Praise for
MEET MATILDA ROCKET BUILDER

"A beautiful book full of fun and fascinating facts which celebrates the joy of embarking on over-ambitious projects! A must read for all aspiring rocket scientists, engineers and those who dream big."

Dallas Campbell, TV presenter

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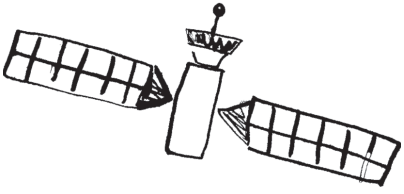
"The most useful book I have ever read about building a rocket to take me to the Moon; maybe this time I'll finally get there. This is a delightful adventure and inspiration to all of us who want to be astronauts."

Robin Ince, broadcaster and comedian

For Oliver, who is patiently
teaching me how to think – D.C.



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MATILDA MEETS THE UNIVERSE

WRITTEN BY DOM CONLON
ILLUSTRATED BY HEIDI CANNON

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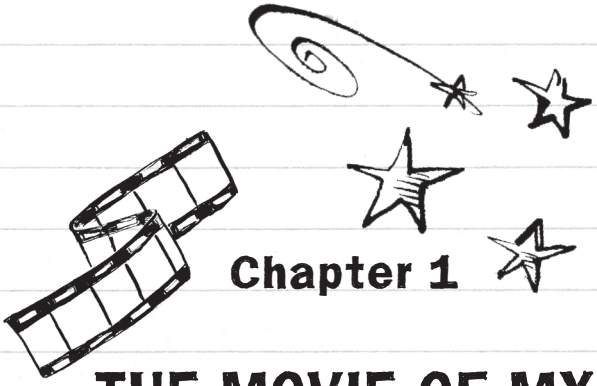
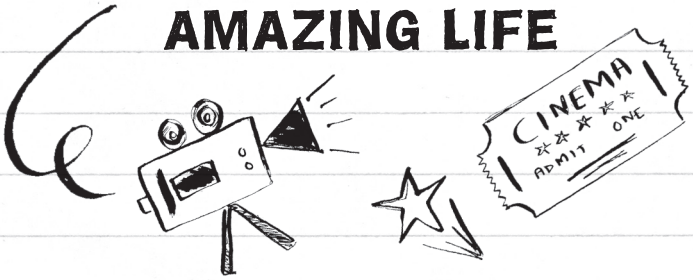


Chapter 1

THE MOVIE OF MY AMAZING LIFE



Hi. My name is Matilda Musk. I'm just me and that is enough (Mum would say it's **MORE** than enough). This is my journal and you'd better have asked my permission before reading it.

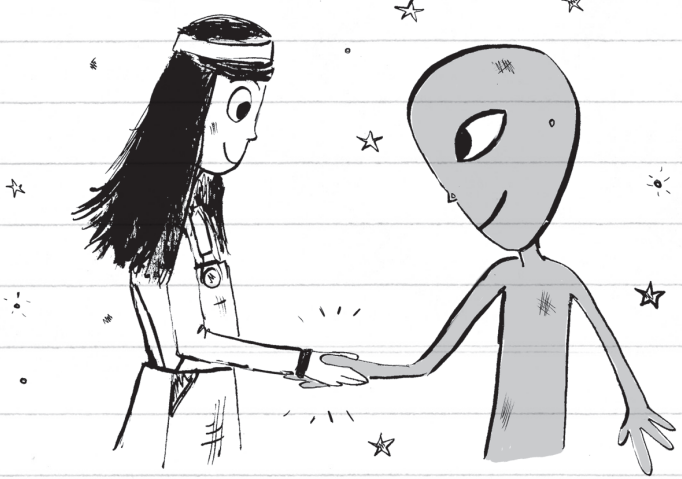
Everything I learn about myself, my home, my town, my city, my country, my planet, my solar system, my galaxy, my **UNIVERSE**, is written here.

My journal helps me prepare for the big things that will happen in my life. Like, a while back when I tried to build a spaceship, I figured: how difficult can it be? I learned all I could learn until I had the answer:

IT IS VERY DIFFICULT!

But difficult isn't the same as impossible, so I've decided to keep on learning and this time I'm going to prepare myself for something a bit simpler:

MEETING ALIEN LIFE!



That's right. I'm going to be the human who makes first contact.

After this happens, I think aliens and humans will make a film of my life to show how all the things I learned helped bring us all together. That movie will start like this:

On a small* blue** planet in the outer edges of a galaxy . . . Light years from any other planet . . . **8 billion***** people wondered if they were alone . . . But only one girl****** was brave enough to find out.

* Earth is **40,000 km** around the middle so our small blue planet isn't THAT small. I wouldn't want to walk around it, that's for sure.

** It's not even completely blue from space, more of a bluey-greeny-brown-white planet.

*** Roughly — but maybe I'm being too picky.

**** ME!

Ok. Now imagine that being said by someone REALLY fabulous – like a superhero or time lord or . . . actually no scratch that, I think I'll be the star of my own film. There will also be some dramatic music and big budget special effects. We'll zoom in from outer space showing a few other planets (just the cool ones) as we go.

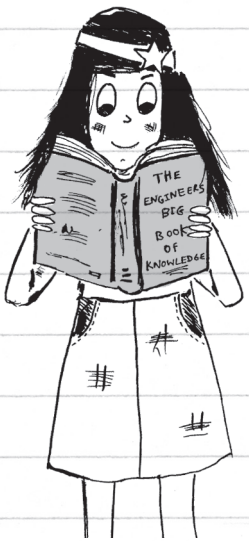
Then we'll pass some asteroids, a satellite and maybe a space unicorn before we finally reach EARTH. Then we KEEP zooming in and in and in until finally we see the face of a brave (and determined, and curious, and slightly-cheeky-but-still-lovable) girl who will wink at the camera, plonk a space helmet over her brilliant hair and climb into a spaceship.

Then we'll probably hear Dad shout "MATILDA, DINNER!" and my LITTLE BROTHER'S annoying head will appear in front of the camera where he'll pick his nose and we'll have to carry on tomorrow because I've got homework after tea and then dance practice and I want to go on Discord with Kareem and

the others and, well, nobody said making a blockbuster film about the first girl to make contact with alien life would be easy.

That's how the movie of my life will start. But my learning? Well that has to start somewhere too.

I've been learning stuff about the universe for as long as I can remember – which is actually **FOREVER** as far as I'm concerned because I can't ever remember not remembering. I'm like an entire universe!



I think that by the time I leave school more people will have walked on the Moon. And then maybe ten years after that people will have walked on Mars. I could be one of those people. Or I could be working with people as clever

as me and I'll have a brilliant brainwave which will help solve a really tricky problem in space exploration. That might sound far-fetched, like what happens in a film, but it isn't. People like me do amazing things all the time – especially when we are working as a team, and especially when that team inspires us and challenges us. It happens in class. I've been listening to a friend talk about her work and suddenly it's given me an idea how I can do my own work. I don't mean in a copycat way, just in a I-can-do-it-too kind of way.

Jerome and Simone are twins in my class and they sometimes finish each other's sentences but they are also really different. Jerome is smart but can be quite annoying and loud whilst Simone is quieter. She says nothing at all for ages and then comes out with something brilliant. I guess they are a kind of team.

I talked to them (and Kareem) a lot when I was trying to build a spaceship and they listened even though spaceships aren't really their thing. But they always made me think a bit harder and be less lazy and more patient. They're my kind of people.

If you're reading this, then I guess you're my kind of people too. Maybe we'll meet one day and talk about space together.

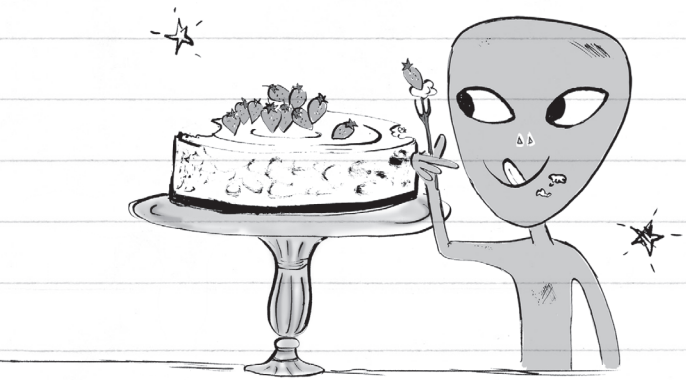
I'd really, really, **REALLY** love to go into space and discover life on another planet. It doesn't have to be a super-intelligent life form (but more intelligent than Dad would be a good start — sorry-not-sorry, Dad). I really don't

fancy meeting a galaxy-conquering, face-eating species or anything. I'd be OK with a quiet sort of species who I can sit and read and eat cheesecake with or something.

But how likely is that?

I don't know. What I do know is that sitting around and doing nothing makes it very **UN**likely. That's why I'm learning all I can about the universe. Like, how did it begin? What's the difference between a planet and a star?

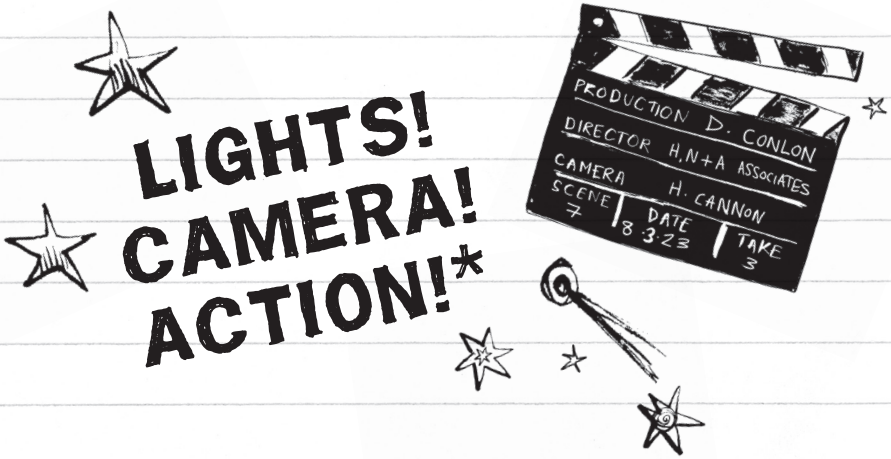
Why does the Moon look as though it changes shape? What else is there in the solar system? What even **IS** a solar system? How far away is the next solar system? How can we



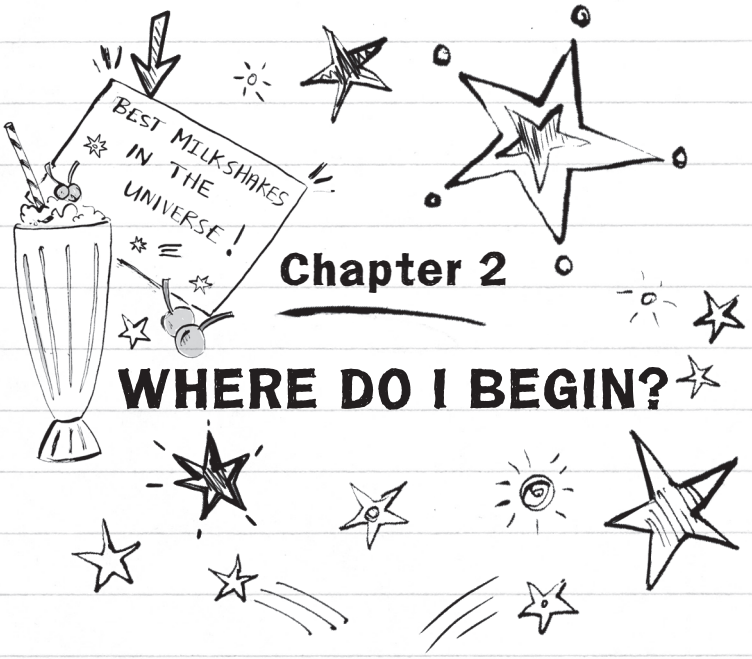
explore other planets? What are the chances of alien life existing? If aliens do exist then how far away might they be and can I catch a bus to visit them?

All this and more will be revealed! I hope my journal makes sense – it's my thoughts, after all and they don't always come out right but I've kept notes about some of the trickiest parts and put those at the back in the **GLOSSARY**.

Right! Let's get on with it.



* More like a fairly brief walk to the library.

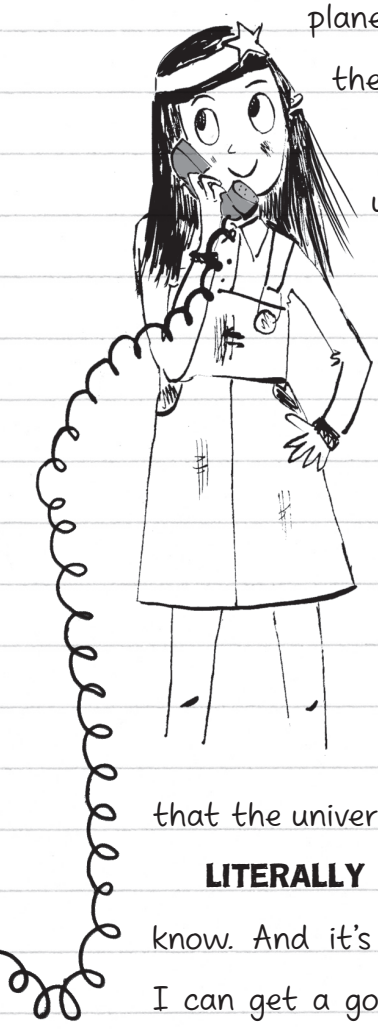


Chapter 2

WHERE DO I BEGIN?

Picture the scene: my phone rings and I get a call. It's an alien. "Hi, Matilda. I'd like to meet up for a milkshake. Can you meet me at the other end of the universe, please?"

It's the call I've been waiting for but hang on — where is the other end of the universe? How is that different from the other end of the



planet, or solar system, or galaxy, or the mess in my room?

Basically . . . what **IS** the universe? If I'm going to find out whether aliens exist and how I'm going to meet them then I need to start right at the beginning. I mean, there's no point looking for snacks in the fridge if I already know that nobody has been to the shops.

I've asked around and done my research and it turns out that the universe is EVERYTHING.

LITERALLY EVERYTHING. As far as we know. And it's around **13.8 billion years old**. I can get a good idea of what's in it just by looking up on a clear night. It's filled with stars – like, **LOADS** of stars.

I know that planets can often be found orbiting stars. Earth orbits our Sun (which is a star) and I know there are other planets close(ish) to Earth. There's Mercury, Venus, Earth, Mars, Saturn, Jupiter, Uranus, and Neptune. There are also other things which are smaller than planets called dwarf planets. Those include Pluto, Eris, Ceres, Makemake, and Haumea. There may be lots more we haven't found yet.

There are also asteroids and comets. I'm going to learn a lot more about everything but the thing I learned first is that the planets and dwarf planets I've mentioned so far are all orbiting our Sun. And the name we have for the area in which everything orbits our Sun is called **THE SOLAR SYSTEM**.

Many stars out there have their own solar systems with planets but there are so many stars that we don't know about all of them.

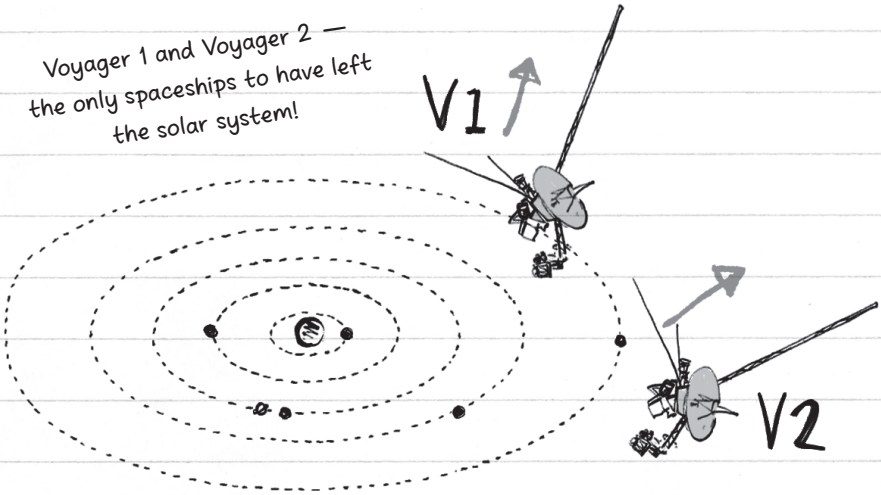
There might even be lonely stars wandering around looking for planet friends.

The size of a solar system depends on how much mass there is in its star. That's because stars with more mass have a greater gravitational effect than stars with less mass. And the greater that gravitational effect is the wider an area of objects it can cause to orbit it.

Humans have sent spaceships (without people in them) to every planet in our solar system. But it's **SUCH** a long way to the edge of our solar system that only two spaceships have ever left it.

I know I'll need to find out all about that but at the moment I'm just trying to get an idea of what all the stuff that makes up our universe is. And there's way more than just stars, planets and solar systems.

All those systems are also caught in

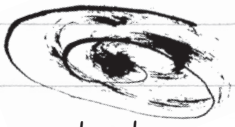


orbits, only this time they are travelling together in what's called a **GALAXY**.

Galaxies are big. Like, **REALLY** big. And the universe doesn't stop there.

Some galaxies can get together in what's called a local group. Hey! This is sounding a bit like school. Hear me out, it's going to make sense.

We have children who I'm thinking are like the planets. Those children sit around a desk. That's like a solar system. There are lots of desks in a classroom. Think of that as a galaxy.



Then there are groups of classrooms in a school which sounds like a local group to me. I asked Mr Wilson about whether there are groups of schools and he said it depends on what types of schools. There are academies or sometimes they are organised in other ways.

But back to our universe. All these objects and groups eventually get together and, if we zoom out far enough to see **EVERYTHING**, then we call that the universe. Actually, we call it the **OBSERVABLE** universe because there's only so much we can actually see.

That's the other thing to mention: the universe is **MASSIVE**.

That seems obvious, right? Anything which can contain **EVERYTHING** has to be pretty big. That word 'big' doesn't even begin to cover it. Our universe is **93 billion light years** across (46.5 billion light years in every direction). It's been

growing for something like **13.8 billion years**. I think I need to really try hard to understand what a light year is and I will but for now I just know that if I hadn't stopped growing for **13.8 billion years** then I'd be pretty big too.

It's not going to be easy to find alien life in such a big universe.

I mean, just think about that size. The edge of our solar system is about **twenty-two billion kilometres** from the Sun. And then it's a long way until the next closest solar system. Solar

systems aren't snuggled up next to each other. There's a lot of space in space.

Oh, and there are no signposts.

I need to keep in mind that there are lots of solar systems in a galaxy and lots of galaxies in the (observable) universe. I still need to find out what makes a star a star or a planet a planet, but I know that I can figure it all out with the help of my friends, my teachers, my parents, and the local library (and not my little brother).

But one thing is certain: finding alien life is going to be difficult. Finding out **HOW** difficult is what I'm **ALL** about though so **BRING. IT. ON.**