BACCALAURÉAT GENERAL
PREUVE SPECIFIQUE DES SECTIONS EUROPENNES
MATHEMATIQUES – ANGLAIS

Corrigé du sujet 21

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

Éléments à prendre en compte pour évaluer la capacité d'analyse et d'argumentation :

The text deals with what a number actually is.

The difference between “digit” and “number” has to be clear.

The candidate can give examples of weird numbers like the negative numbers, the imaginary numbers and so on.

In the exercise being able to cope with the number of zeros in a written number is crucial.

Pay attention to the grammar: “a 3-digit number” (no plural mark).

II. Exercises:

1. Some examples and a conjecture

a. 572 572.

b. It seems that to work out the product of a 3-digit number a by $1\,001$ you just need to write twice the 3-digit block a.

2. Proof of this conjecture

$1\,001\times a=(1\,000+1)\times a=1\,000\times a+a$.For computing $1\,000\times a$, we write 3 zeros on the right. Because a is a 3-digit number, when computing the sum $1\,000\times a+a$, we don’t have to take into account any carry issue.

3. Mental calculation trick

a. $((7\times a)\times 11)\times 13=1\,001\times a$.

b. For example you can perform this way: First you can ask a friend to choose a 3-digit number without telling you which one. Then, using a calculator, he multiplies this number by 7, then the result by 11 and eventually he multiplies the product by 13. Ask him the first digit on the left of the result, then the third and the fifth one. You are able to guess the chosen number!

4. Generalisation

To work out the product of a 4-digit number a by $10\,001$ you just need to write twice the 4-digit block a.

To work out the product of a 5-digit number a by $100\,001$ you just need to write twice the 5-digit block a.