

Løsningsforslag

Oppgave 1. Regn ut.

- a) $2 - 6 - 5 + 8 = -1$
b) $-14 - (-9) : 3 = -14 - (-3) = -14 + 3 = -11$
c) $(2 + 3) \cdot (10 - 7) = 5 \cdot 3 = 15$
d) $3(5 + 2 \cdot 2) = 3(5 + 4) = 3 \cdot 9 = 27$
e) $5 \cdot 10^3 - 3 \cdot 10^4 = 5 \cdot 1\,000 - 3 \cdot 10\,000 = 5\,000 - 30\,000 = -25\,000$
f) $-(6 - 2)^2 = -4^2 = -16$
g) $-3^2 - (-3)^2 = -3 \cdot 3 - (-3) \cdot (-3) = -9 - 9 = -18$
h) $2 - (7 - (8 - 2 \cdot 3) + 5) = 2 - (7 - (8 - 6) + 5) = 2 - (7 - 2 + 5) = 2 - 10 = -8$
i) $-2^2(5 - (-2)^2) = -2 \cdot 2(5 - (-2)(-2)) = -4(5 - 4) = -4 \cdot 1 = -4$
j) $-(2 - (5 - 2^2)) = -(2 - (5 - 2 \cdot 2)) = -(2 - (5 - 4)) = -(2 - 1) = -1$
k) $-(2 - (5 - 2))^2 = -(2 - 3)^2 = -(-1)^2 = -(-1)(-1) = -1$
l) $-(2 - (5 - 2^2)) = -(2 - 3^2) = -(2 - 9) = -(-7) = 7$

Oppgave 2. Regn ut og skriv som brøk.

- a) $7^{-2} = \frac{1}{7^2} = \frac{1}{49}$
b) $(-5)^{-3} = \frac{1}{(-5)^3} = \frac{1}{-125}$
c) $3 \cdot 10^{-1} = 3 \cdot \frac{1}{10} = \frac{3}{1} \cdot \frac{1}{10} = \frac{3}{10}$
d) $5 \cdot 10^{-1} - 3 \cdot 10^{-2} = 5 \cdot \frac{1}{10} - 3 \cdot \frac{1}{100} = \frac{5}{10} - \frac{3}{100} = \frac{5 \cdot 10}{10 \cdot 10} - \frac{3}{100} = \frac{50}{100} - \frac{3}{100} = \frac{50 - 3}{100} = \frac{47}{100}$

Oppgave 3. Skriv som potenser. Eksempel: $2^{50} \cdot 2^{40} = 2^{90}$

- a) $100^2 \cdot 100^3 = 100^{2+3} = 100^5$
b) $10^{10} : 10^{30} = 10^{10-30} = 10^{-20}$
c) $2^5 \cdot 2^{-7} : 2^{-2} = 2^{5-7-(-2)} = 2^{5-7+2} = 2^0$
d) $x^6 \cdot y^3 : x^2 \cdot y^5 = x^{6-2} \cdot y^{3-5} = x^4 \cdot y^{-2}$
e) $x^{-2} : 3^5 : 3^{-2} \cdot x^4 = x^{-2+4} \cdot 3^{5-(-2)} = x^2 \cdot 3^{5+2} = x^2 \cdot 3^7$
f) $(a + b)^7 : (a - b)^2 \cdot (a + b)^{-3} : (a - b)^5 = (a + b)^{7-3} \cdot (a - b)^{-2-5} = (a + b)^4 \cdot (a - b)^{-7}$

Oppgave 4. Skriv på standardform. Eksempel: $2\,600\,000 = 2.6 \cdot 10^6$

- a) $61\,000 = 6.1 \cdot 10^4$
- b) $0.0043 = 4.3 \cdot 10^{-3}$
- c) $5\,000 \cdot 200 = 5 \cdot 10^3 \cdot 2 \cdot 10^2 = 10 \cdot 10^5 = 1 \cdot 10^1 \cdot 10^5 = 1 \cdot 10^6$
- d) $100^{-2} = \frac{1}{100^2} = \frac{1}{10\,000} = 10^{-4}$

Oppgave 5. Regn ut. Eksempel: $61 \cdot 10^{-3} = 0.061$

(Trening? Gå inn på www.ma10kl.com og velg Oppgaver og Ganging med 10-potenser.)

- a) $26 \cdot 10^4 = 260\,000$
- b) $2\,600 \cdot 10^4 = 26\,000\,000$
- c) $2.6 \cdot 10^4 = 26\,000$
- d) $0.26 \cdot 10^4 = 2\,600$
- e) $26 \cdot 10^{-4} = 0.0026$
- f) $2\,600 \cdot 10^{-4} = 0.26$
- g) $2.6 \cdot 10^{-4} = 0.00026$
- h) $0.26 \cdot 10^{-4} = 0.000026$

Oppgave 6. Regn ut.

- a) $3x - 4y + 5x - y = 8x - 5y$
- b) $3x - (4y + 5x) = 3x - 4y - 5x = -2x - 4y$
- c) $3x - 4(y + 5x) = 3x - 4y - 20x = -17x - 4y$
- d) $(3x - 4)(y + 5x) = 3xy + 15x^2 - 4y - 20x$
- e) $4(y + 5x) - y = 4y + 20x - y = 3y + 20x$
- f) $4(y + 5x)(-y) = (4y + 20x)(-y) = -4y^2 - 20xy$
- g) $x + x^2 - 3x^3 + x^3 - 4x + 3x^2 = -3x + 4x^2 - 2x^3$
- h) $2d^3 \cdot 5d^2 = 10d^5$
- i) $4xy - (2x + 3y)(x - 4y) = 4xy - (2x^2 - 8xy + 3yx - 12y^2) = 4xy - 2x^2 + 8xy - 3yx + 12y^2$
 $= 9xy - 2x^2 + 12y^2$
- j) $4(b - (a - b)) = 4(b - a + b) = 4(2b - a) = 8b - 4a$
- k) $4(-(b - a) - b) = 4(-b + a - b) = 4(-2b + a) = -8b + 4a$
- l) $(2x + 3y)^2 - (3x + 2y)^2 = (2x + 3y)(2x + 3y) - (3x + 2y)(3x + 2y)$
 $= 4x^2 + 6xy + 6xy + 9y^2 - (9x^2 + 6xy + 6yx + 4y^2)$
 $= 4x^2 + 12xy + 9y^2 - 9x^2 - 12xy - 4y^2 = -5x^2 + 5y^2$

Oppgave 7. Faktoriser uttrykkene. Eksempel: $6c + 9c^2 = 3c(2 + 3c)$

- a) $6r + 4 = 2 \cdot 3 \cdot r + 2 \cdot 2 = 2(3r + 2)$
- b) $5r^2 + 10r^4 = 5 \cdot r \cdot r + 5 \cdot 2 \cdot r \cdot r \cdot r \cdot r = 5r^2(1 + 2r)$
- c) $4xy - 8xyz + 12x^2 = 2 \cdot 2 \cdot x \cdot y - 2 \cdot 2 \cdot 2 \cdot x \cdot y \cdot z + 3 \cdot 2 \cdot 2 \cdot x \cdot x$
 $= 4x(y - 2yz + 3x)$
- d) $4a^5 - 10a^3 + 18a^6 = 2 \cdot 2 \cdot a^3 \cdot a^2 - 2 \cdot 5 \cdot a^3 + 2 \cdot 3 \cdot 3 \cdot a^3 \cdot a^3$
 $= 2a^3(2a^2 - 5 + 9a^3)$

Oppgave 8. Regn ut verdien av uttrykkene når $a = 3$ og $b = -5$.

- a) $a + 3b + 15 = 3 + 3(-5) + 15 = 3 - 15 + 15 = 3$
- b) $2a - b^2 = 2 \cdot 3 - (-5)^2 = 6 - 25 = -19$

Oppgave 9. Regn ut.

- a) $\frac{2}{3} - \frac{1}{6} = \frac{2}{3} - \frac{1}{6} = \frac{2 \cdot 2}{3 \cdot 2} - \frac{1}{6} = \frac{4}{6} - \frac{1}{6} = \frac{3}{6}$
- b) $\frac{2x}{6} - \frac{x-3}{4} = \frac{2x \cdot 2}{6 \cdot 2} - \frac{(x-3) \cdot 3}{4 \cdot 3} = \frac{2x \cdot 2}{6 \cdot 2} - \frac{(x-3) \cdot 3}{4 \cdot 3} = \frac{4x}{12} - \frac{3x-9}{12} = \frac{4x - (3x-9)}{12} = \frac{x+9}{12}$
- c) $4 : \frac{2}{3} = \frac{4}{1} \cdot \frac{3}{2} = \frac{12}{2} = 6$
- d) $\frac{x-2}{3} \cdot \frac{9}{6y} = \frac{(x-2) \cdot 9}{3 \cdot 6y} = \frac{9x-18}{18y}$
- e) $2\frac{1}{3} - 1\frac{1}{2} = \frac{7}{3} - \frac{3}{2} = \frac{7 \cdot 2}{3 \cdot 2} - \frac{3 \cdot 3}{2 \cdot 3} = \frac{14}{6} - \frac{9}{6} = \frac{5}{6}$
- f) $1\frac{1}{4} + 2\frac{1}{2} = \frac{5}{4} + \frac{5}{2} = \frac{5}{4} + \frac{5 \cdot 2}{2 \cdot 2} = \frac{5}{4} + \frac{10}{4} = \frac{15}{4}$

Oppgave 10. Forkort brøkene.

- a) $\frac{12}{9} = \frac{2 \cdot 2 \cdot 3}{3 \cdot 3} = \frac{4}{3}$
- b) $\frac{6xy}{9y^2} = \frac{2 \cdot 3 \cdot x \cdot y}{3 \cdot 3 \cdot y \cdot y} = \frac{2x}{3y}$
- c) $\frac{2c^5 + 8c^3 - 6c^4}{6c^2} = \frac{2 \cdot c^2 \cdot c^3 + 2 \cdot 2 \cdot c^2 \cdot c - 3 \cdot 2 \cdot c^2 \cdot c^2}{3 \cdot 2 \cdot c^2} = \frac{c^3 + 4c - 3c^2}{3}$

$$d) \quad \frac{6x^2 - 3x}{10x - 5} = \frac{2 \cdot 3 \cdot x \cdot x - 3 \cdot x}{2 \cdot 5 \cdot x - 5} = \frac{3x(2x - 1)}{5(2x - 1)} = \frac{3x}{5}$$

Oppgave 11. Utvid brøkene for å finne ut hvilken brøk som er minst.

$$\frac{3}{8} \qquad \frac{1}{2} \qquad \frac{3}{4} \qquad \frac{5}{16}$$

$$\frac{3 \cdot 2}{8 \cdot 2} \qquad \frac{1 \cdot 8}{2 \cdot 8} \qquad \frac{3 \cdot 4}{4 \cdot 4} \qquad \frac{5}{16}$$

$$\frac{6}{16} \qquad \frac{8}{16} \qquad \frac{12}{16} \qquad \frac{5}{16}$$

$\frac{5}{16}$ er minst.