

2204

a)  $3^3$     b)  $81 = 9 \cdot 9 = 3 \cdot 3 \cdot 3 \cdot 3 = 3^4$

c)  $729 = 9 \cdot 81 = 3 \cdot 3 \cdot 9 \cdot 9 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 3^6$

2205

a)  $64 = 8 \cdot 8 = 8^2$     b)  $64 = 4 \cdot 4 \cdot 4 = 4^3$

c)  $64 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 2^6$

2206

a)  $10^4 \cdot 10^{15} = 10^{4+15} = 10^{19}$

b)  $\frac{10^9}{10^5} = 10^{9-5} = 10^4$

c)  $(10^4)^4 = 10^{4 \cdot 4} = 10^{16}$

d)  $\frac{10^{19}}{10^8 \cdot 10^0} = \frac{10^{19}}{10^{8+0}} = \frac{10^{19}}{10^8} = 10^{19-8} = 10^{11}$

2207

a)  $(3^4)^5 = 3^{4 \cdot 5} = 3^{20}$

b)  $\frac{5^8}{5} = 5^{8-1} = 5^7$

c)  $4^2 \cdot 4^7 \cdot 4^9 = 4^{2+7+9} = 4^{18}$

d)  $\frac{2^8 \cdot 2^5}{2^6} = \frac{2^{8+5}}{2^6} = \frac{2^{13}}{2^6} = 2^{13-6} = 2^7$

2208

a)  $4^m \cdot 4^9 = 4^{11}$   
 $4^{m+9} = 4^{11}$

für potenzen

$$\begin{array}{r} m+9 = 11 \\ -9 \quad -9 \\ \hline m = 2 \end{array}$$

b)  $6 \cdot 6^m = 6^{11}$   
 $6^{1+m} = 6^{11}$

für potenzen

$$\begin{array}{r} 1+m = 11 \\ -1 \quad -1 \\ \hline m = 10 \end{array}$$

c)  $(10^m)^4 = 10^{28}$   
 $10^{4m} = 10^{28}$

$$\begin{array}{r} 4m = 28 \\ \hline m = 7 \end{array}$$

d)  $\frac{7^m}{7} = 343$

$$\begin{array}{r} 7^{m-1} = 7 \cdot 7 \cdot 7 \\ 7^m = 7^3 \end{array}$$

$$\begin{array}{r} m-1 = 3 \\ +1 \quad +1 \\ \hline m = 4 \end{array}$$

2209

$$a) \frac{2x^4}{x^3} = 2x^{4-3} = 2x^1 = 2x$$

$$b) \frac{(5x)^2}{x} = \frac{5^2 \cdot x^2}{x} = 25x^{2-1} = 25x$$

$$c) \frac{x^2 \cdot x^{11}}{x^3} = \frac{x^{2+11}}{x^3} = \frac{x^{13}}{x^3} = x^{13-3} = x^{10}$$

$$d) \frac{a^2 \cdot a^{11}}{a^2 \cdot a^1 \cdot a^2} = \frac{a^{2+11}}{a^{3+3+2}} = \frac{a^{13}}{a^8} = a^{13-8} = a^5$$

2210

$$7^{2m} = 49^{1m}$$

$$7^{2m} = (7 \cdot 7)^{1m}$$

$$7^{2m} = (7^2)^{1m}$$

$$7^{2m} = 7^{2m}$$

2212

$$a) \frac{(5^3)^{1m}}{5^m} = 5^{12}$$

$$\frac{5^{3m}}{5^m} = 5^{12}$$

$$5^{3m-m} = 5^{12}$$

$$5^{2m} = 5^{12}$$

$$\frac{2m}{2} = \frac{12}{2}$$

$$m = 6$$

$$b) 5^6 \cdot 5^{1m} = 5^{2m} \cdot 5$$

$$5^{6+m} = 5^{2m+1}$$

$$\begin{array}{r} 6+m = 2m+1 \\ -m \quad -m \\ \hline 6 = m+1 \\ -1 \quad -1 \\ \hline 5 = m \end{array}$$

$$5 = m$$

2213

$$a) 3^4 \cdot 27 = 3^4 \cdot 3^3 = 3^7$$

$$b) (5^2)^2 \cdot 125 = 5^{2 \cdot 2} \cdot 5^3 = 5^{4+3} = 5^7$$

$$c) \frac{81}{32} = \frac{9 \cdot 9}{32} = \frac{3 \cdot 3 \cdot 3 \cdot 3}{32} = \frac{3^4}{32} = 3^{4-2} = 3^2$$

$$d) 2 \cdot 32 \cdot 9^2 = 2 \cdot (4 \cdot 8 \cdot (2 \cdot 2)^2) = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot (2 \cdot 2)^2 = 2^6 \cdot 2^4 = 2^{10}$$

2218

a)  $7^{-2}$     b)  $7^4 \cdot 7^{-4} = 7^{4-(-4)} = 7^{4+4} = 7^8$   
c)  $(7^3)^{-2} = 7^{3 \cdot (-2)} = 7^{-6}$

2219

a)  $\frac{7^0}{7^6} = 7^{0-6} = 7^{-6}$

b)  $\frac{x^{-1}}{x^{-4}} = x^{-1-(-4)} = x^{-1+4} = x^3$

c)  $x^4 \cdot \frac{x^2}{x^3} = \frac{x^4 \cdot x^2}{x^3} = \frac{x^{4+2}}{x^3} = \frac{x^6}{x^3} = x^{6-3} = x^3$

2220

a)  $5 \cdot 2^{-1} = 5 \cdot \frac{1}{2} = \frac{5}{2}$

b)  $2 \cdot 5^{-1} = 2 \cdot \frac{1}{5} = \frac{2}{5}$

c)  $2^{-1} \cdot 2^{-1} = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

2221

a)  $\frac{1}{x} = x^{-1}$     b)  $\frac{2}{x} = 2 \cdot x^{-1}$     c)  $\frac{1}{x^2} = 1 \cdot x^{-2} = x^{-2}$

2222

a)  $\frac{1}{1 \cdot 1 \cdot 1 \cdot 1} = \frac{1}{1} = 1$     b)  $1 \cdot \frac{1}{2} \cdot \frac{1}{2^2} = 1 \cdot \frac{1}{2} \cdot \frac{1}{4} = \frac{1}{8}$

2223

a)  $\left(\frac{3}{2}\right)^{-1} = \frac{1}{\frac{3}{2}} = 1 \cdot \frac{2}{3} = \frac{2}{3}$     b)  $7^{-2} = \frac{1}{7^2} = \frac{1}{49}$

c)  $\left(\frac{1}{5}\right)^{-2} = \frac{1}{\left(\frac{1}{5}\right)^2} = \frac{1}{\frac{1}{25}} = \frac{1}{\frac{1}{25}} = 1 \cdot \frac{25}{1} = 25$

2224

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

b)  $\frac{1}{32} = \frac{1}{4 \cdot 8} = \frac{1}{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} = \frac{1}{2^5} = 2^{-5}$

c)  $1 = 2^0$

2225

a)  $(a^4)^{-3} = \frac{4 \cdot (-3)}{a} = \frac{-12}{a}$

b)  $(a^{-2})^5 = a^{-2 \cdot 5} = a^{-10}$

c)  $\left(\frac{1}{a}\right)^3 = \frac{1^3}{a^3} = \frac{1}{a^3} = a^{-3}$

2226

a)  $4^n \cdot 4^8 = 4^7$   
 $4^{n+8} = 4^7$

Jhr potenzen  $n+8 = 7$   
 $-8 \quad -8$

$n = -1$

b)  $(6^n)^3 = 1$

$6^{3n} = 1$

$6^{3n} = 6^0$

Jhr potenzen

$\frac{3n}{3} = \frac{0}{3}$   
 $n = 0$

c)  $\frac{7^0}{7^n} = 7^5$

$7^{0-n} = 7^5$

Jhr potenzen

$0-n = 5$

$-n = 5$

$n = -5$

d)  $\frac{2}{2^n} = 1$

$2^{1-n} = 1$

$2^{1-n} = 2^0$

Jhr potenzen

$1-n = 0$   
 $+n \quad +n$

$n = 1$

2229

$$\begin{aligned} a) \quad \frac{2 \cdot x^{-1}}{2} &= \frac{1}{2} \\ x^{-1} &= \frac{1}{2} \\ \frac{1}{x} &= \frac{1}{2} \\ x &= 2 \end{aligned}$$

$$\begin{aligned} b) \quad 2^{-1} + x^{-1} &= 1 \\ \frac{1}{2} + \frac{1}{x} &= 1 \\ x &= 2 \end{aligned}$$

2234

$$a) \quad \frac{1}{(-3)^2 + (-4)^2} = \frac{1}{9+16} = \frac{1}{25} = \frac{1}{5^2} = 5^{-2}$$

$$b) \quad \frac{4 \cdot 5^2 + 5^2}{5^4} = \frac{5 \cdot 5^2}{5^4} = \frac{5^{1+2}}{5^4} = \frac{5^3}{5^4} = 5^{3-4} = 5^{-1}$$

$$\begin{aligned} c) \quad \frac{10^2 + 5^2}{5^3} &= \frac{4 \cdot 5^2 + 5^2}{5^3} = \frac{5 \cdot 5^2}{5^3} = \frac{5^3}{5^3} \\ &= 5^{3-3} = 5^0 \end{aligned}$$

2235

$x^0 = 1$   $x$  kan vara vilket positivt tal  
som helst vi får ex.  $x=5$  då får vi  
 $(x+2)^0 = (5+2)^0 = 7^0 = 1$

Det blir alltså 1 oavsett vad  $x$  kan för  
värde.