

ABSTRACT

- TITLE** Spatial generalizations of the properties of the triangle
- AUTHOR** Jiří Šrubař
- SUPERVISOR** Prof. RNDr. Adolf Karger, DrSc.
- DEPARTMENT** Department of mathematics education
- ABSTRACT** The present thesis describes various interesting properties of a triangle. The aim is to find and prove similar properties of its spatial generalization – a tetrahedron. Even though both synthetic and computational methods are used for proving spatial relations, synthetic approach is preferred whenever possible.
- The thesis is divided into two parts. In the first part, the properties of the tetrahedron analogous to the centroid and the orthocenter of the triangle are described. Also, conditions on the existence of the orthocenter of the tetrahedron are derived. Moreover, for tetrahedrons without an orthocenter, the so-called Monge point is introduced as its generalization.
- In the second part of the thesis, some further properties of the triangle are studied – the Simson line, the de Longchamps point, the nine-point circle, the Euler line, the Lemoine point, the isodynamic points, the Lemoine axis and the Brocard axis. As the main contribution of the present thesis we define and prove the existence of spatial analogues of the above mentioned properties for the tetrahedron – the de Longchamps point, the twelve-point and the eight-point sphere, the Euler line, the Lemoine point, the isodynamic points, the Lemoine plane and the Brocard axis.
- KEYWORDS** Spatial generalization, triangle, tetrahedron, Monge point, twelve-point sphere, eight-point sphere, Euler line, Lemoine point, isodynamic point, Lemoine plane, Brocard axis.