breath in.

That is how people can see where to find these animals. Whales are bigger and their spurting can be seen from a long way away.

Have you ever heard an echo? If you are outside near rocks and mountains and you shout “Hello”, the noise you make may bounce off the rocks and come back to you – that is, you will hear “Hello” a moment later.

Or, in a bare house with no soft furniture – carpets or cushions – sometimes you can hear your footsteps coming back, or ‘echoing’.

Dolphins don’t have very good eyesight. But, they know what’s going on a long way away. That is because they make clicking noises, and when the clicks bounce off hard stuff and come back to them, they can tell what is in that direction. [Have you ever seen a dolphin wearing glasses? No. Well, they don’t like sitting in chairs to have their eyes examined.]

Cambodia

Show your parents
Chapter 20.

Cambodia is a country north of Australia. They have many cities in the jungle which they have not used for about 700 years. The jungle has grown all over them.

We have seen these cities and buildings – they are pretty cool, don't you think?!

Show your parents
Chapter 20.

Q: What do you call a cow that plays a guitar?
A: A MOO-sician.

Q: What kind of cat likes water?
A: An octo-PUSS.

Q: What do you call a dog who goes to the beach in the summer?
A: A hot dog.

Q: Why do tigers have stripes?
A: So they don't get spotted.

Q: What time is it when people are throwing pieces of bread at your head?
A: Time to duck.

Q: What bone will a dog never eat?
A: A trombone.

Show your parents
Chapter 20.

[Public domain. Many thanks.
https://www.publicdomainarchive.com/horse-eye-close-brown-hair/]

Getting around

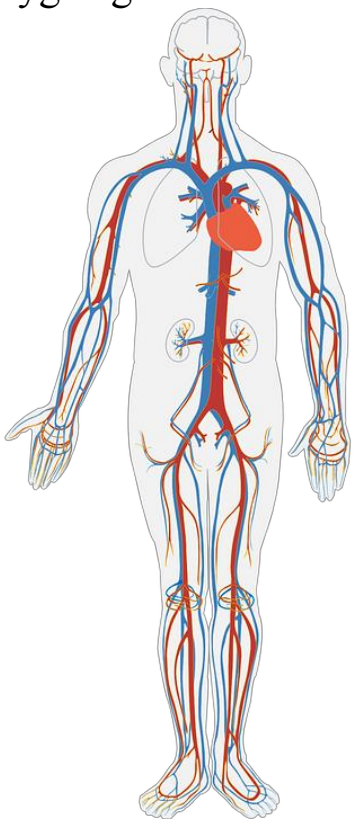
We said there was some very pure stuff in the world. Stuff that is the same all the way through. There are different sorts, and we called them elements.

The elements we thought of were gold and mercury. And oxygen, which is in the air. We need oxygen.

The reason we breathe is to get oxygen into our bodies. It comes into our lungs in our chest [with the rest of the air].

But, we don't just need oxygen in our lungs – we need it everywhere – in our ears, our fingers and tummies, our ankles.

The question is, how does the oxygen get from our lungs to our ears? Well, it is picked up from the lungs by the blood, and your heart [which is just a pump] pushes the blood around your body, and the oxygen gets off when it wants to.



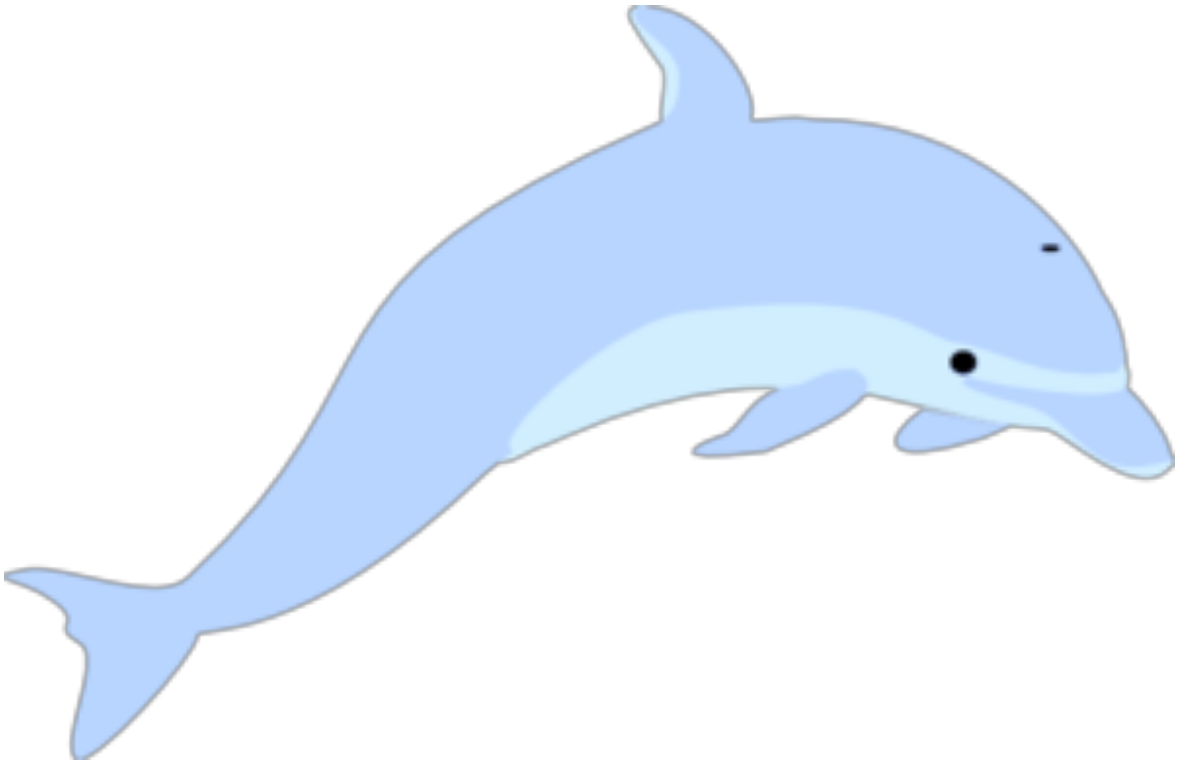
[Pixabay. Free picture. Many thanks.
https://pixabay.com/vectors/human-body-circulatory-system-311864/]

In this picture the heart is that red lump in the middle of the chest.

There are little red and blue lines in this picture – the red lines show blood with oxygen in it being pushed out to the tummy and the toes and some other places I have forgotten.

The blue lines show blood which has no oxygen left, going back to the lungs to get some more.

The problem with being a dolphin



[http://www.clker.com/cliparts/3/6/a/8/13989042176038022 45blue-grey-dolphin-md.png]

The problem with being a dolphin is that you've got to sleep on top of the water. If you go under the water while you are asleep you won't be able to get oxygen from the air, and water will go down your blowhole and you will drown!!

Show your parents
Chapter 21.

Don’t worry

[From Wikimedia Commons. Many thanks
https://commons.wikimedia.org/wiki/File:Huashan_Upside_Down_House_20160409b.jpg]

There are a few houses around the world which have been built upside down, for fun. This one is in Taiwan…

and this one is in Niagara, Canada.

Q: Which letter of the alphabet has the most water?
[If you don’t know, please ask a dolphin.]
A: The C

Q: Why couldn't Goldilocks sleep?
A: Because of nightbears.

Knock, knock.
Who's there?
Alien
Alien who?
Just how many aliens do you know?

Knock, knock.
Who’s there?
Abby.
Abby who?
Abby birthday to you!

Geography special

We think you are sick of oxygen, hydrogen and helium, so we won't mention them today.

What is a 'country'?
Well, you could say it's a piece of land [maybe more than one piece of land] along with the people who say, "this is our country".

We live in Tasmania.

[From Wikimedia Commons. Many thanks.
https://commons.wikimedia.org/wiki/File:Relief_Map_of_Tasmania.png]

Now, Tasmania has three sides, like a triangle. So, it could be called 'Trianglia'.

But, 'Trianglia', sorry, Tasmania, is not a country. It is a state or part of a country.

Our country is Australia.

Show your parents
Chapter 22.

[Free map. Many thanks
http://mapsopensource.com/australia-map.html]

So, on this map of Australia, you can see ‘Trianglia’, sorry, Tasmania, down the bottom. So, this country is made of two separate pieces of land [the big piece which is called the ‘mainland’ and the smaller (best) piece called Tasmania].

If you go out to the right of Australia, there is another country made of two main pieces.

[Australasia Map by Google with additions by Bugbog
https://www.bugbog.com/maps/australasia/]

This country is called New Zealand. It looks like 2 sausages. [The Australian people and the New Zealand people enjoy teasing each other, but we are not allowed to do that anymore.]

But, if this is ‘New Zealand’, where is ‘Old Zealand’?

[https://www.wikiwand.com/en/Region_Zealand]

‘Zealand’ is a small part [shown in red on this map] of the tiny country of Denmark, which is in Europe.

[By the way, this part of Denmark is not called ‘Old’ Zealand, just Zealand – as you already worked out].

The point is, when European sailors stumbled on those islands, it reminded them of Zealand [not sausages] – that’s how it got the name.

Speaking of sausages, Hawaii used to be called the Sandwich Islands. The English sailor who found Hawaii liked a fellow called Lord Sandwich [who was the man who invented sandwiches] and so called the place the Sandwich Islands. But, the name didn’t stick.

Show your parents
Chapter 22.

[Just so you know, this is Lord Sandwich, after whom your sandwiches are named.]

[Public domain.
https://commons.wikimedia.org/wiki/File:John_Montagu,_4th_Earl_of_Sandwich.jpg]

As you know, Hawaii is now part of the country called the United States of America or the USA or the US. When they say US, they don't mean us, like you and me, but, I guess you knew that.

[https://www.dw.com/en/fighting-for-a-forgotten-cause-in-west-papua/a-16701714]

Show your parents
Chapter 22.

Just to finish off, if you go straight up from Australia, the first island you will bump into looks like a dinosaur. We don't think it has a name, anymore. It should be called Dinosaur Island.
It doesn't have a name [as far as we know] because it has been divided into halves. Another country [Indonesia] has taken the left half of Dinosaur Island.

The right-hand side is called Papua New Guinea [or PNG] – which is a separate country [but half an island, if you know what we mean].

Knock, knock.
Who's there?
Guinea!
Guinea who?
Guinea a break!

Knock, knock.
Who's there?
Iran!
Iran who?
Iran over here to tell you this!

Speak up

Why is your voice different from the voice of an old man?

Well, we all have this thing in our necks – called a voice-box [in some people you can see it from the outside].

[Photo: Pixabay. Many thanks]

And, in that little box there are your ‘vocal cords’ – and they make your voice.

[http://clipart-library.com/string-instruments-cliparts.html]

All of these instruments have strings [and your vocal cords are like little strings].

If you stroke the strings of these instruments, they sound different. And, on the same instrument, the thick strings sound different to the thin strings.

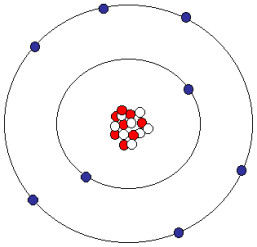
So, kids and adult women have vocal cords which give higher pitched voices than old men.

OK, so how do we stroke our vocal cords? By letting air come out when we want to speak. Try speaking while you are holding your breath.

No, I can't hear anything!

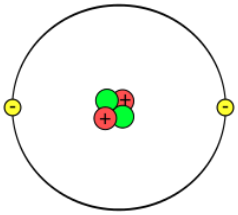
Changing the subject, a bit

OK, gold, mercury, oxygen, hydrogen, helium – what are they? No… not boring… they are elements. They are the same all the way through. Each element is made up of small pieces [atoms] – and the atoms of the different elements are different.



This is what an atom of oxygen looks like – there are 16 lumps in the middle and 8 tiny bits spinning around them.

OK, this is what an atom of helium looks like. It only has 4 lumps in the middle and two bits spinning around them.



[Svdmolen/Jeanot (converted by King of Hearts)
https://commons.wikimedia.org/wiki/File:Atom.svg]

So, oxygen is much heavier than helium. So, when you are breathing normal air your voice sounds normal. BUT, when someone is blowing up balloons with helium and they take a breath of helium and speak – their voice is really funny and squeaky, like a cartoon character.

Why is that? Well, oxygen is heavier [and so are some of the other elements in air – like nitrogen] than helium, and when they [oxygen and nitrogen] bang into the vocal cords on the way out, they give

them a pretty good bang – and we hear a normal voice. But, when you breathe out helium it just gives the vocal cords a slight tickle – and so, you sound like a cartoon chicken.

Yes, it's fun. But, don't do it. At least, don't do it for more than one breath. We breathe because we need oxygen – everywhere – in your back, in your fingers, in your heart. If you breathe a lot of helium or anything else, it will push the oxygen out of the way, and you won't get the oxygen where you need it. And then we will have to put you somewhere really boring.

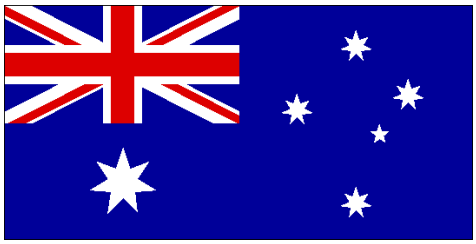
Q: What is the best thing about Switzerland?

A: I don't know, but the flag is a big plus.

This is a joke [and a hint].

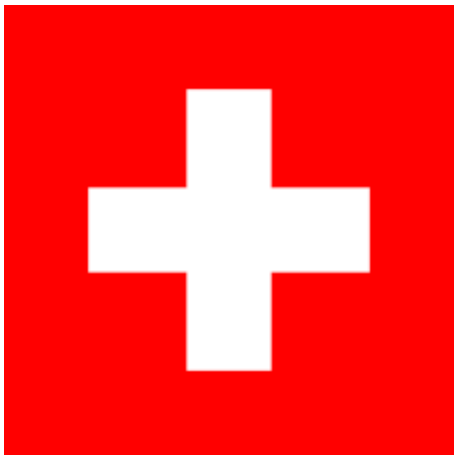
But, now, you have to try to pick out the flag of Switzerland.

No, that’s the flag of the United Kingdom [England, Scotland, Wales and Northern Ireland].



No, that’s the flag of Australia. You can see the United Kingdom flag up in the corner.

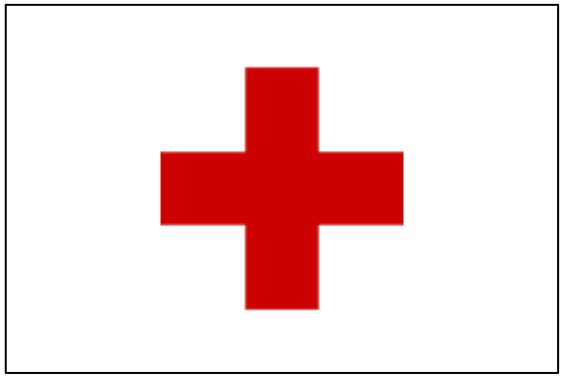
No, that’s the flag of Indonesia.



Yes, that’s the Switzerland flag.

So, now you see the joke about the flag of Switzerland being “a big plus”.

Now, here is an interesting fact:



This is the flag of the Red Cross – not a country, but a group of people who help sick and injured people all over the world.

Now, Switzerland is a pacifist country – which means they won’t fight wars.

The Red Cross people try to help everyone, and they don’t like fighting. They think Switzerland was good not to fight in wars. So, they [the Red Cross] people use the Switzerland flag – but, with the colours changed around.

This is the flag of Swaziland – not Switzerland – we just put this in to confuse you. The black and white are a cow hide shield. There are two spears and a stick. The blue stuff on the stick is feathers.

Swaziland is a tiny country in Africa. Please remember this, as we don’t want to have to go through it again.

Show your parents
Chapter 23.

There are two muffins baking in the oven. One muffin says to the other, “Phew, is it getting hot in here or is it just me?” The other muffin says, “AAAAHHH!! A TALKING MUFFIN!”

Q: When do you go at red and stop at green?
A: When you're eating a watermelon.

Going around

Let’s talk about planet Earth.

[Clker.com FREE CLIPART. Many thanks
http://www.clker.com/cliparts/6/7/a/e/13995180031432111734Top.svg.med.png]

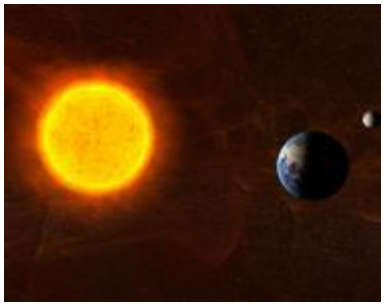
Correct. This is not the Earth. It’s a spinning top, spinning around on the spot.

[Foto: Stefan Brending / Lizenz: Creative Commons CC-BY-SA-3.0 de
https://commons.wikimedia.org/wiki/File:2018_DM_Leichtathletik_-_400-Meter-Huerden_Frauen_-_Alica_Schmidt_-_by_2eight_-_DSC7136.jpg]

Correct again!! This is not the planet Earth – it is people running around in a big circle.
We know what the Sun looks like. We know what it does, it gives us sunburn [yes, but that's not that important at the moment] – it gives us light.

If you are in a dark room and you shine a torch on things, the light only gets on the sides of things which are facing the torch. The Sun is like a huge torch.

OK, so, when you are on the part of the Earth which is facing the Sun – is it daytime or night-time?


[Daylight for the part of the Earth facing the Sun]

Well, there is plenty of light [coming straight to you from the Sun] so it must be daytime.

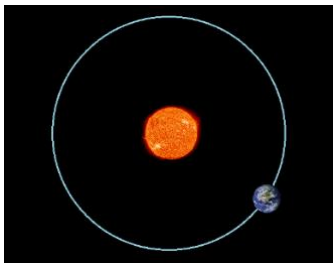
We know the Earth spins around on the spot. So, what would you see if you went to school, played, came home, had something to eat and 12 hours later, looked out of the window?
You wouldn't see anything, because it would be night.

I would be night – because the Earth would have spun around so that another part was now facing the Sun, and getting light, and the part you were on would be away from the Sun, and no light could get to you.

So, how long does it take for the Earth to spin around once? One day and one night – that is, 24 hours.

Show your parents
Chapter 24.

OK, we know from Chapter 6 that the 7 planets go around the Sun. Like those runners racing around the athletics field.
The closest planet to the Sun is Mercury, then comes Venus, and then Earth.



[https://leepavelich.wordpress.com/2012/03/05/back-of-the-envelope-calculation-earths-orbital-velocity/]

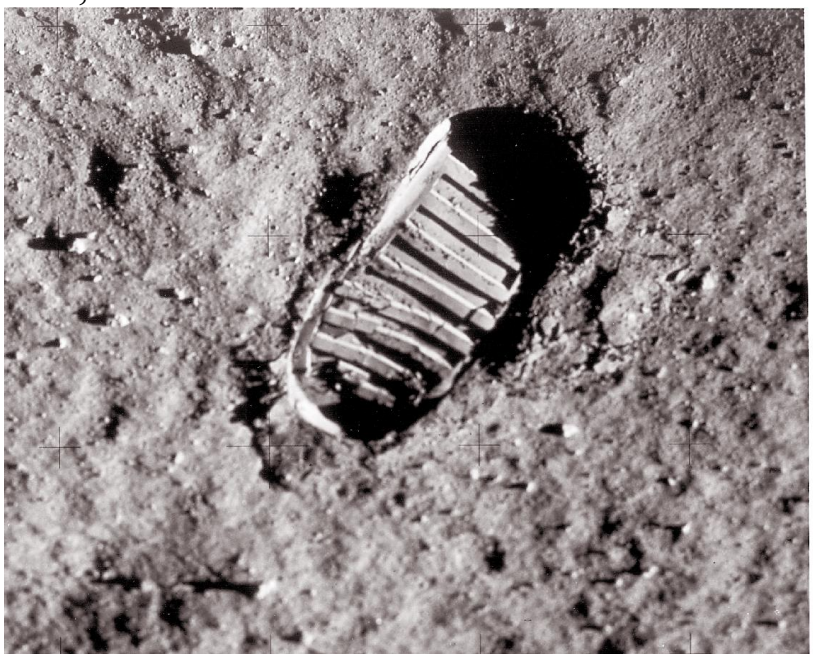
How long does it take for the Earth to go around the Sun once? The answer is 365 days – that is, one year.

So – we have just learned that the Earth spins around like a top, and it takes 24 hours to turn around once – it is this spinning on the spot that gives us day and night. Also, the Earth goes around the Sun and it takes one year for it to get around once. Not bad to know!

So, what goes around the Earth?

Yes, the Moon.

And, what is this?



[https://www.nasa.gov/audience/forstudents/k-4/home/F_Apollo_11.html]

This is the first footprint ever made on the Moon [by Neil Armstrong] in 1969 – from long before Mummy and Daddy were born. [So, what would they know about it?]

Stonehenge

[Stonehenge Monument Air Clouds Tourism by Doodlebug.
https://cleanpublicdomain.com/downloads/stonehenge-monument-air-clouds-tourism/]

Stonehenge is in England and one of the great mysteries of the world. As you can see, it is a circle of huge stones [about 100 metres across]. Many of these huge stones [about 3 metres high] are standing on one end – mostly they are in pairs, and another huge stone is laid across the top.

Stonehenge is a mystery because we don't know
1. How it was built, or
2. Why it was built.

Well, it was built by English people – they started about 5,000 years ago, and they changed it quite a bit for a couple of thousand years. Of course, these stones are very heavy [some weigh as much as four African elephants each].
Some stones were brought from 25 kilometres away, and some were brought from 225 kilometres away – probably on sledges. Nobody

really knows how they managed; especially, how did they get the lying down ones on top of the standing ones?

An old legend says Stonehenge was built on a mountain in another country by giants, and moved to England by a magician called Merlin. Unfortunately, that is not true, but it is a good story.

Why was Stonehenge built? We are not sure about this either. At special times of the year the Sun peeps under some of these arches, so this might be a calendar – a way to tell people when the weather is going to change from cold to hot and stuff like that.

It is good to have a good mystery – it stops your brain going stiff.

Pangolins

Pangolins are very unusual animals – they are mammals [mothers feed their babies milk] – they eat ants and termites and they are mainly found in Africa.

Pangolins have large hard scales [a suit of armour] and can grow to 1 metre in length. They live in trees or in burrows.

Pangolins are endangered [that means there are not many left, and they need to be protected] because some people kill them – these killers think [but they are wrong] that you can make medicine out of pangolin scales.

Show your parents
Chapter 24.

[Photo: Olivier Laude for Bloomberg Businessweek
https://www.scmp.com/magazines/post-magazine/long-reads/article/3023842/chinese-and-vietnamese-demand-pangolin-scales]

[A pangolin in defensive posture, Horniman Museum, London
Stephencdickson via Wikimedia Commons
https://answersingenesis.org/kids/mammals/pangolin/]

When they need protection, they roll themselves into a ball – when they do this, even lions may not be able to hurt them.

Show your parents
Chapter 24.

Knock, knock.
Who's there?
Ya.
Ya who?
Wow, I'm excited to see you too!

[Belinda Fewings@bel2000a
https://unsplash.com/photos/73XDjmZQo6Y]

Knock, knock.
Who's there?
Figs.
Figs who?
Figs the doorbell, it's broken!

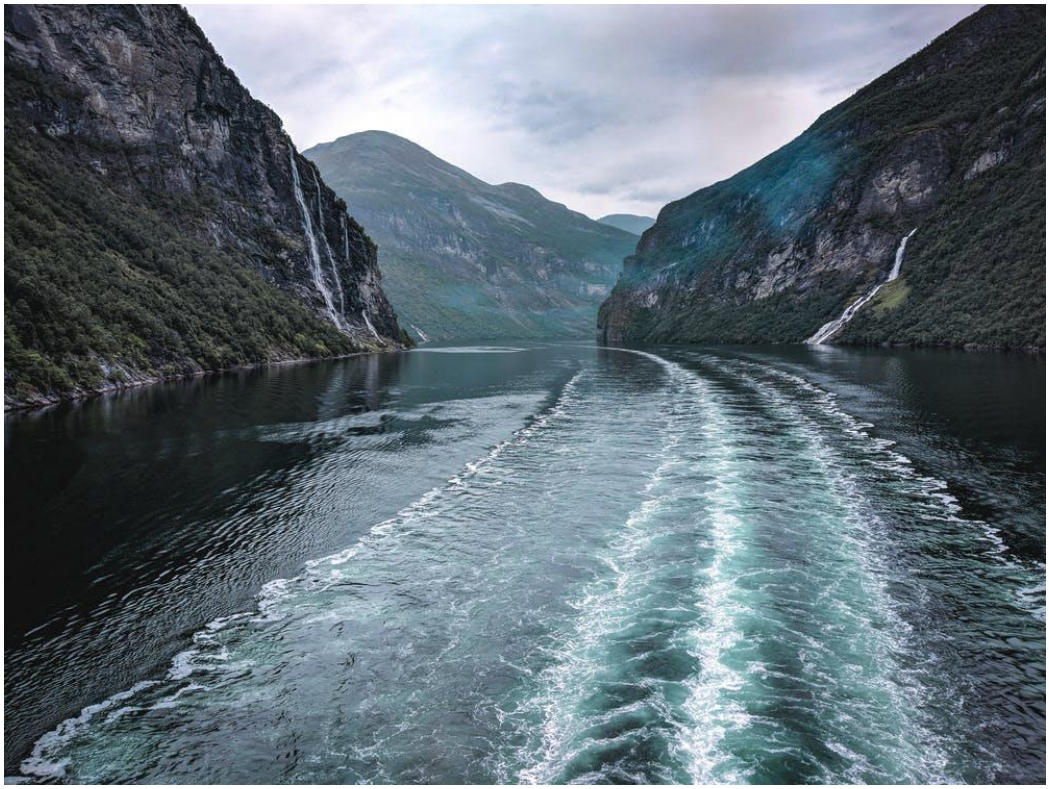
[Geran de Klerk@gerandeklerk
https://unsplash.com/photos/bKhETeDV1WM]

Dragon’s blood

What is a fjord?

Well, first, you have to know how to say it – this is not an English word. [What is that ‘j’ doing there?]

Anyway, in English, to make the proper sound, you could say, “Fee Ord”.



[Pexels. Free Stock Photo. Jordi García Almida. Many thanks.
https://www.pexels.com/photo/fjord-norway-river-ship-1379592/]

OK, this is a Fee Ord. Sorry, fjord.

It just looks like a river. Yes, but look at the banks. You see it looks like the river is running between two walls of rock. As if something has cut the mountains to make way for the river.

Fjords are formed by glaciers. Glaciers are rivers where the river is not running water – but hard ice. What happens is the river of ice scrapes down to the sea. So, it is ice that cuts the sides of the mountains and forms the walls of rock.

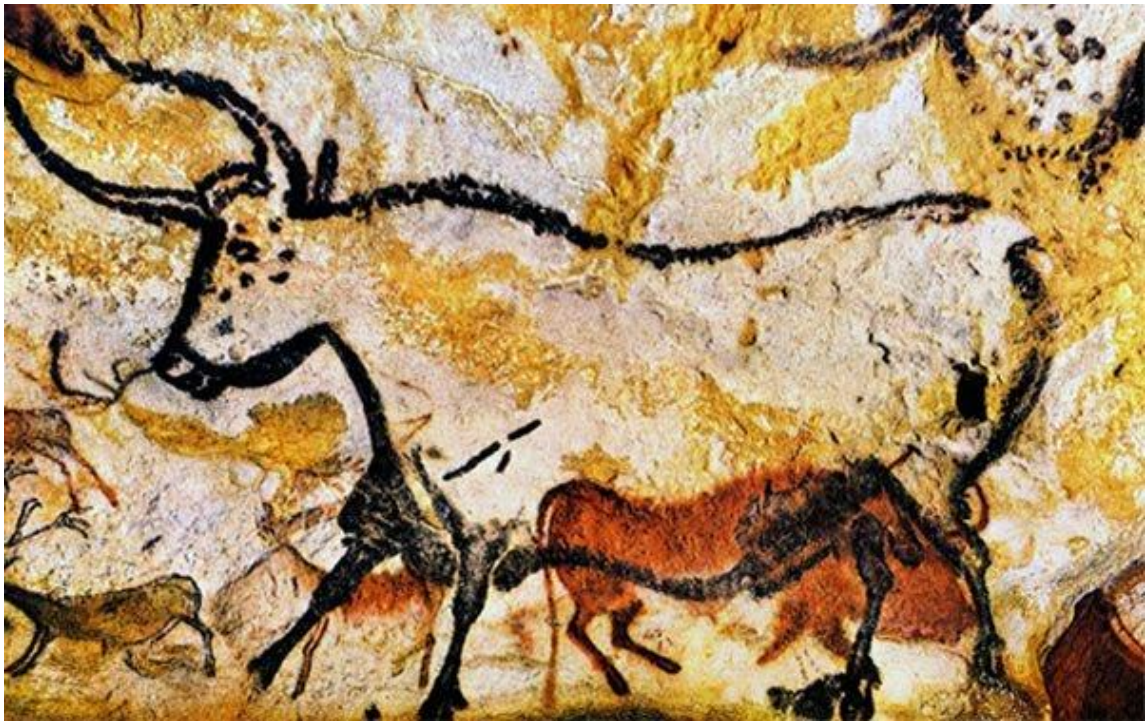
Show your parents
Chapter 25.

[PublicDomainPictures.net. Mike Peters. Many thanks
https://publicdomainpictures.net/en/view-image.php?image=58330]

This is a glacier in Alaska. You can see that this is ice and you can imagine it scraping and pushing rocks aside.

Show your parents
Chapter 25.

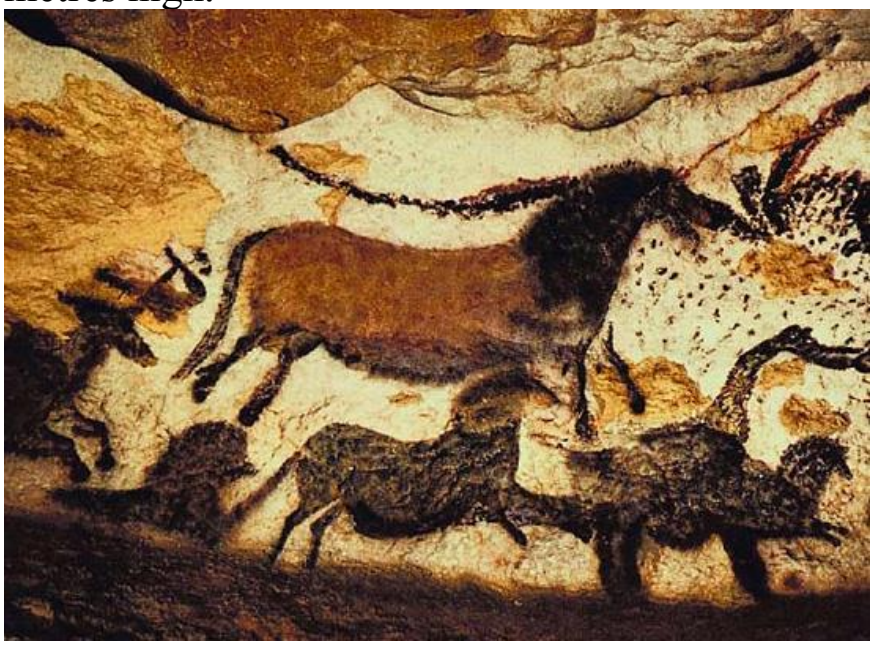
Lascaux Cave Paintings



[Public domain]

These amazing paintings were found on the walls of the Lascaux caves in France.

They were painted by Stone Age people 25,000 years ago. There are about 200 drawings and paintings of different animals. Some are 6 metres high.



[Public domain]

They were found in 1940 – a bit before your grandparents were born.

They were found by four boys. They lost their dog. They looked for it and in a grassy area, they found a hole in the ground. They thought the dog may have fallen into this hole and made it bigger so they could squeeze down themselves.

They found themselves in this magic set of connected caves – full of paintings which had not been seen for many thousands of years. Nobody had known that Stone Age people were so clever.

Also, nobody knows if they found their dog, or where it had been, and if they gave it a special dinner that night.

Dragon's blood tree

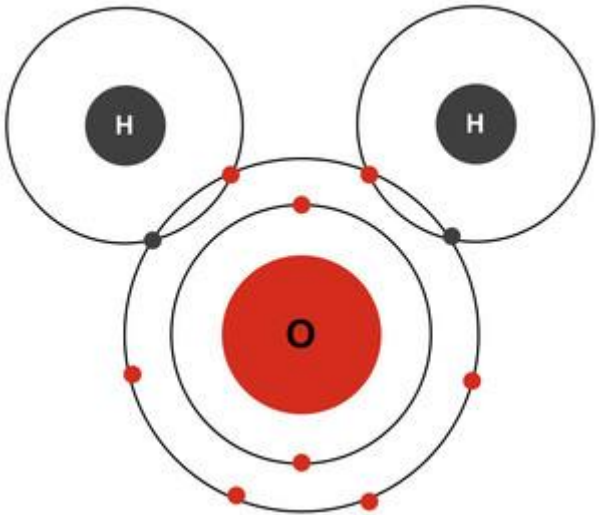
The Dragon's blood tree has an unusual appearance. It is related to the palm tree. Its sap is red – which is why blood is in its name.

[By Boris Khvostichenko(User:Boriskhv) - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=7175533.]

It only grows in one place in the world – on Socotra island – which belongs to the country Yemen.

Water

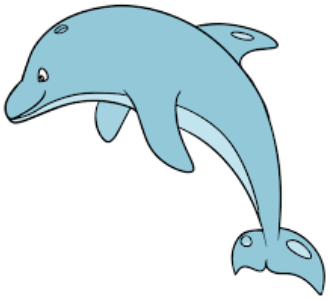
We said that elements are stuff that is the same all the way through. We said there was gold and mercury and oxygen and hydrogen. Oxygen and hydrogen are both gases, so they float around in the air. BUT, if a piece [atom] of oxygen joins up with two pieces [atoms] of hydrogen, you get a piece of water – which is a liquid and makes you wet. Now, that is pretty weird!!!



Show your parents
Chapter 25.

Above is a piece [molecule] of water. When we first saw this molecule of water, we thought it was Mickey Mouse. The atoms join up when those whizzing bits [electrons] link up.

Knock, knock.
Who's there?
Razor.
Razor who?
Razor hands, this is a stick up!



Q: What did the lettuce say to the celery?
A: Quit stalking me!

Q: What do you call a boy with a dictionary in his pocket?
A: Smartie Pants!

Larry

In 1982 [a little bit before Mummy and Daddy were born] a really good thing happened.

Larry Walters [who lived in the USA] did something he had always wanted to do. He filled 45 weather [very big] ballons which were tied to a chair, with helium. He took some sandwiches and a pellet gun and sat in the chair.

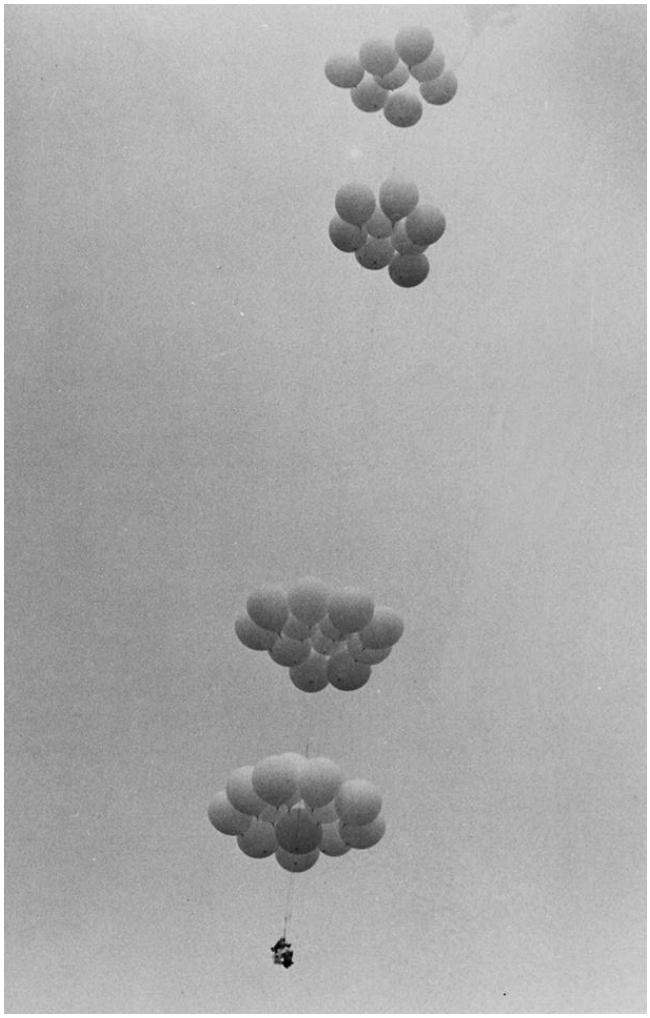
[A pellet gun does not shoot bullets – it shoots little pieces of metal – he took one so when he wanted to come down, he could shoot some of the balloons.]

Show your parents
Chapter 26.

Larry thought he would go up about 10 metres in the air – but, he went straight up to about 5,000 metres. He got in the way of some passenger planes.

He stayed up for hours – when he wanted to come down he shot some balloons and he came down a little – but, he dropped his gun and he had to wait until his invention came down naturally. When he did come down his invention broke some electrical wires so some people didn't have electrictity for a while.

The chair was a piece of outside furniture – which some people call a 'lawn chair'. Larry immediately became famous and the television and newspapers called him, 'Lawn Chair Larry'.



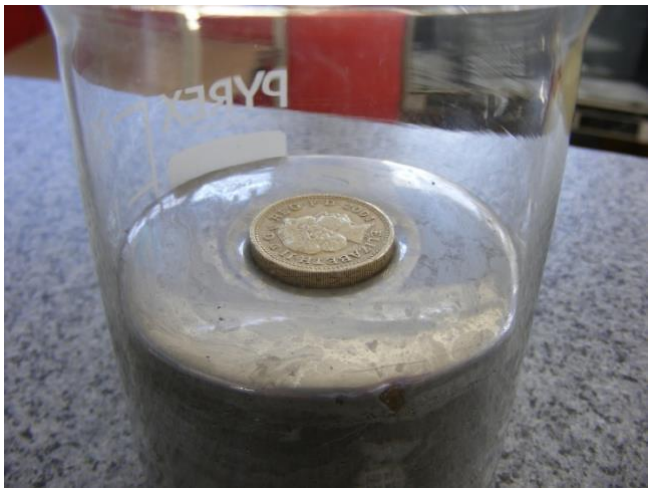
[https://medium.com/lessons-from-history/the-strange-sad-odyssey-of-lawn-chair-larry-3b943991179c]

Larry got into trouble and was fined for flying a machine in the wrong place – but he was famous for a time. Yes, it is probably dangerous and could have hurt other people or himself.
But, he did what he had dreamed of doing since he was a boy, and many people think that's a good thing.
In the next chapter we learn more about helium – we learn that it is very light, and that is why helium balloons float up in the air [which is heavier].

Floating

Stuff will float on stuff which is heavier than it is. So Lawn Chair Larry's helium baloons floated on air because helium is lighter than air.

If you pick up a dry stick and throw it into a pond of water – will it sink or float? Well, wood is lighter than water, so a stick floats on water. What if you pick up a stone [any size] and throw that in the pond – sink or float? Stone is heavier than water so, a stone will sink in water.



[Author: Alby
https://commons.wikimedia.org/wiki/File:Pound-coin-floating-in-mercury.jpg]

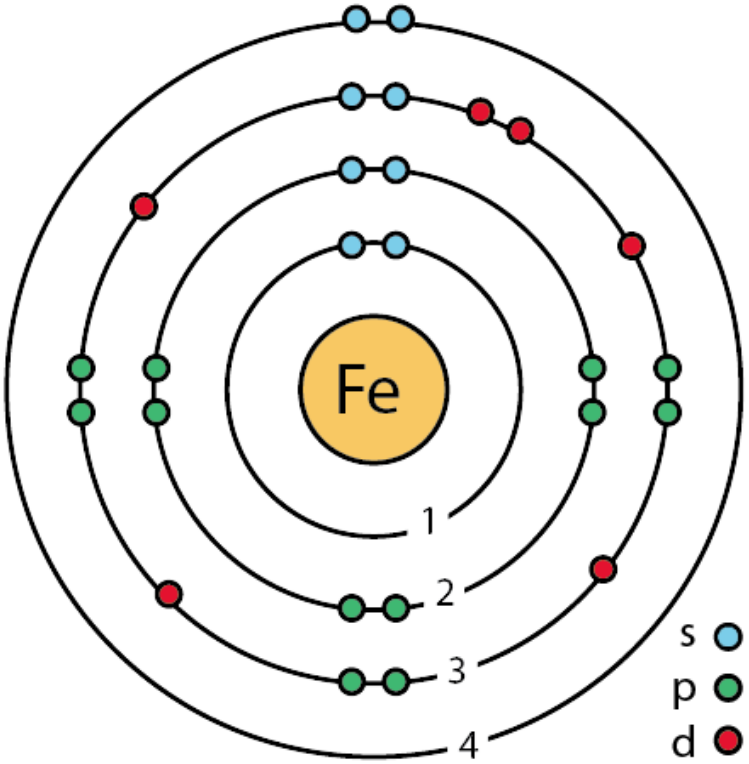
This is a very interesting picture – it shows a metal coin [coins are mainly made of iron] which is floating in a container of mercury.
We know iron and mercury are both elements – they are made of one type of atom.

We know iron, it is hard and used to make railway lines. We know mercury – yes, it is a metal, but it is very strange, because it is a metal which is runny like water.

In this picture, we see a coin [mainly iron] floating on a pool of mercury. This suggests that iron is lighter than mercury.

We can check that by comparing their atoms.

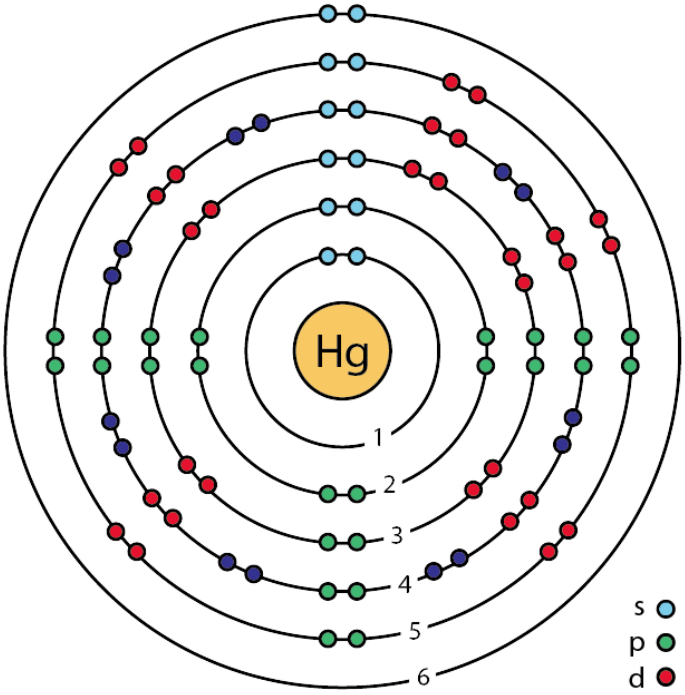
Most of the weight of an atom comes from the big lumps in the middle. The number of electrons, those little bits whizzing around the outside of atom, give a good idea about whether the atom will be heavy or light.



[Author: Ahazard.sciencewriter
https://commons.wikimedia.org/wiki/File:26_iron_(Fe)_enhanced_Bohr_model.png]

Fe is the symbol for iron. There are 26 electrons going around in iron atoms – and the mass number of an iron atom is 56.

So, let's have a look at a mercury atom. Hg is the symbol for mercury.



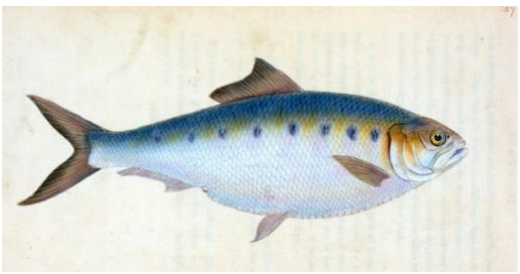
[Author: Ahazard.sciencewriter
https://commons.wikimedia.org/wiki/File:80_mercury_(Hg)_enhanced_Bohr_model.png]

Wow! There are 80 electrons going around in the mercury atom [heaps more] and the mass number of a mercury atom is 201 [nearly 4 times heavier].

So, of course, a piece of iron will float on a pool of mercury.

Just checking

So, in Chapter 2, we said that dolphins are not fish, they are mammals.
And we saw that they breathe [get their oxygen] through holes in the tops of their heads.
We said that fish get their oxygen straight out of the water. They do that through gills, which are slits on the sides of their necks.



[https://thegraphicsfairy.com/free-fish-clip-art/]

The gills are those slits behind the eye and in front of the first fin.

And, how many eyes do spiders have?

They usually have 8 – some only have 6. The one in this picture only has 4 in front, but he/she has others on the side and back.

Knock, knock.
Who's there?
Art
Art who?
R2-D2

My friend recently got crushed by a pile of books, but he's only got his shelf to blame.

Q: What gives you the power to walk through a wall?
A: A door.

Q: David's father has three sons: Snap, Crackle and… ?
A: David.

Show your parents
Chapter 27.

More atoms

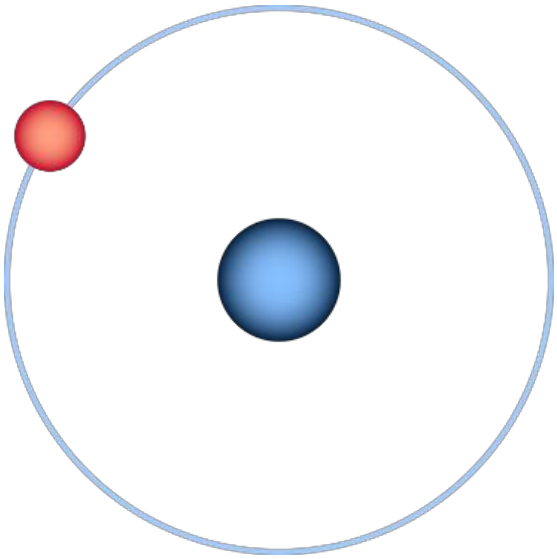
The world is made of tiny little things called atoms. Everything is made of atoms. There are at least 100 different sorts, but they have a lot in common.

All atoms have some lumpy bits in the middle [the middle is called the nucleus] and have some really tiny bits whizzing around the nucleus [these are called electrons]. An atom, with a nucleus in the middle and electrons whizzing around it, is a bit like the Sun with the planets whizzing around it.

An ‘element’ is a collection of atoms which are all the same. A hydrogen atom is different from a gold atom, which is different from a mercury atom, and so it goes on.

The simplest atom in the world is hydrogen. It has only one lump in the middle [the nucleus] and one little bit [electron] whizzing around.

Hydrogen

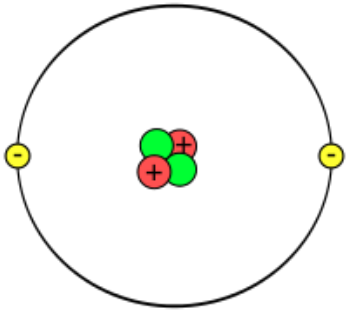


[Pixabay License Free for commercial use No attribution required
https://pixabay.com/vectors/hydrogen-atom-electron-2750576/]

Q: Why don’t scientists trust atoms?
A: Because they make up everything.

Next comes helium. The helium atom has a bigger nucleus and two electrons going around outside.

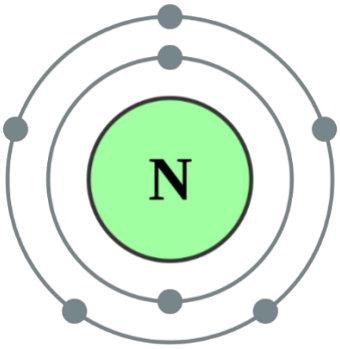
Helium



[Svdmolen/Jeanot (converted by King of Hearts)
https://commons.wikimedia.org/wiki/File:Atom.svg]

Now, the air is mostly made up of the element called nitrogen. The nitrogen atom has lots of stuff in the middle and going around the outside. It is much heavier than hydrogen or helium.

Nitrogen



[Author: Pumbaa (original work by Greg Robson). Many thanks
https://commons.wikimedia.org/wiki/File:Electron_shell_007_Nitrogen_-_no_label.svg]

More floating

[We spoke about floating in Chapter 26.]
So, hydrogen and helium are both lighter than nitrogen – and so they are going to float up in the air. We know that party balloons filled with helium float up in the air.

Now, about 100 years ago, there were ‘airships’. Some airships were called ‘zeppelins’ and some others were called ‘blimps’. They were

big things that could carry lots of people over oceans. They were huge bags [balloons] filled with helium or hydrogen, which made them float up in the air.

You can see under the front of this one, a place where people could have seats and look out through the windows.

A problem was that hydrogen can explode and the airships full of hydrogen could easily explode and burn. This is a picture of an accident which happened in America – some passengers were killed.

Because of accidents, people stopped using these airships. They are not made anymore.

We don't know whether this man is full of hydrogen or helium. What do you think? But, watch out, he might explode.

That footprint

In Chapter 24 we saw the first footprint on the Moon. It was made by Neil Armstrong in 1969. This chapter was written in 2019 – so that footprint was put there 50 years ago.

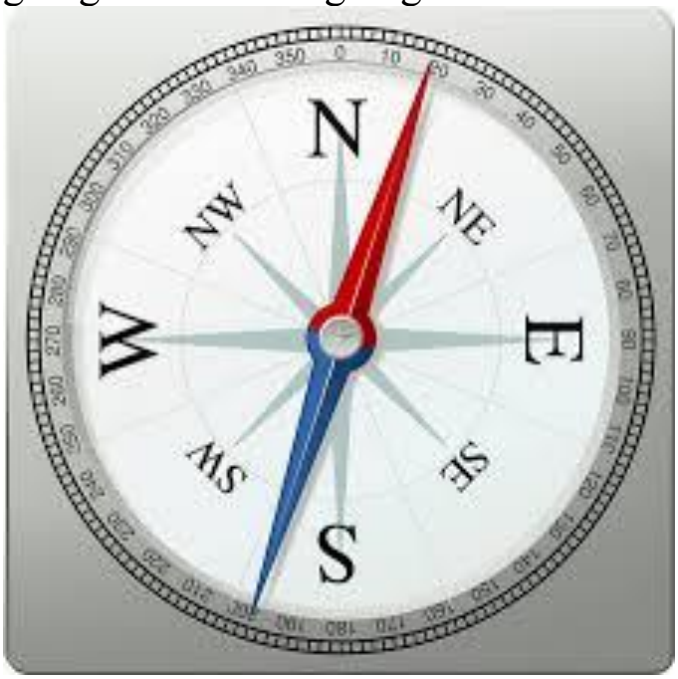
Would it still be there?
The answer is, yes! There is no air on the Moon, so there is no wind. There is no water on the Moon, so there is no rain. So, there is nothing to brush it away.

It is amazing – there is a footprint in powdery stuff, on the Moon, whizzing through space, and it just stays there, year after year.

Here is Neil Armstrong, arriving, just about to make that footprint.

A compass

A compass is a thing to help you keep going in the right direction. It tells you where north is. Then you know where south is [because, south is in the opposite direction to north]. Then, right is east and going to the left is going to the west. OK, pretty simple.



[This bit is a bit hard – in Chapter 17 we learnt that the Earth has a magnetic field. The needle of the compass is a little ‘bar magnet’ which can move. This bar magnet needle lines up with the magnetic field of the Earth – so it always points in the direction of north.]

Now if you were in Tasmania – what direction would you go if you wanted to get to New Zealand?

The maps in books are always arranged so that north is at the top.

Show your parents
Chapter 27.

[Public domain maps of Australia and New Zealand.
https://ian.macky.net/pat/map/aunz/aunz.html]

This map shows that from Tasmania you would go to the right to get to New Zealand – and on the right of that compass there is an ‘E’. So, we would go to the east to get to New Zealand.

OK, if you were in Tasmania and you went north – which state of Australia would you come to first? Just go straight up – and you would come to Victoria.

OK, now this is a bit tricky. Can you see the state New South Wales? It is north of Victoria. Anyway, if you were in New South Wales, which direction would you go to get to the state of South Australia?

Well, South Australia is the purple state on the left of New South Wales. That means you would go west.

[You would go west to get to a place called ‘South’ – that sounds a bit crazy – but, it makes sense when you think about it.]

Knock, knock.
Who’s there?
Stopwatch!
Stopwatch who?
Stopwatch you’re doing and open this door!

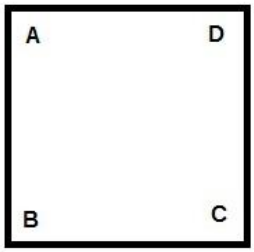
Q: What did the zero say to the eight?
A: Nice belt!

Q: What do you call a smart group of trees?
A: A brainforest.

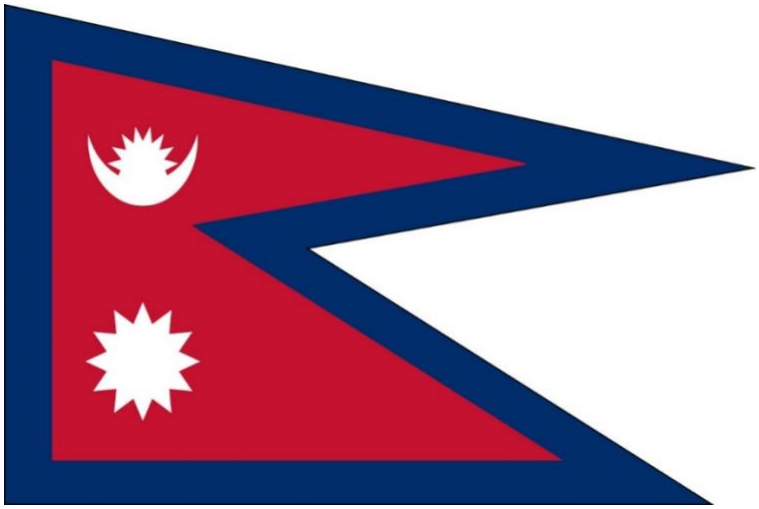
Knock, knock.
Who’s there?
Spell.
Spell who?
Okay, okay: W. H. O.

[Darius Krause
https://www.pexels.com/photo/brown-cat-in-selective-focus-photography-2305947/]

Flags



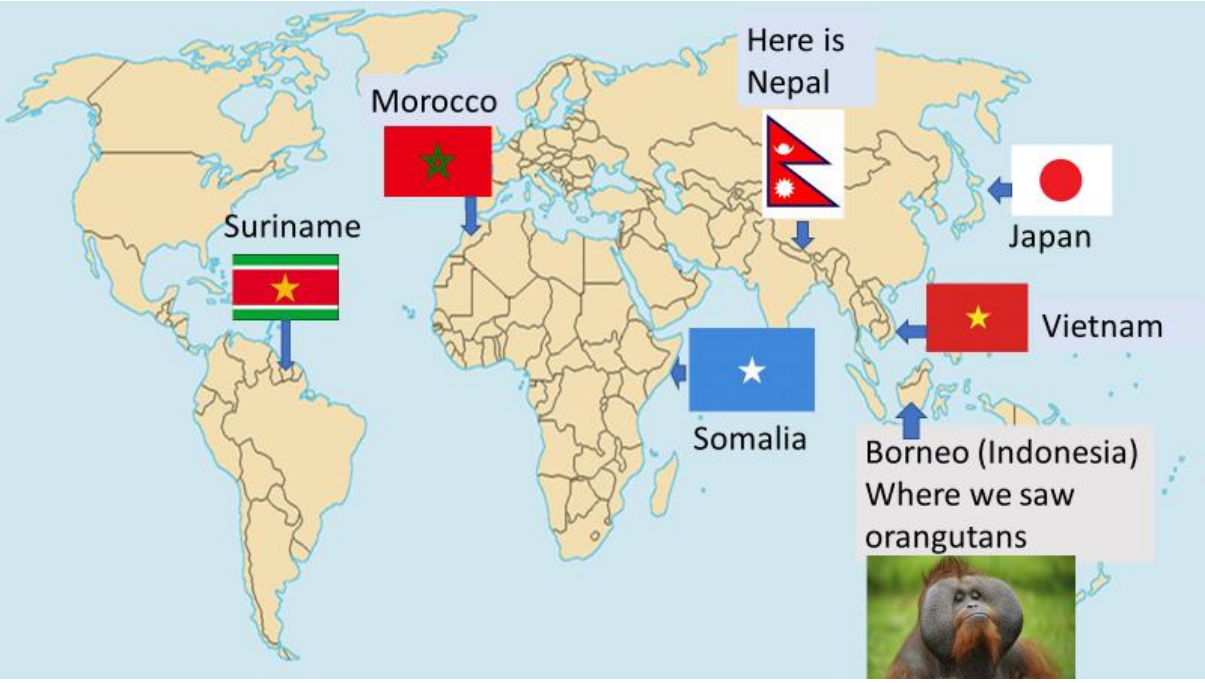
These corners are called ‘square’. All the flags in the world – hundreds of them – all have ‘square’ corners. Except…



The flag of Nepal.
It is spiky – the spikes look like the mountains of Nepal.

They have some pretty spiky mountains in Nepal.
[We could call their flag the Nepalese flag.]
OK, so, where is Nepal [with all its mountains]?

Show your parents
Chapter 28.



What if you wanted to go there? Which direction would you go in? That would depend on where you are now, of course. If you are in Morocco, you would go east, if you are in Japan you would go west.

Let's pretend you are in Tasmania, the island below mainland Australia.

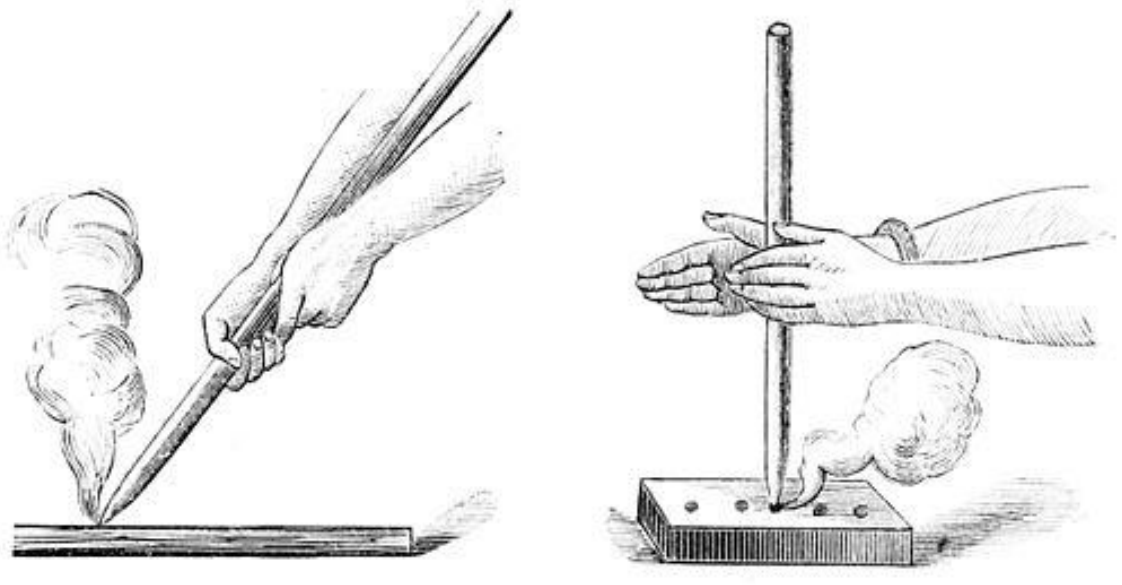
You would have to go ‘up’ which is called north, and over to the ‘left’ which is west. So, halfway between these is called north west – that’s the way for you. You can see NW on the compass.

Getting fired-up

If you rub two pieces of wood together for a long time, they will get hot, where they are touching.

Your arm will get tired – because you will use up a lot of energy.

Some of the energy used up in your arms will be placed where the wood is touching – some of the energy from your arms will make the place where the wood is touching very hot.



[Wikimedia Commons, the free media repository
https://commons.wikimedia.org/wiki/File%3APSM_V10_D029_Ancient_fire_making_methods.jpg]

Where the wood is touching it can get so hot that a fire starts. If you put some dry grass around the touching point you will get flames and a proper fire that you can keep going by putting on some sticks.

This is how people made fire before we had matches and lighters and things like that.

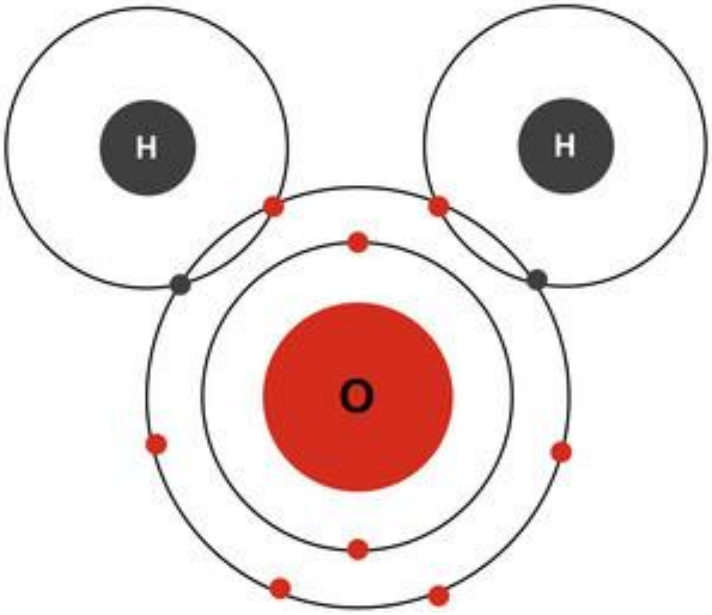
You could boil an egg with that fire – it would go hard, and you could eat it!

So, the energy from your arms heated the wood and caused a fire and energy from the fire heated the water and the energy from the water changed the egg so that you could eat it. Food is a form of energy, and gives you energy so you can do stuff, like lighting fires – oh, no, here we go again!!

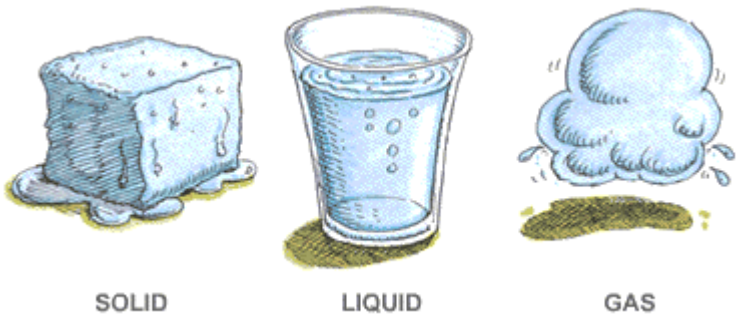
Knock, knock.
Who's there?
A titch!
A titch who?
Bless you!

Water

In Chapter 25 we said that water looked like Mickey Mouse. Chemists call water H_2O – you can see why. Two hydrogen [H] atoms join up with one oxygen [O] atom. They join up by sharing some of those electrons which are spinning around. When atoms are joined up in this way, it is called a molecule. So, this is a molecule of water.



OK, we know if we put water in the freezer, it will become ice, hard stuff, not runny like (liquid) water – but it is still the same stuff, still H_2O. We know water can also be gas.



[American Water Works Association, 2002
https://www.pvwc.com/story_of_water/html/3forms.htm]

You have seen water in gas form when the kettle is boiling and some steam comes out – that steam is very hot – so, don't put your hand near it. You have also seen water in gas form when you have looked at clouds in the sky – you know that rain [liquid water] comes from the clouds. [The clouds are not hot like steam, but that is a long story.]

The molecules of H_2O in ice don't move around much – they form clumps of six molecules and stay in one place.

In liquid [runny] water the oxygen atoms link together and the water molecules are in long chains.

This is as you would expect. Ice is hard and keeps its shape, so, you would expect the molecules to be pretty well stuck together.

Liquid water flows sideways, but it stays in a container – the water in your glass does not drift off into the air!

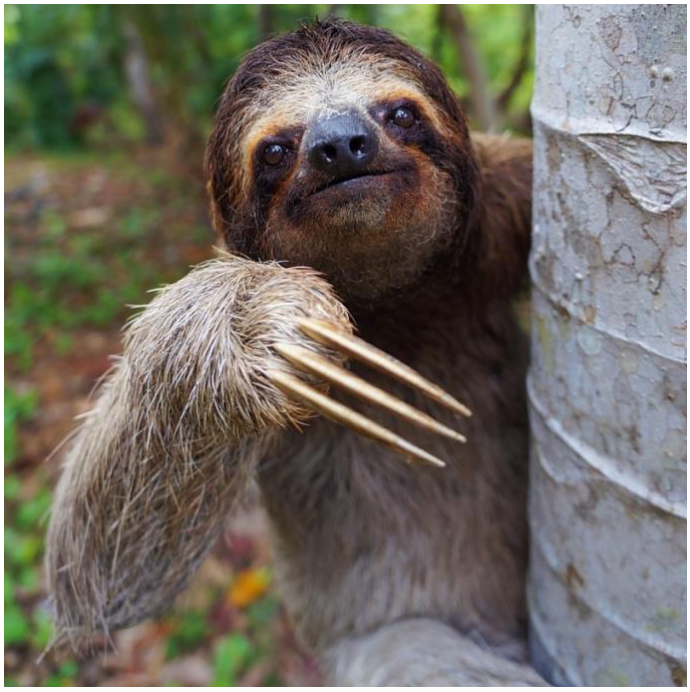
The molecules in steam have a lot of energy [because they are hot] – they are not joined together, but move around separately. Therefore, they can leave an open container and drift off around the room.

Knock, knock.
Who's there?
Ice cream!
Ice cream who?
Ice cream if you don't let me in!

Orangutans are apes [primates] which now live mainly in Malaysia and on the island of Borneo [part of Indonesia]. Not many of them are still alive and they need to be protected.

Q: Where do cows go for entertainment?
A: The mooooo-vies!

Knock, knock.
Who's there?
Wooden shoe.
Wooden shoe who?
Wooden shoe like to hear another joke?



This is a sloth – they live in Central and South America. They look a bit like primates – but they are not, and are closely related to anteaters.

They are very slow moving [the name sloth comes from the word slow] and interesting animals. They only go to the toilet about once a week!

Q: Why couldn't the pony sing?
A: Because she was a little hoarse.

Show your parents
Chapter 28.

Moscow

Some people use the word ‘plasticine’, others call it ‘modelling clay’, it comes in different colours and you make things out of it. If you pick up a piece to make a model of Mummy, it might be hard to use straight away. It might break if you try to bend it too far!

So, you hold it in your hand, close your fingers around it. You squeeze it hard with your fingers, you give it a few hard pokes with the fingers and the thumb of your other hand. What happens? It gets softer, and you can make a model of a dinosaur.

When you made it warm, you gave it ‘energy’. And, when you poked it, you gave it ‘energy’. It was that new energy that you gave it that made it softer – made it so that you could change its shape, bend it and make it very thin without it breaking.

In Chapter 28 we talked about ice – you can’t bend it – the molecules of water [H_2O] stay in one place – but, when you give it heat [energy] the parts [molecules] form strings, they move around and you have liquid water. Then, if you give it even more energy – boil it in a kettle, the molecules move around completely separately and will even go up into the air as gas [steam].

Heating up air

Of course, when you heat up air, the atoms [oxygen, nitrogen] have more energy and buzz around faster than normal. They push each other out of the way and there is not enough room for those with more energy. If there is not enough room for all of these atoms there will be fewer of them in a balloon, for example. If there are fewer atoms in a balloon than the air outside, the balloon will be lighter so it will float [rise up in the air].

[Igor Ovsyannykov of Fancycrave: Many thanks
https://fancycrave.com/free-hot-air-balloon-photos/]

This magnificent photograph [made available by Igor Ovsyannykov] shows something we will never forget – people are heating the air in their hot air balloon. The atoms will get lots of energy and buzz around, soon there will not be as many left inside as outside, so the balloon will be lighter than the air outside – and it should float away. Let's see if it works.

Show your parents
Chapter 29.

[Andrea Enríquez Cousiño @andreoiide. Many thanks
https://unsplash.com/photos/C1HhAQrbykQ]

Yep! It works just fine. If you look in the red band you can see bright yellow flames – they are heating up the air as they are going along.

[Pedro Lastra. Many thanks
https://fancycrave.com/download-by-pedro-lastra/]

What a magnificent picture [from Pedro Lastra] – the heater doesn't have to be on all the time while balloons are flying.

Show your parents
Chapter 29.

A reminder

We talked about ‘Lawn Chair Larry’ in Chapter 26, and about zeppelins and other airships in Chapter 27 – these are NOT hot air balloons. These balloons and airships were filled with helium or hydrogen – which is lighter than air – and that is why they floated.

The hot air balloon has less air inside because it has been heated and buzzes around and some gets pushed out – that is why it is lighter. Yes, we knew, you knew that.

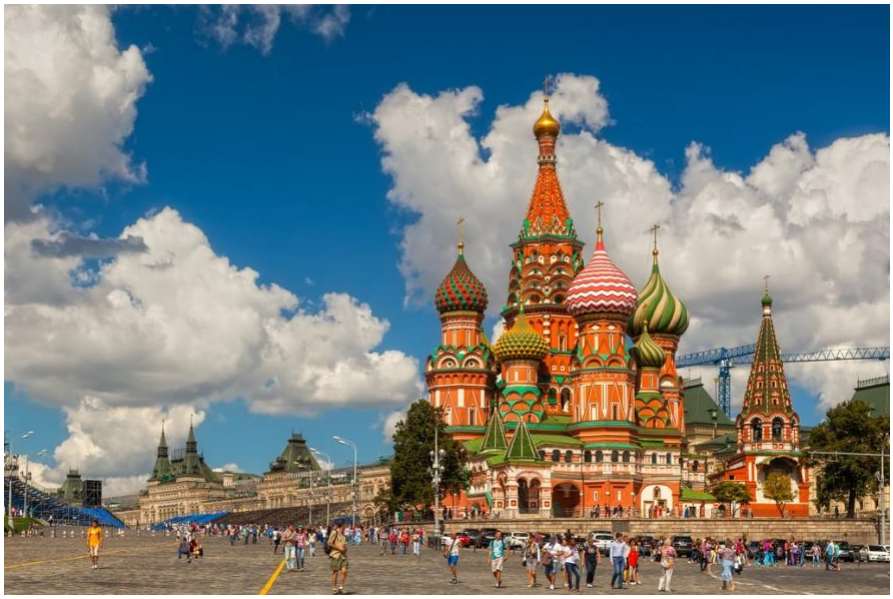
Moscow

Russia is the largest country in the world. Say you were in Nepal, one of the smallest countries in the world – which direction would you take to get to Russia?

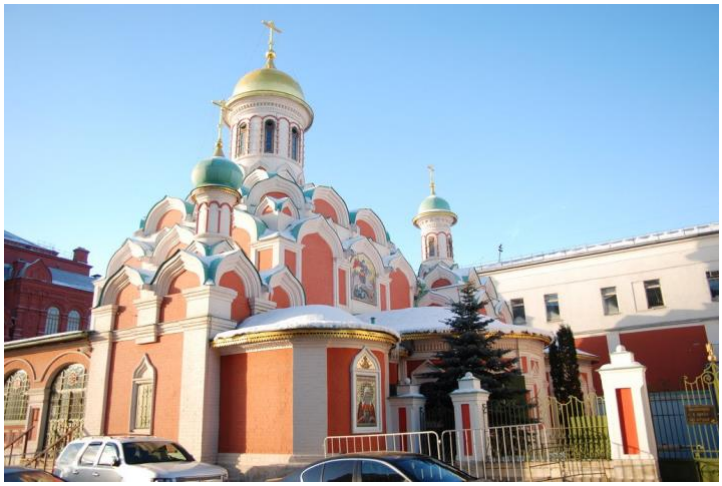
You might be able to work it out using this map.

Moscow is the capital of Russia. It has some beautiful buildings.

Show your parents
Chapter 29.



Saint Basil’s Cathedral



Kazan Cathedral

The Cathedral of Christ the Saviour

The strange thing is that the above 3 buildings are churches – but, Russia is not a very religious place. Mummy can explain.

Knock, knock.
Who's there?
Moustache.
Moustache who?
I moustache you a question, but I'll shave it for later.

Nice shoes! Yours?

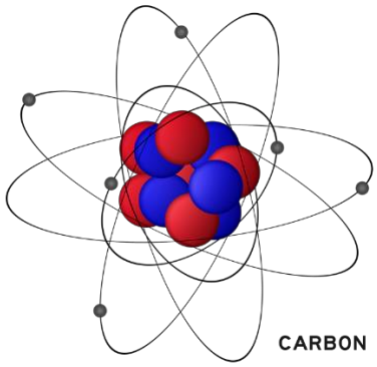
Q: What English word has three consecutive double letters?
A: Bookkeeper [not a joke]

Some carbon

Look, we can't ignore carbon forever.

We already know about gold and helium and oxygen – these are elements. That means they are the same all the way through and each is made up of their own special atoms.

An atom of gold is different to an atom of helium or an atom of oxygen. Carbon is also an element and has its own sort of atom.



[Pixabay "Free download". Many thanks
https://pixabay.com/illustrations/carbon-hydrogen-atom-molecule-2222968/]

Here is a carbon atom. It has 6 electrons going around the outside and its mass number is 12. [It is smaller than oxygen which has 8 electrons and a mass number of 16]

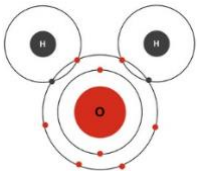
Carbon is an amazing element.

What does carbon look like when you have a big hunk of nothing but carbon atoms? One of the amazing things about carbon is that it can take one of two forms. A big hunk of carbon can be a diamond,

or it can be coal [dirty black stuff we burn in fires].

Carbon dioxide

In Chapter 25 we talked about water, which is one oxygen atom attached to two hydrogen atoms. [This joining of atoms makes a molecule.] We said H_2O looks like Mickey Mouse.



Now, we have to think about carbon holding onto 2 oxygen atoms. This molecule is called 'carbon dioxide' [di means two] – CO_2.

[YWD. https://ya-webdesign.com/explore/co2-drawing-carbon-dioxide/]

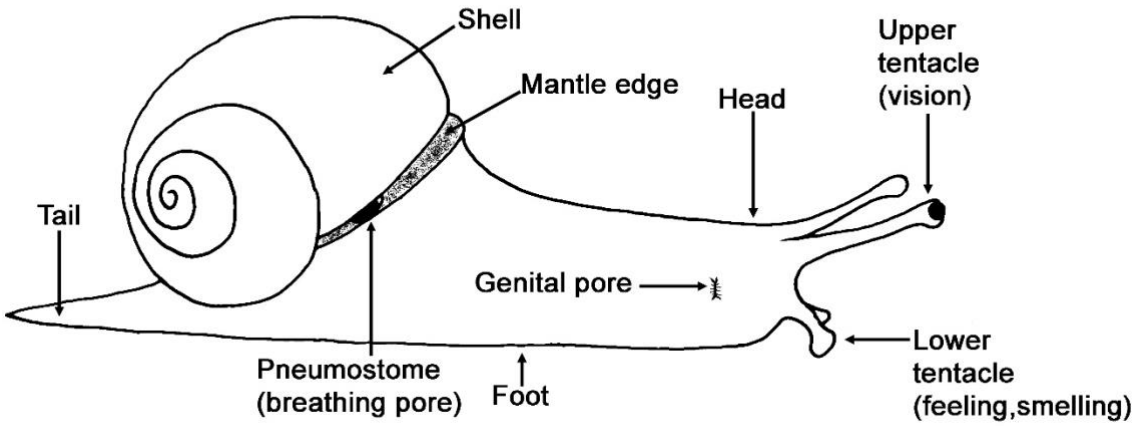
This is another way of showing a molecule of CO_2.

OK, it's a good idea to keep breathing. Why?
Because we need to get oxygen into our bodies to stay alive!
That's a pretty good reason.

There is one other reason for breathing – because when we breathe out, we get rid of [breathe out] carbon dioxide. We make carbon dioxide in our bodies and too much carbon dioxide can kill us – the same as not enough oxygen.

Show your parents
Chapter 30.

Snailing



Here's something more interesting – snails are able to see using the two big tentacles which come out of the top of their head – we think of these as being like eyes. Snails are able to smell using the shorter tentacles which come out of the front of their heads – we think of these as being like noses.

On the side, just under the edge of their shell [exoskeleton] they have a 'Pneumostome'. 'Pneu' is an old Greek word for wind or air – and 'stome' means opening or mouth – so that black mark under the edge of the shell is a breathing opening or mouth.

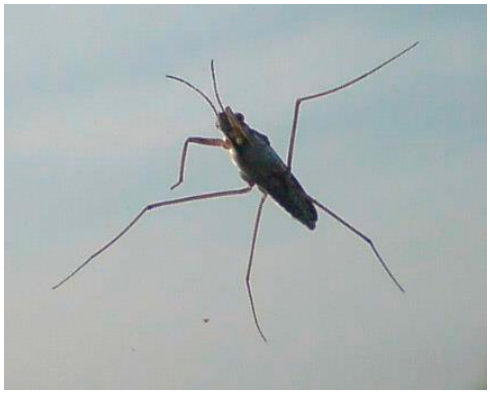
So, snails see and smell with parts of their head – but they take air in on their side.

Interesting that they have only one foot, but it works like a conveyor belt.

Knock, knock.
Who's there?
Funnel.
Funnel who?
The Funnel start once you let me in!

Show your parents
Chapter 30.

The Water Strider



[Author: Apple 2000
https://commons.wikimedia.org/wiki/File:Water_strider_Gerridae.jpg]

The ‘water strider’ is an insect which can run across the water in ponds and slow streams without drowning. It is very light so that helps, but the most important feature is the underside of its body is covered with hairs which repel water.

Q: When will the little snake arrive?
A: I don’t know, but he won't be long.

Q: Why should you not let a bear operate the remote?
A: He will keep pressing the paws button.

Q: Why did the man get fired from his job at the coin factory?
A: He stopped making cents.

Q: Why was the road nervous?
A: It was about to get graded.

Q: Why did the dinosaur refuse to wear deodorant?
A: He didn’t want to be ex-stink.

Q: Why was the weightlifter upset?
A: She worked with dumbbells.

Q: Why did the pony get sent to his room?
A: He wouldn’t stop horsing around.

More carbon

The reasons you can read this sentence are that, 1) you can read, and 2) we can see through air. So, what is air made of?

Well, we know it has a bit of hydrogen, and a bit of carbon dioxide [CO_2], and a lot of oxygen. So, because you can see that 'so', all that stuff must be colourless.

We breathe in so we get oxygen in [which we need]. We breathe out so we can get CO_2 out [too much of it can kill us].

Where does most of this carbon dioxide in your body [that you have to get rid of] come from?

Well, when we are cold we want to burn some wood in the fire – we want to get energy [heat] out of the wood, to warm us up.

Yes, but, that is not where the carbon dioxide comes from that we have to get rid of.

What happens is – we eat food and we use it up. We get energy out of our food for running around and dancing. But, in the same way that we burn wood for heat, when we use up food for energy, to do things, we make carbon dioxide. And, we have to get rid of it!

So – we breathe it out. Problem solved.

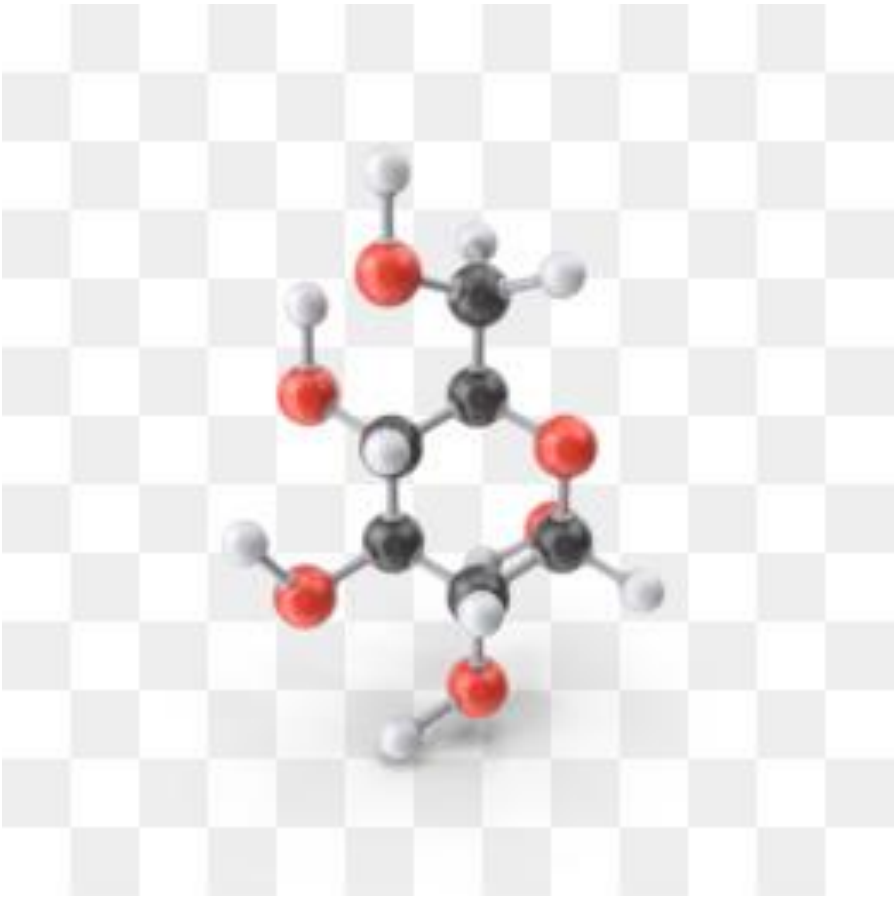
Soon, we will have a talk about how trees and plants help us get rid of carbon dioxide from the air.

Coal – pure carbon – is the remains of forests which covered the land millions of years ago. These were buried, and heat and pressure slowly changed these forests into coal.

Show your parents
Chapter 31.

Carbon atoms can make 4 links with other atoms. They often make rings of 6 carbon atoms – and that leaves other links they can use.

Table sugar, which you eat every day, is a combination of two very simple sugars – glucose and fructose. Here we have a look at glucose.



[CLEANPNG. Free Download. Many thanks.
https://www.cleanpng.com/png-molecule-molecular-model-molecule-3046167/]

In this a model of a glucose molecule – carbon atoms are shown as black balls. You can see there are 5 carbon atoms in a ring. There is also a red ball in the ring – the red balls in this model represent oxygen atoms.

There is also one black ball [carbon atom] sitting away from the ring.

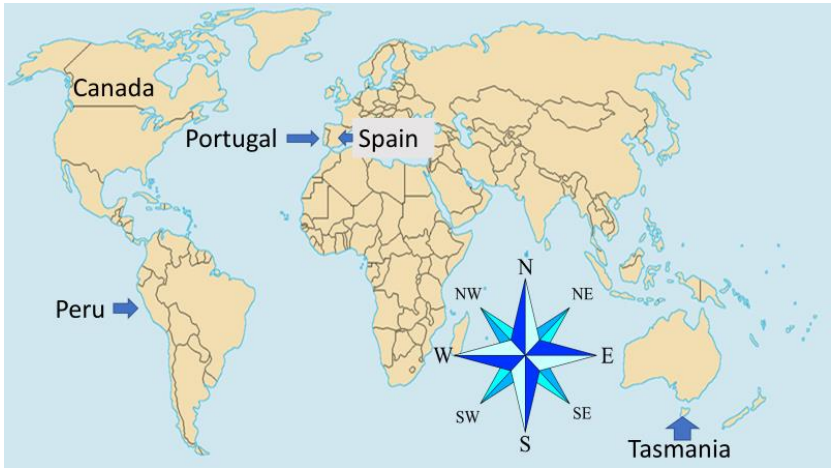
The white balls represent hydrogen atoms.

So, glucose [sugar] is made up of carbon, oxygen and hydrogen – you know all those atoms quite well. Good job!

Show your parents
Chapter 31.

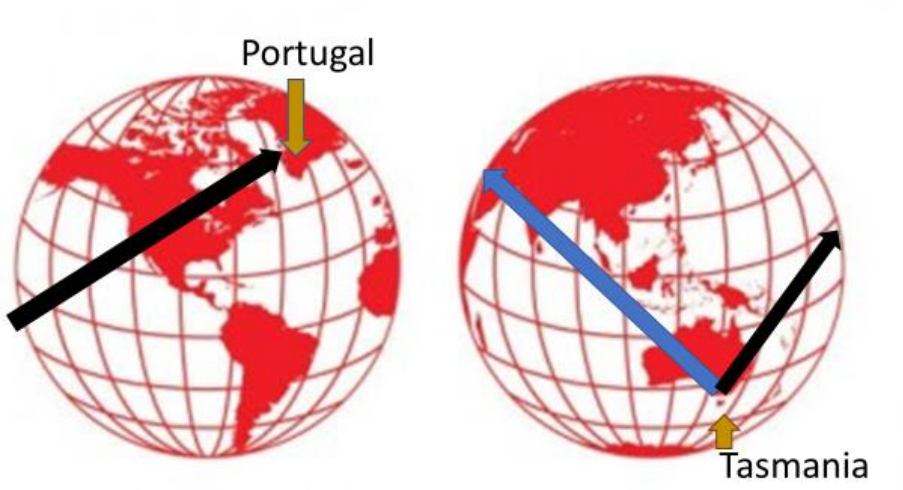
A question

We were in Tasmania and we had to go to a conference in Portugal [a tiny country next to Spain]. To get to Portugal from Tasmania you have to go north west [that's much the same direction as if you wanted to go to Nepal or England].



If you were tired of going north west – is there another direction you could take and still get there?

Well, another direction might be possible – but, it wouldn't be very easy.



[BLOG World Cliparts Free. Many thanks
https://clipartsworld.com/globe-clipart-vector.html]

Remember, the world is like a ball – with countries all around. So, if you were in Tasmania and you wanted to go to Portugal, but you didn't want to go north west – you could head off in the north east direction – that would take you across the Pacific Ocean, North America and then the Atlantic Ocean. So, it is possible.

Not a water strider

[https://www.abc.net.au/news/2016-08-31/anopheles-stephensi/7799798]

This looks a bit like a water strider [Chapter 30] – but it is not. It is a mosquito – a special type, which can carry a bad germ [tiny living organism] which can kill people.

The mosquito lives on the blood of people or animals. Part of its mouth is a thin tube – it puts this through the skin and sucks a little bit of blood out. We call this a 'bite' – it's not really a bite.

The problem is that a special type of mosquito might pass a nasty disease from one person to another.

Malaria is the disease mosquitos can spread. If a mosquito 'bites' [takes some blood from] a person who has malaria, and then 'bites' another person, some of the bad germs from the sick person may be passed on to the second person – who then becomes sick.

Malaria is found in hot [tropical] areas. There are ways to treat and prevent the disease.

Show your parents
Chapter 31.

We've met this guy before, somewhere!!

Knock, knock.
Who's there?
Says.
Says who?
Says me, that's who!

Q: What happened when the frog's car broke down on the side of the road?
A: It got toad away.

Q. What do you get when you cross a centipede with a parrot?
A. A walkie-talkie!

Q: Why did the baby elephant need a new suitcase for her vacation?
A: She only had a little trunk.

Knock, knock.
Who's there?
Dishes!
Dishes who?
Dishes the police, come out with your hands up.

Show your parents
Chapter 32.

Photosynthesis

We want to know a couple of things, 1) why are we breathing out carbon dioxide [CO_2], and 2) how might plants be able to help if there is too much CO_2 about?

We said that coal is pure carbon, and that coal can be burnt to make us warm. Of course, wood can also be burnt to make us warm. Coal and wood are also burnt in large factories to get energy to make things like steel and rubber.

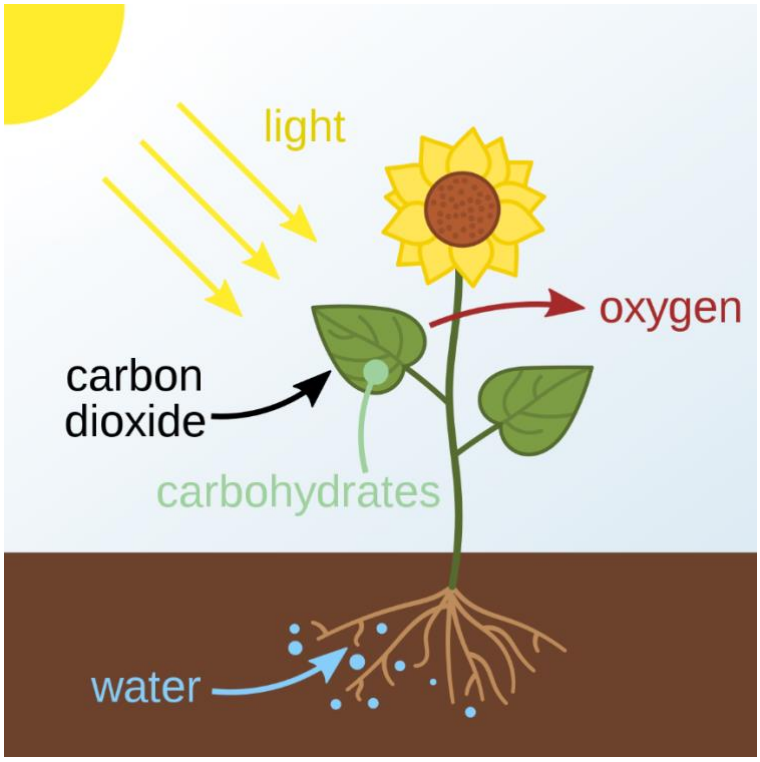
When things burn, oxygen combines with another molecule like carbon, and energy is given out. Therefore, when most things burn, we get energy given out [which is what we want] and CO_2 – which we didn't worry about many years ago, but now we do worry about, and don't want in the environment.

Now, we can answer that **first question** above. We breathe out CO_2 because to get energy we burn up the food we have eaten, like a fire. Carbon and oxygen combine in our bodies. We need to get rid of CO_2 [because too much will kill us]. We have to breathe it OUT. We don't get hot like a fire, but a similar chemical process takes place. Absolutely amazing!

The answer to that **second question** is just as amazing. Plants are able to grow and live because of **'photosynthesis'**. Photo means light – you can't take a photograph in your room at night with the light off. You need light to take a photograph because the light is a form of energy and without energy the graph [picture] cannot be made.

Plants are a bit like cameras – they need light [energy] to work properly. So, here is the wonderful process of photosynthesis.

Show your parents
Chapter 32.



[Wikimedia Commons, the free media repository. Many thanks.
https://commons.wikimedia.org/wiki/File:Photosynthesis_en.svg]

The leaves take in CO_2 from the air and with some water [don't forget to water the garden] and energy from the Sun [sunlight] they turn it into more leaves and stems – and grow!

Not only do plants get rid of some CO_2, but, after they have stripped off the carbon [to keep] – they release the oxygen – for us to breathe! Wonderful!

We make CO_2 which we don't want, and they release oxygen which we do want.

Photosynthesis in brief

Carbon dioxide + water + light → Glucose + oxygen

$CO_2 + H_2O + \text{light} \rightarrow C_6H_{12}O_6 + O_2$

Not only does photosynthesis manage the gas problem – but it also enables the plants to grow – which provides us with food.

Show your parents
Chapter 32.

Knock, knock.
Who's there
Tank.
Tank who?
You're welcome.

[Foto-Rabe. Thanks also to Igor.
https://fancycrave.com/two-green-mamba-snakes-hanging-on-a-branch/]

[Alessio Lin. Thanks also to Igor
https://fancycrave.com/butterfly-and-toad-friendship/]

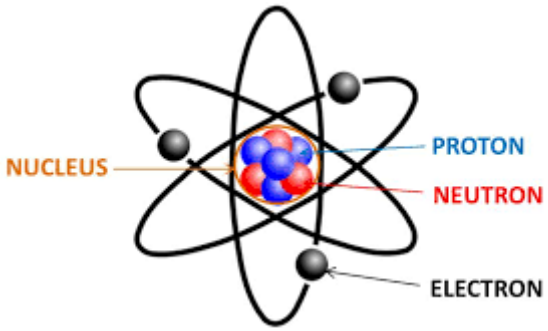
Show your parents
Chapter 33.

Pisa

We have said that if you take some gold and keep cutting it in half, you would get little bits which are all the same [call them atoms]. So, gold is an ‘element’ and all its atoms are exactly the same. We know carbon, oxygen and hydrogen are elements, and are all made up of slightly different atoms. Although the atoms of different elements are different – they all have similar features.

We said that every atom has stuff in the middle, and some little bits [electrons] whizzing around the outside.

Well, it is a bit more complicated than that



The bit in the middle is called the ‘nucleus’. And the nucleus has two different sorts of specks in it – some are called ‘neutrons’ and the others are called ‘protons’.

Two last things, 1) there is the same number of electrons buzzing around as there are protons in the nucleus, and 2) the mass of the atom is the number of neutrons added to the number of protons. OK, that’s enough.

If flies are called flies because they ‘fly’…
Adults should be called ‘walks’.
And kids should be called an ‘annoyances’.

Life cycle of the fly

We know that some insects have a ‘life cycle’ – such as beautiful butterflies coming from caterpillars which hang in bags called cocoons.

But what about the boring old house fly? Yes, they have a life cycle.

Flies lay eggs, a bit like birds… they lay eggs, but let’s not get off the track.

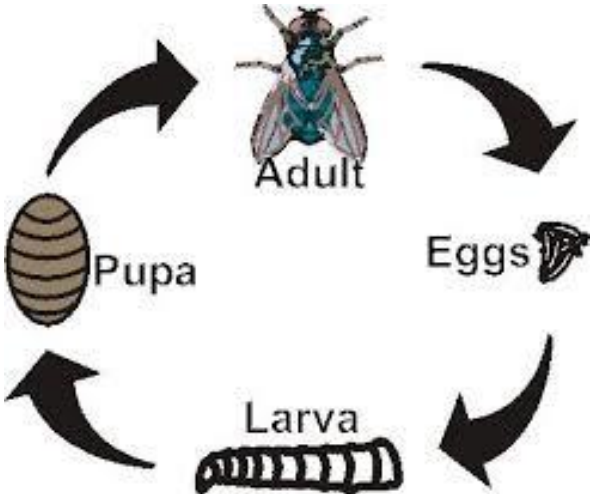
When the eggs open out comes ‘larvae’.

Now, in the butterfly life cycle, the ‘larva’ is the caterpillar, which is quite cute.

In the life cycle of the house fly, the ‘larva’ is thought to be pretty horrible. They don’t have pretty colours like most caterpillars – instead they are creamy-white. They are called maggots. They eat rotting meat. If you see a dead animal on the road and turn it over, you will see maggots eating the dead meat. People don’t like maggots – but they are good – they clean up the world.

The next stage is the pupa stage. With butterflies this is the cocoon hanging somewhere. With the house fly, the pupa stage is like a tiny

acorn, with bands around it – usually in a pretty smelly place like the remains of a dead animal or other rubbish.



[Wikimedia Commons, the free media repository. Many thanks https://commons.wikimedia.org/wiki/File:Musca_domestica_-_life_cycle.png]

Anyway, when the pupa stage is over, out comes the fly – ready to play a part in cleaning up roadkill and other bodies.

But, we mustn't praise house flies too much. While they clean up some messes, they do carry germs, and we must keep them well away from people, especially when we need to avoid infection with germs.

The most important experiment

Aristotle (384-322 BC) lived in Greece, and was a fabulously clever person – he knew about physics, zoology, philosophy… he knew everything that was known in his time.

He said, "Good habits formed during youth make all the difference".

But, he made one mistake. He thought that heavy things fall faster than light things.

Galileo (1564-1642) lived in Italy, and was also fabulously clever and knew about physics and astronomy.

Show your parents
Chapter 33.

Before Galileo, everyone believed the Earth was the centre of the universe and the Sun revolved around the Earth.
Galileo is perhaps most famous for teaching that the Sun is the centre of the system in which we live, and the Earth and other planets circulate around it.

However, we want to talk about something else. Galileo also said that Aristotle was wrong, and that all things [heavy and light] fall at the same speed.

Galileo was the first person to say experiments were the way to prove things.

It is said that Galileo took two weights, one heavy and one light, up to the top of the Tower of Pisa [Italy] and dropped them at the same time. It is said these two objects landed at the same time, proving he was right.

This is one of the most important findings ever made.

[The Tower of Pisa leans because the earth under one side sank down – somebody didn't do an experiment.]

[Interestingly, Galileo might not have actually done this experiment – perhaps he might have just talked about doing it.]

Q: What do you call a train carrying bubble gum?
A: A chew-chew train.

Knock, knock.
Who's there?
Butter.
Butter who?
Butter be quick, I have to go to the bathroom!

Q: Why was 6 afraid of 7?
A: Because 7, 8, 9.

This is a real animal which lives in deserts in Australia – it is called the thorny devil. They have similar ones in USA.

[https://www.genesispark.com/exhibits/reptiles/lizards/horned/].

Show your parents
Chapter 33.

Knock, knock.
Who's there?
Cargo.
Cargo who?
No, car go "beep beep"!

Knock, knock.
Who's there?
Police.
Police who?
Police stop telling these awful knock-knock jokes!

Toes and energy

Think about this – don't actually do it. Say you are standing up and you haven't put your shoes on, yet. You have a rock in your hands, about the size of an apple.

You are watching a bird outside the window. You go to put the rock down on the table, but it slips and falls on your left toes.

Why do you go jumping around the room on your right foot saying, "Ow, ow, ow! Ouch, ouch, ouch!"?

You go jumping around the room on your right foot saying "Ow, ow, ow! Ouch, ouch, ouch!" because your left toes are hurting!

[Remember, when you rub your hands together, they get a bit warm. You use up some energy in your arms and that becomes warmth or heat in your hands. Heat is a sort of energy.]

Anyway, when the rock falls, it puts too much energy into your toes – this 'too much energy' makes your toes hurt. So, you go hopping around on the other foot.

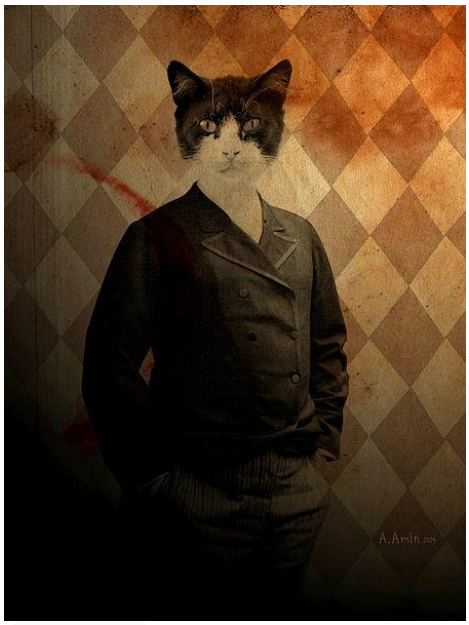
Why does this rock have energy?

It has energy because it is high and can fall. Things that can fall can do stuff.

If you held the rock and let it drop onto a hard wooden floor it would make a big bang – that noise is a sort of energy. If you knock on a door really hard [use a lot of energy] your knock will be really loud. So, if the rock will make a loud noise when it lands, that tells us that if you are holding it up in the air, it has energy.

Next week we will talk about water having energy when it is up high.

Show your parents
Chapter 34.



[Amanj amin. https://commons.wikimedia.org/wiki/File:200_%D9%86%D8%B3%D8%AE.jpg]

Before we go, we must say one more thing about hurting your toes by putting too much energy on them. Imagine, you need a bath. You turn the tap on and put the water in – but, you forget to check it. It is really hot. You put your toes in first, and you go jumping around the room on the other foot going, “Wa, wa, wa! Ooh, ooh, ooh!”

[http://clipart-library.com/bath-cliparts.html]

This is because, first of all, you are really good at making weird noises. Secondly, heat is a sort of energy. The really hot water put too much energy into your toes – and that hurts.
It is OK to draw faces on your toes – they don’t mind.

Show your parents
Chapter 34.

OK, here is a skeleton of a foot

and here is a skeleton of a hand.

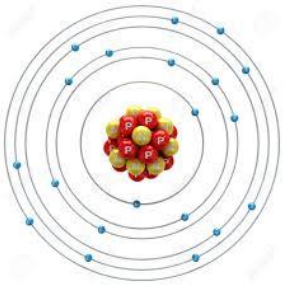
They look like each other, a fair bit. They don't look so much the same when they have all the skin and everything on them.

OK, how many elements do we know? Elements are made up of little things [atoms] – in an element, all the tiny atoms are exactly the same.

So, we know oxygen, that we breathe in from the air, and we need to live. We know helium and hydrogen, two very light gases, which are also in the air. We know gold – some people have rings made out of gold. We know mercury – that weird silver metal, which is runny, like water. Oh, we know carbon, which makes diamonds and coal.

Then, there is also calcium.

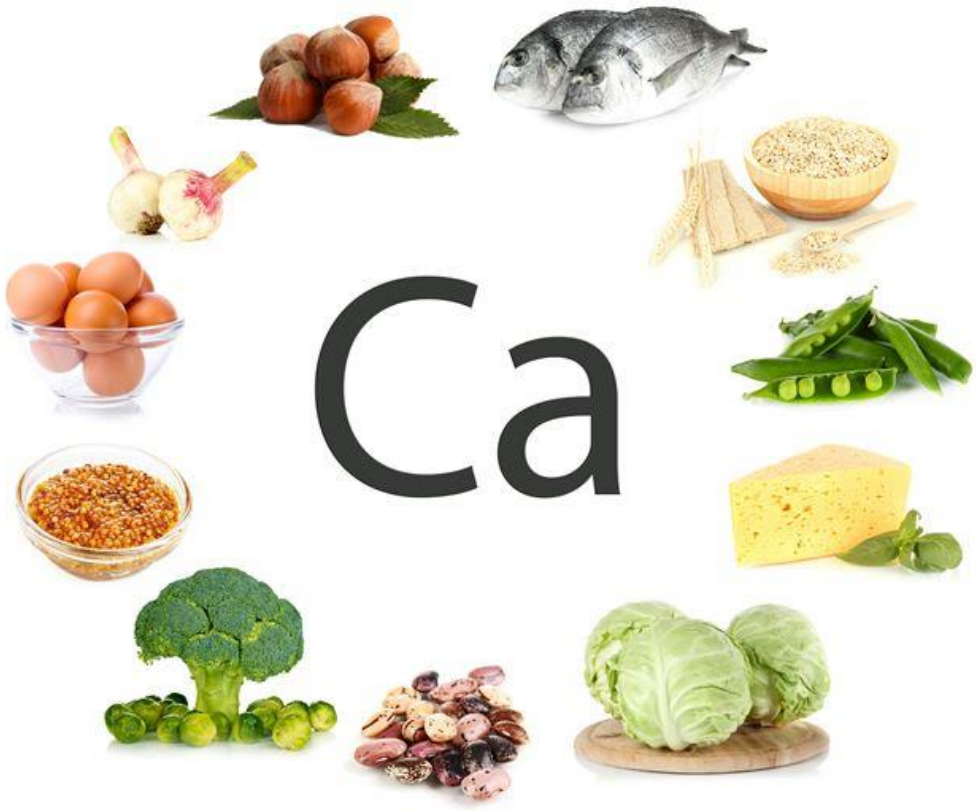
Show your parents
Chapter 34.



Compared to hydrogen, calcium has BIG atoms.

Now, the point is…

calcium is what gives our bones their strength – so, we need lots of calcium, so we have strong bones, and they won't break easily.



And this is where we get calcium – broccoli and peas and cheese and eggs and fish.

Show your parents
Chapter 34.

This week we are very grateful indeed to © Galapagos Conservation Trust / Marek Jackowski [and Verity Ramsay] for allowing us to use this amazing picture. This is a marine iguana – it is a lizard which swims and catches lots of its food in the sea. The marine iguana is the only lizard which goes into the sea. It only lives in one place in the world – the Galapagos Islands.

The Galapagos Islands are in the Pacific Ocean, near to the country of Ecuador. We will talk about the Galapagos Islands again in the future.

Q: Why did the math book look so sad?
A: Because it had so many problems!

Knock, knock.
Who's there?
Razor.
Razor who?
Razor hands, this is a stick up!

Q: What do you call cheese that isn't yours?
A: Nacho cheese!

Show your parents
Chapter 34.

Q: Why are elephants so wrinkled?
A: Because they take too long to iron!

What is this?
Hint – You might have to think about it!

My friend said to me: "What rhymes with orange"
I said: "No it doesn't"

Water and energy

We talked about when you dropped a rock on your toes, and it hurt because the rock gave your toes too much energy. And the rock had energy because it was up high, and it gave it out when it landed.

And we wondered if everything has energy to give out when it was up high. Put the tap on and put your hand underneath. Water is not spiky or hard, like rock, but you can feel it pressing down on your hand.

[Image credit: US Air Force, Carlin Leslie via Africom.mil. Public Domain]

What about the water high up in dams? Does that have energy?

[Dams in California – Public Policy Institute California
https://www.ppic.org/publication/dams-in-california/]

Show your parents
Chapter 35.

Wow! It looks like this falling water has lots of energy!!
Well, water falling out of dams is used to turn huge wheels like this – and that makes the energy used to make the lights and heaters and refrigerators in houses work properly.


[FFC. https://www.ffc-srl.com/en/ffc-services-hydroelectric-plants.html. Many thanks]

This is an interesting piece of history. Long before electricity was discovered, it was found that a river, as it slowly flows down from a high place to a low place, has energy and this can be used to turn a large wheel. This turning wheel was used to crush wheat and make it into flour [and this flour was made into bread]. This was called a flour-mill.

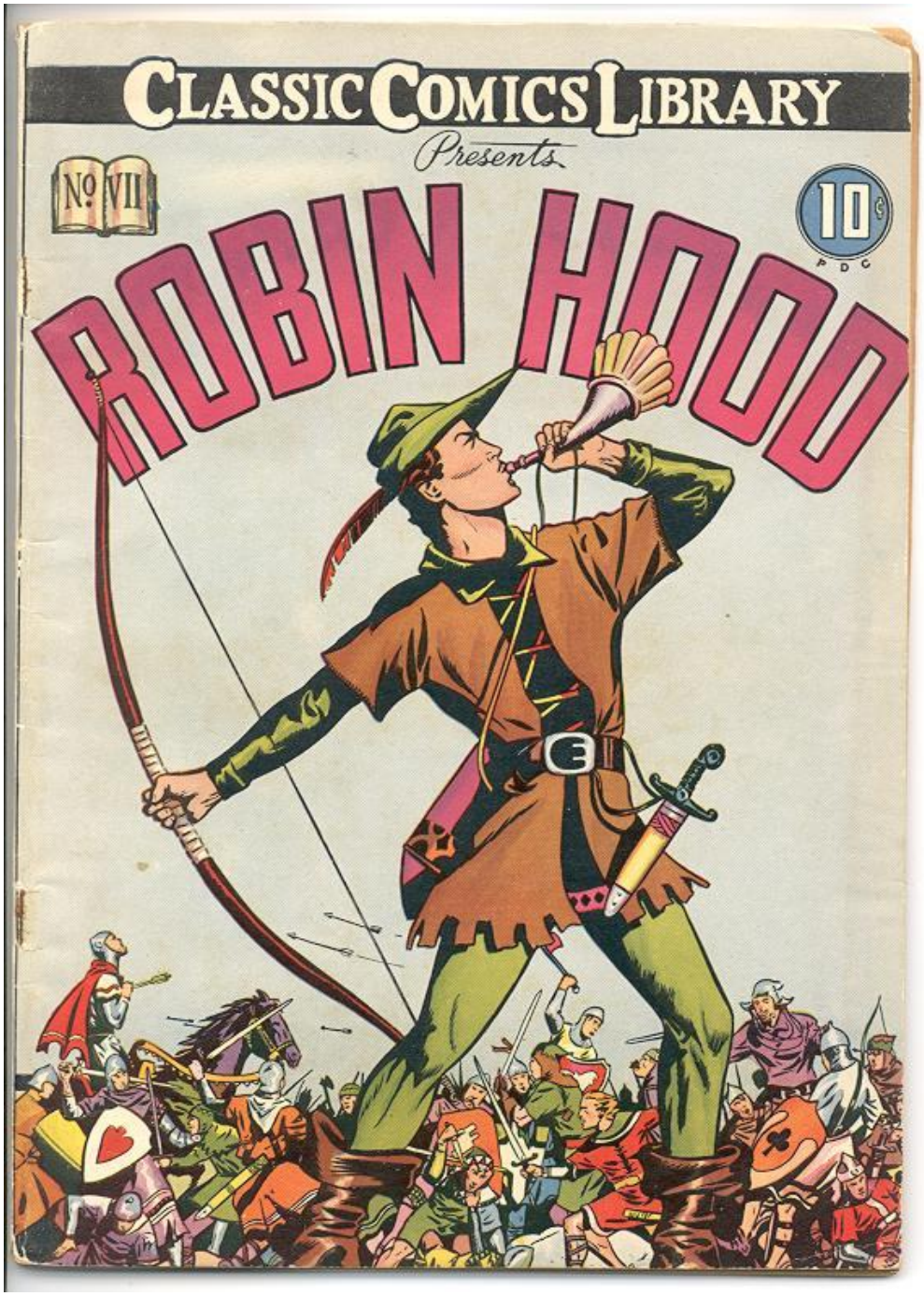
You can see the big wheel on the side of this mill. It can be pushed around by water.


[Pixabay License Free for commercial use No attribution required]

Show your parents
Chapter 35.

Who do you think of when you look at this picture?

Yes, me too…



[GNU Free Documentation License. https://commons.wikimedia.org/wiki/File:CC_No_07_Robin_Hood.jpg]

Knock, knock.
Who's there?
Robin.
Robin who?
Robin the rich to give to the poor!

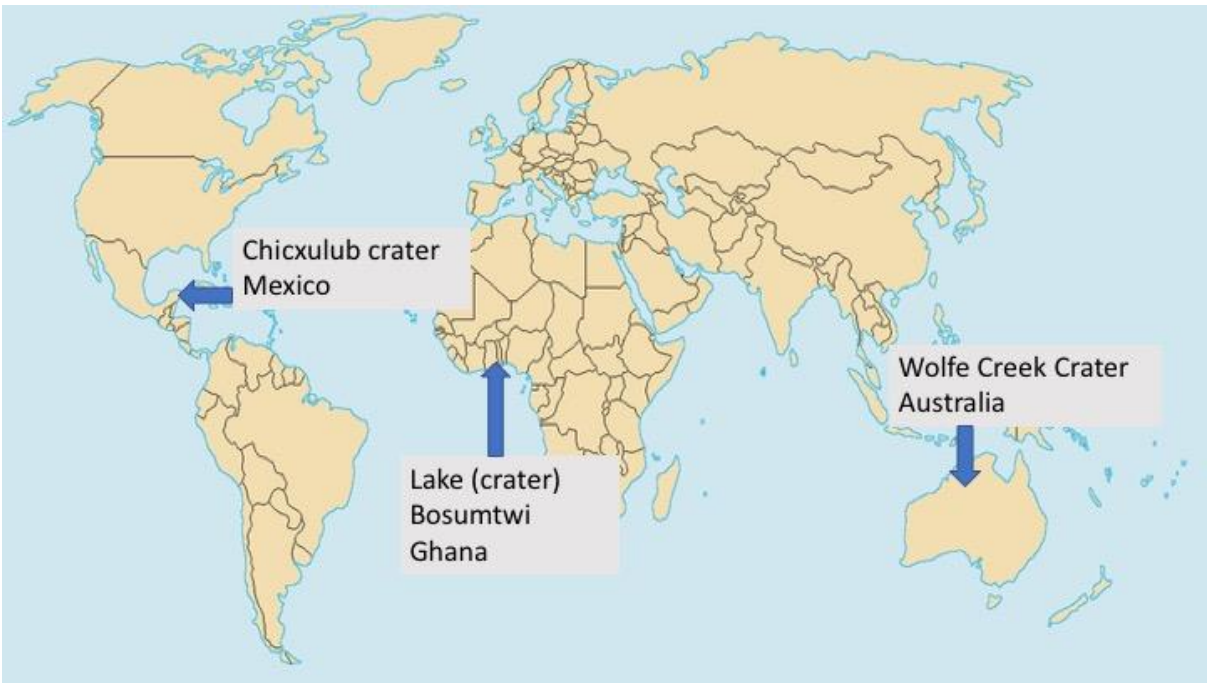
Show your parents
Chapter 36.

Craters

There are some big rocks whizzing around in space – they are called meteors. Sometimes [not often] they whack into planets [like Earth] and also into moons.

When that happens? They make a big hole – which is called a crater.

Let's talk about 3 different craters.



[This map was released into the public domain by its author, Vardion. Many thanks]

Wolfe Creek Crater

[Photo provided by de:Benutzer:Kookaburra. Many thanks.
https://commons.wikimedia.org/wiki/File:Wolfe_creek_crater.jpg]

In Western Australia, Wolfe Creek Crater [about 900 metres across and 60 metres deep] is a huge hole in the ground. The meteor landed a long, long time ago.

Lake (crater) Bosumtwi

[Wikimedia Commons // Public Domain
https://en.wikipedia.org/wiki/Lake_Bosumtwi]

Lake Bosumtwi in Ghana [Africa] – is a crater. It doesn't look like a crater because the meteor landed a very long time ago and it is in the middle of a rainforest, and the plants have covered things up. But, it is quite deep and you can see it is round.

Show your parents
Chapter 36.

Chicxulub crater

You can't see Chicxulub crater – it doesn't look like a big hole. This is because the meteor landed a very, very long time ago [nearly 70 million years], and it hit half on the land [Mexico] and half in the sea.

The meteor was bigger than we can imagine – about 5 kilometres across.

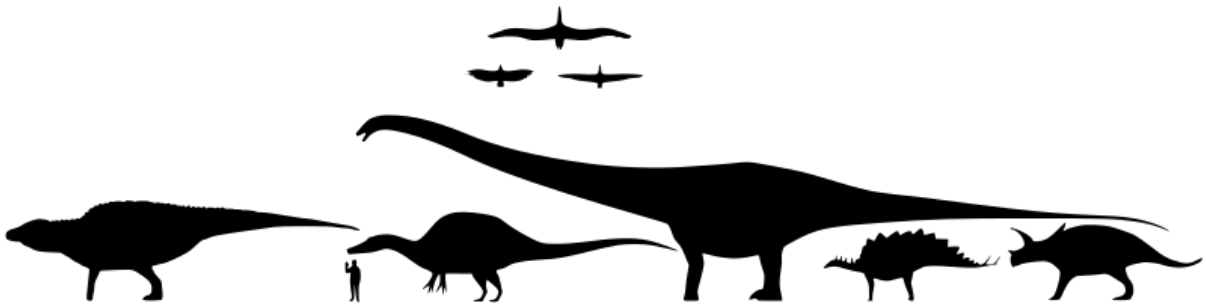
Importance – "impact winter"

We may not be able to see the crater – but the Chicxulub meteor was really important. When it landed it was so big that it threw up a huge amount of dirt, dust and ash into the air and space around Earth.

This blocked out the rays and energy from the Sun. So, the Earth was dark and freezing cold. So, suddenly, there was an 'ice age'. And, most of the animals on the earth died.

Did you every wonder why you haven't seen a dinosaur in the zoo? The answer is that Chicxulub meteor caused an ice age. The dinosaurs were freezing cold, there was no food and they all died 70 million years ago.

Q: What came after the dinosaur?
A: Its tail!



[From Wikimedia Commons, the free media repository
https://commons.wikimedia.org/wiki/File:Dinosaur_size.svg]

Show your parents
Chapter 36.

Knock, knock.
Who's there?
Candice
Candice who?
Candice door open, or am I stuck out here?

Knock, knock.
Who's there?
Voodoo.
Voodoo who?
Voodoo you think you are, asking all these questions?

[Free picture
http://clipart-library.com/clipart/qcBX5Xj4i.htm]

Animals, mainly

[https://www.cnn.com/travel/article/kenya-things-to-do/index.html]

If you go to Africa, you will see, in the daytime, huge herds of animals. The ones in this picture are wildebeest [also called ‘gnu’, which is a pretty cool name] – they are a type of antelope.

If you wander around in Australia, in the daytime, you may see a couple of kangaroos, but not many. Kangaroos are nocturnal, which means they come out at night. [Actually kangaroos like to come out just before nightfall and just before morning.]

Wombats, Tasmanian devils and possums are nocturnal – if you walk around in the bush in the daytime, you will hardly ever see one. [It is safer for them to come out at night, and their eyes work better at night.]

Show your parents
Chapter 37.

[Pexels. Mark Gleeson. Many thanks.
https://www.pexels.com/photo/wombat-at-waldheim-1173659/]

[A wombat who should be at home because it's daytime]

If you take a torch out in the Australian bush at night, and shine it up in the trees, you will certainly see possums then, they will be out eating and having parties. The point is, even though you don't see many, there are lots of animals around.

[Wikimedia Commons. Author: Vicki Nunn. Many thanks.
https://commons.wikimedia.org/wiki/File:Common_Brushtail_Possum_(public_domain).jpg]

This is an Australian possum. It is well behaved – it has only come out in the night.

Fossils

If you go to the museum you will see what look like bones of animals which haven't been walking around on Earth for hundreds of thousands of years – like dinosaurs.

These might be real bones – or, they are often fossils. Fossils are mainly stone. What happens is, when an animal dies and is covered by water and mud, gradually the atoms [tiny bits] of bones are replaced by tiny bits of stone.

Sometimes all the mud and earth turns into stone and what you find is the shape of where the bones used to be.

[The same thing happens for plants and sea creatures.]

[Wikimedia Commons. Author: James L. Amos. Many thanks.
https://commons.wikimedia.org/wiki/File:Archaeopteryx_fossil.jpg]

This is a fossil of an Archaeopteryx [we can't say that either] – anyway, it was a dinosaur bird. Many of these lived in Germany – about 150 million years ago.

This is one of those fossils where the mud and earth has turned to stone and you see where the bones used to be. If you look very closely you can see where the feathers used to be on the wings.

[ABSFreePic.com. Absolutely free pictures.
http://absfreepic.com/free-photos/download/dinosaur-fossils-in-museum-2592x3888_54383.html]

This is a fossil of a dinosaur – pretty scary. So, they really did walk around on Earth.

Show your parents
Chapter 37.


[https://pixabay.com/photos/fossil-plant-leaf-stone-rock-2166817/]

Plants can also be made into fossils.


[https://paultrani.com/wp-content/uploads/2016/04/lion-1170x830.png]

Q: What tastes better than it smells?
A: Your tongue!

Q: What room has no doors or windows?
A: A mushroom!

Q: What's orange and sounds like a parrot?
A: A carrot!

Q: Before Mt Everest was discovered, what was the highest mountain in the world?
A: Mt Everest!

Knock, knock.
Who's there?
Cook.
Cook who?
Yes you are!

Show your parents
Chapter 38.

Old rocks

The pyramids. There were more than 100 built in Egypt. Many were built more than 4000 years ago. [Stonehenge, Chapter 24, might be a bit older.]

Many of the pyramids are close to the capital of Egypt, which is called Cairo.

The pyramids were built as places to put the bodies of dead kings. It was thought the kings would travel from the pyramids to Heaven.

Like Stonehenge, huge stones had to be brought, often by river, from far away.

Easter Island is a small island in the Pacific Ocean [which you can't see on many maps].

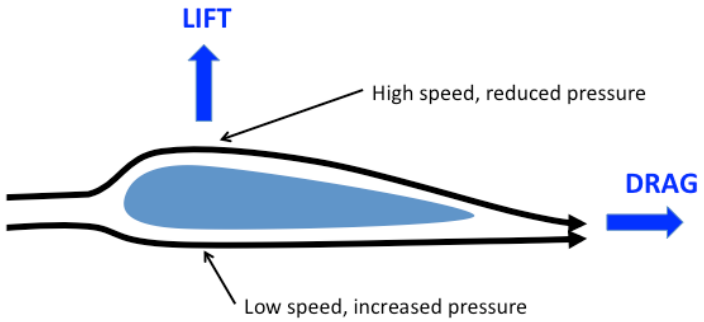
The most remarkable feature of Easter Island is more than 1000 huge statues. The indigenous people arrived on the island about 800 years ago, so these statues are not as old as Stonehenge or the Pyramids.

These statues were made to remind the indigenous people of their ancestors.

This is amazing

Why do planes have propellers or jets?
It is NOT to make them fly, but to go forward, fast!

So, what makes a plane go up in the air?



[Frank Jackson, SKYbray
https://www.skybrary.aero/index.php/File:Aerofoil2.png]

It is the shape of the wings which make a plane go up in the air!! Look at a wing from the side and you will see that it is pretty flat underneath – but the top goes up like a little hill.

So, when the propellers or the jets make the plane go along the runway, very fast, the air that goes over the top of the wing has further to go than the air that goes underneath. With further to go, the air going over the top has to go faster.

So, the air on the top of the wing does not press down as hard as the air going under the wing is pressing up. This is a bit hard to understand, but the shape of the wing means that the air underneath presses up more strongly than the air going over the top, and so the plane lifts off the ground, and flies!!

First to the poles

We know that the Earth has a big magnetic field around it, and a compass will show you which direction to go, if you feel like being very cold and uncomfortable.

When you look at a map of the world, the North Pole is at the top of the map, and the South Pole is at the bottom of the map.

Show your parents
Chapter 38.

The Earth is in the shape of a ball – so, the bit closest to the Sun [the middle of the ball] is hotter than the rest of the planet – and is called the tropics.

The top and the bottom [North Pole and South Pole] are further away from the Sun, and so are really cold and covered in ice and snow.

Who was the first to get to the North Pole? We don't know. Some people thought they got there, but made a mistake, and others pretended they got there, but told lies. Whoever got there first, it would have been a bit over 100 years ago.
But we do know who was the first to get to the South Pole. There was a big race. Two teams started out in 1911. One from England led by Captain Scott and one from Norway led by Roald Amundsen.

The team from Norway got there first.

[Author: Olav Bjaaland (1863-1961)
https://en.wikipedia.org/wiki/File:At_the_South_Pole,_December_1911.jpg]

This is a picture of the Norway team at the South Pole. Amundsen is standing on the left. You can see how terribly cold and difficult things must have been.

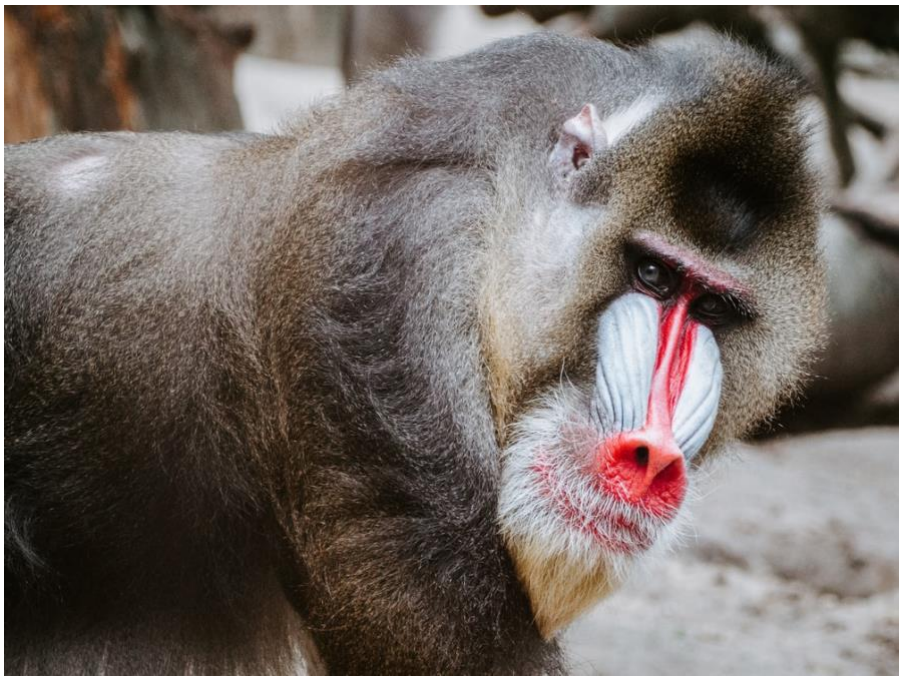
Sadly, Captain Scott and two of his men died on the journey back.

Q: Why was the belt arrested?
A: It was holding up some pants!

Q: What's E.T. short for?
A: Because he's only got little legs.

**Two men meet on opposite sides of a river. One shouts to the other "I need you to help me get to the other side!"
The other guy replies, "You're *on* the other side!"**

**Did you hear about the guy whose whole left side was cut off?
He's all right now.**



[Author: Max van den Oetelaar
https://unsplash.com/photos/IRrQ0Ypp1yk]

This is a primate – called a mandrill [it used to be thought that it was a sort of baboon, but now it has its own name].