

Suggested activity

Topic: Land Surveying and GPS

Level: Secondary IV

Branch of mathematics: Geometry

Option: Technical and Scientific

THE USE OF INSTRUMENTS IN CERTAIN TECHNICAL FIELDS (LAND SURVEYING AND TOPOGRAPHY)

In this activity, students must accurately determine or represent the surface features of a stand of maple trees by using the coordinates obtained with a GPS system.

The SSD in land surveying and topography allows students to acquire the knowledge and skills needed to gather topographical data using common land surveying instruments such as a level, theodolite or total station. The latter is sometimes built into a GPS system. In this course, students also learn to use mathematics to specify technical information so that it can be represented graphically in the form of topographic drawings and plans, produced on a drawing board or a computer.

Here are the coordinates of four points that define the boundaries of a maple stand in the Mont Saint-Grégoire region:

45° 21' 45.36" N 73° 09' 36.11" O elevation 45 m

45° 21' 37.63" N 73° 09' 47.02" O elevation 45 m

45° 21' 20.37" N 73° 09' 18.08" O elevation 66 m

45° 21' 32.88" N 73° 09' 16.96" O elevation 61 m

Based on the Earth's meridional perimeter (passing through the poles), i.e. 40 007.864 km, the value of a second of latitude is estimated to be 30.87 m. As well, based on the equatorial perimeter, i.e. 40 075.017 km, the value of a second of longitude is estimated to be 30.92 m.

Reference

http://www2.inforoutefpt.org/guide/det_prog_sec.asp?QProg=5238&QRegion=0

http://ch.monemploi.com/sec_pro/a/72Land_surveyinggettopography.html

Google Earth (latitude and longitude)

DEVELOPMENT OF COMPETENCIES

Students solve a situational problem when asked to accurately determine the surface features of the maple stand. They use their spatial and measurements sense to identify the task at hand and explore possible solutions. They visualize the figures (quadrilaterals and triangles) involved in the situational problem and represent them using instruments or geometry software. In developing their solution, they find unknown measurements of length and area and, in particular, apply the concept of the distance between two points. They organize and justify the steps in their solution using properties and postulates. They make sure that their result is plausible, given the context, and express it by using an appropriate unit of measure. Students communicate by using mathematical language when asked to represent technical information graphically so that it can be presented to others.

Training session 2009-2010 – Mathematics - Secondary Cycle Two



Mathematics program team