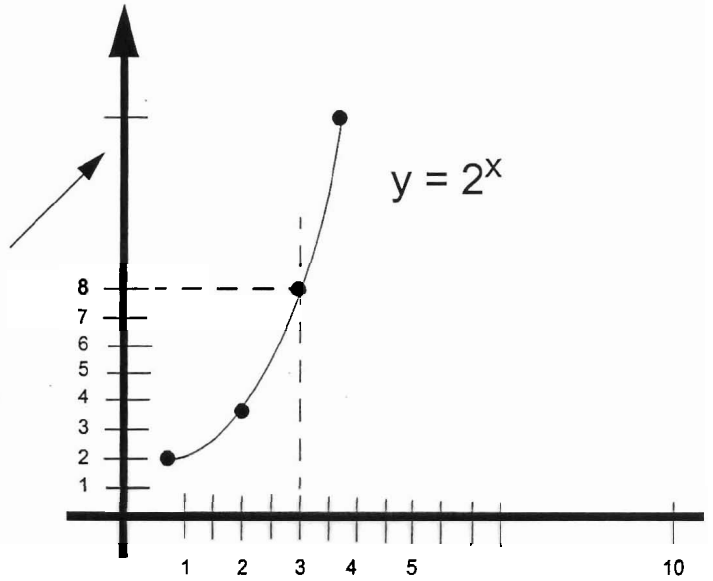
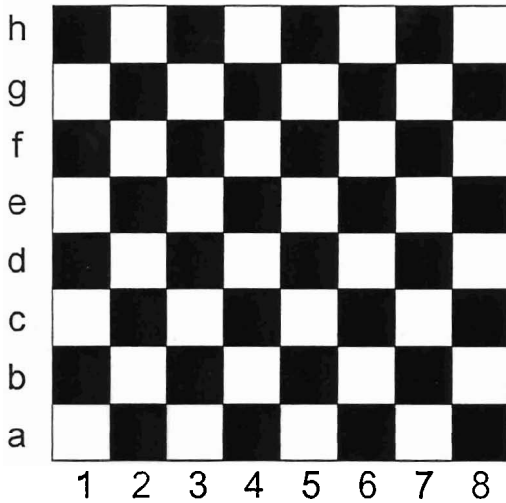




The chessboard (Sessa Ebn Daher) and exponential growth

$$2^{64} = 18,4 \cdot 10^{18} \text{ (grains)}$$



$$0 = 1 \text{ Million } (10^6) \text{ (grains)}$$

$$y = a^x = e^{x \ln a}$$

$$\ln 2 = 0,6931$$

Remember: All exponential functions are e-functions

$$\underbrace{\frac{dN}{dt}}_{\text{growth}} = \underbrace{k \cdot N}_{\text{stock (quantity on hand)}} + \underbrace{0}_{\text{no history}}$$

$$N = N_0 e^{k \cdot t}$$

$N_0$  = initial stock