

Vaardigheden - Blok 2

bladzijde 122

1a $\frac{3}{8} - \frac{2}{5} = \frac{15}{40} - \frac{16}{40} = -\frac{1}{40}$

b $\frac{7}{15} - \frac{8}{5} + \frac{1}{6} = \frac{14}{30} - \frac{48}{30} + \frac{5}{30} = \frac{-29}{30} = -\frac{29}{30}$

c $\frac{5}{9} \cdot \frac{-3}{8} = \frac{5 \cdot -3}{9 \cdot 8} = \frac{5 \cdot -1}{3 \cdot 8} = -\frac{5}{24}$

d $-\frac{5}{12} \cdot \frac{6}{7} = -\frac{5 \cdot 6}{12 \cdot 7} = -\frac{5 \cdot 1}{2 \cdot 7} = -\frac{5}{14}$

2a $\frac{3p}{8} - \frac{7p}{10} = \frac{30p - 56p}{80} = -\frac{26p}{80} = -\frac{13p}{40}$

b $\frac{5x}{2y} + \frac{x}{7y} = \frac{35x + 2x}{14y} = \frac{37x}{14y}$

c $\frac{13}{6x} + \frac{1}{2x^2} = \frac{13x + 3}{6x^2}$

d $\frac{8a}{15} - \frac{3}{2a} = \frac{16a^2 - 45}{30a}$

e $\frac{-7}{2x} + \frac{3x}{8y} = \frac{-7y + 3x^2}{8xy}$

f $\frac{9m}{4} \cdot \frac{-m}{5} = -\frac{9m^2}{20}$

g $\frac{3p}{8q} \cdot \frac{-2}{15p} = -\frac{6p}{8 \cdot 15 \cdot p \cdot q} = -\frac{1}{20q}$

h $\frac{12a}{13b} \cdot \frac{5b^2}{2ab} = \frac{12 \cdot 5 \cdot ab^2}{2 \cdot 13 \cdot ab^2} = \frac{30}{13} = 2\frac{4}{13}$

i $\frac{2}{7x} \cdot \frac{3x+1}{5x} = \frac{6x+2}{35x^2}$

3a $3 \cdot \frac{5}{17} = \frac{3}{1} \cdot \frac{5}{17} = \frac{15}{17}$

b $6a \cdot \frac{5}{18} = \frac{6a}{1} \cdot \frac{5}{18} = \frac{5a}{3}$

c $-12a \cdot \frac{7b}{6a} = \frac{-12a}{1} \cdot \frac{7b}{6a} = -14b$

d $6p \cdot \frac{p-3}{5} = \frac{6p}{1} \cdot \frac{p-3}{5} = \frac{6p^2 - 18p}{5}$

e $(3q+6) \cdot \frac{2}{q^2} = \frac{3q+6}{1} \cdot \frac{2}{q^2} = \frac{6q+12}{q^2}$

f $2q \cdot \frac{1}{3q+1} \cdot (-4q+7) = \frac{2q}{1} \cdot \frac{1}{3q+1} \cdot \frac{-4q+7}{1} = \frac{-8q^2+14q}{3q+1}$

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4a $1 - \frac{3}{p} = \frac{p}{p} - \frac{3}{p} = \frac{p-3}{p}$

$$\begin{aligned} \text{b} \quad \text{A: } 5 + \frac{3}{t} &= \frac{5t}{t} + \frac{3}{t} = \frac{5t+3}{t} \\ \text{B: } 4p - \frac{7}{3p} &= \frac{12p^2}{3p} - \frac{7}{3p} = \frac{12p^2-7}{3p} \\ \text{C: } x+4 - \frac{5}{x} &= \frac{x^2+4x}{x} - \frac{5}{x} = \frac{x^2+4x-5}{x} \end{aligned}$$

5a Daarmee werk je de breuk in de noemer weg.

$$\begin{aligned} \text{b} \quad \text{A: } \frac{15}{\frac{2}{7}} &= \frac{15}{\frac{2}{7}} \cdot \frac{7}{7} = \frac{15 \cdot 7}{2} = \frac{105}{2} = 52\frac{1}{2} \\ \text{B: } \frac{-10t}{\frac{4t}{3}} &= \frac{-10t}{\frac{4t}{3}} \cdot \frac{3}{3} = \frac{-30t}{4t} = -\frac{30}{4} = -7\frac{1}{2} \\ \text{C: } \frac{2p+5}{\frac{2}{p}} &= \frac{2p+5}{\frac{2}{p}} \cdot \frac{p}{p} = \frac{2p^2+5p}{2} = p^2 + 2\frac{1}{2}p \\ \text{c} \quad \text{Voor } p=0 &\text{ is } \frac{5p}{\frac{2}{p}} \text{ niet gedefinieerd terwijl dan } \frac{5p^2}{2} \text{ wel gedefinieerd is.} \end{aligned}$$

$$\text{6a} \quad \frac{18}{\frac{2}{3}} = \frac{18}{\frac{2}{3}} \cdot \frac{3}{3} = \frac{54}{2} = 27$$

$$\text{b} \quad \frac{3p}{\frac{2p}{5}} = \frac{3p}{\frac{2p}{5}} \cdot \frac{5}{5} = \frac{15p}{2p} = 7\frac{1}{2} \text{ mits } p \neq 0.$$

$$\text{c} \quad \frac{a+1}{\frac{2}{a}} = \frac{a+1}{\frac{2}{a}} \cdot \frac{a}{a} = \frac{a^2+a}{2} \text{ mits } a \neq 0.$$

$$\text{d} \quad \frac{5a-3}{\frac{a+1}{a}} = \frac{5a-3}{\frac{a+1}{a}} \cdot \frac{a}{a} = \frac{5a^2-3a}{a+1} \text{ mits } a \neq 0.$$

$$\text{e} \quad -7q \cdot \frac{2q+7}{\frac{3q}{4}} = -7q \cdot \frac{2q+7}{\frac{3q}{4}} \cdot \frac{4}{4} = -\frac{7q(2q+7)}{3q} = -\frac{14q+49}{3} \text{ mits } q \neq 0.$$

$$\text{f} \quad 10t \cdot \frac{-30t}{\frac{1}{t}} = \frac{10t}{1} \cdot \frac{-30t}{\frac{1}{t}} \cdot \frac{t}{t} = \frac{10t \cdot -30t^2}{1} = -300t^3 \text{ mits } t \neq 0.$$

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$$\text{7a} \quad \frac{5}{d-1} + \frac{10}{d} = \frac{5d+10(d-1)}{d(d-1)} = \frac{15d-10}{d(d-1)}$$

$$\text{b} \quad \frac{-9}{5a} + \frac{6}{a+4} = \frac{-9(a+4)+6 \cdot 5a}{5a(a+4)} = \frac{-9a-36+30a}{5a(a+4)} = \frac{21a-36}{5a(a+4)}$$

$$\text{c} \quad \frac{1}{8t+3} + \frac{5t}{7} = \frac{7+5t(8t+3)}{7(8t+3)} = \frac{40t^2+15t+7}{7(8t+3)}$$

$$\text{d} \quad \frac{-4a}{15} - \frac{12}{3a-7} = \frac{-4a(3a-7)-12 \cdot 15}{15(3a-7)} = \frac{-12a^2+28a-180}{15(3a-7)}$$

$$\text{e} \quad \frac{45}{3m-2} + 1 = \frac{45}{3m-2} + \frac{3m-2}{3m-2} = \frac{3m+43}{3m-2}$$

$$\text{f} \quad \frac{4t+7}{9t-3} - 5 = \frac{4t+7}{9t-3} - \frac{5(9t-3)}{9t-3} = \frac{4t+7-45t+15}{9t-3} = \frac{22-41t}{9t-3}$$

8a $(3a-1)(a+2) = 3a^2 + 6a - a - 2 = 3a^2 + 5a - 2$

b $(p+6)(2p+\frac{1}{2}) = 2p^2 + \frac{1}{2}p + 12p + 3 = 2p^2 + 12\frac{1}{2}p + 3$

c $(3a+\frac{2}{a})(a+\frac{1}{a}) = 3a^2 + 3 + 2 + \frac{2}{a^2} = 3a^2 + 5 + \frac{2}{a^2}$

d $(\frac{1}{3}d+3)(9-\frac{2}{3}d) = 3d - \frac{2}{9}d^2 + 27 - 2d = -\frac{2}{9}d^2 + d + 27$

e $(\frac{1}{2}x+\frac{1}{3})(\frac{2}{3}x-\frac{1}{2}) = \frac{1}{3}x^2 - \frac{1}{4}x + \frac{2}{9}x - \frac{1}{6} = \frac{1}{3}x^2 - \frac{1}{36}x - \frac{1}{6}$

f $(1+\frac{3}{a})(a+5) = a+5+3+\frac{15}{a} = a+8+\frac{15}{a}$

9 $t = \frac{8}{p-1}$
 $t(p-1) = 8$
 $p-1 = \frac{8}{t}$
 $p = \frac{8}{t} + 1$

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10a $T = 6 + \frac{1}{P}$
 $\frac{1}{P} = T - 6$
 $P = \frac{1}{T-6}$

b $T = \frac{-8}{0,5P}$
 $0,5P = \frac{-8}{T}$
 $P = \frac{-16}{T}$

c $T = \frac{12}{1+P} - 1$
 $\frac{12}{1+P} = T + 1$
 $\frac{1+P}{12} = \frac{1}{T+1}$
 $1+P = \frac{12}{T+1}$
 $P = \frac{12}{T+1} - 1$

d $T = \frac{-3}{4P+8}$

$$4P+8 = \frac{-3}{T}$$

$$4P = \frac{-3}{T} - 8$$

$$P = \frac{-3}{4T} - 2$$

e $T = \frac{2}{\sqrt{P}}$

$$\sqrt{P} = \frac{2}{T}$$

$$P = \frac{4}{T^2}$$

f $T = 4 - \frac{1}{2\sqrt{P}}$
 $\frac{1}{2\sqrt{P}} = 4 - T$

$$2\sqrt{P} = \frac{1}{4-T}$$

$$\sqrt{P} = \frac{1}{8-2T}$$

$$P = \frac{1}{(8-2T)^2}$$

11a $y \cdot v = 3 \Rightarrow y = \frac{3}{v}$

b $\frac{y}{v} = 2$
 $y = 2v$

c $\frac{9v}{y} = 15$
 $15y = 9v$
 $5y = 3v$
 $y = 0,6v$

d $2y(v+6) = -2$
 $2y = \frac{-2}{v+6}$
 $y = \frac{-1}{v+6}$

e $\frac{3v-9}{y+1} = 3$

$3v-9 = 3y+3$

$v-3 = y+1$

$y = v-4$

f $\frac{y}{y-1} = v$

$y = v(y-1)$

$y = vy - v$

$y - vy = -v$

$y(1-v) = -v$

$y = \frac{-v}{1-v} = \frac{v}{v-1}$

12a $\frac{7}{x} = \frac{x+6}{1} \Rightarrow 7 = x(x+6)$ (kruislings vermenigvuldigen)

b $x^2 + 6x = 7$

$x^2 + 6x - 7 = 0$

$(x+7)(x-1) = 0$

$x = -7$ of $x = 1$

c $g(-7) = 1$ en $g(1) = 7$

Dus zijn $(-7, 1)$ en $(1, 7)$ de snijpunten.

13a Stel $\frac{3}{x} = 2x + 1$

$2x^2 + x - 3 = 0$

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

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

$g(\frac{1}{2}) = 2$ en $g(-3) = -5$

Dus zijn $(\frac{1}{2}, 2)$ en $(-3, -5)$ de snijpunten.

b Stel $\frac{x+1}{2x} = 5x - 1$

$x+1 = 2x(5x-1)$

$x+1 = 2x^2 + 2x$

$2x^2 + x - 1 = 0$

$x = \frac{-1 \pm \sqrt{41}}{20}$ en $y = 5 \cdot \frac{-1 \pm \sqrt{41}}{20} + 1 = -\frac{1}{4} \pm \frac{1}{4}\sqrt{41} + 1 = \frac{3}{4} \pm \frac{1}{4}\sqrt{41}$

Dan zijn $(0,27; 2,35)$ en $(-0,37; -0,85)$ bij benadering de snijpunten van de grafieken van f en g .

14a Verticale asymptoot $t = 3$ want dan is de noemer 0.

Horizontale asymptoot $y = 2$ want $\frac{2t+4}{t-3} \approx \frac{2t}{t} = 2$ voor waarden van t die erg ver

van 0 liggen.

- b** Stel $\frac{2t+4}{t-3} = t-4$
 $2t+4 = (t-4)(t-3)$
 $2t+4 = t^2 - 7t + 12$
 $t^2 - 9t + 8 = 0$
 $(t-8)(t-1) = 0$
 $t = 8$ of $t = 1$
 $q(8) = 4$ en $q(1) = -3$
Snijpunten $(8, 4)$ en $(1, -3)$.
- c** Aflezen en let op de verticale asymptoot: $t < 1$ of $3 < t < 8$.