GATEWAYS JOURNEYS

G.A.T.E.WAYS invites high-ability Year 5 & 6 students with a love of STEM to …

A problem can first appear like a mountain – too big to tackle! At least, that is what the citizens of Airley Heights thought when their water supply was cut-off by a landslide. Are you ready to help them engineer a solution for transporting their water from its source at the top of the mountain, to their homes and businesses below? Engineering helps us design technologies that make mountainous problems seem like molehills – easy to overcome. In this Journey, we will explore the physics concepts and principles that engineers must consider for effective design, while planning, building, and testing a zip line to transport water to the town.

Requirements:

- Please bring a well-stocked pencil case and an exercise book.

Session 1: Forced to move

The laws of physics are FUNdamental in engineering. In our first session we will explore Newton's laws of motion through hands-on activities to help us better understand how they will influence our zip line. We will create static force diagrams to visualise these invisible forces and investigate how unbalanced forces make things move. Are you ready to get our Journey moving in our first session all about physics? It will take your knowledge about Newtonian forces to new heights!

Session 2: Balancing Act

The centre of gravity is critical in static engineering design Today, we will investigate this important physics concept by creating a hanging mobile and looking to real-world examples for inspiration. But not all things are static! We will also discover engineering dynamics, specifically angular momentum, by building a range of balanced spinners so we can apply our learnings to the zip line. Everything hangs in the balance for Airley Heights, but what you learn in this session will definitely help them to solve their water woes.

Session 3: Shape Up!

Today's session is shaping up to be a challenging one that explores material properties, tension, compression, and bending. Building a structure to transport so much heavy water from the mountain peak will require strength, and a lot of it. You must consider the materials you use and how they are arranged. To do this, we'll put a range of materials to the test to find out which are fit-for-purpose and those that can go on the scrap heap. We don't need our structure to buckle under the pressure – the people of Airley Heights are counting on you!

Session 4: Zippee!

As things begin to look up for the people of Airley Heights, it's all downhill from here … literally! Today you will apply your newly gained science and engineering knowledge to create a watertight solution. We will collaborate in small teams to build and test a zip-line gondola that successfully carries water from the peak of the mountain to the 'buffer zone' below. Can you engineer something that does not spill a drop and ensures Airley Heights once again has access to fresh, clean water?

Intended Outcomes:

In this program students will develop their understanding of engineering and physics by:

- Engaging in scientific inquiry through making and recording accurate observations.
- Investigating balanced forces by explaining and demonstrating Newton's first law of motion
- Exploring static force diagrams.
- Learning about physics concepts including, centre of gravity and angular momentum.
- Testing the material properties of objects and exposing these to different conditions.
- Employing engineering principles to create and design a solution to complete the 'zip line' challenge.

About the presenter:

Kim Miter is a qualified aerospace engineer with 10 years' experience in the structural analysis and design of civil and military aircraft. She now teaches STEM to primary aged children, using problem-based learning and the design process to engage students in critical and creative thinking.