Mathematik * Klasse 9d * Hausaufgabe vom 09.10.2017

S. 27/3a) $\frac{1}{\sqrt{2}} = \frac{1 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \frac{\sqrt{2}}{2} \quad (= \frac{1}{2}\sqrt{2})$

d) $\frac{2\sqrt{11}}{\sqrt{14}} = \frac{2 \cdot \sqrt{11 \cdot 14}}{14} = \frac{1}{7}\sqrt{154}$

g) $\frac{3\sqrt{5} + 5\sqrt{3}}{\sqrt{6}} = \frac{(3\sqrt{5} + 5\sqrt{3}) \cdot \sqrt{6}}{6} = \frac{3\sqrt{30} + 5 \cdot 3\sqrt{2}}{6} = \frac{1}{2}\sqrt{30} + \frac{5}{2}\sqrt{2}$

h) $\frac{5}{3 - \sqrt{2}} = \frac{5 \cdot (3 + \sqrt{2})}{(3 - \sqrt{2}) \cdot (3 + \sqrt{2})} = \frac{15 + 5\sqrt{2}}{9 - 2} = \frac{15 + 5\sqrt{2}}{7}$

S. 27/4a) $\frac{a^2 + 6a + 9}{a^2 - 9} = \frac{(a+3)^2}{(a+3)(a-3)} = \frac{a+3}{a-3}$

4d) $\frac{\sqrt{12}}{\sqrt{35}} - \frac{\sqrt{35}}{\sqrt{12}} = \frac{\sqrt{12}^2 - \sqrt{35}^2}{\sqrt{35} \cdot \sqrt{12}} = \frac{12 - 35}{\sqrt{5 \cdot 7 \cdot 3 \cdot 4}} =$

$= \frac{-23}{\sqrt{105} \cdot 2} = -\frac{23 \cdot \sqrt{105}}{105 \cdot 2} = -\frac{23 \cdot \sqrt{105}}{210}$

4g) $\frac{\sqrt{6}}{\sqrt{6} - \sqrt{5}} = \frac{\sqrt{6} \cdot (\sqrt{6} + \sqrt{5})}{(\sqrt{6} - \sqrt{5}) \cdot (\sqrt{6} + \sqrt{5})} = \frac{6 + \sqrt{30}}{6 - 5} = 6 + \sqrt{30}$

4h) $\frac{x - 144}{\sqrt{x} - 12} = \frac{(\sqrt{x} - 12)(\sqrt{x} + 12)}{\sqrt{x} - 12} = \sqrt{x} + 12$

S. 27/7a) $\frac{1}{\sqrt{a}} = \frac{\sqrt{a}}{\sqrt{a} \cdot \sqrt{a}} = \frac{\sqrt{a}}{a} \qquad a \in \mathbb{R}^+$

7d) $\frac{1}{1 - \sqrt{a}} = \frac{1 \cdot (1 + \sqrt{a})}{(1 - \sqrt{a})(1 + \sqrt{a})} = \frac{1 + \sqrt{a}}{1 - a} \qquad a \in \mathbb{R}_0^+ \setminus \{1\}$

7g) $\frac{\sqrt{x} - \sqrt{y}}{\sqrt{x} + \sqrt{y}} = \frac{(\sqrt{x} - \sqrt{y})^2}{(\sqrt{x} + \sqrt{y})(\sqrt{x} - \sqrt{y})} = \frac{\sqrt{x}^2 - 2\sqrt{xy} + \sqrt{y}^2}{x - y} =$

$x \in \mathbb{R}_0^+$, $y \in \mathbb{R}_0^+$ und x und y nicht beide Null!

$= \frac{x - 2\sqrt{xy} + y}{x - y} \quad \leftarrow$ $x \in \mathbb{R}_0^+$, $y \in \mathbb{R}_0^+$ und $x \neq y$ oder $x \in \mathbb{R}_0^-$, $y \in \mathbb{R}_0^-$ und $x \neq y$

7h) $\frac{2\sqrt{a} + 3\sqrt{b}}{3\sqrt{a} - 2\sqrt{b}} = \frac{(2\sqrt{a} + 3\sqrt{b}) \cdot (3\sqrt{a} - 2\sqrt{b})}{9a - 4b} =$

$= \frac{6a - 4\sqrt{ab} + 9\sqrt{ab} - 6b}{9a - 4b} = \frac{6a + 5\sqrt{ab} - 6b}{9a - 4b}$

S. 27 / 7b, $\frac{b}{5\sqrt{a}} = \frac{b\sqrt{a}}{5a}$ $\quad a \in \mathbb{R}^+$

7e, $\frac{\sqrt{x}+\sqrt{y}}{\sqrt{x}} = \frac{(\sqrt{x}+\sqrt{y})\cdot\sqrt{x}}{\sqrt{x}\cdot\sqrt{x}} = \frac{x+\sqrt{xy}}{x}$

* Ausgangsterm: $x \in \mathbb{R}^+, y \in \mathbb{R}_0^+$

$(x \in \mathbb{R}^+$ und $y \in \mathbb{R}_0^+)$ oder $(x \in \mathbb{R}^-$ und $y \in \mathbb{R}_0^-)$

7h, $\frac{\sqrt{s}-\sqrt{t}}{\sqrt{st}} = \frac{(\sqrt{s}-\sqrt{t})\cdot\sqrt{st}}{\sqrt{st}\cdot\sqrt{st}} = \frac{s\sqrt{t}-t\sqrt{s}}{st} = \frac{\sqrt{t}}{t} - \frac{\sqrt{s}}{s}$

$s \in \mathbb{R}^+, t \in \mathbb{R}^+$ $\quad t \in \mathbb{R}^+, s \in \mathbb{R}^+$

7l, $\sqrt{a} + \frac{5a}{\sqrt{a}} = \sqrt{a} + \frac{5a\sqrt{a}}{\sqrt{a}\sqrt{a}} = \sqrt{a} + \frac{5a\sqrt{a}}{a} = \sqrt{a}+5\sqrt{a} = 6\sqrt{a}$

$a \in \mathbb{R}^+$ $\quad a \in \mathbb{R}_0^+$

S. 27 / 8a, $\frac{a-1}{\sqrt{a}+1} = \frac{(a-1)(\sqrt{a}-1)}{(\sqrt{a}+1)(\sqrt{a}-1)} = \frac{(a-1)(\sqrt{a}-1)}{(a-1)} = \sqrt{a}-1$

$a \in \mathbb{R}_0^+$ $\quad a \in \mathbb{R}_0^+$

8d, $\frac{3a-12}{\sqrt{a}-2} = \frac{(3a-12)(\sqrt{a}+2)}{(\sqrt{a}-2)(\sqrt{a}+2)} = \frac{3\cdot(a-4)(\sqrt{a}+2)}{a-4} = 3\sqrt{a}+6$

$a \in \mathbb{R}_0^+ \setminus \{4\}$ $\quad a \in \mathbb{R}_0^+$

8g, $\frac{a-b}{\sqrt{a}+\sqrt{b}} = \frac{(a-b)(\sqrt{a}-\sqrt{b})}{(\sqrt{a}+\sqrt{b})(\sqrt{a}-\sqrt{b})} = \frac{(a-b)\cdot(\sqrt{a}-\sqrt{b})}{(a-b)} = \sqrt{a}-\sqrt{b}$

$b, a \in \mathbb{R}_0^+$ aber nicht beide Null $\quad a, b \in \mathbb{R}_0^+$