

Does my  
GOLDFISH  
KNOW  
Who  
I AM?

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# DOES THE UNIVERSE HAVE AN EDGE?

ASKED BY Josh, age 10

**Professor Brian Cox**, *particle physicist*, says:

That's a great question. The answer is that we don't even know how big the Universe is! We can only see a small part of our Universe – the part that light has had the time to travel across to reach us during the 13.8 billion years since the Big Bang. Anything further away can't be seen, simply because the light from these distant places hasn't reached us yet.

The part we can see is pretty large, however. It contains around 350 billion large galaxies, each containing anything up to a trillion suns. This part, which is known as the observable Universe, is just over 90 billion light years across. But we are sure that the Universe extends far beyond this. It may even be infinitely big, which is impossible to imagine!

# WILL MONKEYS EVER TURN INTO MEN?

ASKED BY Evie, age 6

**Sir David Attenborough**, *naturalist*, says:

Monkeys are very good at living in trees. They have hands and feet with which they can clamber about and pick the leaves and fruit they eat. No other animals, including human beings, can do it better than they do. So there is no need for them to change.

But things could alter. The forests could slowly get smaller so that there is less room for monkeys. Or a particularly good food might appear on the grassy plains beyond the forest edge. Then some monkeys might find it worthwhile to leave the forest and live out on the plain. If they did, then over millions of years they would slowly change. They would no longer need to grip branches. Instead they'd run about on the ground.

So their feet would become flatter, their legs longer, and they would stand upright. That is what may have happened to some apes a very long time ago. As millions of years passed, their bodies

altered. They became more and more like us. They were our ancestors.

But as long as monkeys have plenty of food in the forests and the forests themselves are big enough to provide them with homes, they will remain monkeys.



## WHY DO I GET DIZZY WHEN I SPIN AROUND?

ASKED BY Jumaina, age 7

**Dr Ellie Cannon, GP and telly doctor, says:**

You may not know it but your balance and steadiness is actually controlled by your ears. They do the listening and they do the balance. Pretty clever really.

Right inside your ear, just next to your brain, there are three tiny tubes in an arch shape, full of liquid.

The tubes are lined with even tinier hairs that waft around in the liquid, a bit like plants under the sea. Those hairs are actually sending signals to your brain to say ‘We’re moving a lot today,’ or ‘We’re not moving very much.’

If you’re not moving, then the liquid is calm like a quiet pond and the hairs tell your brain that you’re steady on your feet or sitting still. When you start spinning, that fluid gets really churned up like a stormy sea, and the hairs move wildly and tell your brain that you’re spinning around. Trouble is,

even when you stop spinning, that liquid carries on sloshing around for a while.

It takes a while to stop the sloshing – so the hairs keep sending those messages to say you're moving. Your body has stopped, but your brain still thinks you're moving. The difference between what your brain thinks and what your body is doing makes you feel dizzy.

I used to love doing this when I was a kid, though I always ended up crashing into my mum's coffee table.



## HOW DO I KNOW MY LIFE ISN'T JUST A DREAM?

ASKED BY Esther, age 5

**Derren Brown**, *illusionist*, says:

Often we have dreams and they feel so real that we might wonder whether we're dreaming right now too. It feels like you're wide awake now, but doesn't it feel like you're wide awake in dreams too? How on Earth can you tell the difference? Maybe you'll wake up in a moment and realise you weren't reading this book – because it never existed!

Well, at least you know you're probably real. Because even if you were having a dream right now, there would have to be a you somewhere who was having that dream about yourself. But before your head starts spinning too fast, here's the important thought. We only ever really know about the stuff we see and hear and feel, and that's only a tiny part of what's around us. (For example, you can't see what's happening in the next room, or in someone else's head.) We can only guess at what's real from the little bit we know about – and often we get it very wrong.

So next time you have an argument or think someone's being stupid, remember: the other person is just as certain they're right, and really you only have half the story! So even though you're probably not dreaming, it's worth remembering that you're only aware of a small part of what's real, too.

## WHAT WAS THE FIRST MUSICAL INSTRUMENT?

ASKED BY Caitlin, age 9

**Tony Robinson**, *actor, writer and broadcaster*,  
*says:*

When you're asked a question, it's rude not to answer, isn't it? Well, maybe. But sometimes if it's a difficult question like this one, the sensible thing is just to ask another question back, like 'What's a musical instrument?' or 'How do archaeologists know when they've found one?'

When we clap our hands, are they musical instruments? If so, the oldest instrument ever found has got to be the hands from an ancient skeleton. And how about stones? If you whack one, it'll make a noise. If you whack a smaller one, it'll make a different noise. Put three together and you've got a xylophone. But you're not going to put them in a case and take them to your music lessons, are you? You'll just chuck them away when you've finished playing them. They're a kind of temporary musical instrument.

Maybe what we mean by a musical instrument is something specially made and kept just for making music, and there are certainly 45,000-year-old bits of hollow bone with holes in that look suspiciously like early flutes. But maybe they're not. Perhaps the holes were drilled for a completely different reason. Maybe they were tools or jewellery or children's toys.

The most we can say for certain is that by around 35,000 years ago people were bashing drums, knocking out tunes on their xylophones, and blowing flutes and pipes made from vultures' wing bones and mammoths' tusks. Life must have been extremely noisy back then.



## HOW CAN I BECOME A FOOTBALLER?

ASKED BY Azaan, age 7

**Lee Dixon**, *former Arsenal and England international, now TV football analyst, says:*

When I was a young boy of about seven or eight, growing up in Manchester, all I ever did was play football. I played at school. I played in the park. I played in the street. It was safe to do so back then as the streets were quieter and Mum could keep an eye on me. We even played in the house when it was raining with a balloon instead of a ball.

I wanted to be a footballer from my earliest memory. My dad was a professional for my favourite team, Manchester City, back in the 1950s. Also when I was young the best film that has ever been made was released: *Willy Wonka and the Chocolate Factory*. I watched it every time it was on and was fascinated by the Golden Tickets in the chocolate bars. So much so that I dreamed there was another golden ticket. This one didn't get you access to Willy's factory, however. This one got you a professional contract to play for Man City! How good is that?

It wasn't true, of course. There was no Golden Ticket. But nonetheless I used that dream to inspire me and I worked very, very hard at my football and eventually got a lucky break and signed a professional contract with Burnley FC in July 1983.

Throughout my career playing football, whenever I had a setback I thought about my dream. I knew if I worked hard and concentrated, there would be another chance. Another Golden Ticket. It has served me well.

## CAN ANYTHING SURVIVE IN A BLACK HOLE?

ASKED BY Anthony, age 8, and Lauren, age 10

**Marcus Chown**, *author of books about space and the Universe*, says:

If you were in a spacecraft, you might be able to survive inside a black hole. But only if it was a big black hole and only for a short time.

A black hole is a region of space where gravity is so strong nothing can escape, not even light, so it appears black. If you approach a small black hole, only a few times as massive as the Sun, its gravity will stretch you out like a long piece of spaghetti and rip you apart. Surprisingly, though, big black holes are gentler. If you approach a ‘supermassive’ black hole – and many galaxies like our Milky Way contain holes billions of times bigger than the Sun – you will be able to pass into the hole with no ill effect.

Inside, it is a very dangerous place because lots of rocks and stuff from around the hole are falling in with you. Everything is heading towards the ‘singularity’ – the centre of the black hole lurking like

a monstrous spider. Even if your spacecraft has the most powerful rocket engines imaginable, it cannot avoid being dragged there too.

A singularity crushes everything out of existence. But there is a small ray of hope. As black holes grow old, their singularities become less terrible. Some scientists think it might be possible to pass through them without being killed. The singularity may become a ‘gateway’ to another region of space and you could come out in an entirely new universe!

