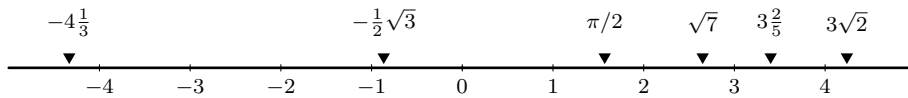


Uitwerkingen hoofdstuk 2

2.3

1.



2. a. $2\sqrt{2} > 3$: onjuist, want $\sqrt{2} < 1\frac{1}{2}$ dus $2\sqrt{2} < 2 \cdot 1\frac{1}{2}$
b. $\frac{1}{\sqrt{3}} < \frac{1}{\sqrt{2}}$: juist, want $\sqrt{3} > \sqrt{2}$
c. $1\frac{2}{3} < 1,5$: onjuist, want $\frac{2}{3} > \frac{1}{2}$
d. $3 \leq 4$: juist, want $3 < 4$ en als $a < b$ dan geldt ook $a \leq b$
e. $7 \geq 6$: juist, want $7 > 6$ en als $a > b$ dan geldt ook $a \geq b$
f. $6 < 6$: onjuist, want $6 = 6$ en uit $a < b$ volgt $a \neq b$
3. a. $\sqrt{625} = \sqrt{25^2} = 25$
b. $\sqrt[4]{625} = \sqrt[4]{5^4} = 5$
c. $\sqrt[3]{64} = \sqrt[3]{4^3} = 4$
d. $\sqrt[2]{6\frac{1}{4}} = \sqrt{\frac{25}{4}} = \frac{\sqrt{25}}{\sqrt{4}} = \frac{5}{2} = 2\frac{1}{2}$
e. bestaat niet (evenmachtswortel uit een negatief getal)
f. $\sqrt[3]{-216} = \sqrt[3]{(-6)^3} = -6$
4. a. $\sqrt{300} = \sqrt{3 \cdot 100} = \sqrt{3} \cdot \sqrt{100} = \sqrt{3} \cdot 10 = 10\sqrt{3}$
b. $\sqrt{48} = \sqrt{16 \cdot 3} = \sqrt{16} \cdot \sqrt{3} = 4\sqrt{3}$
c. $\sqrt{128} = \sqrt{2 \cdot 64} = \sqrt{2} \cdot \sqrt{64} = \sqrt{2} \cdot 8 = 8\sqrt{2}$
d. $\sqrt{150} = \sqrt{6 \cdot 25} = \sqrt{6} \cdot \sqrt{25} = 5\sqrt{6}$
e. $\sqrt{169} = 13$
f. $\sqrt{363} = \sqrt{3 \cdot 121} = \sqrt{3} \cdot \sqrt{121} = 11\sqrt{3}$

$$5. \quad \begin{array}{ll} \text{a. } \sqrt{125^2} = 125 & \text{d. } 2\sqrt{3} \cdot 3\sqrt{3} = 2 \cdot 3 \cdot \sqrt{3} \cdot \sqrt{3} = 6 \cdot 3 = 18 \\ \text{b. } \sqrt{6} \cdot (\sqrt{6})^2 = \sqrt{6} \cdot 6 = 6\sqrt{6} & \text{e. } \sqrt{2} \cdot \sqrt{18} = \sqrt{2 \cdot 18} = \sqrt{36} = 6 \\ \text{c. } \sqrt{500} = \sqrt{5 \cdot 100} = 10\sqrt{5} & \text{f. } \sqrt{20} = \sqrt{4 \cdot 5} = 2\sqrt{5} \end{array}$$

$$6. \quad \begin{array}{l} \text{a. } 2\sqrt{18} + 8\sqrt{2} = 2\sqrt{2 \cdot 9} + 8\sqrt{2} = 6\sqrt{2} + 8\sqrt{2} = 14\sqrt{2} \\ \text{b. } 14\sqrt{8} - 18\sqrt{2} = 14\sqrt{4 \cdot 2} - 18\sqrt{2} = 28\sqrt{2} - 18\sqrt{2} = 10\sqrt{2} \\ \text{c. } 2\sqrt{36} - 2\sqrt{25} = 2 \cdot 6 - 2 \cdot 5 = 2 \\ \text{d. } 4\sqrt{5} + 5\sqrt{4} = 4\sqrt{5} + 5 \cdot 2 = 10 + 4\sqrt{5} \\ \text{e. } 5\sqrt{3} \cdot 3\sqrt{5} = 5 \cdot 3 \cdot \sqrt{3} \cdot \sqrt{5} = 15\sqrt{15} \\ \text{f. } 2\sqrt{6} \cdot 5\sqrt{3} = 2 \cdot 5 \cdot \sqrt{6} \cdot \sqrt{3} = 10 \cdot \sqrt{2 \cdot 3 \cdot 3} = 10 \cdot 3 \cdot \sqrt{2} = 30\sqrt{2} \end{array}$$

$$7. \quad \begin{array}{l} \text{a. } \frac{\sqrt{300}}{2\sqrt{6}} = \frac{\sqrt{50} \cdot \sqrt{6}}{2\sqrt{6}} = \frac{\sqrt{50}}{2} = \frac{\sqrt{2 \cdot 25}}{2} = \frac{5\sqrt{2}}{2} = 2\frac{1}{2}\sqrt{2} \\ \text{b. } \frac{3\sqrt{6}}{\sqrt{48}} = \frac{3\sqrt{2} \cdot \sqrt{3}}{\sqrt{3 \cdot 16}} = \frac{3\sqrt{2} \cdot \sqrt{3}}{4\sqrt{3}} = \frac{3}{4}\sqrt{2} \\ \text{c. } \frac{\sqrt{128}}{2\sqrt{18} + 8\sqrt{2}} = \frac{\sqrt{2 \cdot 64}}{2\sqrt{2 \cdot 9} + 8\sqrt{2}} = \frac{8\sqrt{2}}{6\sqrt{2} + 8\sqrt{2}} = \frac{8\sqrt{2}}{14\sqrt{2}} = \frac{8}{14} = \frac{4}{7} \\ \text{d. } \frac{1}{\sqrt{150}} = \frac{1}{\sqrt{6 \cdot 25}} = \frac{1}{5\sqrt{6}} = \frac{\sqrt{6}}{5\sqrt{6} \cdot \sqrt{6}} = \frac{\sqrt{6}}{5 \cdot 6} = \frac{1}{30}\sqrt{6} \\ \text{e. } \sqrt{2} \cdot \frac{\sqrt{120}}{\sqrt{8}} = \frac{\sqrt{2} \cdot \sqrt{120}}{\sqrt{8}} = \frac{\sqrt{2} \cdot \sqrt{2 \cdot 2 \cdot 2 \cdot 15}}{\sqrt{2 \cdot 2 \cdot 2}} = \sqrt{2} \cdot \sqrt{15} = \sqrt{30} \\ \text{f. } \frac{\sqrt{98}}{2\sqrt{28} + 3\sqrt{7}} = \frac{\sqrt{2 \cdot 49}}{2\sqrt{4 \cdot 7} + 3\sqrt{7}} = \frac{7\sqrt{2}}{4\sqrt{7} + 3\sqrt{7}} = \frac{7\sqrt{2}}{7\sqrt{7}} = \frac{\sqrt{2}}{\sqrt{7}} = \frac{\sqrt{2} \cdot \sqrt{7}}{7} = \frac{1}{7}\sqrt{14} \end{array}$$

$$8. \quad \begin{array}{l} \text{a. } \sqrt{\frac{1}{3}} = \sqrt{\frac{3}{3 \cdot 3}} = \frac{1}{3}\sqrt{3} \\ \text{b. } \sqrt{\frac{1}{8}} = \sqrt{\frac{2}{16}} = \frac{1}{4}\sqrt{2} \\ \text{c. } \sqrt{3\frac{1}{3}} = \sqrt{\frac{16}{5}} = 4\sqrt{\frac{1}{5}} = \frac{4}{5}\sqrt{5} \\ \text{d. } \sqrt{7\frac{1}{2}} = \sqrt{\frac{15}{2}} = \sqrt{\frac{30}{4}} = \frac{1}{2}\sqrt{30} \\ \text{e. } \frac{5}{\sqrt{2\frac{1}{2} + \frac{1}{6}}} = \frac{5}{\sqrt{2\frac{2}{3}}} = \frac{5}{\sqrt{\frac{8}{3}}} = \frac{5\sqrt{3}}{\sqrt{8}} = \frac{5\sqrt{3}}{2\sqrt{2}} = \frac{5\sqrt{6}}{4} = \frac{5}{4}\sqrt{6} \\ \text{f. } 1 + \frac{1}{\sqrt{2}} = 1 + \frac{\sqrt{2}}{2} = 1 + \frac{1}{2}\sqrt{2} \end{array}$$

9. a. $\frac{1}{\sqrt{2}} + \frac{2}{\sqrt{3}} = \frac{\sqrt{2}}{2} + \frac{2\sqrt{3}}{3} = \frac{3\sqrt{2}}{6} + \frac{4\sqrt{3}}{6} = \frac{3\sqrt{2} + 4\sqrt{3}}{6}$
 b. $\frac{2}{\sqrt{a}} + \frac{3}{\sqrt{b}} = \frac{2\sqrt{a}}{a} + \frac{3\sqrt{b}}{b} = \frac{2b\sqrt{a}}{ab} + \frac{3a\sqrt{b}}{ab} = \frac{2b\sqrt{a} + 3a\sqrt{b}}{ab}$
 c. $p - \frac{2}{\sqrt{p}} = p - \frac{2\sqrt{p}}{p} = \frac{p^2}{p} - \frac{2\sqrt{p}}{p} = \frac{p^2 - 2\sqrt{p}}{p}$
 d. $\sqrt{2x-1} + \frac{1}{\sqrt{2x-1}} = \frac{2x-1}{\sqrt{2x-1}} + \frac{1}{\sqrt{2x-1}} = \frac{2x}{\sqrt{2x-1}} = \frac{2x\sqrt{2x-1}}{2x-1}$
 e. $\sqrt{7} + \frac{1}{\sqrt{7}} = \sqrt{7} + \frac{\sqrt{7}}{7} = \sqrt{7} + \frac{1}{7}\sqrt{7} = 1\frac{1}{7}\sqrt{7}$
 f. $\frac{1+\sqrt{2}}{\sqrt{363}} = \frac{1+\sqrt{2}}{11\sqrt{3}} = \frac{(1+\sqrt{2})\sqrt{3}}{11 \cdot 3} = \frac{\sqrt{3} + \sqrt{6}}{33}$

10. a. $|0| = 0$ d. $|4\frac{1}{3} - 3\frac{2}{3}| = |3\frac{4}{3} - 3\frac{2}{3}| = |\frac{2}{3}| = \frac{2}{3}$
 b. $|(-3)^2| = |9| = 9$ e. $|12^2 - 13^2| = |144 - 169| = |-25| = 25$
 c. $|\frac{2}{5} - \frac{1}{2}| = |\frac{4}{10} - \frac{5}{10}| = |-\frac{1}{10}| = \frac{1}{10}$ f. $|\frac{-2}{7}| = \frac{2}{7}$

11. a. $\frac{\sqrt{3} + \sqrt{5}}{2} = \frac{\sqrt{3}}{2} + \frac{\sqrt{5}}{2} = \frac{1}{2}\sqrt{3} + \frac{1}{2}\sqrt{5}$
 b. $\frac{\sqrt{3} \cdot \sqrt{5}}{2} = \frac{\sqrt{15}}{2} = \frac{1}{2}\sqrt{15}$
 c. $\frac{2a + 4b + 4c}{\sqrt{2}} = \frac{(2a + 4b + 4c)\sqrt{2}}{2} = (a + 2b + 2c)\sqrt{2}$
 d. $\frac{2a \cdot 4b \cdot 4c}{\sqrt{2}} = \frac{2}{\sqrt{2}} \cdot a \cdot 4b \cdot 4c = \sqrt{2} \cdot a \cdot 4b \cdot 4c = 16abc\sqrt{2}$
 e. $\frac{\sqrt{6} + \sqrt{10}}{2} = \frac{\sqrt{6}}{2} + \frac{\sqrt{10}}{2} = \frac{1}{2}\sqrt{6} + \frac{1}{2}\sqrt{10}$
 f. $\frac{\sqrt{6} \cdot \sqrt{10}}{2} = \frac{\sqrt{2} \cdot \sqrt{3} \cdot \sqrt{2} \cdot \sqrt{5}}{2} = \frac{2\sqrt{15}}{2} = \sqrt{15}$

12. a. $x^7 = -1 \Leftrightarrow x = \sqrt[7]{-1} = -1$ d. $x^6 = 1 \Leftrightarrow x = \sqrt[6]{1}$ of $x = -\sqrt[6]{1} \Leftrightarrow x = 1$ of $x = -1$
 b. $x^7 = 1 \Leftrightarrow x = \sqrt[7]{1} = 1$ e. $x^3 = -\frac{1}{8} \Leftrightarrow x = \sqrt[3]{-\frac{1}{8}} = -\frac{1}{2}$, want $-\frac{1}{2} \cdot -\frac{1}{2} \cdot -\frac{1}{2} = -\frac{1}{8}$
 c. $x^6 = -1$: geen oplossing ($x^6 \geq 0$) f. $x^3 = \frac{1}{8} \Leftrightarrow x = \sqrt[3]{\frac{1}{8}} = \frac{1}{2}$, want $(\frac{1}{2})^3 = \frac{1}{8}$