BACCALAURÉAT GENERAL
EPREUVE SPECIFIQUE DES SECTIONS EUROPENNES
MATHEMATIQUES - ANGLAIS

SUJET 5

Sumerian and Babylonian mathematics
Thèmes : History of mathematics, numeration, equations, conversion

Sujet comportant deux pages. L'usage de tout modèle de calculatrice, avec ou sans mode examen est autorisé.

Sumer (a region of Mesopotamia, modern-day Iraq) was the birthplace of writing, the wheel, agriculture, irrigation and many other innovations, and is often referred to as the Cradle of Civilization. The Sumerians developed the earliest known writing system, a pictographic writing system known as cuneiform script. It was based on a base 60 numeric system. It has been conjectured that Babylonian advances in mathematics were probably facilitated by the fact that 60 has many divisors, and the continued modern-day usage of 60 seconds in a minute, 60 minutes in an hour, and 360 (60 x 6) degrees in a circle, are all testaments to the ancient Babylonian system.

The Babylonians also used geometric shapes in their buildings and design and in dice for the leisure games which were so popular in their society, such as the ancient game of backgammon. Their geometry extended to the calculation of the areas of rectangles, triangles and trapezoids, as well as the volumes of simple shapes such as bricks and cylinders.

The famous and controversial Plimpton 322 clay tablet, believed to date from around 1800 BC, suggests that the Babylonians may well have known the secret of right-angled triangles (that the square of the hypotenuse equals the sum of the square of the other two sides) many centuries before the Greek Pythagoras.

Adapted from the website www.storyofmathematics.com

Dégager les idées essentielles du texte ci-dessus.

Explain what the text deals with and comment on it.
Don't forget to talk about Babylonian innovations.

Le sujet doit être restitué à la fin de l'épreuve.

Exercise

The following problem is taken from the Babylonian tablet YBC 4652 (see picture).

I found a stone, but did not weigh it
after I subtracted one-seventh, added one-eleventh,
and subtracted one-thirteenth
I weighed it: 1 mana. What was the original weight of the stone?

1. Do you think this is a practical problem?
   Can you suggest what the tablet might have been used for?
2. Let x be the original weight of the stone.
   a. Explain why the weight of the stone is $\frac{6}{7}x$ after subtracting one-seventh.
   b. What is the weight of the stone after subtracting one-seventh and adding one-eleventh?
   c. Show that the final weight of the stone is $\frac{864}{1001}x$ and then solve the problem.
3. Here is the solution written on the tablet:

   The original weight of the stone was 1 mana, 9½ gin, and 2½ se.

   Knowing that, there are in fact 60 *gin* in 1 *mana*, and 180 se in 1 *gin*, do you think this solution is correct?
4. Solve this second problem and write your answer using “mana” and “gin”:

I found a stone, but did not weigh it
after I subtracted one-seventh, and subtracted one-thirteenth
I weighed it: 1 mana. What was the original weight of the stone?