

Aufgabe 1: Berechnen Sie die folgenden Summen und Differenzen.

$$a) \quad \frac{17}{128} - \frac{33}{128} = \frac{17-33}{128} = \frac{-16}{128} = -\frac{4}{32} = -\frac{1}{8}$$

$$b) \quad \frac{n}{5m} + \frac{2n}{5m} = \frac{n+2n}{5m} = \frac{3n}{5m}$$

$$c) \quad \frac{6}{3k} - \frac{a+d}{3k} = \frac{6-(a+d)}{3k} = \frac{6-a-d}{3k}$$

$$d) \quad 5 + \frac{3}{2xy} = \frac{5 \cdot \frac{2xy}{2xy} + 3}{2xy} = \frac{10xy + 3}{2xy}$$

$$e) \quad \frac{a}{a+1} - \frac{-1}{a+1} = \frac{a-(-1)}{a+1} = \frac{a+1}{a+1} = 1$$

Aufgabe 2: Berechnen Sie die folgenden Summen und Differenzen.

$$a) \frac{2x}{3y^6} + \frac{x}{4y^3} + \frac{1}{2y^6} = \frac{4 \cdot 2x}{12y^6} + \frac{3y^3 \cdot x}{12y^6} + \frac{6 \cdot 1}{12y^6} = \frac{8x + 3y^3x + 6}{12y^6}$$

$$\left. \begin{array}{l} 3y^6 = \underline{3 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7} \\ 4y^3 = \underline{2 \cdot 2 \cdot 7 \cdot 7 \cdot 7} \\ 2y^6 = \underline{2 \cdot 7 \cdot 7 \cdot 7 \cdot 7 \cdot 7} \end{array} \right\} \text{Hgl} = 3 \cdot 7^6 \cdot 2^2 = 12y^6$$

$$b) \frac{ab}{c-d} + \frac{1-2ab}{d-c} + 1 = \frac{ab}{c-d} + \frac{1-2ab}{(-1) \cdot (c-d)} + \frac{c-d}{c-d} = \frac{ab}{c-d} + \frac{(-1) \cdot (2ab-1)}{(-1) \cdot (c-d)} + \frac{c-d}{c-d}$$

$$\begin{aligned} (c-d) &= (-1) \cdot (d-c) \\ &= \frac{ab + 2ab - 1 + c - d}{c-d} \\ &= \frac{3ab + c - d - 1}{c-d} \end{aligned}$$

$$c) \frac{3p}{p^2-q^2} - \frac{4q}{p+q} - \frac{p+q}{p-q} = \frac{3p}{p^2-q^2} - \frac{4q(p-q)}{p^2-q^2} - \frac{(p+q)^2}{p^2-q^2} = \frac{3p - 4pq + 4q^2 - (p+q)^2}{p^2-q^2}$$

$$(p+q)(p-q) = p^2 - \cancel{pq} + \cancel{pq} - q^2 = p^2 - q^2 \quad \left| \begin{array}{l} \text{Zähler} \\ \text{Nenner} \end{array} \right. = \frac{3p - 4pq + 4q^2 - (p+q)(p+q)}{p^2-q^2}$$

$$\begin{aligned} &= \frac{3p - 4pq + 4q^2 - p^2 - pq - pq - q^2}{p^2-q^2} \\ &= \frac{-p^2 + 3q^2 + 3p - 6pq}{p^2-q^2} \end{aligned}$$

$$d) \frac{-3a^2d}{c(3a^2-6a+3)} - \frac{da+d}{ca-c} + \frac{3}{a-1}$$

$$\begin{aligned} c(3a^2-6a+3) &= 3c(a^2-2a+1) = \underline{3c(a-1)(a-1)} = \text{Hgl} \\ ca-c &= c(a-1) \\ a-1 & \end{aligned}$$

$$\frac{-3a^2d}{3c(a-1)(a-1)} - \frac{3 \cdot (a-1) \cdot (da+d)}{3c(a-1)(a-1)} + \frac{3c(a-1) \cdot 3}{3c(a-1)(a-1)}$$

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

Aufgabe 3: Multiplizieren Sie die folgenden Brüche und kürzen Sie soweit möglich.

$$a) \quad \frac{3x}{8y} \cdot \frac{9z}{6y} = \frac{3x \cdot 9z}{8y \cdot 6y} = \frac{27xz}{48y^2} = \underline{\underline{\frac{9xz}{16y^2}}}$$

$$b) \quad \frac{-4xy}{2y^2} \cdot \frac{3y}{-6} = \frac{(-4 \times y) \cdot 3y}{2y^2 \cdot (-6)} = \frac{\cancel{-12} \times \cancel{y^2}}{\cancel{-12} y^2} = \underline{\underline{x}}$$

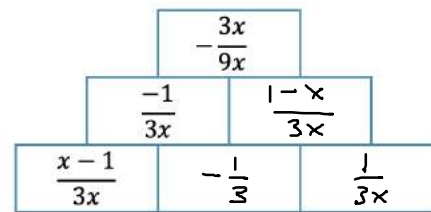
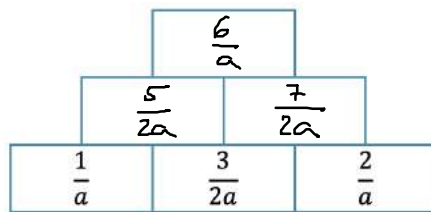
$$\frac{+4 \times \cancel{y} \cdot \cancel{3y}}{2 \cancel{y^2} \cdot (+6)} = \frac{12x}{12} = \underline{\underline{x}}$$

$$c) \quad (4w - 4) \cdot \frac{v}{w - 1} = \frac{(4w - 4) \cdot v}{w - 1} = \frac{4 \cdot (\cancel{w - 1}) \cdot v}{(\cancel{w - 1})} = \underline{\underline{4v}}$$

$$d) \quad \frac{x}{3f + 6g} \cdot \frac{9f - 6g}{a^2} = \frac{9f - 6g}{(3f + 6g) \cdot a} = \frac{\cancel{3} \cdot (3f - 2g)}{\cancel{3} \cdot (f + 2g) \cdot a} = \underline{\underline{\frac{3f - 2g}{(f + 2g) \cdot a}}}$$

$$e) \quad \frac{a - b}{(\cancel{a + b})} \cdot \frac{(\cancel{a + b})}{2a - 2b} = \frac{(\cancel{a - b})}{2(\cancel{a - b})} = \underline{\underline{\frac{1}{2}}}$$

Aufgabe 4: Vervollständigen Sie die beiden "Mauern". Ein Backstein entspricht der Summe der beiden unteren Backsteine.



$$1 \cdot \frac{1}{2a} + \frac{3}{2a} = \frac{2+3}{2a} = \frac{5}{2a}$$

$$\frac{3}{2a} + \frac{2 \cdot 2}{2a} = \frac{3+4}{2a} = \frac{7}{2a}$$

$$\frac{5}{2a} + \frac{7}{2a} = \frac{12}{2a} = \frac{6}{a}$$

$$\frac{x-1}{3x} + y = \frac{-1}{3x}$$

$$y = -\frac{1}{3x} - \frac{x-1}{3x} = \frac{-1-(x-1)}{3x} = \frac{-1-x+1}{3x} = \frac{-x}{3x} = -\frac{1}{3}$$

$$-\frac{1}{3x} + z = -\frac{3x}{9x} = -\frac{x}{3x}$$

$$z = -\frac{x}{3x} - \frac{-1}{3x} = \frac{-x+1}{3x} = \frac{1-x}{3x}$$

$$-\frac{1}{3} + a = \frac{1-x}{3x}$$

$$a = \frac{1-x}{3x} + \frac{1}{3} = \frac{1-x+x}{3x} = \frac{1}{3x}$$

Aufgabe 5: Vereinfachen Sie die folgenden Doppelbrüche.

$$a) \quad \frac{\frac{1}{2}}{\frac{1}{2}} = \underline{1} \quad \left(\frac{1}{2} \cdot \frac{2}{1} = \frac{1 \cdot 2}{2 \cdot 1} = 1 \right)$$

$$b) \quad \frac{\frac{6x}{4}}{\frac{2x}{3}} = \frac{\cancel{6}^3}{4} \cdot \frac{3}{\cancel{2}_1} = \frac{18}{8} = \underline{\frac{9}{4}}$$

$$c) \quad \frac{\frac{a+b}{a^2-2ab}}{\frac{(a+b)(a-b)}{a}} = \frac{\cancel{(a+b)}^1}{\cancel{a^2-2ab}_{\cancel{a} \cdot (a-2b)}} \cdot \frac{\cancel{a}}{\cancel{(a+b)}(a-b)} = \underline{\frac{1}{(a-2b) \cdot (a-b)}}$$

$$d) \quad \frac{\frac{1}{2} + c}{\frac{1}{2} - c} = \frac{\frac{1+2c}{2}}{\frac{1-2c}{2}} = \frac{1+2c}{1-2c}$$

$$e) \quad \frac{1 - \frac{1}{2a-1}}{1 + \frac{1}{2a-1}} = \frac{\frac{(2a-1)-1}{2a-1}}{\frac{(2a-1)+1}{2a-1}} = \frac{2a-2}{(2a-1)+1} \cdot \frac{(2a-1)}{2a} = \frac{\cancel{2} \cdot (a-1)}{\cancel{2} \cdot a} = \underline{\frac{a-1}{a}}$$

$$f) \quad \frac{\frac{1}{p+2} - \frac{1}{p-2}}{\frac{1}{(p+2)(p-2)}} = \frac{\frac{p-2}{(p+2)(p-2)} - \frac{p+2}{(p+2)(p-2)}}{\frac{1}{(p+2)(p-2)}} = \frac{\frac{\cancel{p}-2-\cancel{p}-2}{(p+2)(p-2)}}{\frac{1}{(p+2)(p-2)}} = \frac{-4}{(p+2)(p-2)} \cdot \frac{(p+2)(p-2)}{1} = \underline{-4}$$