BRITISH COLUMBIA
Ministry of Education

BIG IDEAS

Mathematics has developed over many centuries and continues to evolve.	The development of number and number systems occurred in many areas of the world and has evolved over time.	The algebra of today is an accumulation of work throughout the ages by mathematicians from many cultures.	Tools and technology have moved mathematics forward.	Historical mathematicians nurtured a sense of play and curiosity that led to the development of many areas in mathematics.

Learning Standards

Curricular Competencies	Content
Students are expected to be able to do the following:	*Students are expected to know the following:*
Reasoning and analyzing • Explore, make connections, predict, analyze, generalize, and make conclusions • Use historically appropriate tools and technology to explore problems from the past **Understanding and solving** • Explore multiple strategies used to solve problems throughout history • Develop, construct, and apply mathematical understanding through play, inquiry, and problem solving • Engage in problem-solving experiences that are connected to place, story, and cultural practices relevant to the historical context **Communicating and representing** • Communicate in a variety of ways, including written and oral language from a variety of cultures • Understanding historical mathematical understanding through concrete, pictorial, and symbolic representations of the past	• **number and number systems:** including written and oral numbers, zero, rational numbers, pi, irrational numbers, prime numbers • **patterns and algebra:** early algebraic thinking, variables, early uses of algebra, Cartesian plane, notation, Fibonacci sequence • **geometry:** lines, angles, triangles, Euclid's five postulates, geometric constructions, developments through time • **probability and statistics:** Pascal's Triangle, games involving probability, **early beginnings** of statistics and probability • **tools and technology:** development over time, from clay tablets to modern-day calculators and computers • **cryptography:** use of cyphers, encryption, and decryption throughout history; modern uses of cryptography in war; digital applications

Learning Standards (continued)

Curricular Competencies	Content
Connecting and reflecting • Access the significance of key figures throughout history and their contributions to the advancement of mathematics • Explore, apply, and connect concepts to each other • Explore the effects of mathematics on culture socially and politically • Incorporate First Peoples worldviews and perspectives to make connections to mathematical concepts	

number and number systems:

- Egyptian, Babylonian, Roman, Greek, Arabic, Mayan, Indian, Chinese, First Peoples
- exploring the idea of different bases, different forms of arithmetic, infinity
- problems from the Rhind Papyrus, Eratosthenes

patterns and algebra:

- Al-Khwarizmi's *Algebra,* Indian mathematics, Islamic mathematics, Descartes, golden ratio, patterns in art

geometry:

- problems from the Rhind Papyrus, Mosco Papyrus, Pythagoras, Hippocrates and construction problems of antiquity, geometry in Euclid's *Elements*, Archimedes, Apollonius, Pappus's *Book III*, Indian and Arabic contributions, Descartes and Fermat

probability and statistics:

- Pascal, Cardano, Fermat, Bernoulli, Laplace
- ancient games such as dice and the Egyptian game called Hounds and Jackals
- Egyptian record keeping
- Graunt and the development of statistics in response to a need for merchant insurance policies

early beginnings:

- forms of tabulating information, leading to the beginnings of probability and statistics

tools and technology:

- Papyrus, stone tablets, bone, compass straight, edge, abacus, scales, slide rule, rulers, protractor, calculators, computers

cryptography:

- cuneiform, Spartan military use of ciphers, first documentation of cyphers in the Arab world, John Wallis, WWII and the Enigma Machine, barcodes, modular arithmetic, RSA coding, current coding techniques and security in digital password encryption