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Fraction Arithmetic

See Appendix A2 for more rules and tricks. Let $b, e \neq 0$ in the following.

$$\frac{a}{b} + \frac{c}{b} = \frac{a+c}{b} \qquad \frac{a}{b} - \frac{c}{b} = \frac{a-c}{b}$$

$$\frac{a}{b} \cdot \frac{c}{e} = \frac{a \cdot c}{b \cdot e} \qquad \frac{1}{\frac{a}{b}} = \frac{b}{a}$$

$$\frac{a}{b} = \frac{a \cdot e}{b \cdot e} \qquad \frac{a \cdot c}{b} = a \cdot \frac{c}{b}$$

Exponential Arithmetic

See Appendix A1 for more rules and tricks. Let $a, b > 0$ in the following.

$$a^{r+s} = a^r \cdot a^s \qquad a^{r-s} = \frac{a^r}{a^s}$$

$$(a^r)^s = a^{r \cdot s} \qquad a^{-s} = \frac{1}{a^s}$$

$$(a \cdot b)^r = a^r \cdot b^r \qquad a^s = \frac{1}{a^{-s}}$$

$$\sqrt[r]{a \cdot b} = \sqrt[r]{a} \cdot \sqrt[r]{b} \qquad \sqrt[r]{a} = a^{1/r}$$

Fractions which do NOT simplify easily

Doesn't simplify at all: $\dfrac{3}{x+1}$

Must find a common denomiator before you can combine terms: $\dfrac{x+1}{x-1} + \dfrac{1}{x}$

Exponents and Products that do NOT simplify easily

Doesn't simplify at all:

$$\sqrt{x+1} = (x+1)^{1/2}$$

You must FOIL to simplify:

$$(x+1)^2 = (x+1)(x+1) = x^2 + 2x + 1$$

You must rewrite, FOIL, *and* distribute twice to simplify:

$$(x+1)^3 = (x+1)(x^2+2x+1) = (x+1) \cdot x^2 + (x+1) \cdot 2x + (x+1) \cdot 1$$

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