Algebra as a Strand of School Mathematics for All Students
A Position of the National Council of Teachers of Mathematics

Question
What is algebra as a strand of a school mathematics curriculum for all students?

NCTM Position
All students should have access to algebra in a pre-K–12 mathematics curriculum, including opportunities to generalize, model, and analyze situations that are purely mathematical and ones that arise in real-world phenomena. Algebraic ideas need to evolve across grades as a way of thinking and valuing structure with integrated sets of concepts, procedures, and applications.

Algebra is not confined to a course or set of courses in the school curriculum; rather, it is a strand that unfolds across a pre-K–12 curriculum. Students experience the algebra strand as a way of thinking and valuing structure that develops across grades. At the elementary level, students develop fluency with numbers, explore structure in operations and their properties, and verbalize quantitative relationships (cf. Kieran 2007a; Schifter, Russell, and Bastable 2009). Middle grades students move from verbal descriptions of relationships to proficiency in generalizing numerical relationships and expressing them with symbolic representations and in the language of functions (cf. Kieran 2007b). High school students extend their ability to use and see structure in symbolic expressions as they create and reason with equations, inequalities, and systems (cf. Kieran 2007c).

Each topic within the algebra strand should be experienced as an integration of concepts, procedures, and applications. Concepts such as variable and equivalence and procedures such as solving equations and inequalities are equally important. Multiple strategies, including variations on common procedures and procedures using different representations, are needed to solve problems within mathematics and within other contexts. At all levels, students generalize, model, and analyze situations that are purely mathematical or ones that arise in real-world phenomena. They develop strategic use of a range of representations, tools, and technologies—including calculators, graphing utilities, spreadsheets, and computer algebra systems.

Before students transition into algebra content as a prominent part of their coursework, they need to develop a solid foundation in pre-kindergarten through middle school mathematics. For example, prior to extensive study of linear equations and slope, students should be able to write and interpret equivalent numerical expressions, recognize situations in which quantities are proportionally related, and write ratios to express relationships between those quantities.

Characterizing algebra as a strand of the school curriculum highlights the power and usefulness of algebraic thinking and skills—proficiencies that open academic doors and are evident in many professions and careers. Such an algebra strand in the school curriculum is critical and is accessible for all students.
References


Resources


