

Mathematik 8		
Potenzen	Lösungen	S. 120 / 12 S. 120 / 16

S. 120 / 12

$$\text{a) } 3 \cdot \left(\frac{1}{2}\right)^{-2} = 3 \cdot \frac{1}{\left(\frac{1}{2}\right)^2} = 3 \cdot \frac{1}{\frac{1}{4}} = 3 \cdot 4 = 12$$

einfacher:

$$3 \cdot \left(\frac{1}{2}\right)^{-2} = 3 \cdot \left(\frac{2}{1}\right)^2 = 3 \cdot 4 = 12$$

$$\text{b) } 5 \cdot \left(\frac{3}{4}\right)^{-1} = 5 \cdot \frac{4}{3} = \frac{20}{3}$$

$$\text{c) } 72 : 6^2 = 72 : 36 = 2$$

$$\text{d) } -3 \cdot 0,5^{-3} = -3 \cdot \left(\frac{1}{2}\right)^{-3} = -3 \cdot 2^3 = -24$$

$$\text{e) } 3 \cdot 5^2 = 3 \cdot 25 = 75$$

$$\text{f) } (3 \cdot 5)^2 = 15^2 = 225$$

$$\text{g) } (-3 \cdot 2)^4 = (-6)^4 = 1296$$

$$\text{h) } -8 : 2^{-3} = -8 : \frac{1}{8} = -8 \cdot 8 = -64$$

$$\text{i) } 6 + 2 \cdot 3^2 = 6 + 2 \cdot 9 = 6 + 18 = 24$$

$$\text{j) } -$$

$$\text{k) } 6 : 2^3 - 9 \cdot 3^{-2} = \frac{6}{8} - 9 \cdot \frac{1}{9} = \frac{3}{4} - 1 = -\frac{1}{4}$$

$$\text{l) } 8 + 2 \cdot 5^{-2} = 8 + 2 \cdot \frac{1}{25} = 8 \frac{2}{25}$$

$$\text{m) } 8 + (2 \cdot 5)^{-2} = 8 + \frac{1}{10^2} = 8 \frac{1}{100} = 8,01$$

S. 120 / 16

$$\text{a) } x^{-1} - \frac{x^3}{x^4} = x^{-1} - x^{3-4} = x^{-1} - x^{-1} = 0$$

$$\text{b) } 2x^{-2}(x^2 - x) = 2x^{-2} \cdot x^2 - 2x^{-2} \cdot x = 2x^{-2+2} - 2x^{-2+1} = 2x^0 - 2x^{-1} = 2 - 2x^{-1}$$

$$\text{c) } \frac{x^{-2}}{x^2} + \frac{x^2}{x^{-2}} = x^{-2-2} + x^{2-(-2)} = x^{-4} + x^4$$

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d) $x^{-2} + x^{-3}$

Kann nicht weiter vereinfacht werden. Man könnte die Potenzen höchstens in Bruchterme umwandeln und dann addieren:

$$x^{-2} + x^{-3} = \frac{1}{x^2} + \frac{1}{x^3} = \frac{x}{x^3} + \frac{1}{x^3} = \frac{x+1}{x^3}$$

e) $x^n \cdot x^{1-n} = x^{n+1-n} = x^1 = x$

f) $(x+2)^{-2} - \frac{1}{x+2} = \frac{1}{(x+2)^2} - \frac{1}{x+2} = \frac{1}{(x+2)^2} - \frac{x+2}{(x+2)^2} = \frac{1-(x+2)}{(x+2)^2} = \frac{-x-1}{(x+2)^2}$

g) $x^{1-k} : x^{k-1} = x^{1-k-(k-1)} = x^{1-k-k+1} = x^{2-2k}$

h) $x^{-1} \cdot x^2 \cdot x^{-3} \cdot x^4 = x^{-1+2+(-3)+4} = x^2$

i) $(x-4) : (2x-8)^{-3} = (x-4) : \frac{1}{(2x-8)^3} = (x-4) \cdot (2x-8)^3 =$
 $= (x-4) \cdot (2x-8) \cdot (2x-8) \cdot (2x-8) =$
 $= (x-4) \cdot 2(x-4) \cdot 2(x-4) \cdot 2(x-4) =$
 $= 2^3(x-4)^4 = 8(x-4)^4$

j) -

k) $x^{3 \cdot (2-6)} \cdot x^{(4+2) \cdot 2} = x^{-12} \cdot x^{12} = x^{-12+12} = x^0 = 1$