Diophantus of Alexandria

rom the days of Euclid (ca 300 B.C.) to the time of Hypatia (A.D. 415), Alexandria, a city in northern Egypt, was the world's center of mathematical activity. Many famous mathematicians studied and lived there, among them Diophantus (ca A.D. 250), a heavily influential figure in the development of algebra. His most important work was Arithmetica, which contains impressive number theorems and about 130 diverse problems.

An interesting feature of Diophantus' algebra are his solutions for indeterminate equations. An example of an indeterminate equation is 5x + 2y = 20, where the number of unknowns (two) exceeds the number of equations (one). Because he recognized only positive rational number solutions, some of his solutions are restricted to integers. In his search for ways to find solutions for indeterminate equations, he founded the branch of algebra we call Diophantine analysis.

Although his contributions to mathematics are of great importance, we know little about Diophantus' life other than that he lived in Alexandria—and we are reasonably certain of his age when he died. One of his admirers described Diophantus' life in an algebraic riddle, which legend tells us appeared on his tombstone.

> Diophantus' youth lasted 1/6 of his life. He grew a beard after 1/12 more of his life. After 1/7 more of his life, Diophantus married. Five years later be bad a son. The son lived exactly $\frac{1}{2}$ as long as his father. Diophantus died just four years after his son's death. All of this totals the years Diophantus lived.

Can you solve the riddle to determine Diophantus' age at death? 🛨

ΔΙΟΦΑΝΤΟΥ

ΑΛΕΞΑΝ ΔΡΕΩΣ APIOMHTIKON A.

DIOPHANTI ALEXANDRINI ARITHMETICORVM LIBER PRIMVS.



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IN PRIMVM LIBRVM DIOPHANTI COMMENTARIL



COMMENTARII.

**ACTROLIS ance primain quaftionem premifie Diophaneus, ea defininonium & principionum locum obtaneus. Sed velut ad altiora feftinari, via non tam se acplicare volutile vide atur, quiam indicare, co runcique admonere, via nonniti horum cognitione sam proble influentia do hote libros seudiados accredas. Quod Puè non oblicura verbu professia est, definitione decuma vindecimiqu, cum att cum qui hoc negori; susceptim additione, subductione, & multiplicatione specierum tam exercitatum este debere, nectionium aquationibus nitè praparandus apprimit versa.

A page from the first volume of Diophantus' six-volume Arithmetica, written in Greek with Latin translation.

Activities

- $oldsymbol{1}$. Research some of the algebraic symbols introduced by Diophantus.
- 2. Solve these problems from Arithmetica.
 - a. Find four numbers that, taken three at a time, add up to 22, 24, 27, and 20.
 - b. In the right triangle ABC, right angled at C, AD bisects angle A. Find the set of smallest integers for AB, AD, AC, BD, and DC such that DC:CA:AD = 3:4:5.
- 3. When converting temperatures from Fahrenheit to Celsius, we use the formula $C = \frac{5}{2}(F 32)$. If we substitute integer values for F and round the values of C to the nearest integer, then we are finding (approximate) Diophantine solutions. What other common formulas are used in this way?

Related Reading

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