



Resoluções das atividades

Capítulo 5 Operações fundamentais com números racionais

Adição algébrica

$$1) a) -\frac{5}{3} + \frac{1}{2} = \frac{-10+3}{6} = -\frac{7}{6}$$

$$b) -\frac{3}{5} + \frac{8}{10} = \frac{-6+8}{10} = \frac{2}{10} = \frac{1}{5}$$

$$c) \frac{6}{10} - \frac{11}{10} + \frac{3}{4} = \frac{12-22+15}{20} = \frac{5}{20} = \frac{1}{4}$$

$$d) -\frac{10}{3} - \frac{12}{10} + 1 + \frac{1}{2} = \frac{-100-36+30+15}{30} = -\frac{91}{30}$$

$$e) -\frac{63}{10} - \frac{18}{10} + \frac{1}{4} = \frac{-126-36+5}{20} = -\frac{157}{20}$$

$$f) -\frac{3}{4} - \frac{4}{3} - \frac{1}{4} + 4 =$$

$$-\frac{3}{4} - \frac{1}{4} + 4 - \frac{4}{3} = -\frac{4}{4} + 4 - \frac{4}{3} =$$

$$-1 + 4 - \frac{4}{3} = \frac{9-4}{3} = \frac{5}{3}$$

$$2) A = \frac{1}{3} - \left[\frac{2}{5} - \left(\frac{3}{2} - \frac{7}{15} \right) \right] + \frac{7}{10}$$

$$A = \frac{1}{3} - \left[\frac{2}{5} - \frac{3}{2} + \frac{7}{15} \right] + \frac{7}{10}$$

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

$$A = \frac{10-12+45-14+21}{30}$$

$$A = \frac{50}{30} \rightarrow A = \frac{5}{3}$$

$$B = -\frac{35}{10} + \frac{33}{12} + \frac{17}{12}$$

$$B = -\frac{35}{10} + \frac{50}{12}$$

$$B = \frac{-210+250}{60}$$

$$B = \frac{40}{60}$$

$$B = \frac{2}{3}$$

$$(A-B)^{335} = \left(\frac{5}{3} - \frac{2}{3} \right)^{335} = \left(\frac{3}{3} \right)^{335} = 1^{335} = 1$$

$$3) a) a+b = -\frac{5}{12} + \frac{4}{9} = \frac{-15+16}{36} = \frac{1}{36}$$

$$b) -a-b = -\left(-\frac{5}{12} \right) - \left(\frac{4}{9} \right) = \frac{5}{12} - \frac{4}{9} = \frac{15-16}{36} = -\frac{1}{36}$$

$$c) -(a+b) = -\left(\frac{1}{36} \right) = -\frac{1}{36}$$

$$d) \frac{1}{a+b} = \frac{1}{\frac{1}{36}} = 1 \cdot \frac{36}{1} = 36$$

$$4) a) \begin{array}{r} 25,1 \\ - 17,6 \\ \hline 7,5 \end{array}$$

Aumento de 7,5 °C.

$$b) 4,2 - (-5,8) = 4,2 + 5,8 = 10,0$$

Aumento de 10 °C.

$$c) -14,6 - (-23,7) = -14,6 + 23,7 = +9,1 \text{ graus}$$

Aumento de 9,1 °C.

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

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

$$-3 - \frac{1}{2} = \frac{-6-1}{2} = -\frac{7}{2} = -3,5$$

Resposta: -3,5 está entre os números -4 e -3.

$$6) \frac{1}{8} + \frac{3}{5} = \frac{5+24}{40} = \frac{29}{40}$$

$$1 - \frac{29}{40} = \frac{40}{40} - \frac{29}{40} = \frac{11}{40}$$

Resposta: Yuri comeu $\frac{29}{40}$ da barra de chocolate, restando $\frac{11}{40}$ dela.

$$7) a) -\frac{2}{3} + \frac{5}{4} - 1 = \frac{-8+15-12}{12} = -\frac{5}{12}$$

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

$$\frac{-8-12-15}{12} = -\frac{35}{12}$$

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

$$\frac{-8-15}{12} = -\frac{23}{12}$$



8 a) $x = -\frac{13}{18} + \frac{8}{9}$
 $x = \frac{-13+16}{18}$
 $x = \frac{3}{18}$ ou $x = \frac{1}{6}$

b) $y = -\frac{7}{6} + \frac{4}{3}$
 $y = \frac{-7+8}{6} \rightarrow y = \frac{1}{6}$

c) $\sqrt{\frac{1}{6} - \frac{1}{6}} = \sqrt{0} = 0$

d) $-4 + (x+y) = -4 + \left(\frac{1}{6} + \frac{1}{6}\right) = -4 + \frac{2}{6} = -4 + \frac{1}{3} = -\frac{11}{3}$

Multiplicação

1 a) $\left(-\frac{4}{5}\right) \cdot \left(+\frac{3}{20}\right) = -\frac{4 \cdot 3}{5 \cdot 20} = -\frac{12}{100} = -\frac{3}{25}$

b) $-6 \cdot \left(+\frac{2}{9}\right) = -\frac{12}{9} = -\frac{4}{3}$

c) $(-1,4) \cdot \left(-\frac{5}{21}\right) =$
 $\left(-\frac{14}{10}\right) \cdot \left(-\frac{5}{21}\right) =$
 $\left(-\frac{2}{2}\right) \cdot \left(-\frac{1}{3}\right) = +\frac{2}{6} = \frac{1}{3}$

d) $\left(+\frac{49}{48}\right) \cdot \left(-\frac{30}{7}\right) \cdot \left(+\frac{1}{5}\right) =$
 $\left(+\frac{7}{8}\right) \cdot \left(-\frac{8}{1}\right) \cdot \left(+\frac{1}{8}\right) =$
 $\left(+\frac{7}{8}\right) \cdot \left(-\frac{1}{1}\right) \cdot \left(+\frac{1}{1}\right) = -\frac{7}{8}$

e) $\left(+\frac{21}{8}\right) \cdot \left(-\frac{16}{7}\right) \cdot \left(-\frac{1}{20}\right) \cdot \left(-\frac{75}{36}\right) =$
 $= (+3) \cdot (-2) \cdot \left(-\frac{1}{4}\right) \cdot \left(-\frac{15}{36}\right) = \left(+\frac{3}{4}\right) \cdot \left(-\frac{5}{12}\right) =$
 $= -\frac{30}{48} = -\frac{15}{24} = -\frac{5}{8}$

f) $\left(-\frac{2}{10}\right) \cdot \left(-\frac{91}{17}\right) \cdot \left(+\frac{51}{13}\right) \cdot \left(\frac{10}{7}\right) =$
 $= \left(-\frac{2}{1}\right) \cdot \left(-\frac{7}{1}\right) \cdot \left(+\frac{3}{1}\right) \cdot \left(\frac{1}{7}\right) =$
 $= \left(-\frac{2}{1}\right) \cdot \left(-\frac{1}{1}\right) \cdot \left(+\frac{3}{1}\right) \cdot \left(\frac{1}{1}\right) = 6$

2 a) $x = \left(-\frac{8}{100}\right) \cdot \left(-\frac{25}{36}\right) =$
 $x = \left(-\frac{2}{4}\right) \cdot \left(-\frac{1}{9}\right) =$
 $x = \left(-\frac{1}{2}\right) \cdot \left(-\frac{1}{9}\right) =$
 $x = \frac{1}{18}$

b) $y = \left(+\frac{125}{10}\right) \cdot \left(-\frac{4}{10}\right) =$
 $y = -\frac{125 \cdot 4}{10 \cdot 10} =$
 $y = -\frac{500}{100} =$
 $y = -5$

c) $\left(+\frac{1}{18}\right) \cdot (-5) = -\frac{1 \cdot 5}{18 \cdot 1} = -\frac{5}{18}$

d) $20 \cdot \left(-\frac{5}{18}\right) - 100 =$
 $= 20 \cdot (-5) - 100 = -100 - 100 = -200$

3 a) $x = 10 \cdot \left(-\frac{18}{25}\right) - \frac{40}{8} \cdot \left(-\frac{25}{100}\right) =$
 $x = 2 \cdot \left(-\frac{18}{5}\right) - \frac{2}{1} \cdot \left(-\frac{5}{5}\right) =$
 $x = -\frac{36}{5} + 2 = \frac{-36+10}{5} = -\frac{26}{5}$

b) $-x = -\left(-\frac{26}{5}\right) = \frac{26}{5}$

c) $xy = 1 \rightarrow -\frac{26}{5} \cdot y = 1$
 $\rightarrow y = \frac{1}{-\frac{26}{5}} \rightarrow y = 1 \cdot \left(-\frac{5}{26}\right) \rightarrow y = -\frac{5}{26}$

d) $-10 \cdot \left(-\frac{26}{8}\right) = -2 \cdot \left(-\frac{26}{1}\right) = 52$



$$\begin{aligned} 4) \quad & 2 \cdot \left(\frac{1}{30} - \frac{2}{30} + \frac{3}{30} - \frac{4}{30} + \dots + \frac{27}{30} - \frac{28}{30} + \frac{29}{30} - \frac{30}{30} \right) = \\ & 2 \cdot \left(\frac{1-2+3-4+\dots+27-28+29-30}{30} \right) = 2 \cdot \left(\frac{-1 \cdot 15}{30} \right) = \\ & 2 \cdot \left(-\frac{15}{30} \right) = -\frac{30}{30} = -1 \end{aligned}$$

Divisão

$$\begin{aligned} 1) \quad & a) \left(+\frac{32}{35} \right) : (-20) = +\frac{\overset{:4}{32}}{35} \cdot \left(-\frac{1}{\underset{:4}{20}} \right) = \left(+\frac{8}{35} \right) \cdot \left(-\frac{1}{5} \right) = \\ & -\frac{8}{175} \cong -0,04571 \end{aligned}$$

$$\begin{aligned} b) \quad & \left(-\frac{24}{75} \right) : \left(+\frac{112}{30} \right) = \left(-\frac{\overset{:8}{24}}{\underset{:15}{75}} \right) : \left(+\frac{\overset{:15}{112}}{\underset{:8}{30}} \right) = \\ & \left(-\frac{3}{5} \right) \cdot \left(+\frac{2}{14} \right) = -\frac{6}{70} = -\frac{3}{35} \cong -0,08571 \end{aligned}$$

$$\begin{aligned} c) \quad & \left(+\frac{24}{100} \right) : \left(-\frac{64}{50} \right) = \left(+\frac{\overset{:8}{24}}{\underset{:50}{100}} \right) : \left(-\frac{\overset{:50}{64}}{\underset{:8}{8}} \right) = \\ & \left(+\frac{3}{2} \right) \cdot \left(-\frac{1}{8} \right) = -\frac{3}{16} = -0,1875 \end{aligned}$$

$$\begin{aligned} d) \quad & \left(-\frac{26}{24} \right) : \left(-\frac{26}{10} \right) = \left(-\frac{\overset{5}{26}}{\underset{12}{24}} \right) : \left(-\frac{\overset{5}{26}}{\underset{2}{10}} \right) = \\ & \frac{5}{12} \cong 0,41667 \end{aligned}$$

$$\begin{aligned} e) \quad & \left(+\frac{4183}{10} \right) : \left(-\frac{4}{10} \right) = \left(+\frac{4183}{10} \right) \cdot \left(-\frac{10}{4} \right) = \\ & -\frac{4183}{4} \cong -1045,75 \end{aligned}$$

$$\begin{aligned} f) \quad & \left(-\frac{5186}{10} \right) : \left(-\frac{5}{10} \right) = \left(-\frac{5186}{10} \right) \cdot \left(-\frac{10}{5} \right) = \\ & \frac{5186}{5} = 1\,037,2 \end{aligned}$$

Desafio

Se $4 \leq a \leq 7$ e $9 \leq b \leq 14$, então, o valor máximo e mínimo que **a** e **b** podem assumir é: $a = 4$ (mínimo) e $a = 7$ (máximo); $b = 9$ (mínimo) e $b = 14$ (máximo). Para que $\frac{b}{a}$ tenha o maior valor possível, o numerador deve ser o maior possível, e o denominador, o menor possível. Assim: $\frac{b}{a} = \frac{14}{4} = \frac{7}{2} = 3,5$.

$$\begin{aligned} 2) \quad & a) \frac{-\frac{6}{25}}{-\frac{48}{5}} = -\frac{6}{25} : \left(-\frac{48}{5} \right) = -\frac{\overset{1}{6}}{\underset{5}{25}} \cdot \left(-\frac{\overset{5}{5}}{\underset{48}{48}} \right) = \\ & -\frac{1}{5} \cdot \left(-\frac{1}{8} \right) = \frac{1}{40} \end{aligned}$$

$$\begin{aligned} b) \quad & \frac{\frac{30}{16}}{-\frac{18}{28}} = \frac{30}{16} : \left(-\frac{28}{18} \right) = \\ & \frac{840}{288} = -\frac{35}{12} \end{aligned}$$

$$\begin{aligned} c) \quad & \frac{\frac{1}{4}}{-\frac{84}{84}} = \frac{1}{4} : \left(-\frac{84}{7} \right) = \\ & +\frac{1}{1} \cdot \left(-\frac{21}{7} \right) = (+1) \cdot (-3) = \\ & -3 \end{aligned}$$

$$\begin{aligned} d) \quad & \frac{-\frac{28}{17}}{\frac{196}{196}} = \left(-\frac{\overset{1}{28}}{17} \right) \cdot \frac{1}{\underset{7}{196}} = \\ & \left(-\frac{1}{17} \right) \cdot \frac{1}{7} = -\frac{1}{119} \end{aligned}$$

$$\begin{aligned} 3) \quad & a) \frac{-\frac{1}{6} - \frac{4}{15}}{-\frac{1}{20}} = \frac{-\frac{5-8}{30}}{-\frac{1}{20}} = -\frac{13}{\underset{3}{30}} : \left(-\frac{\overset{2}{20}}{1} \right) = \frac{26}{3} \end{aligned}$$

$$\begin{aligned} b) \quad & \frac{-\frac{1}{2}}{2 - \frac{1}{3} : \frac{2}{3}} = \frac{-\frac{1}{2}}{2 - \frac{1}{3} \cdot \frac{3}{2}} = \frac{-\frac{1}{2}}{2 - \frac{1}{2}} = \frac{-\frac{1}{2}}{\frac{4-1}{2}} = \frac{-\frac{1}{2}}{\frac{3}{2}} = \\ & -\frac{1}{2} \cdot \frac{2}{3} = -\frac{1}{3} \end{aligned}$$

$$\begin{aligned} c) \quad & 1 - \left(\frac{125}{100} \right) : \left(-\frac{5}{10} \right) = 1 - \frac{\overset{5}{125}}{\underset{10}{100}} : \left(-\frac{\overset{1}{10}}{\underset{1}{10}} \right) = \\ & 1 + \frac{5}{2} = \frac{2+5}{2} = \frac{7}{2} \end{aligned}$$

$$\begin{aligned} d) \quad & \frac{\frac{32}{-\frac{9}{10}}}{\left(-\frac{9}{10} \right) : \left(-\frac{2}{5} - \frac{1}{2} \right)} = \\ & \frac{32}{\left(-\frac{9}{10} \right) : \left(-\frac{4-5}{10} \right)} = \frac{32}{\left(-\frac{9}{10} \right) : \left(-\frac{9}{10} \right)} = \frac{32}{1} = 32 \end{aligned}$$



$$\begin{aligned} 4) \quad x &= \left[\left(-\frac{8}{5} \right) : \left(-\frac{16}{100} \right) \right] : \left(+\frac{25}{100} \right) + \left(+\frac{50}{17} \right) : \left(-\frac{5}{68} \right) \\ x &= \left[\left(-\frac{8}{5} \right) \cdot \left(-\frac{100}{16} \right) \right] : \left(+\frac{1}{4} \right) + \left(+\frac{50}{17} \right) \cdot \left(-\frac{68}{5} \right) \\ x &= \left[+\frac{800}{80} \right] : \left(+\frac{4}{1} \right) + \left(+\frac{10}{1} \right) \cdot \left(-\frac{4}{1} \right) \\ x &= (+10) \cdot (+4) - 40 \\ x &= +40 - 40 \rightarrow x = 0 \\ \frac{x}{500} &= \frac{0}{500} = 0 \end{aligned}$$

$$\begin{aligned} 5) \quad a) \quad x &= - \left[-\frac{2}{5} + \left(-\frac{3}{2} + \frac{9}{4} \right) \right] - \left[-\frac{7}{10} - \left(4 - \frac{12}{5} \right) \right] - 2 \\ x &= - \left[-\frac{2}{5} + \left(\frac{-6+9}{4} \right) \right] - \left[-\frac{7}{10} - \left(\frac{20-12}{5} \right) \right] - 2 \\ x &= - \left[-\frac{2}{5} + \frac{3}{4} \right] - \left[-\frac{7}{10} - \frac{8}{5} \right] - 2 \\ x &= +\frac{2}{5} - \frac{3}{4} + \frac{7}{10} + \frac{8}{5} - 2 \\ x &= \frac{+8-15+14+32-40}{20} \rightarrow x = -\frac{1}{20} \end{aligned}$$

$$b) \quad -\frac{1}{x} = -\frac{1}{-\frac{1}{20}} = -1 \cdot \left(-\frac{20}{1} \right) = 20$$

$$\begin{aligned} c) \quad x + y &= 1 \\ -\frac{1}{20} + y &= 1 \\ y - \frac{1}{20} &= \frac{20}{20} \\ y &= \frac{21}{20} \end{aligned}$$

Desafio

1ª	2ª	3ª	4ª	5ª
3	7	9	18	63
3 + 7 + 9 + 18 + 63 = 100				

$$\begin{aligned} 6) \quad x &= \frac{\left(-\frac{2}{5} \right) \cdot \left(-\frac{3}{4} \right)}{\left(\frac{-1+4}{2} \right)} = \frac{\left(-\frac{1}{5} \right) \cdot \left(-\frac{3}{2} \right)}{\left(+\frac{3}{2} \right)} = \frac{\cancel{3} \cdot \cancel{2}}{\cancel{10} \cdot \cancel{2}} = \frac{1}{5} \\ y &= \frac{1}{x} = \frac{1}{\frac{1}{5}} = 1 \cdot \frac{5}{1} = 5 \end{aligned}$$

$$a) \quad x + y = \frac{1}{5} + 5 = \frac{1+25}{5} = \frac{26}{5}$$

$$b) \quad x - y = \frac{1}{5} - 5 = \frac{1-25}{5} = -\frac{24}{5}$$

$$c) \quad x \cdot y = \frac{1}{5} \cdot 5 = 1$$

$$d) \quad x : y = \frac{1}{5} : 5 = \frac{1}{5} \cdot \frac{1}{5} = \frac{1}{25}$$

$$7) \quad k = \frac{1}{1 + \frac{1}{1 - \frac{1}{1+1}}}$$

$$k = \frac{1}{1 + \frac{1}{1 - \frac{1}{2}}}$$

$$k = \frac{1}{1 + \frac{1}{\frac{1}{2}}}$$

$$k = \frac{1}{1+2}$$

$$k = \frac{1}{3}$$

Potenciação

$$1) \quad a) \quad \frac{16}{9}$$

$$b) \quad 49$$

$$c) \quad \left(-\frac{6}{10} \right)^3 = -\frac{216}{1000} = -0,216$$

$$d) \quad 1$$

$$e) \quad -\frac{2}{3}$$

$$f) \quad \frac{9}{25}$$

$$g) \quad \frac{1}{16}$$

$$h) \quad -\frac{27}{343}$$

$$2) \quad a) \quad (+13)^2 = 169$$

$$c) \quad \left(-\frac{3}{4} \right)^3 = -\frac{27}{64}$$

$$b) \quad (-0,5)^2 = 0,25$$

$$d) \quad \left(-\frac{2}{3} \right)^5 = -\frac{32}{243}$$

$$3) \quad a) \quad x = 0$$

$$d) \quad x = 5$$

$$b) \quad x = 1$$

$$e) \quad x = 4$$

$$c) \quad x = 4$$

$$f) \quad x = 2$$

$$4) \quad a) \quad \left(\frac{1}{2} \right)^2 + \left(\frac{1}{3} \right)^2 = \frac{1}{4} + \frac{1}{9} = \frac{9+4}{36} = \frac{13}{36}$$



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

$$c) \left(\frac{1}{2}\right)^2 - \left(\frac{1}{3}\right)^2 = \frac{1}{4} - \frac{1}{9} = \frac{9-4}{36} = \frac{5}{36}$$

$$d) \left(\frac{1}{2}\right)^2 - 2 \cdot \frac{1}{2} \cdot \frac{1}{3} + \left(\frac{1}{3}\right)^2 = \frac{1}{4} - \frac{1}{3} + \frac{1}{9} = \frac{9-12+4}{36} = \frac{1}{36}$$

$$5) a) +\frac{1}{16} + \left(+\frac{1}{16}\right) = \frac{2}{16} = \frac{1}{8}$$

$$b) +\frac{4}{9} : \left(-\frac{4}{10}\right)^2 = +\frac{4}{9} : \left(+\frac{16}{100}\right) = +\frac{4}{9} \cdot \left(+\frac{100}{16}\right) = \frac{25}{9}$$

$$c) +\frac{225}{256} \cdot \frac{1024}{625} + \frac{14}{25} =$$

$$\frac{9}{1} \cdot \frac{4}{25} + \frac{14}{25} =$$

$$\frac{36}{25} + \frac{14}{25} = \frac{50}{25} = 2$$

$$d) \left[1:25 - \left(\frac{2}{5}\right)^7 : \left(\frac{2}{5}\right)^5\right] : \left(\frac{9}{5}\right)^2 + \frac{2}{27} =$$

$$\left[\frac{1}{25} - \left(\frac{2}{5}\right)^2\right] : \frac{81}{25} + \frac{2}{27} =$$

$$\left[\frac{1}{25} - \frac{4}{25}\right] \cdot \frac{25}{81} + \frac{2}{27} =$$

$$-\frac{3}{25} \cdot \frac{25}{81} + \frac{2}{27} =$$

$$-\frac{3}{81} + \frac{2}{27} = -\frac{1}{27} + \frac{2}{27} = \frac{1}{27}$$

$$6) a) (-11)^{-2} = \left(-\frac{1}{11}\right)^2 = \frac{1}{121}$$

$$b) (+12)^{-3} = \left(+\frac{1}{12}\right)^3 = \frac{1}{1728}$$

$$c) \left(-\frac{20}{13}\right)^1 = -\frac{20}{13}$$

$$d) \left(-\frac{4}{3}\right)^{-5} = \left(-\frac{3}{4}\right)^5 = -\frac{243}{1024}$$

$$e) \left(-\frac{10}{3}\right)^4 = \frac{10\,000}{81}$$

$$f) \left(-\frac{6}{5}\right)^{-5} = \left(-\frac{5}{6}\right)^5 = -\frac{3\,125}{7\,776}$$

$$7) x = [(-10)^4 : (-10)^{-4} : 10^{-6}]$$

$$x = [(-10)^{4-(-4)} : 10^{-6}]$$

$$x = [(-10)^8 : 10^{-6}]$$

$$x = [10^8 : 10^{-6}]$$

$$x = 10^{8-(-6)}$$

$$x = 10^{8+6} = 10^{14}$$

$$y = -\frac{1}{x}$$

$$y = -\frac{1}{10^{14}}$$

$$y = -(10)^{-14}$$

$$8) a) \left(-\frac{27}{20}\right)^6 \cdot \left(-\frac{27}{20}\right)^8 = \left(-\frac{27}{20}\right)^{6+8} = \left(-\frac{27}{20}\right)^{14} = \left(\frac{27}{20}\right)^{14}$$

$$b) \left(-\frac{13}{4}\right)^{6-5} = \left(-\frac{13}{4}\right)^1$$

$$c) \left(+\frac{23}{35}\right)^{3 \cdot 6} = \left(\frac{23}{35}\right)^{18}$$

$$d) (-0,38)^{6 \cdot 5} = (0,38)^{30}$$

$$e) \left(-\frac{3}{19}\right)^{9+6+1} = \left(-\frac{3}{19}\right)^{16} = \left(\frac{3}{19}\right)^{16}$$

Desafio

$$K = \frac{\overset{1}{2} \cdot \overset{2^1}{8} \cdot \overset{3^1}{15} \cdot \overset{4^1}{24} \cdot \overset{5^1}{35} \cdot \overset{6^1}{48} \cdot \overset{7^1}{63} \cdot \overset{8^1}{80} \cdot \overset{9^1}{99} \cdot \overset{10^1}{120} \cdot \overset{11^1}{143} \cdot \overset{12^1}{168}}{\underset{1}{4} \cdot \underset{2^1}{8} \cdot \underset{3^1}{16} \cdot \underset{4^1}{25} \cdot \underset{5^1}{36} \cdot \underset{6^1}{49} \cdot \underset{7^1}{64} \cdot \underset{8^1}{81} \cdot \underset{9^1}{100} \cdot \underset{10^1}{121} \cdot \underset{11^1}{144} \cdot \underset{12^1}{169}}$$

$$\frac{\overset{15^1}{195} \cdot \overset{8}{224}}{\underset{28^1}{196} \cdot \underset{15}{225}}$$

$$K = \frac{8}{15}$$

Logo:

$$(30 \cdot K - 16)^{500} = \left(30 \cdot \frac{8}{15} - 16\right)^{500} = (16 - 16)^{500} = 0^{500} = 0$$

$$9) a) 0,1 = \frac{1}{10} = \frac{1}{10^1} = 10^{-1}$$

$$b) 0,001 = \frac{1}{1000} = \frac{1}{10^3} = 10^{-3}$$

$$c) 0,000001 = \frac{1}{1000000} = \frac{1}{10^6} = 10^{-6}$$

$$d) 0,0000000001 = \frac{1}{10000000000} = \frac{1}{10^{10}} = 10^{-10}$$



10 a) $\left(-\frac{2}{3}\right)^{5-(-2)} - 2 = \left(-\frac{2}{3}\right)^7 - 2 =$
 $-\frac{128}{2187} - 2 = \frac{-128 - 4374}{2187} =$
 $-\frac{4502}{2187}$

b) $-\frac{1}{216} \cdot \left[\left(-\frac{7}{8}\right) \cdot \left(-\frac{15}{28}\right) - \frac{25}{36} \right] + \frac{1}{12} =$
 $-\frac{1}{216} \cdot \left[+\frac{3}{4} - \frac{25}{36} \right] + \frac{1}{12} =$
 $-\frac{1}{216} \cdot \left[\frac{27-25}{36} \right] + \frac{1}{12} =$
 $-\frac{1}{216} \cdot \frac{2}{36} + \frac{1}{12} =$
 $-\frac{1}{216} \cdot \frac{36}{2} + \frac{1}{12} =$
 $-\frac{1}{216} \cdot 18 + \frac{1}{12} =$
 $-\frac{1}{12} + \frac{1}{12} = 0$

c) $\frac{\frac{1}{2} + \frac{1}{4}}{\frac{1}{8}} = \frac{\frac{4+2}{8}}{\frac{1}{8}} = \frac{6}{8} \cdot \frac{8}{1} = 6$

d) $\left(\frac{6-1}{2}\right)^{-2} \cdot \left(\frac{5+3}{15}\right)^{-1} + \left[-3 + \left(\frac{2-1}{2}\right)^{-2}\right] - \frac{3}{10} =$
 $\left(\frac{5}{2}\right)^{-2} \cdot \frac{15}{8} + \left[-3 + \left(\frac{1}{2}\right)^{-2}\right] - \frac{3}{10} =$
 $\frac{4}{25} \cdot \frac{15}{8} + \left[-3 + \frac{4}{1}\right] - \frac{3}{10} =$
 $\frac{3}{10} + [+1] - \frac{3}{10} = 1$

Radiação

1 $+\frac{2}{5}$ e $-\frac{2}{5} \rightarrow \left(+\frac{2}{5}\right)^2 = \left(-\frac{2}{5}\right)^2 = \frac{4}{25}$
 $\sqrt{\frac{4}{25}} = \frac{2}{5}$

2 a) $\frac{4}{5}$

b) $-\frac{1}{9}$

c) $\frac{7}{6}$

d) $-\sqrt{\frac{64}{100}} = -\frac{8}{10} = -0,8$

e) $\sqrt{\frac{289}{100}} = \frac{17}{10} = 1,7$

f) $\sqrt{\frac{361}{100}} = \frac{19}{10} = 1,9$

3 a) $\sqrt{\frac{1}{4}} = \frac{1}{2}; \sqrt{\frac{49}{100}} = \frac{7}{10}; -\sqrt{\frac{4}{81}} = -\frac{2}{9}$

b) $\sqrt{\frac{1}{2}}; \sqrt{0,9}$

4 a) $x = \sqrt{\frac{34-18}{9}} = \sqrt{\frac{16}{9}} = \frac{4}{3}$

b) $x = \sqrt{0,48+0,01} = \sqrt{0,49} = \sqrt{\frac{49}{100}} = \frac{7}{10} = 0,7$

5 $A = \sqrt{\left(\frac{1}{2}\right)^2 \cdot \left(\frac{5}{12} \cdot \frac{15}{9}\right)}$

$A = \sqrt{\frac{1}{4} \cdot \left(\frac{5}{12} \cdot \frac{9}{15}\right)}$

$A = \sqrt{\frac{1}{4} \cdot \frac{1}{12} \cdot \frac{9}{3}} = \sqrt{\frac{1 \cdot 1}{4 \cdot 4}} = \sqrt{\frac{1}{16}} \rightarrow A = \frac{1}{4}$

$\sqrt{A} = \sqrt{\frac{1}{4}} = \frac{1}{2}$

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

$\frac{\frac{5}{3} - \sqrt{\frac{25}{9} + \frac{8}{3}} - \frac{1}{2}}{\frac{4}{3}} = \frac{\frac{5}{3} - \sqrt{\frac{25+24}{9}} - \frac{1}{2}}{\frac{4}{3}} =$

$\frac{\frac{5}{3} - \frac{7}{3} - \frac{1}{2}}{\frac{4}{3}} = \frac{-\frac{2}{3} - \frac{1}{2}}{\frac{4}{3}} = \frac{-\frac{2 \cdot 3 - 1 \cdot 3}{6}}{\frac{4}{3}} = \frac{-\frac{1}{2}}{\frac{4}{3}} = -\frac{1}{2} \cdot \frac{3}{4} = -\frac{3}{8}$

7 a) $\frac{2}{3} \cdot \sqrt{\frac{9}{100}} - \frac{25}{7} \cdot \sqrt{\frac{49}{100}} = \frac{2}{3} \cdot \frac{3}{10} - \frac{25}{7} \cdot \frac{7}{10} =$
 $= \frac{1}{5} - \frac{5}{2} = \frac{2-25}{10} = -\frac{23}{10} = -2,3$

b) $\left[\left(-\frac{5}{2}\right) \cdot \frac{2}{5} + \frac{1}{16} \cdot 4 \right] : \left(\frac{1}{2} - 2\right) =$

$\left[-1 + \frac{1}{4}\right] : \left(\frac{1-4}{2}\right) =$

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

$\left(-\frac{3}{4}\right) \cdot \left(-\frac{2}{3}\right) = +\frac{1}{2} = 0,5$



$$\begin{aligned} \text{c) } \sqrt{\frac{1}{25}} + \sqrt{\frac{1}{4}} - \sqrt{\frac{9}{100}} &= \\ \frac{1}{5} + \frac{1}{2} - \frac{3}{10} &= \\ \frac{2+5-3}{10} &= \\ \frac{4}{10} &= \frac{2}{5} \end{aligned}$$

$$\begin{aligned} \text{d) } \{[-(+4) - 3] : 1 - 2\} &= \\ \{[-4 - 3] : 1 - 2\} &= \\ \{-7 : 1 - 2\} &= \\ \{-7 - 2\} &= \\ -9 & \end{aligned}$$