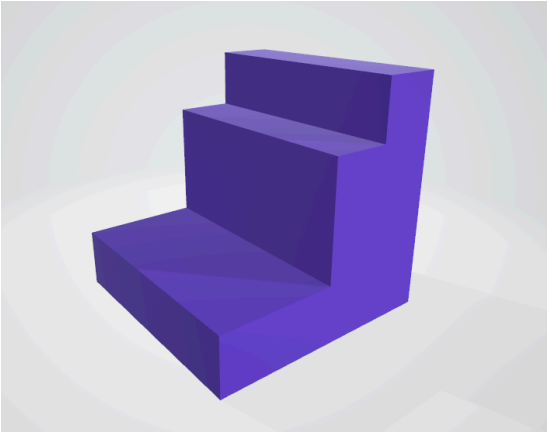
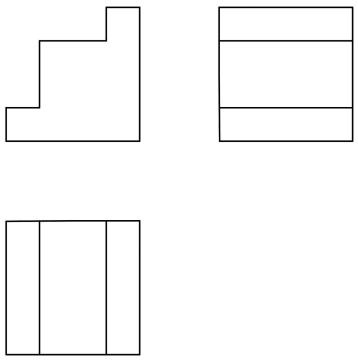
Axonometry Introduction Lesson plan

Created by Jesús Arbués, Delightex Edu Ambassador

** A Merge Cube is needed for this activity.*

[Link Vídeo]





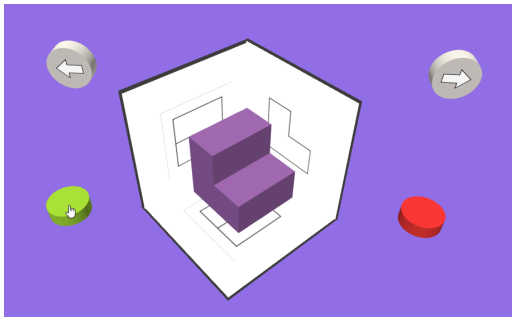
Short description: Introduction to Axonometry. This project consists of two activities of twelve simple models, representing 3D geometric objects that can be viewed with a computer, smartphone, or tablet using Augmented Reality.
This exercise is meant to support children to imagine an object in three dimensions, in particular from different directions.

Educational level: These activities have originally been designed for subjects such as Technology and Visual Arts Education. Students 12 - 14.

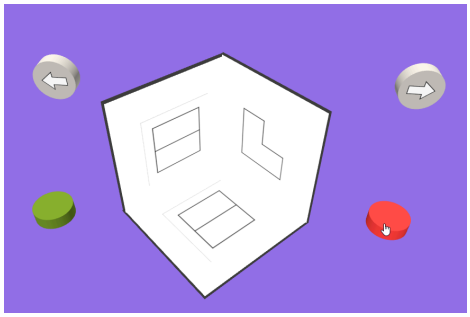
Subjects: Visual Arts and Technology

Format: Individual or in groups of two students

Assignment duration: approx. 2 hours



Activity 1 Link



Activity 2 Link

Introduction:

In Activity 1, the 3D models appear on the screen at the beginning. This activity will help your students understand how axonometry works.
In Activity 2, the figures only appear after pressing a button, which means that your students - already trained - can deduce the 3D models from their different views.

To see the 3D models and their views, you can click on the activities link or scan the QR code with a mobile phone or tablet.

Activity 1 Link

Activity 2 Link

You will need a Merge Cube to enjoy Augmented Reality. The Cube works by using the camera function to detect the different patterns on its faces and allow the coding to interact with it, similarly to a QR code. The Merge Cube can be obtained by clicking on this link.

Curriculum standards:

Axonometry is not always introduced into the curriculum at the same

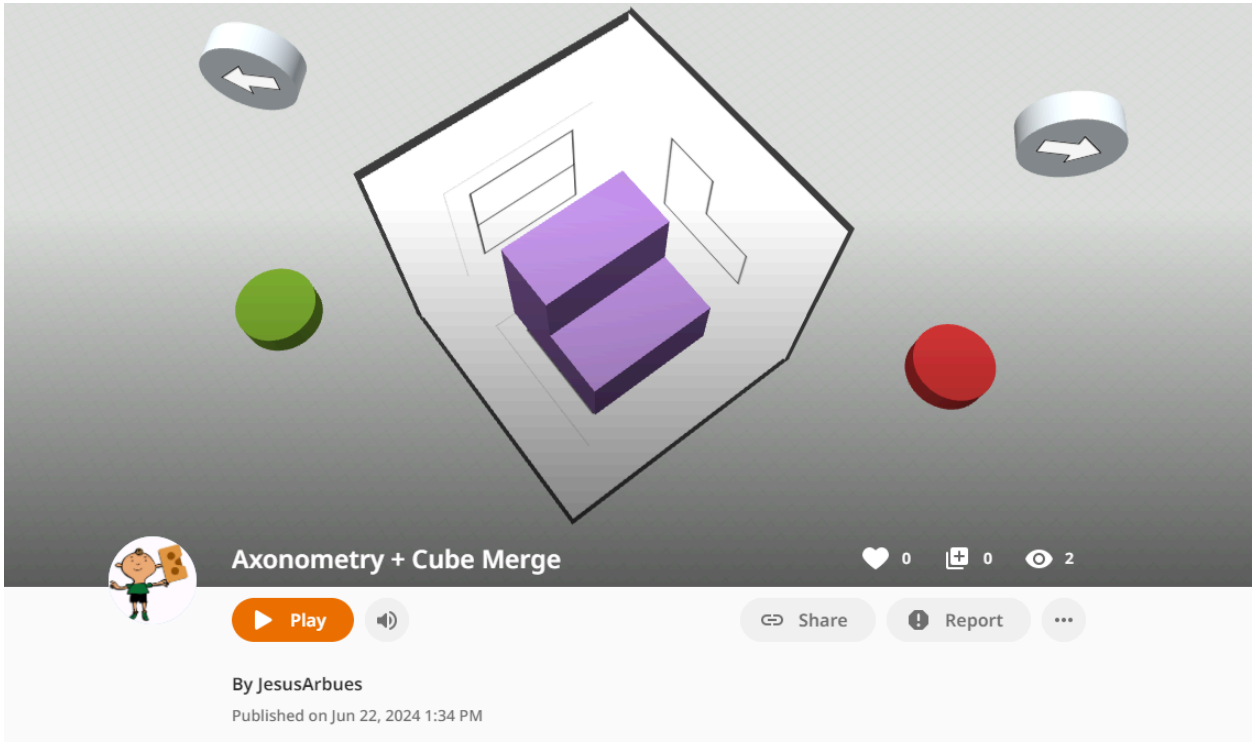
time and place. In my country, Spain, we start using axonometry in the first year of secondary school (12-year-old students), usually in subjects such as technology.

Learning goals:

- Learn 3D creation skills
- Improve spatial skills
- Develop creativity
- Develop technological skills
- Develop computational thinking
- Learn basic options to analyze the figure from different viewpoints

Lesson structure:

1. Activity 1 (with computer)



This is the first model that appears in the activity.
You might use the scroll wheel of the mouse to zoom in/out.

To rotate the content that appears in the scene you might use the arrow keys on your keyboard. This will allow you to view the model from different space directions (including those to obtain orthogonal projections).

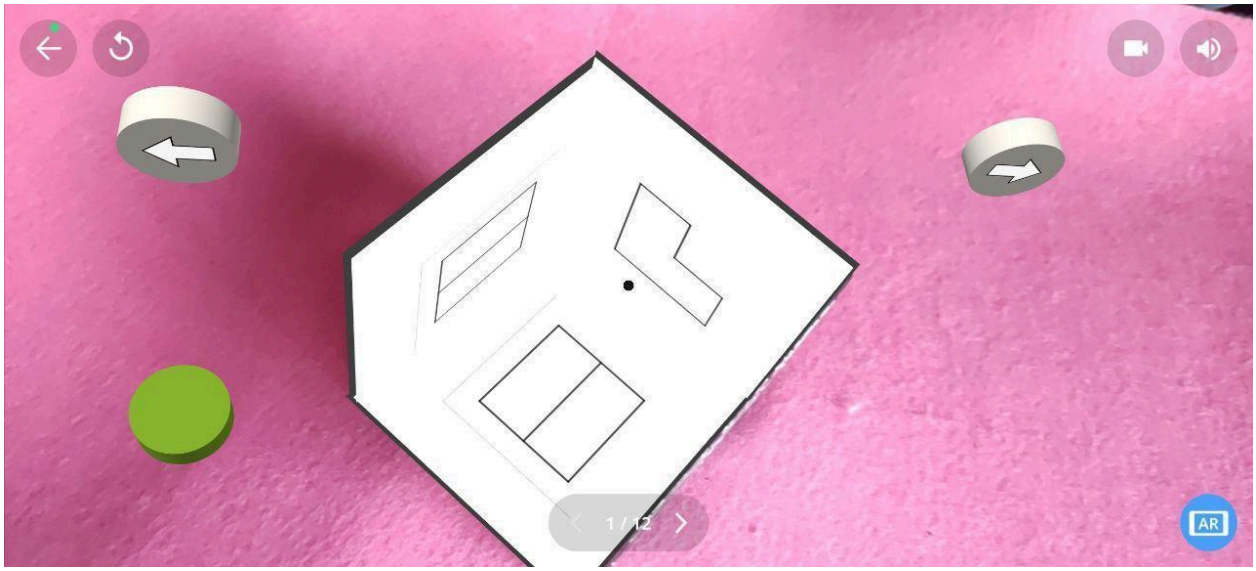
By clicking or hovering over the arrow buttons you can obtain the classic navigation options: move forward/backward to the next/previous scenes.

You might also press the red or the green button to make the model disappear or appear. This can help to better see the views that are just behind the figures.

In this way, by moving the figure, you can match different viewpoints to the projection.
You can look at the orthographic projection of the model from above, which will show what is projected on the floor; as well as from the two upper sides, revealing the elevation and profile projections.

Buttons
By clicking or hovering over the buttons, you can get the classic navigation options: go forward, go back - different figures - in the scenes and, for better understanding, the red and green buttons make the figure disappear or appear again.
This can help to better see the views that are just behind the figures.

2. Activity 2 (with mobile or tablet)



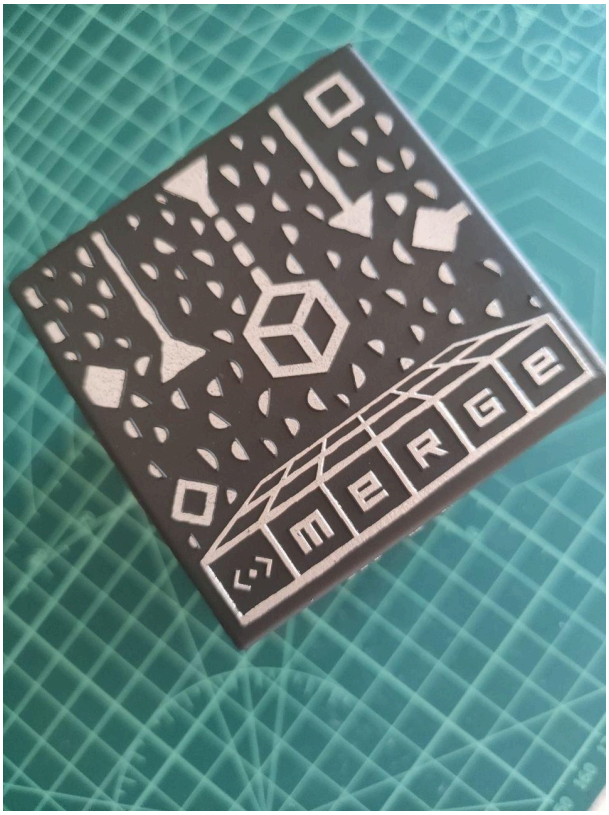
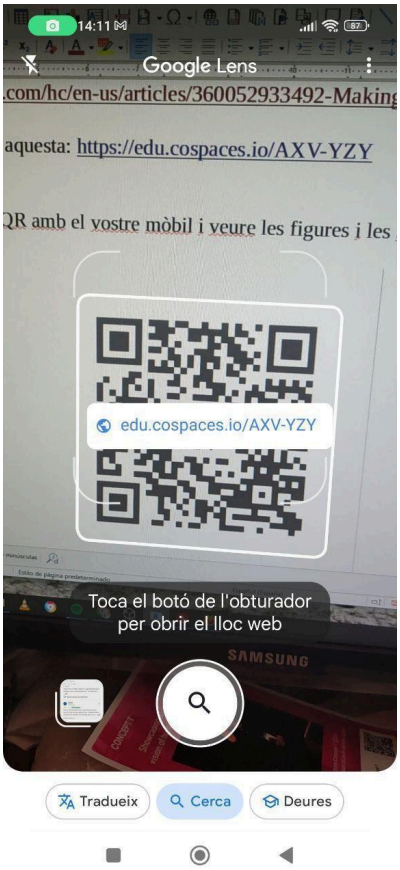
When you start the second activity, you will find out that the 3D pieces do not appear at the beginning. The only available button will be the green one, that students can use to show the object. Similarly, when the object is showing, the only available button is the red one, to make the object disappear.

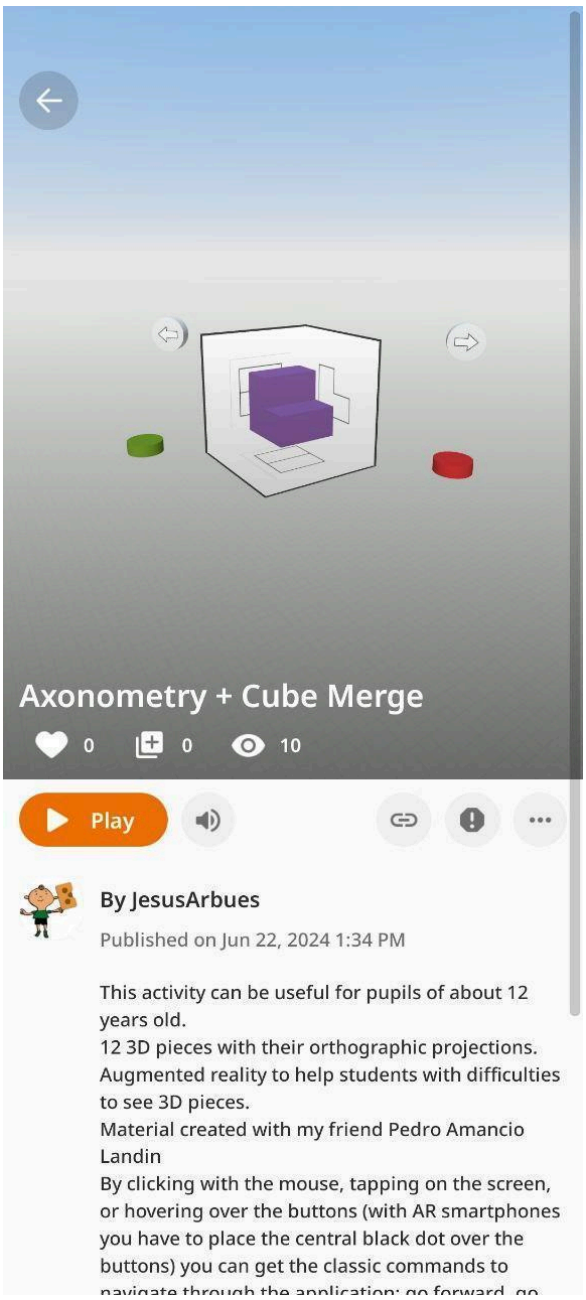
Buttons
Similarly as in the computer activity, by clicking or hovering over the arrow buttons you can get the classic navigation options: move forward/backward to the next/previous model.
Once again, the green/red button makes the model appear or disappear.
This second activity could serve as a model for drawing 3D objects starting from their orthogonal views.

Extension ideas:

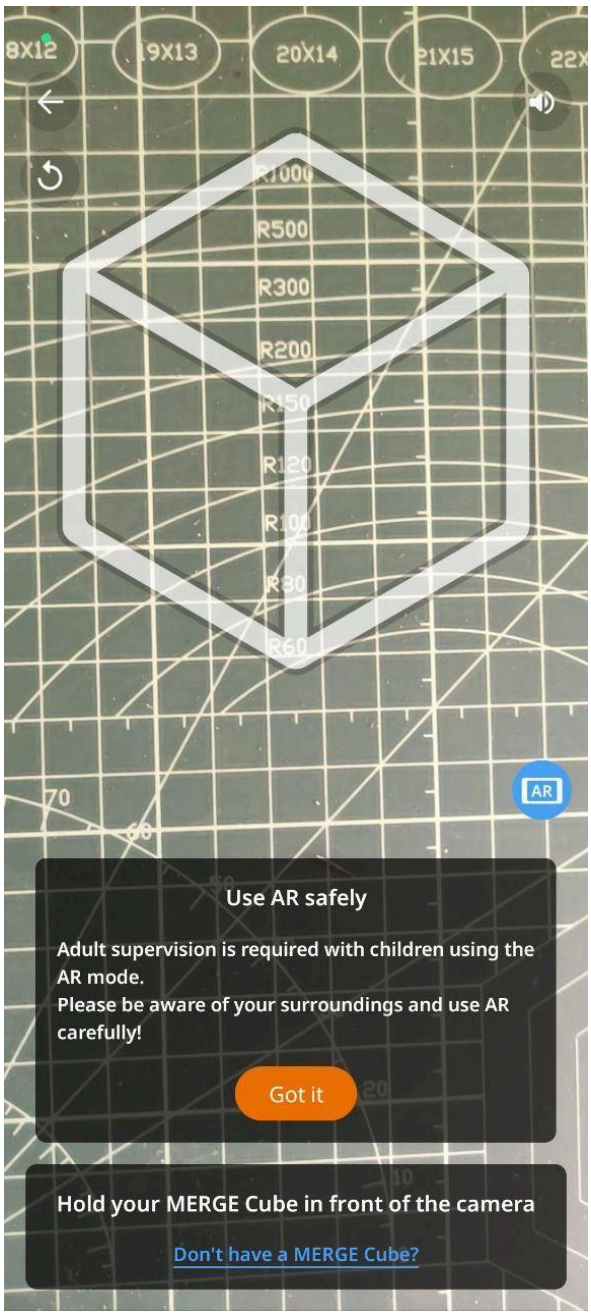
Here are two additional resources to "improve" practice. The first sheet presents figures drawn in 2D and the second shows 3D views. They can be used according to the needs of your students.
In the first exercise, students will be asked to draw 3D objects - isometric drawing - starting from their views.
In the second activity, you will ask your students to look at a 3D object and draw their three main views (elevation, plan and profile).

Assignment steps:

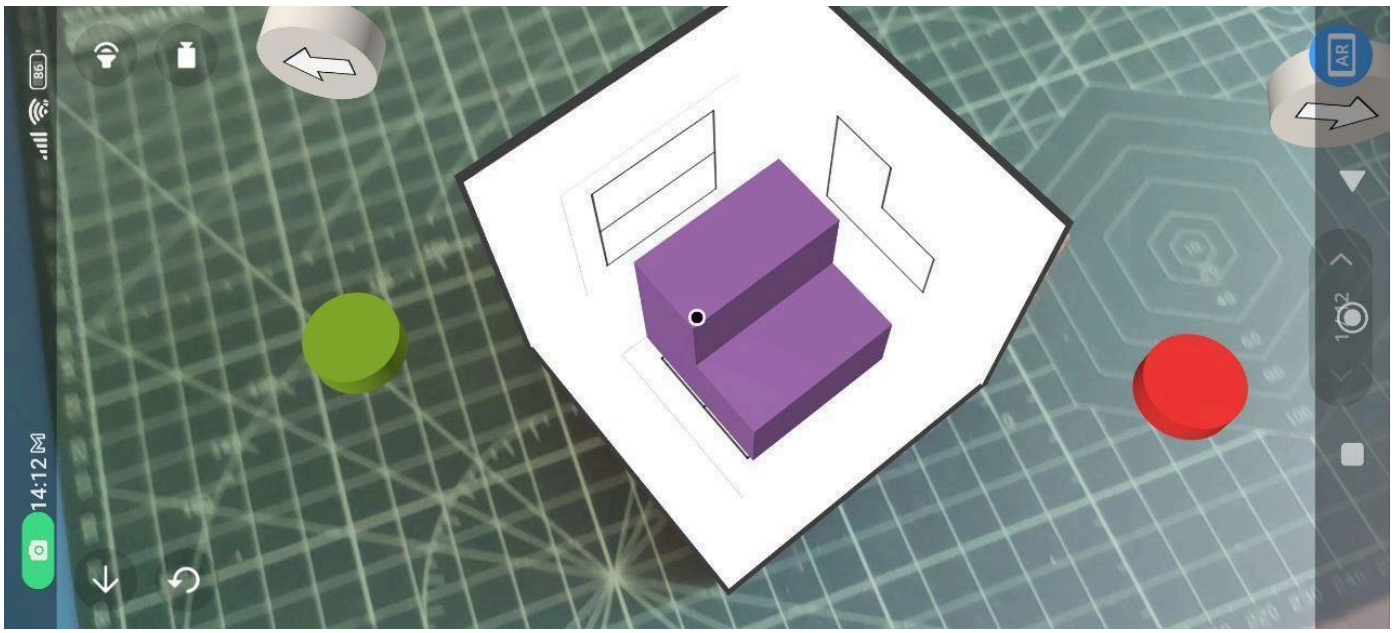
	
Place the Merge Cube on a surface	Scan the application's QR code



The activity opens by clicking on the Play button



Now we need to match the white silhouette that appears on the screen (cube shape) with our Merge Cube.



Evaluation suggestions:

These activities should be considered as a digital tool to assist the learner, the actual assessment should be marked with a subject-specific rubric.

This project was made possible thanks to the help of my friend Pedro Amancio Landin Iglesias (@pelandintecno) from Sagrado Corazón Placeres-Fundación Educativa Sofía Barat.
All 3D models and images of the views used were designed by him.
You can find 3D models similar to the ones used on this Sketchfab link