

BACCALAURÉAT GÉNÉRAL ET TECHNOLOGIQUE
ÉPREUVE SPÉCIFIQUE DES SECTIONS EUROPÉENNES
MATHÉMATIQUES – ANGLAIS

Corrigé 3

Thème : Prime numbers – Number Theory

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

- The first part of the text talks about prime numbers and some of the mathematicians that studied these numbers and their properties. The mathematicians listed date back to 500BC with Pythagorus up to the 19th century with Gauss.
- The second part of the text talks about Sophie Germain primes. It gives the definition along with an example as well as the largest known for the moment.

Questions mathématiques

a)

- Most candidates will probably choose the theorem of Pythagorus (or the Pythagorean Theorem). If so, the equality $a^2 + b^2 = c^2$ should be explained in words: “the square of the hypotenuse is equal to the sum of the squares of the other two sides.” If not, during the interview the candidate can be guided by asking to complete the sentence, “The square of the hypotenuse ...”. Note that the exact phrase is not obligatory.
- Some candidates may choose Euclid and state one of many geometric relations referring to the study of Euclidean geometry. Other possibilities may include that there exists an infinite number of primes, or even his proof of the Pythagorean Theorem
- Some candidates may choose Gauss and talk about the normal curve (the Gaussian curve)

- b) As both n and p are prime numbers, the product $n \times p$ has n (and/or p) as a divisor and thus the product is not a prime number as neither n nor p can be equal to 1.
- c) 7 is a prime number, however $2(7) + 1 = 15$ is not a prime number and so 7 is not a Sophie Germain prime number.
11 is a prime number and $2(11) + 1 = 23$ is also a prime number so 11 is in fact a Sophie Germain prime number.
- d) $(11, 13), (17, 19), (29, 31), (41, 43)$, are the next four pairs that meet the requirement.

Remark: If the student is curious, would read, “Two trillion, six hundred eighteen billion, one hundred sixty-three million, four hundred two thousand, four hundred and seventeen.” The ability to say this number is not required.