

Suggested activity

Topic: Slide Rule

Year: Secondary V

Branch of mathematics: Arithmetic and Algebra (logarithms)

Option: Technical and Scientific

IDENTIFY THE MATHEMATICAL CONCEPTS AND PROCESSES ASSOCIATED WITH THE DESIGN OF AN INSTRUMENT

For more than two centuries until the invention of electronic calculators, the slide rule was used regularly by scientists, engineers and students. The principle underlying its use (the sum of the logarithms of two numbers is equal to the logarithm of the product of the two numbers) made it possible to develop other models using discs and cylinders. In fact, circular models are still used for aerial navigation.

The precision of a slide rule, which is normally limited to three significant digits, usually requires the use of rounded values and encourages the search for analytical solutions.

In this suggested activity, students must study and make a slide rule.

This activity can be carried out in three phases: discovery, building and analytical.

- *Discovery phase*: The teacher hands out an instrument to each group of students and asks questions about how the instrument works: *How does it work?* Each student has the opportunity to handle the objects before making them. Certain important questions may arise during this initial phase; the teacher can decide that these questions are worthy of investigation, but must not answer them. This phase does not usually last very long (10-15 minutes) and the teacher may have to cut it short even if the students have not received answers to their questions.

- *Building phase*: Each student studies how to go about making the object, builds it and customizes it. This phase is crucial to the process.

- *Analytical phase*: Now that the students each have their instrument, they can go back to answering the initial question: *How and why does it work?* To study instruments it is preferable, and even necessary, for each student to have one. It is important to work in groups of two, three or four in order to test out and compare opinions.

References:

<http://www.dma.ens.fr/culturemath/materiaux/poissard/Dossier.pdf>

<http://www.taswegian.com/TwoHeaded/UniVirtual/UniVirtual.html> (Virtual slide rule)

<http://blogue.sciencepresse.qc.ca/culture/item/262>

http://fr.wikipedia.org/wiki/Règle_à_calcul

http://haubans-maths.chez-alice.fr/documents/regl_cal.htm

Training session 2009-2010 – Mathematics - Secondary Cycle Two



Mathematics program team

DEVELOPMENT OF THE COMPETENCIES

After being shown how a slide rule works, students use mathematical reasoning when asked to explain this process by using mathematical knowledge, in particular, their knowledge of the properties of logarithms. Students use networks of algebraic concepts and processes to validate their conjectures. They present a series of deductive steps that constitute a proof.

Students communicate by using mathematical language when asked to explain how the slide rule works (based on the properties of logarithms). They describe, interpret or explain the data given in the problem. They use definitions, properties and postulates to construct a clear and solid argument. This explanation can take different forms: text, oral presentation, article, poster, etc.