

**BACCALAURÉAT GÉNÉRAL  
ÉPREUVE SPÉCIFIQUE DES SECTIONS EUROPÉENNES  
MATHÉMATIQUES – ANGLAIS**

**SUJET 15**

**Babylonian mathematics  
Geometry**

Le sujet comporte 2 pages. L'usage de tout modèle de calculatrice, avec ou sans mode examen, est autorisé.

**Mathematical mystery of ancient clay tablet solved**

Some Sydney scientists have discovered the purpose of a famous 3700-year-old Babylonian clay tablet, revealing it is the world's oldest and most accurate trigonometric table, possibly used by ancient mathematical scribes to calculate how to construct palaces and temples and build canals. They have revealed that Plimpton 322 pre-dates Pythagoras by 1,000 years.

Plimpton 322 has puzzled mathematicians for more than 70 years, since it was realised it contains a special pattern of numbers.

Research reveals that Plimpton 322 describes the shapes of right-angle triangles using a novel kind of trigonometry based on ratios, not angles and circles. It is a fascinating mathematical work that demonstrates undoubted genius.

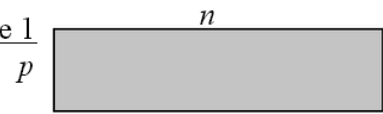
The tablet not only contains the world's oldest trigonometric table; it is also the only completely accurate trigonometric table, because of the very different Babylonian approach to arithmetic and geometry.

*Adapted from <https://newsroom.unsw.edu.au> – 25 August 2017*

## I. Explain what the text deals with and comment on it.

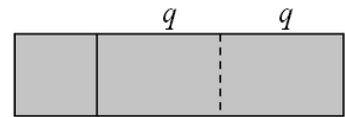
## II. Exercise

This diagram illustrates an old Babylonian exercise on Figure 1  
reciprocals, found in the tablet named YBC 6967 (Yale  
Babylonian Collection), using a method that also underlies  
the table in Plimpton 322.



In Babylonian notation, two reciprocals are two numbers  
whose product is 60.

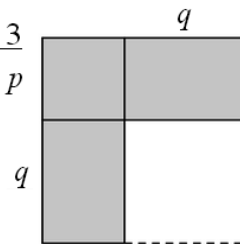
Figure 2  
 $p$



The Babylonian exercise is:

Figure 3  
 $p$

*“Given two reciprocals  $n$  and  $p$ , and given that the difference  
between  $n$  and  $p$  is 7, what are the values of  $n$  and  $p$ ?”*



### 1. Algebraic method

- Express  $n$  in terms of  $p$ .
- Prove that  $p$  is solution of the equation  $p^2 + 7p = 60$ .
- Show this equation can be written:  $(p + 3,5)^2 = 72,25$ ,
- Find the value of  $p$  using this equation and then find  $n$ .

### 2. Geometric method

- Explain how we can build figures 2 and 3.
  - Using figure 1, calculate the area of the grey part.
  - Using figure 2, calculate the value of  $q$ , deduce the area of the white square of figure 3.
  - Calculate the area of the great square and its side.
  - Deduce  $p$  then  $n$
3. Compare the two methods.