

What Type of Mathematics Should Be Taught in Secondary Schools?

An abstract based on an expert report by Prof. Roza Leikin,
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In many countries around the world, mathematics curricula have undergone significant changes in recent decades. Among the factors contributing to these changes are the advances in scientific research in mathematics education; trends of the global world in which mathematics plays a central role; and the influence of international standards. The objective of this study was to analyze these changes in light of the Israeli mathematics curriculum in secondary schools, and to formulate a consensus report among well-known experts from various research institutions in Israel and abroad, to serve as a basis for an upcoming modification of the Israeli curriculum.

Recommendations:

- 1.** The learning of mathematics in secondary schools should rely on three axes: knowledge, thinking, and reasoning. Each dimension can be studied on a different level, in accordance with the learning stage or topic studied. Progress is made in a linear and spiral manner.
- 2.** The knowledge axis: facts, concepts, definitions, theorems, and processes around content areas, such as geometry, algebra, and others. There is a certain degree of correspondence between the mathematical topics studied in the Israeli curriculum and those measured by international standards.
- 3.** The thinking axis: types of thinking, such as logical, intuitive, critical, and abstract, practices by using proof, problem-solving, generalization, modeling, and research skills. At the high levels (5-6 PISA levels), students are asked to creatively devise new solutions to complex problems.
- 4.** The reasoning axis: the ability to express the mathematical process by using consistent and precise arguments, while connecting the mathematical model to the real-world context. The higher the reasoning ability, the higher the level of mathematical learning in the classroom.
- 5.** An initial mapping of the Israeli curriculum shows that at present, the main emphasis is on the knowledge axis and on the procedural and conceptual comprehension dimensions of the thinking axis.

Mathematical Thinking in School

