

**Příprava na
přijímací zkoušky**

Aritmetika

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Zlomky a celá čísla 25 – procvičování

$$1) \quad 3 \cdot (-4) + \underbrace{(2-8)}_{-6} \cdot (-2) = 3 \cdot (-4) - 6 \cdot (-2) = -12 + 12 = 0$$

$$2) \quad 36 : (-6) + 9 : (-3) = -6 - 3 = -9$$

$$3) \quad -12 - (10 - 4 \cdot 3) = -12 - (10 - 12) = -12 - (-2) = -12 + 2 = -10$$

$$4) \quad -30 - (-60 - 90) \cdot 2 = -30 - \underbrace{(-150)}_{+} \cdot 2 = -30 + 150 \cdot 2 = -30 + 300 = 270$$

$$5) \quad 45 + 5 \cdot (-4) - 20 = 45 - 20 - 20 = 5$$

$$6) \quad 4 + 6 : 2 - 5 \cdot \overset{2}{(-3+5)} = 4 + 6 : 2 - 5 \cdot 2 = 4 + 3 - 10 = -3$$

$$7) \quad 0,4 - (0,2 - 0,35) = 0,4 - \underbrace{(-0,15)}_{\text{záporné znaménko}} = 0,4 + 0,15 = 0,55$$

$$\begin{array}{r} \text{L} \rightarrow \text{rozdíly} \\ 0,35 \\ -0,2 \\ \hline 0,15 \end{array}$$

$$8) \quad 1,75 : (0,15 : 0,3) = 1,75 : 0,5 = 3,5$$

$$\begin{array}{r} 0,15 : 0,3 = 1,5 : 3 = 0,5 \\ \begin{array}{r} 1,5 \\ 3 \overline{) 15} \\ \underline{15} \\ 0 \end{array} \end{array} \quad \begin{array}{r} 1,75 : 0,5 = 17,5 : 5 = 3,5 \\ \begin{array}{r} 17,5 \\ 5 \overline{) 175} \\ \underline{15} \\ 25 \\ \underline{25} \\ 0 \end{array} \end{array}$$

$$9) \quad \overset{30-120}{(80-40 \cdot 7)} : 8 + 2 \cdot 12 = \underbrace{(-200)}_{30-120} : 8 + 2 \cdot 12 = -25 + 24 = -1$$

$$10) \quad (0,08 - 1) : 0,2 = \underbrace{(-0,92)}_{\text{rozdíly}} : 0,2 = -9,2 : 2 = -4,6$$

$$\begin{array}{r} \text{L} \rightarrow \begin{array}{r} 1,00 \\ -0,08 \\ \hline 0,92 \end{array} \quad \text{roz} \quad 8-100 = -92 \end{array}$$

$$1) \quad (-3-2) \cdot (21-\overset{24}{3 \cdot 8}) = (-5) \cdot (-3) = 15$$

$$\begin{array}{r} 1,2 \\ 1,5 \\ \hline 60 \\ 12 \\ \hline 180 \end{array}$$

$$\begin{array}{r} 1,2 \\ \cdot 0,5 \\ \hline 0,60 \end{array}$$

$$\begin{array}{r} 1,0 \\ - 0,2 \\ \hline 0,8 \end{array}$$

$$2) \quad (1,2 \cdot 1,5 - 1,2 \cdot 0,5) : 1,2 - 0,2 = \underset{1,8}{1,8} - \underset{0,6}{0,6} = (1,8 - 0,6) : 1,2 - 0,2 = 1,2 : 1,2 - 0,2 = 1 - 0,2 = 0,8$$

$$3) \quad -0,5 \cdot 0,2 - 0,1 \cdot (\overset{-5}{3-8}) = -0,5 \cdot 0,2 - 0,1 \cdot (-5) = -0,1 + 0,5 = 0,4$$

$$\begin{array}{r} 0,5 \\ 0,2 \\ \hline 0,10 \end{array}$$

$$4) \quad 5 \cdot (-3 \cdot 2) - 21 : (1 - 0,7) = 5 \cdot (-6) - 21 : (0,3) = -30 - 70 = -100$$

$$\begin{array}{r} 1,0 \\ - 0,3 \\ \hline 0,3 \end{array}$$

$$21 : 0,3 = 210 : 3 = 70$$

$$5) \quad 20 - 0,6 \cdot (-0,8) - 20 + (\overset{+6}{-0,6 \cdot 8}) = \overset{\sqrt{20 \cdot 2} \cdot 1 - 10 = -9}{20 + 0,48 - 20 - 4,8} = -4,32$$

$$\begin{array}{r} 0,6 \\ 0,8 \\ \hline 0,48 \end{array}$$

$$\begin{array}{r} 0,6 \\ \cdot 8 \\ \hline 4,8 \end{array}$$

$$\begin{array}{r} -4,80 \\ 0,48 \\ \hline -4,32 \end{array}$$

$$6) \quad 0,5 + 1,5 \cdot (\overset{+6}{10-4}) - 1,5 : 5 = 0,5 + 9 - 0,3 = 9,2$$

$$\begin{array}{r} 1,5 \\ \cdot 6 \\ \hline 9,0 \end{array}$$

$$\rightarrow 1,5 : 5 = 0,3$$

$$\sqrt{20 \cdot 2} \cdot 1 - 10 = -9$$

$$7) \quad 0,4 \cdot 0,3 - 0,3 \cdot 1,6 = 0,12 - 0,48 = -0,36$$

$$\begin{array}{r} 0,4 \\ \cdot 0,3 \\ \hline 0,12 \end{array}$$

$$\begin{array}{r} 0,3 \\ 1,6 \\ \hline 18 \\ 3 \\ \hline 0,48 \end{array}$$

$$\begin{array}{r} 0,48 \\ - 0,12 \\ \hline 0,36 \end{array}$$

$$8) \quad 0,5 - (\overset{0,2}{-0,3+0,5}) \cdot 2,1 = 0,5 - 0,2 \cdot 2,1 = 0,5 - 0,42 = 0,08$$

$$\begin{array}{r} 2,1 \\ \cdot 0,2 \\ \hline 0,42 \end{array}$$

$$\begin{array}{r} 0,50 \\ - 0,42 \\ \hline 0,08 \end{array}$$

$$9) \quad 0,025 \cdot 40 - 0,2 : (-0,25) = 1 + 0,8 = 1,8$$

$$\begin{array}{r} 0,025 \\ \cdot 40 \\ \hline 00 \\ 100 \\ \hline 1000 \end{array}$$

$$0,2 : 0,25 = 20 : 25 = 0,8$$

$$10) \quad 1 + [-4 \cdot (\overset{-13}{-4-9}) - 2 \cdot (\overset{-4}{-8+4})] = 1 + [-4 \cdot (-13) - 2 \cdot (-4)] = 1 + [52 + 8] = 1 + 60 = 61$$

$$1) \quad 2,2 : 0,22 - 0,22 : (0,1 - 0,078) + 22 = 2,2 : 0,22 - 0,22 : 0,022 + 22 = 10 - 10 + 22 = 22$$

$$2,2 : 0,22 = 220 : 22 = 10$$

$$0,22 : 0,022 = 220 : 22 = 10$$

$$2) \quad (-7) \cdot 0,3 - 0,7 \cdot (6-3) : (-1) = (-7) \cdot 0,3 - 0,7 \cdot 3 : (-1) = -2,1 - 2,1 : (-1) = -2,1 + 2,1 = 0$$

$$3) \quad [-2 \cdot (-4+3) - 2] \cdot [-8 + (4-7)] = [-2 \cdot (-1) - 2] \cdot [-8 + (-3)] = [2-2] \cdot [-8-3] = 0 \cdot [-11] = 0$$

$$V_{\text{zov}}: -15 + 6 = -9$$

$$4) \quad (-0,8) : 0,08 - 0,5 : 0,1 + 6,4 = -10 - 5 + 6,4 = -15 + 6,4 = -8,6$$

$$80 : 8 = 10$$

$$5 : 1 = 5$$

$$\begin{array}{r} -15,0 \\ +6,4 \\ \hline -8,6 \end{array}$$

$$5) \quad -(0,11 : 1,1) + 1,1 \cdot [1,1 : (-0,11)] = -0,1 + 1,1 \cdot [-10] = -0,1 - 11 = -11,1$$

$$1,1 : 11 = 0,1$$

$$110 : 11 = 10$$

$$6) \quad -0,4 + 0,1 \cdot (0,1 - 0,4) : 0,01 = -0,4 + 0,1 \cdot (-0,3) : 0,01 = -0,4 - 0,03 : 0,01 = -0,4 - 3 = -3,4$$

$$\begin{array}{r} 0,4 \\ -0,1 \\ \hline 0,3 \end{array}$$

$$\begin{array}{r} 0,1 \\ \cdot 0,3 \\ \hline 0,03 \end{array}$$

$$3 : 1 = 3$$

$$7) \quad 0,16 \cdot (0,1 : 0,001) - 3,2 : 0,1 = 0,16 \cdot 100 - 3,2 : 0,1 = 16 - 32 = -16$$

$$100 : 1 = 100$$

$$32 : 1 = 32$$

$$8) \quad 5,2 : 4 + 0,13 : 0,1 - 0,52 : 0,2 = 1,3 + 1,3 - 2,6 = 2,6 - 2,6 = 0$$

$$5,2 : 4 = 1,3$$

$$1,3 : 1 = 1,3$$

$$5,2 : 2 = 2,6$$

$$12 : 6 = 2$$

$$\begin{array}{r} 0,3 \\ \cdot 0,2 \\ \hline 0,06 \end{array}$$

$$0,6 : 1 = 0,6$$

$$9) \quad -1,2 : 0,6 \cdot (0,4 - 0,5) + (-0,3) \cdot 0,2 : (-0,1) = -1,2 : 0,6 \cdot (-0,1) - 0,3 \cdot 0,2 : (-0,1) = -2 \cdot (-0,1) - 0,06 : (-0,1) = 0,2 + 0,6 = 0,8$$

$$1) \frac{\frac{5}{7} + \frac{5}{6}}{\frac{2}{3} - \frac{3}{7}} = \frac{\frac{30}{42} + \frac{35}{42}}{\frac{14}{21} - \frac{3}{21}} = \frac{\frac{65}{42}}{\frac{5}{21}} = \frac{65}{42} : \frac{5}{21} = \frac{65}{42} \cdot \frac{21}{5} = \frac{13}{2}$$

$$2) \frac{\frac{7}{4} - 4}{7 - \frac{4}{7}} = \frac{\frac{7}{4} - \frac{16}{4}}{\frac{49}{7} - \frac{4}{7}} = \frac{-\frac{9}{4}}{\frac{45}{7}} = -\frac{9}{4} : \frac{45}{7} = -\frac{9}{4} \cdot \frac{7}{45} = -\frac{7}{20}$$

$$3) 2 \cdot \frac{1}{6} - \frac{3}{8} \cdot 4 = \frac{2}{3} - \frac{3}{2} = \frac{2}{6} - \frac{9}{6} = -\frac{7}{6}$$

$$\frac{2}{1} \cdot \frac{1}{6}$$

$$4) \frac{6}{7} \cdot \left(\frac{2}{6} - \frac{3}{4} \right) - 1 = \frac{6}{7} \cdot \left(\frac{4}{12} - \frac{9}{12} \right) - 1 = -\frac{6}{7} \cdot \frac{5}{12} - 1 = -\frac{5}{14} - \frac{14}{14} = -\frac{19}{14}$$

$$5) \left(\frac{5}{6} - \frac{3}{8} \right) - \left(2 - \frac{11}{12} \right) = \left(\frac{20}{24} - \frac{9}{24} \right) - \left(\frac{24}{12} - \frac{11}{12} \right) = \frac{11}{24} - \frac{13}{12} = \frac{11}{24} - \frac{26}{24} = -\frac{15}{24} = -\frac{5}{8}$$

$$6) 0,2 \cdot \left(\frac{1}{9} + \frac{7}{12} \right) - \frac{1}{4} = \frac{1}{5} \cdot \left(\frac{4}{36} + \frac{21}{36} \right) - \frac{1}{4} = \frac{1}{5} \cdot \frac{25}{36} - \frac{1}{4} = \frac{5}{36} - \frac{9}{36} = -\frac{4}{36} = -\frac{1}{9}$$

$\hookrightarrow \frac{2}{10} = \frac{1}{5}$

$$7) \frac{\frac{2}{3} - 1}{\frac{8}{9}} = \frac{-\frac{1}{3}}{\frac{8}{9}} = -\frac{1}{3} : \frac{8}{9} = -\frac{1}{3} \cdot \frac{9}{8} = -\frac{3}{8}$$

$$\frac{2}{3} - \frac{3}{3} = -\frac{1}{3}$$

$$8) \frac{6}{5} - \frac{6}{5} : \frac{9}{10} + 0,3 = \frac{6}{5} - \frac{6}{5} \cdot \frac{10}{9} + \frac{3}{10} = \frac{6}{5} - \frac{20}{15} + \frac{3}{10} = \frac{36}{30} - \frac{40}{30} + \frac{9}{30} = -\frac{4}{30} + \frac{9}{30} = \frac{5}{30} = \frac{1}{6}$$

$$9) 3 \cdot \frac{2}{5} - \frac{2 + \frac{2}{5}}{3} = \frac{6}{5} - \frac{\frac{10}{5} + \frac{2}{5}}{3} = \frac{6}{5} - \frac{\frac{12}{5}}{3} = \frac{6}{5} - \frac{12}{5} : 3 = \frac{6}{5} - \frac{12}{5} \cdot \frac{1}{3} = \frac{2}{5}$$

$$1) \quad \frac{\frac{2}{3} - \frac{4}{5}}{\frac{7}{10} + \frac{21}{8}} = \frac{\frac{10}{15} - \frac{12}{15}}{\frac{10}{10} + \frac{21}{8}} = \frac{-\frac{2}{15}}{\frac{4}{15}} = -\frac{2}{15} : \frac{4}{15} = -\frac{2}{15} \cdot \frac{15}{4} = -\frac{1}{2}$$

$$\frac{25}{10} : \frac{5}{5} = \frac{5}{2}$$

$$2) \quad \left(\frac{9}{2} - 2,5\right) \cdot \frac{1}{4} = \left(\frac{9}{2} - \frac{5}{2}\right) \cdot \frac{1}{4} = \frac{4}{2} \cdot \frac{1}{4} = \frac{1}{2}$$

$$3) \quad \frac{\frac{1}{3} \cdot \left(\frac{5}{6} - \frac{1}{2}\right)}{\frac{1}{2} \cdot \left(1 - \frac{2}{3}\right)} = \frac{\frac{1}{3} \cdot \left(\frac{5}{6} - \frac{3}{6}\right)}{\frac{1}{2} \cdot \left(\frac{3}{3} - \frac{2}{3}\right)} = \frac{\frac{1}{3} \cdot \frac{2}{6}}{\frac{1}{2} \cdot \frac{1}{3}} = \frac{\frac{1}{9}}{\frac{1}{6}} = \frac{1}{9} \cdot \frac{6}{1} = \frac{2}{3}$$

$$\frac{3}{15} = \frac{1}{5}$$

$$4) \quad \frac{\frac{1}{4} \cdot \frac{12}{15} + \frac{2}{5}}{\frac{3}{4} + \frac{3}{2} \cdot \frac{2}{3}} = \frac{\frac{1}{5} + \frac{2}{5}}{\frac{3}{4} + \frac{3}{4}} = \frac{\frac{3}{5}}{\frac{3}{4} + \frac{3}{4}} = \frac{\frac{3}{5}}{\frac{12}{4}} = \frac{\frac{3}{5}}{\frac{3}{1}} = \frac{3}{5} : \frac{3}{1} = \frac{3}{5} \cdot \frac{1}{3} = \frac{1}{5}$$

$$5) \quad \frac{\frac{3 \cdot 15}{4} - \frac{71}{12}}{\frac{21}{6} - \frac{13}{3}} = \frac{\frac{45}{4} - \frac{71}{12}}{\frac{21}{6} - \frac{26}{6}} = \frac{-\frac{26}{12}}{-\frac{5}{6}} = -\frac{13}{6} : \left(-\frac{5}{6}\right) = \frac{13}{6} \cdot \frac{6}{5} = \frac{13}{5}$$

$$6) \quad \frac{\frac{3}{5} \cdot \frac{2}{7} - \frac{14}{5} \cdot \frac{6}{7}}{\frac{3}{5} \cdot \frac{7}{2} - \frac{14}{5} \cdot \frac{6}{7}} = \frac{\frac{6}{35} - \frac{84}{35}}{\frac{21}{10} - \frac{12 \cdot 2}{5 \cdot 2}} = \frac{\frac{6}{35} - \frac{24}{35}}{\frac{21}{10} - \frac{24}{10}} = -\frac{3}{10}$$

$$\frac{25}{100} = \frac{5}{20} = \frac{1}{4}$$

$$7) \quad \frac{2}{3} \cdot 0,25 - \frac{1}{4} \cdot \left(2 - \frac{2}{3}\right) = \frac{2}{3} \cdot \frac{1}{4} - \frac{1}{4} \cdot \frac{4}{3} = \frac{1}{6} - \frac{1}{3} = \frac{1}{6} - \frac{2}{6} = -\frac{1}{6}$$

$$\frac{2}{1} = \frac{6}{3}$$

$$8) \quad 3 : \frac{2 \cdot 6}{2+6} - \frac{12}{8} \cdot \frac{5}{8} = 3 : \frac{3}{2} - \frac{1}{1} \cdot \frac{5}{8} = 3 \cdot \frac{2}{3} - \frac{5}{8} = 2 - \frac{5}{8} = \frac{16}{8} - \frac{5}{8} = \frac{11}{8}$$

$$\hookrightarrow \frac{12}{8} = \frac{3}{2}$$

$$\hookrightarrow \frac{2}{1} \cdot \frac{2}{2}$$

$$\hookrightarrow \frac{2}{1} = \frac{4}{2}$$

$$1) \quad 0,5 + \frac{2}{7} = \frac{1}{2} + \frac{2}{7} = \frac{7}{14} + \frac{4}{14} = \frac{11}{14} = \frac{11}{14} : \frac{22}{22} = \frac{11}{14} \cdot \frac{2}{22} = \frac{1}{4}$$

$$2) \quad 1\frac{3}{5} - \frac{8}{9} = \frac{32}{45} - \frac{40}{45} = \frac{32}{45} = \frac{32}{45} : \frac{10}{10} = \frac{32}{45} \cdot \frac{3}{10} = \frac{16}{75}$$

$$\hookrightarrow 9 : 3 = \frac{27}{3}$$

$$3) \quad 1\frac{5}{6} - \frac{3}{9} = \frac{11}{6} - \frac{2}{6} = \frac{9}{6} = \frac{3}{2} = \frac{3}{2} : \frac{3}{3} = \frac{1}{2}$$

$$4) \quad -2 + \frac{3}{-(-1-2)} = \frac{-2 + \frac{3}{-(-3)}}{3 - (-1)} = \frac{-2 + \frac{3}{3}}{3 + 1} = \frac{-2 + 1}{4} = \frac{-1}{4} = -\frac{1}{4}$$

$$5) \quad \frac{\left(\frac{2}{7} + \frac{1}{2}\right) \cdot \frac{7}{11}}{\frac{1}{5}} = \frac{\left(\frac{4}{14} + \frac{7}{14}\right) \cdot \frac{7}{11}}{\frac{1}{5}} = \frac{\frac{11}{14} \cdot \frac{7}{11}}{\frac{1}{5}} = \frac{\frac{1}{2}}{\frac{1}{5}} = \frac{1}{2} : \frac{1}{5} = \frac{1}{2} \cdot \frac{5}{1} = \frac{5}{2}$$

$$6) \quad \frac{3}{8} - \frac{5}{6} + \frac{3}{4} + \frac{7}{2} : 6 = \frac{9}{24} - \frac{20}{24} + \frac{18}{24} + \frac{14}{24} = \frac{21}{24} = \frac{7}{8}$$

$$\hookrightarrow \frac{7}{2} : \frac{6}{1} = \frac{7}{2} \cdot \frac{1}{6} = \frac{7}{12}$$

$$7) \quad \left(\frac{1}{3 \cdot 4} - 3\right) : \left(\frac{1}{3 \cdot 4} + 4\right) = \left(\frac{1}{12} - 3\right) : \left(\frac{1}{12} + 4\right) = \left(\frac{1}{12} - \frac{36}{12}\right) : \left(\frac{1}{12} + \frac{48}{12}\right) = \frac{-35}{12} : \frac{49}{12} = -\frac{35}{12} \cdot \frac{12}{49} = -\frac{5}{7}$$

$$\frac{3 \cdot 12}{1 \cdot 12} = \frac{36}{12} \quad \frac{4 \cdot 12}{1 \cdot 12} = \frac{48}{12}$$

$$8) \quad \left(0,2 - 1\frac{2}{3}\right) : \frac{11}{3} = \left(\frac{1}{5} - \frac{5}{3}\right) : \frac{11}{3} = \left(\frac{3}{15} - \frac{25}{15}\right) : \frac{11}{3} = \frac{-22}{15} : \frac{11}{3} = \frac{-22}{15} \cdot \frac{3}{11} = -\frac{2}{5}$$

$$\hookrightarrow \frac{2}{10} = \frac{1}{5}$$

$$1) \quad \frac{2}{3} : \frac{5}{6} - 1,5 : \frac{15}{4} = \frac{2}{3} \cdot \frac{6}{5} - \frac{15}{4} \cdot \frac{4}{15} = \frac{4}{5} - \frac{2}{5} = \frac{2}{5}$$

$\downarrow$
 $\frac{15}{10}$

$$2) \quad \left(2\frac{1}{3} - \frac{11}{9}\right) \cdot \left(\frac{7}{8} - \frac{7}{40}\right) = \left(\frac{21}{9} - \frac{11}{9}\right) \cdot \left(\frac{35}{40} - \frac{7}{40}\right) = \frac{10}{9} \cdot \frac{28}{40} = \frac{28}{36} = \frac{7}{9}$$

$\hookrightarrow \frac{7}{3} \cdot \frac{3}{3} = \frac{21}{9}$

$$3) \quad 10 \cdot \frac{1}{0,7} \cdot \left(\frac{2}{5} - \frac{3}{4}\right) = 10 \cdot \frac{10}{7} \cdot \left(\frac{8}{20} - \frac{15}{20}\right) = \frac{100}{7} \cdot \left(-\frac{7}{20}\right) = -\frac{100}{20} = -5$$

$$1 - \left(-\frac{23}{24}\right) = \frac{5}{4}$$

$$4) \quad 1 - \frac{\frac{3}{8} - \frac{4}{3}}{\frac{5}{4}} = 1 - \frac{\frac{9}{24} - \frac{32}{24}}{\frac{5}{4}} = 1 - \frac{-\frac{23}{24}}{\frac{5}{4}} = 1 + \frac{23}{24} \cdot \frac{4}{5} = 1 + \frac{23}{30} = \frac{30}{30} + \frac{23}{30} = \frac{53}{30}$$

$$5) \quad \frac{\frac{2}{3} : \frac{4}{9} - \frac{5}{8}}{\frac{2}{3}} = \frac{\frac{2}{3} \cdot \frac{9}{4} - \frac{5}{8}}{\frac{2}{3}} = \frac{\frac{3}{2} - \frac{5}{2}}{\frac{2}{3}} = \frac{-\frac{2}{2}}{\frac{2}{3}} = -\frac{1}{\frac{2}{3}} = -1 : \frac{2}{3} = -1 \cdot \frac{3}{2} = -\frac{3}{2}$$

$$6) \quad \left(\frac{2}{3} - 1\right) \cdot \frac{9}{10} : \left(\frac{7}{15} + \frac{1}{3}\right) = -\frac{1}{3} \cdot \frac{9}{10} : \frac{12}{15} = -\frac{3}{10} \cdot \frac{15}{12} = -\frac{3}{4}$$

$\downarrow$
 $\frac{3}{3}$

$$7) \quad 1 : \left(\frac{\frac{6}{5} - \frac{5}{6}}{\frac{2}{3}}\right) = 1 : \left(\frac{\frac{36}{30} - \frac{25}{30}}{\frac{2}{3}}\right) = 1 : \frac{\frac{11}{30}}{\frac{2}{3}} = \begin{cases} 1 \cdot \frac{\frac{2}{3}}{\frac{11}{30}} = \frac{2}{3} : \frac{11}{30} = \frac{2}{3} \cdot \frac{30}{11} = \frac{20}{11} \\ 1 : \left[\frac{11}{30} : \frac{2}{3}\right] = 1 : \left[\frac{11}{30} \cdot \frac{3}{2}\right] = 1 : \frac{11}{20} = 1 \cdot \frac{20}{11} = \frac{20}{11} \end{cases}$$

$$\begin{aligned} 2 : (-1) &= -2 \\ 3 : (-3) &= -1 \end{aligned}$$

$$8) \quad \frac{\frac{1}{-1+2} + \frac{2}{1-2} + \frac{3}{-1-2}}{1+2} = \frac{\frac{1}{1} + \frac{2}{-1} + \frac{3}{-3}}{3} = \frac{1-2-1}{3} = -\frac{2}{3}$$

$$1) \quad \begin{aligned} & \rightarrow \frac{16}{5} \\ & \frac{-\frac{6}{5} + 3\frac{1}{5}}{2 + \frac{2}{3}} = \frac{-\frac{6}{5} + \frac{16}{5}}{\frac{6}{3} + \frac{2}{3}} = \frac{\frac{10}{5}}{\frac{8}{3}} = \frac{10}{5} : \frac{8}{3} = \frac{10}{5} \cdot \frac{3}{8} = \frac{2}{1} \cdot \frac{3}{4} = \frac{3}{4} \end{aligned}$$

$$2) \quad \left(\frac{3}{4} - \frac{2}{3}\right) : \frac{1}{6} + 0,8 = \left(\frac{3}{12} - \frac{8}{12}\right) : \frac{1}{6} + \frac{8}{10} = \frac{1}{12} \cdot \frac{6}{1} + \frac{8}{10} = \frac{1}{2} + \frac{8}{10} = \frac{5}{10} + \frac{8}{10} = \frac{13}{10}$$

$$3) \quad \begin{aligned} & \rightarrow \frac{125}{1000} = \frac{25}{200} = \frac{1}{8} \\ & \left(0,125 + \frac{3}{4}\right) : 3\frac{1}{2} = \left(\frac{1}{8} + \frac{6}{8}\right) : \frac{7}{2} = \frac{7}{8} : \frac{7}{2} = \frac{1}{4} \end{aligned}$$

$$4) \quad 0,25 \cdot \frac{8}{15} - \frac{2}{3} \cdot 0,6 = \frac{1}{4} \cdot \frac{8}{15} - \frac{2}{3} \cdot \frac{6}{10} = \frac{2}{15} - \frac{2 \cdot 3}{5 \cdot 3} = \frac{2}{15} - \frac{6}{15} = -\frac{4}{15}$$

$$5) \quad \begin{aligned} & \rightarrow \frac{6}{5} \\ & \frac{4}{5} : 1\frac{1}{5} - \frac{2}{3} : \frac{5}{18} = \frac{4}{5} \cdot \frac{5}{6} - \frac{2}{3} \cdot \frac{18}{5} = \frac{2}{3} - \frac{36}{5} = \frac{10}{15} - \frac{36}{15} = -\frac{26}{15} \end{aligned}$$

$$6) \quad \begin{aligned} & \rightarrow \frac{7}{34} = \frac{28}{12} \\ & \left(\frac{5}{12} + 2\frac{1}{3}\right) : \left(\frac{1}{5} + \frac{1}{6}\right) = \left(\frac{5}{12} + \frac{28}{12}\right) : \left(\frac{6}{30} + \frac{5}{30}\right) = \frac{33}{12} : \frac{11}{30} = \frac{33}{12} \cdot \frac{30}{11} = \frac{3 \cdot 10}{4} = \frac{15}{2} \end{aligned}$$

$$7) \quad \begin{aligned} & \rightarrow \text{čekají na konec} \\ & \frac{3}{8} - 0,2 \cdot \left(\frac{9}{2} + 3\right) : 1,5 = \frac{3}{8} - \frac{2}{10} \cdot \left(\frac{9}{2} + \frac{6}{2}\right) : \frac{15}{10} = \frac{3}{8} - \frac{2}{10} \cdot \frac{15}{2} \cdot \frac{10}{15} = \frac{3}{8} - 1 = \frac{3}{8} - \frac{8}{8} = -\frac{5}{8} \\ & \rightarrow \frac{3}{1} = \frac{6}{2} \end{aligned}$$

$$8) \quad \begin{aligned} & \frac{63}{5} : 0,6 - \frac{96}{8} : \frac{132}{24} = \frac{63}{5} \cdot \frac{10}{6} - \frac{96}{8} \cdot \frac{24}{132} = 21 - \frac{24 \cdot 3}{33} = 21 - \frac{24}{11} = \frac{231}{11} - \frac{24}{11} = \frac{207}{11} \\ & \rightarrow \frac{6}{10} \end{aligned}$$

$96 : 4 = 24$
 $132 : 4 = 33$

$\frac{21}{11}$
 $\frac{24}{11}$
 $\frac{207}{11}$

$$1) \quad \frac{1\frac{1}{5} - \frac{7}{9}}{1\frac{1}{10} - \frac{7}{15}} = \frac{\frac{3 \cdot 6}{3 \cdot 5} - \frac{7 \cdot 5}{3 \cdot 9}}{\frac{11}{10} - \frac{7}{15}} = \frac{\frac{54}{45} - \frac{35}{45}}{\frac{33}{30} - \frac{14}{30}} = \frac{\frac{19}{45}}{\frac{19}{30}} = \frac{19}{45} : \frac{19}{30} = \frac{19}{45} \cdot \frac{30}{19} = \frac{2}{3}$$

$$2) \quad \frac{1\frac{5}{7} - \frac{2}{3}}{\frac{1}{2} + 1\frac{1}{14}} = \frac{\frac{3 \cdot 12}{3 \cdot 7} - \frac{2 \cdot 7}{3 \cdot 3}}{\frac{7}{2} + \frac{15}{14}} = \frac{\frac{36}{21} - \frac{14}{21}}{\frac{7}{2} + \frac{15}{14}} = \frac{\frac{22}{21}}{\frac{22}{14}} = \frac{22}{21} : \frac{22}{14} = \frac{22}{21} \cdot \frac{14}{22} = \frac{2}{3}$$

$$3) \quad \frac{\frac{2}{3} - 0,5 + \frac{2}{4}}{\frac{2}{3} : \frac{6}{11}} = \frac{\frac{2}{3} - \frac{1}{2} + \frac{1}{2}}{\frac{2}{3} \cdot \frac{11}{6}} = \frac{\frac{2}{3}}{\frac{2}{3} \cdot \frac{11}{6}} = \frac{1}{\frac{11}{6}} = 1 : \frac{11}{6} = 1 \cdot \frac{6}{11} = \frac{6}{11}$$

$$4) \quad \left(\frac{13}{7} \cdot \frac{5}{10} + \frac{26}{14} \right) : \frac{13}{35} = \left(\frac{13}{14} + \frac{26}{14} \right) : \frac{13}{35} = \frac{39}{14} : \frac{13}{35} = \frac{15}{2}$$

$$5) \quad \frac{-\frac{5}{14} \cdot \left(\frac{3}{4} - \frac{2}{5} \right)}{3 \cdot \frac{10}{40}} = \frac{-\frac{5}{14} \cdot \left(\frac{15}{20} - \frac{8}{20} \right)}{\frac{3}{4}} = \frac{-\frac{5}{14} \cdot \frac{7}{20}}{\frac{3}{4}} = \frac{-\frac{1}{8}}{\frac{3}{4}} = -\frac{1}{8} : \frac{3}{4} = -\frac{1}{8} \cdot \frac{4}{3} = -\frac{1}{6}$$

$$6) \quad -\frac{7}{12} + 2,5 - \frac{5}{8} : 0,6 = -\frac{7}{12} + \frac{5}{2} - \frac{5}{8} \cdot \frac{5}{3} = -\frac{7}{12} + \frac{5}{2} - \frac{25}{24} = -\frac{14}{24} + \frac{60}{24} - \frac{25}{24} = \frac{21}{24} = \frac{7}{8}$$

$$7) \quad 2\frac{1}{5} - \frac{1}{5 + \frac{1}{5}} = \frac{2}{5} - \frac{1}{\frac{26}{5}} = \frac{2}{5} - 1 : \frac{26}{5} = \frac{2}{5} - 1 \cdot \frac{5}{26} = \frac{26}{130} - \frac{5}{26} = \frac{52}{130} - \frac{25}{130} = \frac{27}{130}$$

$\hookrightarrow \frac{25}{5} + \frac{1}{5} = \frac{26}{5}$

$$8) \quad \frac{5\frac{2}{3} + \left(\frac{-37}{9} \right)}{\frac{22}{7} - 1\frac{1}{7}} = \frac{\frac{3 \cdot 12}{3 \cdot 3} - \frac{37}{9}}{\frac{22}{7} - \frac{8}{7}} = \frac{\frac{51}{9} - \frac{37}{9}}{\frac{14}{7}} = \frac{\frac{14}{9}}{\frac{14}{7}} = \frac{14}{9} : \frac{14}{7} = \frac{14}{9} \cdot \frac{7}{14} = \frac{7}{9}$$

$$1) \quad \frac{\frac{3}{2} \cdot \frac{4}{3} - \frac{3}{8}}{2 - \frac{7}{16} - \frac{3}{4}} = \frac{\frac{3}{2} \cdot \frac{4}{3} - \frac{3}{8}}{\frac{32}{16} - \frac{7}{16} - \frac{12}{16}} = \frac{\frac{3}{8} - \frac{3}{8}}{\frac{13}{16}} = \frac{\frac{6}{8}}{\frac{13}{16}} = \frac{6}{8} : \frac{13}{16} = \frac{6}{8} \cdot \frac{16}{13} = \frac{12}{13}$$

$$\hookrightarrow \frac{2}{1} - \frac{32}{16}$$

$$2) \quad \left(\frac{5}{8} - \frac{3}{4} + \frac{1}{6} \right) : \left(1\frac{1}{8} : 0,3 - 1\frac{2}{3} \right) = \left(\frac{15}{24} - \frac{18}{24} + \frac{4}{24} \right) : \left(\frac{2}{8} \cdot \frac{10}{3} - \frac{5}{3} \right) = \frac{1}{24} : \left(\frac{3 \cdot 15}{3 \cdot 4} - \frac{5 \cdot 4}{3 \cdot 4} \right) = \frac{1}{24} : \left(\frac{45}{12} - \frac{20}{12} \right) \\ = \frac{1}{24} : \frac{25}{12} = \frac{1}{24} \cdot \frac{12}{25} = \frac{1}{50}$$

$$3) \quad \frac{\frac{3}{10} - \frac{1}{2} \cdot \frac{1}{6}}{\frac{2}{5} : \left(-1\frac{1}{3} \right)} = \frac{\frac{3}{10} - \frac{3}{2} \cdot \frac{1}{6}}{\frac{2}{5} : \left(-\frac{4}{3} \right)} = \frac{\frac{3}{10} - \frac{1}{4}}{-\frac{2}{5} \cdot \frac{3}{4}} = \frac{\frac{6}{20} - \frac{5}{20}}{-\frac{3}{10}} = \frac{\frac{1}{20}}{-\frac{3}{10}} = -\frac{1}{20} : \frac{3}{10} = -\frac{1}{20} \cdot \frac{10}{3} = -\frac{1}{6}$$

$$4) \quad 1 - \frac{2 - \frac{3}{4+5}}{2 + \frac{3}{4-5}} = 1 - \frac{2 - \frac{3}{9}}{2 + \frac{3}{-1}} = 1 - \frac{2 - \frac{1}{3}}{2 - 3} = 1 - \frac{\frac{6}{3} - \frac{1}{3}}{(-1)} = 1 - \frac{\frac{5}{3}}{-1} = 1 + \frac{5}{3} = \frac{3}{3} + \frac{5}{3} = \frac{8}{3}$$

$$5) \quad \frac{0,5 + \frac{0,04 \cdot 100}{0,8 \cdot 100}}{\frac{100 \cdot 0,3}{100 \cdot 0,02} + \frac{0,9 \cdot 10}{0,6 \cdot 10}} = \frac{0,5 + \frac{4}{80}}{\frac{30}{2} + \frac{3}{2}} = \frac{\frac{1}{2} + \frac{1}{20}}{\frac{30}{2} + \frac{3}{2}} = \frac{\frac{10}{20} + \frac{1}{20}}{\frac{33}{2}} = \frac{\frac{11}{20}}{\frac{33}{2}} = \frac{11}{20} : \frac{33}{2} = \frac{11}{20} \cdot \frac{2}{33} = \frac{1}{30}$$

$$6) \quad \frac{-2\frac{7}{9} - \frac{3}{7} \cdot \frac{9}{14}}{\frac{5}{6} - \frac{2}{3}} = \frac{-\frac{14}{9} - \frac{3}{7} \cdot \frac{9}{14}}{\frac{5}{6} - \frac{1}{6}} = \frac{-\frac{14}{9} - \frac{6}{9}}{\frac{1}{6}} = \frac{-\frac{20}{9}}{\frac{1}{6}} = -\frac{20}{9} : \frac{1}{6} = -\frac{20}{9} \cdot \frac{6}{1} = -\frac{40}{3}$$

$$7) \quad \frac{\frac{2}{3} - \frac{4}{5} - \frac{10}{11}}{0,6 + \frac{8}{12}} = \frac{\frac{10}{15} - \frac{12}{15} - \frac{10}{11}}{\frac{6}{10} + \frac{1}{2}} = \frac{-\frac{2}{15} - \frac{10}{11}}{\frac{6}{10} + \frac{5}{10}} = \frac{-\frac{2}{15} - \frac{10}{11}}{\frac{11}{10}} = \frac{-\frac{2}{15}}{\frac{11}{10}} - \frac{10}{11} = -\frac{2}{15} : \frac{11}{10} - \frac{10}{11} = -\frac{4}{33} - \frac{10 \cdot 3}{11 \cdot 3} = -\frac{4}{33} - \frac{30}{33} = -\frac{34}{33}$$

$$\hookrightarrow \frac{6}{10} =$$

$$\hookrightarrow -\frac{2}{15} : \frac{11}{10} = -\frac{2}{15} \cdot \frac{10}{11} = -\frac{4}{33}$$

$$8) \quad \left(\frac{4 - \frac{7}{3}}{2 \cdot \frac{2}{3}} \right) \cdot \left(\frac{\frac{2}{5}}{1 - \frac{2}{5}} \right) \cdot \frac{9}{10} = \frac{\frac{12}{3} - \frac{7}{3}}{\frac{4}{3}} - \frac{\frac{2}{5}}{\frac{5}{5} - \frac{2}{5}} \cdot \frac{3}{10} = \frac{\frac{5}{3}}{\frac{4}{3}} - \frac{\frac{2}{5}}{\frac{3}{5}} \cdot \frac{3}{10} = \frac{5}{4} - \frac{2}{3} \cdot \frac{3}{10} = \frac{5}{4} - \frac{2}{10}$$

$$\frac{4}{1} - \frac{12}{3}$$

$$1 = \frac{5}{5}$$

$$\hookrightarrow \frac{5}{3} : \frac{4}{3} = \frac{5}{3} \cdot \frac{3}{4} = \frac{5}{4}$$

$$= \frac{5}{4} - \frac{3}{5} = \frac{25}{20} - \frac{12}{20} = \frac{13}{20}$$

Mocniny 4 – Číselný výraz s mocninami

$$-2 \cdot 1^2 = -2 \cdot 1 = -2$$

$$-2 \cdot 5^2 = -2 \cdot 25 = -50$$

$$3^2 - 5^2 = 9 - 25 = -16$$

$$(-7)^2 - (-4^2) = 49 - (-16) = 49 + 16 = 65$$

$$(-7) \cdot (-7) = 49$$

$$(-8)^2 : (+4)^2 = 64 : 16 = 4$$

$$(-8)^2 : (-4^2) = 64 : (-16) = -4$$

$$-7^2 - (-4)^2 = -49 - 16 = -65$$

$$-8^2 : (-4^2) = -64 : (-16) = 4$$

cermat:

$$1 : 0,2^2 = 1 : 0,04 = 100 : 4 = 25$$

posuneme čárku

$$(-6)^2 - 3 \cdot (-3) = 36 + 9 = 45$$

$$(-0,4)^2 + 0,3^2 = 0,16 + 0,09 = 0,25$$

$$1,5^2 - 0,3^2 = 2,25 - 0,09 = 2,16$$

$$\left(\frac{3}{5} - 1\right)^2 = \left(\frac{3}{5} - \frac{5}{5}\right)^2 = \left(\frac{-2}{5}\right)^2 = \frac{4}{25}$$

→ vyřešíme zápornku →

$$\frac{8^2 + 6^2}{10^2} = \frac{64 + 36}{100} = \frac{100}{100} = 1$$

$$\left(\frac{1}{2} + \frac{1}{3}\right)^2 = \left(\frac{3}{6} + \frac{2}{6}\right)^2 = \left(\frac{5}{6}\right)^2 = \frac{25}{36}$$

$$\left(\frac{1}{3}\right)^2 - \sqrt{\frac{4}{9}} = \frac{1}{9} - \frac{2}{3} = \frac{1}{9} - \frac{6}{9} = -\frac{5}{9}$$

$$\left(\frac{1}{2} + \frac{1}{3}\right) \cdot \left(\frac{1}{2} + \frac{1}{3}\right) \rightarrow \text{nejednoduše vyřešíme zápornku!}$$

$$\left(\frac{4}{5} - \frac{4}{3}\right)^2 = \left(\frac{12}{15} - \frac{20}{15}\right)^2 = \left(\frac{-8}{15}\right)^2 = \frac{64}{225}$$

$$1 - \sqrt{\frac{25}{64}} = 1 - \frac{5}{8} = \frac{8}{8} - \frac{5}{8} = \frac{3}{8}$$

$$\sqrt{4 \cdot 0,25} = \sqrt{1} = 1$$

$$\sqrt{1^2 - 0,6^2} = \sqrt{1 - 0,36} = \sqrt{0,64} = 0,8$$

nemůžeme odčinit záporně
≠ 1 - 0,6

$$0,5 : 0,5^2 = 0,5 : 0,25 = 2$$

50 : 25 = 2

$$\sqrt{10^2 \cdot 0,0025} = \sqrt{100 \cdot 0,0025} = \sqrt{0,25} = 0,5$$

$$\sqrt{14,4 : 0,001} = \sqrt{14400} = 120$$

14400 : 1 = 14400

$$\frac{0,3^2}{0,1} : 0,01 = \frac{0,09}{0,1} : 0,01 = \frac{9}{10} : \frac{1}{100} = \frac{9}{10} \cdot \frac{100}{1} = 90$$

tako zlomek

→ 0,09 : 0,1 = 0,9 → 0,9 : 0,01 = 90

0,9 : 1 90 : 1

$$\frac{1 - \frac{1}{3}}{-6^2} = \frac{\frac{3}{3} - \frac{1}{3}}{-36} = \frac{\frac{2}{3}}{-36} = \frac{2}{3} : (-36) = -\frac{2}{3} \cdot \frac{1}{36} = -\frac{1}{54}$$

Mocniny 5 – Číselný výraz s mocninami

$$\sqrt{49} = \sqrt{7^2} = 7$$

$$1) \quad \frac{7^2 - \sqrt{7^2}}{\sqrt{49}} = \frac{49 - 7}{7} = \frac{42}{7} = 6$$

$$2) \quad \frac{\frac{5}{2} - \frac{2}{5}}{(-7)^2} = \frac{\frac{25}{10} - \frac{4}{10}}{49} = \frac{\frac{21}{10}}{49} = \frac{21}{10} \cdot \frac{1}{49} = \frac{21}{10} \cdot \frac{1}{7 \cdot 7} = \frac{3}{70}$$

$$3) \quad (-3)^2 - 5^2 - 4 \cdot (-4) = 9 - 25 + 16 = 0$$

$$4) \quad \sqrt{(-5)^2} - 3^2 = \sqrt{25} - 3^2 = 5 - 9 = -4$$

$$5) \quad \sqrt{1,3^2 - 1,2^2} = \sqrt{1,69 - 1,44} = \sqrt{0,25} = 0,5$$

$\neq 1,3 - 1,2$!

$$6) \quad \sqrt{(40 : 0,1)} - 0,5 : 0,1 = \sqrt{400} - 5 : 1 = 20 - 5 = 15$$

$\downarrow$ $\downarrow$
 $400 : 1 = 400$ $5 : 1 = 5$

$$7) \quad \left(\frac{1}{2} + \frac{1}{3}\right)^2 = \left(\frac{3}{6} + \frac{2}{6}\right)^2 = \left(\frac{5}{6}\right)^2 = \frac{25}{36}$$

$$8) \quad 0,005 \cdot 10^2 - 1,2 : 0,02 = 0,005 \cdot 100 - 1,2 : 0,02 = 0,5 - 60 = -59,5$$

$\rightarrow 120 : 2 = 60$

$$9) \quad \frac{-8^2 + (-7)^2}{(5-2)^2} = \frac{-64 + 49}{(3)^2} = \frac{-15}{9} = -\frac{5}{3}$$

$\downarrow$
 vykrátit

$$10) \quad \frac{(3-2)^2}{5^2 \cdot 6 - 12^2} = \frac{1^2}{25 \cdot 6 - 144} = \frac{1}{150 - 144} = \frac{1}{6}$$

$$11) \quad \sqrt{\frac{16}{0,1}} + 9 = \sqrt{160 + 9} = \sqrt{169} = 13$$

$\downarrow$
 $\text{zobnovit se děleno}$
 $\rightarrow 16 : 0,1 = 160 : 1 = 160$

$$12) \quad 100 + 1 : \sqrt{6400 + 60^2} = 100 + 1 : \sqrt{6400 + 3600} = 100 + 1 : \sqrt{10000} = 100 + 1 : 100 = 100 + 0,01 = 100,01$$

Mocniny 6 – Číselný výraz s mocninami

$$1) \sqrt{\frac{8^2+8}{6^2-4}} = \sqrt{\frac{64+8}{36-4}} = \sqrt{\frac{72}{32}} = \sqrt{\frac{9}{4}} = \frac{3}{2}$$

$$2) \sqrt{\frac{3^2}{4^2} - \left(\frac{-3}{4}\right)^2} = \sqrt{\frac{9}{16} - \frac{9}{16}} = \sqrt{0} = 0$$

$$3) \frac{-2 \cdot (5^2 - 4^2)}{(-3)^2 + 5^2} = \frac{-2 \cdot (25 - 16)}{9 + 25} = \frac{-2 \cdot 9}{34} = -\frac{18}{34} = -\frac{9}{17}$$

$$4) \frac{3^2}{5} - \frac{3}{5^2} + \left(\frac{3}{5}\right)^2 = \frac{9}{5} - \frac{3}{25} + \frac{9}{25} = \frac{45 - 3 + 9}{25} = \frac{51}{25}$$

→ čísel na jednotné číslo v závorce

$$5) \left[\left(\frac{1}{3}\right)^2 - \left(-\frac{2}{3}\right)^2 \right] = \left[\frac{1}{9} + \frac{4}{9} \right] = \left[\frac{5}{9} \right] = \frac{5}{9}$$

→ pod odmocninou jednotné číslo!

$$6) \sqrt{(-4-2)^2 + (7-15)^2} = \sqrt{(-6)^2 + (-8)^2} = \sqrt{36 + 64} = \sqrt{100} = 10$$

$$7) \sqrt{(2-15)^2 - (-6-6)^2} = \sqrt{(-13)^2 - (-12)^2} = \sqrt{169 - 144} = \sqrt{25} = 5$$

$$8) \frac{\sqrt{169} - \sqrt{144}}{\sqrt{169 - 144}} = \frac{13 - 12}{\sqrt{25}} = \frac{1}{5}$$

$$9) \left(7 \cdot \frac{1}{2}\right)^2 - \left(-\frac{1}{2}\right)^2 = \frac{49}{4} - \frac{1}{4} = \frac{48}{4} = 12$$

$\left(\frac{1}{2}\right)^2$ ————— ↑

$$10) \frac{(-5)^2}{3} - \left(5 \cdot \frac{1}{3}\right)^2 + \left(-\frac{2}{3}\right)^2 = \frac{25}{3} - \frac{25}{9} + \frac{4}{9} = \frac{75 - 25 + 4}{9} = \frac{54}{9} = 6$$

$1, \frac{5}{3}$

$$11) (1,2^2 - 0,6^2) : (-2)^2 = (1,44 - 0,36) : 4 = 1,08 : 4 = 0,27$$

$\frac{28}{0}$

→ jednotné číslo

$$12) (9 - \sqrt{9})^2 - (\sqrt{9})^2 = (9 - 3)^2 - 9 = 6^2 - 9 = 36 - 9 = 27$$

Mocniny 7 – Číselný výraz s mocninami

$$\sqrt{1+1} \neq \sqrt{1} + \sqrt{1} \quad \text{To už známe}$$

Vzor: $\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$

$$\sqrt{a : b} = \sqrt{a} : \sqrt{b} \rightarrow \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$$

1) $\frac{\sqrt{2}}{\sqrt{8}} = \sqrt{\frac{2}{8}} = \sqrt{\frac{1}{4}} = \frac{\sqrt{1}}{\sqrt{4}} = \frac{1}{2}$

2) $\sqrt{8} : \sqrt{2} = \sqrt{8 : 2} = \sqrt{4} = 2$

3) $\sqrt{2} \cdot \sqrt{32} = \sqrt{2 \cdot 32} = \sqrt{64} = 8$

4) $\sqrt{10} \cdot \sqrt{10} = \sqrt{10 \cdot 10} = \sqrt{100} = 10$
 $\hookrightarrow \sqrt{10^2} = 10$

5) $\frac{\sqrt{128} : \sqrt{2}}{\sqrt{3} \cdot \sqrt{12}} = \frac{\sqrt{128 : 2}}{\sqrt{3 \cdot 12}} = \frac{\sqrt{64}}{\sqrt{36}} = \frac{8}{6} = \frac{4}{3}$

6) $\sqrt{10^2 - 8^2} - 2\sqrt{4} + \sqrt{(-3-7)^2} = \sqrt{100 - 64} - 2 \cdot 2 + \sqrt{(-10)^2} = \sqrt{36} - 4 + \sqrt{100} = 6 - 4 + 10 = 12$

pozn: $2\frac{1}{3} = \frac{2 \cdot 3 + 1}{3} = \frac{7}{3}$

7) $\sqrt{1\frac{36}{64}} - \sqrt{\frac{36}{64}} = \sqrt{\frac{100}{64}} - \sqrt{\frac{36}{64}} = \frac{10}{8} - \frac{6}{8} = \frac{4}{8} = \frac{1}{2}$

$\hookrightarrow \frac{1 \cdot 64 + 36}{64} = \frac{100}{64}$

8) $[2^2 - 0,6^2 - (0,8)^2]^2 = [4 - 0,36 - 0,64]^2 = [3]^2 = 9$
 $\hookrightarrow$ Na konec

9) $\frac{2^2}{5} \cdot \left(\frac{10}{12}\right)^2 \cdot \left(\frac{6}{7}\right)^2 = \frac{4}{5} \cdot \frac{25}{36} \cdot \frac{36}{49} = \frac{20}{49}$

10) $[-4^2 + (-3)^2 - 6^2 - (-2)^2 + 7^2]^2 = [-16 + 9 - 36 - 4 + 49]^2 = [2]^2 = 4$
 $-56 + 58$
 $\hookrightarrow$ Na konec

11) $\frac{-3^2 - (-5)^2}{(-4-3)^2 - 3 \cdot 5} = \frac{-9 - 25}{(-7)^2 - 15} = \frac{-34}{49 - 15} = \frac{-34}{34} = -1$

12) $\frac{10^2 - 2 \cdot (5^2 + 2^2)}{(-6) \cdot (-4)^2} = \frac{100 - 2 \cdot (25 + 4)}{-6 \cdot 16} = \frac{100 - 58}{-6 \cdot 16} = \frac{42}{-96} = -\frac{7}{16}$

13) $\frac{[-2^2 - (-6)]^2}{(-3)^2 - 2^2} = \frac{[-4 + 6]^2}{9 - 4} = \frac{[2]^2}{5} = \frac{4}{5}$
 $\hookrightarrow$ Na konec

Mocniny 8 – Číselný výraz s mocninami

$$1) \frac{-5^2 + (-6)^2}{[15^2 - (-3-11)^2]} = \frac{-25 + 36}{225 - 196} = \frac{11}{29}$$

$$2) \frac{2 \cdot [3 - (1^2 - 4^2)]}{4 \cdot [-20 + (1-4)^2]} = \frac{2 \cdot [3 - (1 - 16)]}{4 \cdot [-20 + (-3)^2]} = \frac{2 \cdot [3 + 15]}{4 \cdot [-20 + 9]} = \frac{2 \cdot 18}{4 \cdot (-11)} = \frac{18}{2 \cdot (-11)} = -\frac{9}{11}$$

$$3) \frac{[2 \cdot (13^2 - 167)^2]}{(2 \cdot 3)^2} = \frac{[2 \cdot (169 - 167)^2]^2}{6^2} = \frac{[2 \cdot 4]^2}{36} = \frac{64}{36} = \frac{16}{9}$$

$$4) \frac{\sqrt{82-18} - \sqrt{97-16}}{(\sqrt{121} - \sqrt{49})^2} = \frac{\sqrt{64} - \sqrt{81}}{(11-7)^2} = \frac{8-9}{4^2} = -\frac{1}{16}$$

$$5) 3 \cdot \sqrt{\frac{1}{36}} - \frac{3}{2} \cdot \sqrt{\frac{16}{144}} = 3 \cdot \frac{1}{6} - \frac{3}{2} \cdot \frac{1}{12} = \frac{1}{2} - \frac{1}{4} = \frac{1}{4}$$

$$6) \frac{-7^2 \cdot 2 + 8^2 + 2^2 - 2}{(-2)^2 - 6^2} = \frac{-49 \cdot 2 + 64 + 4 - 2}{4 - 36} = \frac{-98 + 66}{-32} = \frac{-32}{-32} = 1$$

→ Na korec

$$7) \left[\frac{5^2}{11} - \frac{3^2}{11} + \left(-\frac{144}{12^2} \right) \right]^2 = \left[\frac{25}{11} - \frac{9}{11} - \frac{144}{144} \right]^2 = \left[\frac{16}{11} - 1 \right]^2 = \left[\frac{16}{11} - \frac{11}{11} \right]^2 = \left[\frac{5}{11} \right]^2 = \frac{25}{121}$$

$$8) \frac{2\sqrt{49} - (-3)^2}{\sqrt{58} - (-2-1)^2} = \frac{2 \cdot 7 - 9}{\sqrt{58} - (-3)^2} = \frac{14-9}{\sqrt{58}-9} = \frac{5}{\sqrt{58}-9}$$

$$9) \frac{\left(-\frac{1}{2} \right)^2}{\left(\frac{3}{\sqrt{9}} \right)^2} = \frac{\left(-\frac{1}{2} \right)^2}{\left(\frac{3}{3} \right)^2} = \frac{\left(-\frac{1}{2} \right)^2}{(1)^2} = \frac{\frac{1}{4}}{1} = \frac{1}{4}$$

$$10) 25,6 : 0,2 - 10^2 \cdot 0,029 = 128 - 2,9 = 125,1$$

$$\begin{array}{r} 128,0 \\ - 2,9 \\ \hline 125,1 \end{array}$$

Mocniny 9 – Číselný výraz s mocninami

$$1) \quad \sqrt{12^2} - (\sqrt{0,01})^2 \cdot 360 = 12 - 0,01 \cdot 360 = 12 - 3,6 = 8,4$$

$$2) \quad (-3) \cdot [(15^2 - 5^2) : (-10) + 5 \cdot 3^2] = (-3) \cdot [(225 - 25) : (-10) + 5 \cdot 9] = (-3) \cdot [200 : (-10) + 45] = (-3) \cdot [-20 + 45] \\ = -3 \cdot 25 = -75 \\ -(-3) \cdot \sqrt{1} = 3 \cdot \sqrt{1} = 3$$

$$3) \quad \frac{-1 - (-3) \cdot \sqrt{1} + 4 \sqrt{4}}{(28 - 4 \sqrt{36})^2} = \frac{-1 - (-3) + 4 \cdot 2}{(28 - 4 \cdot 6)^2} = \frac{-1 + 3 + 8}{4^2} = \frac{10}{16} = \frac{5}{8}$$

$$4) \quad (1,9^2 - 1,5^2) : (0,6^2 + 2^2 - 0,7^2 + 13 \cdot 0,1^2) = (3,61 - 2,25) : (0,36 + 4 - 0,49 + 13 \cdot 0,01) = 1,36 : 4 = 0,34 \\ 4 + 0,49 - 0,49$$

$$5) \quad \frac{-12 : \sqrt{36} - 18 : \sqrt{81}}{[(-5)^2 - \sqrt{(4-6)^2} - 22]^2} = \frac{-12 : 6 - 18 : 9}{[25 - \sqrt{(-2)^2} - 22]^2} = \frac{-2 - 2}{[25 - 2 - 22]^2} = \frac{-4}{[1]^2} = \frac{-4}{1} = -4 \\ \hookrightarrow \sqrt{4} = 2$$

$$6) \quad \frac{8 - \sqrt{225} : \sqrt{25}}{\sqrt{(-1-5)^2 + (3-11)^2}} = \frac{8 - 15 : 5}{\sqrt{(-6)^2 + (-8)^2}} = \frac{8-3}{\sqrt{36+64}} = \frac{8-3}{\sqrt{100}} = \frac{5}{10} = \frac{1}{2}$$

$$7) \quad \frac{210 : (-0,7)}{100 : 7 = 300} + \sqrt{\frac{8^2 + 8}{6^2 - 4}} = -300 + \sqrt{\frac{64+8}{36-4}} = -300 + \sqrt{\frac{72}{32}} = -300 + \sqrt{\frac{9}{4}} = -300 + \frac{3}{2} = -300 + 1,5 = -298,5 \\ \hookrightarrow \frac{-600}{2} + \frac{3}{2} = \frac{-597}{2}$$

$$8) \quad \frac{10^2 \cdot (10^2 - 1)}{10 \cdot 10^2 + 10^2} = \frac{100 \cdot (100 - 1)}{10 \cdot 100 + 100} = \frac{100 \cdot 99}{1000 + 100} = \frac{100 \cdot 99}{1100} = \frac{99}{11} = 9$$

$$9) \quad \frac{(8 - \sqrt{16})^2 - \sqrt{256}}{5^2 - 45 : \sqrt{25}} = \frac{(8-4)^2 - 16}{25 - 45 : 5} = \frac{16 - 16}{25 - 9} = \frac{16 - 16}{16} = \frac{0}{16} = 0$$

Výrazy 9 – Zjednodušování v přijímacích zkouškách

$$1) \quad \underline{2x} - 3 - \underline{x} = x - 3$$

$$2) \quad (\underline{y-3y}) \cdot (y+3y) = -2y \cdot 4y = -8y^2$$

$$3) \quad (5n-2) \cdot (-4n) = -20n^2 + 8n$$

$$4) \quad (3a-2) \cdot (-2a) = -6a^2 + 4a$$

$$5) \quad (\underline{2-x}) \cdot \underline{3x} - 2x = 6x - 3x^2 - 2x = -3x^2 + 4x$$

$$6) \quad (3x+y) \cdot (3x-2) = 9x^2 - 6x + 3xy - 2y$$

$$7) \quad (2+y) (\underline{y+2-2y}) = (\underline{2+y}) \cdot (\underline{2-y}) = 4 - 2y + 2y - y^2 = 4 - y^2$$

$$8) \quad (a+a) \cdot (1-a) - a \cdot a = \underline{2a} \cdot (\underline{1-a}) - a^2 = 2a - \underline{2a^2 - a^2} = -3a^2 + 2a$$

$$9) \quad 5a \cdot (0,4b - 2a + 3) = 2ab - 10a^2 + 15a$$

$5 \cdot 0,4 = 2$

$$10) \quad \underline{2x(x-3)} - (\underline{x^2+3x}) = \underline{2x^2 - 6x} - \underline{x^2 + 3x} = x^2 - 9x$$

$2x^2 - (x^2) = x^2$ $-(6x) - 3x = -9x$

$$11) \quad \underline{-3y(y-2)} - (\underline{2y^2+5y}) = \underline{-3y^2 + 6y} - \underline{2y^2 + 5y} = -5y^2 + y$$

$-(3y^2) = -3y^2$ $-(2y^2) = -2y^2$

$-(5y) = -5y$ $-(2y^2+5y) = -2y^2-5y$

$$12) \quad y(3y-1) - \underline{3(y^2-y)} = \underline{3y^2 - y} - \underline{3y^2 - 3y} = 2y$$

$$13) \quad [2 \cdot (3y-x)] \cdot (5-y) = [6y-2x] \cdot (5-y) = 30y - 6y^2 - 10x + 2xy$$

$$14) \quad \underline{(4-y+3)} \cdot x - (\underline{y+5}) \cdot 5 = (\underline{7-y}) \cdot x - \underline{5 \cdot (y+5)} = 7x - xy - 5y - 25$$

Výrazy 10 – Zjednodušování v přijímacích zkouškách

$$1) \quad (2-b) \cdot (2+b) - 7 \cdot (-b+b) + b \cdot b = 4 + 2b - 2b - b^2 + b^2 = 4$$

$$2) \quad a \cdot 2a - 2 \cdot (3a-1) \cdot a - a(7-4) = 2a^2 - 2a \cdot (3a-1) - 3a = 2a^2 - 6a^2 + 2a - 3a = -4a^2 - a$$

$$3) \quad 2n \cdot (3-n) + 2 \cdot (3n \cdot n) - n \cdot (3 \cdot n) = 6n - 2n^2 + 6n^2 - 3n^2 = n^2 + 6n$$

$$4) \quad (4n-1) \cdot (4n+1) - 8n \cdot (n-1) = 16n^2 + 4n - 4n - 1 - 8n^2 + 8n = 8n^2 + 8n - 1$$

$$5) \quad (2n-3) \cdot (4n-2) + (n-3) \cdot (n+3) = 8n^2 - 4n - 12n + 6 + n^2 + 3n - 3n - 9 = 9n^2 - 16n - 3$$

$$6) \quad (a+2a) \cdot (a-2a) - (a-2a) = 3a \cdot (-a) - (-a) = -3a^2 + a$$

$$7) \quad (2b+1) \cdot (2b-1) - b \cdot (-b+b) + 1 = 4b^2 - 2b + 2b - 1 + 1 = 4b^2$$

$$8) \quad 3e \cdot (2-f) - 2f \cdot (e-3f) = 6e - 3ef - 2ef + 6f^2 = 6e - 5ef + 6f^2$$

$$9) \quad (2+y) \cdot (y-2) - 2(y^2-1) = 2y - 4 + y^2 - 2y - 2y^2 + 2 = -y^2 - 2$$

$$10) \quad (2-5) \cdot (2b-1) - (4b-2b) \cdot (-2) = -3 \cdot (2b-1) - 2b \cdot (-2) = -6b + 3 + 4b = -2b + 3$$

$$11) \quad (4+n) \cdot (4-n) + (3n-2) \cdot (-3) = 16 - 4n + 4n - n^2 - 9n + 6 = -n^2 - 9n + 22$$

$$1) \quad a - a^2 + 2 - 2 \cdot (a+1) \cdot (1-a) = a - a^2 + 2 + [-2a - 2] \cdot (1-a) = a - a^2 + 2 - 2a + 2a^2 - 2 + 2a = a^2 + a$$

$$2) \quad (2+n) \cdot (3n-3) + (3n-n) \cdot 2 - n \cdot (3-5) = 6n - 6 + 3n^2 - 3n + 4n + 2n = 3n^2 + 9n - 6$$

$$3) \quad \frac{-2+3a}{2b} + \frac{(1+2a) \cdot 2}{1 \cdot b} = \frac{-2+3a}{2b} + \frac{2+4a}{2b} = \frac{-2+3a+2+4a}{2b} = \frac{7a}{2b}$$

pozn: $\frac{3}{10} + \frac{2}{5} \cdot 2$ rozšíříme

$$4) \quad (10x-8) - x \cdot \sqrt{100-64} = 10x-8 - x \cdot \sqrt{36} = 10x-8-6x = 4x-8$$

$$5) \quad (2n+6) \cdot (2n-6) + (3-5) \cdot 2n - 5n \cdot (n-2n) = 4n^2 - 12n + 12n - 36 - 4n + 5n^2 = 9n^2 - 4n - 36$$

$$6) \quad \frac{2 \cdot 2}{1 \cdot 3} \cdot a + \frac{a}{6} - \frac{4a}{12} = \frac{4a}{6} + \frac{a}{6} - \frac{2a}{6} = \frac{3a}{6} = \frac{1}{2}a = \frac{a}{2}$$

$$7) \quad \frac{(y+3)}{3} - \frac{y}{4} - 1 = \frac{4(y+3)}{12} - \frac{3y}{12} - \frac{12}{12} = \frac{4y+12-3y-12}{12} = \frac{y}{12}$$

$$8) \quad \frac{(b-3)}{3} + 4 - \frac{2b}{2} - 1 = \frac{b-3}{3} + 3 - b = \frac{b-3}{3} + \frac{9}{3} - \frac{3b}{3} = \frac{b-3+9-3b}{3} = \frac{-2b+6}{3}$$

$$9) \quad \frac{2(n-1)}{2 \cdot 2} - \frac{2n-3}{4} = \frac{2(n-1)}{4} - \frac{2n-3}{4} = \frac{2(n-1) - (2n-3)}{4} = \frac{2n-2-2n+3}{4} = \frac{1}{4}$$

$$10) \quad (5-y) \cdot (5+y) + 3 \cdot (y^2-10) - (2y-3) \cdot y = 25 + 5y - 5y - y^2 + 3y^2 - 30 - 2y^2 + 3y = 3y - 5$$

$-y \cdot (2y-3)$

$$11) \quad 2a \left(2 - \frac{a}{2} \right) - \left(\frac{2a}{3} + a^2 \right) \cdot 3 = 4a - a^2 - 2a - 3a^2 = -4a^2 + 2a$$

$2a \cdot (-\frac{a}{2})$ $-3 \cdot (\frac{2a}{3} + a^2)$

$$12) \quad \frac{1}{2} \cdot n \cdot (2-3n) + 3 \cdot (n+2n) - n \cdot (3-n) = n - \frac{3}{2}n^2 + 9n - 3n + n^2 = -\frac{1}{2}n^2 + 7n$$

$\frac{1}{2}n \cdot 2$

$$-\frac{3}{2}n^2 + n^2 = -\frac{3}{2}n^2 + \frac{2}{2}n^2 = -\frac{1}{2}n^2$$

Výrazy 18 – Součinný tvar

Zjednodušte a rozložte na součin (Cermat)

$$1) \quad 4a^2 - 9 = (2a+3)(2a-3)$$

$$2) \quad p^2 - 16 = (p-4)(p+4)$$

$$3) \quad (4a)^2 - 9 \cdot 9 = (4a-9)(4a+9) \\ 16a^2 - 81$$

$$4) \quad 9a^2 - 30a + 25 = (3a-5)^2 \\ \text{kontrola: } 2 \cdot 3a \cdot 5 = 30a \checkmark$$

$$5) \quad 49 - (-4a)^2 = 49 - 16a^2 = (7-4a) \cdot (7+4a) \\ (-4a)^2 = 16a^2$$

$$6) \quad (4+x) \cdot x + 2x^2 = 4x + x^2 + 2x^2 = 3x^2 + 4x = x \cdot (3x+4)$$

$$7) \quad x \cdot x - x + 2x^2 = x^2 - x + 2x^2 = 3x^2 - x = x \cdot (3x-1)$$

$$8) \quad 5^2 - (a^2 + 16) = 25 - a^2 - 16 = 9 - a^2 = (3-a)(3+a)$$

$$9) \quad 2 \cdot (x^2 - x) + x = 2x^2 - 2x + x = 2x^2 - x = x \cdot (2x-1)$$

$$10) \quad (3+a)^2 - (3 \cdot a)^2 - 3^2 = 9 + 6a + a^2 - 9a^2 - 9 = 6a - 8a^2 = 2a(3-4a)$$

$$11) \quad x \cdot (y-3) + 3 \cdot (x-2y) = xy - 3x + 3x - 6y = xy - 6y = y \cdot (x-6)$$

$$12) \quad a \cdot (-a) - 2^2 \cdot 3a + 6a^2 = -a^2 - 12a + 6a^2 = 5a^2 - 12a = a \cdot (5a-12)$$

$$13) \quad 5 - (1-x^2) - x \cdot 2x = 5 - 1 + x^2 - 2x^2 = 4 - x^2 = (2-x)(2+x)$$

$$14) \quad (3n+7) \cdot (-4n+3n) + n \cdot (4n+9) = -3n^2 - 7n + 4n^2 + 9n = n^2 + 2n = n \cdot (n+2) \\ \text{kontrola: } -n \cdot (3n+7)$$

Doplň čísla aby rovnost dávala smysl

$$15) \quad a + b \quad a^2 + 2ab + b^2 \\ (y + \underline{5})^2 = y^2 + 10y + \underline{25}$$

$$17) \quad (x + y)^2 = x^2 + 2xy + y^2 \\ (-7 \cdot a + 4 \cdot b)^2 = 49 \cdot a^2 - 56ab + (4 \cdot b)^2 \\ 2 \cdot (-7) \cdot 4b = -56ab \\ -56ab : 8b = -7a$$

$$16) \quad (y + \underline{6}) \cdot (2y + 3) = 2y^2 + 15y + \underline{18} \\ \text{kontrola: } 2y^2 + 3y + 12y = 2y^2 + 15y \\ 12y : 2y = 6$$

Procvičování: Rovnice se zkouškou 3

Najdi řešení rovnice a proved' zkoušku

1)

$$\frac{3c+14}{4}=2 \quad / \cdot 4$$

$$3c+14=8 \quad / -14$$

$$3c=8-14$$

$$3c=-6 \quad / :3$$

$$\underline{c=-2}$$

zk: $L_{(-2)}: \frac{-6+14}{4} = \frac{8}{4} = 2$

$P_{(-2)}: 2 \quad L=P$

2)

$$\frac{b-4}{3}=\frac{9-b}{2} \quad / \cdot 6$$

$$2 \cdot (b-4) = 3 \cdot (9-b)$$

$$2b-8 = 27-3b \quad / +3b +8$$

$$2b+3b = 27+8$$

$$5b = 35 \quad / :5$$

$$\underline{b=7}$$

zk: $L_{(7)}: \frac{7-4}{3} = \frac{3}{3} = 1$ $P_{(7)}: \frac{9-7}{2} = \frac{2}{2} = 1$

3)

$$2 \cdot \frac{x+1}{4} - x = \frac{x-1}{3}$$

I) $\frac{2x+2}{4} - x = \frac{x-1}{3} \quad / \cdot 12$

II) $2 \cdot \frac{x+1}{4} - x = \frac{x-1}{3} \quad / \cdot 12$

$$3 \cdot 2 \cdot (x+1) - 12 = 4 \cdot (x-1)$$

III) $2 \cdot \frac{x+1}{4} - x = \frac{x-1}{3} \quad / \cdot 6$

$$\frac{x+1}{2} - x = \frac{x-1}{3} \quad / \cdot 6$$

$$3 \cdot (x+1) - 6x = 2 \cdot (x-1)$$

$$3x+3-6x=2x-2$$

$$3-3x=2x-2 \quad / -2x-3$$

$$-3x-2x=-2-3 \quad / :(-5)$$

$$-5x=-5$$

$$\underline{x=1}$$

zk: $L_{(1)}: 2 \cdot \frac{1+1}{4} - 1 = 2 \cdot \frac{2}{4} - 1 = \frac{4}{4} - 1 = 1 - 1 = 0$

$P_{(1)}: \frac{1-1}{3} = 0 \quad L=P$

4)

$$6 - \frac{3-2y}{5} \cdot 2 = 4y \quad / \cdot 5$$

$$30 - 2 \cdot (3-2y) = 20y$$

$$30 - 6 + 4y = 20y$$

$$24 + 4y = 20y \quad / -4y$$

$$24 = 20y - 4y$$

$$24 = 16y \quad / :8$$

$$3 = 2y \quad / :2$$

$$\underline{\frac{3}{2} = y}$$

zk: $L_{(\frac{3}{2})}: 6 - \frac{3-2 \cdot \frac{3}{2}}{5} \cdot 2 = 6 - 0 = 6$

$P_{(\frac{3}{2})}: 4 \cdot \frac{3}{2} = 6 \quad L=P$

5)

$$\frac{9}{5} + t = \frac{t}{2} + \frac{4}{5} \quad / \cdot 10$$

$$18 + 10t = 5t + 8 \quad / -5t - 18$$

$$10t - 5t = 8 - 18$$

$$5t = -10$$

$$\underline{t = -2}$$

zk: $L_{(-2)}: \frac{9}{5} - 2 = \frac{9}{5} - \frac{10}{5} = -\frac{1}{5}$

$P_{(-2)}: -\frac{2}{2} + \frac{4}{5} = -1 + \frac{4}{5} = -\frac{5}{5} + \frac{4}{5} = -\frac{1}{5} \quad L=P$

6)

$$\frac{6x-5}{3} = 2x - \frac{10}{3} \quad / \cdot 3$$

$$6x-5 = 6x-10 \quad / -6x +5$$

$$6x-6x = -10+5$$

$$0 = -5$$

NEMÁ ŘEŠENÍ

Procvičování: Rovnice se zkouškou 4
Najdi řešení rovnice a proved' zkoušku

1)

$$\frac{x-2}{2} - x = 2 - \frac{2x}{3} \quad / \cdot 6$$

$$3 \cdot (x-2) - 6x = 12 - 4x$$

$$3x - 6 - 6x = 12 - 4x$$

$$-6 - 3x = 12 - 4x \quad / +4x + 6$$

$$-3x + 4x = 12 + 6$$

$$x = 18$$

$$ZK: L_{(18)}: \frac{18-2}{2} - 18 = \frac{16}{2} - 18 = 8 - 18 = -10$$

$$P_{(18)}: 2 - \frac{2 \cdot 18}{3} = 2 - 12 = -10 \quad L=P$$

2)

$$\frac{x-5}{2} + x = \frac{2x}{3} - \frac{5}{6} \quad / \cdot 6$$

$$3 \cdot (x-5) + 6x = 4x - 5$$

$$3x - 15 + 6x = 4x - 5$$

$$-15 + 3x = 4x - 5 \quad / -4x + 15$$

$$3x - 4x = -5 + 15$$

$$5x = 10 \quad / :5$$

$$x = 2$$

$$ZK: L_{(2)}: \frac{2-5}{2} + 2 = -\frac{3}{2} + 2 = -\frac{3}{2} + \frac{4}{2} = \frac{1}{2}$$

$$P_{(2)}: \frac{2}{3} - \frac{5}{6} = \frac{4}{6} - \frac{5}{6} = -\frac{1}{6} = -\frac{1}{6}$$

$L=P$

3)

$$\frac{16-5t}{7} = \frac{t+7}{2} \quad / \cdot 14$$

$$2 \cdot (16-5t) = 7 \cdot (t+7)$$

$$32 - 10t = 7t + 49 \quad / -7t - 32$$

$$-10t - 7t = 49 - 32$$

$$-17t = 17 \quad / : (-17)$$

$$t = -1$$

$$ZK: L_{(-1)}: \frac{16-5 \cdot (-1)}{7} = \frac{16+5}{7} = \frac{21}{7} = 3$$

$$P_{(-1)}: \frac{-1+7}{2} = \frac{6}{2} = 3 \quad L=P$$

4)

$$\frac{2}{3} \cdot (x+1) = -\frac{1}{3} \cdot (2x-1) - 1 \quad / \cdot 3$$

$$\frac{2}{3}x + \frac{2}{3} = -\frac{2}{3}x + \frac{1}{3} - 1 \quad / \cdot 3$$

$$2x + 2 = -2x + 1 - 3$$

$$2x + 2 = -2x - 2 \quad / +2x - 2$$

$$2x + 2x = -2 - 2$$

$$4x = -4 \quad / :4$$

$$x = -1$$

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

$$ZK: L_{(-1)}: \frac{2}{3} \cdot (-1+1) = \frac{2}{3} \cdot 0 = 0$$

$$P_{(-1)}: -\frac{1}{3} \cdot (-2-1) - 1 = -\frac{1}{3} \cdot (-3) - 1 = \frac{3}{3} - 1 = 1 - 1 = 0$$

$L=P$

5)

$$\frac{3x-10}{3} - \frac{x}{2} + \frac{2x-13}{6} = 0 \quad / \cdot 6$$

$$2 \cdot (3x-10) - 3x - (2x-13) = 0$$

$$6x - 20 - 3x - 2x + 13 = 0$$

$$x - 7 = 0 \quad / +7$$

$$x = 7$$

$$ZK: L_{(7)}: \frac{21-10}{3} - \frac{7}{2} + \frac{14-13}{6} = \frac{11}{3} - \frac{7}{2} + \frac{1}{6} = \frac{22-21-1}{6} = \frac{0}{6} = 0$$

$$P_{(7)}: 0 \quad L=P$$

6)

$$\frac{5x-2}{4} = 1,25x - \frac{1}{2} \quad / \cdot 4$$

$$5x - 2 = 5x - 2 \quad / -5x + 2$$

$$5x - 5x = -2 + 2$$

$$0 = 0$$

NEKONEČNĚ MNOHO
ŘEŠENÍ

Procvičování: Rovnice se zkouškou 5

Najdi řešení rovnice a proved' zkoušku

1)

$$\frac{2x}{3} = \frac{5}{12}$$

$$\begin{aligned} \cdot 12 \\ -4x = 5 \quad / :(-4) \\ x = -\frac{5}{4} \end{aligned}$$

$$\text{II) } -\frac{x}{3} = \frac{5}{12} \quad / \cdot 3$$

$$-x = \frac{5}{4} \quad / :(-1)$$

$$x = -\frac{5}{4}$$

zk:

$$L(-\frac{5}{4}): -\frac{2}{3} \cdot (-\frac{5}{4}) = -\frac{1}{3} \cdot (-\frac{5}{4}) = \frac{5}{12}$$

$$-\frac{5}{4} : 1 = -\frac{5}{4} \cdot \frac{1}{1} = -\frac{5}{4}$$

$$P(-\frac{5}{4}): \frac{5}{12}$$

2)

$$\frac{1-x}{2} = 4 - x + \frac{5x}{3} \quad / \cdot 6$$

$$\begin{aligned} 3 \cdot (1-x) &= 24 - 6x + 10x \\ 3 - 3x &= 24 + 4x \quad / -4x - 3 \\ -3x - 4x &= 24 - 3 \\ -7x &= 21 \quad / :(-7) \\ x &= -3 \end{aligned}$$

zk

$$L(-3): \frac{1-(-3)}{2} = \frac{1+3}{2} = \frac{4}{2} = 2$$

$$P(-3): 4 - (-3) + \frac{5 \cdot (-3)}{3} = 4 + 3 - 5 = 2 \quad \underline{L=P}$$

3)

$$1 - \frac{7c-4}{9} - \frac{5-3c}{6} = \frac{c}{3} \quad / \cdot 18$$

$$\begin{aligned} 18 - 2 \cdot (7c-4) - 3 \cdot (5-3c) &= 6c \\ 18 - 14c + 8 - 15 + 9c &= 6c \\ 11 - 5c &= 6c \quad / +5c \\ 11 &= 6c + 5c \\ 11 &= 11c \quad / :11 \\ 1 &= c \end{aligned}$$

zk:

$$L(1): 1 - \frac{7 \cdot 1 - 4}{9} - \frac{5 - 3 \cdot 1}{6} = 1 - \frac{3}{9} - \frac{2}{6} = 1 - \frac{1}{3} - \frac{1}{3} = \frac{1}{3}$$

$$P(1): \frac{1}{3} \quad \underline{L=P}$$

4)

$$\frac{6-t}{4} - 3 = \frac{2t+6}{7} - \frac{t+4}{2} \quad / \cdot 28$$

$$\begin{aligned} 7 \cdot (6-t) - 84 &= 4 \cdot (2t+6) - 14 \cdot (t+4) \\ 42 - 7t - 84 &= 8t + 24 - 14t - 56 \\ -7t - 42 &= -6t - 32 \quad / +6t + 42 \\ -7t + 6t &= -32 + 42 \\ -t &= 10 \quad / :(-1) \\ t &= -10 \end{aligned}$$

zk

$$L(-10): \frac{6-(-10)}{4} - 3 = \frac{16}{4} - 3 = 4 - 3 = 1$$

$$P(-10): \frac{-20+6}{7} - \frac{-10+4}{2} = \frac{-14}{7} - \frac{(-6)}{2} = -2 + 3 = 1 \quad \underline{L=P}$$

5)

$$\frac{2-x}{2} - 3 = \frac{2x+1}{3} \quad / \cdot 6$$

$$\begin{aligned} 3 \cdot (2-x) - 18 &= 2 \cdot (2x+1) \\ 6 - 3x - 18 &= 4x + 2 \\ -3x - 12 &= 4x + 2 \quad / -4x + 12 \\ -3x - 4x &= 2 + 12 \\ -7x &= 14 \quad / :(-7) \\ x &= -2 \end{aligned}$$

zk

$$L(-2): \frac{2-(-2)}{2} - 3 = \frac{4}{2} - 3 = 2 - 3 = -1$$

$$P(-2): \frac{-4+1}{3} = \frac{-3}{3} = -1 \quad \underline{L=P}$$

6)

↪ Zjednot' člen

$$2 \cdot \frac{x-1}{9} - \frac{2x+3}{6} = \frac{1}{2} \quad / \cdot 18$$

$$\begin{aligned} 2 \cdot 2 \cdot \frac{x-1}{9} - 3 \cdot \frac{2x+3}{6} &= 9 \\ 4x - 4 - 6x - 9 &= 9 \\ -2x - 13 &= 9 \quad / +13 \\ -2x &= 9 + 13 \\ -2x &= 22 \quad / :(-2) \\ x &= -11 \end{aligned}$$

zk

$$L(-11): 2 \cdot \frac{-11-1}{9} - \frac{-22+3}{6} = \frac{-24}{9} - \frac{-19}{6} = -\frac{8}{3} + \frac{19}{6} = -\frac{16}{6} + \frac{19}{6} = \frac{3}{6} = \frac{1}{2}$$

$$P(-11): \frac{1}{2} \quad \underline{L=P}$$

$$:0,2 \rightarrow : \frac{2}{10} \rightarrow : \frac{10}{2} \rightarrow : 5$$

Procvičování: Rovnice se zkouškou 6

Najdi řešení rovnice a proved' zkoušku

1) $\rightarrow (x-2) \cdot 0,2 = (x-2) \cdot \frac{1}{5} = (x-2) \cdot 5$

$$\frac{x-2}{0,2} + 0,6 = x + \frac{1}{5}$$

$$5 \cdot (x-2) + 0,6 = x + \frac{1}{5}$$

$$5x - 10 + 0,6 = x + \frac{1}{5} \quad / \cdot 5$$

$$25x - 50 + 3 = 5x + 1 \quad / -5x + 47$$

$$20x - 5x = 1 + 47$$

$$20x = 48 \quad / : 2$$

$$10x = 24 \quad / : 10$$

$$x = 2,4$$

zk $L(2,4) : \frac{2,4-2}{0,2} + 0,6 = \frac{0,4}{0,2} + 0,6 = 2 + 0,6 = 2,6$

$P(2,4) = 2,4 + \frac{1}{5} = 2,4 + 0,2 = 2,6$

2)

$$\frac{(y-2) \cdot 4}{3} - 2 = 2 \cdot (y-3) \quad / \cdot 3$$

$$(y-2) \cdot 4 - 6 = 3 \cdot 2 \cdot (y-3)$$

$$4y - 8 - 6 = 6y - 18$$

$$4y - 14 = 6y - 18 \quad / +14 -6y$$

$$4y - 6y = -18 + 14$$

$$-2y = -4 \quad / : (-2)$$

$$y = 2$$

zk

$L(2) : \frac{(2-2) \cdot 4}{3} - 2 = \frac{0 \cdot 4}{3} - 2 = 0 - 2 = -2$

$P(2) : 2 \cdot (2-3) = 2 \cdot (-1) = -2$

3)

$$\frac{v-5}{5} + \frac{1+v}{2} = 1 + \frac{3 \cdot (v-3)}{4} \quad / \cdot 20$$

$$4 \cdot (v-5) + 10 \cdot (1+v) = 20 + 5 \cdot 3 \cdot (v-3)$$

$$4v - 20 + 10 + 10v = 20 + 15v - 45$$

$$14v - 10 = -25 + 15v \quad / -15v + 10$$

$$14v - 15v = -25 + 10$$

$$-v = -15 \quad / \cdot (-1)$$

$$v = 15$$

zk

$L(15) : \frac{15-5}{5} + \frac{1+15}{2} = \frac{10}{5} + \frac{16}{2} = 2 + 8 = 10$

$P(15) : 1 + \frac{3 \cdot (15-3)}{4} = 1 + \frac{3 \cdot 12}{4} = 1 + 3 \cdot 3 = 1 + 9 = 10$

$L=P$

4)

$$7a \cdot (a-1) - 17 = 3a \cdot (2a+5) + a \cdot a + 5$$

$$7a^2 - 7a - 17 = 6a^2 + 15a + a^2 + 5 \quad / -6a^2 - a^2$$

$$7a^2 - 6a^2 - a^2 - 7a - 17 = 15a + 5 \quad / -15a + 17$$

$$-7a - 15a = 5 + 17$$

$$-22a = 22 \quad / : (-22)$$

$$a = -1$$

zk

$L(-1) : -7 \cdot (-1-1) - 17 = -7 \cdot (-2) - 17 = 14 - 17 = -3$

$P(-1) : -3 \cdot (-2+5) - 1 \cdot (-1) + 5 = -3 \cdot 3 + 1 + 5 = -9 + 6 = -3$

$L=P$

5)

$$2v \cdot (2v-1) = 4v \cdot (3+v) - 7$$

$$4v^2 - 2v = 12v + 4v^2 - 7 \quad / -4v^2$$

$$4v^2 - 4v^2$$

$$-2v = 12v - 7 \quad / -12v$$

$$-2v - 12v = -7$$

$$-14v = -7 \quad / : (-7)$$

$$2v = 1 \quad / : 2$$

$$v = \frac{1}{2} = 0,5$$

zk:

$L(0,5) : 1 \cdot (1-1) = 1 \cdot 0 = 0$

$P(0,5) : 2 \cdot (3+0,5) - 7 = 2 \cdot 3,5 - 7 = 7 - 7 = 0$

$L=P$

6)

$$\frac{x+3}{2} - \frac{2x+5}{3} = 8 \quad / \cdot 6$$

$$3(x+3) - 2 \cdot (2x+5) = 48$$

$$3x + 9 - 4x - 10 = 48$$

$$-x - 1 = 48 \quad / +1$$

$$-x = 48 + 1$$

$$-x = 49 \quad / \cdot (-1)$$

$$x = -49$$

zk

$L(-49) : \frac{-49+3}{2} - \frac{2 \cdot (-49)+5}{3} = \frac{-46}{2} - \frac{(-93)}{3} = -23 + 31 = 8$

$P(-49) : 8$

$L=P$

Procvičování: Rovnice se zkouškou 7

Najdi řešení rovnice a proved' zkoušku

1)

$$3,5x - \frac{15}{3} = 7 + \frac{x}{2} \quad / \cdot 6 \quad \rightarrow 3,5x - 5 = 7 + \frac{x}{2} \quad / \cdot 2$$

$$21x - 30 = 42 + 3x \quad / -3x + 30$$

$$18x - 30 = 42 + 30$$

$$18x = 72 \quad / : 9$$

$$2x = 8 \quad / : 2$$

$$x = 4$$

zk

$$L(4): 3,5 \cdot 4 - \frac{15}{3} = 14 - 5 = 9$$

$$P(4): 7 + \frac{4}{2} = 7 + 2 = 9 \quad L = P$$

2)

$$x = \frac{2}{5}(2x - 7) + \frac{x}{3} + 2 \quad / \cdot 15$$

$$15x = 3 \cdot 2 \cdot (2x - 7) + 5x + 30$$

$$15x = 12x - 42 + 5x + 30$$

$$15x = 17x - 12 \quad / -17x$$

$$15x - 17x = -12$$

$$-2x = -12 \quad / : (-2)$$

$$x = 6$$

zk

$$L(6): 6$$

$$P(6): \frac{2}{5} \cdot (12 - 7) + \frac{6}{3} + 2 = \frac{2}{5} \cdot 5 + 2 + 2 = 2 + 2 + 2 = 6 \quad L = P$$

3)

$$\frac{x-3}{5} + 0,6x = -2\frac{1}{5} \quad \rightarrow -2\frac{1}{5} \rightarrow -\frac{2 \cdot 5 + 1}{5}$$

$$\frac{x-3}{5} + 0,6x = -\frac{11}{5} \quad / \cdot 5$$

$$x - 3 + 3x = -11$$

$$4x - 3 = -11 \quad / +3$$

$$4x = -11 + 3$$

$$4x = -8 \quad / : 4$$

$$x = -2$$

$$L(-2): \frac{-2-3}{5} + 0,6 \cdot (-2) = -\frac{5}{5} - 1,2 = -1 - 1,2 = -2,2$$

$$P(-2): -\frac{11}{5} = -2,2 \quad L = P$$

$$\frac{11}{5} = 2,2$$

4)

$$\frac{5}{12} + \frac{5a-7}{3} = 2a - \frac{7}{12} \quad / \cdot 12$$

$$5 + 4 \cdot (5a - 7) = 24a - 7$$

$$5 + 20a - 28 = 24a - 7$$

$$20a - 23 = 24a - 7 \quad / -24a + 23$$

$$20a - 24a = -7 + 23$$

$$-4a = 16 \quad / : (-4)$$

$$a = -4$$

$$L(-4): \frac{5}{12} + \frac{5 \cdot (-4) - 7}{3} = \frac{5}{12} - \frac{27 \cdot 4}{3 \cdot 4} = \frac{5 - 108}{12} = -\frac{103}{12}$$

$$P(-4): -8 - \frac{7}{12} = -\frac{96 - 7}{12} = -\frac{103}{12} \quad L = P$$

5)

$$\frac{3z}{5} - \frac{1}{3} \cdot (-z) = 1\frac{4}{15} - \frac{z}{3}$$

$$\frac{3z}{5} + \frac{z}{3} = \frac{19}{15} - \frac{z}{3} \quad / \cdot 15$$

$$9z + 5z = 19 - 5z$$

$$14z = 19 - 5z \quad / +5z$$

$$14z + 5z = 19$$

$$19z = 19 \quad / : 19$$

$$z = 1$$

$$zk \quad L(1): \frac{3}{5} - \frac{1}{3} \cdot (-1) = \frac{3}{5} + \frac{1}{3} = \frac{3+5}{15} = \frac{8}{15}$$

$$P(1): \frac{19}{15} - \frac{1}{3} = \frac{19-5}{15} = \frac{14}{15} \quad L = P$$

6)

$$(d+2) \cdot (d-3) + 1 = (d+1)^2$$

$$d^2 - 3d + 2d - 6 + 1 = d^2 + 2d + 1 \quad / -d^2$$

$$-d - 5 = 2d + 1 \quad / -2d + 5$$

$$-d - 2d = 1 + 5$$

$$-3d = 6 \quad / : 3$$

$$-d = 2 \quad / \cdot (-1)$$

$$d = -2$$

$$L(-2): (-2+2) \cdot (-2-3) + 1 = 1$$

$$P(-2): (-2+1)^2 = (-1)^2 = 1 \quad L = P$$

Procvičování: Rovnice se zkouškou 8

Najdi řešení rovnice a proved' zkoušku

1)

$$\frac{4z-6}{5} - \frac{3z-8}{4} = \frac{z-4}{20} + 1 \quad / \cdot 20$$

$$4 \cdot (4z-6) - 5 \cdot (3z-8) = z-4 + 20$$

$$16z - 24 - 15z + 40 = z - 4 + 20$$

$$z + 16 = z + 16 \quad / - z - 16$$

$$z - z = 16 - 16$$

$$0 = 0$$

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2)

$$\frac{1-3t}{2} + \frac{3t+11}{8} = 1 - \frac{5t-3}{4} \quad / \cdot 8$$

$$4 \cdot (1-3t) + 3t+11 = 8 - 2 \cdot (5t-3)$$

$$4 - 12t + 3t + 11 = 8 - 10t + 6$$

$$-9t + 15 = -10t + 14 \quad / + 10t - 15$$

$$-9t + 10t = 14 - 15$$

$$t = -1$$

$$2k \quad L_{(-1)}: \frac{1-3 \cdot (-1)}{2} + \frac{-3+11}{8} = \frac{1+3}{2} + \frac{8}{8} = \frac{4}{2} + 1 = 3$$

$$P_{(-1)}: 1 - \frac{5-3}{4} = 1 - \frac{-8}{4} = 1 + \frac{8}{4} = 1 + 2 = 3 \quad L=P$$

3)

$$s - \frac{1}{6}(3s+9) - 1 = \frac{1}{2}(s-5) \quad / \cdot 6$$

$$6s - (3s+9) - 6 = 3(s-5)$$

$$6s - 3s - 9 - 6 = 3s - 15$$

$$3s - 15 = 3s - 15 \quad / - 3s + 15$$

$$3s - 3s = -15 + 15$$

$$0 = 0$$

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4)

$$\frac{1}{2}(5-3x) - \frac{4}{7}(4x+11) = 2x+2 \quad / \cdot 14$$

$$7 \cdot (5-3x) - 8 \cdot (4x+11) = 28x+28$$

$$35 - 21x - 32x - 88 = 28x + 28$$

$$-53x - 53 = 28x + 28 \quad / - 28x + 53$$

$$-53x - 28x = 28 + 53$$

$$-81x = 81 \quad / : (-81)$$

$$x = -1$$

$$2k \quad L_{(-1)}: \frac{1}{2} \cdot (5-3 \cdot (-1)) - \frac{4}{7} \cdot (-4+11) = \frac{1}{2} \cdot 8 - \frac{4}{7} \cdot 7 = 4 - 4 = 0$$

$$P_{(-1)}: -2+2=0 \quad L=P$$

5)

$$\frac{7}{2} + 2 \cdot \left(5 - \frac{3+f}{4}\right) - \frac{2f+3}{2} = \frac{3f+2}{5} - 2 \cdot (f-5)$$

$$\frac{7}{2} + 10 - \frac{3+f}{2} - \frac{2f+3}{2} = \frac{3f+2}{5} - 2f + 10 \quad / \cdot 10$$

$$35 + 100 - 5 \cdot (3+f) - 5 \cdot (2f+3) = 2 \cdot (3f+2) - 20f + 100 \quad / - 100$$

$$35 - 15 - 5f - 10f - 15 = 6f + 4 - 20f$$

$$5 - 15f = -14f + 4 \quad / - 5 + 14f$$

$$-15f + 14f = 4 - 5$$

$$-f = -1 \quad / : (-1)$$

$$f = 1$$

$$L_{(1)}: \frac{7}{2} + 2 \cdot \left(5 - \frac{3+1}{4}\right) - \frac{2+3}{2} = \frac{7}{2} + 2 \cdot (5-1) - \frac{5}{2} = \frac{7}{2} + 2 \cdot 4 = 1 + 8 = 9$$

$$P_{(1)}: \frac{3+2}{5} - 2 \cdot (1-5) = \frac{5}{5} - 2 \cdot (-4) = 1 + 8 = 9 \quad L=P$$