

### **Subject n°15**

**Please, don't write on the exam paper.**

Once upon a time in a distant kingdom, a young inventor presented his king with his new discovery. He had just created the game of chess! The sovereign was very enthusiastic, and asked the young man how he could thank him. The inventor then said: "If you don't mind, majesty, please give me one grain of wheat for the first square, two grains for the second one, then four for the third one, eight for the fourth and so on till the 64<sup>th</sup>". The king agreed, but a few days later, he ordered the execution of the inventor!

Can you explain the king's reaction?

Hint:

- a-** Describe the inventor's request with a sequence you will describe precisely.
- b-** How many grains are supposed to be given for the last square?
- c-** What is the total amount of wheat the inventor will get?
- d-** Given that one grain weighs one gram, give in tons the total weight of all the grain(s).  
Conclude.

### **Glossary**

**Game of chess** : Jeu d'échec

**Square**: case (du jeu d'échec)

**Wheat** : blé

**Request** : demande

### **Formula**

Sum of the consecutive terms of a geometric sequence (common ratio is  $q$ ):

$$S = u_0 + u_1 + \dots + u_n = u_0 \times \frac{1 - q^{n+1}}{1 - q}$$