



# Middle School Mathematics Curriculum – Theory and Practice

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In recent years, Israel's middle and high school mathematics curricula have undergone several changes. Some of these changes stemmed from deliberate and systematic policies by the Ministry of Education, others from gradual adjustments to the examination frameworks, and some arose from challenges and constraints brought on by the COVID-19 pandemic and the Swords of Iron War. At the same time, mathematics curricula worldwide are undergoing significant changes owing to technological advances and the skills now required for the job market. To some extent, these global shifts also impact the mathematics curriculum in Israel.

Niza Sion, a former national mathematics teaching instructor for Israel's Ministry of Education, thoroughly examined these developments. She analyzed the official curriculum and compared it to the guidelines provided to mathematics teachers in Israel. Sion also explored how changes in the high school curriculum impacted the middle school program; the influence of the conceptual framework of the PISA exam; and, the real-life effects of the cancellation of the Meitzav achievement exams, the Corona pandemic, and the war.

## Main findings:

1. The middle school mathematics curriculum is divided into three main sections: Numbers and Operations, Algebra, and Geometry. The curriculum is taught in 7<sup>th</sup> through 9<sup>th</sup> grades, with approximately 150 hours of class each school year.
2. Following changes to the high school curriculum, adjustments were made to the middle school curriculum, including the addition of topics, such as coordinate geometry and properties of functions as an introduction to calculus.
3. However, due to the war, the Ministry of Education narrowed and reduced the scope of the material. Topics removed from the curriculum included functions, statistics, probability, word problems, and some geometry topics. This has led to significant gaps between the curriculum and its implementation.
4. The curriculum emphasizes the importance of incorporating literacy-based problems ("literacy tasks will be integrated into every learning unit where possible"), yet there is a mismatch between the mathematics topics and their weight in the curriculum versus the conceptual framework of the PISA assessment.
5. For example, the geometry curriculum focuses on plane geometry and drawing conclusions based on theorems, justifications, and proofs, whereas PISA emphasizes spatial geometry and applied geometry.
6. PISA assigns significant importance to statistics and probability, reflecting their prominence in the modern world. However, these topics are marginalized in Israel's mathematics curriculum.
7. The external middle school assessment system (Meitzav) was canceled. A triennial sample-based replacement was planned, but its implementation was postponed due to the war. Meanwhile, the Ministry of Education has offered schools internal assessment tools until the national model is implemented.
8. In middle school excellence classes (Amat, or "Scientific-Technological Reserve" classes), the focus is on deepening knowledge at the expense of enrichment, with emphasis on motion problems, literacy-based questions, properties of functions, and advanced geometry problems.