**Sčítání a odčítání zlomků s různými jmenovateli – procvičování – řešení č. 63**

**1.př. Vypočítej.**

a). $\frac{4}{3}+\frac{5}{9}$ = $\frac{12}{9}+\frac{5}{9} $= $\frac{12+5}{9}$ = $\frac{17}{9}$ = $1\frac{8}{9}$

b) $\frac{-7}{10}$ + $\frac{11}{15}$ = $\frac{-21}{30}+\frac{22}{30}$ = $\frac{-21+22}{30}$ = $\frac{1}{30}$

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

d) $-\frac{7}{10}+\frac{2}{3}+\frac{5}{6}$ = $-\frac{21}{30}+\frac{20}{30}+\frac{25}{30}$ = $\frac{-21+20+25}{30}$ = $\frac{24}{30}$ = $\frac{4}{5}$

e) $-\frac{3}{4}+\frac{1}{8}+\frac{1}{2}$ = $-\frac{6}{8}+\frac{1}{8}+\frac{4}{8}$ = $\frac{-6+1+4}{8}$ = $\frac{-1}{8}$ = $-\frac{1}{8}$

f) $+\frac{4}{5}+\frac{2}{7}+\frac{-22}{35}$ = $+\frac{28}{35}+\frac{10}{35}+\frac{-22}{35}$ = $\frac{+28+10+(-22)}{35}$ = $\frac{16}{28}$ = $\frac{4}{7}$

g) $\frac{1}{3}+ \frac{1}{4}+\frac{1}{6}$ = $\frac{4}{12}+\frac{3}{12}+\frac{2}{12}$ = $\frac{4+3+2}{12}$ = $\frac{9}{12}$ = $\frac{3}{4}$

h) $\frac{7}{9}+\frac{2}{3}+\frac{-3}{2}$ = $\frac{14}{18}+\frac{12}{18}+\frac{-27}{18}$ = $\frac{14+12+(-27)}{18}$ = $\frac{-1}{18}$ = $-\frac{1}{18}$

i) $-\frac{1}{2}+\frac{4}{5}+\frac{3}{10}+\frac{-1}{3}$ = $-\frac{15}{30}+\frac{24}{30}+\frac{9}{30}$ $+\frac{-10}{30}$= $\frac{-15+24+9+(-10)}{30}$ = $\frac{8}{30}$ = $\frac{4}{15}$

j) $+\frac{1}{6}+\frac{1}{9}+\frac{1}{2}+\frac{2}{3}$ = $+\frac{3}{18}+\frac{2}{18}+\frac{9}{18}+\frac{12}{18}$ = $\frac{+3+2+9+12}{18}$ = $\frac{26}{18}$ = $\frac{13}{9}$ = $1\frac{4}{9}$

**2.př. Vypočítej.**

a). $\frac{2}{3}-\frac{1}{6}$ = $\frac{4}{6}-\frac{1}{6}$ = $\frac{4-1}{6}$ = $\frac{3}{6}$ = $\frac{1}{2}$

b) $\frac{-3}{4}$ $-\frac{3}{7}$ = $\frac{-21}{28}-\frac{12}{28}$ = $\frac{-21-12}{28}$ = $\frac{-33}{28}$ = $-1\frac{5}{28}$

c) $\frac{7}{9}- \frac{2}{3}$ = $\frac{7}{9}-\frac{6}{9}$ = $\frac{7-6}{9}$ = $\frac{1}{9}$

d) $\frac{1}{5}-\frac{13}{15}+\frac{2}{3}$ = $\frac{3}{15}-\frac{13}{15}+\frac{10}{15}$ = $\frac{3-13+10}{15}$ = $\frac{0}{15}$ = 0

e) $-\frac{5}{8}- \frac{-3}{4}-\frac{1}{2}$ = $-\frac{5}{8}-\frac{-6}{8}-\frac{4}{8}$ = $\frac{-5-\left(-6\right)-4}{8}$ = $\frac{-3}{8}$ = $-\frac{3}{8}$

f) $+\frac{1}{3}- \frac{7}{4}+\frac{11}{6}$ = $+\frac{4}{12}-\frac{21}{12}+\frac{22}{12}$ = $\frac{+4-21+22}{12}$ = $\frac{5}{12}$

g) $\frac{5}{6}- \frac{1}{3}-\frac{1}{2}$ = $\frac{5}{6}-\frac{2}{6}-\frac{3}{6}$ = $\frac{5-2-3}{6}$ = $\frac{0}{6}$ = 0

h) $\frac{7}{15}-\frac{3}{5}+\frac{1}{3}$ = $\frac{7}{15}-\frac{9}{15}+\frac{5}{15}$ = $\frac{7-9+5}{15}$ = $\frac{3}{15}$ = $\frac{1}{5}$

i) $-\frac{1}{16}- \frac{2}{4}+\frac{13}{8}-\frac{3}{2}$ = $-\frac{1}{16}-\frac{8}{16}+\frac{26}{16}-\frac{24}{16}$ = $\frac{-1-8+26-24}{16}$ = $\frac{-7}{16}$ = $-\frac{7}{16}$

j) $+\frac{13}{10}- \frac{5}{4}-\frac{6}{5}+\frac{21}{20}$ = $+\frac{26}{20}-\frac{25}{20}-\frac{24}{20}+\frac{21}{20}$ = $\frac{+26-25-24+21}{20}$ = $\frac{-2}{20}$ = $-\frac{1}{10}$

**Sčítání a odčítání racionálních čísel – řešení č. 64**

**1.př. Vypočítej.**

a). $2\frac{1}{3}+\frac{-5}{4}$ = $\frac{7}{3}+\frac{-5}{4}$ = $\frac{28}{12}+\frac{-15}{12}$ = $\frac{28+(-15)}{12}$ = $\frac{13}{12}$ = $1\frac{1}{12}$

b) + 0,9+ $1\frac{1}{5}$ = $+\frac{9}{10}+\frac{6}{5}$ = $\frac{9}{10}+\frac{12}{10}$ = $\frac{9+12}{10}$ = $\frac{21}{10}$ = $2\frac{1}{10}$

c) $-\frac{7}{5}+ 2$ = $-\frac{7}{5}+\frac{2}{1}$ = $-\frac{7}{5}+\frac{10}{5}$ = $\frac{-7+10}{5}$ = $\frac{3}{5}$

d) $-1\frac{2}{3}+1\frac{1}{6}$ = $-\frac{5}{3}+\frac{7}{6}$ = $-\frac{10}{6}+\frac{7}{6}$ = $\frac{-10+7}{6}$ = $\frac{-3}{6}$ = $-\frac{1}{2}$

e) $\frac{3}{4}+2\frac{1}{8}$ = $\frac{3}{4}+\frac{17}{8}$ = $\frac{6}{8}+\frac{17}{8}$ = $\frac{6+17}{8}$ = $\frac{23}{8}$ = $2\frac{7}{8}$

f) $-\frac{3}{5}+1\frac{1}{2}+0,3$ = $-\frac{3}{5}+\frac{3}{2}+\frac{3}{10}$ = $-\frac{6}{10}+\frac{15}{10}+\frac{3}{10}$ = $\frac{-6+15+3}{10}$ = $\frac{12}{10}$ = $\frac{6}{5}$ = $1\frac{1}{5}$

g) $2\frac{1}{3}+ 1\frac{1}{4}+\frac{-4}{1}$ = $\frac{7}{3}+\frac{5}{4}+\frac{-4}{1}$ = $\frac{28}{12}+\frac{15}{12}+\frac{-48}{12}$ = $\frac{28+15+(-48)}{12}$ = $\frac{-5}{12}$ = $-\frac{5}{12}$

h) $1\frac{7}{8}+\frac{2}{4}+(-1)$ = $\frac{15}{8}+\frac{2}{4}-\frac{1}{1}$ = $\frac{15}{8}+\frac{4}{8}-\frac{8}{8}$ = $\frac{15+4-8}{8}$ = $\frac{11}{8}$ = $1\frac{3}{8}$

i) $-1\frac{1}{2}+\frac{9}{5}+0,4$ = $-\frac{3}{2}+\frac{9}{5}+\frac{4}{10}$ = $-\frac{15}{10}+\frac{18}{10}+\frac{4}{10}$ = $\frac{-15+18+4}{10}$ = $\frac{7}{10}$

j) $+1\frac{1}{6}+0,1+\frac{1}{2}+\frac{2}{15}$ = $\frac{7}{6}+\frac{1}{10}+\frac{1}{2}+\frac{2}{15}$ = $\frac{35}{30}+\frac{3}{30}+\frac{15}{30}+\frac{4}{30}$ = $\frac{35+3+15+4}{30}$ = $\frac{57}{30}$ = $\frac{19}{10}$ = $1\frac{9}{10}$

**2.př. Vypočítej.**

a). $1\frac{1}{3}-2$ = $\frac{4}{3}-\frac{2}{1}$ = $\frac{4}{3}-\frac{6}{3}$ = $\frac{4-6}{3}$ = $\frac{-2}{3}$ = $-\frac{2}{3}$

b) $\frac{-3}{4}$ $-1\frac{3}{16}$ = $\frac{-3}{4}-\frac{19}{16}$ = $\frac{-12}{16}-\frac{19}{16}$ = $\frac{-12-19}{16}$ = $\frac{-31}{16}$ = $-1\frac{15}{16}$

c) $2\frac{2}{9}- \frac{5}{3}$ = $\frac{20}{9}-\frac{5}{3}$ = $\frac{20}{9}-\frac{15}{9}$ = $\frac{20-15}{9}$ = $\frac{5}{9}$

d) $-1\frac{1}{5}-\frac{13}{15}$ = $-\frac{6}{5}-\frac{13}{15}$ = $-\frac{18}{15}-\frac{13}{15}$ = $\frac{-18-13}{15}$ = $\frac{-31}{15}$ = $-2\frac{1}{15}$

e) $-0,6- \frac{-5}{4}$ = $-\frac{6}{10}-\frac{-5}{4}$ = $-\frac{12}{20}-\frac{-25}{20}$ = $\frac{-12-(-25)}{20}$ = $\frac{13}{20}$

f) $+0,5- \frac{1}{4}+1\frac{1}{6}$ = $+\frac{5}{10}-\frac{1}{4}+\frac{7}{6}$ = $+\frac{30}{60}-\frac{15}{60}+\frac{70}{60}$ = $\frac{+30-15+70}{60}$ = $\frac{85}{60}$ = $\frac{17}{12}$ = $1\frac{5}{12}$

g) $2- 1\frac{2}{3}-\frac{1}{9}$ = $\frac{2}{1}-\frac{5}{3}-\frac{1}{9}$ = $\frac{18}{9}-\frac{15}{9}-\frac{1}{9}$ = $\frac{18-15-1}{9}$ = $\frac{2}{9}$

h) $1\frac{11}{15}-\frac{4}{5}-1\frac{1}{3}$ = $\frac{26}{15}-\frac{4}{5}-\frac{4}{3}$ = $\frac{26}{15}-\frac{12}{15}-\frac{20}{15}$ = $\frac{26-12-20}{15}$ = $\frac{-6}{15}$ = $-\frac{2}{5}$

i) $-2\frac{1}{16}- \frac{1}{8}+2\frac{1}{4}$ = $-\frac{33}{16}-\frac{1}{8}+\frac{9}{4}$ = $-\frac{33}{16}-\frac{2}{16}+\frac{36}{16}$ = $\frac{-33-2+36}{16}$ = $\frac{1}{16}$

j) $+0,9- 1\frac{1}{4}-\frac{3}{5}+2$ = $+\frac{9}{10}-\frac{5}{4}-\frac{3}{5}+\frac{2}{1}$ = $+\frac{18}{20}-\frac{25}{20}-\frac{12}{20}+\frac{40}{20}$ = $\frac{+18-25-12+40}{20}$ = $\frac{21}{20}$ = $1\frac{1}{20}$

**Sčítání a odčítání racionálních čísel – příklady se závorkami – řešení č.65**

**1.př. Vypočítej. (Nejprve odstraň závorky – obdobně jako při počítání s celými čísly.)**

a). $1\frac{1}{9}+\left(-\frac{5}{18}\right)$ = $1\frac{1}{9}-\frac{5}{18}$ = $\frac{10}{9}-\frac{5}{18}$ = $\frac{20}{18}-\frac{5}{18}$ = $\frac{20-5}{18}$ = $\frac{15}{18}$ = $\frac{5}{6}$

b) + 0,3 + $\left(+1\frac{1}{2}\right)$ = $+\frac{3}{10}+1\frac{1}{2}$ = $+\frac{3}{10}+\frac{3}{2}$ = $+\frac{3}{10}+\frac{15}{10}$ = $\frac{+3+15}{10}$ = $\frac{18}{10}$ = $\frac{9}{5}$ = $1\frac{4}{5}$

c) $-\left(-1\frac{7}{11}\right)-\left(+3\right) $ = $+1\frac{7}{11}-3$ = $+\frac{18}{11}-\frac{3}{1}$ = $+\frac{18}{11}-\frac{33}{11}$ = $\frac{+18-33}{11}$ = $\frac{-15}{11}$ = $-1\frac{4}{11}$

d) $+\left(-1\frac{2}{5}\right)+1,4$ = $-1\frac{2}{5}+1,4$ = $-\frac{7}{5}+\frac{14}{10}$ = $-\frac{14}{10}+\frac{14}{10}$ = $\frac{-14+14}{10}$ = $\frac{0}{14}$ = 0

e) $-\frac{3}{4}+\left(-1\frac{3}{8}\right)$ = $-\frac{3}{4}-1\frac{3}{8}$ = $-\frac{3}{4}-\frac{11}{8}$ = $-\frac{6}{8}-\frac{11}{8}$ = $\frac{-17}{8}$ = $-2\frac{1}{8}$

f) $\left(+\frac{1}{5}\right)-\left(-0,7\right)-1\frac{1}{2}$ = $+\frac{1}{5}+0,7-1\frac{1}{2}$ = $+\frac{1}{5}+\frac{7}{10}-\frac{3}{2}$ = $+\frac{2}{10}+\frac{7}{10}-\frac{15}{10}$ = $\frac{+2+7-15}{10}$ = $\frac{-6}{10}$ = $-\frac{3}{5}$

g) $2\frac{1}{4}+\left(-1\frac{3}{5}\right) + \frac{3}{20}$ = $2\frac{1}{4}-1\frac{3}{5}+\frac{3}{20}$ = $\frac{9}{4}-\frac{8}{5}+\frac{3}{20}$ = $\frac{45}{20}-\frac{32}{20}+\frac{3}{20}$ = $\frac{45-32+3}{20}$ = $\frac{16}{20}$ = $\frac{4}{5}$

h) $-\frac{1}{2}+\left(+\frac{2}{5}\right)+(-1,1)$ = $-\frac{1}{2}+\frac{2}{5}-1,1$ = $-\frac{1}{2}+\frac{2}{5}-\frac{11}{10}$ = $-\frac{5}{10}+\frac{4}{10}-\frac{11}{10}$ = $\frac{-5+4-11}{10}$ = $\frac{-12}{10}$ = $-\frac{6}{5}$ = $-1\frac{1}{5}$

i) $-\left(-1\frac{1}{3}\right)+\left(+1\frac{5}{12}\right)-\frac{5}{4}$ = $+1\frac{1}{3}+1\frac{5}{12}-\frac{5}{4}$ = $+\frac{4}{3}+\frac{17}{12}-\frac{5}{4}$ = $+\frac{16}{12}+\frac{17}{12}-\frac{15}{12}$ = $\frac{+16+17-15}{12}$ = $\frac{18}{12}$ = $\frac{3}{2}$ = $1\frac{1}{2}$

**2.př. Vypočítej. (Pamatuj, že výpočty v závorkách mají přednost. )**

a). $\frac{1}{3}-\left(\frac{1}{6}-\frac{1}{2}\right)$ = $\frac{1}{3}-\left(\frac{1}{6}-\frac{3}{6}\right)$ = $\frac{1}{3}-\left(\frac{1-3}{6}\right)$ = $\frac{1}{3}-\left(-\frac{2}{6}\right)$ = $\frac{1}{3}+\frac{2}{6}$ = $\frac{2}{6}+\frac{2}{6}$ = $\frac{2+2}{6}$ = $\frac{4}{6}$ = $\frac{2}{3}$

b) $1\frac{3}{4}$ $- \left(\frac{1}{8}+\frac{5}{16}\right)$ = $\frac{7}{4}-\left(\frac{2}{16}+\frac{5}{16}\right)$ = $\frac{7}{4}-\left(\frac{2+5}{16}\right)$ = $\frac{7}{4}-\frac{7}{16}$ = $\frac{28}{16}-\frac{7}{16}$ = $\frac{28-7}{16}$ = $\frac{21}{16}$ = $1\frac{5}{16}$

c) $-\frac{7}{9}+\left(-\frac{4}{6}+\frac{2}{3}\right) $ = $-\frac{7}{9}+\left(-\frac{4}{6}+\frac{2}{3}\right)$ = $-\frac{7}{9}+\left(-\frac{4}{6}+\frac{4}{6}\right)$ = $-\frac{7}{9}+\left(\frac{-4+4}{6}\right)$ = $-\frac{7}{9}$ + (0) = $-\frac{7}{9}$

d) $-1\frac{1}{2}-\left(-0,4-\frac{3}{5}\right) $ = $-\frac{3}{2}-\left(-\frac{4}{10}-\frac{3}{5}\right)$ = $-\frac{3}{2}-\left(-\frac{4}{10}-\frac{6}{10}\right)$ = $-\frac{3}{2}-\left(\frac{-4-6}{10}\right)$ = $-\frac{3}{2}-\left(-\frac{10}{10}\right)$ = $-\frac{3}{2}+\frac{10}{10}$ = $-\frac{15}{10}+\frac{10}{10}$ = $\frac{-15+10}{10}$ = $\frac{-5}{10}$ = $-\frac{1}{2}$

e) $+1+\left(\frac{-3}{4}+ \frac{5}{8}\right) $= $+\frac{1}{1}+\left(\frac{-6}{8}+\frac{5}{8}\right)$ = $+\frac{1}{1}+\left(\frac{-6+5}{8}\right)$ = $+\frac{1}{1}+\left(-\frac{1}{8}\right)$ = $\frac{1}{1}-\frac{1}{8}$ = $\frac{8}{8}-\frac{1}{8}$ = $\frac{8-1}{8}$ = $\frac{7}{8}$

f) $+0,3- \left(\frac{1}{2}-1\frac{2}{5}\right)$ = $+\frac{3}{10}-\left(\frac{1}{2}-\frac{7}{5}\right)$= $+\frac{3}{10}-\left(\frac{5}{10}-\frac{14}{10}\right)$= $+\frac{3}{10}-\left(\frac{5-14}{10}\right)$= $+\frac{3}{10}-\left(-\frac{9}{10}\right)$ = $+\frac{3}{10}+\frac{9}{10}$ = $\frac{+3+9}{10}$ = $\frac{12}{10}$ = $\frac{6}{5}$ = $1\frac{1}{5}$

g) $2-\left(\frac{2}{3}-\frac{5}{4}\right) $ = $\frac{2}{1}-\left(\frac{8}{12}-\frac{15}{12}\right)$ = $\frac{2}{1}-\left(\frac{8-15}{12}\right)$ = $\frac{2}{1}-\left(-\frac{7}{12}\right)$ = $\frac{2}{1}+\frac{7}{12}$ = $\frac{24}{12}+\frac{7}{12}$ = $\frac{24+7}{12}$ = $\frac{31}{12}$ = $2\frac{7}{12}$

h) $1\frac{3}{14}+ \left(\frac{1}{2}-1\frac{1}{7}\right)$ = $\frac{17}{14}+\left(\frac{1}{2}-\frac{8}{7}\right)$ = $\frac{17}{14}+\left(\frac{7}{14}-\frac{16}{14}\right)$ = $\frac{17}{14}+\left(\frac{7-16}{14}\right)$ = $\frac{17}{14}+\left(-\frac{9}{14}\right)$ = $\frac{17}{14}-\frac{9}{14}$ = $\frac{17-9}{14}$ = $\frac{8}{14}$ = $\frac{4}{7}$

i) $-\frac{1}{16}-\left(\frac{5}{8}+\frac{1}{4}\right) $ = $-\frac{1}{16}-\left(\frac{5}{8}+\frac{2}{8}\right)$ = $-\frac{1}{16}-\left(\frac{5+2}{8}\right)$ = $-\frac{1}{16}-\frac{7}{8}$ = $-\frac{1}{16}-\frac{14}{16}$ = $\frac{-1-14}{16}$ = $\frac{-15}{16}$ = $-\frac{15}{16}$