

Mathematik 1

Repetition Terme und Potenzen

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1 Übung Repetition Terme und Potenzen

Wenn nichts anderes vermerkt, sollen die Terme vereinfacht oder ausgerechnet werden.

$$1. -[2a - b \cdot (a - 2b) + ab] = -[2a - ab + 2b^2 + ab] = -2a - 2b^2$$

$$2. e \cdot (3e^2 - 4) - 2 \cdot (e^3 - e^2 - 2e) = 3e^3 - 4e - 2e^3 + 2e^2 + 4e = e^3 + 2e^2$$

$$3. \frac{-2x^2 - 4xy - 2y^2}{x + y} = \frac{-2 \cdot (x^2 + 2xy + y^2)}{x + y} = \frac{-2 \cdot (x + y) \cdot (x + y)}{(x + y)} = -2x - 2y$$

$$4. \frac{(a^2 - 1) \cdot (2 - a) \cdot (-a^2)}{a \cdot (a - 2) \cdot (a + 1)} = \frac{(a + 1) \cdot (a - 1) \cdot (2 - a) \cdot (-1) \cdot a^2}{a \cdot (-1) \cdot (2 - a) \cdot (a + 1)} = a \cdot (a - 1)$$

$$5. (s - t)^3 = 1s^3 - 3s^2 \cdot t + 3s \cdot t^2 - t^3$$

$$6. ac - bd + bc - ad = a \cdot (c - d) + b(c - d) = (c - d) \cdot (a + b)$$

$$7. x^3 - x^2 + y^2 \cdot (x - 1) = x^2 \cdot (x - 1) + y^2 \cdot (x - 1) = (x - 1) \cdot (x^2 + y^2)$$

$$8. 4x^2 - 36y^2 = (2x + 6y) \cdot (2x - 6y)$$

$$9. -9u^2 + 49z^2 = 49z^2 - 9u^2 = (7z + 3u) \cdot (7z - 3u)$$

$$10. a^2 - 9a + 20 = (a - 5) \cdot (a - 4)$$

$$11. x^2 + x - 42 = (x + 7) \cdot (x - 6)$$

$$12. z^4 - 1 = (z^2 - 1) \cdot (z^2 + 1) = (z - 1) \cdot (z + 1) \cdot (z^2 + 1)$$

$$13. \frac{ax + bx}{ay + by} = \frac{x \cdot (a + b)}{y \cdot (a + b)} = \frac{x}{y}$$

$$14. \frac{a^2 + 5a - 24}{a^2 - 5a + 6} = \frac{(a + 8) \cdot (a - 3)}{(a - 2) \cdot (a - 3)} = \frac{a + 8}{a - 2}$$

$$15. \frac{rs + r + s + 1}{rt + t + r + 1} = \frac{r \cdot (s + 1) + 1 \cdot (s + 1)}{t \cdot (r + 1) + 1 \cdot (r + 1)} = \frac{(s + 1) \cdot (r + 1)}{(r + 1) \cdot (t + 1)} = \frac{s + 1}{t + 1}$$

16. $\frac{p^3 - 2p^2 + p}{pq - q} = \frac{p \cdot (p^2 - 2p + 1)}{q \cdot (p - 1)} = \frac{p \cdot (p - 1) \cdot (p - 1)}{q \cdot (p - 1)} = \frac{p \cdot (p - 1)}{q}$
17. $\frac{6a}{5c} - \frac{11a}{15c} = \frac{3 \cdot 6a}{3 \cdot 5c} - \frac{11a}{15c} = \frac{18a - 11a}{15} = \frac{7a}{15c}$
18. $\frac{w^2}{w - 2} - w = \frac{w^2}{w - 2} - w \cdot \frac{(w - 2)}{(w - 2)} = \frac{w^2 - w^2 + 2w}{w - 2} = \frac{2w}{w - 2}$
19. $\frac{a}{a + b} + \frac{b}{a - b} = \frac{a}{(a + b)} \cdot \frac{(a - b)}{(a - b)} + \frac{b}{(a - b)} \cdot \frac{(a + b)}{(a + b)} = \frac{a^2 - ab + ab + b^2}{(a + b) \cdot (a - b)} = \frac{a^2 + b^2}{a^2 - b^2}$
20. $\frac{3b^2 - 3bc}{c} \div (6b - 6c) = \frac{3b(b - c)}{c} \cdot \frac{1}{6 \cdot (b - c)} = \frac{3b}{6c} = \frac{b}{2c}$
21. $\frac{+64x^2y}{7z} \cdot \frac{49z^2}{+72xy^3} = \frac{8 \cdot 8x^2 \cdot y \cdot 7 \cdot 7 \cdot z^2}{7z \cdot 9 \cdot 8 \cdot x \cdot y^3} = \frac{56}{9} \cdot \frac{x \cdot z}{y^2}$
22. $\frac{m^2 - n^2}{2 - m} \div \frac{m - n}{m - 2} = \frac{(m + n) \cdot (m - n)}{(-1) \cdot (-2 + m)} \cdot \frac{(m - 2)}{(m - n)} = -m - n$
23. $\left(\frac{x^2}{y} + y\right) \div \frac{x}{y} = \left(\frac{x^2}{y} + y \cdot \frac{y}{y}\right) \cdot \frac{y}{x} = \left(\frac{x^2 + y^2}{y}\right) \cdot \frac{y}{x} = \frac{(x^2 + y^2)}{x}$
24. $\frac{\frac{a^3b^2c}{c^2d}}{\frac{ab^2c^3}{2d}} = \frac{a^3b^2c}{c^2 \cdot d} \cdot \frac{2d}{ab^2c^3} = \frac{2a^2}{c^4}$
25. $\frac{\frac{a^2 - 16c^2}{8a^2}}{\frac{a - 4c}{4a}} = \frac{(a + 4c) \cdot (a - 4c)}{8a^2} \cdot \frac{4a}{(a - 4c)} = \frac{a + 4c}{2a}$
26. $\frac{f^{13} + f^8}{f^5 + 1} = \frac{f^8 \cdot (f^5 + 1)}{(f^5 + 1)} = f^8$
27. $(2k - 1)^4 \cdot (2k - 1)^{-5} = (2k - 1)^{4-5} = (2k - 1)^{-1} = \frac{1}{2k - 1}$
28. $\frac{3^{-3}}{(-3)^3} = \frac{1}{3^3 \cdot (-1)^3 \cdot 3^3} = -\frac{1}{3^9} = -\frac{1}{729}$
29. $\frac{8c^2e^5}{9d^{-2}b^2} \div \frac{e^4d}{(3b)^3 \cdot (2c)^{-2}} = \frac{8c^2e^5 \cdot d^2}{9b^2} \div \frac{e^4d \cdot (2c)^2}{(3b)^3} = \frac{8c^2e^5d^2}{9b^2} \cdot \frac{3^3b^3}{e^4 \cdot d \cdot 4c^2} = 6dbe$

$$30. \frac{48^{\frac{1}{4}}}{4^{\frac{1}{4}}} = \sqrt[4]{\frac{48}{4}} = \sqrt[4]{12}$$

$$31. \frac{b^{\frac{5}{6}}}{\sqrt[5]{b^4}} = b^{\frac{5}{6} - \frac{4}{5}} = b^{\frac{25-24}{30}} = b^{\frac{1}{30}} = \sqrt[30]{b}$$

$$32. \sqrt{\frac{z^3}{6y}} \div \sqrt{\frac{9z}{24y^5}} = \sqrt{\frac{z^3 \cdot 24y^5}{6y \cdot 9z}} = \sqrt{\frac{4 \cdot z^2 y^4}{9}} = \frac{2}{3} \cdot z \cdot y^2$$

$$33. \sqrt{p \cdot \sqrt[3]{\frac{1}{p}}} = \sqrt{\sqrt[3]{\frac{p^3}{p}}} = \sqrt{\sqrt[3]{p^2}} = \sqrt[3]{\sqrt{p^2}} = \sqrt[3]{p}$$

$$34. \frac{x^{\frac{1}{4}} \cdot \sqrt[5]{x^2}}{x^{\frac{2}{5}} \cdot \sqrt[4]{x}} = \frac{\sqrt[4]{x} \cdot \sqrt[5]{x^2}}{\sqrt[5]{x^2} \cdot \sqrt[4]{x}} = 1$$

$$35. \frac{(3-2\sqrt{x})}{(3+2\sqrt{x})} = \frac{(3-2\sqrt{x}) \cdot (3-2\sqrt{x})}{(3+2\sqrt{x}) \cdot (3-2\sqrt{x})} = \frac{9-12\sqrt{x}+4x}{9-4x}$$

$$36. 32^{-\frac{1}{5}} = \frac{1}{\sqrt[5]{32}} = \frac{1}{\sqrt[5]{2^5}} = \frac{1}{2}$$