Aristotle thought that mathematics was begun by the priests in Egypt, 'because there the priestly class was allowed leisure' (Metaphysics 981b 23–24). Herodotus, however, believed that geometry was created because the annual flooding of the Nile necessitated surveying, to redetermine land boundaries. Indeed, Democritus called the Egyptian mathematicians 'rope-stretchers'.

From a philosophical point of view, it is interesting that the Egyptians held that mathematics had a divine source. It had been given them by the god Thoth.¹ In this book, we shall encounter a view, called Aristotelianism, which sees mathematics ascending from the human animal, and another view, called Platonism, which sees mathematics descending from a divine realm.

The Moscow Papyrus

Our only sources of information on the mathematics of ancient Egypt are the Moscow Mathematical Papyrus and the Rhind Mathematical Papyrus. The Moscow Mathematical Papyrus dates from 1850 B.C., about the time of Abraham. V. S. Golenishchev acquired it in 1893 and brought it to Moscow.

The most interesting problem in the Moscow Mathematical Papyrus is

¹See Plato's Phaedrus 274c-d
Problem 14. This is a computation of the volume of a frustum, using the correct formula. A frustum is a pyramid with a similar pyramid cut off its top. If it has a square base of side $a$, and a square top of side $b$, and if its height is $h$, then, as the ancient Egyptians realised, the volume of the frustum is

$$h \left( a^2 + ab + b^2 \right) \frac{1}{3}$$

Note that if $b = 0$, we get the formula for the volume of a square-base pyramid: $a^2h/3$.

We do not know how the Egyptians arrived at these formulas. Perhaps it was by trial and error.

The Rhind Papyrus

The Rhind Mathematical Papyrus is a copy of an even earlier work. It was copied by a scribe called Ahmose in 1650 B.C., about the time Joseph was governor of Egypt. Alexander Henry Rhind acquired it in Luxor, Egypt, in 1858, and the British Museum bought it from his estate in 1865.

The Rhind Mathematical Papyrus opens by promising the reader ‘a thorough study of all things, insight into all that exists, knowledge of all obscure secrets’. In fact, it is a sequence of solved problems in elementary mathematics, a Schaum’s Outline for aspiring scribes. These scribes had to calculate how many bricks were needed to build a ramp of a certain size, how many loaves of bread were required to feed the slave labourers, and so on.

To multiply 70 by 13, the Egyptians would work as follows:

\[
\begin{array}{ccc}
70 & 13 & / \\
140 & 6 & / \\
280 & 3 & / \\
560 & 1 & / \\
910 & & \\
\end{array}
\]

In general, the method was to set up two columns, each headed by one of the multipliers. The entries in the first column were doubled, while those in the second column were halved (first subtracting 1 if the number was odd). Finally, those entries in the first column beside odd second column entries (the checked ones) were added. (The method works because the odd-numbered entries in the second column correspond to 1’s in the scale 2 expression of the second multiplier.)

The Rhind Mathematical Papyrus shows us how the Egyptians divided, extracted square roots, and solved linear equations. They used the formula $(4/3)^4 r^2$ for the area of a circle (giving 3.16 as an approximation for $\pi$), and they did interesting work with arithmetic progressions. Problem 64, for