Lumination Learning Lab

Lesson Bytes
Teaching ideas for immersive learning

Angles of Depression and Elevation

Learning Area
Maths

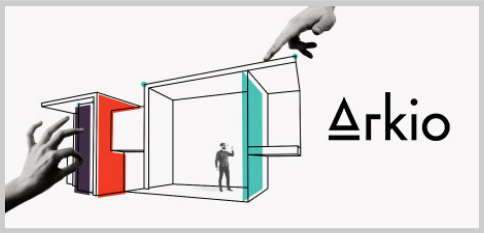
Year Level
Year 10

Introduction

In this lesson, students will explore the real-world applications of angles of elevation and depression using immersive virtual reality. By designing various building structures and natural elements such as trees in Arkio, they will visualise and solve mathematical problems using Pythagoras' theorem and trigonometry. Students will also recreate these scenarios in CoSpaces, where they will input their equations and provide verbal explanations of their process, combining mathematical theory with creative 3D modeling.

Application

Arkio
Arkio is a powerful design and collaboration tool that allows users to create and explore 3D models in virtual reality. In this lesson, students will use Arkio to build realistic scenarios involving buildings, trees, and other objects to study angles of elevation and depression.



Lesson Overview

Lesson Objectives

- Apply Pythagoras' theorem and trigonometry to real-life structures.
- Calculate angles of elevation and depression using right-angled triangles.
- Create virtual representations of

VR/AR Resources

- Example Questions for Finding Angles of Elevation and Depression
- Arkio Controller Diagram

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mathematical problems to enhance and display their understanding.

Lesson Outline

Before the Immersive Learning Journey

- Ensure that all VR equipment (headsets, controllers, sensors) and software (applications, simulations) are properly set up and functioning.
- Ensure students are familiarised with the Arkio experience, knowing how to insert shapes on the design table and modify their size; and familiar with CoSpaces, ensuring they know how to manipulate objects, add texts and clickable voice explanations (optional).
- Teachers should review Pythagoras' theorem and trigonometry concepts with students, particularly focusing on angles of elevation and depression.
- Teachers can introduce examples of practical problems involving elevation and depression angles, discussing their relevance to real-world structures.
- Teacher to distribute copies of worded problems and the controller diagram under resources, or provide students with their own worded problem to recreate.

During the Immersive Learning Journey

Divide your class into two groups, and further divide them into smaller groups, depending on the number of IMVR Stations available. Introduce the goal of the lesson: learning to contextualise worded problems to find its solution and check the appropriateness of their answers.

IMVR Station: Students in a group will take turn to create 3D models in Arkio to match the worded problems provided. Controller diagrams available in resources for students who are new to the experience. Other members in their team will have to calculate the angles of elevation and depression between the objects with the correct formula. Teams will check their answer against the Arkio scenario to ensure their answer makes sense (i.e teleport to the top of a building and look down at an object to evaluate the depression angle).

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Creation Station: Students in this station will work with their smaller groups to create 3D environments in CoSpaces, where they will recreate their worded problems. They will input text boxes with their trigonometric equations and if desired, record their voices explaining how they calculated the angles of elevation and depression. This can be done through the upload → sound → record section of CoSpaces. Sounds can be 'inserted' through the "Code" panel: under Action → Sound. Advanced CoSpaces students can insert the "Events" block: When item is clicked → play sound block.
Groups in this station can collaborate on their equations yet create individual 3D Environments, or teachers can "Create Assignment" in their class and allow group work in one 3D Environment.

After the Immersive Learning Journey

Discussion Questions:

1. How did creating 3D models help you visualise and solve problems related to elevation and depression angles?
2. What challenges did you face when applying trigonometry in a virtual world?
3. How can this approach be applied to real-world problem-solving in fields like architecture or engineering?

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