

2019 MA3 Week 10 Investigation

There's a famous legend about the origin of chess that goes like this. When the inventor of the game showed it to the emperor of India, the emperor was so impressed by the new game, that he said to the man

"Name your reward!"

The man responded,

"Oh emperor, my wishes are simple. I only wish for this. Give me one grain of wheat for the first square of the chessboard, two grains for the next square, four for the next, eight for the next and so on for all 64 squares, with each square having double the number of grains as the square before."

The emperor agreed, amazed that the man had asked for such a small reward - or so he thought. He asked for a bag of wheat to be brought and assumed the man would soon be on his way. The bag of wheat was soon used up and the emperor now realised that he could never grant the reward as from then on he would be doubling the bags of wheat on each square.

- a) How many grains of wheat are needed for the 64th square?
- b) How many grains of wheat are needed altogether?
- c) If a grain of wheat weighs 0.1 grams, how many kilograms of wheat does this represent?
(1000 grams = 1 kilogram)
- d) Compare this to the world's total production of wheat for 1 year.

Note: Show how the answers are calculated (in other words show the working out) but you will need but look up the actual answers (the numbers are very big).