Werkkaart 2015-10$\mathcal{A}$C-00003(2)

(1) Vereenvoudig, sonder 'n sakrekenaar: (Skryf antwoorde as positiewe eksponente.)

(a) $\dfrac{2.3^x - 3^{x+1}}{3^{x-1} + 3^x}$

$= \dfrac{2.3^x - 3^x.3^1}{3^x.3^{-1} + 3^x}$

$= \dfrac{\cancel{3^x}(2-3)}{\cancel{3^x}(3^{-1}+1)}$

$= \dfrac{2-3}{\frac{1}{3}+1}$

$= \dfrac{-1}{1\frac{1}{3}}$

$= \dfrac{-1}{\frac{4}{3}}$

$= -\dfrac{3}{4}$

(b) $\dfrac{18^{n-1} \times 9^{n+3}}{27^n \times 12^{1-n} \times 3^{2n} \times 8^{n-2}}$

$= \dfrac{(2^1 \times 3^2)^{n-1} \times (3^2)^{n+3}}{(3^3)^n \times (2^2 \times 3^1)^{1-n} \times 3^{2n} \times (2^3)^{n-2}}$

$= \dfrac{2^{n-1} \times 3^{2n-2} \times 3^{2n+6}}{3^{3n} \times 2^{2-2n} \times 3^{1-n} \times 3^{2n} \times 2^{3n-6}}$

$= \dfrac{2^{n-1} \times 3^{2n-2+2n+6}}{3^{3n+1-n+2n} \times 2^{2-2n+3n-6}}$

$= 2^{(n-1)-(n-4)} \times 3^{(4n+4)-(4n+1)}$

$= 2^{\underline{n}-1-\underline{n}+4} \times 3^{\underline{4n}+4-\underline{4n}-1}$

$= 2^3 \times 3^3 = 8 \times 27 = 216$

(c) $\left(\frac{-2x^{-2}y^{3}}{3x^{5}y^{-2}}\right)^{3}$

$= \left(\frac{-2\,x^{-2-5}\,y^{3-(-2)}}{3}\right)^{3}$

$= \left(\frac{(-2)^{1}x^{-7}y^{5}}{3^{1}}\right)^{3}$

$= \frac{(-2)^{3}x^{-21}y^{15}}{3^{5}}$

$= \frac{-8\,x^{-21}y^{15}}{343}$

$= \frac{-8\,y^{15}}{343\,x^{21}}$

(2) Los op vir x:

(a) $25^{2x-3} = 125$

$(5^{2})^{2x-3} = 5^{3}$

$5^{4x-6} = 5^{3}$

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$\therefore 4x-6 = 3$

$4x = 9$

$x = \frac{9}{4}$

(b) $64^{1-x} = 0{,}125$

$(2^{6})^{1-x} = \frac{125}{1000} = \frac{1}{8} = \frac{1}{2^{3}}$

$2^{6-6x} = 2^{-3}$

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$\therefore 6-6x = -3$

$-6x = -9$

$x = \frac{-9}{-6} = \frac{3}{2} = 1\frac{1}{2}$

(c) $\sqrt[3]{x^4} \,.\, x^{\frac{1}{2}} = 2$

$x^{\frac{4}{3}} \,.\, x^{\frac{1}{2}} = 2$

$x^{\frac{4}{3}+\frac{1}{2}} = 2$

$x^{\frac{11}{6}} = 2$

$\left(x^{\frac{11}{6}}\right)^{\frac{6}{11}} = (2)^{\frac{6}{11}}$

$x = 2^{\frac{6}{11}}$

$x = \sqrt[11]{2^6} = \sqrt[11]{64}$

(d) $5^{x-1} + 2.5^{x} = \frac{11}{125}$

$5^{x} . 5^{-1} + 2 . 5^{x} = \frac{11}{125}$

$5^{x}\left(5^{-1} + 2\right) = \frac{11}{125}$

$5^{x}\left(\frac{1}{5} + 2\right) = \frac{11}{125}$

$5^{x}\left(2\frac{1}{5}\right) = \frac{11}{125}$

$5^{x}\left(\frac{11}{5}\right) = \frac{11}{125}$

$5^{x}\left(\frac{\cancel{11}}{\cancel{5}}\right) \times \frac{\cancel{5}}{\cancel{11}} = \frac{\cancel{11}}{\cancel{125}_{25}} \times \frac{\cancel{5}^{1}}{\cancel{11}}$

$5^{x} = \frac{1}{25}$

$5^{x} = \frac{1}{5^2}$

$5^{x} = 5^{-2}$

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$\therefore x = -2$

(e) $8 \times 3^{4x} = 27 \times 2^{4x}$

$2^3 \times 3^{4x} = 3^3 \times 2^{4x}$

$\frac{3^{4x}}{2^{4x}} = \frac{3^3}{2^3}$

$\left(\frac{3}{2}\right)^{4x} = \left(\frac{3}{2}\right)^3$

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$\therefore 4x = 3$

$\therefore x = \frac{3}{4}$

(f) $(3^{2x} - 9)\left(\left(\frac{1}{5}\right)^{x-1} - 1\right) = 0$

$3^{2x} - 9 = 0$ of $\left(\frac{1}{5}\right)^{x-1} - 1 = 0$

$3^{2x} = 9$ $\left(\frac{1}{5}\right)^{x-1} = 1$

$3^{2x} = 3^2$ $\left(\frac{1}{5}\right)^{x-1} = \left(\frac{1}{5}\right)^0$

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$\therefore 2x = 2$ $\therefore x - 1 = 0$

$x = \frac{2}{2}$ $x = 1$

$x = 1$