

Lösungen Potenzen VII

Ergebnisse:

E1	Ergebnisse
a)	$(6a^6 + a^4b + 25b^3) : (3a^2 + 5b) = 2a^4 - 3a^2b + 5b^2$
b)	$(15a^9 - 8a^6b + 8b^3) : (3a^3 + 2b) = 5a^6 - 6a^3b + 4b^2$
c)	$(14a^4 - a^3 + 5a^2 - 3a + 1) : (7a^2 - 4a + 1) = 2a^2 + a + 1$

E2	Ergebnisse
a)	$(a^5 + a^4 - 8a^3 + 26a^2 - 29a + 21) : (a^2 - 2a + 3) = a^3 + 3a^2 - 5a + 7$
b)	$(a^3 - 2a^2b + 2ab^2 - b^3) : (a - b) = a^2 - ab + b^2$
c)	$(a^3 + 2a^2b + 2ab^2 + b^3) : (a + b) = a^2 + ab + b^2$

E3	Ergebnisse
a)	$\frac{3x^5y^{n+2} + 3x^2y^{3n+2} - 2x^{m+3}y^{n+3} - 2x^my^{3n+3}}{x^3 + y^{2n}} = 3x^2y^{n+2} - 2x^my^{n+3}$
b)	$\frac{48a^{n+x} + 56a^xb^x - 72a^nb^c - 84b^{x+c}}{12a^n + 14b^x} = 4a^x - 6b^c$
c)	$\frac{8a^{2n+1} - 10a^{2n}b + 15a^{3n-2}b - 12a^{3n-1}}{2a^{2n} - 3a^{3n-2}} = 4a - 5b$

E4	Ergebnisse
a)	$\frac{2a^5b^{x+2} - 2a^3b^{x+5} + 3a^4b^{2x-1} - 3a^2b^{2x+2}}{a^2 - b^3} = 2a^3b^{x+2} + 3a^2b^{2x-1}$
b)	$\frac{24a^{c+x} + 28a^xb^x - 36a^cb^r - 42b^{x+r}}{6a^c + 7b^x} = 4a^x - 6b^r$
c)	$\frac{24a^{m+1}b^{m+2} - 28a^mb^{m+3} - 6a^{m+3}b^m + 7a^{m+2}b^{m+1}}{4a^mb^{m+2} - a^{m+2}b^m} = 6a - 7b$

E5	Ergebnisse				
a)	$\left[\left(\frac{1}{2}\right)^2\right]^3 = \frac{1}{64}$	b)	$\left[\left(\frac{1}{2}\right)^3\right]^2 = \frac{1}{64}$	c)	$\left(\frac{a^{-2}b^3}{c^4d^{-5}}\right)^{-3} = \frac{a^6c^{12}}{b^9d^{15}}$
d)	$\left(\frac{a^0b^{-2}}{c^3d^{-4}}\right)^{-2} = \frac{b^4c^6}{d^8}$	e)	$\frac{\left[(-a)^2\right]^{2n} \cdot a^6}{a^4} = a^{4n+2}$	f)	$\frac{\left[(-a^m)^2\right]^3}{a^{4m}} = a^{2m}$

E6		Ergebnisse	
a)	$(5x^{-1}y^2z) \cdot \frac{(2x^2y)^4}{(3yz^3)^8} = \frac{5 \cdot 3^8 y^6 z^{25}}{16x^9}$	b)	$\left(\frac{x^7}{y^4}\right) \cdot \left(\frac{y}{x^{-3}}\right)^4 = x^{19}$

Potenzgesetze

$a^m \cdot a^n = a^{m+n}$	$\frac{a^m}{a^n} = a^{m-n}$	$a^n \cdot b^n = (a \cdot b)^n$	$\frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n$
$(a^n)^m = a^{n \cdot m}$	$\sqrt[n]{a^m} = a^{\frac{m}{n}}$	$a^0 = 1$	$\frac{1}{a^n} = a^{-n}$

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Ausführliche Lösungen :

A1	Ausführliche Lösung
a)	$\begin{array}{r} (6a^6 + a^4b + 25b^3) : (3a^2 + 5b) = \underline{\underline{2a^4 - 3a^2b + 5b^2}} \\ -(6a^6 + 10a^4b) \\ \hline -9a^4b \\ -(-9a^4b - 15a^2b^2) \\ \hline 15a^2b^2 + 25b^3 \\ -(15a^2b^2 + 25b^3) \\ \hline \end{array}$

A1	Ausführliche Lösung
b)	$\begin{array}{r} (15a^9 - 8a^6b + 8b^3) : (3a^3 + 2b) = \underline{\underline{5a^6 - 6a^3b + 4b^2}} \\ -(15a^9 + 10a^6b) \\ \hline -18a^6b \\ -(-18a^6b - 12a^3b^2) \\ \hline -12a^3b^2 + 8b^3 \\ -(12a^3b^2 + 8b^3) \\ \hline \end{array}$

A1	Ausführliche Lösung
c)	$\begin{array}{r} (14a^4 - a^3 + 5a^2 - 3a + 1) : (7a^2 - 4a + 1) = \underline{\underline{2a^2 + a + 1}} \\ -(14a^4 - 8a^3 + 2a^2) \\ \hline 7a^3 + 3a^2 - 3a \\ -(7a^3 - 4a^2 + a) \\ \hline 7a^2 - 4a + 1 \\ -(7a^2 - 4a + 1) \\ \hline \end{array}$

A2	Ausführliche Lösung
a)	$(a^5 + a^4 - 8a^3 + 26a^2 - 29a + 21) : (a^2 - 2a + 3) = \underline{\underline{a^3 + 3a^2 - 5a + 7}}$ $\begin{array}{r} \underline{-(a^5 - 2a^4 + 3a^3)} \\ 3a^4 - 11a^3 + 26a^2 \\ \underline{-(3a^4 - 6a^3 + 9a^2)} \\ -5a^3 + 17a^2 - 29a \\ \underline{-(-5a^3 + 10a^2 - 15a)} \\ 7a^2 - 14a + 21 \\ \underline{-(7a^2 - 14a + 21)} \end{array}$

A2	Ausführliche Lösung
b)	$(a^3 - 2a^2b + 2ab^2 - b^3) : (a - b) = \underline{\underline{a^2 - ab + b^2}}$ $\begin{array}{r} \underline{-(a^3 - a^2b)} \\ -a^2b + 2ab^2 \\ \underline{-(-a^2b + ab^2)} \\ ab^2 - b^3 \\ \underline{-(ab^2 - b^3)} \end{array}$

A2	Ausführliche Lösung
c)	$(a^3 + 2a^2b + 2ab^2 + b^3) : (a + b) = \underline{\underline{a^2 + ab + b^2}}$ $\begin{array}{r} \underline{-(a^3 + a^2b)} \\ a^2b + 2ab^2 \\ \underline{-(a^2b + ab^2)} \\ ab^2 + b^3 \\ \underline{-(ab^2 + b^3)} \end{array}$

A3	Ausführliche Lösung
a)	$\begin{array}{r} (3x^5y^{n+2} + 3x^2y^{3n+2} - 2x^{m+3}y^{n+3} - 2x^my^{3n+3}) : (x^3 + y^{2n}) = \underline{\underline{3x^2y^{n+2} - 2x^my^{n+3}}} \\ -(3x^5y^{n+2} + 3x^2y^{3n+2}) \\ \hline -2x^{m+3}y^{n+3} - 2x^my^{3n+3} \\ -(-2x^{m+3}y^{n+3} - 2x^my^{3n+3}) \end{array}$

A3	Ausführliche Lösung
b)	$\begin{array}{r} (48a^{n+x} + 56a^xb^x - 72a^nb^c - 84b^{x+c}) : (12a^n + 14b^x) = \underline{\underline{4a^x - 6b^c}} \\ -(48a^{n+x} + 56a^xb^x) \\ \hline -72a^nb^c - 84b^{x+c} \\ -(-72a^nb^c - 84b^{x+c}) \end{array}$

A3	Ausführliche Lösung
c)	$\begin{array}{r} (8a^{2n+1} - 10a^{2n}b + 15a^{3n-2}b - 12a^{3n-1}) : (2a^{2n} - 3a^{3n-2}) = \underline{\underline{4a - 5b}} \\ -(8a^{2n+1} - 12a^{3n-1}) \\ \hline -10a^{2n}b + 15a^{3n-2}b \\ -(-10a^{2n}b + 15a^{3n-2}b) \end{array}$

A4	Ausführliche Lösung
a)	$\begin{array}{r} (2a^5b^{x+2} - 2a^3b^{x+5} + 3a^4b^{2x-1} - 3a^2b^{2x+2}) : (a^2 - b^3) = \underline{\underline{2a^3b^{x+2} + 3a^2b^{2x-1}}} \\ -(2a^5b^{x+2} - 2a^3b^{x+5}) \\ \hline 3a^4b^{2x-1} - 3a^2b^{2x+2} \\ - (3a^4b^{2x-1} - 3a^2b^{2x+2}) \end{array}$

A4	Ausführliche Lösung
b)	$\begin{array}{r} (24a^{c+x} + 28a^xb^x - 36a^cb^r - 42b^{x+r}) : (6a^c + 7b^x) = \underline{\underline{4a^x - 6b^r}} \\ -(24a^{c+x} + 28a^xb^x) \\ \hline -36a^cb^r - 42b^{x+r} \\ -(-36a^cb^r - 42b^{x+r}) \end{array}$

A4	Ausführliche Lösung
c)	$(24a^{m+1}b^{m+2} - 28a^m b^{m+3} - 6a^{m+3}b^m + 7a^{m+2}b^{m+1}) : (4a^m b^{m+2} - a^{m+2}b^m) = \underline{\underline{6a - 7b}}$ $\frac{-(24a^{m+1}b^{m+2} \quad - 6a^{m+3}b^m)}{-28a^m b^{m+3} \quad + 7a^{m+2}b^{m+1}}$ $-\left(-28a^m b^{m+3} \quad + 7a^{m+2}b^{m+1}\right)$

A5	Ausführliche Lösungen		
a)	$\left[\left(\frac{1}{2}\right)^2\right]^3 = \left(\frac{1}{2}\right)^{2 \cdot 3}$ $= \left(\frac{1}{2}\right)^6$ $= \frac{1^6}{2^6} = \underline{\underline{\frac{1}{64}}}$	b)	$\left[\left(\frac{1}{2}\right)^3\right]^2 = \left(\frac{1}{2}\right)^{3 \cdot 2}$ $= \left(\frac{1}{2}\right)^6$ $= \frac{1^6}{2^6} = \underline{\underline{\frac{1}{64}}}$

A5	Ausführliche Lösungen		
c)	$\left(\frac{a^{-2}b^3}{c^4d^{-5}}\right)^{-3} = \frac{a^{-2 \cdot (-3)} \cdot b^{3 \cdot (-3)}}{c^{4 \cdot (-3)} \cdot d^{-5 \cdot (-3)}}$ $= \frac{a^6 b^{-9}}{c^{-12} d^{15}}$ $= \frac{a^6 c^{12}}{b^9 d^{15}}$	d)	$\left(\frac{a^0 b^{-2}}{c^3 d^{-4}}\right)^{-2} = \frac{a^{0 \cdot (-2)} \cdot b^{-2 \cdot (-2)}}{c^{3 \cdot (-2)} \cdot d^{-4 \cdot (-2)}}$ $= \frac{a^0 b^4}{c^{-6} \cdot d^8}$ $= \frac{b^4 c^6}{d^8}$

A5	Ausführliche Lösungen		
e)	$\frac{\left[(-a)^2\right]^{2n} \cdot a^6}{a^4} = \frac{\left[a^2\right]^{2n} \cdot a^6}{a^4}$ $= \frac{a^{2 \cdot 2n} \cdot a^6}{a^4}$ $= a^{4n} \cdot a^6 \cdot a^{-4}$ $= \underline{\underline{a^{4n+2}}}$	f)	$\frac{\left[(-a^m)^2\right]^3}{a^{4m}} = \frac{\left[a^{2m}\right]^3}{a^{4m}}$ $= \frac{a^{2 \cdot 3m}}{a^{4m}}$ $= a^{6m-4m}$ $= \underline{\underline{a^{2m}}}$

A6 Ausführliche Lösungen	
a)	$\begin{aligned} & (5x^{-1}y^2z) : \frac{(2x^2y)^4}{(3yz^3)^8} \\ &= \frac{5x^{-1}y^2z \cdot (3yz^3)^8}{(2x^2y)^4} \\ &= \frac{5x^{-1}y^2z \cdot 3^8 \cdot y^8 \cdot z^{24}}{2^4 \cdot x^8 \cdot y^4} \\ &= \frac{5 \cdot 3^8 x^{-1} y^{10} z^{25}}{2^4 \cdot x^8 \cdot y^4} \\ &= \frac{5 \cdot 3^8 y^6 z^{25}}{2^4 x^9} \end{aligned}$
b)	$\begin{aligned} & \left(\frac{x^7}{y^4}\right) \cdot \left(\frac{y}{x^{-3}}\right)^4 = \frac{x^7}{y^4} \cdot (y \cdot x^3)^4 \\ &= \frac{x^7 \cdot y^4 \cdot x^{12}}{y^4} \\ &= \frac{x^7 \cdot \cancel{y^4} \cdot x^{12}}{\cancel{y^4}} \\ &= \underline{\underline{x^{19}}} \end{aligned}$

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