

7. Exponentilla 0 tai -n

$$a^2 = \frac{a^3}{a}$$

$$a^1 = \frac{a^2}{a}$$

$$a^0 = \frac{a^1}{a} = \frac{a}{a} = 1$$

$$a^{-1} = \frac{a^0}{a} = \frac{1}{a}$$

$$a^{-2} = \frac{a^{-1}}{a} = \frac{\frac{1}{a}}{a} = \frac{1}{a} \cdot \frac{1}{a} = \frac{1}{a^2} (= (\frac{1}{a})^2)$$

;

Yleisesti

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n} = \left(\frac{1}{a}\right)^n \quad a \neq 0$$

Esim. a) $2^{-4} = \frac{1}{2^4} = \frac{1}{16} (= 0,0625)$

b) $\left(\frac{4}{5}\right)^{-3} = \frac{1}{\left(\frac{4}{5}\right)^3} = \frac{1}{\frac{4^3}{5^3}} = \frac{5^3}{4^3} = \frac{125}{64}$

c) $5 \cdot 10^{-3} = 5 \cdot \frac{1}{10^3} = 5 \cdot \frac{1}{1000} = 5 \cdot 0,001 = 0,005$

7.18 b) protoni: $\frac{1,7 \cdot 10^{-27} \text{ kg}}{9,1 \cdot 10^{-31} \text{ kg}} \approx 1868,13 \approx \underline{1900}$

a) protonin on isompi

7.21 a) $\frac{1}{3^4 \cdot 3^5} = \frac{1}{3^{4+5}} = \frac{1}{3^9} = 3^{-9}$

b) $\frac{3^6}{3^2 \cdot 3^7} = \frac{3^6}{3^9} = 3^{6-9} = 3^{-3}$

TAI: $\frac{3^6}{3^2 \cdot 3^7} = \frac{\cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot \cancel{3}}{(\cancel{3} \cdot \cancel{3}) \cdot (\cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot \cancel{3} \cdot \cancel{3})} = \frac{1}{3 \cdot 3 \cdot 3} = \frac{1}{3^3} = 3^{-3}$

c) $\frac{3^2 \cdot 3^5 \cdot 3^3}{(3^5)^2} = \frac{3^{10}}{3^{10}} = 3^{10-10} = 3^0 (=1)$