RATIONAL TANGLES: Sequence Overview

Summary of learning goals

Students problem-solve and explore the properties of rational numbers.

Australian Curriculum: Mathematics (Year 8)

ACMNA183: Carry out the four operations with rational numbers and integers, using efficient mental and written strategies and appropriate digital technologies.

Summary of lessons

Who is this Sequence for?

Students need to have developed skills for adding and subtracting fractions.

Lesson 1: Untangling Tangles

Students learn a "dance" with ropes that can be used to represent any rational number. They experiment with the dance to determine its properties.

We value your feedback after these lessons via our website.

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Reflection on this sequence

Rationale

This task investigates an interesting problem about tangling ropes developed by the mathematician John Conway. He discovered that a pair of "tangling operations", twisting and rotating, can be represented by a pair of simple arithmetical operations. A twist is represented by adding 1: $x \rightarrow x+1$, and rotation is represented by a number's negative reciprocal: $x \rightarrow -\frac{1}{x}$.

This task draws on students' mathematical reasoning as students make sense of something quite complex using simple arithmetic procedures. As John Conway stated:

What I like doing is taking something that other people thought was complicated and difficult to understand, and finding a simple idea so that any fool - and in this case, you - can understand the complicated thing.

reSolve Mathematics is Purposeful

- Students recognise the interconnectedness of mathematics as they explore how fractions can be used to better understand the formation of knots

reSolve Tasks are Inclusive and Challenging

- This task utilises the physical manipulation of ropes and links this to symbolic recording

reSolve Classrooms Have a Knowledge Building Culture

- The task is collaborative in nature as students participate in a whole class demonstration and then work in small groups to build their understanding and reasoning skills

Acknowledgements

This resource draws from Amie Albrecht's blog posts *Tangling and Untangling* and *#NoticeWonder and Rational Tangles*. Amie has given permission for her work to be used here.