

Herzlich willkommen zur Demo der mathepower.de – Aufgabensammlung

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Michael Lobsien
Geschäftsführer mathepower.de

Addition und Subtraktion gleichnamiger Bruchterme

$$1. \quad \left. \begin{array}{l} \text{a) } \frac{x}{3} + \frac{y}{3} \\ \text{e) } \frac{4}{k} - \frac{2}{k} \end{array} \right| \left. \begin{array}{l} \text{b) } \frac{3}{m} + \frac{2}{m} \\ \text{f) } \frac{15}{3p} - \frac{12}{3p} \end{array} \right| \left. \begin{array}{l} \text{c) } \frac{a}{c} + \frac{b}{c} \\ \text{g) } \frac{a}{c^2} - \frac{b}{c^2} \end{array} \right| \left. \begin{array}{l} \text{d) } \frac{7}{x^3} + \frac{12}{x^3} \\ \text{h) } \frac{13x}{5} - \frac{5x}{5} \end{array} \right.$$

$$2. \quad \left. \begin{array}{l} \text{a) } \frac{x}{3} + \frac{y}{3} - \frac{z}{3} \\ \text{d) } \frac{5q}{7r} - \frac{3q}{7r} + \frac{2q}{7r} \end{array} \right| \left. \begin{array}{l} \text{b) } \frac{7}{3x} - \frac{4}{3x} + \frac{2}{3x} \\ \text{e) } \frac{5k}{12} - \frac{4m}{12} + \frac{2n}{12} \end{array} \right| \left. \begin{array}{l} \text{c) } \frac{4a}{3x} - \frac{2a}{3x} + \frac{9a}{3x} \\ \text{f) } \frac{12}{3b} - \frac{15}{3b} + \frac{6}{3b} \end{array} \right.$$

$$3. \quad \left. \begin{array}{l} \text{a) } \frac{a}{y+2z} + \frac{b}{y+2z} - \frac{c}{y+2z} \\ \text{c) } \frac{r}{2x-y} + \frac{s}{2x-y} - \frac{t}{2x-y} \\ \text{e) } \frac{x+y}{a} - \frac{x-y}{a} - \frac{2x-2y}{a} \end{array} \right| \left. \begin{array}{l} \text{b) } \frac{a-b}{c} + \frac{a+b}{c} - \frac{b-a}{c} \\ \text{d) } \frac{3x+4y}{3z} - \frac{2x-2y}{3z} + \frac{x-2y}{3z} \\ \text{f) } \frac{8ab}{x} + \frac{8a^2}{x} - \frac{3b^2}{x} \end{array} \right.$$

$$4. \quad \left. \begin{array}{l} \text{a) } \frac{12r^2 - 4r - 1}{2a+b} + \frac{4r^2 + 2r + 2}{2a+b} \\ \text{c) } \frac{a^2 - b^2}{2x} - \frac{a^2 + 2ab + b^2}{2x} - \frac{a^2 - 2ab + b^2}{2x} \end{array} \right| \left. \begin{array}{l} \text{b) } \frac{(2x+y)^2}{a+b} - \frac{(2x-3y)^2}{a+b} \\ \text{d) } \frac{5a^3 - 2a^2 + a}{m-n} - \frac{2a^3 + a^2 - 2a}{m-n} \end{array} \right.$$

$$5. \quad \left. \begin{array}{l} \text{a) } \frac{3a-4b}{d-e} - \frac{5a+2b}{d-e} + \frac{2a-b}{d-e} \\ \text{c) } \frac{5x-5}{x+y} - \frac{2x-4}{x+y} + \frac{3x+2}{x+y} \\ \text{e) } \frac{12a-13b+5c}{3} - \frac{8a-4b-c}{3} + \frac{5a+8b-c}{3} \end{array} \right| \left. \begin{array}{l} \text{b) } \frac{9r+2s}{a^2} - \frac{4r-2s}{a^2} - \frac{r+8s}{a^2} \\ \text{d) } \frac{5c-3d}{p-2q} - \frac{8c+3d}{p-2q} + \frac{9c-d}{p-2q} \\ \text{f) } \frac{2x+4y}{z^2} - \frac{5x-4y}{z^2} - \frac{9x+y}{z^2} \end{array} \right.$$

Addition und Subtraktion ungleichnamiger Bruchterme

1. a) $\frac{x}{5} - \frac{y}{10}$ b) $\frac{5}{7d} + \frac{8}{14d}$ c) $\frac{5}{a^2} + \frac{3}{a}$ d) $\frac{a}{b^3} - \frac{c}{b^2}$
 e) $\frac{x}{3k} - \frac{y}{6k}$ f) $\frac{2x}{y^2z^2} + \frac{3}{yz}$ g) $\frac{a}{7x} + \frac{b}{14x}$ h) $\frac{4}{x} - \frac{2}{x^2}$

2. a) $\frac{5x}{2} + \frac{3y}{6} - \frac{2z}{3}$ b) $\frac{5}{4x} + \frac{3}{5x} - \frac{7}{20x}$ c) $\frac{5}{x^2} + \frac{2}{x} + \frac{3}{x^3}$
 d) $\frac{4a^2}{9} + \frac{2b^2}{6} - \frac{c^2}{18}$ e) $\frac{5}{8d} - \frac{3}{6d} + \frac{7}{24d^2}$ f) $\frac{5}{9m} - \frac{2}{18mn} + \frac{3}{6n}$

3. a) $\frac{x+1}{3} - \frac{2x-4}{2} + \frac{3x-2}{6}$ b) $\frac{3a-4b}{5} - \frac{8a-7b}{2} + \frac{3b-4a}{10}$
 c) $\frac{5a}{a^2-b^2} - \frac{3}{a+b} + \frac{5}{a-b}$ d) $\frac{8}{4x^2-9y^2} - \frac{2}{2x-3y} + \frac{5}{2x+3y}$
 e) $\frac{5}{a^2-b^2} + \frac{3}{a-b} - \frac{2}{a+b}$ f) $\frac{4}{p^2-q^2} + \frac{4}{p+q} - \frac{2}{p-q}$

4. a) $\frac{x}{a} - \frac{y}{b}$ b) $\frac{x}{m} + \frac{y}{n}$ c) $\frac{7}{k} + 4$
 d) $5 + \frac{1}{r}$ e) $\frac{x}{y} - 1$ f) $\frac{1}{p} - \frac{1}{q}$

5. a) $\frac{3}{x} + \frac{2}{y} - \frac{1}{z}$ b) $\frac{4a}{3} + \frac{5b}{2} - \frac{7}{8}$ c) $\frac{7}{x} + \frac{2}{y} - 1$
 d) $\frac{2x}{5c} + \frac{3y}{4c} - \frac{5z}{r}$ e) $\frac{5x}{8} - 1 + y$ f) $\frac{2a}{5} - \frac{2b}{3} - \frac{c}{6}$

6. a) $\frac{2a+3b}{5} - \frac{3a-5b}{4}$ b) $\frac{5x-3y}{2a} - \frac{2x+3y}{b}$ c) $\frac{a}{x+1} - \frac{b}{x-1}$
 d) $\frac{5}{2d-e} + \frac{4}{3d-e}$ e) $\frac{5}{x+1} - \frac{2}{x+2}$ f) $\frac{3-a}{x} + \frac{2-a}{y}$

7. a) $\frac{3x+4y}{2a-b} - \frac{5x+y}{a+3b}$ b) $\frac{2a+3b-4c}{4} - \frac{a-3b+5c}{5}$
 c) $\frac{2x-3y}{10m+3n} + \frac{4x-2y}{5m-2n}$ d) $\frac{a+2}{x+1} - \frac{a+5}{x+2}$
 e) $\frac{5x+3}{2x-4} + \frac{2x-1}{x+3}$ f) $\frac{2x+5y-z}{3} + \frac{3x-4y+2z}{5}$

8. a) $\frac{x^2}{x^2-9} + \frac{x}{x+3} - \frac{x}{x-3}$ b) $\frac{5}{a-b} + \frac{3}{a^2-b^2} + 1$
 c) $\frac{a}{2(a+b)} - \frac{b}{3(a-b)} + \frac{ab}{a^2-b^2}$ d) $\frac{4x}{4x-6y} + \frac{2x}{6x+9y} - \frac{3x}{24x^2-54y^2}$

Addition und Subtraktion von gleichnamigen Brüchen

Aufgabe:

$$\frac{3}{7} + \frac{2}{7} = ?$$

Lösung:

$$\frac{3}{7} + \frac{2}{7} = \frac{3+2}{7} = \frac{5}{7}$$

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Merke:

Gleichnamige Brüche werden addiert (subtrahiert), indem man die Zähler addiert (subtrahiert) und den Nenner unverändert lässt.

Beispiele mit Variablen:

$$\frac{a}{3} + \frac{b}{3} = \frac{a+b}{3}$$

$$\frac{7}{5b} + \frac{8}{5b} - \frac{3}{5b} = \frac{7+8-3}{5b} = \frac{12}{5b}$$

$$\frac{7x-3}{x-y} + \frac{8x+5}{x-y} - \frac{2x-4}{x-y} = \frac{7x-3+8x+5-(2x-4)}{x-y} = \frac{7x-3+8x+5-2x+4}{x-y} = \frac{13x+6}{x-y}$$

Demo

Aufgabensammlung

Addition und Subtraktion von ungleichnamigen Brüchen

Aufgabe:

$$\frac{3}{4} + \frac{1}{5} = ?$$

Lösung:

$$\frac{3}{4} + \frac{1}{5} = \frac{15}{20} + \frac{4}{20} = \frac{19}{20}$$

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Merke:

Gleichnamige Brüche werden addiert bzw. subtrahiert, indem man die Zähler addiert bzw. subtrahiert und den Nenner beibehält. Ungleichnamige Brüche werden vor dem Addieren (Subtrahieren) durch Erweitern bzw. Kürzen gleichnamig gemacht.

Beispiele mit Variablen:

Fall 1: Der größte Nenner ist der Hauptnenner

$$\begin{aligned} & \frac{a}{4} + \frac{b}{2x} - \frac{c}{4x^2} \\ &= \frac{ax^2}{4x^2} + \frac{2bx}{4x^2} - \frac{c}{4x^2} \\ &= \frac{ax^2 + 2bx - c}{4x^2} \end{aligned}$$

HN:

$$4x^2$$

Demo

Fall 2: Die Nenner haben gemeinsame Teiler

$$\begin{aligned} & \frac{9}{6a^2} - \frac{3}{5ab} + \frac{9}{10b^2} \\ &= \frac{45b^2}{30a^2b^2} - \frac{18ab}{30a^2b^2} + \frac{27a^2}{30a^2b^2} \\ &= \frac{45b^2 - 18ab + 27a^2}{30a^2b^2} \end{aligned}$$

Nenner 1: $2 \cdot 3 \cdot a^2$

Nenner 2: $5 \cdot a \cdot b$

Nenner 3: $2 \cdot 5 \cdot b^2$

Hauptnenner: $30a^2b^2$

Aufgabensammlung

Fall 3: Die Nenner sind teilerfremd

$$\begin{aligned} & \frac{5}{2x} + \frac{6}{3y} - \frac{7}{5z} \\ &= \frac{75yz}{30xyz} + \frac{60xz}{30xyz} - \frac{42xy}{30xyz} \\ &= \frac{75yz + 60xz - 42xy}{30xyz} \end{aligned}$$

HN:

$$30xyz$$

Addition und Subtraktion gleichnamiger Bruchterme - Lösungen

1. a) $\frac{x}{3} + \frac{y}{3} = \frac{x+y}{3}$ b) $\frac{3}{m} + \frac{2}{m} = \frac{5}{m}$ c) $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$ d) $\frac{7}{x^3} + \frac{12}{x^3} = \frac{19}{x^3}$

e) $\frac{4}{k} - \frac{2}{k} = \frac{2}{k}$ f) $\frac{15}{3p} - \frac{12}{3p} = \frac{3}{3p} = \frac{1}{p}$ g) $\frac{a}{c^2} - \frac{b}{c^2} = \frac{a-b}{c^2}$ h) $\frac{13x}{5} - \frac{5x}{5} = \frac{8x}{5}$

2. a) $\frac{x}{3} + \frac{y}{3} - \frac{z}{3} = \frac{x+y-z}{3}$ b) $\frac{7}{3x} - \frac{4}{3x} + \frac{2}{3x} = \frac{5}{3x}$ c) $\frac{4a}{3x} - \frac{2a}{3x} + \frac{9a}{3x} = \frac{11a}{3x}$

d) $\frac{5q}{7r} - \frac{3q}{7r} + \frac{2q}{7r} = \frac{4q}{7r}$ e) $\frac{5k}{12} - \frac{4m}{12} + \frac{2n}{12} = \frac{5k-4m+2n}{12}$ f) $\frac{12}{3b} - \frac{15}{3b} + \frac{6}{3b} = \frac{3}{3b} = \frac{1}{b}$

3. a) $\frac{a}{y+2z} + \frac{b}{y+2z} - \frac{c}{y+2z} = \frac{a+b-c}{y+2z}$ b) $\frac{a-b}{c} + \frac{a+b}{c} - \frac{b-a}{c} = \frac{a-b+a+b-b+a}{c} = \frac{3a-b}{c}$

c) $\frac{r}{2x-y} + \frac{s}{2x-y} - \frac{t}{2x-y} = \frac{r+s-t}{2x-y}$ d) $\frac{3x+4y}{3z} - \frac{2x-2y}{3z} + \frac{x-2y}{3z} = \frac{3x+4y-2x+2y+x-2y}{3z} = \frac{2x+4y}{3z}$

e) $\frac{x+y}{a} - \frac{x-y}{a} - \frac{2x-2y}{a} = \frac{-2x+4y}{a}$ f) $\frac{8ab}{x} + \frac{8a^2}{x} - \frac{3b^2}{x} = \frac{8ab+8a^2-3b^2}{x}$

4. a) $\frac{12r^2-4r-1}{2a+b} + \frac{4r^2+2r+2}{2a+b} = \frac{16r^2-2r+1}{2a+b}$ b) $\frac{(2x+y)^2}{a+b} - \frac{(2x-3y)^2}{a+b} = \frac{16xy-8y^2}{a+b}$

c) $\frac{a^2-b^2}{2x} - \frac{a^2+2ab+b^2}{2x} - \frac{a^2-2ab+b^2}{2x} = \frac{a^2-b^2-a^2-2ab-b^2-a^2+2ab-b^2}{2x} = \frac{-a^2-3b^2}{2x}$ d) $\frac{5a^3-2a^2+a}{m-n} - \frac{2a^3+a^2-2a}{m-n} = \frac{5a^3-2a^2+a-2a^3-a^2+2a}{m-n} = \frac{3a^3-3a^2+3a}{m-n}$

$$5. \quad a) \quad \frac{3a-4b}{d-e} - \frac{5a+2b}{d-e} + \frac{2a-b}{d-e}$$

$$= \frac{3a-4b-5a-2b+2a-b}{d-e}$$

$$= \frac{-7b}{d-e}$$

$$c) \quad \frac{5x-5}{x+y} - \frac{2x-4}{x+y} + \frac{3x+2}{x+y}$$

$$= \frac{5x-5-2x+4+3x+2}{x+y}$$

$$= \frac{6x+1}{x+y}$$

$$e) \quad \frac{12a-13b+5c}{3} - \frac{8a-4b-c}{3} + \frac{5a+8b-c}{3}$$

$$= \frac{12a-13b+5c-8a+4b+c+5a+8b-c}{3}$$

$$= \frac{9a-b+5c}{3}$$

$$b) \quad \frac{9r+2s}{a^2} - \frac{4r-2s}{a^2} - \frac{r+8s}{a^2}$$

$$= \frac{9r+2s-4r+2s-r-8s}{a^2}$$

$$= \frac{4r-4s}{a^2}$$

$$d) \quad \frac{5c-3d}{p-2q} - \frac{8c+3d}{p-2q} + \frac{9c-d}{p-2q}$$

$$= \frac{5c-3d-8c-3d+9c-d}{p-2q}$$

$$= \frac{6c-7d}{p-2q}$$

$$f) \quad \frac{2x+4y}{z^2} - \frac{5x-4y}{z^2} - \frac{9x+y}{z^2}$$

$$= \frac{2x+4y-5x+4y-9x-y}{z^2}$$

$$= \frac{-12x+7y}{z^2}$$

Demo

Aufgabensammlung

Addition und Subtraktion ungleichnamiger Bruchterme - Lösungen

1. a) $\frac{x}{5} - \frac{y}{10}$
 $= \frac{2x}{10} - \frac{y}{10}$
 $= \frac{2x - y}{10}$

b) $\frac{5}{7d} + \frac{8}{14d}$
 $= \frac{10}{14d} + \frac{8}{14d}$
 $= \frac{18}{14d} = \frac{9}{7d}$

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

d) $\frac{a}{b^3} - \frac{c}{b^2}$
 $= \frac{a}{b^3} - \frac{bc}{b^3}$
 $= \frac{a - bc}{b^3}$

e) $\frac{x}{3k} - \frac{y}{6k}$
 $= \frac{2x}{6k} - \frac{y}{6k}$
 $= \frac{2x - y}{6k}$

f) $\frac{2x}{y^2z^2} + \frac{3}{yz}$
 $= \frac{2x}{y^2z^2} + \frac{3yz}{y^2z^2}$
 $= \frac{2x + 3yz}{y^2z^2}$

g) $\frac{a}{7x} + \frac{b}{14x}$
 $= \frac{2a}{14x} + \frac{b}{14x}$
 $= \frac{2a + b}{14x}$

h) $\frac{4}{x} - \frac{2}{x^2}$
 $= \frac{4x}{x^2} - \frac{2}{x^2}$
 $= \frac{4x - 2}{x^2}$

2. a) $\frac{5x}{2} + \frac{3y}{6} - \frac{2z}{3}$
 $= \frac{15x}{6} + \frac{3y}{6} - \frac{4z}{6}$
 $= \frac{15x + 3y - 4z}{6}$

b) $\frac{5}{4x} + \frac{3}{5x} - \frac{7}{20x}$
 $= \frac{25}{20x} + \frac{12}{20x} - \frac{7}{20x}$
 $= \frac{30}{20x} = \frac{3}{2x}$

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

d) $\frac{4a^2}{9} + \frac{2b^2}{6} - \frac{c^2}{18}$
 $= \frac{8a^2}{18} + \frac{6b^2}{18} - \frac{c^2}{18}$
 $= \frac{8a^2 + 6b^2 - c^2}{18}$

e) $\frac{4}{8d} - \frac{2}{6d} + \frac{9}{24d^2}$
 $= \frac{12d}{24d^2} - \frac{8d}{24d^2} + \frac{9}{24d^2}$
 $= \frac{12d - 8d + 9}{24d^2} = \frac{4d + 9}{24d^2}$

f) $\frac{3}{9m} - \frac{2}{18mn} + \frac{3}{6n}$
 $= \frac{6n}{18mn} - \frac{2}{18mn} + \frac{9m}{18mn}$
 $= \frac{6n - 2 + 9m}{18mn}$

$$\begin{aligned}
 3. \quad a) \quad & \frac{x+1}{3} - \frac{2x-4}{2} + \frac{3x-2}{6} \\
 &= \frac{2x+2}{6} - \frac{6x-12}{6} + \frac{3x-2}{6} \\
 &= \frac{-x+12}{6}
 \end{aligned}$$

$$\begin{aligned}
 b) \quad & \frac{3a-4b}{5} - \frac{8a-7b}{2} + \frac{3b-4a}{10} \\
 &= \frac{6a-8b}{10} - \frac{40a-35b}{10} + \frac{3b-4a}{10} \\
 &= \frac{-38a+30b}{10}
 \end{aligned}$$

$$\begin{aligned}
 c) \quad & \frac{5a}{a^2-b^2} - \frac{3}{a+b} + \frac{5}{a-b} \\
 &= \frac{5a}{a^2-b^2} - \frac{3a-3b}{a^2-b^2} + \frac{5a+5b}{a^2-b^2} \\
 &= \frac{7a+8b}{a^2-b^2}
 \end{aligned}$$

$$\begin{aligned}
 d) \quad & \frac{8}{4x^2-9y^2} - \frac{2x-3y}{2x-3y} + \frac{5}{2x+3y} \\
 &= \frac{8}{4x^2-9y^2} - \frac{4x+6y}{4x^2-9y^2} + \frac{10x-15y}{4x^2-9y^2} \\
 &= \frac{8+6x-21y}{4x^2-9y^2}
 \end{aligned}$$

$$\begin{aligned}
 e) \quad & \frac{5}{a^2-b^2} + \frac{3}{a-b} - \frac{2}{a+b} \\
 &= \frac{5}{a^2-b^2} + \frac{3a+3b}{a^2-b^2} - \frac{2a-2b}{a^2-b^2} \\
 &= \frac{5+a+5b}{a^2-b^2}
 \end{aligned}$$

$$\begin{aligned}
 f) \quad & \frac{4}{p^2-q^2} + \frac{4}{p+q} - \frac{2}{p-q} \\
 &= \frac{4}{p^2-q^2} + \frac{4p-4q}{p^2-q^2} - \frac{2p+2q}{p^2-q^2} \\
 &= \frac{4+2p-6q}{p^2-q^2}
 \end{aligned}$$

$$\begin{aligned}
 4. \quad a) \quad & \frac{x}{a} - \frac{y}{b} \\
 &= \frac{bx}{ab} - \frac{ay}{ab} \\
 &= \frac{bx-ay}{ab} \\
 d) \quad & 5 + \frac{1}{r} \\
 &= \frac{5r}{r} + \frac{1}{r} \\
 &= \frac{5r+1}{r}
 \end{aligned}$$

$$\begin{aligned}
 b) \quad & \frac{x}{m} + \frac{y}{n} \\
 &= \frac{xn}{mn} + \frac{ym}{mn} \\
 &= \frac{xn+ym}{mn} \\
 e) \quad & \frac{x}{y} - 1 \\
 &= \frac{x}{y} - \frac{y}{y} \\
 &= \frac{x-y}{y}
 \end{aligned}$$

$$\begin{aligned}
 c) \quad & \frac{7}{k} + 4 \\
 &= \frac{7}{k} + \frac{4k}{k} \\
 &= \frac{7+4k}{k} \\
 f) \quad & \frac{1}{p} - \frac{1}{q} \\
 &= \frac{q}{pq} - \frac{p}{pq} \\
 &= \frac{q-p}{pq}
 \end{aligned}$$

Aufgabensammlung

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Demo

$$5. \quad a) \quad \frac{3}{x} + \frac{2}{y} - \frac{1}{z}$$

$$= \frac{3yz}{xyz} + \frac{2xz}{xyz} - \frac{xy}{xyz}$$

$$= \frac{3yz + 2xz - xy}{xyz}$$

$$b) \quad \frac{4a}{3} + \frac{5b}{2} - \frac{7}{8}$$

$$= \frac{32a}{24} + \frac{60b}{24} - \frac{21}{24}$$

$$= \frac{32a + 60b - 21}{24}$$

$$c) \quad \frac{7}{x} + \frac{2}{y} - 1$$

$$= \frac{7y}{xy} + \frac{2x}{xy} - \frac{xy}{xy}$$

$$= \frac{7y + 2x - xy}{xy}$$

$$d) \quad \frac{2x}{5p} + \frac{6y}{4q} - \frac{5z}{r}$$

$$= \frac{8qrx}{20pqr} + \frac{15pry}{20pqr} - \frac{100pqz}{20pqr}$$

$$= \frac{8qrx + 15pry - 100pqz}{20pqr}$$

$$e) \quad \frac{5x}{8} - \frac{1}{1+y}$$

$$= \frac{5x}{8} - \frac{8}{8} + \frac{8y}{8}$$

$$= \frac{5x - 8 + 8y}{8}$$

$$f) \quad \frac{2a}{5} - \frac{2b}{3} - \frac{c}{6}$$

$$= \frac{12a}{30} + \frac{20b}{30} - \frac{5c}{30}$$

$$= \frac{12a + 20b - 5c}{30}$$

$$6. \quad a) \quad \frac{2a + 3b}{5} - \frac{3a - 5b}{4}$$

$$= \frac{8a + 12b}{20} - \frac{15a - 25b}{20}$$

$$= \frac{-7a + 37b}{20}$$

$$b) \quad \frac{5x - 3y}{2a} - \frac{2x + 3y}{b}$$

$$= \frac{5bx - 3by}{2ab} - \frac{4ax + 6ay}{2ab}$$

$$= \frac{5bx - 3by - 4ax - 6ay}{2ab}$$

$$c) \quad \frac{a}{x+1} - \frac{b}{x-1}$$

$$= \frac{ax - a}{x^2 - 1} - \frac{bx + b}{x^2 - 1}$$

$$= \frac{ax - a - bx - b}{x^2 - 1}$$

$$d) \quad \frac{5}{2d - e} + \frac{4}{3d - e}$$

$$= \frac{15d - 5e}{(2d - e)(3d - e)} + \frac{8d - 4e}{(2d - e)(3d - e)}$$

$$= \frac{23d - 9e}{6d^2 - 5de + e^2}$$

$$e) \quad \frac{5}{x+1} - \frac{2}{x+2}$$

$$= \frac{5x + 10}{(x+1)(x+2)} - \frac{2x + 2}{(x+1)(x+2)}$$

$$= \frac{3x + 8}{x^2 + 3x + 2}$$

$$f) \quad \frac{3-a}{x} + \frac{2-a}{y}$$

$$= \frac{3y - ay}{xy} + \frac{2x - ax}{xy}$$

$$= \frac{3y - ay + 2x - ax}{xy}$$

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7. a) $\frac{3x+4y}{2a-b} - \frac{5x+y}{a+3b}$
 $= \frac{(3x+4y)(a+3b)}{(2a-b)(a+3b)} - \frac{(5x+y)(2a-b)}{(2a-b)(a+3b)}$
 $= \frac{-7ax+14bx+2ay+13by}{2a^2+5ab-3b^2}$

b) $\frac{2a+3b-4c}{4} - \frac{a-3b+5c}{5}$
 $= \frac{10a+15b-20c}{20} - \frac{4a-12b+20c}{20}$
 $= \frac{6a+27b-40c}{20}$

c) $\frac{2x-3y}{10m+3n} + \frac{4x-2y}{5m-2n}$
 $= \frac{(2x-3y)(5m-2n)}{(10m+3n)(5m-2n)} + \frac{(4x-2y)(10m+3n)}{(10m+3n)(5m-2n)}$
 $= \frac{50mx+8nx-35my}{50m^2-5mn-6n^2}$

d) $\frac{a+2}{x-1} - \frac{a+5}{x+2}$
 $= \frac{(a+2)(x+2)}{(x-1)(x+2)} - \frac{(a+5)(x-1)}{(x-1)(x+2)}$
 $= \frac{a-3x-1}{x^2+3x+2}$

e) $\frac{5x+3}{2x-4} + \frac{2x-1}{x+3}$
 $= \frac{(5x+3)(x+3)}{(2x-4)(x+3)} + \frac{(2x-1)(2x-4)}{(2x-4)(x+3)}$
 $= \frac{9x^2+8x+13}{2x^2+2x-12}$

f) $\frac{2x+5y-z}{3} + \frac{3x-4y+2z}{5}$
 $= \frac{10x+25y-5z}{15} + \frac{9x-12y+6z}{15}$
 $= \frac{19x+13y+z}{15}$

8. a) $\frac{x^2}{x^2-9} + \frac{x}{x+3} - \frac{x}{x-3}$
 $= \frac{x^2}{x^2-9} + \frac{x(x-3)}{x^2-9} - \frac{x(x+3)}{x^2-9}$
 $= \frac{x^2-6x}{x^2-9}$

b) $\frac{5}{a-b} + \frac{3}{a^2-b^2} + 1$
 $= \frac{5a+5b}{a^2-b^2} + \frac{3}{a^2-b^2} + \frac{a^2-b^2}{a^2-b^2}$
 $= \frac{5a+5b+3+a^2-b^2}{a^2-b^2}$

c) $\frac{a}{2(a+b)} - \frac{b}{3(a-b)} + \frac{ab}{a^2-b^2}$
 $= \frac{3a(a-b)}{6a^2-6b^2} - \frac{2b(a+b)}{6a^2-6b^2} + \frac{6ab}{6a^2-6b^2}$
 $= \frac{3a^2+ab-2b^2}{6a^2-6b^2}$

d) $\frac{4x}{4x-6y} + \frac{2x}{6x+9y} - \frac{3x}{24x^2-54y^2}$
 $= \frac{4x}{2(2x-3y)} + \frac{2x}{3(2x+3y)} - \frac{3x}{6(4x^2-9y^2)}$
 $= \frac{12x(2x+3y)}{24x^2-54y^2} + \frac{4x(2x-3y)}{24x^2-54y^2} - \frac{3x}{24x^2-54y^2}$
 $= \frac{32x^2+24xy-3x}{24x^2-54y^2}$

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Demo

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