

1. $\log_c 25 = 7 \rightarrow c^7 = 25$
 $c = \sqrt[7]{25} = \underline{\underline{1,58382}}$ 1P

2. natürlicher Log. : $\log_e = \underline{\underline{ln}}$ 1,5P
 Zehner Log. : $\log_{10} = \underline{\underline{lg}}$
 Zweier Log. : $\log_2 = \underline{\underline{lb}}$

3. a) $\log_{10} x = -2,5 \rightarrow 10^{-2,5} = x = \underline{\underline{0,00316}}$

b) $\log_3 1385,456 = \frac{lg 1385,456}{lg 3} = \underline{\underline{6,58447}}$ 1P

4. a) $\log_c \frac{1}{c^n} = \log_c c^{-n} = \underline{\underline{-n}}$ 6P

b) $\log_2 128 = \log_2 2^7 = \underline{\underline{7}}$ (je 1P)

c) $\log_b \sqrt[b]{b^3} = \log_b b^{1/2} = \underline{\underline{1/2}}$

d) $\log_{1/8} \frac{1}{4} = \log_{2^{-3}} (2^{-2}) = -2 \frac{lg 2^{-2}}{lg 2^{-3}} = \underline{\underline{+2/3}}$

e) $\log_y (y^x) = x \log_y y = \underline{\underline{x}}$

f) $\log_a \frac{1}{\sqrt[4]{a^3}} = \log_a a^{-3/4} = \underline{\underline{-3/4}}$

5) a) $lg \frac{1}{x+y} = lg (x+y)^{-1} = \underline{\underline{-lg(x+y)}}$ 1P

b) $lg \frac{x^2 \sqrt{a}}{c^3} = \underline{\underline{2lg x + \frac{1}{2}lg a - 3lg c}}$ 1P

c) $lg 9xy^2 \sqrt{(x^2+y^2)} c = \underline{\underline{lg 9 + lg x + 2lg y + \frac{1}{2}lg c + \frac{1}{2}lg(x^2+y^2)}}$ 1,5P

d) $lg \sqrt[n]{\frac{a^2 - a - 30}{2ma^2 - 26am + 84m}} =$

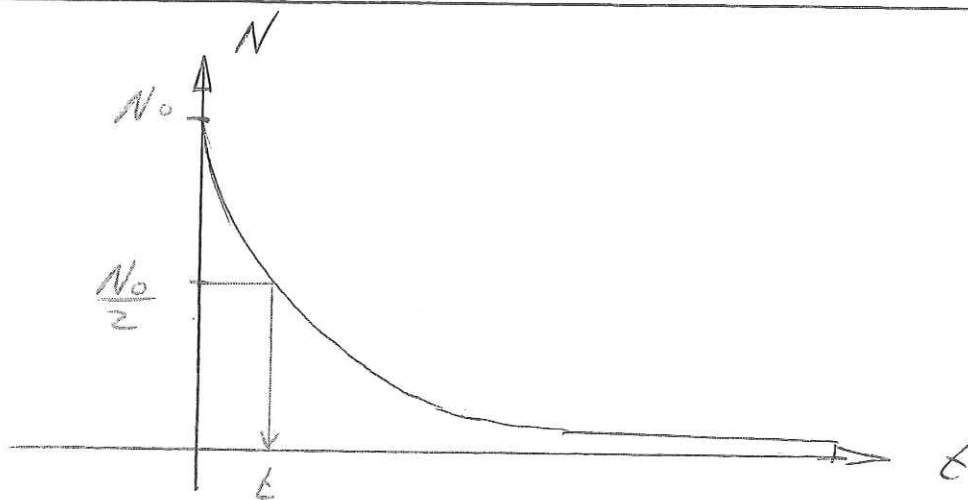
$lg \sqrt[n]{\frac{(a+5)(a-6)}{2m(a-6)(a-7)}} =$

$$= \frac{1}{n} \lg(a+5) - \frac{1}{n} \lg 2 - \frac{1}{n} \lg m - \frac{1}{n} \lg(a-7) \quad 2P$$

6) a) $2 \lg x - \frac{1}{2} \lg y = \underline{\underline{\lg \frac{x^2}{\sqrt{y}}}} \quad 1P$

b) $\frac{1}{2} \lg(x^2 - xy + y^2) + \frac{1}{2} \lg(x+y) =$
 $\underline{\underline{\lg \sqrt{(x^2 - xy + y^2) \cdot (x+y)}}} = \underline{\underline{\lg \sqrt{x^3 + y^3}}} \quad 2P$

7) $N(t) = N_0 e^{-k \cdot t}$
 $\frac{N_0}{2} = N_0 \cdot e^{-k \cdot t}$
 $\frac{1}{2} = e^{-k \cdot t} \quad | \ln$
 $\ln \frac{1}{2} = -k \cdot t \underbrace{\ln e}_1$
 $\ln \frac{1}{2} = -k \cdot t$
 $t = \underline{\underline{\frac{\ln 0,5}{-k}}} = \underline{\underline{\frac{0,693}{k}}} = \underline{\underline{\frac{\ln 2}{k}}}$ 4P



Logarithmenprüfung

B

$$1) \log_a 235 = 5 \Rightarrow a = \sqrt[5]{235} = \underline{\underline{2,97998}}$$

$$2) a) \lg (a^5 b^6)^3 = \underline{\underline{15 \lg a + 18 \lg b}}$$

$$b) \lg \frac{p^3 q^4}{\sqrt[3]{x y^5}} = \underline{\underline{3 \lg p + 4 \lg q - \frac{1}{3} \lg x - \frac{5}{3} \lg y}}$$

$$c) \lg \frac{x^3 y^4 z^5}{(x y z)^2} = \underline{\underline{\lg x + 2 \lg y + 3 \lg z}}$$

$$d) \lg \frac{1}{\sqrt[3]{x}} = \underline{\underline{-\frac{1}{3} \lg x}}$$

$$3) a) \underline{\underline{\lg \frac{\sqrt{a} \cdot c}{b^4}}}$$

$$c) \underline{\underline{\lg 80}}$$

$$b) \underline{\underline{\lg (x^5 \cdot \sqrt[4]{y} \cdot 2 \cdot \sqrt{z})}}$$

$$d) \underline{\underline{\lg \frac{4^3}{100} = \lg 0,64}}$$

$$4) a) \ln \frac{1}{e} = \ln e^{-1} = -1 \cdot \ln e = \underline{\underline{-1}}$$

$$b) e^{\ln 2} = \underline{\underline{2}}$$

$$c) \ln(\ln e) = \ln 1 = \underline{\underline{0}}$$

$$d) \ln \frac{e}{\sqrt[3]{e}} = \ln e^{\frac{2}{3}} = \frac{2}{3} \ln e = \underline{\underline{\frac{2}{3}}}$$

$$5) a) \lg 40 + \lg 25 = \lg (40 \cdot 25) = \underline{\underline{3}}$$

$$b) 3 \lg 2 + 3 \lg 5 = \lg (8 \cdot 125) = \underline{\underline{3}}$$

$$c) \lg \sqrt[4]{0,01} = \lg 10^{-\frac{1}{2}} = -\frac{1}{2} \lg 10 = \underline{\underline{-\frac{1}{2}}}$$

$$d) 10^{3 - \lg 5} = \frac{10^3}{10^{\lg 5}} = \frac{1000}{5} = \underline{\underline{200}}$$

$$c) a) T(x) = \lg \sqrt{(10-3x)^2} \quad G = \mathbb{R}$$

$$10-3x \neq 0 \quad (\text{wä. } \lg 0 \text{ nicht def!!})$$

$$3x \neq 10$$

$$x \neq 10/3$$

$$\underline{\underline{D = \mathbb{R} \setminus \{10/3\}}}$$

$$b) \lg \left(\frac{1}{2}x - 1 \right) + \lg (6-x)$$

$$> 0 \quad \wedge \quad > 0$$

$$\frac{1}{2}x - 1 > 0 \quad \wedge \quad 6-x > 0$$

$$\frac{1}{2}x > 1$$

$$-x > -6$$

$$\underline{\underline{x < 6}}$$

$$\underline{\underline{x > 2}}$$

$$\underline{\underline{D = \{x \mid 2 < x < 6 \wedge x \in \mathbb{R}\}}}$$

$$7) \quad p = f(h) = p_0 \cdot e^{-h/H}$$

$$p = \frac{p_0}{2}$$

$$\frac{p_0}{2} = p_0 \cdot e^{-h/H}$$

$$0,5 = e^{-h/H} \quad | \ln$$

$$\ln 0,5 = -\frac{h}{H} \ln e$$

$$H \cdot \ln 0,5 = -h \cdot 1$$

$$\underline{\underline{h = -\ln 0,5 \cdot H}}$$

$$h = -\ln 0,5 \cdot 8005 = \underline{\underline{5549 \text{ m}}}$$

Logarithmenprüfung

B2

Nota selbstred.

C2

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$$b) \lg \frac{p^3 q^4}{\sqrt[3]{x_3^5}} = \underline{\underline{3 \lg p + 4 \lg q - \frac{1}{3} \lg x - \frac{5}{3} \lg 3}}$$

$$c) \lg \frac{x^2 y^4 z^5}{(x y z)^2} = \underline{\underline{\lg x + 2 \lg y + 3 \lg z}}$$

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$$3) a) \lg \frac{\sqrt{a} \cdot c}{b^4}$$

$$c) \lg 80$$

$$b) \lg (x^5 \cdot \sqrt[4]{y} \cdot 2 \cdot \sqrt{z})$$

$$d) \lg \frac{4^3}{100} = \underline{\underline{\lg 0,64}}$$

$$4) a) \ln \frac{1}{e} = \ln e^{-1} = -1 \cdot \ln e = \underline{\underline{-1}}$$

$$b) e^{\ln 2} = \underline{\underline{2}}$$

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$$> 0 \quad \wedge \quad > 0$$

$$\frac{1}{2}x - 1 > 0 \quad \wedge \quad 6-x > 0$$

$$\frac{1}{2}x > 1$$

$$-x > -6$$

$$\underline{\underline{x < 6}}$$

$$\underline{\underline{x > 2}}$$

$$\underline{\underline{D = \{x \in \mathbb{R} \mid 2 < x < 6\}}}$$

$$6c) 3x - 2 > 0$$

$$3x > 2$$

$$x > \frac{2}{3}$$

$$\underline{\underline{D = \{x \in \mathbb{R} \mid x > \frac{2}{3}\}}}$$

$$6d) x^2 > 0 \Rightarrow \underline{\underline{D = \mathbb{R} \setminus \{0\}}}$$

$$7) p = f(h) = p_0 \cdot e^{-h/H}$$

$$p = \frac{p_0}{2}$$

$$\frac{p_0}{2} = p_0 \cdot e^{-h/H}$$

$$0,5 = e^{-h/H} \quad | \ln$$

$$\ln 0,5 = -h/H \cdot \ln e$$

$$H \cdot \ln 0,5 = -h \cdot 1$$

$$\underline{\underline{h = -\ln 0,5 \cdot H}}$$

$$h = -\ln 0,5 \cdot 8005$$

$$\underline{\underline{h = 5549 \text{ m}}}$$

c)

$$1. \log_x 377 = 8 \rightarrow x^8 = 377$$

$$x = \sqrt[8]{377} = \underline{\underline{2,0991}}$$

$$2. a) \lg[(a^2 b^2)^2]^3 = \lg(a^{12} b^{12}) = \underline{\underline{12 \lg a + 12 \lg b}}$$

$$b) \lg(x-1)^5 = \underline{\underline{5 \lg(x-1)}}$$

$$c) \lg\left(\frac{3x \sqrt[3]{6}}{5y^3}\right) = \underline{\underline{\lg 3 + \lg x + \frac{1}{3} \lg 6 - \lg 5 - 3 \lg y}}$$

$$d) \lg \frac{1}{\sqrt[3]{x^2}} = \underline{\underline{-\frac{2}{3} \lg x}}$$

$$3. a) \lg a^3 - \lg\left(\frac{1}{a}\right)^2 = \lg \frac{a^3}{\frac{1}{a^2}} = \underline{\underline{\lg a^5}}$$

$$b) \lg \sqrt{\frac{a+\sqrt{x}}{a^2-x}} = \lg \sqrt{\frac{a+\sqrt{x}}{(a-\sqrt{x})(a+\sqrt{x})}} = \underline{\underline{\lg \frac{1}{\sqrt{a-\sqrt{x}}}}}$$

$$c) \lg(k-1)^{\frac{1}{n}} = \underline{\underline{\lg \sqrt[n]{k-1}}}$$

$$d) \lg 4^3 - \lg 10 = \lg \frac{64}{10} = \underline{\underline{\lg 6,4}}$$

$$4. a) \log_a a^5 = \underline{\underline{5}}$$

$$b) e^{3 \ln 4} = (e^{\ln 4})^3 = 4^3 = \underline{\underline{64}}$$

$$c) \log_{\frac{1}{a}} \sqrt{a} = x$$

$$\left(\frac{1}{a}\right)^x = a^{\frac{1}{2}} \Rightarrow \left(\frac{1}{a}\right)^x = \left(\frac{1}{a}\right)^{-\frac{1}{2}} \Rightarrow x = \underline{\underline{-\frac{1}{2}}}$$

$$d) \ln(e \cdot e^{-\frac{1}{3}}) = \ln e^{\frac{2}{3}} = \underline{\underline{\frac{2}{3}}}$$

$$5) a) \lg 2^3 + \lg 5^3 = \lg(8 \cdot 125) = \lg 1000 = \underline{\underline{3}}$$

$$b) \frac{\cancel{\lg a}}{\cancel{\lg a}} \cdot \frac{\cancel{\lg a}}{\cancel{\lg a}} = \underline{\underline{1}}$$

$$5. c) \left(\frac{1}{2}\right)^x = \frac{1}{64} \Rightarrow \left(\frac{1}{2}\right)^x = \left(\frac{1}{2}\right)^6 \Rightarrow \underline{\underline{x=6}}$$

$$d) \frac{\lg 125 \cdot \lg 3^{1/3} \cdot \lg 8}{\lg 3 \cdot \lg 2 \cdot \lg 5} = \frac{\lg 5 \cdot \lg 3 \cdot \lg 2}{\lg 3 \cdot \lg 2 \cdot \lg 5} = \underline{\underline{3}}$$

$$6. a) T(x) = \lg \sqrt{10-3x} \quad \mathbb{G} = \mathbb{R}$$

$$10-3x > 0$$

$$-3x > -10$$

$$\underline{\underline{x < \frac{10}{3}}}$$

$$\underline{\underline{D = \left\{x \mid x < \frac{10}{3}\right\}_{\mathbb{R}}}}$$

$$b) T(x) = \lg \left(\frac{x-1}{2-2x} + \frac{1}{2} \right) \quad \mathbb{G} = \mathbb{R}$$

$$\frac{x-\cancel{x} + \cancel{x-x}}{2(1-x)} > 0$$

$$\frac{0}{2(1-x)} > 0$$

$$\frac{0}{2(1-x)} > 0$$

$$0 > 0$$

$$\underline{\underline{D = \{\} \mathbb{R}}}$$

$$7. a) 7500 = 5000 \left(1 + \frac{4,5}{100}\right)^n$$

$$\frac{7500}{5000} = 1,045^n \quad | \lg$$

$$\lg 1,5 = n \lg 1,045$$

$$n = \frac{\lg 1,5}{\lg 1,045} = \underline{\underline{9,212 \text{ Jahre}}}$$

Es dauert 9,2 Jahre

$$b) 10'000 = 5000 \left(1 + \frac{p}{100}\right)^{10}$$

$$2 = \left(\frac{100+p}{100}\right)^{10} \quad | \sqrt[10]{}$$

$$\sqrt[10]{2} = \frac{100+p}{100}$$

$$100 \cdot \sqrt[10]{2} = 100 + p$$

$$p = 107,177 - 100 = \underline{\underline{7,177\%}}$$

$$8) a) 0,6^x = 6 \quad | \lg$$

$$x \cdot \lg 0,6 = \lg 6$$

$$x = \frac{\lg 6}{\lg 0,6}$$

$$\underline{\underline{L = \{-3,51\}}} \quad x = \underline{\underline{-3,51}}$$

$$b) e^x = \pi \quad | \ln$$

$$x \cdot \underbrace{\ln e} = \ln \pi$$

$$x \cdot 1 = \ln \pi$$

$$x = \ln \pi$$

$$x = 1,15$$

$$\underline{\underline{L = \{1,15\}}}$$

$$c) 2 \cdot 3^{2x-1} = 12$$

$$3^{2x-1} = 6 \quad | \lg$$

$$(2x-1) \cdot \lg 3 = \lg 6$$

$$2x-1 = \frac{\lg 6}{\lg 3} = 1,6309$$

$$2x = 2,6309$$

$$x = \underline{\underline{1,32}}$$

$$\underline{\underline{L = \{1,32\}}}$$

$$d) N = N_0 \cdot n^{x-a}$$

$$n^{x-a} = \frac{N}{N_0} \quad | \lg$$

$$(x-a) \lg n = \lg \frac{N}{N_0}$$

$$x-a = \frac{\lg \frac{N}{N_0}}{\lg n}$$

$$x = \underline{\underline{\frac{\lg \frac{N}{N_0}}{\lg n} + a}}$$

Σ

(mit Folien)

$$1) \quad a) \quad x = \sqrt[3]{333} = \underline{\underline{6,931}} \quad b) \quad \frac{\lg 50}{\lg 5} = \underline{\underline{2,431}}$$

$$2) \quad a) \quad \lg(a^2 b^3) = \underline{\underline{2 \lg a + 3 \lg b}}$$

$$b) \quad \lg(x^{-1/2} \cdot a^{1/2} \cdot y^{1/6}) = \underline{\underline{1/2 \lg a - 1/2 \lg x + 1/6 \lg y}}$$

$$c) \quad \underline{\underline{\lg x + 2 \lg y - 2 \lg z}}$$

$$d) \quad \underline{\underline{-\lg(x-y)}}$$

$$3) \quad a) \quad \frac{1}{2} \lg \frac{a}{b^3} = \underline{\underline{\lg \sqrt{\frac{a}{b^3}}}}$$

$$b) \quad \underline{\underline{\ln \frac{x \sqrt[5]{24}}{\sqrt{y}}}}$$

$$c) \quad \lg 100 + \lg 2 = \underline{\underline{\lg 200}}$$

$$d) \quad \lg 500 - \lg 1000 = \lg \frac{500}{1000} = \underline{\underline{\lg 0,5}}$$

$$4) \quad a) \quad \ln \sqrt{e} = \ln e^{1/2} = \underline{\underline{0,5}}$$

$$b) \quad \log_a \sqrt{a^2} = \log_a a = \underline{\underline{1}}$$

$$c) \quad \ln(\ln e) = \ln 1 = \underline{\underline{0}}$$

$$d) \quad \ln\left(7 \cdot \frac{1}{7}\right) = \ln 1 = \underline{\underline{0}}$$

5) falsch sind: 1 / 2 / 6 / 7 / 8 / 9

OF \rightarrow 4P | 1+2F \Rightarrow 3P | 3+4F \Rightarrow 2P | 5+6F \Rightarrow 1P

$$6) \quad a) \quad \underline{\underline{D = \{x \in \mathbb{R} \mid x < 1/12\}}}$$

$$b) \quad \underline{\underline{D = \{x \in \mathbb{R} \mid -1/2 \leq x < 2\}}}$$

$$7) a) \quad \lg \sqrt{x} + \lg \sqrt{2x} = 2 \quad D = \{x \in \mathbb{R} \mid x > 0\}$$

$$\lg x^{1/2} + \lg (2x)^{1/2} = 2$$

$$\lg [x^{1/2} \cdot (2x)^{1/2}] = 2$$

$$\lg (x \cdot \sqrt{2}) = 2$$

$$10^2 = x \cdot \sqrt{2}$$

$$x = \frac{100}{\sqrt{2}} = \underline{\underline{70,71}}$$

$$b) \quad \lg (3x - 2) = 2$$

$$10^2 = 3x - 2 \quad D = \{x \in \mathbb{R} \mid x > \frac{2}{3}\}$$

$$102 = 3x$$

$$x = 34 \quad K = \underline{\underline{\{34\}}}$$

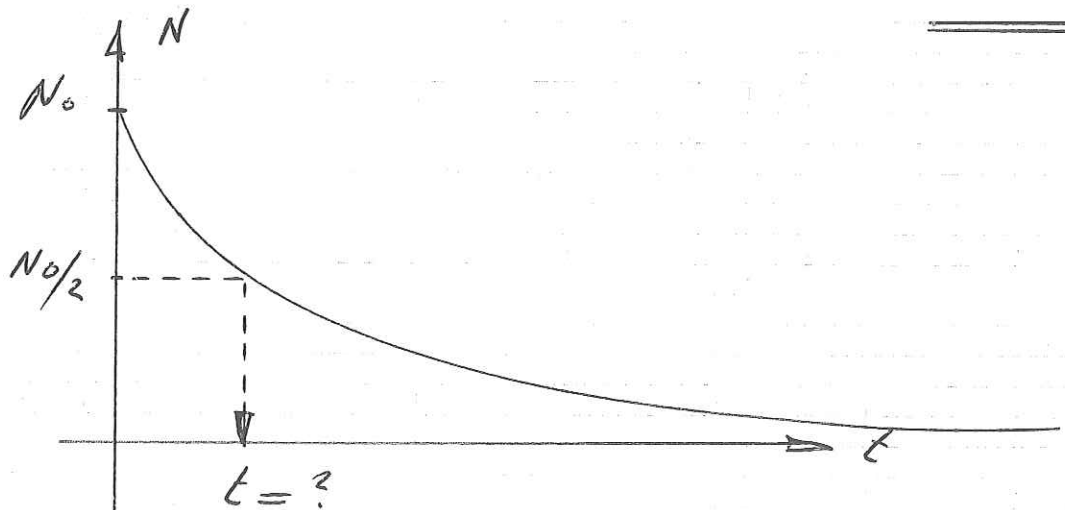
$$8) \quad \frac{N_0}{2} = N_0 \cdot e^{-k \cdot t}$$

$$\frac{1}{2} = e^{-k \cdot t} \quad | \quad \ln$$

$$\ln \left(\frac{1}{2} \right) = \underbrace{\ln e^{-k \cdot t}}_{-k \cdot t}$$

$$\ln 0,5 = -k \cdot t$$

$$t = \frac{-\ln 0,5}{k} = \frac{\ln 2}{k} = \underline{\underline{\frac{0,6931}{k}}}$$



Logarithmenprüfung

E)

1) a) $\log_x 8888 = 7 \Rightarrow x = \sqrt[7]{8888} = \underline{\underline{3,6653}}$
b) $\log_2 x = 5 \Rightarrow 2^5 = x \quad x = \underline{\underline{32}}$

2) a) $\lg(a^5 b^6)^3 = \underline{\underline{15 \lg a + 18 \lg b}}$
b) $\lg \frac{p^3 \cdot q^4}{\sqrt[3]{x} \cdot y^5} = \underline{\underline{3 \lg p + 4 \lg q - \frac{1}{3} \lg x - 5 \lg y}}$
c) $\lg \frac{x^3 y^4 z^5}{(x y z)^2} = \underline{\underline{\lg x + 2 \lg y + 3 \lg z}}$
d) $\lg \frac{1}{\sqrt[3]{x}} = \underline{\underline{-\frac{1}{3} \lg x}}$

3) a) $\lg \frac{\sqrt{a} \cdot c}{b^4}$ c) $\underline{\underline{\lg 80}}$
b) $\underline{\underline{\lg(x^5 \cdot \sqrt[4]{y} \cdot z \cdot \sqrt{2})}}$ d) $\lg \frac{4^3}{100} = \underline{\underline{\lg 0,64}}$

4) a) $\ln \frac{1}{e} = \ln e^{-1} = -1 \ln e = \underline{\underline{-1}}$
b) $e^{\ln 2} = \underline{\underline{2}}$
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5) a) $\lg 40 + \lg 25 = \lg(40 \cdot 25) = \underline{\underline{3}}$
b) $3 \lg 2 + 3 \lg 5 = \lg(2^3 \cdot 5^3) = \lg 1000 = \underline{\underline{3}}$
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$$3x \neq 10$$

$$x \neq 10/3$$

$$D = \mathbb{R} \setminus \{10/3\}$$

$$b) \underbrace{\lg\left(\frac{1}{2}x - 1\right)}_{> 0} + \underbrace{\lg(6-x)}_{> 0}$$

$$\frac{1}{2}x - 1 > 0$$

$$\frac{1}{2}x > +1$$

$$\underline{x > 2}$$

$$6-x > 0$$

$$-x > -6$$

$$\underline{x < 6}$$

$$D = \underline{\underline{\{x \in \mathbb{R} \mid 2 < x < 6\}}}$$

$$7) a) p = f(h) = p_0 \cdot e^{-h/H}$$

$$p = \frac{p_0}{2}$$

$$\frac{p_0}{2} = p_0 \cdot e^{-h/H}$$

(halb so gross wie auf Meeresh.)

$$0,5 = e^{-\frac{h}{H}} \quad | \ln$$

$$\ln 0,5 = \ln e^{-h/H}$$

$$\ln 0,5 = \frac{-h}{H} \cdot \underbrace{\ln e}_{=1}$$

$$H \cdot \ln 0,5 = -h \cdot 1 \Rightarrow$$

$$b) h = -\ln 0,5 \cdot 8005$$

$$h = \underline{\underline{5549 \text{ m}}}$$

$$h = \underline{\underline{-\ln 0,5 \cdot H}}$$

$$8) a) 5^x = 10 \quad | \lg$$

$$\lg 5^x = \lg 10$$

$$x \cdot \lg 5 = 1$$

$$x = \frac{1}{\lg 5} = \underline{\underline{1,4307}}$$

$$L = \underline{\underline{\{1,4307\}}}$$

$$b) 5^{\sqrt{x}} = 10 \quad | \lg$$

$$\lg 5^{\sqrt{x}} = \lg 10$$

$$\sqrt{x} \cdot \lg 5 = 1$$

$$\sqrt{x} = \frac{1}{\lg 5} = 1,4306$$

$$x = 1,4306^2 = 2,09$$

$$L = \underline{\underline{\{2,0968\}}}$$

$$c) 8 \cdot e^{10-x} = 0,6$$

$$e^{10-x} = \frac{0,6}{8} = 0,075 \quad | \ln$$

$$\ln e^{10-x} = \ln 0,075$$

$$(10-x) \cdot \ln e = -2,59026$$

$$x = 72,6$$

$$L = \underline{\underline{\{72,6\}}}$$

Logarithmenprüfung : Lösungen F

$$1) a) \log_x 2550 = 7 \Rightarrow x = \sqrt[7]{2550} = \underline{\underline{3,067}}$$

$$b) \log_b x = 6 \Rightarrow 2^6 = x \quad x = \underline{\underline{64}}$$

$$2) a) \lg(x^3 y^6)^3 = 3[\lg(x^3 y^6)] = \underline{\underline{9 \lg x + 18 \lg y}}$$

$$b) \lg \frac{p^3 q^4}{\sqrt[3]{xy^5}} = \underline{\underline{3 \lg p + 4 \lg q - \frac{1}{3} \lg x - \frac{5}{3} \lg y}}$$

$$c) \lg \frac{x^2 y^2 \sqrt{z}}{(xyz)^2} = \underline{\underline{\lg y - 1,5 \lg z}}$$

$$d) \lg \frac{1}{\sqrt[3]{x}} = \underline{\underline{-\frac{1}{3} \lg x}}$$

$$3) a) \lg \frac{\sqrt{a \cdot c}}{b^4}$$

$$c) \lg 100 - \lg 2^{10} =$$

$$= \lg \frac{100}{2^{10}} = \lg \frac{25}{256}$$

$$b) \log_a (x^2 - 1)$$

$$d) \lg \frac{4^3}{100} = \underline{\underline{\lg 0,64}}$$

$$4) a) \ln 1/e = \ln e^{-1} = -1 \ln e = \underline{\underline{-1}}$$

$$b) e^{\ln 2} = \underline{\underline{2}}$$

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$$x \neq \frac{10}{3} \quad \underline{\underline{D = \mathbb{R} \setminus \left\{ \frac{10}{3} \right\}}}$$

$$b) \lg \underbrace{\left(\frac{1}{2}x - 1 \right)}_{> 0} + \lg \underbrace{(6-x)}_{> 0}$$

$$\frac{1}{2}x - 1 > 0$$

$$\frac{1}{2}x > 1$$

$$\underline{x > 2}$$

$$6-x > 0$$

$$-x > -6$$

$$\underline{x < 6}$$

$$\underline{\underline{D = \{x \in \mathbb{R} \mid 2 < x < 6\}}}$$

$$7) a) S_{DIN} = 1 + 10 \lg S_{ASA}$$

$$S_{DIN} = 1 + 10 \lg 64 = \underline{\underline{19,06}}$$

$$S_{DIN} = 1 + 10 \lg 100 = \underline{\underline{21}}$$

$$b) S_{DIN} - 1 = 10 \lg S_{ASA}$$

$$\frac{S_{DIN} - 1}{10} = \lg S_{ASA}$$

$$\underline{\underline{S_{ASA} = 10^{\frac{S_{DIN} - 1}{10}}}} \quad \left| \begin{array}{l} = 10^{\frac{19-1}{10}} \\ = 10^{1,8} = \underline{\underline{63,1}} \end{array} \right. \quad \downarrow S_{DIN}$$

$$8) a) 5^{\sqrt{x}} = 100 \quad | \lg$$

$$\sqrt{x} \cdot \lg 5 = \lg 100$$

$$\sqrt{x} = \frac{2}{\lg 5} \quad |^2$$

$$x = \left(\frac{2}{\lg 5} \right)^2 = \underline{\underline{8,19}}$$

$$b) e^{2x-3} = 5 \quad | \ln$$

$$2x-3 = \ln 5$$

$$2x = \ln 5 + 3$$

$$x = \frac{\ln 5 + 3}{2}$$

$$x = \underline{\underline{2,304}}$$

$$c) a \cdot e^{10-x} = b$$

$$e^{10-x} = \frac{b}{a} \quad | \ln$$

$$10-x = \ln \frac{b}{a}$$

$$x = 10 - \ln \frac{b}{a}$$

Logarithmenprüfung

Lösungen

G)

$$1) a) x = \sqrt[3]{335} = \underline{\underline{6,945}}$$

$$b) \log_7 77 = \frac{\log 77}{\log 7} = \underline{\underline{2,232}}$$

$$c) x = 3^5 = \underline{\underline{243}}$$

$$2) a) \lg(x^8 y^{12}) = \underline{\underline{8 \lg x + 12 \lg y}}$$

$$b) \ln \frac{m^{1/15}}{m^{1/10}} = \ln m^{-1/30} = \underline{\underline{-1/30 \ln m}}$$

$$c) \lg \frac{x^2 \cdot y^3 \cdot z^{1/2}}{x^4 \cdot y^2 \cdot z^2} = \lg(y \cdot z^{-3/2}) = \underline{\underline{\lg y - 3/2 \lg z}}$$

$$d) \lg x^{-1/3} = \underline{\underline{-1/3 \lg x}}$$

$$3) a) \lg\left(\frac{a^2}{a}\right) = \underline{\underline{\lg a}}$$

$$b) \ln \frac{a^{-1}}{a^{1/3}} = \ln \frac{1}{a \cdot a^{1/3}} = \ln \frac{1}{\sqrt[3]{a^4}}$$

$$c) \lg 100 - \lg 2^{10} = \lg \frac{100}{2^{10}} = \lg \frac{25}{256}$$

$$d) \lg 4^3 - \lg 100 = \lg \frac{64}{100} = \underline{\underline{\lg 0,64}}$$

$$4) a) \ln 1/e = \ln e^{-1} = -1 \cdot \ln e = \underline{\underline{-1}}$$

$$b) e^{\ln 5} = \underline{\underline{5}}$$

$$c) \ln \left(\frac{\ln e}{1} \right) = \ln 1 = \underline{\underline{0}}$$

$$d) \ln \frac{e}{e^{1/3}} = \ln e^{2/3} = \frac{2}{3} \cdot \frac{\ln e}{1} = \underline{\underline{2/3}}$$

$$5) a) \lg 40 + \lg 25 = \lg(40 \cdot 25) = \lg 1000 = \underline{\underline{3}}$$

$$b) \lg \cdot \left(\frac{1000 \cdot \lg 10}{1} \right) = \lg 1000 = \underline{\underline{3}}$$

$$5c) \lg \frac{1}{\sqrt[4]{100}} = \lg \frac{1}{\sqrt[4]{10^2}} = \lg 10^{-1/2} = -1/2 \lg 10 = \underline{\underline{-1/2}}$$

$$d) \log_2 \left(-\log_3 \frac{1}{3^4} \right) = \log_2 \left(-\log_3 3^{-4} \right) = \log_2 4 = \underline{\underline{2}}$$

$$6) a) T(x) = \lg(20 - 4x) \quad \mathbb{D} = \mathbb{R}$$

$$20 - 4x > 0$$

$$-4x > -20 \quad | \cdot (-1)$$

$$4x < 20$$

$$\underline{x < 5} \quad \mathbb{D} = \{x \in \mathbb{R} \mid x < 5\}$$

$$b) T(x) = \lg(x^2 - 9) = \lg \left[\overset{+}{(x-3)} \overset{+}{(x+3)} \right] \quad \overset{+}{>0} \vee \overset{-}{>0} \cdot \overset{-}{>0}$$

$$x-3 > 0$$

$$x+3 > 0$$

$$\underline{x > 3}$$

$$\underline{x > -3}$$

$$\underline{\underline{\mathbb{D} = \{x \in \mathbb{R} \mid x > 3 \vee x < -3\}}}$$

$$7) K_n = K_0 \cdot q^n$$

$$21'000 \cdot 1,035^n = 20'500 \cdot 1,04^n$$

$$\left(\frac{1,035}{1,04} \right)^n = \frac{20'500}{21'000} \quad | \lg$$

$$n \cdot \lg \frac{1,035}{1,04} = \lg \frac{20'500}{21'000}$$

$$n = \underline{\underline{5}}$$

Nach 5 Jahren
sind beide Guthabef.

$$8) a) 7^{\sqrt{x}} = 3 \quad | \lg$$

$$\sqrt{x} \cdot \lg 7 = \lg 3$$

$$\sqrt{x} = \frac{\lg 3}{\lg 7} = 0,56457 \quad |^2$$

$$\underline{\underline{x = 0,31874}}$$

$$b) \ln(\ln x) = 1$$

$$e^1 = \ln x$$

$$\underline{\underline{x = e^e}}$$

$$c) e^{-x} = 0,5 \quad | \ln$$

$$-x \cdot \ln e = \ln 0,5$$

$$-x = \ln 0,5$$

$$x = -\ln 0,5$$

$$\underline{\underline{x = 0,6931}}$$