

Brøkregler

I en brøk $\frac{a}{b}$ kaldes a for tælleren og b for nævneren.

Regler	Eksempler
<p>En brøk kan forlænges eller forkortes med et tal k:</p> $\frac{a}{b} = \frac{ka}{kb} \quad \text{eller} \quad \frac{a}{b} = \frac{\frac{a}{k}}{\frac{b}{k}}$	$\frac{5}{7} = \frac{3 \cdot 5}{3 \cdot 7} = \frac{15}{21} \quad \frac{12}{15} = \frac{\frac{12}{3}}{\frac{15}{3}} = \frac{4}{5}$
<p>Brøker med samme nævner kan umiddelbart adderes (lægges sammen):</p> $\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b}$	$\frac{5}{17} + \frac{11}{17} = \frac{5+11}{17} = \frac{16}{17}$
<p>Brøker adderes ved at skaffe brøkerne fællesnævner og så gå frem som ovenfor:</p> $\frac{a}{b} + \frac{c}{d} = \frac{a \cdot d}{b \cdot d} + \frac{b \cdot c}{b \cdot d} = \frac{a \cdot d + b \cdot c}{b \cdot d}$	$\frac{4}{7} + \frac{3}{5} = \frac{4 \cdot 5}{7 \cdot 5} + \frac{7 \cdot 3}{7 \cdot 5} = \frac{20}{35} + \frac{21}{35} = \frac{20+21}{35} = \frac{41}{35}$ $\frac{5}{11} + \frac{3}{2} = \frac{10}{22} + \frac{33}{22} = \frac{10+33}{22} = \frac{43}{22}$
<p>Man ganger to brøker med hinanden ved at gange tæller med tæller og nævner med nævner:</p> $\frac{a}{b} \cdot \frac{c}{d} = \frac{a \cdot c}{b \cdot d}$	$\frac{5}{6} \cdot \frac{4}{7} = \frac{5 \cdot 4}{6 \cdot 7} = \frac{20}{42} \quad \frac{2}{5} \cdot \frac{3}{7} = \frac{2 \cdot 3}{5 \cdot 7} = \frac{6}{35}$
<p>Man ganger en brøk med et tal ved at gange tælleren med tallet:</p> $c \cdot \frac{a}{b} = \frac{c \cdot a}{b}$	$5 \cdot \frac{4}{7} = \frac{5 \cdot 4}{7} = \frac{20}{7} \quad 3 \cdot \frac{2}{11} = \frac{3 \cdot 2}{11} = \frac{6}{11}$
<p>Man dividerer med en brøk ved at vende den om og gange:</p> $d : \frac{a}{b} = d \cdot \frac{b}{a} \quad \frac{c}{d} : \frac{a}{b} = \frac{c}{d} \cdot \frac{b}{a}$	$7 : \frac{3}{2} = 7 \cdot \frac{2}{3} = \frac{14}{3}$ $\frac{4}{7} : \frac{5}{3} = \frac{4}{7} \cdot \frac{3}{5} = \frac{4 \cdot 3}{7 \cdot 5} = \frac{12}{35}$
<p>Man dividerer en brøk med et tal ved at gange nævneren med tallet:</p> $\frac{c}{d} : a = \frac{c}{d \cdot a}$	$\frac{2}{11} : 3 = \frac{2}{11 \cdot 3} = \frac{2}{33}$ $\frac{10}{17} : 7 = \frac{10}{17 \cdot 7} = \frac{10}{119}$

Øvelse 009:

a) Forkort brøkerne: $\frac{35}{63}$, $\frac{32}{72}$, $\frac{21}{-77}$, $\frac{360}{3150}$

I b) til f) skal man foretage en udregning og skrive resultatet som en uforkortelig brøk.

b) $\frac{3}{7} + \frac{5}{11}$, $\frac{5}{3} - \frac{5}{7}$, $\frac{10}{11} - \frac{5}{11}$, $\frac{1}{3} + \frac{1}{2} + \frac{1}{6}$

c) $\frac{4}{7} \cdot \frac{5}{3}$, $\frac{2}{3} \cdot \left(-\frac{5}{7}\right)$, $\frac{4}{10} \cdot \frac{3}{11}$, $\left(-\frac{4}{7}\right) \cdot \frac{3}{7}$

d) $5 \cdot \frac{3}{7}$, $7 \cdot \frac{6}{11}$, $(-5) \cdot \frac{5}{7}$

e) $\frac{4}{7} : \frac{5}{3}$, $\frac{2}{3} : \frac{5}{-7}$, $\frac{\frac{4}{7}}{\frac{4}{4}}$, $\frac{\frac{-4}{5}}{\frac{5}{-3}}$

f) $\frac{4}{7} : 5$, $\frac{5}{3} : (-4)$, $\frac{14}{11} : 7$

Øvelse 010: Skriv følgende som én brøk:

a) $\frac{4}{7} + \frac{5}{7}$, $\frac{4}{13} - \frac{7}{13}$, $\frac{4}{117} + \frac{25}{117} - \frac{11}{117}$, $\frac{a}{n} - \frac{b}{n} + \frac{c}{n}$

b) $\frac{4}{7} - \frac{3}{5}$, $\frac{7}{10} + \frac{3}{8}$, $\frac{3}{25} - \frac{2}{75}$, $\frac{2}{3} + \frac{5}{6} - \frac{1}{12}$, $\frac{7}{15} + \frac{3}{20} + \frac{71}{12}$

c) $\frac{4}{7} \cdot \frac{5}{3}$, $\frac{4}{13} \cdot \frac{7}{10}$, $\frac{4}{-10} \cdot \frac{3}{11}$, $\frac{14}{3} \cdot \frac{4}{9}$, $\frac{-2}{3} \cdot \frac{5}{7} \cdot \frac{4}{-9}$, $\frac{a}{n} \cdot \frac{b}{m} \cdot \frac{c}{r}$

d) $\frac{4}{7} : \frac{5}{3}$, $\frac{-4}{13} : \frac{7}{10}$, $\frac{4}{10} : \frac{3}{11}$, $\frac{14}{-3} : \frac{4}{9}$, $\frac{\frac{2}{7}}{\frac{3}{5}}$, $\frac{\frac{3}{4}}{\frac{5}{6}}$, $\frac{\frac{a}{b}}{\frac{m}{n}}$

e) $\frac{5}{6} + \frac{3}{7}$, $\frac{5}{6} - \frac{3}{7}$, $\frac{5}{6} \cdot \frac{3}{7}$, $\frac{5}{6} : \frac{3}{7}$

Øvelse 011: Skriv følgende tal som en uforkortelig brøk:

a) $5 \cdot \frac{2}{3}$, $4 \cdot \frac{5}{13}$, $(-3) \cdot \frac{12}{17}$, $3 \cdot \frac{22}{67}$, $15 \cdot \frac{-2}{35}$, $51 \cdot \frac{5}{17} \cdot \frac{2}{43}$

b) $\frac{2}{3} : 5$, $\frac{7}{4} : (-5)$, $\frac{20}{3} : 15$, $\frac{-7}{23} : 21$, $\frac{2}{3} : 6$, $\frac{12}{7} : 18$

c) $\frac{\frac{2}{3}}{\frac{4}{5}}$, $\frac{-\frac{5}{4}}{\frac{3}{2}}$, $\frac{\frac{7}{4}}{\frac{3}{8}}$, $\frac{\frac{15}{7}}{\frac{25}{14}}$, $\frac{\frac{21}{32}}{-\frac{42}{8}}$

d) $\frac{\frac{5}{2}}{\frac{3}{9}}$, $\frac{15}{42}$, $5 : \frac{-15}{17}$, $11 : \frac{121}{117}$

Øvelse 012: Skriv hvert af følgende tal som en uforkortelig brøk:

a) $\frac{4}{71} - \frac{5}{71} + \frac{15}{71}$, $\frac{4}{3} + \frac{7}{3} - \frac{11}{3}$, $\frac{14}{17} - \frac{52}{17} - \frac{31}{17}$, $\frac{pn}{3k} - \frac{qn}{3k} + \frac{ac}{3k}$

b) $\frac{7}{9} + \frac{3}{7}$, $\frac{5}{7} - \frac{3}{8}$, $\frac{3}{120} + \frac{2}{180}$, $\frac{1}{2} + \frac{2}{3} - \frac{3}{4} + \frac{4}{5}$, $\frac{5}{12} - \frac{3}{20} + \frac{7}{15}$

c) $\frac{3}{9} \cdot \frac{5}{4}$, $\frac{4}{5} \cdot \frac{3}{7}$, $\frac{-7}{20} \cdot \frac{7}{12}$, $\frac{7}{12} \cdot \frac{-4}{5}$, $\frac{5}{6} \cdot \frac{5}{7} \cdot \frac{4}{9}$, $\frac{k}{a} \cdot \frac{w}{v} \cdot \frac{tc}{r}$

d) $\frac{2}{11} : \frac{4}{5}$, $\frac{-4}{13} : \frac{7}{10}$, $\frac{6}{11} : \frac{4}{5}$, $-\frac{4}{7} : \frac{4}{5}$, $\frac{\frac{12}{13}}{\frac{3}{4}}$, $\frac{\frac{2}{5}}{\frac{5}{7}}$, $\frac{\frac{p}{h}}{\frac{w}{p}}$

Øvelse 013: Benyt et CAS-værktøj til at udregne følgende tal:

a) $\frac{1,4}{7,2} - \frac{5,3}{7,2}, \frac{4,5}{1,3} + \frac{3,7}{1,3}$

b) $\frac{0,4}{0,7} + \frac{3,0}{5}, \frac{2,1}{10} - \frac{3,22}{8}, \frac{1,5}{3,0} - \frac{1,5}{2,0} - \frac{1,5}{1,2}, \frac{2}{23} + \frac{7}{23} + \frac{10}{23}$

c) $\frac{4,9}{7,1} \cdot \frac{5,6}{3,3}, \frac{4}{1,3} \cdot \frac{7,1}{10}$

d) $\frac{46}{71} : \frac{25}{31}, \frac{4,9}{1,78} : \frac{7,6}{10,5}$

Øvelse 014: Skriv følgende tal som én brøk:

a) $14 \cdot \frac{5}{14}, 11 \cdot \frac{15}{11}, 14 \cdot \frac{-5}{21}, 5 \cdot \frac{5}{14}, -24 \cdot \frac{5}{32}, 19 \cdot \frac{11}{38}$

b) $\frac{42}{23} : 21, \frac{24}{17} : (-12), \frac{119}{23} : 17$

c) $\frac{1}{3} + \frac{4}{12}, \frac{2}{7} + \frac{5}{14}, \frac{5}{8} + \frac{7}{12}$

d) $\frac{2}{3} : \frac{7}{12}, \frac{2}{3} \cdot \frac{5}{7}, \frac{3}{8} : \frac{7}{4}, \frac{3}{4} \cdot \frac{7}{10}$

e) $\frac{4}{13} + \frac{9}{26}, \frac{4}{13} - \frac{7}{26}, \frac{4}{13} : \frac{7}{26}$

Facitliste

009: a) $\frac{5}{9}, \frac{4}{9}, -\frac{3}{11}, \frac{4}{35}$ b) $\frac{68}{77}, \frac{20}{21}, \frac{5}{11}, 1$

c) $\frac{20}{21}, -\frac{10}{21}, \frac{6}{55}, -\frac{12}{49}$ d) $\frac{15}{7}, \frac{42}{11}, -\frac{25}{7}$

e) $\frac{12}{35}, -\frac{14}{15}, \frac{16}{49}, \frac{6}{5}$ f) $\frac{4}{35}, -\frac{5}{12}, \frac{2}{11}$

010: a) $\frac{9}{7}, -\frac{3}{13}, \frac{18}{117}, \frac{a-b+c}{n}$ b) $-\frac{1}{35}, \frac{43}{40}, \frac{7}{75}, \frac{17}{12}, \frac{98}{15}$

c) $\frac{20}{21}, \frac{14}{65}, -\frac{6}{55}, \frac{56}{27}, \frac{40}{189}, \frac{abc}{nmr}$

d) $\frac{12}{35}, -\frac{40}{91}, \frac{22}{15}, -\frac{21}{2}, \frac{10}{21}, \frac{9}{10}, \frac{an}{bm}$ e) $\frac{53}{42}, \frac{17}{42}, \frac{15}{42} = \frac{5}{14}, \frac{35}{18}$

f) $\frac{10}{6} = \frac{5}{3}, \frac{1}{36}, \frac{2}{6} = \frac{1}{3}$ g) $\frac{3}{2}, \frac{6}{15} = \frac{2}{5}, \frac{2}{6} = \frac{1}{3}$

011: a) $\frac{10}{3}, \frac{20}{13}, -\frac{36}{17}, \frac{66}{67}, -\frac{6}{7}, \frac{30}{43}$ b) $\frac{2}{15}, -\frac{7}{20}, \frac{4}{9}, -\frac{1}{69}, \frac{1}{9}, \frac{2}{21}$

c) $\frac{5}{6}, -\frac{5}{6}, \frac{14}{3}, \frac{6}{5}, -\frac{1}{8}$ d) $\frac{15}{2}, \frac{45}{14}, -\frac{17}{3}, \frac{117}{11}$

012: a) $\frac{14}{71}, 0, -\frac{69}{17}, \frac{pn-qn+ac}{3k}$ b) $\frac{76}{63}, \frac{19}{56}, \frac{13}{360}, \frac{73}{60}, \frac{11}{15}$

c) $\frac{5}{12}, \frac{12}{35}, -\frac{49}{240}, -\frac{7}{15}, \frac{50}{189}, \frac{kwtc}{avr}$

d) $\frac{5}{22}, -\frac{40}{91}, \frac{15}{22}, -\frac{5}{7}, \frac{16}{13}, \frac{14}{25}, \frac{p^2}{hw}$

013: a) $-\frac{39}{72}, \frac{82}{13}$ b) $\frac{41}{35}, -\frac{77}{400}, -\frac{3}{2}, \frac{19}{23}$

c) $\frac{2744}{2343}, \frac{142}{65}$ d) $\frac{1426}{1775}, \frac{25725}{6764}$

014: a) $5, 15, -\frac{10}{3}, \frac{25}{14}, -\frac{15}{4}, \frac{11}{2}$ b) $\frac{2}{23}, -\frac{2}{17}, \frac{7}{23}$

c) $\frac{2}{3}, \frac{9}{14}, \frac{29}{24}$ d) $\frac{8}{7}, \frac{10}{21}, \frac{3}{14}, \frac{21}{40}$ e) $\frac{17}{26}, \frac{1}{26}, \frac{8}{7}$