

TRIGONOMETRIC TRAJECTORIES: Sequence Overview

Summary of learning goals

Students' understanding of trigonometric and Pythagorean relationships are reinforced through two engaging real-world contexts: researching and building a thrilling (yet safe) zipline ride for a doll, and outlining a proposal for building glider poles in their local area.

Australian Curriculum: Mathematics (Year 10/10A)

ACMMG245: Solve right-angled triangle problems including those involving direction and angles of elevation and depression.

ACMMG276: Apply Pythagoras' Theorem and trigonometry to solving three-dimensional problems in right-angled triangles.

Summary of lessons

Who is this Sequence for?

This sequence is for students who are familiar with Pythagoras' Theorem and angles of depression/elevation. There are opportunities for students to independently design and conduct practical experiments by creating models, drawing diagrams and conducting and refining practical experiments.

Lesson 1: World's Greatest Ziplines

Students apply known trigonometric and Pythagorean relationships to investigate the dimensions of adventure ziplines around the world. They plan, diagram, model and construct a zipline for a Barbie doll.

Lesson 2: Glider Poles

Students learn about the importance of building "glider poles" by the sides of highways to allow gliding mammals to cross wide roads, then design a pair of glider poles appropriate for the animals and roads in their region. They use their knowledge of trigonometry, particularly angles of elevation and depression.

We value your feedback after these lessons via our website.

Reflection on this sequence

Rationale

This sequence contains two intriguing real-world applications of trigonometry, providing opportunities for students to use mathematics to investigate real life contexts and solve real life problems.

reSolve Mathematics is Purposeful

- Students build fluency with calculations in engaging real-world contexts.
- Students explore issues of real-world relevance and concern: preserving the Australian ecosystem and investigating the safety issues in popular adventure activities.

reSolve Tasks are Inclusive and Challenging

- There are multiple possible approaches to building a safe yet thrilling zipline in Lesson 1: detailed diagrams and calculations in the planning stage or repeated experimentation and reiteration.
- Both lessons allow students to set their own difficulty based on the location and conditions they choose.

reSolve Classrooms Have a Knowledge Building Culture

- Students collaborate to model, design, experiment and redesign.

Acknowledgements

Lesson 2 draws on the work of Ross Goldingay and in particular Goldingay, R., Taylor, B. & Parkyn, J. (2018). “Use of tall wooden poles by four species of gliding mammal provides further proof of concept for habitat restoration” in *Australian Mammalogy*.