





**Lösungen zur 1. Extemporale aus der Mathematik, Klasse 9b, 19.10.2006  
Gruppe A**

1. a)  $\sqrt{162} \cdot \sqrt{6} = \sqrt{2 \cdot 81 \cdot 2 \cdot 3} = \sqrt{2^2 \cdot 9^2 \cdot 3} = 2 \cdot 9 \cdot \sqrt{3} = 18 \cdot \sqrt{3}$

b)  $\sqrt{363a^2} = \sqrt{3 \cdot 121 \cdot a^2} = \sqrt{3 \cdot 11^2 \cdot a^2} = 11 \cdot |a| \cdot \sqrt{3}$

2. a)  $\frac{5 - 3\sqrt{5}}{\sqrt{15}} = \frac{(5 - 3\sqrt{5}) \cdot \sqrt{15}}{\sqrt{15} \cdot \sqrt{15}} = \frac{5 \cdot \sqrt{15}}{15} - \frac{3 \cdot \sqrt{5 \cdot 5 \cdot 3}}{15} = \frac{\sqrt{15}}{3} - \sqrt{3}$

b)  $\frac{\sqrt{2}}{\sqrt{6} + \sqrt{14}} = \frac{\sqrt{2}}{\sqrt{2} \cdot (\sqrt{3} + \sqrt{7})} = \frac{1 \cdot (\sqrt{7} - \sqrt{3})}{(\sqrt{3} + \sqrt{7}) \cdot (\sqrt{7} - \sqrt{3})} = \frac{\sqrt{7} - \sqrt{3}}{7 - 3} = \frac{1}{4} \sqrt{7} - \frac{1}{4} \sqrt{3}$

c)  $\frac{11\sqrt{2}}{5 + \sqrt{14}} = \frac{11\sqrt{2} \cdot (5 - \sqrt{14})}{(5 + \sqrt{14}) \cdot (5 - \sqrt{14})} = \frac{55\sqrt{2} - 11\sqrt{2 \cdot 2 \cdot 7}}{25 - 14} = \frac{55\sqrt{2} - 22\sqrt{7}}{11} = 5 \cdot \sqrt{2} - 2 \cdot \sqrt{7}$

3. a)  $\frac{1}{2} \sqrt{8} \cdot (6\sqrt{10} - \sqrt{6}) = \frac{6}{2} \cdot \sqrt{8 \cdot 10} - \frac{1}{2} \cdot \sqrt{8 \cdot 6} = 3 \cdot 4 \cdot \sqrt{5} - \frac{1}{2} \cdot 4 \cdot \sqrt{3} = 12\sqrt{5} - 2\sqrt{3}$

b)  $(\sqrt{14,4} + \sqrt{0,9}) \cdot \sqrt{5} = \sqrt{\frac{144 \cdot 5}{10}} + \sqrt{\frac{9 \cdot 5}{10}} = 12 \cdot \sqrt{\frac{1 \cdot 2}{2 \cdot 2}} + 3 \cdot \sqrt{\frac{1 \cdot 2}{2 \cdot 2}} = 6\sqrt{2} + \frac{3}{2}\sqrt{2} = 7,5\sqrt{2}$

4. a)  $x^2 - 3 = 72 \Leftrightarrow x^2 = 75 \Leftrightarrow x_{1/2} = \pm \sqrt{75} = \pm 5\sqrt{3}$

b)  $\sqrt{196} - x^2 = 6 \Leftrightarrow 14 - x^2 = 6 \Leftrightarrow x^2 = 8 \Leftrightarrow x_{1/2} = \pm 2\sqrt{2}$

**Lösungen zur 1. Extemporale aus der Mathematik, Klasse 9b, 19.10.2006  
Gruppe B**

$$1. \text{ a) } \sqrt{162} \cdot \sqrt{10} = \sqrt{2 \cdot 81 \cdot 2 \cdot 5} = \sqrt{2^2 \cdot 9^2 \cdot 5} = 2 \cdot 9 \cdot \sqrt{5} = 18 \cdot \sqrt{5}$$

$$\text{b) } \sqrt{242a^2} = \sqrt{2 \cdot 121 \cdot a^2} = \sqrt{2 \cdot 11^2 \cdot a^2} = 11 \cdot |a| \cdot \sqrt{2}$$

$$2. \text{ a) } \frac{3 - 5\sqrt{3}}{\sqrt{15}} = \frac{(3 - 5\sqrt{3}) \cdot \sqrt{15}}{\sqrt{15} \cdot \sqrt{15}} = \frac{3 \cdot \sqrt{15}}{15} - \frac{5 \cdot \sqrt{3} \cdot 3 \cdot 5}{15} = \frac{\sqrt{15}}{5} - \sqrt{5}$$

$$\text{b) } \frac{\sqrt{2}}{\sqrt{6} + \sqrt{10}} = \frac{\sqrt{2}}{\sqrt{2} \cdot (\sqrt{3} + \sqrt{5})} = \frac{1 \cdot (\sqrt{5} - \sqrt{3})}{(\sqrt{3} + \sqrt{5}) \cdot (\sqrt{5} - \sqrt{3})} = \frac{\sqrt{5} - \sqrt{3}}{5 - 3} = \frac{1}{2} \sqrt{5} - \frac{1}{2} \sqrt{3}$$

$$\text{c) } \frac{6\sqrt{2}}{5 + \sqrt{22}} = \frac{6\sqrt{2} \cdot (5 - \sqrt{22})}{(5 + \sqrt{22}) \cdot (5 - \sqrt{22})} = \frac{30\sqrt{2} - 6\sqrt{2} \cdot 2 \cdot 11}{25 - 22} = \frac{30\sqrt{2} - 12\sqrt{11}}{3} = 10 \cdot \sqrt{2} - 4 \cdot \sqrt{11}$$

$$3. \text{ a) } \frac{1}{2} \sqrt{8} \cdot (6\sqrt{6} - \sqrt{10}) = \frac{6}{2} \cdot \sqrt{8} \cdot 6 - \frac{1}{2} \cdot \sqrt{8} \cdot 10 = 3 \cdot 4 \cdot \sqrt{3} - \frac{1}{2} \cdot 4 \cdot \sqrt{5} = 12\sqrt{3} - 2\sqrt{5}$$

$$\text{b) } (\sqrt{12,1} + \sqrt{0,9}) \cdot \sqrt{5} = \sqrt{\frac{121 \cdot 5}{10}} + \sqrt{\frac{9 \cdot 5}{10}} = 11 \cdot \sqrt{\frac{1 \cdot 2}{2 \cdot 2}} + 3 \cdot \sqrt{\frac{1 \cdot 2}{2 \cdot 2}} = \frac{11}{2} \sqrt{2} + \frac{3}{2} \sqrt{2} = 7\sqrt{2}$$

$$4. \text{ a) } x^2 - 3 = 122 \Leftrightarrow x^2 = 125 \Leftrightarrow x_{1/2} = \pm \sqrt{125} = \pm 5\sqrt{5}$$

$$\text{b) } \sqrt{169} - x^2 = 5 \Leftrightarrow 13 - x^2 = 5 \Leftrightarrow x^2 = 8 \Leftrightarrow x_{1/2} = \pm 2\sqrt{2}$$