

Mathematik Klasse 9

Hausaufgaben Seite 55:

Aufgabe 2:

- a) $7\sqrt{3} + 5\sqrt{3} = 12\sqrt{3}$
- b) $8\sqrt{5} - 2\sqrt{5} = 6\sqrt{5}$
- c) $\sqrt{7} + 5\sqrt{7} = 6\sqrt{7}$
- d) $-\sqrt{11} - 3\sqrt{11} = -4\sqrt{11}$
- e) $6\sqrt{1,2} - 5\sqrt{1,2} = \sqrt{1,2}$
- j) $\frac{7}{3}\sqrt{0,4} - \frac{2}{9}\sqrt{0,4} = \frac{21}{9}\sqrt{0,4} - \frac{2}{9}\sqrt{0,4} = \frac{19}{9}\sqrt{0,4}$

Aufgabe 3:

- a) $3\sqrt{a} + 2\sqrt{a} = 5\sqrt{a}$
- b) $9\sqrt{b} - 4\sqrt{b} = 5\sqrt{b}$
- c) $-3\sqrt{x} + 3\sqrt{x} = 0$
- d) $4\sqrt{xy} - 5\sqrt{xy} = -\sqrt{xy}$
- e) $7\sqrt{abc} - 6\sqrt{abc} = \sqrt{abc}$
- j) $\frac{7}{3}\sqrt{st} - 0,3\sqrt{st} = \frac{7}{3}\sqrt{st} - \frac{3}{10}\sqrt{st} = \frac{70}{30}\sqrt{st} - \frac{9}{30}\sqrt{st} = \frac{61}{30}\sqrt{st}$

Aufgabe 4:

- a) $6\sqrt{5} + 3\sqrt{2} + 8\sqrt{5} = 3\sqrt{2} + 14\sqrt{5}$
- b) $-\sqrt{2} - 2\sqrt{2} + 4\sqrt{3} = -3\sqrt{2} + 4\sqrt{3}$
- c) $4\sqrt{5} - 5\sqrt{7} + 9\sqrt{5} - \sqrt{7} = 13\sqrt{5} - 6\sqrt{7}$
- f) $\frac{9}{5}\sqrt{7} - \frac{5}{4}\sqrt{7} + \frac{1}{9}\sqrt{2} + \frac{5}{2}\sqrt{7} = \frac{36}{20}\sqrt{7} - \frac{25}{20}\sqrt{7} + \frac{1}{9}\sqrt{2} + \frac{50}{20}\sqrt{7}$
 $= \frac{1}{9}\sqrt{2} + \frac{61}{20}\sqrt{7}$

Aufgabe 5:

- a) $-7\sqrt{a} - 3\sqrt{b} + 8\sqrt{a} = \sqrt{a} - 3\sqrt{b}$
- b) $\sqrt{2} - 4\sqrt{c} + 3\sqrt{c} + 5\sqrt{2} = 6\sqrt{2} - \sqrt{c}$
- c) $9\sqrt{x} + 6\sqrt{x} - 8\sqrt{y} - 11\sqrt{x} = 4\sqrt{x} - 8\sqrt{y}$
- f) $\frac{6}{7}\sqrt{p} - \frac{5}{8}\sqrt{q} + \frac{7}{4}\sqrt{q} - \frac{9}{2}\sqrt{q} = \frac{6}{7}\sqrt{p} - \frac{5}{8}\sqrt{q} + \frac{14}{8}\sqrt{q} - \frac{36}{8}\sqrt{q}$
 $= \frac{6}{7}\sqrt{p} - \frac{27}{8}\sqrt{q}$

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Aufgabe 6:

- a) $\sqrt{a} - 2\sqrt{a^2} + a = \sqrt{a} - 2a + a = \sqrt{a} - a$
- b) $\sqrt{1+x^2} - \sqrt{1+x}$ lässt sich nicht vereinfachen
- c) $2\sqrt{r^2+s} - \sqrt{r^2+1}$ lässt sich nicht vereinfachen
- d) $3\sqrt{p^2} - 2p\sqrt{p^2} + 4\sqrt{p} = 3p - 2p \cdot p + 4\sqrt{p} = -2p^2 + 3p + 4\sqrt{p}$
- e) $\sqrt{z^4} - z\sqrt{z^2} = z^2 - z \cdot z = z^2 - z^2 = 0$
- f) $\sqrt{u^2+v^2} - u - 2v$ lässt sich nicht vereinfachen
- i) $\sqrt{y^2} + \sqrt{16} - \sqrt{y^2+16} = y + 4 - \sqrt{y^2+16}$

Aufgabe 7:

- a) $\sqrt{2} + \sqrt{8} = \sqrt{2} + \sqrt{4 \cdot 2} = \sqrt{2} + 2\sqrt{2} = 3\sqrt{2}$
- b) $\sqrt{27} - \sqrt{12} = \sqrt{9 \cdot 3} - \sqrt{4 \cdot 3} = 3\sqrt{3} - 2\sqrt{3} = \sqrt{3}$
- c) $\sqrt{7} + \sqrt{28} = \sqrt{7} + \sqrt{4 \cdot 7} = \sqrt{7} + 2\sqrt{7} = 3\sqrt{7}$
- d) $\sqrt{48} - \sqrt{75} = \sqrt{16 \cdot 3} - \sqrt{25 \cdot 3} = 4\sqrt{3} - 5\sqrt{3} = -\sqrt{3}$
- e) $\sqrt{20} + \sqrt{45} = \sqrt{4 \cdot 5} + \sqrt{9 \cdot 5} = 2\sqrt{5} + 3\sqrt{5} = 5\sqrt{5}$
- j) $\sqrt{343} + \sqrt{252} = \sqrt{49 \cdot 7} + \sqrt{36 \cdot 7} = 7\sqrt{7} + 6\sqrt{7} = 13\sqrt{7}$

Aufgabe 8:

- a) $2\sqrt{2} + \sqrt{18} = 2\sqrt{2} + \sqrt{9 \cdot 2} = 2\sqrt{2} + 3\sqrt{2} = 5\sqrt{2}$
- b) $5\sqrt{28} - 3\sqrt{63} = 5\sqrt{4 \cdot 7} - 3\sqrt{9 \cdot 7} = 5 \cdot 2\sqrt{7} - 3 \cdot 3\sqrt{7} = \sqrt{7}$
- c) $6\sqrt{7} - 3\sqrt{28} = 6\sqrt{7} - 3\sqrt{4 \cdot 7} = 6\sqrt{7} - 3 \cdot 2\sqrt{7} = 0$
- d) $5\sqrt{48} - 2\sqrt{75} = 5\sqrt{16 \cdot 3} - 2\sqrt{25 \cdot 3}$
 $= 5 \cdot 4\sqrt{3} - 2 \cdot 5\sqrt{3} = 10\sqrt{3}$
- e) $7\sqrt{20} + 2\sqrt{45} = 7 \cdot 2\sqrt{5} + 2 \cdot 3\sqrt{5} = 14\sqrt{5} + 6\sqrt{5} = 20\sqrt{5}$
- f) $4\sqrt{50} + 5\sqrt{72} = 4 \cdot 5\sqrt{2} + 5 \cdot 6\sqrt{2} = 20\sqrt{2} + 30\sqrt{2} = 50\sqrt{2}$
- g) $6\sqrt{75} - 5\sqrt{48} = 6 \cdot 5\sqrt{3} - 5 \cdot 4\sqrt{3} = 30\sqrt{3} - 20\sqrt{3} = 10\sqrt{3}$
- h) $2\sqrt{98} - \frac{6}{5}\sqrt{72} = 2 \cdot 7\sqrt{2} - \frac{6}{5} \cdot 6\sqrt{2} = 14\sqrt{2} - \frac{36}{5}\sqrt{2} = \frac{34}{5}\sqrt{2}$
- l) $\frac{8}{7}\sqrt{343} - \frac{5}{7}\sqrt{1372} = \frac{8}{7}\sqrt{49 \cdot 7} - \frac{5}{7}\sqrt{196 \cdot 7} = \frac{8}{7} \cdot 7\sqrt{7} - \frac{5}{7} \cdot 14\sqrt{7}$
 $= 8\sqrt{7} - 10\sqrt{7} = -2\sqrt{7}$

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Aufgabe 9:

- a) $5\sqrt{5} - \sqrt{75} + 4\sqrt{605} = 5\sqrt{5} - \sqrt{25 \cdot 3} + 4\sqrt{121 \cdot 5}$
 $= 5\sqrt{5} - 5\sqrt{3} + 4 \cdot 11\sqrt{5} = -5\sqrt{3} + 49\sqrt{5}$
- b) $\sqrt{12} - 3\sqrt{32} + 5\sqrt{48} - \sqrt{8}$
 $= \sqrt{4 \cdot 3} - 3\sqrt{16 \cdot 2} + 5\sqrt{16 \cdot 3} - \sqrt{4 \cdot 2}$
 $= 2\sqrt{3} - 3 \cdot 4\sqrt{2} + 5 \cdot 4\sqrt{3} - 2\sqrt{2} = -14\sqrt{2} + 22\sqrt{3}$
- c) $6\sqrt{72} - 3\sqrt{63} + \sqrt{28} - \sqrt{32} = 6 \cdot 6\sqrt{2} - 3 \cdot 3\sqrt{7} + 2\sqrt{7} - 4\sqrt{2}$
 $= 36\sqrt{2} - 9\sqrt{7} + 2\sqrt{7} - 4\sqrt{2} = -7\sqrt{7} + 32\sqrt{2}$
- d) $\sqrt{56} - \sqrt{40} - \sqrt{90} + \sqrt{126} = 2\sqrt{14} - 2\sqrt{10} - 3\sqrt{10} + 3\sqrt{14}$
 $= 5\sqrt{14} - 5\sqrt{10}$
- f) $4\sqrt{8} + 5\sqrt{32} - \sqrt{64} + \sqrt{128}$
 $= 4\sqrt{4 \cdot 2} + 5\sqrt{16 \cdot 2} - 8 + \sqrt{64 \cdot 2}$
 $= 4 \cdot 2\sqrt{2} + 5 \cdot 4\sqrt{2} - 8 + 8\sqrt{2} = 36\sqrt{2} - 8$

Aufgabe 10:

- a) $\sqrt{4a+4} - \sqrt{9a+9} = \sqrt{4 \cdot (a+1)} - \sqrt{9 \cdot (a+1)}$
 $= 2\sqrt{a+1} - 3\sqrt{a+1} = -\sqrt{a+1}$
- b) $\sqrt{4+b^2} - \sqrt{4+4b^2} = \sqrt{4+b^2} - \sqrt{4 \cdot (1+b^2)}$
 $= \sqrt{4+b^2} - 2\sqrt{1+b^2}$
- c) $2\sqrt{9d^2-3e} - \sqrt{3d^2-e} = 2\sqrt{3 \cdot (3d^2-e)} - \sqrt{3d^2-e}$
 $= 2\sqrt{3} \cdot \sqrt{3d^2-e} - \sqrt{3d^2-e} = (2\sqrt{3} - 1) \cdot \sqrt{3d^2-e}$
- d) $\sqrt{x^2y^2} - x\sqrt{y^3} + xy\sqrt{x} = xy - xy\sqrt{y} + xy\sqrt{x}$
lässt sich nicht weiter vereinfachen
- e) $\sqrt{12t^3} - t\sqrt{3t} = 2t\sqrt{3t} - t\sqrt{3t} = t\sqrt{3t}$
- f) $\sqrt{4r^2+16s^2} - 2r - 4s = \sqrt{4(r^2+4s^2)} - 2r - 4s$
 $= 2\sqrt{r^2+4s^2} - 2r - 4s$ lässt sich nicht weiter vereinfachen
- i) $\sqrt{y^6+16y^4} + y^2 \cdot \sqrt{4y^2+64}$
 $= \sqrt{y^4 \cdot (y^2+16)} + y^2 \cdot \sqrt{4 \cdot (y^2+16)}$
 $= y^2 \cdot \sqrt{y^2+16} + 2y^2 \cdot \sqrt{y^2+16}$
 $= (y^2+2y^2) \cdot \sqrt{y^2+16} = 3y^2 \cdot \sqrt{y^2+16}$

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Aufgabe 11:

a) $\sqrt{2} + \frac{3}{\sqrt{2}} = \sqrt{2} + \frac{3 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}} = \sqrt{2} + \frac{3\sqrt{2}}{2} = \sqrt{2} + \frac{3}{2}\sqrt{2} = \frac{5}{2}\sqrt{2}$

b) $3\sqrt{7} - \frac{5}{\sqrt{7}} = 3\sqrt{7} - \frac{5 \cdot \sqrt{7}}{\sqrt{7} \cdot \sqrt{7}} = 3\sqrt{7} - \frac{5\sqrt{7}}{7} = 3\sqrt{7} - \frac{5}{7}\sqrt{7} = \frac{16}{7}\sqrt{7}$

c) $\frac{5}{\sqrt{12}} - \frac{2}{3}\sqrt{12} = \frac{5}{\sqrt{4 \cdot 3}} - \frac{2}{3}\sqrt{4 \cdot 3} = \frac{5}{2 \cdot \sqrt{3}} - \frac{2}{3} \cdot 2\sqrt{3}$
 $= \frac{5 \cdot \sqrt{3}}{2 \cdot \sqrt{3} \cdot \sqrt{3}} - \frac{4}{3}\sqrt{3} = \frac{5 \cdot \sqrt{3}}{2 \cdot 3} - \frac{4}{3}\sqrt{3} = \frac{5}{6}\sqrt{3} - \frac{4}{3}\sqrt{3} = -\frac{1}{2}\sqrt{3}$

d) $3\sqrt{8} - \frac{7}{\sqrt{32}} = 3\sqrt{4 \cdot 2} - \frac{7}{\sqrt{16 \cdot 2}} = 3 \cdot 2\sqrt{2} - \frac{7}{4\sqrt{2}}$
 $= 6\sqrt{2} - \frac{7 \cdot \sqrt{2}}{4 \cdot \sqrt{2} \cdot \sqrt{2}} = 6\sqrt{2} - \frac{7 \cdot \sqrt{2}}{4 \cdot 2} = 6\sqrt{2} - \frac{7}{8}\sqrt{2} = \frac{41}{8}\sqrt{2}$

e) $-\frac{4}{\sqrt{45}} - \frac{8}{3}\sqrt{125} = -\frac{4}{\sqrt{9 \cdot 5}} - \frac{8}{3}\sqrt{25 \cdot 5} = -\frac{4}{3\sqrt{5}} - \frac{8}{3} \cdot 5\sqrt{5}$
 $= -\frac{4 \cdot \sqrt{5}}{3 \cdot \sqrt{5} \cdot \sqrt{5}} - \frac{40}{3}\sqrt{5} = -\frac{4 \cdot \sqrt{5}}{3 \cdot 5} - \frac{40}{3}\sqrt{5}$
 $= -\frac{4}{15}\sqrt{5} - \frac{40}{3}\sqrt{5} = -\frac{204}{15}\sqrt{5} = -\frac{68}{5}\sqrt{5}$

j) $\frac{\sqrt{12}}{\sqrt{35}} - \frac{\sqrt{35}}{\sqrt{12}} = \frac{\sqrt{4 \cdot 3}}{\sqrt{35}} - \frac{\sqrt{35}}{\sqrt{4 \cdot 3}} = \frac{2\sqrt{3}}{\sqrt{35}} - \frac{\sqrt{35}}{2\sqrt{3}} = \frac{2 \cdot \sqrt{3} \cdot \sqrt{35}}{\sqrt{35} \cdot \sqrt{35}} - \frac{\sqrt{35} \cdot \sqrt{3}}{2 \cdot \sqrt{3} \cdot \sqrt{3}}$
 $= \frac{2\sqrt{105}}{35} - \frac{\sqrt{105}}{2 \cdot 3} = \frac{2}{35}\sqrt{105} - \frac{1}{6}\sqrt{105}$
 $= \frac{12}{210}\sqrt{105} - \frac{35}{210}\sqrt{105} = -\frac{23}{210}\sqrt{105}$

Aufgabe 12:

a) $\sqrt{a} + \frac{5a}{\sqrt{a}} = \sqrt{a} + 5\sqrt{a} = 6\sqrt{a}$

b) $2a\sqrt{b} - \frac{2ab}{\sqrt{b}} = 2a\sqrt{b} - 2a\sqrt{b} = 0$

c) $\frac{2x^2}{\sqrt{x}} - \frac{4}{5}x\sqrt{4x} = \frac{2x^2 \sqrt{x}}{x} - \frac{8}{5}x\sqrt{x} = 2x\sqrt{x} - \frac{8}{5}x\sqrt{x} = \frac{2}{5}x\sqrt{x}$

d) $4\sqrt{6t} - \frac{5t\sqrt{2}}{\sqrt{3t}} = 4\sqrt{6t} - \frac{5t\sqrt{6t}}{3t} = 4\sqrt{6t} - \frac{5}{3}\sqrt{6t} = \frac{7}{3}\sqrt{6t}$

h) $\frac{\sqrt{x^3y}}{\sqrt{x^2y}} - \frac{y\sqrt{x^4y}}{x\sqrt{xy^3}} = \frac{x\sqrt{x} \sqrt{y}}{x\sqrt{y}} - \frac{yx^2 \sqrt{y}}{x\sqrt{x} y \sqrt{y}} = \sqrt{x} - \frac{x}{\sqrt{x}} = \sqrt{x} - \frac{x\sqrt{x}}{x}$
 $= \sqrt{x} - \sqrt{x} = 0$