

About your Technology and Digitisation I book



Technology and Digitisation I ESO is organised into units and projects which bring together the 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

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

An introduction to the **Work on your key competences task**, which is the **Learning situation LS** at the end of the unit

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.

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.

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.

Revision activities

The revision activities are organised by topic. They include a wide variety of different types of activity that cover the different key competences and all of them cover the STEM and plurilingual competences.

In the **Study skills** section, you'll make a summary of the unit, a concept map and a scientific glossary. You'll be able to use all of these resources to revise the contents of the unit.

Revision activities

1. Name five loads that can act on your body. Say which ones are fixed and which ones are variable.
2. Name the most common types of forces and give an example. Explain when each of them occurs.
3. Say whether the following statements are true or false. Give the reason for your answer.
 - a. The cutting force only appears when we cut something.
 - b. Friction is a force that tends to stretch an object.
 - c. The human skeleton is basically subjected to compression.
 - d. A plastic cup hasn't got a structure.
4. Say what kind of forces these natural structures are subjected to: a hanging parrot, an elephant's trunk, a bird's leg (spread out), a hammer's rest and a snail's foot.
5. Draw the following structures and analyse the forces of the parts subjected to:
 - a. a gymnast bar
 - a. a swing
 - a. a chair
 - a. a table fan
6. What's a reason for the legs of a chair to break if we lean back on it? Think about the material it's made of as well.
7. Say which materials (wood, concrete, steel, etc.) are used to manufacture the following structural elements: beam, girder, arch and building. Keep in mind that, as well as structural reasons, there may be other reasons why we use it. Explain your answer.
8. List the advantages of reinforced concrete over steel.
9. What's the function of the buttresses of a cathedral? What are they called? Give an example. Illustrate instead of just list! Why are they used?
10. Say the following statements are true or false. Explain your answer.
 - a. Stone is a structural material that's typically used in mass structures.
11. Put the following structural elements in order, according to their function and their order of appearance throughout history: beam, arch, wall, roof, column, brick, trapezoidal, girder, cable, joint, pipe, truss, moment-resisting, etc. What type of load?
12. Check something in the internet that's related to you can see a bridge, a suspension bridge, a cable-stayed bridge, etc. What do you think is the most important part of the bridge? What do you think is the most important part of the bridge? What do you think is the most important part of the bridge?
13. Look at this bridge. As you can see, it has two different types of structures. What are they? Name the parts and say what type of force each one supports. Can you think the two parts of the bridge work together? Explain your answer.
14. What's the difference between a column and a beam? What do these elements do? What type of force do they have to withstand? Draw and label a diagram of each showing how loads usually act on them.
15. Make a summary of the unit answering these questions:
 - a. What are structures?
 - b. What do we mean by "load"?
 - c. What is a force in the context of structures? What are the main types of forces?
 - d. What does a structure do? What are its functions?
 - e. How can we improve how a structure behaves against loads?
 - f. How have structures evolved throughout history?
 - g. What are the main types of structures we see around us?
 - h. What structural elements do we associate with each type of structure?
 - i. What type of stress is a result of structural elements subjected to?
16. Draw a concept map of the unit. Include:
 - Main concepts: force, load, stress, stability, resistance, rigidly mass structures, joints and structural elements, moment-resisting structures, supported structures, reinforced concrete structures, laminated structures, prestressed structures, parametric structures.
 - Create your own glossary with the most important terms from this unit. Include: compression, tension, bending, shear, axial, impact, lift, drag, pressure, column, beam, floor, slab, truss, arch, pipe, etc. (include 10 different concepts at least).

Practical skills sections

Working with technology

Construction of paper and cardboard structures

Working sheets of paper and cardboard into a reusable structure requires the proper techniques. First, we will study different ways of forming the materials so that we can use them in the construction of the bridge.

Working with computers

Bridge simulator

Working with simulators allows us to test the behaviour of structures and to compare the design in a virtual environment before we build them. In this activity, we will use the **Bridge Designer** program, which you can download at: bridedesigner.com

Technology workshop

Typological analysis of structures

In this type of analysis, we will decide what type of structures they used in a construction and what elements and/or components are in it.

Functional analysis of structures

In this type of analysis, we will study how the structure and its elements work, according to the loads they need to bear.

There are three sections that help you work on your practical technological skills:

- **Working with technology.** In this section, you'll learn about interesting methods and techniques for working with materials and tools, applying what you've learned throughout the unit.
- **Working with computers.** In this section, you'll learn how to use information Technology as a tool to explore, analyse, design, model and digitalise technological objects.
- **Technology workshop.** In this section, you'll use procedures and activities to analyse technological objects. You'll learn how to define any technological problem and set up problem-solving processes.

Emerging technologies and sustainability

In this section, you'll see how technological and digital developments are giving rise to new concepts and more environmentally-friendly products. These new concepts and products will revolutionise our lives in the coming years.

Emerging technologies and sustainability

Innovation in the world of construction

Engineers are developing materials that sustainably connect through nature. One application of this technology is the use of natural materials like bamboo and straw to create sustainable and eco-friendly construction materials.

3D printing

We can use 3D printing to create architectural models and prototypes. This technology allows us to build more complex and detailed structures than traditional methods.

Work on your key competences

Work on your key competences

Building efficient structures

Analysis

1. Analyze the problem with the following conditions in mind:
 - a. Calculate the length of the beam: 3 m.
 - b. Materials: paper, cardboard and paper glue.
2. Study previous solutions, identifying differences and similarities that you can use to build bridges. Make a list of the main features of each of the types of beams you find that make sure you understand how they work.

Idea

Develop your own idea. Draw sketches with the characteristics you want the bridge to have. You can base it on the best of the others you've seen or create a completely new one. All this you can do in a bridge construction project.

Development

1. Develop your idea. Draw your own structure, identifying and calculating the type of beam, their length and how many of each you will need. Make a small drawing of the end of the elements such as joints and boards, and say how many you will need of each.

Construction

1. Build the bridge. You may need to identify the structure that you need to build the beam on each side of your construction.

Testing

1. Test the bridge that you've built by putting the correct load on it.
2. Record a video of the test and a description of your bridge. (In your construction and test it works).

The **Learning situation** in **Work on your key competences** enables you to put the contents you've studied into practice in an integrated manner, as well as allowing you to relate them to the Sustainable Development Goals.

Throughout the unit there are **LS** activities, which are connected to the Learning situation.

On your **GENiOX Desktop** there's a **Task guide**, which includes the self-assessment rubrics.

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**.

The collage shows various project pages from the book. Key elements include:

- Technology and digitalisation:** A page with a title and introductory text about technology's role in society.
- Projects Let's recycle:** A page with a title, a photo of a recycling bin, and text about designing a recycling program.
- Chess for everyone:** A page with a title, a photo of chess pieces, and text about designing a chess set for everyone.
- Design and make a drawbridge:** A page with a title, a photo of a drawbridge model, and text about designing and building a drawbridge.
- Guided Project Introduction:** A page with a title, a photo of a car model, and text about the guided project methodology.

Symbols used in this 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 Technology and Digitisation mainly works 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
- STEAM 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 Projects**, 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

▶ **Video** of the guided project

 **Digital revision activities** to test your knowledge in an interactive format

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

 **Weblinks** to expand your knowledge and find information for research tasks

The Sustainable Development Goals

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.

