

Technology and Digitalisation II ESO is organised into units and projects. The projects bring together content studied in the units.

UNITS

Unit introduction

The opening pages are structured in the following way:

A **list** of the contents and sections in the unit.

The introductory texts have been selected to foster **individual growth** (emotional, social and academic) and to encourage you to respond to the **challenges facing the world today**: the achievement of the Sustainable Development Goals, children's rights, gender equality and digital competence. They'll also help you to develop the personal, academic and professional competences you'll need in the future.

In addition, by going to your **GENiOX Desktop** you can access **Oxford Projects**. You can consolidate your learning with this digital resource, which includes tasks and simulators.

In **Think and discuss**, there are activities that promote reflection on and debate about the contents of the text.

Development

These boxes introduce interesting facts or ask questions based on everyday life, experiments or images. This helps you to deduce what content will be covered in the section.

In the margins, there are **glossary boxes** with definitions of key vocabulary, as well as complementary texts that reinforce or extend the content.

Key content is highlighted.

Activities include **listening** and **speaking tasks**. Activities also cover various **key competences** and all activities cover the STEM and plurilingual competences.

Projects and the guided project

At the end of the book, you'll find three projects that bring together what you've learned in various units. These paced projects will allow you to use your **creativity** and **imagination** within a **project methodology** framework.

The guided project is designed so that you can apply **project methodology** to the **design and construction of a car**.

PROJECTS

Technology and digitalisation

Do you remember what the purpose of technology is?

- Why are projects an important part of it?
- What stages must we complete when we do a project?

Throughout history, humans have used technology to satisfy their needs, creating objects that make their lives easier. From ancient stone tools to digital resources, the project method plays a vital role in the development of these solutions.

Technology is key to understanding how our digitalised society works. It uses scientific and technical knowledge to meet specific needs. It is crucial to understand how we use technology in a responsible, sustainable manner, understanding its impact on the environment and our health, and promoting equality and respect for others.

Projects like the ones described throughout the book bring all of these elements together. We aim to give you a comprehensive idea of what the foundations for the projects presented here, which are for more ambitious and aim to consolidate the knowledge you've acquired throughout the year. When doing these projects, think about the SDG you've learned about throughout the course, and follow the project methodology, though you may wish to vary it slightly as necessary.

• Analyse: Idea: Development of the idea: Construction: Checking: Testing

These projects are quite challenging, and they require individual effort as well as good teamwork. For each project, you'll need to apply knowledge you've learned in several different parts of the book. The projects are carefully planned so that we can use to measure your progress towards developing key competences.

The three projects are on topics covered in different units of the book:

- **What does disease include:** content from units 1, 2, 3, 4, 5, and 7.
- **Following in the Footsteps of Leonardo:** includes content from units 1, 2, 3, 4, 5, and 8.
- **Smart Traffic Lights:** includes content from units 1, 2, 3, 4, and 5.

Project

Smart Traffic Light Design and build a programmable traffic light

PROJECT AIM

The aim of this project is to design and build a programmable traffic light.

Your traffic light must be different from conventional traffic lights with an original design.

It must include a sensor, lights and sounds.

It should have an on-board program and display its operating information on a computer screen.

Optional: It could include some type of artificial intelligence, such as voice activation.

• Build a scale model of the system.

• Present the results to the class.

In this project, you're going to...

- Design an innovative traffic control system that includes various sensors and actuators.
- Write a control program.
- Build a scale model of the system.
- Present the results to the class.

Don't forget...

- Use rechargeable batteries or a solar panel to power your control system.
- Use recycled materials and design your traffic light so that you can reuse components in other projects.

RESEARCH AND ANALYSIS

- 1 Analyse the traffic of your city.
 - What problem does it cause?
 - How is it controlled?
 - Is it safe for pedestrians?
 - Is the city designed for cars or pedestrians?
 - Discuss this statement by your group: One way to promote sustainable urban mobility is to improve how bicycles and e-scooters access schools.
- 2 Draw a block diagram or flowchart, showing a traditional traffic light sequence and write a list of components necessary to make a scale model of that traffic light.
- 3 Use a simulation program, such as Tinkercad, to test the electronic system and control program of a traditional traffic light.

RESEARCH AND ANALYSIS

Do this project in your **GENDIG** Design and complete this self-assessment table.

	Excellent	Satisfactory	Progress	Insufficient
Has completed a traffic light system in the workshop stage.	5	4	3	2
You presented a satisfactory proposal clearly to the class.	5	4	3	2
You used the traffic light without delays, working together efficiently as a team.	5	4	3	2
You used all the necessary documentation for the development of the project. You were able to identify the correct website of the project code to build the traffic light.	5	4	3	2

GUIDED PROJECT

Design and build an automobile

An automobile is a self-propelled vehicle equipped with an internal combustion engine, four wheels and with an on-board system and systems that allow it to be controlled.

Completing this project will help you to:

- 1 Become familiar with the mechanics of transmission and engine transformation that are used in some machines.
- 2 Design, and incorporate into your project, control circuits that meet the rotation of a DC electric motor and that is automatically wired to activate.
- 3 Use metals and plastic materials and find out about their physical characteristics, as well as the techniques and processes involved in their transformation.
- 4 Make cardboard and aluminium supports to scale in order to accurately represent the object that is going to be built.
- 5 Analyse the pros and cons of automobile use, particularly the way that it affects the environment.

1. Introducing the task

To design and build a steering-controlled car for the transportation of people.

Features of the task

- The car should be powered by a 4.5V battery and it should be able to move safely and smoothly.
- It should have two main directions (forward and backward).
- It should have a steering system with stub axles that turn in parallel, moved by an electric motor, and which should stop automatically when the wheels reach a predefined limit in terms of the turn angle.
- It should have a wired remote control that will facilitate both controlling the drive direction and the turning of the car.

Improvement proposal (optional)

Install a headlight system, and a light and sound signal system for reversing the vehicle.

Design and incorporate a hub for the constructed vehicle chassis.

Symbols used in your book

Some sections and activities in this book are specifically designed to develop the **key competences** and to **focus** on aspects of your **individual development** and the **challenges of today's world**. The symbols below help you to identify these sections and activities.

Remember that Biology and Geology mainly works on the STEM competence. This means that all of the activities in this book develop that competence, as well as the plurilingual competence.

KEY COMPETENCES

- Linguistic competence
- Plurilingual competence
- Competence in Science, Technology, Engineering and Mathematics (STEM)
- Digital competence
- Personal and social competence and learning to learn
- Civic competence
- Entrepreneurial competence
- Cultural awareness and expression

FOCUS ON

- Children's rights
- Gender equality
- Physical and emotional wellbeing
- Digital competence
- The world of work
- The Sustainable Development Goals

OTHER SYMBOLS

- Learning situation
- Speaking activity
- Group activity and cooperative learning
- STEM task (interdisciplinary activity)
- Downloadable material

The GENiOX Desktop

The **GENiOX Desktop** is a digital space where you can access your **digital book**, as well as a wide range of **resources** in different formats (such as video, HTML and PDF). These will help you with the tasks and processes that are the basis of your learning: observation, analysis, consolidating and expanding your knowledge, study skills and exam revision.

Unit presentation

Oxford Investigation, which works on the contents digitally through tasks, animations and simulators

Animations that help you to visualise processes and mechanisms in a dynamic way

Simulators that allow you to work in a virtual laboratory

► **Experiment video** of the Science practical

Digital revision activities to test your knowledge in an interactive format

PDF **Concept maps**, **dictionary worksheets** and **scaffolding worksheets**

Weblinks to expand your knowledge and find information for research tasks

The Sustainable Development Goals (SDGs)

The UN launched the Sustainable Development Goals (SDGs) in 2015 for its member states to adopt. The SDGs aim to end poverty, reduce inequality and injustice and tackle climate change for everyone in the world.

Go to your **GENiOX Desktop** to learn about the objectives associated with each Sustainable Development Goal.

