UNIVERSIDADE FEDERAL DO PARÁ
CAMPUS UNIVERSITÁRIO DE BRAGANÇA
FACULDADE DE LÍNGUAS ESTRANGEIRAS
Grande Área: Ciências Exatas e Engenharias
Novembro/2023

PROLIN
FALEST - Bragança

PROFICIÊNCIA EM LEITURA EM LÍNGUA INGLESA

Adapted from: M. Asper. **The two cultures of mathematics in ancient Greece**, in The Oxford Handbook of the History of Mathematics. Oxford: Oxford University Press, 2009, p. 107-10.

THE TWO CULTURES OF MATHEMATICS IN ANCIENT GREECE

[1] The notion of 'Greek mathematics' is a key concept among those who teach or learn about the Western tradition and, especially, the history of science. It seems to be the field where that which used to be referred to as 'the Greek miracle' is at its most miraculous. The works of, for example, Euclid or Archimedes appear to be of timeless brilliance, their assumptions, methods, and proofs, even after Hilbert, of almost eternal elegance. Therefore, for a long time, a historical approach that investigated the environment of these astonishing practices was not deemed necessary. Recently, however, a consensus has emerged that Greek mathematics was heterogeneous and that the famous mathematicians are only the tip of an iceberg that must have consisted of several coexisting and partly overlapping fields of mathematical practices. We describe as much of this 'iceberg' as possible, and the relationships between its more prominent parts, mainly during the most crucial time for the formation of the most important Greek mathematical traditions, the fifth to the third centuries BC.

[2] Let us begin with a basic observation. Whoever looks for the first time at a page from one of the giants of Greek mathematics, say, Euclid, cannot but realize an obvious fact: these theorems and proofs are far removed from practical life and its problems. They are theoretical. Counting, weighing, measuring, and in general any empirical methods, have no place in this type of mathematics. Somebody, however, must have performed such practices in daily life, for example, in financial or administrative fields such as banking, engineering, or architecture. Some of these fields demand mathematical operations of considerable complexity, for example, the calculation of interest or the comparison of surface areas. Occasionally, ancient authors mention such mathematical practices in passing. **What is known about these practical forms of Greek mathematics?**

[3] Of the social elite who alone wrote and read for pleasure, most were less interested in practical mathematics, which was apparently not part of common knowledge. Occasionally, one comes across obvious arithmetical blunders, mostly by historians. On the other hand, in most cases the practitioners themselves left no texts. Therefore, of all the manifold forms of practical mathematics that must have existed, only two are known a little, partly through occasional references by authors interested in other topics, partly through preserved artifacts, and, rarely, through the textual traditions of the practitioners themselves.

[4] Pebble arithmetic was used in order to perform calculations of all kinds. 'Pebbles' that symbolized different numbers through different forms and sizes, were moved and arranged on a marked surface—what is sometimes called the 'Western abacus'. Several of these have been found, and the practitioners themselves are mentioned occasionally. These must have been professionals that one could hire whenever some arithmetical problem had to be solved, not so different from professionals renting out their literacy. However, manipulating pebbles on an abacus can lead to the discovery of general arithmetical knowledge, for example the properties of even and odd, or prime numbers, or abstract rules of how to produce certain classes of numbers, for example, square numbers. I call this knowledge

‘general’ because it no longer has any immediate application. Here ‘theoretical’ knowledge emerges from a purely practical-professional background.

[5] The second subgroup of mathematical practitioners was concerned with measuring and calculating areas and volumes. Unlike the pebble arithmeticians, they had textual traditions, of which traces are scarce for ancient Greece, but considerable throughout the ancient Near East. These textual traditions, however, were sub-literary, that is, they never made it into the traditions of Greek mathematical literature. Therefore, most of these texts have been found inscribed on papyri, mostly written in imperial times, extant only from the Greek population in Egypt because of the favorable conditions of preservation there. There is every reason to assume, however, that in antiquity such texts were widespread in the Greek speaking world, both earlier and later. Here is an example from a first-century AD Greek papyrus, now in Vienna:

> Concerning stones and things needed to build a house, you will measure the volume according to the rules of the geometer as follows: the stone has 5 feet everywhere. Make 5 x 5! It is 25. That is the area of the surface. Make this 5 times concerning the height. It is 125. The stone will have so many feet and is called a cube.

[6] The papyrus contained thirty-eight such paragraphs in sixteen columns, obviously meant to codify valid methods or, rather, approved procedures in textbook style. Obviously, these methods are what the text calls ‘the rules of the geometer’.

RESPONDA ÀS PERGUNTAS DE 1 A 5 EM <u>PORTUGUÊS</u>, DE ACORDO COM AS INFORMAÇÕES VEICULADAS NO TEXTO.

1) O texto afirma que há um novo consenso que altera o entendimento anterior sobre a matemática grega antiga. Explique a razão para esta afirmação. (2,5 pontos)

Durante séculos, acreditou-se que matemáticos renomados como Euclides e Arquimedes representavam a totalidade das práticas matemáticas da Grécia Antiga. Hoje em dia, percebe-se que esse grupo de matemáticos representa apenas uma das culturas matemáticas existentes à época.

2) De acordo com as informações constantes no 2º parágrafo, os chamados “gigantes da matemática grega” NÃO (1,5 pontos)

a) conheciam os princípios da engenharia e da arquitetura.
b) incluíam matemáticos relevantes, como Euclides.
c) se interessavam por aspectos práticos da vida.
d) utilizavam operações matemáticas complexas.

3) Segundo o texto, o que se sabe sobre a pergunta “What is known about these practical forms of Greek mathematics?”, em destaque ao final do 2º parágrafo? (2,5 pontos)

Não se sabe muito sobre a matemática prática na Grécia Antiga, pois os matemáticos desse grupo não legaram textos que registrassem suas práticas. Assim, além dos raros relatos sobre a essa temática, a pouca informação existente advém de referências ocasionais feitas por estudiosos de outros assuntos e de artefatos antigos conservados até hoje.

4) A aritmética dos seixos (“pebble arithmetic”)

I. baseava-se em princípios semelhantes aos de um ábaco.

II. era praticada por matemáticos renomados.

III. exigia aplicação teórico-prática nas operações.

É CORRETO o que se afirma em (2,0 pontos)

a) I e III, apenas.
b) I e II, apenas.
c) II, apenas.
d) III, apenas.

5) O papiro que hoje se encontra em Viena (1,5 pontos)

a) demonstra que as conjecturas dos “gigantes da matemática grega” estavam corretas.
b) foi, na realidade, escrito por matemáticos egípcios.
c) objetivava explicar noções básicas e teóricas de aritmética.
d) serve para ilustrar um dos tipos de interesse de um subgrupo de matemáticos gregos.