# KLAUSUR – Vorbereitung: Brüche

1.) Folgende Brüche sind zu kürzen:

(a) $\frac{144}{168}$, $\frac{735}{1050}$

(b) $\frac{48a^2b}{20ab^2}$, $\frac{3ab^2-2a^2b}{2ab^2-3a^2b}$

(c) $\frac{a^2-2a+1}{a^2-1}$, $\frac{3a-2b}{4b^2-9a^2}$

2.) Die Brüche $\frac{a}{b}$, $\frac{a}{c}$, $\frac{b}{ac}$ sollen durch Erweitern jeweils auf den Nenner $abc$ gebracht werden.

3.) Berechnen Sie:

(a) $\frac{a+b}{2a}+\frac{a-b}{2a}$, $\frac{a+3b}{2a}-\frac{a-b}{2a}$

(b) $\frac{4}{3}-\frac{11}{12}$, $\frac{3}{4}\cdot\frac{36}{45}-\frac{11}{6}:\frac{11}{3}$

(c) $\frac{1}{a+b}+\frac{1}{a-b}$, $\frac{a}{4b-2a}+\frac{b}{a-2b}$

4.) Multiplizieren/dividieren und vereinfachen Sie:

(a) $\frac{5a}{6b}\cdot\frac{3b}{10a}$, $\frac{2a^2c}{3b^2}\cdot\frac{3b}{4ac}$

(b) $\frac{8ab}{15cd}:\frac{4a}{5c}$, $\left(\frac{a}{b^2}+\frac{b^2}{a}\right):\left(\frac{1}{a}+\frac{1}{b}\right)$

5) Man vereinfache die Doppelbrüche durch Erweitern:

$$\frac{\frac{1}{a}-\frac{1}{b}}{\frac{1}{a}+\frac{1}{b}}, \quad \frac{\frac{2}{a}-\frac{4}{b}}{1+\frac{2}{a}\cdot\frac{4}{b}}$$

Lösung:

1.) (a) $\frac{144}{168} = \frac{72}{84} = \frac{36}{42} = \frac{18}{21} = \frac{6}{7}$

$\frac{735}{1050} = \frac{147}{210} = \frac{21}{30} = \frac{7}{10}$

(b) $\frac{48a^2b}{20ab^2} = \frac{12a}{5b}$

$\frac{3ab^2 - 2a^2b}{2ab^2 - 3a^2b} = \frac{3b-2a}{2b-3a}$

(c) $\frac{a^2-2a+1}{a^2-1} = \frac{(a-1)^2}{(a-1)(a+1)} = \frac{a-1}{a+1}$

$\frac{3a-2b}{4b^2-9a^2} = \frac{-1\,(3a-2b)}{(2b-3a)(2b+3a)} = -\frac{1}{2b+3a}$

2.) $\frac{a}{b} = \frac{a \cdot ac}{b \cdot ac} = \frac{a^2c}{abc}$

$\frac{a}{c} = \frac{a \cdot ab}{c \cdot ab} = \frac{a^2b}{abc}$

$\frac{b}{ac} = \frac{b \cdot b}{ac \cdot b} = \frac{b^2}{abc}$

3.) (a) $\frac{a+b}{2a} + \frac{a-b}{2a} = \frac{a+b+a-b}{2a} = \frac{2a}{2a} = 1$

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

(b) $\frac{4}{3} - \frac{11}{12} = \frac{48-33}{36} = \frac{15^{\,5}}{36_{\,12}} = \frac{5}{12}$

$\frac{3}{4} \cdot \frac{36^{\,9}}{45_{\,15}} - \frac{11}{6} : \frac{11}{3} = \frac{9}{15} - \frac{11}{6_{\,2}} \cdot \frac{3}{11} = \frac{9}{15} - \frac{1}{2}$

$= \frac{18-15}{30} = \frac{3}{30} = \frac{1}{10}$

(c) $\frac{1}{a+b}+\frac{1}{a-b}=\frac{a-b+a+b}{(a+b)(a-b)}=\frac{2a}{a^2-b^2}$

$\frac{a}{4b-2a}+\frac{b}{a-2b}=\frac{a^2-2ab+4b^2-2ab}{2(2b-a)(a-2b)}$

$=\frac{a^2-4ab+4b^2}{(-2)(a-2b)^2}=-\frac{(a-2b)^2}{2(a-2b)^2}=-\frac{1}{2}$

4.) (a) $\frac{5a}{6b}\cdot\frac{3b}{10a}=\frac{1}{4}$

$\frac{2a^2c}{3b^2}\cdot\frac{3b}{4ac}=\frac{a}{2b}$

(b) $\frac{8ab}{15cd}:\frac{4a}{5c}=\frac{8ab}{15cd}\cdot\frac{5c}{4a}=\frac{2b}{3d}$

$\left(\frac{a}{b^2}+\frac{b^2}{a}\right):\left(\frac{1}{a}+\frac{1}{b}\right)=\frac{a^2+b^4}{ab^2}:\frac{b+a}{ab}$

$=\frac{a^2+b^4}{ab^2}\cdot\frac{ab}{a+b}=\frac{a^2+b^4}{b(a+b)}$

5.) $\frac{\frac{1}{a}-\frac{1}{b}}{\frac{1}{a}+\frac{1}{b}}=\frac{\left(\frac{1}{a}-\frac{1}{b}\right)ab}{\left(\frac{1}{a}+\frac{1}{b}\right)ab}=\frac{b-a}{b+a}$

$\frac{\frac{2}{a}-\frac{4}{b}}{1+\frac{2}{a}\cdot\frac{4}{b}}=\frac{\left(\frac{2}{a}-\frac{4}{b}\right)ab}{\left(1+\frac{2}{a}\cdot\frac{4}{b}\right)ab}=\frac{2b-4a}{ab+8}$