



Algebra – A Significant Mathematical Modulation for Scholars to Ease Out Education

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ABSTRACT: Algebra is a branch of mathematics dealing with symbols and the rules for manipulating those symbols. In elementary algebra, those symbols (today written as Latin and Greek letters) represent quantities without fixed values, known as variables. Algebra is great fun - you get to solve puzzles!With computer games you play by running, jumping or finding secret things. Well, with Algebra you play with letters, numbers and symbols, and you also get to find secret things!And once you learn some of the "tricks", it becomes a fun challenge to work out how to use your skills in solving each "puzzle".

I.INTRODUCTION

An equation says that two things are equal. It will have an equals sign "=" like this:

$$x + 2 = 6$$

That equations says: **what is on the left (x + 2) is equal to what is on the right (6)**

So an equation is like a **statement** "this equals that"

A formula is a fact or rule that uses mathematical symbols.

It will usually have:

- an equals sign (=)
- two or more **variables** (x, y, etc) that stand in for values we don't know yet

It shows us how things are related to each other.

These are all equations, but only some are formulas:[1]

$$x = 2y - 7 \quad \text{Formula (relating x and y)}$$

$$a^2 + b^2 = c^2 \quad \text{Formula (relating a, b and c)}$$



$$x/2 + 7 = 0 \quad \text{Not a Formula (just an equation)}$$

Algebra is a fundamental component of mathematics and differs from arithmetic in the use of abstractions, such as using letters to stand for numbers that are either unknown or allowed to take on many values. We separate fundamental basic algebra into three class of courses of increasing difficulty: **Elementary or Beginning Algebra, Intermediate Algebra, and College or Advanced Algebra.** The content in these courses is generally considered to be essential for any study of mathematics, science, or engineering, as well as such applications as medicine and economics. More advanced study includes Linear Algebra and Abstract Algebra.[2]

My question extends beyond algebra and applies more broadly to the usual mathematics sequence, from geometry through calculus. State regents and legislators — and much of the public — take it as self-evident that every young person should be made to master polynomial functions and parametric equations.

is the second math course in high school and will guide you through among other things expressions, systems of equations, functions, real numbers, inequalities, exponents, polynomials, radical and rational expressions.

- Algebra is used in Maths when we **do not know** the exact number(s) in a calculation.
- In algebra we use **letters** to represent unknown values or values that can change.[3]

II.DISCUSSION

Algebra can be used in business when predicting sales, growth and profit.

Algebra is commonly used in formulas when we do not know at least one of the numbers, or when one of the numbers can change.

Algebra can be used to predict sales and how much a customer will spend. Algebra is used to estimate the life time value of a customer, which calculates the percentage of annual spend.

The formula used is:

$$y = 12 + 8x$$

Algebra is used because **x** (the number of months a customer has shopped with us) can change. **y** represents the percentage that a customer will spend in a year.

Imagine that a customer spends £50 in their first 2 months with us. We have to include their first month as $x = 0$, so their 2nd month will be $x = 1$.

Now we know $x = 1$, we can substitute it into $y = 12 + 8x$. [4]

Therefore:

$$y = 12 + (8 \times 1)$$
$$y = 20\%$$



If 20% = £50. Then over a full year, 100% will equal £250 ($5 \times £50$). This means we can predict a customer will spend £250 a year.

III.SIGNIFICANCE

Instructional programs from prekindergarten through grade 12 should enable each and every student to—

- Understand patterns, relations, and functions
- Represent and analyze mathematical situations and structures using algebraic symbols
- Use mathematical models to represent and understand quantitative relationships
- Analyze change in various contexts[5]

Understand patterns, relations, and functions

Pre-K–2 Expectations: In pre-K through grade 2 each and every student should—

- sort, classify, and order objects by size, number, and other properties;
- recognize, describe, and extend patterns such as sequences of sounds and shapes or simple numeric patterns and translate from one representation to another;
- analyze how both repeating and growing patterns are generated.

Grades 3–5 Expectations: In grades 3–5 each and every student should—

- describe, extend, and make generalizations about geometric and numeric patterns;
- represent and analyze patterns and functions, using words, tables, and graphs.

Grades 6–8 Expectations: In grades 6–8 each and every student should—[6]

- represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules;
- relate and compare different forms of representation for a relationship;
- identify functions as linear or nonlinear and contrast their properties from tables, graphs, or equations.

Grades 9–12 Expectations: In grades 9–12 each and every student should—[7]

- generalize patterns using explicitly defined and recursively defined functions;
- understand relations and functions and select, convert flexibly among, and use various representations for them;
- analyze functions of one variable by investigating rates of change, intercepts, zeros, asymptotes, and local and global behavior;
- understand and perform transformations such as arithmetically combining, composing, and inverting commonly used functions, using technology to perform such operations on more-complicated symbolic expressions;
- understand and compare the properties of classes of functions, including exponential, polynomial, rational, logarithmic, and periodic functions;
- interpret representations of functions of two variables



IV.EXPECTATIONS & CONCLUSIONS

Pre-K–2 Expectations: In pre-K through grade 2 each and every student should–

- illustrate general principles and properties of operations, such as commutativity, using specific numbers;
- use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations.

Grades 3–5 Expectations: In grades 3–5 each and every student should–

- identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers;
- represent the idea of a variable as an unknown quantity using a letter or a symbol;
- express mathematical relationships using equations.

Grades 6–8 Expectations: In grades 6–8 each and every student should–

- develop an initial conceptual understanding of different uses of variables;
- explore relationships between symbolic expressions and graphs of lines, paying particular attention to the meaning of intercept and slope;
- use symbolic algebra to represent situations and to solve problems, especially those that involve linear relationships;
- recognize and generate equivalent forms for simple algebraic expressions and solve linear equations

Grades 9–12 Expectations: In grades 9–12 each and every student should–[8]

- understand the meaning of equivalent forms of expressions, equations, inequalities, and relations;
- write equivalent forms of equations, inequalities, and systems of equations and solve them with fluency—mentally or with paper and pencil in simple cases and using technology in all cases;
- use symbolic algebra to represent and explain mathematical relationships;
- use a variety of symbolic representations, including recursive and parametric equations, for functions and relations;
- judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.

Use mathematical models to represent and understand quantitative relationships

Pre-K–2 Expectations: In pre-K through grade 2 each and every student should–

- model situations that involve the addition and subtraction of whole numbers, using objects, pictures, and symbols.

Grades 3–5 Expectations: In grades 3–5 each and every student should–[9]

- model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions.



Grades 6–8 Expectations: In grades 6–8 each and every student should–

- model and solve contextualized problems using various representations, such as graphs, tables, and equations.

Grades 9–12 Expectations: In grades 9–12 each and every student should–

- identify essential quantitative relationships in a situation and determine the class or classes of functions that might model the relationships;
- use symbolic expressions, including iterative and recursive forms, to represent relationships arising from various contexts;
- draw reasonable conclusions about a situation being modeled.

Analyze change in various contexts

Pre-K–2 Expectations: In pre-K through grade 2 each and every student should–

- describe qualitative change, such as a student's growing taller;
- describe quantitative change, such as a student's growing two inches in one year.

Grades 3–5 Expectations: In grades 3–5 each and every student should–

- investigate how a change in one variable relates to a change in a second variable;
- identify and describe situations with constant or varying rates of change and compare them.

Grades 6–8 Expectations: In grades 6–8 each and every student should–

- use graphs to analyze the nature of changes in quantities in linear relationships.

Grades 9–12 Expectations: In grades 9–12 each and every student should–

- approximate and interpret rates of change from graphical and numerical data.

REFERENCES

1. "algebra". Oxford English Dictionary. Oxford University Press.
2. ^ Menini, Claudia; Oystaeyen, Freddy Van (2017-11-22). Abstract Algebra: A Comprehensive Treatment. CRC Press. ISBN 978-1-4822-5817-2.
3. ^ See Herstein 1964, page 1: "An algebraic system can be described as a set of objects together with some operations for combining them".
4. ^ See Herstein 1964, page 1: "...it also serves as the unifying thread which interlaces almost all of mathematics".
5. ^ Jump up to:^a ^b ^c See Boyer 1991, Europe in the Middle Ages, p. 258: "In the arithmetical theorems in Euclid's Elements VII–IX, numbers had been represented by line segments to which letters had been attached, and the geometric proofs in al-Khwarizmi's Algebra made use of lettered diagrams; but all coefficients in the equations used in



the Algebra are specific numbers, whether represented by numerals or written out in words. The idea of generality is implied in al-Khwarizmi's exposition, but he had no scheme for expressing algebraically the general propositions that are so readily available in geometry."

6. ^ Esposito, John L. (2000-04-06). The Oxford History of Islam. Oxford University Press. p. 188. ISBN 978-0-19-988041-6.
7. ^ T. F. Hoad, ed. (2003). "Algebra". The Concise Oxford Dictionary of English Etymology. Oxford: Oxford University Press. doi:10.1093/acref/9780192830982.001.0001.ISBN 978-0-19-283098-2.
8. ^ "2010 Mathematics Subject Classification". Retrieved 2014-10-05.
9. ^ Struik, Dirk J. (1987). A Concise History of Mathematics. New York: Dover Publications. ISBN 978-0-486-60255-4.