

## 5. Potenssi

$$a^m = \underbrace{a \cdot a \cdot \dots \cdot a}_m$$

↑  
kantaluku

← eksponentti

Esim. Paperin paksuus on 0,1 mm. Taitetaan paperi toistuvasti 2-kertoin.  
Munkke paperin paperipöytä on a) 10, b) 100. taiton jälkeen?

Ratk. aluslehti: 0,1 mm

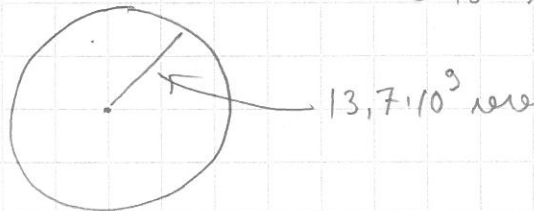
1. taiton jälkeen:  $2 \cdot 0,1 \text{ mm}$

2. ————— :  $2 \cdot 2 \cdot 0,1 \text{ mm} = 2^2 \cdot 0,1 \text{ mm}$

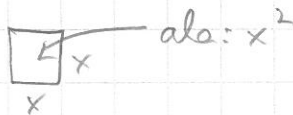
3. ————— :  $2^3 \cdot 0,1 \text{ mm}$

a) 10. ————— :  $2^{10} \cdot 0,1 \text{ mm} = 102,4 \text{ mm} \approx 10 \text{ cm}$

b) 100. ————— :  $2^{100} \cdot 0,1 \text{ mm} \approx 1,268 \cdot 10^{29} \text{ mm} \approx 1,3 \cdot 10^{26} \text{ m}$   
 $\approx 13 \cdot 10^9$  valovuotta

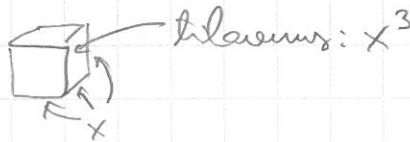


5.1 a)  $7^2 = 49$



b)  $(-3)^4 = 3^4 = 81$

c)  $(-3)^3 = -3^3 = -27$



5.4, 6, 9, 19

5.4 a)  $-3^2 + (-2)^2 = -9 + 4 = -5$

b)  $12 + \frac{1}{2} \cdot (-4)^2 = 12 + \frac{1}{2} \cdot 16 = 12 + 8 = 20$

5.6 a)  $1,496 \cdot 10^8 \text{ km} = 149600000 \text{ km}$

b)  $12\ 756\ 280 \text{ m} \approx 128 \cdot 10^5 \text{ m} = 1,28 \cdot 10^7 \text{ m}$

c)  $4,6 \cdot 10^9 \text{ m} = 4600\ 000\ 000 \text{ m}$

5.9 a)  $1 \text{ vu} = 299\ 792 \text{ km} \cdot 365 \cdot 24 \cdot 60 \cdot 60 = 9\ 454\ 240\ 572\ 000 \text{ km}$

b)  $4,24 \cdot 9,45 \cdot 10^{12} \text{ km} \approx 4,01 \cdot 10^{13} \text{ km}$   
*sekuntia vuodessa*