Math
Year 10

The content and organization of Math teaching process are based on the *competence approach* whereby the final result of discipline studying is presented by certain formed competences which will facilitate pupils' ability to apply their knowledge in real life situations, take responsibility for their actions, and become useful members of society.

Practical competence requirements for the graduate of the general education establishment are as follows:

- knows how to build and research the simplest mathematical models of real facilities, processes, phenomena, and tasks related to them using mathematical objects and the relevant mathematical tasks;
- has mastered calculation techniques in a rational combination of oral, written and instrumental calculation, specifically, the approximate ones;
- knows how to design and conduct algorithmic and heuristic activities using mathematic materials;
- knows how to work with formulas (understands the concept of each formula element, knows how to find their numeric values with the set variable values, and how to express one variable through the other one);
- understands and is able to build functional dependence graphs, and knows how to study them;
- knows how to classify and create geometric figures on the plane and in space, describe their features, make solid figures and their elements, and build on images;
- knows how to measure geometric variables on the plane and in space describing the position of geometric figures (distances and angles), and to find quantitative features of figures (area and volume);
- knows how to assess the probability of events.

Algebra and Precalculus

(54 hrs Term I — 16 hrs, 1 hr per week,
Term II — 38 hrs, 2 hr per week, reserve – 7 hrs)

The expected results of learning and cognitive activity of pupils	**Content of educational material**
Topic 1. Functions, their features and graphs, 15 hrs	
Pupil: ● **uses** different methods of setting functions;	Numerical functions and their features. Method of function setting. Even and odd

• **finds** the area of functional dependence definition; the value of function under the set argument values and the argument value whereby the function reaches this value; • **sets** the main features of the function under its graph; • **sets** the features of the functions; • **calculates and compares** the values of expressions with degrees and rational indicators, and roots; • **recognizes and makes schemes of** degree function graphs; • **designs** real processes using exponential functions.	functions. N-degree root. N-degree arithmetical root and its features. Degree with a rational value and its features Exponential functions, their features and graphs.
Topic 2. Trigonometric functions, 18 hrs	
Pupil: • **knows** how to convert angle radial measure to degree measure and backwards; • **sets** the correspondence between the real numbers and dots on a unit circle; • **recognizes and makes schemes** of trigonometric function graphs; • **uses** graphs to describe the values of trigonometric functions; • **converts** simple trigonometric expressions; • **applies** trigonometric functions to describe real processes; • **solves** the simplest trigonometric solutions.	Sine, cosine, and tangent of an angle. Radial measuring of angles. Trigonometric functions of a numeric argument. The main relations between the trigonometric functions of one argument. Reduction formulas. Function periodicity. Features and graphs of trigonometric functions. Formulas of adding for trigonometric functions and their results. Simplest trigonometric solutions.
Topic 3. Derivatives and use of derivatives, 14 hrs	
Pupil: • **understands** the value of a derivative to describe real processes, specifically, mechanic movement; • **finds** the speed of value change in the dot, angle coefficient, and tangent slope angle to the function graph in this dot; • **differentiates** between the functions using the table of derivatives and the rules of derivatives; • **applies** the derivative to find the monotony intervals and extremes of a function, and to build graphs; • **finds** the largest and the smallest value of a function; • **solves** simple applied tasks to find the largest and the smallest values of real variables.	Derivative of a function, its geometrical and physical content. Differentiating rules. Function continuity sign. Sufficient conditions of function growth and decrease. Function extremes. Use of a derivative to research the function and build the function graphs. The largest and the smallest function value on the line.

Geometry

**(51 hrs. Term I — 32 hrs, 2 hr per week,
Term II — 19 hrs, 1 hr per week, reserve – 7 hrs)**

The expected results of learning and cognitive activity of pupils	Content of educational material
Topic 1. Parallelism of lines and planes and in space, 17 hrs	
Pupil: • **names** the main definitions of stereometry; • **differentiates** between the denoted and non-denoted notions, axioms and theorems; • **formulates** stereometry axioms and results thereof; • **uses** stereometry axioms and results thereof to solve simple tasks; • **classifies** the mutual placement of lines, lines and planes, and planes in space by the number of mutual dots; • **sets** the parallelism of lines, line and a plane, and two planes; • **finds out** whether two lines cross; • **draws** the lines in space; • **uses** the parallelism relation between the lines and planes in space to describe the relations between real world objects.	The main features and axioms of stereometry, and the simplest results thereof. Mutual distribution of lines in space. Parallel projection and features thereof. Images of figures in stereometry. Parallelism of a line and a plane. Parallelism of planes.
Topic 2. Perpendicularity of lines and planes in space, 17 hrs	
Pupil: • **sets and justifies** the perpendicularity of lines, line and a plane, and two planes; • **knows the definition** of an angle between the lines, a line and a plane, the planes, and a theorem of three perpendicular lines; • **uses** the relations between the lines and planes in space, distances and angles in space to describe the real world objects; • **solves** the tasks on measuring the distances and angles in space, particularly, the practical ones.	Perpendicularity of lines. Perpendicularity of a line and a plane. Theorem of three perpendicular lines. Perpendicularity of planes. Dihedral angle. Measuring distances in space: from a dot to a plane, from a line to a plane, and between the planes. Measuring angles in space: between the lines, between the line and a plane, and between the planes.
Topic 3. **Coordinates and vectors, 10 hrs**	
Pupil: • **uses** an analogy between the vectors and coordinates on the plane and in space; • **realizes** the importance of a vector coordination method in Math;	Coordinates of rectangles in space. Coordinates of the middle of interval. Distance between two dots. Vectors in space. Operations on vectors. Formulas to calculate the length of a vector,

• **conducts** operations on vectors; • **uses** vectors to model and calculate the geometrical and physical values; • **finds** the distance between two dots, coordinates of a middle of an interval, coordinates of dots symmetrical towards the beginning of the coordinates and the coordinate planes; • **uses** coordinates in space to measure the distances and angles.	angle between vectors, and distance between two dots. Symmetry of the center of coordinates and coordinate planes