



Concepts for teaching units

Title	Travelling on a map with vectors
Age of students/grade	Upper-secondary students – 16 and more
Length of the unit	Approximately 4 x 45 minutes
Materials needed	Online or paper maps, tools for geometry
Objectives	<ul style="list-style-type: none">• to modelize a trip using pairs vectors• to use IT tools in Mathematics (Geogebra, a spreadsheet)• to develop students' ability to collect, analyze and study a set of data• to cooperate in a group of students
Content related anchor points	<ul style="list-style-type: none">• vectors – properties of vectors• idea of a vector as a model for moving (a movement of a ship or a bird moving in a direction, influence of wind)• sum of vectors, linear combination• idea of span or basis of a vector space• creating, reading and interpreting graphs (on the paper or using a computer)• the trip can be on the sea, in the air, on the roads or virtual
Methodology related anchor points	<ul style="list-style-type: none">• Work in groups• Presentation of results in front of the whole class• Use of electronic devices and tools.• Interdisciplinary work – cooperation with other teachers• Use of maps (real or invented)•
Language related anchor points	<ul style="list-style-type: none">• Basic vocabulary linked with coordinate geometry• Some concepts from geography

Appendixes

Example of a situation

A vector-loving man goes from Praha to Kostelec nad Černými lesy. The towns are represented by points $P(0,0)$, $K(5,-2)$ on the map. In order to move, he uses only given vectors, sums or differences of given vectors and multiples of a given vector by a number.

Describe the trip and represent it on the map in the following cases

- a) vectors $i=(1,0)$, $j=(0,1)$
- b) vectors $u=(2,1)$, $v=(1,3)$
- c) vectors $a=(1,2)$, $b=(3,6)$

