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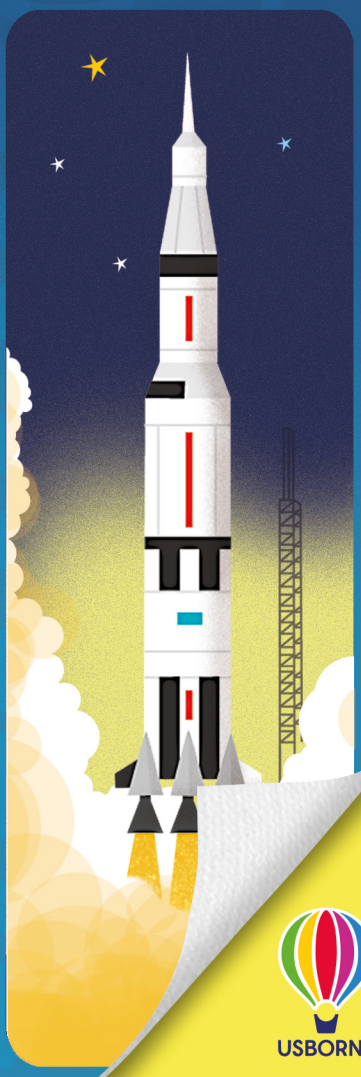
USBORNE 100 THINGS TO KNOW ABOUT SPACE



SHAPES for schools

USBORNE

100 THINGS TO KNOW ABOUT SPACE

Written by Alex Frith, Alice James and Jerome Martin
Illustrated by Federico Mariani and Shaw Nielsen

Introduction

Notes for Key Stage Two teachers
Suitable for 8+
Subject Checklist: Science • Maths • History • Literacy • Philosophy
Explore Themes of: The Earth and space • The solar system • Space travel • Gravity • The history of space science • Women in STEM • The ethics of space exploration

About the Book

A fun and informative book packed with 100 fascinating things to know about space, from how to escape a black hole to why astronauts learn wilderness survival skills. There are detailed facts on every page, with bright infographic-style illustrations, and a glossary and index are provided at the back of the book.

Usborne Quicklinks

For links to carefully chosen websites to find more out-of-this-world facts about planets, asteroids and constellations, videos of astronauts in training, and quizzes to test how well you know our solar system, go to usborne.com/100SpaceQuicklinks
At Usborne Quicklinks, you'll find links to websites with videos, quizzes and activities specially selected to support the information in Usborne books.

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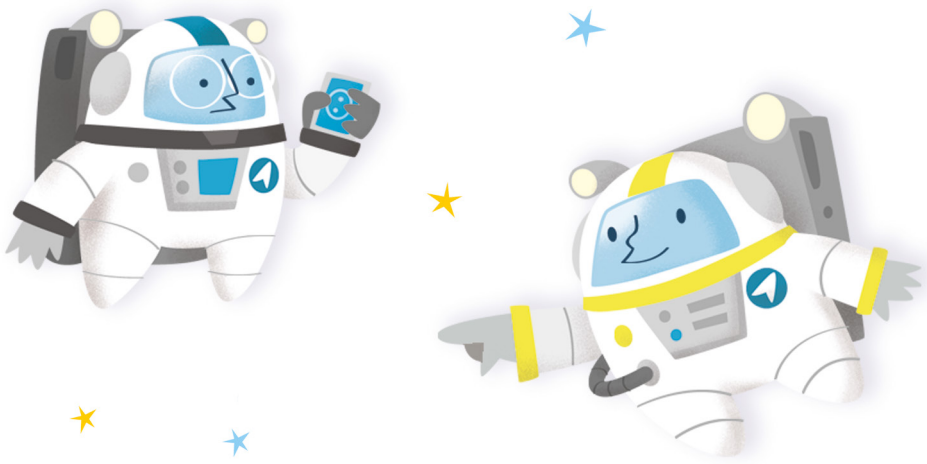

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Theme 1 – The movement of planet Earth

Look at the extract on the following page, and then consider the following discussion questions.

Discussion Questions:

- At what speed does the Earth spin around and how long does one full rotation take?
- What does the word ‘orbit’ mean? (You can use the glossary at the end of the book to help you.)
- At what speed does the Earth orbit the Sun?
- Can you use the information on the page to work out how fast the average plane flies?
- What is the solar system? Why do you think it is called the solar system?
- What is a galactic orbit and how long does one galactic orbit take?
- In what way is living in the universe ‘like being on a fairground ride’?
- Can you close your eyes and visualise all the ways in which the Earth is moving through space?

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1 Living in the Universe...

is like being on a fairground ride that never stops.

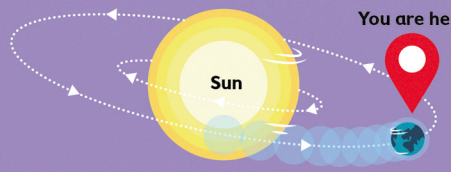
When you stand still, it doesn't feel as if you're moving. But in fact, the planet under your feet is hurtling through space at great speeds.

The Earth spins around at a rate of **1,670km (1,037 miles) per hour**...

One full rotation takes just under 24 hours.

...that's 3 times faster than some of the world's the fastest trains.

It also orbits the Sun at a steady **107,000km (66,000 miles) per hour**.



The Sun spins around too. One rotation takes around 25 Earth days.

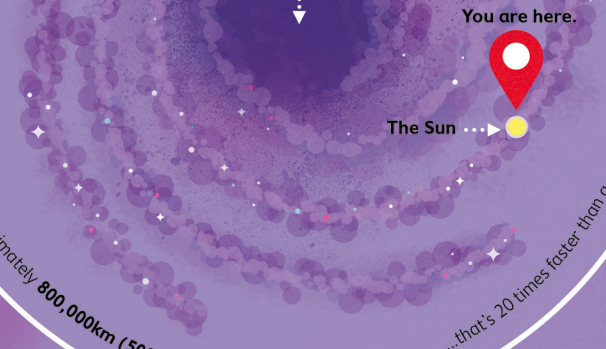
That's 30 times faster than some of the world's fastest planes.

Find out what *orbit* and other space words mean on pages 120-123.

The Sun and the eight planets that make up the **Solar System** all travel in an incredibly long *galactic orbit* around the heart of the **Milky Way galaxy**.

A single galactic orbit takes around **250 million Earth years.**

The Milky Way revolves around an object known as a **supermassive black hole**.



The Solar System orbits at approximately **800,000km (500,000 miles) per hour**...

...that's 20 times faster than a rocket shooting into space.

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Activity 1: Create a model

Although it doesn't feel like it, planet Earth is moving through space at great speeds. The Earth is spinning on its axis while also orbiting the Sun. Plus, the whole solar system is orbiting around the heart of the Milky Way galaxy!

Can you create a model or representation to show the different ways Earth is moving through space? Use extract one to help you. Perhaps you could work with a group to create a dance? Perhaps you could make a 2D model using card and split pins? Or maybe you could create a 3D model using plasticine? It's up to you! Use the space below to write or draw your ideas and plan your model.

Plan

When you have completed your model, present it to your class explaining what the different parts represent.

Extra challenge: Read page 98. What was the 'geocentric' theory of the universe? How is this different to the model you have just created? Can you imagine explaining your model to somebody who was alive in the year 1600? How do you think they'd react? What questions might they have?

Theme 2: Astronauts on the Moon

Look at the extract on the following page, and then consider the following discussion questions.

Discussion Questions:

- How many miles did the Apollo mission crews travel to get to the Moon?
- Why was it important for the astronauts to have periods of rest?
- What were the astronaut's four main activities whilst they were on the Moon?
- How long did the Apollo 11 astronauts spend on the Moon in total?
- Why did Neil Armstrong have trouble sleeping?
- How do you think it would feel to look out the window and see the Earth in the distance?
- Would you like to be an astronaut? Why?

Activity 2: Research the schedule of the Apollo 11 mission

Use the infographic on page 28 to help you record the astronaut's schedule for the time they were on the Moon. Write down the activities they did in chronological order in the table below. Use the scale on the next page to help you estimate how long they spent doing each activity.

Extra challenge: You are an Apollo 11 astronaut and you've just arrived back home after your mission to the Moon! Write a description of your time on the Moon. Use the schedule above to help you. What did you do? How did you feel? Which bits were fun and which bits were more difficult? What was your favourite part of your time on the Moon? How does it feel to be back home?

22 Astronauts on the Moon...

spent more time resting than exploring.

Although they had flown a quarter of a million miles to get to the Moon, the Apollo mission crews couldn't spend all their time exploring. To stay fit and alert, they had to schedule in long rest periods.

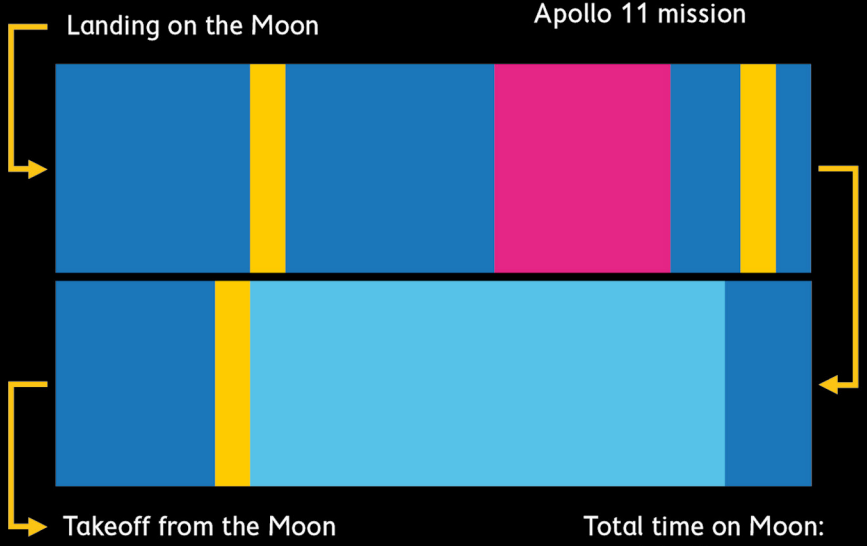
These graphics show how much time the astronauts of the first and last Moon missions spent eating, sleeping, working and exploring.

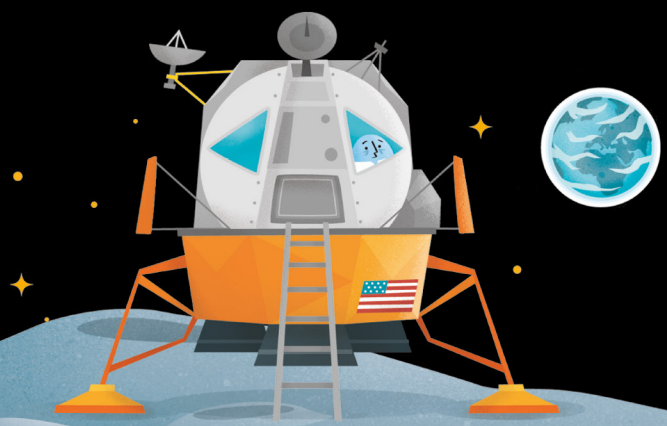
Key:

- Working inside the Lunar Module
- Exploring the Moon's surface
- Eating inside the Lunar Module
- Resting inside the Lunar Module

Reading order:

Scale: 5 hours





Neil Armstrong had trouble getting to sleep on the Moon – partly because the Earth was shining into his eyes through the window of the Lunar Module.

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Apollo 11 Schedule:

	Activity	Time spent doing this activity (in hours and minutes)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Theme 3: A message to aliens

Look at the extract on the following page, and then consider the following discussion questions.

Discussion Questions:

- What piece of equipment did astronomers use to send a message into space in 1974?
- What was this message called?
- Why do you think the astronomers chose to transmit the message using a code of ones and zeros?
- What information did the message contain?
- What would you like to know about alien life?

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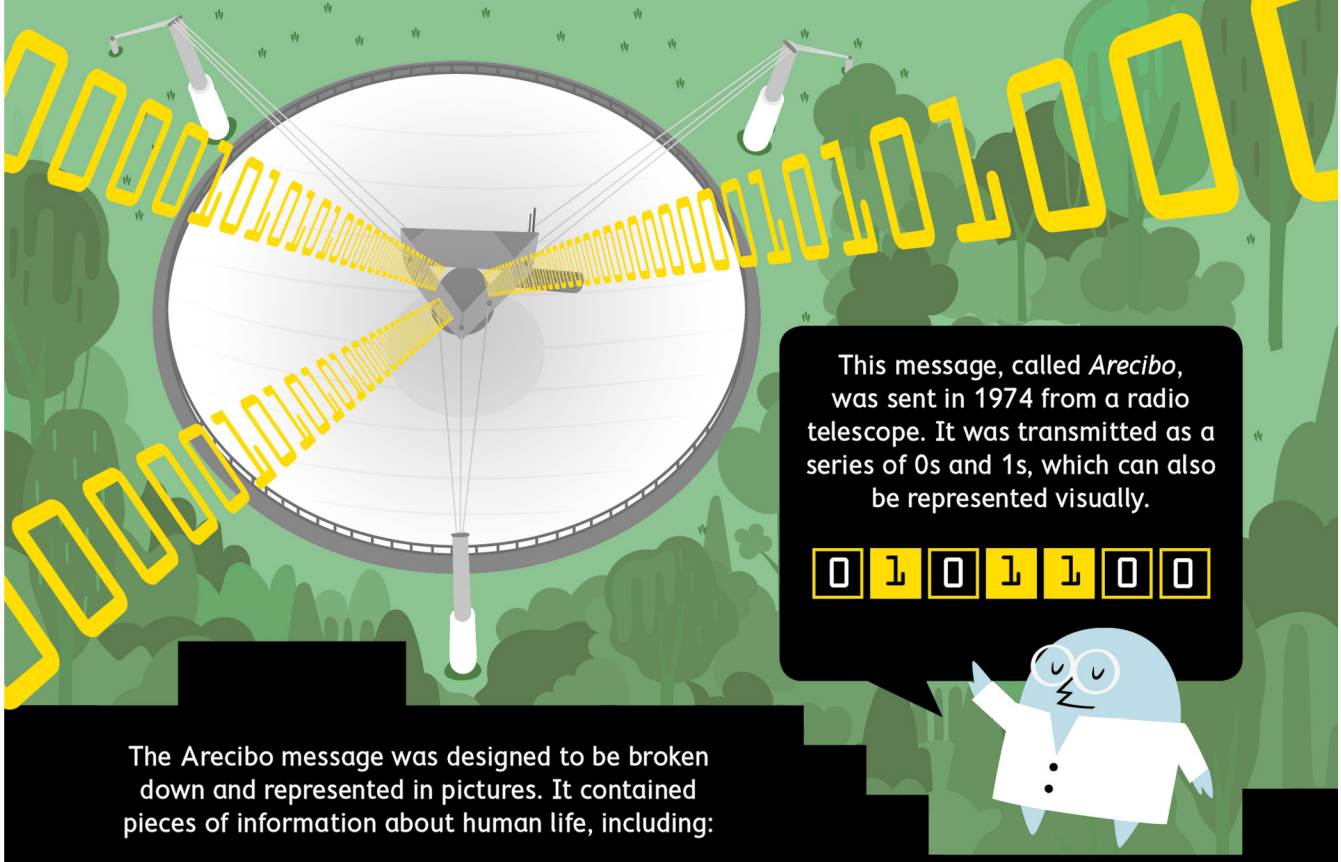
65 A message to aliens...

has been beamed into space.

Astronomers have sent messages into space in an attempt to communicate with aliens. To read them, aliens will need to understand a human code.

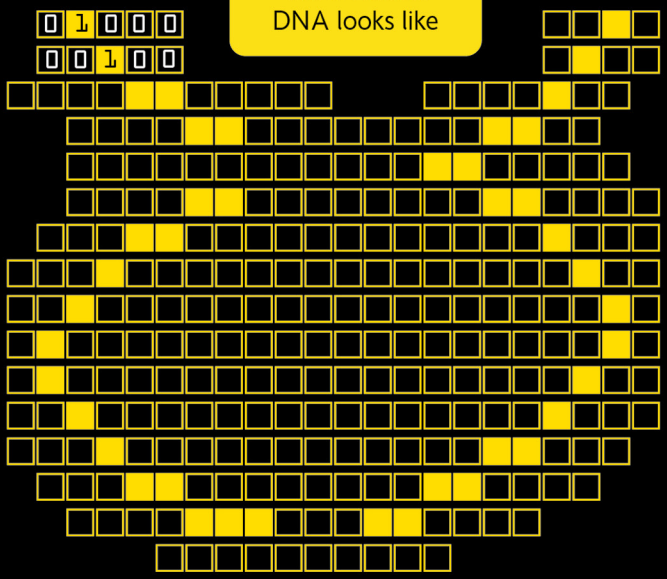


This message, called *Arecibo*, was sent in 1974 from a radio telescope. It was transmitted as a series of 0s and 1s, which can also be represented visually.

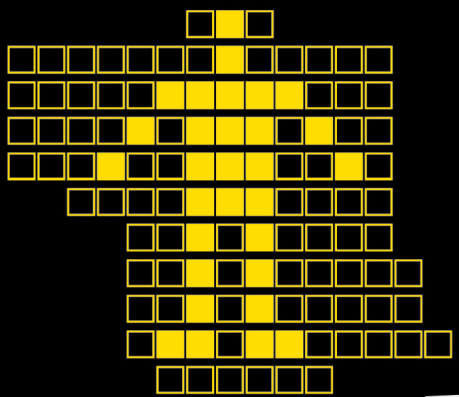
0 1 0 1 1 0 0

The Arecibo message was designed to be broken down and represented in pictures. It contained pieces of information about human life, including:

What human DNA looks like



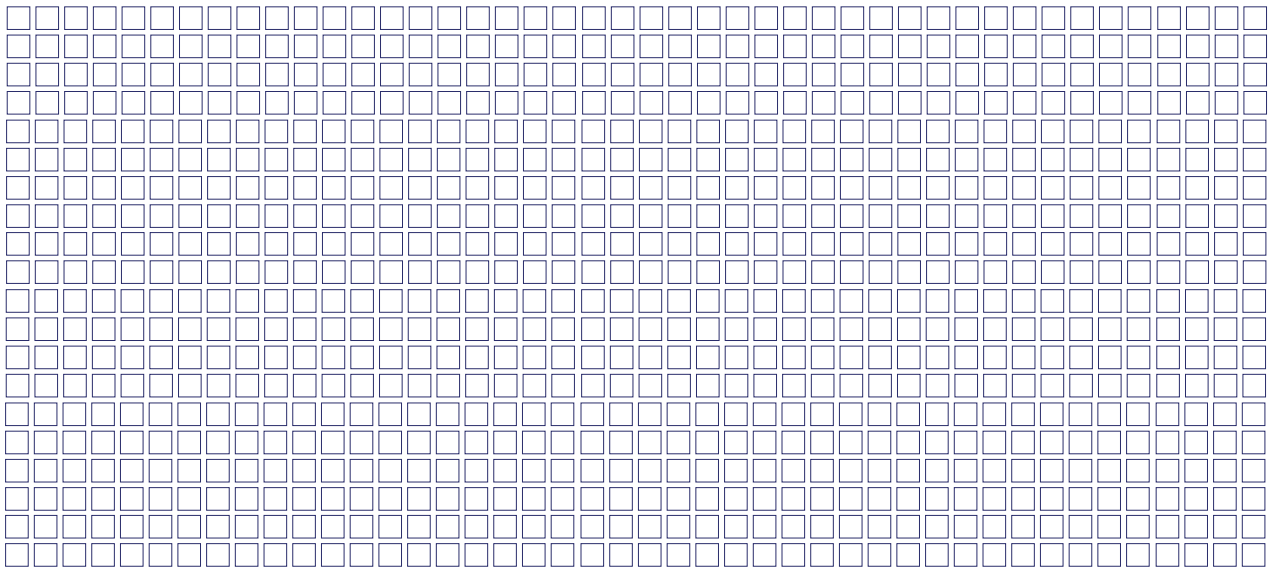
A human's body shape



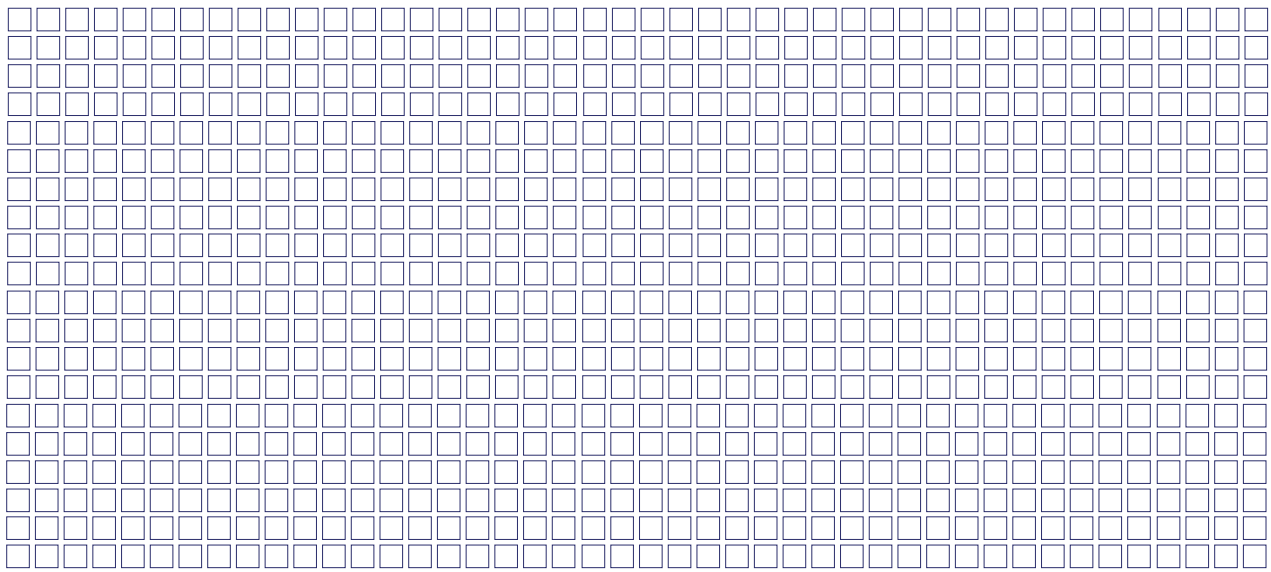
Activity 3: Create your own alien messages!

1. You've been given access to a radio telescope! This is your opportunity to send a message to any aliens out there in the Universe.

   You must send your message in a code that can be represented in pictures (just like the Arecibo message). Astronomers have already sent a message containing an image of a human being and of human DNA. Can you think of any other images that would to help aliens understand life on Earth? Plan your message in the space below by colouring in some of the squares to form pictures:



2. Guess what? You've received a reply! A message has come back to you from outer space! What pictures have the aliens have sent? Draw your alien reply using the squares below:



Extra challenge: Swap your alien message with a classmate so that everyone in your class has a new alien message. Can you interpret your new message? What do you think the aliens are trying to communicate? Perhaps you could work in a group to discuss your messages then present them to the class in the form of a news bulletin?

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Theme 4: Extra-terrestrial sports

Look at the extract on the following page, and then consider the following discussion questions.

Discussion Questions:

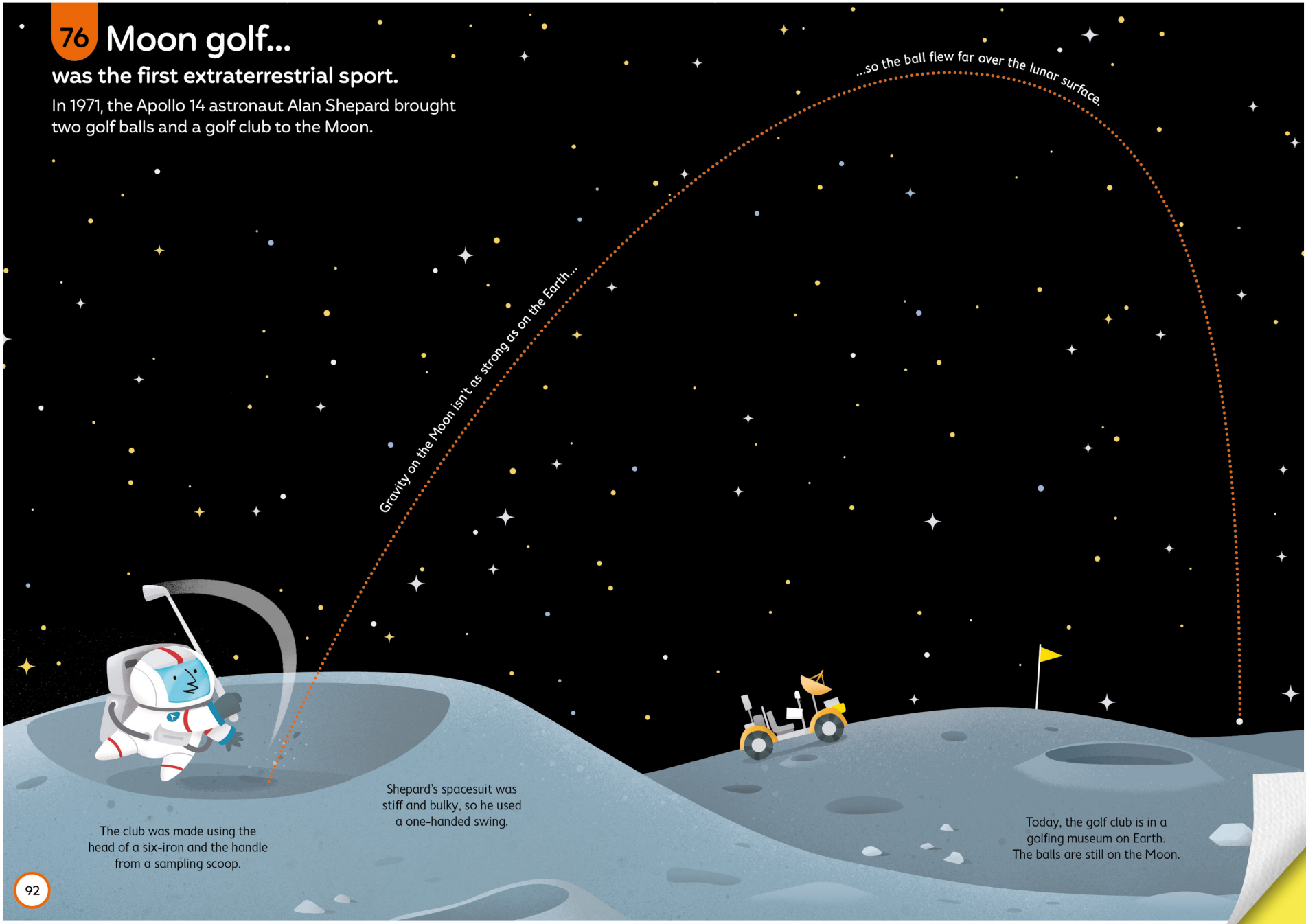
- Who was the first person to play sport in space?
- What year did this take place?
- What is gravity? (You can use the glossary on page 120 to help you.)
- What effect does gravity have here on Earth? Can you give an example?
- Is there gravity on the Moon?
- Imagine you are a sports commentator. You are commentating on Alan Shepard's game of golf on the Moon! How do you describe what you see?
- What is your favourite sport? How would it be different if you played it on the Moon?
- Which of these sports do you think would be best suited to playing on the Moon and why?

  Basketball Gymnastics Football

76 Moon golf...

was the first extraterrestrial sport.

In 1971, the Apollo 14 astronaut Alan Shepard brought two golf balls and a golf club to the Moon.



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Activity 4: Design a new sport

Design a sport that would be perfect to play on the Moon. (Remember, the force of gravity is not as strong on the Moon as it is here on Earth!)

Name of sport: .....

Number of players: .....

Equipment needed: .....

Description: .....

.....

.....

Rules: .....

.....

.....

.....

Illustration:

Extra challenge: Can you use ICT to create an animation of your sport?

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Test your knowledge with an out-of-this world space quiz!

1. Which of these skills DON'T you need if you want to be an astronaut?

a. Swimming
b. Speaking foreign languages
c. Cooking
d. Wilderness survival

2. Why was the first sandwich eaten in space a near disaster?

a. It set the toaster on fire
b. Crumbs got everywhere
c. It was past its used by date

3. Which of these animals has NEVER been into space?

a. Spider
b. Newt
c. Tortoise
d. Dolphin

4. What was sold in 1910 to protect people from comets?

a. Tweed spacesuits
b. Anti-comet umbrellas
c. Backyard bunker kits
d. Padded bowler hats

5. The galaxy is filled with stuff we can't see. What do scientists call this stuff?

a. Crazy gas
b. Dark matter
c. Einstein's gold
d. Space juice

ANSWERS
1. C 2. B 3. D 4. B 5. B

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