Multiplying fractions

$$\frac{5}{7}\times\frac{2}{3}=\frac{5\times 2}{7\times 3}=\frac{10}{21}$$

$$\frac{a}{b}\times\frac{c}{d}=\frac{ac}{bd}$$

Reciprocals

$$1\div\frac{3}{5}=1/\tfrac{3}{5}=\left(\frac{3}{5}\right)^{-1}=\frac{5}{3}$$

Dividing fractions

$$\frac{3}{7}\div\frac{5}{11}=\frac{3}{7}\times\frac{11}{5}=\frac{33}{35}$$

$$\frac{a}{b}\div\frac{c}{d}=\frac{a}{b}\times\frac{d}{c}=\frac{ad}{bc}$$

Converting mixed fractions to top heavy fractions and vice versa

$$3\tfrac{5}{7}=3\times\frac{7}{7}+\frac{5}{7}=\frac{21+5}{7}=\frac{26}{7}$$

$$\frac{57}{5}=\frac{55+2}{5}=\frac{55}{5}+\frac{2}{5}=11\tfrac{2}{5}$$

Simplifying fractions. Prime factorize, then cancellation *may* occur!

$$\frac{14}{3}\times\frac{6}{7}=\frac{2\times 7\times 2\times 3}{3\times 7}=2\times 2\times\frac{7}{7}\times\frac{3}{3}=4$$

Numerator → n

Denominator → d

$$\frac{n}{d}$$

Adding fractions. Multiply by ONE (e.g. 3/3 or 7/7) to make the denominator the same

$$\frac{2}{7}+\frac{1}{3}=\frac{2}{7}\times\frac{3}{3}+\frac{1}{3}\times\frac{7}{7}=\frac{6+7}{21}=\frac{13}{21}$$

$$\frac{a}{b}+\frac{c}{d}=\frac{a}{b}\times\frac{d}{d}+\frac{c}{d}\times\frac{b}{b}=\frac{ad+cb}{bd}$$

Subtracting fractions. Same method as adding fractions. Subtracting is 'adding with negatives'

$$\frac{2}{3}-\frac{1}{5}=\frac{2}{3}\times\frac{5}{5}-\frac{1}{5}\times\frac{3}{3}=\frac{10-3}{15}=\frac{7}{15}$$

$$\frac{a}{b}-\frac{c}{d}=\frac{a}{b}\times\frac{d}{d}-\frac{c}{d}\times\frac{b}{b}=\frac{ad-cb}{bd}$$

Continued fractions

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

$$\pi=3+\cfrac{1^2}{6+\cfrac{3^2}{6+\cfrac{5^2}{6+\cfrac{7^2}{6+\cfrac{9^2}{6+\ddots}}}}}$$