Uitwerkingen Hoofdstuk 9

Wiskunde 1

9.1

a. $x + 7 = 10 \rightarrow x = 10 - 7 \rightarrow x = 3$

b. $x - 12 = 4 \rightarrow x = 4 + 12 = 16$

c. $x + 3 = -10 \rightarrow x = -10 - 3 = -13$

d. $x - 10 = -7 \rightarrow x = -7 + 10 = 3$

e. $x + 8 = 0 \rightarrow x = 0 - 8 = -8$

9.2

a. $-x + 15 = 6 \rightarrow -x = 6 - 15 = -9 \rightarrow (-1) * (-x) = x = (-1) * (-9) = 9$

b. $-x - 7 = 10 \rightarrow -x = 10 + 7 = 17 \rightarrow x = (-1) * (-x) = (-1) * 17 = -17$

c. $-x + 17 = -10 \rightarrow -x = -10 - 17 = -27 \rightarrow x = 27$

d. $-x - 8 = -9 \rightarrow -x = -9 + 8 = -1 \rightarrow x = 1$

e. $-x - 19 = 0 \rightarrow -x = 0 + 19 = 19 \rightarrow x = -19$

9.3

a. $2x + 7 = 9 \rightarrow 2x = 9 - 7 = 2 \rightarrow \frac{2x}{2} = \frac{2}{2} \rightarrow x = 1$

b. $3x - 8 = 7 \rightarrow 3x = 7 + 8 = 15 \rightarrow \frac{3x}{3} = \frac{15}{3} \rightarrow x = 5$

c. $4x + 3 = 11 \rightarrow 4x = 11 - 3 = 8 \rightarrow x = \frac{8}{4} = 2$

d. $9x - 10 = 17 \rightarrow 9x = 17 + 10 = 27 \rightarrow x = \frac{27}{9} = 3$

e. $6x + 6 = 0 \rightarrow 6x = 0 - 6 = -6 \rightarrow x = -\frac{6}{6} = -1$

9.4

a. $-3x + 15 = 21 \rightarrow -3x = 21 - 15 = 6 \rightarrow x = \frac{6}{-3} = -2$

b. $-2x - 7 = 11 \rightarrow -2x = 11 + 7 = 18 \rightarrow x = \frac{18}{-2} = -9$

c. $-5x + 17 = 32 \rightarrow -5x = 32 - 17 = 15 \rightarrow x = \frac{15}{-5} = -3$

d. $-4x - 8 = 16 \rightarrow -4x = 16 + 8 = 24 \rightarrow \frac{24}{-4} = -6$

e. $-6x - 18 = 0 \rightarrow -6x = 18 \rightarrow x = \frac{18}{-6} = -3$

9.5

a. $2x + 9 = 12 \rightarrow 2x = 12 - 9 = 3 \rightarrow x = \frac{3}{2}$

b. $3x - 12 = 9 \rightarrow 3x = 9 + 12 = 21 \rightarrow x = \frac{21}{3} = 7$

c. $-4x + 3 = -11 \rightarrow -4x = -11 - 3 = -14 \rightarrow x = \frac{-14}{-4} = \frac{7}{2}$

d. $5x - 12 = 17 \rightarrow 5x = 17 + 12 = 29 \rightarrow x = \frac{29}{5}$

e. $-6x + 9 = 0 \rightarrow -6x = -9 \rightarrow x = \frac{-9}{-6} = \frac{3}{2}$

9.6

a. $-x - 15 = 6 \rightarrow -x = 6 + 15 = 21 \rightarrow x = \frac{21}{-1} = -21$

b. $-9x - 7 = -10 \rightarrow -9x = -10 + 7 = -3 \rightarrow x = \frac{-3}{-9} = \frac{1}{3}$

c. $6x + 17 = 12 \rightarrow 6x = 12 - 17 = -5 \rightarrow x = -\frac{5}{6}$

d. $-9x - 18 = -6 \rightarrow -9x = -6 + 18 = 12 \rightarrow x = \frac{12}{-9} = -\frac{4}{3}$

e. $5x - 19 = 0 \rightarrow 5x = 19 \rightarrow x = \frac{19}{5}$

9.7

a. $x + 7 = 10 - 2x \rightarrow x + 2x = 10 - 7 \rightarrow 3x = 3 \rightarrow x = \frac{3}{3} = 1$

b. $x - 12 = 4 + 5x \rightarrow x - 5x = 4 + 12 \rightarrow -4x = 16 \rightarrow x = \frac{16}{-4} = -4$

c. $2x + 3 = -10 + x \rightarrow 2x - x = -10 - 3 \rightarrow x = -13$

d. $3x - 10 = 2x - 7 \rightarrow 3x - 2x = -7 + 10 \rightarrow x = 3$

e. $5x + 9 = 2x \rightarrow 5x - 2x = 3x = -9 \rightarrow x = \frac{-9}{3} = -3$

9.8

a. $-x + 15 = 6 - 4x \rightarrow -x + 4x = 6 - 15 = -9 \rightarrow 3x = -9 \rightarrow x = \frac{-9}{3} = -3$

b. $-2x - 7 = 2x - 10 \rightarrow -2x - 2x = -10 + 7 \rightarrow -4x = -3 \rightarrow x = \frac{-3}{-4} = \frac{3}{4}$

c. $3x + 17 = -11 + x \rightarrow 3x - x = -11 - 17 \rightarrow 2x = -28 \rightarrow x = -\frac{28}{2} = -14$

d. $-x - 8 = -9x - 4 \rightarrow -x + 9x = -4 + 8 \rightarrow 8x = 4 \rightarrow x = \frac{4}{8} = \frac{1}{2}$

e. $2x - 19 = 19 - 2x \rightarrow 2x + 2x = 19 + 19 \rightarrow 4x = 38 \rightarrow x = \frac{38}{4} = \frac{19}{2}$

9.9

a. $x - 12 = 3 - 4x \rightarrow x + 4x = 3 + 12 \rightarrow 5x = 15 \rightarrow x = \frac{15}{5} = 3$

b. $-3x + 5 = 2x - 8 \rightarrow -3x - 2x = -8 - 5 \rightarrow -5x = -13 \rightarrow x = \frac{-13}{-5} = \frac{13}{5}$

c. $-x + 7 = -12 - x \rightarrow -x + x = -12 - 7 \rightarrow 0 * x = -19 \rightarrow kan\ niet, geen\ oplossing!$

d. $4x - 1 = -7x + 4 \rightarrow 4x + 7x = 4 + 1 \rightarrow 11x = 5 \rightarrow x = \frac{5}{11}$

e. $2x + 12 = 9 + 4x \rightarrow 2x - 4x = 9 - 12 \rightarrow -2x = -3 \rightarrow x = \frac{-3}{-2} = \frac{3}{2}$

9.10

a. $\frac{1}{2}x + \frac{3}{2} = 1 + \frac{5}{2}x \rightarrow 2 * \frac{1}{2}x + 2 * \frac{3}{2} = 2 * 1 + 2 * \frac{5}{2}x \rightarrow \frac{2}{2}x + \frac{6}{2} = 2 + \frac{10}{2}x \rightarrow \quad x +$

$3 = 2 + 5x \rightarrow x - 5x = 2 - 3 \rightarrow -4x = -1 \rightarrow x = \frac{-1}{-4} = \frac{1}{4}$

of direct oplossen: $\quad \frac{1}{2}x + \frac{3}{2} = 1 + \frac{5}{2}x \rightarrow \frac{1}{2}x - \frac{5}{2}x = 1 - \frac{3}{2} \rightarrow -\frac{4}{2}x = \frac{2}{2} - \frac{3}{2} \rightarrow -2x = -\frac{1}{2}$

$$\rightarrow 2x = \frac{1}{2} \rightarrow x = \frac{1}{2} : 2 = \frac{1}{2} * \frac{1}{2} = \frac{1}{4}$$

b. $-\frac{1}{3}x - \frac{2}{3} = \frac{4}{3}x - 1 \rightarrow$ *elke term vermenigvuldigen met 3, op de manier als bij 9.10a* $\rightarrow$

$-x - 2 = 4x - 3 \rightarrow -x - 4x = -3 + 2 \rightarrow -5x = -1 \rightarrow x = \frac{-1}{-5} = \frac{1}{5}$

c. $\frac{2}{5}x + \frac{3}{5} = -\frac{3}{5} - \frac{1}{5}x \rightarrow$ *elke term vermenigvuldigen met 5* $\rightarrow \frac{10}{5}x + \frac{15}{5} = -\frac{15}{5} - \frac{5}{5}x \rightarrow$

$2x + 3 = -3 - x \rightarrow 2x + x = -3 - 3 \rightarrow 3x = -6 \rightarrow x = \frac{-6}{3} = -2$

d. $-\frac{3}{7}x - \frac{3}{7} = -\frac{6}{7} - \frac{1}{7}x \rightarrow$ *termen vermenigvuldigen met 7* $\rightarrow -3x - 3 = -6 - x \rightarrow$

$-3x + x = -6 + 3 \rightarrow -2x = -3 \rightarrow x = \frac{-3}{-2} = \frac{3}{2}$

e. $\frac{2}{9}x - \frac{1}{9} = x - \frac{2}{9} \rightarrow$ *termen vermenigvuldigen met 9* $\rightarrow 2x - 1 = 9x - 2$

$$\rightarrow 2x - 9x = -2 + 1 \rightarrow -7x = -1 \rightarrow x = \frac{-1}{-7} = \frac{1}{7}$$

9.11

a. $\frac{1}{3}x + \frac{3}{2} = 1 + \frac{1}{6}x \rightarrow$

6 is een veelvoud van 2 en 3 (kgv van 2,3 en 6), daarom kun je vermenigvuldigen met 6

$\rightarrow \frac{6}{3}x + \frac{18}{2} = 6 + \frac{6}{6}x \rightarrow 2x + 9 = 6 + x \rightarrow 2x - x = 6 - 9 \rightarrow x = -3$

b. $-\frac{2}{3}x - \frac{3}{4} = \frac{4}{3}x - 1 \rightarrow$ *vermenigvuldigen met 12, want kgv (3,4) = 12*

$\rightarrow -\frac{24}{3}x - \frac{36}{4} = \frac{48}{3}x - 12 \rightarrow -8x - 9 = 16x - 12 \rightarrow -8x - 16x = -12 + 9$

$\rightarrow -24x = -3 \rightarrow 24x = 3 \rightarrow x = \frac{3}{24} = \frac{1}{8}$

Had overigens niet per se gehoeven. Je kunt ook gewoon met breuken rekenen.

$-\frac{2}{3}x - \frac{3}{4} = \frac{4}{3}x - 1 \rightarrow -\frac{2}{3}x - \frac{4}{3}x = -1 + \frac{3}{4} \rightarrow -\frac{6}{3}x = -\frac{1}{4} \rightarrow -2x = -\frac{1}{4}$

$\rightarrow 2x = \frac{1}{4} \rightarrow x = \frac{1}{4} : 2 = \frac{1}{4} * \frac{1}{2} = \frac{1}{8}$

c. $\frac{2}{5}x + \frac{5}{3} = -\frac{5}{6} - \frac{2}{3}x \rightarrow$ *Vermenigvuldigen met 30* $\rightarrow \frac{60}{5}x + \frac{150}{3} = -\frac{150}{6} - \frac{60}{3}x$

$\rightarrow 12x + 50 = -25 - 20x \rightarrow 12x + 20x = -25 - 50 \rightarrow 32x = -75 \rightarrow x = -\frac{75}{32}$

d. $-\frac{2}{9}x - \frac{1}{4} = -\frac{3}{2} - \frac{1}{6}x \rightarrow$ *Vermenigvuldigen met* $kgv(2,4,6,9) = 36 \rightarrow$

$-\frac{72}{9}x - \frac{36}{4} = -\frac{108}{2} - \frac{36}{6}x \rightarrow -8x - 9 = -54 - 6x \rightarrow -8x + 6x = -54 + 9 \rightarrow$

$-2x = -45 \rightarrow x = \frac{45}{2}$

e. $\frac{1}{8}x - \frac{5}{6} = x - \frac{3}{4} \rightarrow$ *Vermenigvuldigen met* $kgv(4,6,8) = 24 \rightarrow$

$\frac{24}{8}x - \frac{120}{6} = 24x - \frac{72}{4} \rightarrow 3x - 20 = 24x - 18 \rightarrow 3x - 24x = -18 + 20 \rightarrow$

$-21x = 2 \rightarrow x = -\frac{2}{21}$

9.12

a. $3(x + 4) = -2(x + 8) \rightarrow haakjes\ uitwerken \rightarrow 3x + 12 = -2x - 16 \rightarrow$

       $3x + 2x = -16 - 12 \rightarrow 5x = -28 \rightarrow x = -\dfrac{28}{5}$

b. $-2(x - 3) + 1 = -3(-x + 7) + 2 \rightarrow -2x + 6 + 1 = 3x - 21 + 2 \rightarrow$

       $-2x - 3x = -21 + 2 - 6 - 1 \rightarrow -5x = -26 \rightarrow x = \dfrac{26}{5}$

c. $2 - (x + 4) = -2(x + 1) - 3 \rightarrow 2 - 1 * (x + 4) = -2 * (x + 1) - 3 \rightarrow$

       $2 - x - 4 = -2x - 2 - 3 \rightarrow -x + 2x = -2 - 3 - 2 + 4 \rightarrow x = -3$

9.13

a. $6(-x + 2) - (x - 3) = 3(-x + 1) \rightarrow -6x + 12 - x + 3 = -3x + 3 \rightarrow$

       $-6x - x + 3x = 3 - 12 - 3 \rightarrow -4x = -12 \rightarrow x = \dfrac{12}{4} = 3$

b. $2x - (-x + 1) = -3(-x + 1) \rightarrow 2x + x - 1 = 3x - 3 \rightarrow 2x + x - 3x = -3 + 1 \rightarrow$

       $0 . x = -2\ \ dit\ kan\ niet: geen\ oplossing$

c. $5(-2x + 3) + (2x - 5) = 4(x - 4) \rightarrow -10x + 15 + 2x - 5 = 4x - 16 \rightarrow$

       $-10x + 2x - 4x = -16 - 15 + 5 \rightarrow -12x = -26 \rightarrow x = \dfrac{26}{12} = \dfrac{13}{6}$

9.14

a. $x + 6 < 8 \rightarrow x < 8 - 6 \rightarrow x < 2$

b. $x - 8 > 6 \rightarrow x > 6 + 8 \rightarrow x > 14$

c. $x + 9 \leq 7 \rightarrow x \leq 7 - 9 \rightarrow x \leq -2$

d. $x - 1 \geq -3 \rightarrow x \geq -3 + 1 \rightarrow x \geq -2$

e. $x + 6 > 7 \rightarrow x > 7 - 6 \rightarrow x > 1$

9.15

a. $-2x + 4 < 8 \rightarrow -2x < 8 - 4 \rightarrow -2x < 4 \rightarrow delen\ door - 2, teken\ klapt\ om \rightarrow$

$x > \dfrac{4}{-2} \rightarrow x > -2$

b. $-3x - 8 > 7 \rightarrow -3x > 7 + 8 \rightarrow delen\ door - 3, teken\ klapt\ om \rightarrow x < \dfrac{15}{-3} \rightarrow x < -5$

c. $-5x + 9 \leq -6 \rightarrow -5x \leq -6 - 9 \rightarrow delen\ door - 5, teken\ klapt\ om \rightarrow x \geq \dfrac{-15}{-5} \rightarrow x \geq 3$

d. $-4x + 1 \geq -3 \rightarrow -4x \geq -3 - 1 \rightarrow delen\ door - 4, teken\ klapt\ om \rightarrow x \leq \dfrac{-4}{-4} \rightarrow x \leq 1$

e. $-2x + 6 > 5 \rightarrow -2x > 5 - 6 \rightarrow delen\ door - 2, teken\ klapt\ om \rightarrow x < \dfrac{-1}{-2} \rightarrow x < \dfrac{1}{2}$

9.16

a. $2x + 6 < x - 8 \rightarrow 2x - x < -8 - 6 \rightarrow x < -14$

b. $3x - 8 > 7 - 2x \rightarrow 3x + 2x > 7 + 8 \rightarrow 5x > 15 \rightarrow x > \dfrac{15}{5} \rightarrow x > 3$

c. $x + 9 \leq 7 - 3x \rightarrow x + 3x \leq 7 - 9 \rightarrow 4x \leq -2 \rightarrow x \leq -\dfrac{2}{4} \rightarrow x \leq -\dfrac{1}{2}$

d. $2x - 1 \geq x - 3 \rightarrow 2x - x \geq -3 + 1 \rightarrow x \geq -2$

e. $5x + 6 > 3x + 7 \rightarrow 5x - 3x > 7 - 6 \rightarrow 2x > 1 \rightarrow x > \dfrac{1}{2}$

9.17

a. $-2x + 6 < x + 9 \rightarrow -2x - x < 9 - 6 \rightarrow -3x < 3 \rightarrow delen\ door - 3, teken\ klapt\ om \rightarrow$
$x > \dfrac{3}{-3} \rightarrow x > -1$

b. $x - 8 > 3x + 6 \rightarrow x - 3x > 6 + 8 \rightarrow -2x > 14 \rightarrow delen\ door - 2, teken\ klapt\ om \rightarrow$
$x < \dfrac{14}{-2} \rightarrow x < -7$

c. $2x + 9 \leq 3x + 1 \rightarrow 2x - 3x \leq 1 - 9 \rightarrow -x \leq -8 \rightarrow delen\ door - 1, teken\ klapt\ om \rightarrow$
$x \geq 8$

d. $-3x - 1 \geq 3 - x \rightarrow -3x + x \geq 3 + 1 \rightarrow -2x \geq 4 \rightarrow delen\ door - 2, teken\ klapt\ om \rightarrow$
$x \leq \dfrac{4}{-2} \rightarrow x \leq -2$

e. $5x + 6 > 7x + 2 \rightarrow 5x - 7x > 2 - 6 \rightarrow -2x > -4 \rightarrow delen\ door - 2, teken\ klapt\ om \rightarrow$
$x < \dfrac{-4}{-2} \rightarrow x < 2$

9.18   *Gebruik het kgv om zelf goed na te gaan met welk getal je de breuken moet vermenigvuldigen!*

a. $\frac{1}{2}x + 1 < 2 - \frac{1}{3}x \rightarrow verm.\,met\,6 \rightarrow 3x + 6 < 12 - 2x \rightarrow 3x + 2x < 12 - 6 \rightarrow$

$5x < 6 \rightarrow x < \frac{6}{5}$

b. $\frac{2}{3}x - \frac{1}{2} > 1 + \frac{1}{3}x \rightarrow verm.\,met\,6 \rightarrow \frac{12}{3}x - \frac{6}{2} > 6 + \frac{6}{3}x \rightarrow 4x - 3 > 6 + 2x \rightarrow$

$4x - 2x > 6 + 3 \rightarrow 2x > 9 \rightarrow x > \frac{9}{2}$

c. $\frac{3}{4}x + \frac{1}{2} \leq \frac{1}{2}x - \frac{1}{4} \rightarrow verm.\,met\,4 \rightarrow \frac{12}{4}x + \frac{4}{2} \leq \frac{4}{2}x - \frac{4}{4} \rightarrow 3x + 2 \leq 2x - 1 \rightarrow$

$3x - 2x \leq -1 - 2 \rightarrow x \leq -3$

d. $\frac{1}{6}x - \frac{1}{3} \geq \frac{2}{3}x - \frac{1}{6} \rightarrow verm.\,met\,6 \rightarrow \frac{6}{6}x - \frac{6}{3} \geq \frac{12}{3}x - \frac{6}{6} \rightarrow x - 2 \geq 4x - 1 \rightarrow$

$x - 4x \geq -1 + 2 \rightarrow -3x \geq 1 \rightarrow delen\,door -3, teken\,klapt\,om \rightarrow x \leq \frac{1}{-3} \rightarrow x \leq -\frac{1}{3}$

e. $\frac{2}{5}x - \frac{5}{2} > \frac{1}{2}x - \frac{2}{5} \rightarrow verm.\,met\,10 \rightarrow \frac{20}{5}x - \frac{50}{2} > \frac{10}{2}x - \frac{20}{5} \rightarrow 4x - 25 > 5x - 4 \rightarrow$

$4x - 5x > -4 + 25 \rightarrow -1x > 21 \rightarrow x < \frac{21}{-1} \rightarrow x < -21$

9.19

a. $-\frac{3}{2}x - 1 < 2 - \frac{1}{4}x \rightarrow verm.\,met\,4 \rightarrow -\frac{12}{2}x - 4 < 8 - \frac{4}{4}x \rightarrow -6x - 4 < 8 - x \rightarrow$

$-6x + x < 8 + 4 \rightarrow -5x < 12 \rightarrow x > \frac{12}{-5} \rightarrow x > -\frac{12}{5}$

b. $\frac{1}{5}x - \frac{1}{2} > 1 + \frac{2}{5}x \rightarrow verm.\,met\,10 \rightarrow \frac{10}{5}x - \frac{10}{2} > 10 + \frac{20}{5} \rightarrow 2x - 5 > 10 + 4x \rightarrow$

$2x - 4x > 10 + 5 \rightarrow -2x > 15 \rightarrow x < \frac{15}{-2}$

c. $-\frac{3}{4}x + \frac{1}{3} \leq \frac{1}{2}x - \frac{5}{6} \rightarrow verm.\,met\,24 \rightarrow -\frac{72}{4}x + \frac{24}{3} \leq \frac{24}{2}x - \frac{120}{6} \rightarrow$

$-18x + 8 \leq 12x - 20 \rightarrow -18x - 12x \leq -20 - 8 \rightarrow -30x \leq -28 \rightarrow x \geq \frac{28}{30} \rightarrow \frac{14}{15}$

d. $\frac{2}{7}x - \frac{1}{2} \geq \frac{1}{2}x - \frac{3}{7} \rightarrow verm.\,met\,14 \rightarrow \frac{28}{7}x - \frac{14}{2} \geq \frac{14}{2}x - \frac{42}{7} \rightarrow 4x - 7 \geq 7x - 6 \rightarrow$

$4x - 7x \geq -6 + 7 \rightarrow -3x \geq 1 \rightarrow x \leq \frac{1}{-3} \rightarrow x \leq -\frac{1}{3}$

e. $-\frac{3}{5}x - \frac{5}{2} > -\frac{1}{2}x + \frac{2}{5} \rightarrow verm.\,met\,10 \rightarrow -\frac{30}{5}x - \frac{50}{2} > -\frac{10}{2}x + \frac{20}{5} \rightarrow$
$-6x - 25 > -5x + 4 \rightarrow -6x + 5x > 4 + 25 \rightarrow -x > 29 \rightarrow x < -29$

9.20

a. $-3 < x + 1 < 4 \rightarrow -3 - 1 < x < 4 - 1 \rightarrow -4 < x < 3$

b. $2 < 2x + 4 < 6 \rightarrow 2 - 4 < 2x < 6 - 4 \rightarrow -2 < 2x < 2 \rightarrow -\frac{2}{2} < x < \frac{2}{2} \rightarrow -1 < x < 1$

c. $0 \leq 3x + 6 < 9 \rightarrow 0 - 6 \leq 3x < 9 - 6 \rightarrow -6 \leq 3x < 3 \rightarrow -\frac{6}{3} \leq x < \frac{3}{3} \rightarrow -2 \leq x < 1$

d. $-6 < 4x - 2 \leq 4 \rightarrow -6 + 2 < 4x \leq 4 + 2 \rightarrow -4 < 4x \leq 6 \rightarrow -\frac{4}{4} < x \leq \frac{6}{4} \rightarrow -1 < x \leq \frac{3}{2}$

e. $1 \leq 1 + 2x \leq 2 \rightarrow 1 - 1 \leq 2x \leq 2 - 1 \rightarrow 0 \leq 2x \leq 1 \rightarrow 0 \leq x \leq \frac{1}{2}$

9.21

Bij deze opgave ligt de nadruk op de negatieve x en het omklappen van het teken.

a. $-3 < -x + 1 < 2 \rightarrow -3 - 1 < -x < 2 - 1 \rightarrow -4 < -x < 1 \rightarrow$

      $delen\ door - 1, tekens\ klapt\ om \rightarrow 4 > x > -1$

      $andersom\ opschrijven\ (beginnen\ met\ het\ kleinste\ getal) \rightarrow -1 < x < 4$

b. $2 < 2x - 4 < 4 \rightarrow 6 < 2x < 8 \rightarrow 3 < x < 4$

c. $0 \leq -3x + 9 < 6 \rightarrow -9 \leq -3x < -3 \rightarrow delen\ door - 3, tekens\ klapt\ om \rightarrow$

      $\frac{-9}{-3} \geq x > \frac{-3}{-3} \rightarrow 3 \geq x > 1 \rightarrow beginnen\ met\ kleinste\ getal: 1 < x \leq 3$

d. $-6 < -4x + 2 \leq 4 \rightarrow -8 < -4x \leq 2 \rightarrow delen\ door - 4 \rightarrow \frac{-8}{-4} > x \geq \frac{2}{-4}$

      $\rightarrow 2 > x \geq -\frac{1}{2} \rightarrow beginnen\ met\ kleinste\ getal: -\frac{1}{2} \leq x < 2$

e. $-1 \leq 1 - 2x \leq 0 \rightarrow -2 \leq -2x \leq -1 \rightarrow \frac{-2}{-2} \geq x \geq \frac{-1}{-2} \rightarrow 1 \geq x \geq \frac{1}{2} \rightarrow \frac{1}{2} \leq x \leq 1$

9.22

a. $\frac{1}{x+1} = 5 \rightarrow 1 = 5*(x+1) = 5x + 5 \rightarrow 1 - 5 = 5x \rightarrow -4 = 5x \rightarrow -\frac{4}{5} = x \rightarrow x = -\frac{4}{5}$

(dit antwoord zorgt niet voor een noemer van een breuk gelijk aan 0, dus antwoord klopt)

b. $\frac{x}{x-4} = 2 \rightarrow x = 2*(x-4) = 2x - 8 \rightarrow x - 2x = -8 \rightarrow -x = -8 \rightarrow x = 8$

(dit antwoord zorgt niet voor een noemer van een breuk gelijk aan 0, dus antwoord klopt)

c. $\frac{2x+1}{x} = -3 \rightarrow 2x + 1 = -3*x \rightarrow 2x + 3x = -1 \rightarrow 5x = -1 \rightarrow x = -\frac{1}{5}$

(dit antwoord zorgt niet voor een noemer van een breuk gelijk aan 0, dus antwoord klopt)

d. $\frac{4x-1}{x-3} = -2 \rightarrow 4x - 1 = -2*(x-3) = -2x + 6 \rightarrow 4x + 2x = 6 + 1 \rightarrow 6x = 7 \rightarrow x = \frac{7}{6}$

(dit antwoord zorgt niet voor een noemer van een breuk gelijk aan 0, dus antwoord klopt)

e. $\frac{x+7}{-3x+8} = 1 \rightarrow x + 7 = 1*(-3x+8) = -3x + 8 \rightarrow x + 3x = 8 - 7 = 1 \rightarrow 4x = 1 \rightarrow x = \frac{1}{4}$

(dit antwoord zorgt niet voor een noemer van een breuk gelijk aan 0, dus antwoord klopt)

9.23

a. $\frac{2x}{3x-4} = -1 \rightarrow 2x = -1*(3x-4) = -3x + 4 \rightarrow 2x + 3x = 5x = 4 \rightarrow x = \frac{4}{5}$ en ookgeldt:

$3x - 4 \neq 0$ (de noemer van de breuk mag geen nul worden), dat klopt hier!

b. $\frac{8x}{4x-4} = 2 \rightarrow 8x = 2*(4x-4) = 8x - 8 \rightarrow 8x - 8x = -8 \rightarrow 0x = -8$ (kan dus niet)

c. $\frac{4-4x}{x-1} = -3 \rightarrow 4 - 4x = -3*(x-1) = -3x + 3 \rightarrow -4x + 3x = 3 - 4 \rightarrow -x = -1 \rightarrow$

$x = 1 \rightarrow$ ook geldt dat de noemer van de breuk geen nul mag worden: $x - 1 \neq 0$

Dat zorgt er in deze vergelijking voor dat de oplossing ongeldig wordt! Kan dus niet!

d. $\frac{2x+3}{4x} = 6 \rightarrow 2x + 3 = 24x \rightarrow 2x - 24x = -3 \rightarrow -22x = -3 \rightarrow x = \frac{3}{22}$ en $4x \neq 0$ klopt!

e. $\frac{x-5}{x-4} = 1 \rightarrow x - 5 = x - 4 \rightarrow x - x = -4 + 5 = 1 \rightarrow 0x = 1$ (kan dus ook niet)

9.24

Let op: het getal onder het kwadraat (of een veelvoud van die exponent) kan zowel negatief als postief zijn.

a. $(x + 1)^2 = 1 \rightarrow (x + 1) = \pm\sqrt{1} = \pm 1 \rightarrow x = \pm 1 - 1 \rightarrow x = 0 \ of \ x = -2$

Dit betekent dat wanneer $\sqrt{1}$ gekwadrateerd wordt dit leidt tot wat er aan de linkerzijde van het vergelijkingsteken staat, ongeacht of het $-\sqrt{1}$ of $+\sqrt{1}$ is. Dus twee uitkomsten!

b. $(x - 4)^2 = 9 \rightarrow (x - 4) = \pm\sqrt{9} = \pm 3 \rightarrow x = \pm 3 + 4 \rightarrow x = 1 \ of \ x = 7$

c. $(1 - x)^2 = 25 \rightarrow 1 - x = \pm\sqrt{25} = \pm 5 \rightarrow -x = \pm 5 - 1 \rightarrow$

$-x = 5 - 1 = 4 \rightarrow x = -4 \ of$
$-x = -5 - 1 = -6 \rightarrow x = 6$

d. $(2x + 1)^2 = 4 \rightarrow 2x + 1 = \pm\sqrt{4} = \pm 2 \rightarrow 2x = \pm 2 - 1 \rightarrow$

$x = \dfrac{+2 - 1}{2} = \dfrac{1}{2} \ of \ x = \dfrac{-2 - 1}{2} = -\dfrac{3}{2}$

e. $(-3x + 1)^2 = 16 \rightarrow -3x + 1 = \pm\sqrt{16} = \pm 4 \rightarrow -3x = \pm 4 - 1 \rightarrow$

$x = \dfrac{+4 - 1}{-3} = \dfrac{+3}{-3} = -1 \ of \ x = \dfrac{-4 - 1}{-3} = \dfrac{5}{3}$

9.25

a. $(x + 2)^2 = 3 \rightarrow x + 2 = \pm\sqrt{3} \rightarrow x = \pm\sqrt{3} - 2$

b. $(x - 1)^2 = 2 \rightarrow x - 1 = \pm\sqrt{2} \rightarrow x = \pm\sqrt{2} + 1$

c. $(3 - x)^2 = 5 \rightarrow 3 - x = \pm\sqrt{5} \rightarrow -x = \pm\sqrt{5} - 3 \rightarrow x = \pm\sqrt{5} + 3 = 3 \pm \sqrt{5}$

d. $(2x + 1)^2 = 6 \rightarrow 2x + 1 = \pm\sqrt{6} \rightarrow 2x = \pm\sqrt{6} - 1 \rightarrow x = \dfrac{\pm\sqrt{6} - 1}{2} = \dfrac{\pm\sqrt{6}}{2} - \dfrac{1}{2} = -\dfrac{1}{2} \pm \dfrac{1}{2}\sqrt{6}$

e. $(6 - 2x)^2 = 8 \rightarrow 6 - 2x = \pm\sqrt{8} = \pm\sqrt{2 * 2 * 2} = \pm 2\sqrt{2} \rightarrow -2x = \pm 2\sqrt{2} - 6$

$\rightarrow x = \dfrac{\pm 2\sqrt{2} - 6}{-2} = \pm\sqrt{2} + 3 = 3 \pm \sqrt{2}$

9.26

a. $(x-1)^3 = 1 \rightarrow x - 1 = \sqrt[3]{1} = 1 \rightarrow x = 1 + 1 = 2$ *geen negatief antwoord,* $(-1)^3 = -1$!

b. $(x+4)^3 = -8 \rightarrow x + 4 = -2$ *want* $(-2)^3 = -8 \rightarrow x = -2 - 4 = -6$

c. $(1-x)^3 = 1 \rightarrow 1 - x = \sqrt[3]{1} = 1 \rightarrow -x = 1 - 1 = 0 \rightarrow x = 0$

d. $(2x-1)^3 = 27 \rightarrow 2x - 1 = \sqrt[3]{27} = \sqrt[3]{3*3*3} = 3 \rightarrow 2x = 3 + 1 = 4 \rightarrow x = \frac{4}{2} = 2$

e. $(-4x-1)^3 = 64 \rightarrow -4x - 1 = \sqrt[3]{64} = \sqrt[3]{2*2*2*2*2*2} = 2*2 = 4 \rightarrow$

$$-4x = 4 + 1 = 5 \rightarrow x = \frac{5}{-4} = -\frac{5}{4}$$

9.27

a. $(x-2)^4 = 1 \rightarrow x - 2 = \pm\sqrt[4]{1} = \pm 1 \rightarrow x = \pm 1 + 2 \rightarrow x = 3 \ of \ x = 1$

b. $(x+1)^4 = 16 \rightarrow x + 1 = \pm\sqrt[4]{16} = \pm 2 \rightarrow x = \pm 2 - 1 \rightarrow x = 1 \ of \ x = -3$

c. $(3-2x)^4 = 4 \rightarrow (3-2x)^2 = \pm 2 \rightarrow 3 - 2x = \pm\sqrt{2} = \rightarrow -2x = \pm\sqrt{2} - 3$

$$\rightarrow x = \frac{+\sqrt{2} - 3}{-2} = \frac{3}{2} - \frac{1}{2}\sqrt{2} \ of \ x = \frac{-\sqrt{2} - 3}{-2} = \frac{3}{2} + \frac{1}{2}\sqrt{2}$$

d. $(2x+3)^4 = 81 \rightarrow 2x + 3 = \pm\sqrt[4]{81} = \pm\sqrt[4]{3*3*3*3} = \pm 3 \rightarrow 2x = \pm 3 - 3$

$$\rightarrow x = \frac{+3 - 3}{2} = 0 \ of \ x = \frac{-3 - 3}{2} = -3$$

e. $(4-3x)^4 = 625 \rightarrow 4 - 3x = \pm\sqrt[4]{625} = \pm 5 \rightarrow -3x = \pm 5 - 4$

$$\rightarrow x = \frac{+5 - 4}{-3} = -\frac{1}{3} \ of \ x = \frac{-5 - 4}{-3} = 3$$

9.28

a. $(x + 1)^2 = (2x - 1)^2 \rightarrow \pm(x + 1) = \pm(2x - 1) \rightarrow$

$x + 1 = 2x - 1 \rightarrow x - 2x = -1 - 1 \rightarrow -x = -2 \rightarrow x = 2$

$of \rightarrow x + 1 = -2x + 1 \rightarrow x + 2x = 1 - 1 \rightarrow 3x = 0 \rightarrow x = 0$

b. $(3x - 1)^2 = (x - 1)^2 \rightarrow \pm(3x - 1) = \pm(x - 1) \rightarrow$

$\rightarrow 3x - 1 = x - 1 \rightarrow 3x - x = -1 + 1 \rightarrow 2x = 0 \rightarrow x = 0$

$of\ 3x - 1 = -x + 1 \rightarrow 3x + x = 1 + 1 \rightarrow 4x = 2 \rightarrow x = \dfrac{2}{4} = \dfrac{1}{2}$

c. $(x + 1)^2 = (-2x + 1)^2 \rightarrow \pm(x + 1) = \pm(-2x + 1)$

$(x + 1) = (-2x + 1) \rightarrow x + 2x = 1 - 1 \rightarrow 3x = 0 \rightarrow x = 0$

$of\ x + 1 = +2x - 1 \rightarrow x - 2x = -1 - 1 \rightarrow -x = -2 \rightarrow x = 2$

d. $(2x + 5)^2 = (3 - x)^2 \rightarrow \pm(2x + 5) = \pm(3 - x) \rightarrow$

$2x + 5 = 3 - x \rightarrow 2x + x = 3 - 5 \rightarrow 3x = -2 \rightarrow x = -\dfrac{2}{3}$

$of\ 2x + 5 = -3 + x \rightarrow 2x - x = -3 - 5 \rightarrow x = -8$

e. $(4x + 3)^2 = x^2 \rightarrow \pm(4x + 3) = \pm x \rightarrow$

$4x + 3 = x \rightarrow 4x - x = -3 \rightarrow 3x = -3 \rightarrow x = -\dfrac{3}{3} = -1$

$of\ 4x + 3 = -x \rightarrow 4x + x = -3 \rightarrow 5x = -3 \rightarrow x = -\dfrac{3}{5}$

9.29

a. $(x + 2)^2 = 4x^2 \rightarrow (x + 2)^2 = (2x)^2 \rightarrow \pm(x + 2) = \pm 2x \rightarrow$

$x + 2 = 2x \rightarrow x - 2x = -2 \rightarrow -x = -2 \rightarrow x = 2$

$of \ x + 2 = -2x \rightarrow x + 2x = -2 \rightarrow 3x = -2 \rightarrow x = \dfrac{-2}{3} = -\dfrac{2}{3}$

b. $(2x + 1)^2 = 4(x + 1)^2 \rightarrow (2x + 1)^2 = (2(x + 1))^2 \rightarrow$
$\pm(2x + 1) = \pm 2(x + 1) = \pm(2x + 2) \rightarrow$
$2x + 1 = 2x + 2 \rightarrow 2x - 2x = 2 - 1 \rightarrow 0x = 1 \rightarrow kan\ niet$

$of\ 2x + 1 = -2x - 2 \rightarrow 2x + 2x = -2 - 1 \rightarrow 4x = -3 \rightarrow x = -\dfrac{3}{4}$

c. $(-x + 2)^2 = 9(x + 2)^2 \rightarrow (-x + 2)^2 = (3(x + 2))^2 \rightarrow$
$\pm(-x + 2) = \pm 3(x + 2) = \pm(3x + 6) \rightarrow$

$-x + 2 = 3x + 6 \rightarrow -x - 3x = 6 - 2 \rightarrow -4x = 4 \rightarrow x = -1$

$of - x + 2 = -3x - 6 \rightarrow -x + 3x = -6 - 2 \rightarrow 2x = -8 \rightarrow x = -\dfrac{8}{2} = -4$

d. $4(x + 1)^2 = 25(x - 1)^2 \rightarrow \left(2(x + 1)\right)^2 = (5(x - 1))^2 \rightarrow$
$\pm 2(x + 1) = \pm 5(x - 1) \rightarrow \pm(2x + 2) = \pm(5x - 5) \rightarrow$

$2x + 2 = 5x - 5 \rightarrow 2x - 5x = -5 - 2 \rightarrow -3x = -7 \rightarrow x = \dfrac{7}{3}$

$of\ 2x + 2 = -5x + 5 \rightarrow 2x + 5x = 5 - 2 \rightarrow 7x = 3 \rightarrow x = \dfrac{3}{7}$

e. $9(2x + 1)^2 = 4(1 - 2x)^2 \rightarrow (3(2x + 1))^2 = (2(1 - 2x))^2 \rightarrow$
$\pm 3(2x + 1) = \pm 2(1 - 2x) \rightarrow \pm(6x + 3) = \pm(2 - 4x) \rightarrow$

$6x + 3 = 2 - 4x \rightarrow 6x + 4x = 2 - 3 \rightarrow 10x = -1 \rightarrow x = -\dfrac{1}{10}$

$of\ 6x + 3 = -2 + 4x \rightarrow 6x - 4x = -2 - 3 \rightarrow 2x = -5 \rightarrow x = -\dfrac{5}{2}$