



SCHEME OF WORK



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Subject: Mathematics
Year: Third grade, 3.X
School year:/.....

List of topics

	Topics	Time period
1.	Revision (functions, plane geometry)	September
2.	Constructive geometry in the plane	October - November
3.	Constructive geometry in space	November - January
4.	Vector geometry	February, March
5.	Coordinate geometry in the plane	April - June
6.	Conic section	

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Jihomoravský kraj



INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

TENTO PROJEKT JE SPOLUFINANCOVÁN EVROPSKÝM SOCIÁLNÍM FONDĚM A STÁTNÍM ROZPOČTEM ČESKÉ REPUBLIKY

Topic 1.: Revision (functions, plane geometry)

Outputs:

Main concepts (mapping, function; formula, domain, codomain)

Main attributes (monotonic function, bounded function, inverse function).

Constant function. Linear function. Quadratic function, quotient function, exponential, logarithmic and trigonometric functions - definition a function and list different ways of describing functions, equation, graph

Express main geometric terms, solve problems leading to construction

Sources:

Odvárko O.: *Matematika pro gymnázia – Funkce*, Prometheus, 3. upravené vydání

Odvárko O.: *Sbírka úloh pro gymnázia – Funkce*, Prometheus, 2. vydání

Pomykalová E.: *Matematika pro gymnázia – Planimetrie*, Prometheus, 4. upravené vydání

Odvárko O.: *Matematika pro gymnázia – Goniometrie*, Prometheus, 3. upravené vydání

Odvárko O.: *Sbírka úloh pro gymnázia – Goniometrie*, Prometheus, 2. vydání

Teaching methods:

Frontal teaching

Team work

Exercising

e-learning

Grading:

Notes:

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Topic 2.: Constructive geometry in the plane

Outputs:

- explain a point, a line, a half-line a line segment and a plane
- define, explain and calculate angles, a circle and the parts of a circle, explain basic properties of circles
- calculate angles using the circle angle theorems
- define a triangle and a quadrilateral, their basic elements and their basic properties
- classify triangles and quadrilaterals
- construct a triangle given by three elements of the triangle, and produce an analysis, a description and a discussion of the construction
- prove if two triangles are congruent or similar
- use the Pythagorean and Euclidean theorems for triangles
- define the different types of transformation and their basic properties (translation, reflection, rotation and dilatation)
- use the above transformations in construction problems
- calculate the area and circumference of a circle.
- calculate the areas and perimeters of polygons, segments and sectors of circles

Sources:

Pomykalová E.: *Matematika pro gymnázia – Stereometrie*, Prometheus, 3. upravené vydání

Teaching methods:

Frontal teaching

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Topic 3.: Constructive geometry in space

Outputs:

- describe the different configurations in space of: a point and a line, a point and a plane, two lines, a line and a plane, three planes
- explain theorems concerning different configurations points, lines and planes in space
- list the conditions for lines and planes to be parallel or perpendicular
- define the angle between 2 intersecting lines, a line and a plane, 2 planes and skew lines
- calculate the angle between: two intersecting lines, a line and a plane, two planes, two skew lines
- construct and calculate the perpendicular distance of a point from a line and the perpendicular distance of a point from a plane
- construct and calculate the perpendicular distance of a line /a plane/ from a parallel plane
- define a solid and explain its basic properties
- classify solids and describe their basic properties
- construct solids using the parallel projection
- construct sections through solids and explain basic principles of used mappings
- explain Cavallieri's principle
- calculate the volumes and surface areas of solids and their parts
- solve three-dimensional problems using trigonometry or vectors.

Sources:

Pomykalová E.: *Matematika pro gymnázia – Stereometrie*, Prometheus, 3. upravené vydání

Teaching methods:

Frontal teaching
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Topic 4.: Vector geometry

Outputs:

- explain what is meant by a vector, add, subtract and find scalar multiples of vectors in two-dimensions (numerically and graphically) and in three-dimensions (numerically)
- find the magnitude of a vector
- recognise and write vector equations of lines, half-lines and line segments in two and three-dimensions
- determine if two given vectors are intersecting, parallel or skew
- define the scalar product and list its main properties
- use the scalar product in solving problems
- explain difference between the direction vector and the normal vector of a line in the plane
- understand the significance of normal vectors
- calculate angles in two- or three-dimensional situations involving vectors
- define the vector product and list its geometrical properties
- use the vector product in solving problems.

Sources:

Kočandrle M., Boček L.: *Matematika pro gymnázia – Analytická geometrie*, Prometheus, 2. upravené vydání

Bušek I.: *Sbírka úloh pro gymnázia – Analytická geometrie*, Prometheus, 1. vydání

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Topic 5.: Coordinate geometry in the plane

Outputs:

- define 3 types of equations of a line
- change from one form of the equation of a line to the other
- find the mid-point and length of a line, given the coordinates of its end-points
- find the gradient of a line, given the coordinates of two points on the line
- recognise the equation of a straight line, $y = kx + q$, and explain the geometrical significance of k and q
- determine if two given lines are parallel or intersecting especially if they are perpendicular
- write the equation of a line given the coordinates of two points on the line or given its gradient and the coordinates of one point on the line
- find the equations of lines going through a given point and having a certain angle to a given line
- find the coordinates of the point of intersection of two lines
- find the angle between two lines
- find the perpendicular distance of a given point from a given line
- find the perpendicular distance between 2 parallel lines
- find the locus of a point using co-ordinate geometry

Sources:

Kočandrle M., Boček L.: *Matematika pro gymnázia – Analytická geometrie*, Prometheus, 2. upravené vydání

Bušek I.: *Sbírka úloh pro gymnázia – Analytická geometrie*, Prometheus, 1. vydání

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Topic 6.: Conic section

Outputs:

- define the parabola, the ellipse and the hyperbola as the locus of a point
- describe the construction of the parabola, the hyperbola and the ellipse
- give the equations and describe the basic properties of the parabola, ellipse and hyperbola
- describe configurations of a line with each one of: the parabola, the hyperbola and the ellipse
- find the tangent to these curves at a given point of tangency and at a point
- find the angle between tangents
- find the equation of a tangent to a given curve being parallel/perpendicular to a given line

Sources:

Kočandrle M., Boček L.: *Matematika pro gymnázia – Analytická geometrie*, Prometheus, 2. upravené vydání

Bušek I.: *Sbírka úloh pro gymnázia – Analytická geometrie*, Prometheus, 1. vydání

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