For my daughter, Lori

Written by Dr Maggie Aderin-Pocock
Illustrated by Chelen Écija
Designed by Kim Hankinson
Edited by Frances Evans and Katy Lennon
Cover design by John Bigwood and Angie Allison
Fact-checking by Stuart Atkinson

With special thanks to Hazel Songhurst and Sophie Schrey

First published in Great Britain in 2019 by Buster Books,
9 Lion Yard, Tremadoc Road, London SW4 7NQ

www.mombooks.com/buster
Buster Books
@BusterBooks

Copyright © Buster Books 2019

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, without the prior permission in writing of the publisher, nor be otherwise circulated in any form of binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

A CIP catalogue record for this book is available from the British Library.

ISBN: 978-1-78055-575-1
2 4 6 8 10 9 7 5 3 1

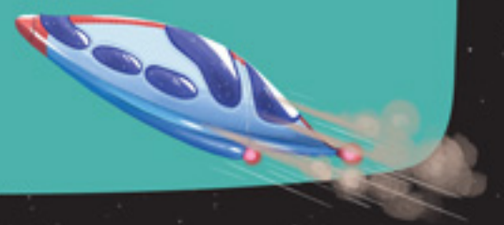
This book was printed in June 2019 by Leo Paper Products Ltd,
Heshan Astros Printing Limited, Xuantan Temple Industrial Zone,
Gulao Town, Heshan City, Guangdong Province, China.

CONTENTS

INTRODUCTION

THE TOUR

SHIP'S DATABASE



INTRODUCING DR MAGGIE

Hi! My name is Dr Maggie. I am a space scientist and I have always wanted to leave the pull of Earth's gravity and travel around the Solar System.

In this book, I'm going to embark on an amazing journey – and I want YOU to come with me! We will visit planets, moons, asteroids and satellites, leaving no question unanswered and no meteorite unturned. And we will travel to places that no one has been to before. It's going to be EPIC.

Growing up, I was just an average kid, so why did I get the space bug so bad? Well, I was born during a fantastically exciting time for space exploration. The Space Race was on, the first humans had explored the Moon, and probes and satellites were travelling further and further into space. Ever since then, I've been looking for ways to get out there myself.

But getting into space is tricky. For one thing, only a few people have made it – just under 550 humans have travelled there. For another, space travel is incredibly expensive. The Apollo program that landed 12 men on the Moon is thought to have cost over 20 BILLION US DOLLARS – and that was in the 1960s. The equivalent cost today would be around SEVEN times that amount. Not only would it take me many lifetimes to save up that much, I'd also need several more lifetimes to complete a real-life grand tour. Even with the fastest space technology, travelling at 1.5 million kilometres (km) per day, it would take me over 300 years to reach the start of the Oort Cloud at the most distant edges of the Solar System.

So how will we make this incredible journey? My inspiration came when I was reading about the scientist Albert Einstein. You know the chap – mad hair, German accent and some truly wonderful ideas. His ideas were so far out that he used 'thought experiments' instead of actual experiments to test his theories. For example, to test his theory of special relativity, Einstein IMAGINED what it would be like to travel on a beam of light.

And that's exactly what we're going to do here. With imagination, we can take a journey no human or machine has made, going right to the edge of the Solar System and making it home in time for tea.

Come on ... what are we waiting for?

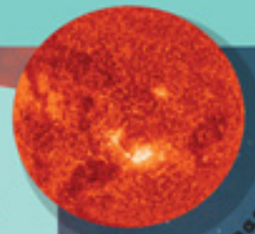
COUNTDOWN: 10, 9, 8...

HOW THE TOUR WORKS

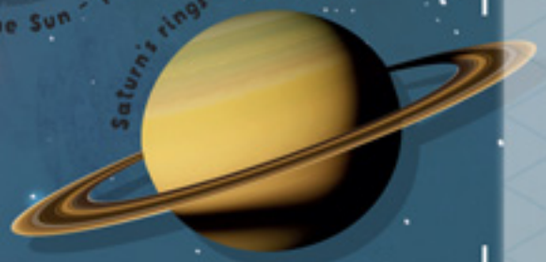
To get the most out of our trip of a lifetime, here's an overview of the incredible sights we'll take in on the tour and some handy tips to help guide us on our travels.

THE ROUTE

We're going to start the tour in familiar territory – on Earth. After a quick look around, we'll head to the Moon, our nearest neighbour, for a spot of moonwalking (all of the clips I've seen make it look like a lot of fun). From there, we'll travel towards the Sun at the heart of our Solar System. We'll learn how the Sun and the Solar System formed before we jet off to explore the remaining inner planets – Mercury, Venus and Mars.



After a quick stopover in the Asteroid Belt, we'll continue further out into space to explore the planets in the outer Solar System – Jupiter, Saturn, Uranus and Neptune. Then we will venture into the strange world of the Kuiper Belt and its icy dwarf planets (including Pluto).



VISOR SETTING

THIS BOX TELLS YOU HOW TO ADJUST YOUR HELMET'S VISOR TO SEE FEATURES OF THE PLANETS IN MORE DETAIL.

LOOK OUT FOR TOUR HIGHLIGHTS THROUGHOUT THE BOOK. THESE ARE SIGHTS AND EXPERIENCES THAT NO SPACE EXPLORER WOULD WANT TO MISS. THEY'RE MARKED WITH THIS SYMBOL:

Beyond Pluto, we'll search for the mysterious Planet Nine – in fact, it's so mysterious that we're not even sure it's out there. Then we'll cross the heliopause, considered to be the boundary of our Solar System. Only two spacecraft have ever made it this far.

Our final stop is the Oort Cloud, a vast expanse of icy objects that sits around the Solar System. Like Planet Nine, scientists think the Oort Cloud exists, but no one has ever seen it. Our discovery of it, at the edge of interstellar space, will make a spectacular ending for our tour.

The planet panel at the bottom of each destination's page will help you to keep track of where we are and how many astronomical units (or AU – see page 111) from the Sun we've travelled.

OUR SPACESHIP'S DATABASE

There is so much to do and see that I can't fit it all into the tour pages, so I have created a database at the back of the book (starting on page 106). This contains in-depth explanations and handy comparisons to help make sense of the mind-blowing facts and figures we'll encounter on our travels. If you get lost at any point of the journey, don't forget to consult it – it will help to get you back on course.

COUNTDOWN: 4, 3...

THE MOON

YOU CAN SEE THE MOON BECAUSE IT REFLECTS LIGHT FROM THE SUN.

EARTH'S LOCAL COMPANION

Our first destination is up ahead – Earth's closest neighbour, the Moon. The differences between this rocky satellite and our home planet are plain to see. With barely any atmosphere and not a trace of liquid water, the surface looks dry, barren and lifeless.

As we circle the Moon, we notice that – as with planets – one half is in darkness and the other is bathed in sunlight. Now we just have to decide whether to land on the day side or the night side.

MOON STATS

SIZE (DIAMETER)
3,475 km

AVERAGE DISTANCE FROM EARTH
384,000 km

HOW MANY BIRTHDAYS?
One – it follows Earth around the Sun

HOW LONG IS A DAY?
27 Earth days

THE TIDES IN THE SEAS AND OCEANS ON EARTH ARE MAINLY CAUSED BY THE PULL OF THE MOON'S GRAVITY.

1 AU FROM THE SUN

MOONWALKING

We have set down our spacecraft on the cusp of where the night side meets the day side – that way we can explore the extreme temperatures in both regions. A full day on the Moon lasts for almost one Earth month, so we can take our time. Once we've got our spacesuits on it's time for EVA, which stands for 'Extravehicular Activity' – let's go moonwalking!

SUN'S RAYS

The day side of the Moon is caused by the Sun's light reaching the Moon's surface. There's no protective atmosphere here like there is on Earth, so you will need to put your visor down when we enter the day side. This will help to protect your eyes from the direct glare of the Sun.

ON THE DAY SIDE ...

With no atmosphere to interrupt it, the Sun shines directly on to the surface of the Moon. It feels incredibly hot – the temperature is about 100°C, the same as boiling water.

FROZEN FOOTPRINT

There are no winds blowing over the surface of the Moon, so it is eerily still. No wind means that there is nothing, apart from collisions with asteroids and meteorites, to remove marks on the surface. This footprint, for example, was left by Buzz Aldrin in 1969 and is still there today.

YOU WILL NOTICE MANY LARGE HOLES COVERING THE MOON'S SURFACE. THESE ARE CALLED CRATERS AND ARE MADE WHEN ASTEROIDS AND METEORITES HIT THE MOON.

SPACE WALK

Walking on the Moon is very different to walking on Earth because gravity is much weaker here. The force that could send you half a metre into the air on Earth for one second, would let you leap three metres on the Moon, and the jump would last for four seconds.

THE MOON IS A GREAT PLACE TO COLLECT METEORITES. THEY STAY EXPOSED ON THE SURFACE BECAUSE THERE IS NOTHING TO COVER THEM.

ON THE NIGHT SIDE ...

In the shadows it is wonderfully cool – maybe even TOO cool! Here, temperatures can drop as low as –173°C, colder than the lowest temperatures ever recorded in Antarctica, the coldest place on Earth.