1. Berechne bzw. vereinfache!

a) $\frac{\sqrt{72}}{\sqrt{8}} = 3$ b) $\frac{\sqrt{250}}{\sqrt{5}\cdot\sqrt{2}} = 5$ c) $\frac{\sqrt{360}}{\sqrt{40}} = 3$

d) $\sqrt{147} : \sqrt{3} = 7$ e) $\frac{\sqrt{\frac{2}{15}}}{\sqrt{\frac{5}{24}}} = \frac{4}{5}$ f) $\sqrt{\frac{3}{35}} : \sqrt{\frac{5}{21}} = \frac{6}{10}$

g) $\frac{\sqrt{24ab^2}\cdot\sqrt{50a^3b}}{\sqrt{8a}\cdot\sqrt{6ab}} = 5ab$ h) $\frac{\sqrt{24x^2yz}}{\sqrt{6y^3z^3}} = 2\frac{x}{yz}$ i) $\sqrt{\frac{4}{25}\cdot 0{,}09} = 0{,}12$

2. Ziehe die Wurzel teilweise!

a) $\sqrt{75} = 5\sqrt{3}$ b) $\sqrt{600} = 10\sqrt{6}$ c) $\sqrt{\frac{27}{121}} = \frac{3}{11}\sqrt{3}$

d) $\sqrt{125r^2s} = 5r\sqrt{5s}$ e) $\sqrt{\frac{150a^3b^2}{288c^4}} = \frac{5ab}{12c^2}\sqrt{3a}$

3. Fasse zusammen!

a) $3\sqrt{2} + 5\sqrt{2} = 8\sqrt{2}$ b) $4\sqrt{7} - 5\sqrt{7} + 8\sqrt{7} - 6\sqrt{7} = \sqrt{7}$

c) $4\sqrt{5} + 8\sqrt{7} - 3\sqrt{5} + 4\sqrt{3} - 5\sqrt{7} = \sqrt{5} + 7\sqrt{7}$

d) $7\sqrt{600} + 8\sqrt{28} - 13\sqrt{150} - 5\sqrt{63} = 70\sqrt{6} + 16\sqrt{7} - 65\sqrt{6} - 15\sqrt{7} = 5\sqrt{6} + \sqrt{7}$

e) $\sqrt{8} + \sqrt{72} + \sqrt{98} = 15\sqrt{2}$ f) $\sqrt{12} + \sqrt{48} + \sqrt{75} = 11\sqrt{3}$

4. Mache den Nenner rational!

a) $\frac{2\sqrt{12}}{\sqrt{12}+4} = \frac{2\sqrt{12}\cdot\left(\sqrt{12}-4\right)}{12-16} = \frac{24-8\sqrt{12}}{-4} = -6 + 2\sqrt{12} = -6 + 4\sqrt{3}$

b) $\frac{7-\sqrt{3}}{\sqrt{3}+1} = \frac{\left(7-\sqrt{3}\right)\cdot\left(\sqrt{3}-1\right)}{3-1} = \frac{1}{2}\left(7\sqrt{3} - 7 - 3 + \sqrt{3}\right) = \frac{1}{2}\cdot\left(8\sqrt{3} - 10\right) = 4\sqrt{3} - 5$

c) $\dfrac{2\sqrt{3}}{3\sqrt{2}+2\sqrt{3}}=\dfrac{2\sqrt{3}\cdot\left(3\sqrt{2}-2\sqrt{3}\right)}{18-12}=\dfrac{6\sqrt{6}-4\cdot 3}{6}=\sqrt{6}-2$

d) $\dfrac{3-\sqrt{7}}{3+\sqrt{7}}=\dfrac{\left(3-\sqrt{7}\right)\cdot\left(3-\sqrt{7}\right)}{9-7}=\dfrac{1}{2}\cdot\left(9-6\sqrt{7}+7\right)=8-3\sqrt{7}$

5. Gib die Definitionsmenge an!

a) $\sqrt{\mathbf{25}-\boldsymbol{a}^{\mathbf{2}}}$ $\quad -5\le a\le 5$

b) $\sqrt{\mathbf{7}\boldsymbol{x}-\mathbf{4}}$ $\quad 7x-4\ge 0 \quad |+4$

$7x\ge 4$

$x\ge\dfrac{4}{7}$

c) $\sqrt{(\boldsymbol{a}-\mathbf{5})^{\mathbf{2}}}$ $\quad$ durch das Quadrat sind alle Werte für a möglich. $a\in R$

d) $\sqrt{\mathbf{12}-\boldsymbol{b}^{\mathbf{2}}}$ $\quad 12-b^2\ge 0;\ d.h.\ \ b^2\le 12 \Leftrightarrow -\sqrt{12}\le b\le\sqrt{12}$