Oxford International Primary

6

Computing

Student Book

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Contents

Introduction

Delivering computing to young learners

Oxford International Primary and Lower Secondary Computing is a complete syllabus for computing education for ages 5–14 (Years 1–9). By following the program of learning set out in this series, teachers can feel reassured that their students have access to the computing skills and understanding that they need for their future education.

Find out more at:
www.oxfordprimary.com/computing.

Structure of the book

This book is divided into six chapters, for Year 6 (ages 10–11).

1. **The nature of technology:** Introduction to robots and what they can do
2. **Digital literacy:** Creating a web page
3. **Computational thinking:** Making and fixing algorithms
4. **Programming:** Controlling movement
5. **Multimedia:** Collecting and presenting data
6. **Numbers and data:** Structuring, sorting and filtering data

What you will find in each unit

- Introduction: An offline activity and a class discussion help students to start thinking about the topic.
- Lessons: Six lessons guide students through activity-based learning.
- Check what you know: A test and activities allow you to measure students' progress.

What you will find in the lessons

Although each lesson is unique, they have common features: learning outcomes for each lesson are set out at the start; learning content delivers skills and develops understanding.


Activity Every lesson involves a learning activity for the students.


Extra challenge Activities to extend students who are able to do more.

Questions check students' understanding of the lesson.

Additional features

You will also find these features throughout the book:

The word cloud builds vocabulary by identifying key terms from the unit.


Be creative Suggestions for creative and artistic work.


Explore more Extra tasks that can be taken outside the classroom and into the home.


Digital citizen of the future Advice on using computers responsibly in life.

Glossary Key terms are identified in the text and defined in the glossary at the end.

Assessing student achievement

The final pages in each unit give an opportunity to assess student achievement.

- Developing: This acknowledges the achievement of students who find the content challenging but have made progress.
- Secure: Students have reached the level set out in the programme for their age group. Most should reach this level.
- Extended: This recognises the achievement of students who have developed above-average skills and understanding.

Questions and activities are colour-coded according to achievement level. Self-evaluation advice helps students to check their own progress.

Software to use

We recommend Scratch for writing programs at this age. For other lessons, teachers can use any suitable software, for example: Microsoft Office; Google Drive software; LibreOffice; any web browser.

Source files


You will see this symbol on some of the pages.

This means that there are extra files you can access to help with the learning activities. For example, Scratch programming files and downloadable images.

To access the files, click 'Download resources' at:
www.oxfordprimary.com/computing.

Teacher's Guides

For more on these topics, look at the Teacher's Guide that accompanies this book.

1 The nature of technology: Robots

You will learn

- what a robot is and how it works
- what control systems can and cannot do
- what robots can do now and how they are developing.

People have been fascinated by robots for hundreds of years. Fictional robots appear in science fiction films such as *Star Wars*. Robots appear in books and in video games. Today, robots are with us in real life. Robots are used to make electronics equipment such as TVs and computers. They are used to build cars. Robots drive cars. We live in an age of robots.

Talk about...

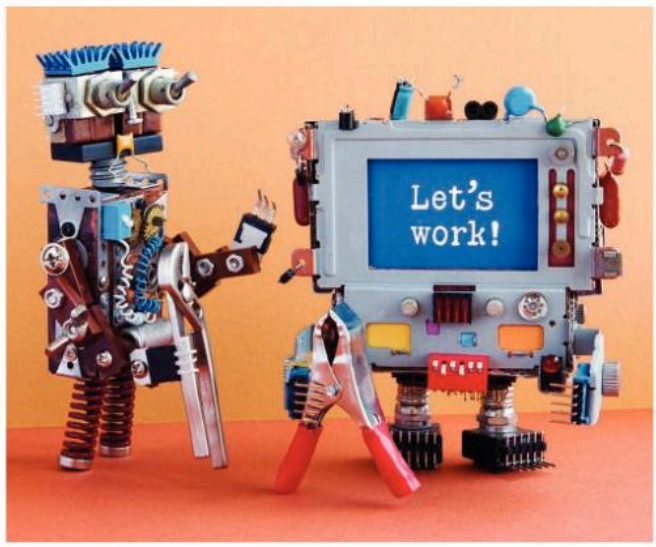
Some robots are designed to look like people. Do you think that makes them more likeable? Or do you prefer robots that don't look like people? Think of examples of robots in films and TV shows. Which ones do you like?

Learning outcomes: Describe the technology of robotics and control systems; Discuss the potential and the limitations of robotics and control systems

Class activity

Design your perfect robot assistant. What will your robot look like? What special tools and powers will it have? What jobs will your robot assistant do that will make your life easier?

robot robot arm drone
actuator sensor
controller control system
artificial intelligence
robot car nanobot



Did you know?

A British scientist called Kevin Warwick had a computer chip implanted into the nerves of his arm. In an experiment that took place in 2002, he controlled a robot hand over the internet. As he moved his hand in the USA, a robot arm in the UK made the same movements. In the future, people who have lost limbs might have mechanical replacements that work just as well as the real thing.

1.1 What is a robot?

In this lesson

You will learn:

- what a robot is and what it looks like.

Spiral back

In Student Book 4, you learned that microprocessors are built into machines and devices that we use every day. Cars, refrigerators and TVs have built-in microprocessors. A microprocessor adds more power to a device and makes it easier to use.

One machine is made more powerful and useful by microprocessors than any other. That machine is the robot. In this unit, you will learn how robots work and what they do.

What is a robot?

A **robot** is a machine. Robots are built by people to do a job. A robot must be programmed by a human to do its job. Once a robot is programmed, it does its job without help from humans.

Unless it breaks down, a robot does its job automatically. It does not need a human to control its actions. A robot does not get bored with its job. It does not make mistakes. The only time a human is needed is if the robot develops a fault.

What does a robot look like?

When people think of a robot, they often imagine them to look like people. Robots in science fiction films are often shown with arms, legs, a body and a head. In the real world, it is different.

Humanoid robots

Humanoid means like a human. Some robots are made to look like people. The robots take part in competitions where they carry out day-to-day tasks just like humans would. They are set challenges such as climbing a flight of stairs and carrying drinks without spilling them.

These robots are used by scientists to develop methods that might be used in the future.

Robot arms

Most robots are built to do jobs that humans do. Humans use their hands and arms to do most jobs. To do the same jobs, a robot has to be able to move like a human. This is the reason that many robots look like a human arm.

A **robot arm** has joints that bend and twist. A robot arm has a hand to grip things with.

Non-humanoid robots

Many robots do a job that humans do without looking human. An example is a robot vacuum cleaner. Another example is a **robot car**. A device does not have to look like a human to be called a robot.

Activity

Invent your own robot which would help with cleaning. Think of a name for your robot. List the main functions of your robot and the advantages of using it to do the cleaning.

Extra challenge

Design a poster to advertise the new robot cleaner.

Be creative

Create an image of the robot cleaner and include it in your poster.

Think again

Is your robot cleaner humanoid or not? Why did you make that choice?

1.2 What robots are used for

In this lesson

You will learn:

- what kinds of jobs robots can do
- how robots are used to build cars.

What jobs can robots do?

Repetitive tasks

Robots do jobs that are repetitive. This means jobs where an action needs to be done in the same way many times. An example is bolting wheels onto a car. Eight thousand wheels are put onto cars every day in a typical car factory. Humans find this kind of work boring. They can get tired and make mistakes or injure themselves. Robots never get bored or make mistakes.

Detailed work

Some jobs involve tasks to be carried out with great accuracy. A single mistake can mean a whole product is spoiled and must be thrown away. Making microprocessors involves a lot of detailed and accurate work. Robots are used to make microprocessors and other electronic equipment such as TVs.

Dangerous work

Robots are used in places where it is dangerous for humans to work. For example, robots are used on space missions. Robots called Sojourner and Pathfinder were sent to explore the surface of Mars. The picture gives you an idea of what Sojourner looked like.

Robots are used under the sea. They explore the sea bed or inspect and repair oil rigs. Robots also work in environments where chemicals or radioactivity make it unsafe for humans to work.

Below are the main differences between how robots and humans do jobs.

Robots	Humans
• More accurate than humans	• Intelligent – they can find better ways of doing jobs
• Do not get bored or tired	• Creative – they can invent new things, such as robots
• Work faster than humans	• Solve problems
• Do not make mistakes	• Have emotions and feelings