1. $$\frac{1-\frac{v^2}{c^2}}{1+\frac{v}{c}}\cdot\frac{v}{c}+\sqrt{\frac{(c-v)(c^2-v^2)}{c^2}\cdot\frac{1}{c+v}}$$

1. Zähler erster Bruch:

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

2. Nenner erster Bruch:

$$1+\frac{v}{c}=\frac{c}{c}+\frac{v}{c}=\underline{\frac{c+v}{c}}$$

3. ganzer erster Bruch:

$$\frac{(c-v)(c+v)}{c^2}\cdot\frac{c}{(c+v)}=\underline{\frac{(c-v)}{c}}$$

4. linker Summand:

$$\frac{(c-v)}{c}\cdot\frac{v}{c}=\underline{\frac{v(c-v)}{c^2}}$$

5. Wurzelterm:

$$\sqrt{\frac{(c-v)(c^2-v^2)}{c^2}\cdot\frac{1}{c+v}}=\sqrt{\frac{(c-v)(c-v)(c+v)}{c^2(c+v)}}=\sqrt{\frac{(c-v)(c-v)}{c^2}}=\underline{\frac{c-v}{c}}$$

6. gesamter Ausdruck:

$$\frac{v(c-v)}{c^2}+\frac{c-v}{c}=\frac{v(c-v)}{c^2}+\frac{c(c-v)}{c^2}=\frac{vc-v^2+c^2-vc}{c^2}=\frac{c^2-v^2}{c^2}=\underline{\underline{\frac{(c-v)(c+v)}{c^2}}}$$

2. $$\frac{2}{1+\frac{3}{x}}+\frac{\frac{(x+3)^2-(c-3)^2-(x+c)(x-c)}{x+c}}{\frac{2x^2-18}{2x-6}}$$

1. Nenner erster Summand:

$$1+\frac{3}{x}=\frac{x}{x}+\frac{3}{x}=\underline{\frac{x+3}{x}}$$

2. ganzer erster Summand:

$$\frac{2}{\frac{x+3}{x}}=\underline{\frac{2x}{x+3}}$$

3. zweiter Summand, Zähler des Zählers:

$$x^2+6x+9-c^2+6c-9-x^2+c^2=6x+6c=\underline{6(x+c)}$$

4. Zähler zweiter Summand:

$$\underline{\frac{6(x+c)}{x+c}=6}$$

5. Nenner zweiter Summand:

$$\frac{2x^2-18}{2x-6}=\frac{2(x^2-9)}{2(x-3)}=\frac{2(x-3)(x+3)}{2(x-3)}=\underline{x+3}$$

6. ganzer zweiter Summand:

$$\underline{\frac{6}{x+3}}$$

7. ganzer Term:

$$\frac{2x}{x+3}+\frac{6}{x+3}=\frac{2x+6}{x+3}=\frac{2(x+3)}{(x+3)}=\underline{\underline{2}}$$

3. $$\frac{\dfrac{p^3-2p-1}{p^2-1}-p}{p+\dfrac{2p^2}{1-p}}+\frac{\dfrac{1}{1-p}}{\dfrac{1-p^2}{(1-p)^2}}$$

1. Zähler linker Summand:

$$\frac{p^3-2p-1}{(p-1)(p+1)}-\frac{p(p^2-1)}{(p-1)(p+1)}=\frac{p^3-2p-1-p^3+p}{(p-1)(p+1)}=\frac{-p-1}{(p-1)(p+1)}=\frac{-1(p+1)}{(p-1)(p+1)}=\underline{\frac{-1}{p-1}}$$

2. Nenner linker Summand:

$$\frac{p(1-p)+2p^2}{(1-p)}=\frac{p-p^2+2p^2}{(1-p)}=\frac{p+p^2}{(1-p)}=\underline{\frac{p(1+p)}{(1-p)}}$$

3. ganzer linker Summand:

$$\frac{-1}{(p-1)}\cdot\frac{(1-p)}{p(1+p)}=\frac{-1\cdot(-1)}{p(p+1)}=\underline{\frac{1}{p(p+1)}}$$

4. rechter Summand:

$$\frac{1}{(1-p)}\cdot\frac{(1-p)(1-p)}{(1-p)(1+p)}=\underline{\frac{1}{(1+p)}}$$

5. ganzer Term

$$\frac{1}{p(p+1)}+\frac{1}{(1+p)}=\frac{1}{p(p+1)}+\frac{p}{p(p+1)}=\frac{(1+p)}{p(p+1)}=\underline{\underline{\frac{1}{p}}}$$

4. $$\frac{1+\frac{2}{n}}{1-\frac{4}{n^2}} \cdot \left[\left(\frac{a}{n}-1\right)^2 - \left(\frac{a}{n}+1\right)^2\right]$$

1. Zähler linker Faktor:

$$1+\frac{2}{n}=\underline{\frac{n+2}{n}}$$

2. Nenner linker Faktor:

$$1-\frac{4}{n^2}=\frac{n^2-4}{n^2}=\underline{\frac{(n+2)(n-2)}{n^2}}$$

3. ganzer linker Faktor:

$$\frac{(n+2)}{n}\cdot\frac{n^2}{(n+2)(n-2)}=\underline{\frac{n}{(n-2)}}$$

4. erste runde Klammer:

$$\left(\frac{a}{n}-1\right)^2=\left(\frac{a}{n}-\frac{n}{n}\right)^2=\left(\frac{(a-n)}{n}\right)^2=\underline{\frac{a^2-2an+n^2}{n^2}}$$

5. zweite runde Klammer:

$$\left(\frac{a}{n}+1\right)^2=\left(\frac{a}{n}+\frac{n}{n}\right)^2=\left(\frac{(a+n)}{n}\right)^2=\underline{\frac{a^2+2an+n^2}{n^2}}$$

6. eckige Klammer:

$$\frac{a^2-2an+n^2}{n^2}-\frac{a^2+2an+n^2}{n^2}=\frac{a^2-2an+n^2-a^2-2an-n^2}{n^2}=\underline{\frac{-4an}{n^2}=\frac{-4a}{n}}$$

7. ganzer Term:

$$\frac{n}{(n-2)}\cdot\frac{(-4a)}{n}=\frac{-4a}{n-2}=\underline{\underline{-\frac{4a}{n-2}}}$$