

Aufgabe 6.1

(a) $3a^4 \cdot 2a^5 = 6a^9$

(b) $5x^3 \cdot 7x^6 = 35x^9$

Aufgabe 6.2

(a) $24t^9 : 8t^2 = 24t^9 : (8 \cdot t^2) = 24t^9 : 8 : t^2 = 3t^7$

(b) $24t^9 : 8 \cdot t^2 = 3t^{11}$

Aufgabe 6.3

$$12y^7 \cdot 10y^5 : 15y^9 = \frac{12 \cdot 10}{15} \cdot y^{7+5-9} = \frac{3 \cdot 4 \cdot 2 \cdot 5}{3 \cdot 5} \cdot y^3 = 8y^3$$

Aufgabe 6.4

$$60z^{14} : 4z^3 : 3z^5 = 60z^{14} : (4z^3 \cdot 3z^5) = \frac{60z^{14}}{4z^3 \cdot 3z^5} = \frac{5z^{14}}{z^8} = 5z^6$$

Aufgabe 6.5

$$60z^{14} : (4z^3 : 3z^5) = 60z^{14} : 4z^3 \cdot 3z^5 = \frac{60z^{14} \cdot 3z^5}{4z^3} = \frac{45z^{19}}{z^3} = 45z^{16}$$

Aufgabe 6.6

(a) $(p+q)^3 \cdot (p+q)^5 = (p+q)^{3+5} = (p+q)^8$

(b) $(v+2w)^7 : (v+2w)^4 = (v+2w)^{7-4} = (v+2w)^3$

Aufgabe 6.7

(a) $(x+y)^3 - (x+y)^3 = 0$

(b) $(s-t)^8 + (s-t)^8 = 2(s-t)^8$

Aufgabe 6.8

(a) $(x^{80} - x^{60}) : x^{20} = x^{80} : x^{20} - x^{60} : x^{20} = x^{60} - x^{40}$

(b) $(y^{80} + y^{60}) \cdot y^{20} = y^{80} \cdot y^{20} + y^{60} \cdot y^{20} = y^{100} + y^{80}$

Aufgabe 6.9

$$(c^{15} - c^{12} + c^{11}) : c^9 = c^{15} : c^9 - c^{12} : c^9 + c^{11} : c^9 = c^6 - c^3 + c^2$$

Aufgabe 6.10

$$(a) x^{3n+3} : (x^n \cdot x^2) = x^{3n+3} : x^{n+2} = x^{3n+3-(n+2)} = x^{2n+1}$$

$$(b) y^{2n+3} : (y^{3n-1} : y^{2n}) = y^{2n+3} : y^{n-1} = y^{(2n+3)-(n-1)} = y^{n+4}$$

Aufgabe 6.11

$$(a) c^{2n} \cdot c : c^{n+2} = c^{2n+1-(n+2)} = c^{n-1}$$

$$(b) x^{4n+5} : x^{2n-4} \cdot x^{3n+2} = x^{4n+5-(2n-4)+3n+2} = x^{4n+5-2n+4+3n+2} = x^{5n+11}$$

Aufgabe 6.12

$$(a) (a^{2n+1} + a^{n+4}) \cdot a^{n-1} = a^{2n+1} \cdot a^{n-1} + a^{n+4} \cdot a^{n-1} \\ = a^{2n+1+n-1} + a^{n+4+n-1} \\ = a^{3n} + a^{2n+3}$$

$$(b) (z^{3x-2} - z^{2x+2}) : z^{x+1} = z^{3x-2} : z^{x+1} - z^{2x+2} : z^{x+1} \\ = z^{3x-2-(x+1)} - z^{2x+2-(x+1)} \\ = z^{2x-3} - z^{x+1}$$

Aufgabe 6.13

$$3v^7 \cdot (2v^3 - 8v^5) : 6v^4 = (6v^{10} - 24v^{12}) : 6v^4 = v^6 - 4v^8$$

Aufgabe 6.14

$$(a) \left(\frac{d}{5}\right)^9 : \left(\frac{d}{5}\right)^7 = \left(\frac{d}{5}\right)^2$$

$$(b) \left(\frac{6}{t}\right)^5 \cdot \left(\frac{t}{6}\right)^4 = \frac{6^5}{t^5} \cdot \frac{t^4}{6^4} = \frac{6}{t}$$

Aufgabe 6.15

$$(a) (3^{67})^{25} \cdot (3^{33})^{25} = (3^{67} \cdot 3^{33})^{25} = (3^{100})^{25} = 3^{2500}$$

$$(b) (7^{99})^{34} : (7^{98})^{34} = (7^{99} : 7^{98})^{34} = (7^1)^{34} = 7^{34}$$

Aufgabe 6.16

$$(a) 5^7 \cdot 25^4 = 5^7 \cdot (5^2)^4 = 5^7 \cdot 5^8 = 5^{15}$$

$$(b) 8^{21} : 2^{30} = (2^3)^{21} : 2^{30} = 2^{63} : 2^{30} = 2^{33}$$

Aufgabe 6.17

$$(a) 9^7 \cdot 27^4 = (3^2)^7 \cdot (3^3)^4 = 3^{14} \cdot 3^{12} = 3^{26}$$

$$(b) 64^6 : 128^5 = (2^6)^6 : (2^7)^5 = 2^{36} : 2^{35} = 2^1 = 2$$

Aufgabe 6.18

$$(a) 100^9 \cdot 1000^8 \cdot 10^7 = 10^{18} \cdot 10^{24} \cdot 10^7 = 10^{18+24+7} = 10^{49}$$

$$(b) 25^{13} : 5^{17} \cdot 125^4 = (5^2)^{13} : 5^{17} \cdot (5^3)^4 = 5^{26} : 5^{17} \cdot 5^{12} = 5^{26-17+12} = 5^{21}$$

Aufgabe 6.19

$$(a) 12.5^8 \cdot 2^8 \cdot 4^8 = (12.5 \cdot 2 \cdot 4)^8 = 100^8 = 10^{16}$$

$$(b) 0.4^{20} \cdot 6^{20} : 1.2^{20} = (0.4 \cdot 6 : 1.2)^{20} = (2.4 : 1.2)^{20} = 2^{20}$$

Aufgabe 6.20

$$(a) (5^9 \cdot 18^9) : (3^9 \cdot 15^9) = \frac{(5 \cdot 18)^9}{(3 \cdot 15)^9} = \left(\frac{5 \cdot 18}{3 \cdot 15}\right)^9 = 2^9 = 512$$

$$(b) (6^7 \cdot 4^7) : (12^7 : 8^7) = 6^7 \cdot 4^7 : 12^7 \cdot 8^7 = (6 \cdot 4 : 12 \cdot 8)^7 = 16^7 = (2^4)^7 = 2^{28}$$

Aufgabe 6.21

$$(a) (x^4)^{3n+1} : (x^3)^{4n+1} = x^{4(3n+1)} : x^{3(4n+1)} = x^{12n+4-(12n+3)} = x^1 = x$$

$$(b) (a^{n+1} \cdot a^{2n-1})^4 = (a^{n+1+2n-1})^4 = (a^{3n})^4 = a^{12n}$$

Aufgabe 6.22

$$(a) (2z^3 \cdot 5z^2)^8 = (10z^5)^8 = 10^8 z^{40}$$

$$(b) (x^2yz^3)^{15} : (xyz^2)^{15} = (x^2yz^3 : xyz^2)^{15} = (xz)^{15} = x^{15}z^{15}$$

Aufgabe 6.23

$$(a) ((-x)^2)^3 = (-x)^{2 \cdot 3} = (-x)^6 = x^6$$

$$(b) ((-x)^3)^2 = (-x)^{3 \cdot 2} = (-x)^6 = x^6$$

Aufgabe 6.24

$$(a) \quad (-x^2)^3 = -(x^2)^3 = -x^6$$

$$(b) \quad (-x^3)^2 = (x^3)^2 = x^6$$

Aufgabe 6.25

$$(a) \quad (12rst)^m : (4st)^m = (12rst : 4st)^m = (3r)^m$$

$$(b) \quad (uvw)^n : uvw^n = u^n v^n w^n : (u \cdot v \cdot w^n) \\ = u^n v^n w^n : u^1 : v^1 : w^n = u^{n-1} v^{n-1}$$

Aufgabe 6.26

$$(a) \quad (8x^2 - 6x)^7 : (4x - 3)^7 = \left(\frac{8x^2 - 6x}{4x - 3} \right)^7 = \left(\frac{2x(4x - 3)}{4x - 3} \right)^7 = (2x)^7$$

$$(b) \quad (x - y)^7 : (y - x)^7 = \left(\frac{x - y}{y - x} \right)^7 = \left(\frac{-(y - x)}{y - x} \right)^7 = (-1)^7 = -1$$

Aufgabe 6.27

$$(a) \quad (p^2 - q^2)^6 : (p - q)^6 = \left(\frac{p^2 - q^2}{p - q} \right)^6 = \left(\frac{(p + q)(p - q)}{p - q} \right)^6 = (p + q)^6$$

$$(b) \quad (a^2 - b^2)^9 : (a + b)^9 = \left(\frac{a^2 - b^2}{a + b} \right)^9 = \left(\frac{(a + b)(a - b)}{a + b} \right)^9 = (a - b)^9$$

Aufgabe 6.28

$$(a) \quad (z^2 + 6z + 9)^8 : (z + 3)^8 = \left(\frac{z^2 + 6z + 9}{z + 3} \right)^8 = \left(\frac{(z + 3)^2}{z + 3} \right)^8 = (z + 3)^8$$

$$(b) \quad (c^2 + 4c + 3)^n : (c + 3)^n = \left(\frac{c^2 + 4c + 3}{c + 3} \right)^n = \left(\frac{(c + 1)(c + 3)}{c + 3} \right)^n = (c + 1)^n$$