5.1

a) $\sqrt{81} = \sqrt{9^2} = 9$

b) $-\sqrt{16} = -\sqrt{4^2} = -4$

c) $\sqrt{49} = \sqrt{7^2} = 7$

d) $\sqrt{-25} = \sqrt{-5^2} = -5$

e) $\sqrt{2,83^2} = 2,83$

5.2

a) $\sqrt{1} = \sqrt{1^2} = 1$

b) $\sqrt{2 \cdot 8} = \sqrt{16} = \sqrt{4^2} = 4$

c) $\sqrt{0,64} = \sqrt{0,8^2} = 0,8$

d) $\sqrt{0} = 0$

5.3

a/ $\frac{13}{\sqrt{13}} = \frac{13 \cdot \sqrt{13}}{\sqrt{13} \cdot \sqrt{13}} = \frac{13 \cdot \sqrt{13}}{13} = \frac{\cancel{13} \cdot \sqrt{13}}{\cancel{13}} = \underline{\underline{\sqrt{13}}}$

b/ $\sqrt{2}$ = kan ikke forenkles

c/ $\sqrt{5}$ = kan ikke forenkles

d/ $\sqrt{-0} = \underline{\underline{0}}$

5.4

a) $\sqrt{7^2} = \underline{\underline{7}}$

b) $\sqrt{7}^2 = \underline{\underline{7}}$

c) $(\sqrt{7})^2 = \underline{\underline{7}}$

d) $(-\sqrt{7})^2 = (-1 \cdot \sqrt{7})^2 = (-1^2) \cdot (\sqrt{7}^2) = -1 \cdot -1 \cdot \sqrt{7}^2 = 1 \cdot \sqrt{7}^2 = \sqrt{7}^2 = \underline{\underline{7}}$

5.5

a) $\sqrt{x^2} = x$

b) $\sqrt{x}^2 = x$

5.6

a) $\sqrt{25+9} = \underline{\underline{\sqrt{34}}}$

b) $\sqrt{25-9} = \sqrt{16} = \sqrt{4^2} = \underline{\underline{4}}$

c) $\sqrt{25} + \sqrt{9} = \sqrt{5^2} + \sqrt{3^2} = 5+3 = \underline{\underline{8}}$

d) $\sqrt{25} - \sqrt{9} = \sqrt{5^2} - \sqrt{3^2} = 5-3 = \underline{\underline{2}}$

5.7

a) $\sqrt{x^2+y^2}^2 = x^2+y^2$ → alle ledd må ha samme potens

b) $(\sqrt{x^2+x^2})^2 = x^2+x^2 = \underline{\underline{2x^2}}$

c) $\sqrt{a+a^2}$ = Kan IKKE forenkles

d) $\sqrt{x-y}\ \sqrt{x+y} = \sqrt{(x-y)(x+y)} = \sqrt{xx+xy+-yx+-yy} = \sqrt{xx+xy-yx+-yy} = \sqrt{x^2+-y^2} = \underline{\underline{\sqrt{x^2-y^2}}}$

e) $\sqrt{y-x}\ \sqrt{x+y} = \sqrt{-(x-y)(x+y)} = \sqrt{-(xx+xy-yx+-yy)} = \sqrt{-(x^2+xy-xy-y^2)} = \sqrt{-(x^2-y^2)}$

$= \underline{\underline{\sqrt{y^2-x^2}}}$

$y-x = -(x-y)$

$10-5 = -(5-10)$

5.8

a) $\sqrt{25 \cdot 9} = \sqrt{25} \cdot \sqrt{9} = 5 \cdot 3 = \underline{\underline{15}}$

b) $\sqrt{\frac{25}{9}} = \frac{\sqrt{25}}{\sqrt{9}} = \underline{\underline{\frac{5}{3}}}$

c) $\sqrt{7^2 5^2} = \sqrt{7^2} \cdot \sqrt{5^2} = 7 \cdot 5 = \underline{\underline{35}}$

d) $\sqrt{28} = \sqrt{4 \cdot 7} = \sqrt{4} \cdot \sqrt{7} = \underline{\underline{2 \cdot \sqrt{7}}}$

5.9

a) $\sqrt{x^2 y^2} = \sqrt{x^2}\sqrt{y^2} = \underline{\underline{x \cdot y}}$

b) $\sqrt{\frac{a^2}{b^2}} = \frac{\sqrt{a^2}}{\sqrt{b^2}} = \underline{\underline{\frac{a}{b}}}$

c) $\sqrt{q^2 p^2} = \sqrt{q^2}\sqrt{p^2} = qp = \underline{\underline{pq}}$ (vi snur fordi p kommer før q)

5.10

a) $\sqrt{50} - \sqrt{8} - \sqrt{18} = \sqrt{25 \cdot 2} - \sqrt{4 \cdot 2} - \sqrt{9 \cdot 2}$

$= \sqrt{25} \cdot \sqrt{2} - \sqrt{4} \cdot \sqrt{2} - \sqrt{9} \cdot \sqrt{2}$

$= (5 \cdot \sqrt{2}) - (2 \cdot \sqrt{2}) - (3 \cdot \sqrt{2})$

$= 5 \cdot \sqrt{2} + \sqrt{2}(-2-3)$ $\quad -(ab) - (ac) = -a(b+c)$

$= 5 \cdot \sqrt{2} + -\sqrt{2}(5)$

$= 5 \cdot \sqrt{2} + \sqrt{2} \cdot (-5)$

$= 5 \cdot \sqrt{2} + -(\sqrt{2} \cdot 5)$

$= (5 \cdot \sqrt{2}) - (5 \cdot \sqrt{2})$ $\quad a - a = 0$

$= \underline{\underline{0}}$

5.10

b) $(\sqrt{8} + \sqrt{18})\sqrt{2} = (\sqrt{2\cdot4} + \sqrt{2\cdot9})\cdot\sqrt{2}$

$= \sqrt{2\cdot4}\cdot\sqrt{2} + \sqrt{2\cdot9} + \sqrt{2}$

$= \sqrt{2}\cdot\sqrt{2}\cdot\sqrt{4} + \sqrt{2}\cdot\sqrt{2}\cdot\sqrt{9}$ → $\sqrt{a}\cdot\sqrt{b} = \sqrt{ab}$

$= \sqrt{2\cdot2\cdot4} + \sqrt{2\cdot2\cdot9}$

$= \sqrt{16} + \sqrt{36}$

$= 4 + 6$

$= \underline{\underline{10}}$

5.10

c) $\sqrt{2} \cdot \sqrt{3} \cdot \sqrt{12} = \sqrt{2 \cdot 3} \cdot \sqrt{2 \cdot 6}$

$= \sqrt{2 \cdot 2} \cdot \sqrt{3 \cdot 6}$

$= \sqrt{4} \cdot \sqrt{18}$

$= \sqrt{4} \cdot \sqrt{9 \cdot 2}$

$= \sqrt{4 \cdot 9 \cdot 2}$

~~$= \sqrt{72}$~~

$= \sqrt{36 \cdot 2}$

$= \sqrt{36} \cdot \sqrt{2}$

$= \underline{\underline{6 \cdot \sqrt{2}}}$

$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$

Prøver ut forskjellige måter før vi lander på den minste "uløste" kvadratroten

5.11

a) $\sqrt{4x^2} = \sqrt{4} \cdot \sqrt{x^2}$

$= \sqrt{2^2} \cdot \sqrt{x^2}$

$= \underline{\underline{2x}}$

$\sqrt{a^2} = a$

$\sqrt{4a^2} = 2a$

$\sqrt{2a^2} = \sqrt{2} \cdot a$

b) $\sqrt{7x^2} = \sqrt{7} \cdot \sqrt{x^2}$

$= \sqrt{7} \cdot x$

$= \underline{\underline{x\sqrt{7}}}$ eller $\underline{\underline{\sqrt{7}x}}$

c) $\sqrt{25x^2y^2} = \sqrt{25} \cdot \sqrt{x^2} \cdot \sqrt{y^2}$

$= \sqrt{5^2} \cdot \sqrt{x^2} \cdot \sqrt{y^2}$

$= 5 \cdot x \cdot y$

$= \underline{\underline{5xy}}$

5.12 Fjern kvadrot i nevneren og forenkl

a) $\frac{13}{\sqrt{7}} = \frac{13 \cdot \sqrt{7}}{\sqrt{7} \cdot \sqrt{7}}$

$= \frac{13 \cdot \sqrt{7}}{7}$ Kan ikke forenkles mere

b) $\frac{\sqrt{8}}{\sqrt{8} + \sqrt{2}} = \frac{\sqrt{8} \cdot \sqrt{8}}{(\sqrt{8} + \sqrt{2}) \cdot \sqrt{8}}$ $\left\{ \frac{a}{b} = \frac{a \times}{b \times} = \frac{a \times\times}{b \times\times} \right.$

$= \frac{8}{\sqrt{8} \cdot \sqrt{8} + \sqrt{8} \cdot \sqrt{2}}$

$= \frac{8}{8 + \sqrt{8 \cdot 2}}$

$= \sqrt{8 \cdot 2}$ $\left\{ \sqrt{8} \cdot \sqrt{2} = \sqrt{8 \cdot 2} = \sqrt{16} \right.$

$= \sqrt{16}$

$= 4$

c) $\frac{7}{10 - \sqrt{3}} = \frac{7(10 + \sqrt{3})}{(10 - \sqrt{3})(10 + \sqrt{3})}$ $\left\{ (a+b)(a-b) = a^2 - b^2 \right.$

$= \frac{7(10 + \sqrt{3})}{10^2 - \sqrt{3}^2}$

$= \frac{7(10 + \sqrt{3})}{100 - 3}$ $\left\{ \frac{ab}{c} = \frac{a}{c} \cdot b \right.$

$= \frac{7}{97} \cdot (10 + \sqrt{3})$

5.13 Fjern kvadratrot i nevneren og forenkle

a) $\frac{1}{\sqrt{x+1}} = \frac{1 \cdot \sqrt{x+1}}{\sqrt{x+1} \cdot \sqrt{x+1}}$ → $\frac{1}{\sqrt{a}} = \frac{\sqrt{a}}{a}$

$= \frac{\sqrt{x+1}}{x+1}$

b) $\frac{\sqrt{p}+1}{\sqrt{p}} = \frac{(\sqrt{p}+1)\cdot\sqrt{p}}{\sqrt{p}\cdot\sqrt{p}}$

$= \frac{\sqrt{p}\cdot\sqrt{p} + \sqrt{p}\cdot 1}{p}$

$= \frac{p+\sqrt{p}}{p}$

c) $\frac{\sqrt{a}\sqrt{b^3c}}{\sqrt{abc}^3} = \frac{\sqrt{a}\sqrt{b^3c}}{abc\sqrt{abc}}$ } Kunne også vært skrevet slik: $\sqrt{\frac{ab^3c}{a^3b^3c^3}}$

fordi: $\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$

$= \frac{\sqrt{a}\sqrt{b^3}\sqrt{c}}{abc\sqrt{abc}}$

$= \frac{\sqrt{abc}\sqrt{b^2}}{abc\sqrt{abc}}$ → $\sqrt{b^2} = b$

$= \frac{b \cdot 1}{abc \cdot 1}$

$= \frac{b\,1}{abc\,1}$

$= \frac{1}{ac\,1}$

$= \frac{1}{ac}$

Forsiktig !!

Vi kan ikke stryke begge "b" fra brøk fordi vi MÅ ha et tall over brøken hvis det ikke finnes andre faktorer.

Vi ganger med "1" for å legge til faktor.

Vi kan ikke stryke begge et-tall fra brøk som du ser...

Vi stryker kun nevneren..