12 komplexere Aufgaben zur Multiplikation und Division von Potenzen mit gleicher Basis (Die Exponenten sind natürliche Zahlen.)

---

1 $2a^2b^3(5a^4 - 3ab + 7b^2) =$

2 $(a^m + b^n)(a^{2m} - a^m b^n + b^{2n}) =$

3 $(x^2 - 3y^3)(x^4 + 3x^2y^3 + 9y^6) =$

4 $\frac{p^7}{r} \cdot \left(\frac{q^5}{p^4} : \frac{q^6}{r} \right) =$

5 $\frac{v^{2n}}{w^{n-1}} : \left(\frac{u}{w^{n+1}} \cdot \frac{v^{3n}}{u^{n+1}} \right) =$

6 $\left(\frac{p^{3n+2}}{q^{m-1}} : \frac{q^3}{s^n} \right) : \left(\frac{p^{2n+2}}{s^{n-1}} : \frac{q^2}{s^{2n-1}} \right) =$

Zerlegen Sie die folgenden Terme in Faktoren!

7 $a^5 + a^6 =$

8 $4x^2y^4 - 4xy^5 + y^6 =$

9 $c^{n+1} - c^{n-1} =$

10 $5 \cdot 3^k - 3^{k+1} =$

11 $6 \cdot 2^n - 11 \cdot 2^{n-1} =$

12 $3^{n+1} - 2 \cdot 3^n + 6 \cdot 3^{n-1} =$

1 $2a^2b^3(5a^4 - 3ab + 7b^2) = 2a^2b^3 \cdot 5a^4 - 2a^2b^3 \cdot 3ab + 2a^2b^3 \cdot 7b^2$
$= 10a^6b^3 - 6a^3b^4 + 14a^2b^5$ Distributivgesetz!

2 $(a^m + b^n)(a^{2m} - a^m b^n + b^{2n}) = a^{3m} - a^{2m}b^n + a^m b^{2n}$
$+ a^{2m}b^n - a^m b^{2n} + b^{3n} = a^{3m} + b^{3n}$

3 $(x^2 - 3y^3)(x^4 + 3x^2y^3 + 9y^6) = x^6 + 3x^4y^3 + 9x^2y^6$
$- 3x^4y^3 - 9x^2y^6 - 27y^9 = x^6 - 27y^9$

4 $\frac{p^7}{r} \cdot \left(\frac{q^5}{p^4} : \frac{q^6}{r} \right) = \frac{p^7}{r} \cdot \frac{q^5}{p^4} \cdot \frac{r}{q^6} = \frac{p^3}{q}$ Klammerrechnung zuerst!

5 $\frac{v^{2n}}{w^{n-1}} : \left(\frac{u}{w^{n+1}} \cdot \frac{v^{3n}}{u^{n+1}} \right) = \frac{v^{2n}}{w^{n-1}} : \frac{v^{3n}}{w^{n+1}u^n} = \frac{v^{2n}}{w^{n-1}} \cdot \frac{w^{n+1}u^n}{v^{3n}} = \frac{w^2u^n}{v^n}$

6 $\left(\frac{p^{3n+2}}{q^{m-1}} : \frac{q^3}{s^n} \right) : \left(\frac{p^{2n+2}}{s^{n-1}} : \frac{q^2}{s^{2n-1}} \right) = \left(\frac{p^{3n+2}}{q^{m-1}} \cdot \frac{s^n}{q^3} \right) : \left(\frac{p^{2n+2}}{s^{n-1}} \cdot \frac{s^{2n-1}}{q^2} \right)$
$= \frac{p^{3n+2}s^n}{q^{m+2}} : \frac{p^{2n+2}s^n}{q^2} = \frac{p^{3n+2}s^n}{q^{m+2}} \cdot \frac{q^2}{p^{2n+2}s^n} = \frac{p^n}{q^m}$

Zerlegen Sie die folgenden Terme in Faktoren!

7 $a^5 + a^6 = a^5 + a^5 \cdot a = a^5(1 + a)$

8 $4x^2y^4 - 4xy^5 + y^6 = y^4(4x^2 - 4xy + y^2) = y^4(2x - y)^2$

9 $c^{n+1} - c^{n-1} = c^{n-1+2} - c^{n-1} = c^{n-1}(c^2 - 1) = c^{n-1}(c + 1)(c - 1)$

10 $5 \cdot 3^k - 3^{k+1} = 3^k(5 - 3) = 2 \cdot 3^k$

11 $6 \cdot 2^n - 11 \cdot 2^{n-1} = 6 \cdot 2^{n-1+1} - 11 \cdot 2^{n-1} = 2^{n-1}(6 \cdot 2 - 11) = 2^{n-1}$

12 $3^{n+1} - 2 \cdot 3^n + 6 \cdot 3^{n-1} = 3^{n-1+2} - 2 \cdot 3^{n-1+1} + 6 \cdot 3^{n-1} = 3^{n-1}(3^2 - 2 \cdot 3 + 6) = 3^{n-1} \cdot 3^2 = 3^{n+1}$