Arbeidshefte

Løsningsforslag

Rasjonale uttrykk

Innhold

Oppgave 1
Oppgave 2
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Oppgave 1

(Tilbake til Innhold)

1)

$$\begin{aligned}\frac{x^2-12x+36}{2x^2-72} &= \frac{(x-6)^2}{2(x-6)(x+6)}\\ &= \frac{(x-6)}{2(x+6)}\end{aligned}$$

2)

$$\begin{aligned}\frac{x^2+10x+25}{2x^2-50} &= \frac{(x+5)^2}{2(x+5)(x-5)}\\ &= \frac{(x+5)}{2(x-5)}\end{aligned}$$

3)

$$\begin{aligned}\frac{x^2-8x+16}{x-4} &= \frac{(x-4)^2}{(x-4)}\\ &= x-4\end{aligned}$$

4)

$$\begin{aligned}\frac{x^2-6x+9}{x-3} &= \frac{(x-3)^2}{x-3}\\ &= x-3\end{aligned}$$

5)

$$\begin{aligned}\frac{3x^2-27}{x+3} &= \frac{3(x+3)(x-3)}{(x+3)}\\ &= 3(x-3)\end{aligned}$$

6)

$$\begin{aligned}\frac{x^2-4xy+4y^2}{3xy-6y^2} &= \frac{(x-2y)^2}{3y(x-2y)}\\ &= \frac{x-2y}{3y}\end{aligned}$$

7)

$$\begin{aligned}\frac{9x^2-25}{3x+5} &= \frac{(3x+5)(3x-5)}{3x+5}\\ &= 3x-5\end{aligned}$$

Oppgave 2

(Tilbake til Innhold)

1)

$$\begin{aligned}\frac{x^2+6x+5}{x+1} &= \frac{(x+1)(x+5)}{(x+1)}\\ &= x+5\end{aligned}$$

2)

$$\begin{aligned}\frac{x^2-3x-40}{x+5} &= \frac{(x+5)(x-8)}{(x+5)}\\ &= x-8\end{aligned}$$

3)

$$\begin{aligned}\frac{x^2+4x-21}{x-3} &= \frac{(x-3)(x+7)}{(x-3)}\\ &= x+7\end{aligned}$$

4)

$$\begin{aligned}\frac{x^2-x-42}{x+6} &= \frac{(x+6)(x-7)}{(x+6)}\\ &= x-7\end{aligned}$$

5)

$$\begin{aligned}\frac{x^2+2x-35}{x+7} &= \frac{(x+7)(x-5)}{(x+7)}\\ &= x-5\end{aligned}$$

6)

$$\begin{aligned}\frac{x^2+5x+4}{x+1} &= \frac{(x+1)(x+4)}{(x+1)}\\ &= x+4\end{aligned}$$

7)

$$\begin{aligned}\frac{x^2+7x+10}{x+2} &= \frac{(x+2)(x+5)}{(x+2)}\\ &= x+5\end{aligned}$$

8)

$$\begin{aligned}\frac{x^2+9x+8}{x+8} &= \frac{(x+8)(x+1)}{(x+8)}\\ &= x+1\end{aligned}$$

Oppgave 3

(Tilbake til Innhold)

1)

$$\begin{aligned}\frac{x^2-9x+8}{x-1} &= \frac{(x-1)(x-8)}{(x-1)}\\ &= x-8\end{aligned}$$

2)

$$\begin{aligned}\frac{9x^2-27x-36}{x-4} &= \frac{9(x^2-3x-4)}{(x-4)}\\ &= \frac{9(x-4)(x+1)}{(x-4)}\\ &= 9(x+1)\end{aligned}$$

3)

$$\begin{aligned}\frac{x^2-4x-45}{x+5} &= \frac{(x+5)(x-9)}{(x+5)}\\ &= x-9\end{aligned}$$

4)

$$\begin{aligned}\frac{2x^2-5x+3}{x-1} &= \frac{2(x-1)(x-\frac{3}{2})}{(x-1)}\\ &= 2(x-\frac{3}{2})\\ &= 2x-3\end{aligned}$$

5)

$$\begin{aligned}\frac{4x^2-7x-2}{4x+1} &= \frac{(4x+1)(x-2)}{(4x+1)}\\ &= x-2\end{aligned}$$

6)

$$\begin{aligned}\frac{2x^2-7x-15}{x-5} &= \frac{(x-5)(2x+3)}{(x-5)}\\ &= 2x+3\end{aligned}$$

7)

$$\begin{aligned}\frac{2x^2-x-21}{x+3} &= \frac{(x+3)(2x-7)}{(x+3)}\\ &= 2x-7\end{aligned}$$

Oppgave 4

(Tilbake til Innhold)

1)

$$\begin{aligned}\frac{2x^2+4x-6}{x^2-9} &= \frac{2(x^2+2x-3)}{(x+3)(x-3)}\\ &= \frac{2(x+3)(x-1)}{(x+3)(x-3)}\\ &= \frac{2(x-1)}{(x-3)}\end{aligned}$$

2)

$$\begin{aligned}\frac{6x^2-5x+1}{2x^2-x} &= \frac{6(x-\frac{1}{2})(x-\frac{1}{3})}{x(2x-1)}\\ &= \frac{(2x-1)(3x-1}{x(2x-1)}\\ &= \frac{3x-1}{x}\end{aligned}$$

3)

$$\begin{aligned}\frac{x^2-1}{x^2-x-2} &= \frac{(x+1)(x-1)}{(x+1)(x-2)}\\ &= \frac{(x-1)}{(x-2)}\end{aligned}$$

4)

$$\begin{aligned}\frac{2x-1}{2x^2+3x-2} &= \frac{2x-1}{(2x-1)(x+2)}\\ &= \frac{1}{x+2}\end{aligned}$$

5)

$$\begin{aligned}\frac{1-x^2}{x^2-x-2} &= \frac{(1+x)(1-x)}{(x+1)(x-2)}\\ &= \frac{1-x}{x-2}\end{aligned}$$

6)

$$\begin{aligned}\frac{x^2+x-2}{x-1} &= \frac{(x-1)(x+2)}{(x-1)}\\ &= x+2\end{aligned}$$

7)

$$\begin{aligned}\frac{2x^2+4x-6}{x+3} &= \frac{2(x-1)(x+3)}{(x+3)}\\ &= 2(x-1)\end{aligned}$$

8)

$$\begin{aligned}\frac{x^2+5x-14}{x-2} &= \frac{(x-2)(x+7)}{(x-2)} \\ &= x+7\end{aligned}$$

Oppgave 5

(Tilbake til Innhold)

1)

$$\begin{aligned}\frac{2x^2+6x-20}{2x-4} &= \frac{2(x^2+3x-10)}{2(x-2)}\\ &= \frac{2(x-2)(x+5)}{2(x-2)}\\ &= x+5\end{aligned}$$

2)

$$\begin{aligned}\frac{(x^2+x-6)(x+1)}{(x+1)(x^2-9)} &= \frac{(x+3)(x-2)}{(x+3)(x-3)}\\ &= \frac{x-2}{x-3}\end{aligned}$$

3)

$$\begin{aligned}\frac{(4x-4)(x+3)}{(x^2-9)(x-1)} &= \frac{4(x-1)(x+3)}{(x+3)(x-3)(x-1)}\\ &= \frac{4}{x-3}\end{aligned}$$

4)

$$\begin{aligned}\frac{(x^2-1)(x+4)}{(x^2-2x-3)(6x-6)} &= \frac{(x+1)(x-1)(x+4)}{(x-3)(x+1)6(x-1)}\\ &= \frac{x+4}{6(x-3)}\end{aligned}$$

5)

$$\begin{aligned}\frac{(x+2)(x^2-8x+15)}{(x-3)(5x-25)} &= \frac{(x+2)(x-5)(x-3)}{(x-3)5(x-5)}\\ &= \frac{x+2}{5}\end{aligned}$$

6)

$$\begin{aligned}\frac{(x^2+6x+8)(3x-12)}{(x^2-16)(4x+4)} &= \frac{(x+4)(x+2)3(x-4)}{(x+4)(x-4)4(x+1)}\\ &= \frac{3(x+2)}{4(x+1)}\end{aligned}$$

7)

$$\begin{aligned}\frac{(2x^2-32)(x^2-9)}{(2x+8)(x^2-3x-4)} &= \frac{2(x+4)(x-4)(x+3)(x-3)}{2(x+4)(x-4)(x+1)}\\ &= \frac{(x+3)(x-3)}{(x+1)}\end{aligned}$$

8)

$$\begin{aligned}\frac{(x^2-12x+35)(x^2+7x+10)}{(x^2-5x-14)(x^2-25)} &= \frac{(x-7)(x-5)(x+5)(x+2)}{(x-7)(x+2)(x+5)(x-5)}\\ &= 1\end{aligned}$$

Oppgave 6

(Tilbake til Innhold)

1)

$$\begin{aligned}\frac{6}{x-3}-\frac{5x+15}{x^2-9}+1 &= \frac{6}{(x-3)}-\frac{5(x+3)}{(x+3)(x-3)}+\frac{x-3}{(x-3)}\\ &= \frac{6-5+x-3}{x-3}\\ &= \frac{x-2}{x-3}\end{aligned}$$

2)

$$\begin{aligned}\frac{3x}{x+3}-\frac{3}{x-3}-\frac{x^2-12x+9}{x^2-9} &= \frac{3x(x-3)}{(x+3)(x-3)}-\frac{3(x+3)}{(x+3)(x-3)}-\frac{x^2-12x+9}{(x+3)(x-3)}\\ &= \frac{3x^2-9x-3x-9-x^2+12x-9}{(x+3)(x-3)}\\ &= \frac{2x^2-18}{(x+3)(x-3)}\\ &= \frac{2(x^2-9)}{(x^2-9)}\\ &= 2\end{aligned}$$

3)

$$\begin{aligned}\frac{x+1}{x-1}-\frac{x-3}{2x-2}+\frac{1}{2} &= \frac{x+1}{x-1}-\frac{x-3}{2(x-1)}+\frac{1}{2}\\ &= \frac{2(x+1)}{2(x-1)}-\frac{x-3}{2(x-1)}+\frac{(x-1)}{2(x-1)}\\ &= \frac{2x+2-x+3+x-1}{2(x-1)}\\ &= \frac{2x+4}{2(x-1)}\\ &= \frac{2(x+2)}{2(x-1)}\\ &= \frac{x+2}{x-1}\end{aligned}$$

4)

$$\begin{aligned}-\frac{4x}{x^2+x-2}+\frac{4x}{x-1} &= -\frac{4x}{(x+2)(x-1)}+\frac{4x(x+2)}{(x-1)(x+2)}\\ &= \frac{-4x+4x^2+8x}{(x+2)(x-1)}\\ &= \frac{4x(x+1)}{(x+2)(x-1)}\end{aligned}$$

5)

$$\begin{aligned}\frac{2}{x+2}+\frac{6x}{x^2-4} &= \frac{2(x-2)}{(x+2)(x-2)}+\frac{6x}{(x+2)(x-2)}\\ &= \frac{2x-4+6x}{(x+2)(x-2)}\\ &= \frac{4(2x-1)}{(x+2)(x-2)}\end{aligned}$$

Oppgave 7

(Tilbake til Innhold)

1)

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

2)

$$\begin{aligned}\frac{x}{4x+8}+\frac{1}{12}-\frac{4x+5}{6x+12}&=\frac{x}{4(x+2)}+\frac{1}{12}-\frac{4x+5}{6(x+2)}\\&=\frac{3x}{12(x+2)}+\frac{x+2}{12(x+2)}-\frac{2(4x+5)}{12(x+2)}\\&=\frac{3x+x+2-8x-10}{12(x+2)}\\&=\frac{-4x-8}{12(x+2)}\\&=\frac{-4(x+2)}{4\cdot 3\cdot(x+2)}\\&=-\frac{1}{3}\end{aligned}$$

3)

$$\begin{aligned}\frac{x}{x^2-4x+3}+\frac{1}{x-3}&=\frac{x}{(x-3)(x-1)}+\frac{x-1}{(x-3)(x-1)}\\&=\frac{x+x-1}{(x-3)(x-1)}\\&=\frac{2x-1}{(x-3)(x-1)}\end{aligned}$$

4)

$$\begin{aligned}\frac{x}{x^2-6x+9}+\frac{1}{2x-6}&=\frac{x}{(x-3)^2}+\frac{1}{2(x-3)}\\&=\frac{2x}{2(x-3)^2}+\frac{x-3}{2(x-3)^2}\\&=\frac{2x+x-3}{2(x-3)^2}\\&=\frac{3(x-1)}{2(x-3)^2}\end{aligned}$$

5)

$$\begin{aligned}\frac{5}{2x-10}-\frac{x+10}{x^2-25}&=\frac{5}{2(x-5)}-\frac{x+10}{(x+5)(x-5)}\\&=\frac{5(x+5)-2(x+10)}{2(x+5)(x-5)}\\&=\frac{5x+25-2x-20}{2(x+5)(x-5)}\\&=\frac{3x+5}{2(x+5)(x-5)}\end{aligned}$$

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