

Exercice 1 :

$$\begin{aligned}
 A &= \frac{5}{7} + \frac{1}{7} \times (5 + \frac{1}{2}) \\
 &= \frac{5}{7} + \frac{1}{7} \times (\frac{10}{2} + \frac{1}{2}) \\
 &= \frac{5}{7} + \frac{1}{7} \times \frac{11}{2} \\
 &= \frac{5}{7} + \frac{11}{14} \\
 &= \frac{10}{14} + \frac{11}{14} \\
 &= \frac{21}{14} = \frac{3 \times \cancel{7}}{2 \times \cancel{7}} = \boxed{\frac{3}{2}}
 \end{aligned}$$

$$\begin{aligned}
 B &= - \frac{54}{26} \times \frac{39}{27} \times \frac{24}{48} \\
 &= - \frac{\cancel{9} \times \cancel{3} \times \cancel{2} \times \cancel{13} \times \cancel{3} \times \cancel{24} \times 1}{\cancel{2} \times \cancel{13} \times \cancel{9} \times \cancel{3} \times \cancel{24} \times 2} \\
 &= \boxed{-\frac{3}{2}}
 \end{aligned}$$

$$\begin{aligned}
 C &= \frac{9 + \frac{5}{3} - \frac{7}{4}}{9 - \frac{5}{3} + \frac{7}{4}} \\
 &= \frac{\frac{12 \times 9}{12} + \frac{5 \times 4}{3 \times 4} - \frac{7 \times 3}{4 \times 3}}{\frac{12 \times 9}{12} - \frac{5 \times 4}{3 \times 4} + \frac{7 \times 3}{4 \times 3}} \\
 &= \frac{\frac{108}{12} + \frac{20}{12} - \frac{21}{12}}{\frac{108}{12} - \frac{20}{12} + \frac{21}{12}} \\
 &= \frac{\frac{108}{12} - \frac{1}{12}}{\frac{108}{12} + \frac{1}{12}} \\
 &= \frac{\frac{107}{12}}{\frac{109}{12}} = \frac{107}{12} \times \frac{\cancel{12}}{109} = \boxed{\frac{107}{109}}
 \end{aligned}$$

$$\begin{aligned}
 D &= \frac{4}{9} \times 7 - \frac{5 + \frac{1}{2}}{\frac{1}{4} - 1} \\
 &= \frac{28}{9} - \frac{\frac{10}{2} + \frac{1}{2}}{\frac{1}{4} - \frac{4}{4}} \\
 &= \frac{28}{9} - \frac{\frac{11}{2}}{-\frac{3}{4}} \\
 &= \frac{28}{9} - \frac{11}{2} \times (-\frac{4}{3}) \\
 &= \frac{28}{9} + \frac{\cancel{11} \times \cancel{2} \times 2}{\cancel{2} \times 3} \\
 &= \frac{28}{9} + \frac{22}{3} = \frac{28}{9} + \frac{66}{9} = \boxed{\frac{94}{9}}
 \end{aligned}$$

Exercice 2 :1)

$$\begin{aligned}
 A &= \frac{10^{-7} \times 10^4}{10^{-6}} \\
 &= \frac{10^{-3}}{10^{-6}} \\
 &= 10^{-3 - (-6)} \\
 &= 10^{-3+6} \\
 &= \underline{\underline{10^3}}
 \end{aligned}$$

$$\begin{aligned}
 B &= \frac{(10^{-3})^2 \times 10^{-11}}{10^4 \times 10^{-9}} \\
 &= \frac{10^{-6} \times 10^{-11}}{10^{-5}} \\
 &= \frac{10^{-17}}{10^{-5}} \\
 &= 10^{-17 - (-5)} \\
 &= 10^{-17+5} \\
 &= \underline{\underline{10^{-12}}}
 \end{aligned}$$

2)

$$\begin{aligned}
 C &= \frac{\cancel{3} \times \cancel{3} \times \cancel{11} \times 10^0}{\cancel{3} \times \cancel{2} \times \cancel{11} \times 10^{-2}} \\
 &= \frac{3}{2} \times 10^{0 - (-2)} \\
 &= \underline{\underline{1,5 \times 10^2}}
 \end{aligned}$$

Exercice 3 :

$$\begin{aligned} A &= \frac{11^9 \times 11^{-13}}{(11^{-4})^5 \times 11^2} \\ &= \frac{11^{-4}}{11^{-20} \times 11^2} \\ &= \frac{11^{-4}}{11^{-18}} \\ &= 11^{-4-(-18)} = 11^{-4+18} = \underline{11^{14}} \end{aligned}$$

Exercice 4 :

$\begin{aligned} A &= \frac{20}{19} \times \left(\frac{5}{2} - \frac{3}{5} \right) \\ &= \frac{20}{19} \times \left(\frac{25}{10} - \frac{6}{10} \right) \\ &= \frac{20}{19} \times \frac{19}{10} \\ &= \frac{20}{10} = \underline{2} \end{aligned}$	$\begin{aligned} B &= \frac{(10^{-6})^2 \times 6 \times 10^5 \times 2,5}{2 \times 10^3 \times 15 \times 10^{-10}} \\ &= \frac{\cancel{3} \times \cancel{2} \times \cancel{2,5}}{2 \times \cancel{3} \times 2 \times \cancel{2,5}} \times \frac{10^{-12} \times 10^5}{10^{-7}} \\ &= \frac{1}{2} \times \frac{10^{-7}}{10^{-7}} = \boxed{\frac{1}{2}} \end{aligned}$
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Ces deux nombres sont inverses l'un de l'autre et non opposés.

Exercice 5 :

1) Détermination d'une al en km :

$$365 \times 24 \times 3600 \times 300\,000 \simeq 9,46 \times 10^{12}$$

Une année-lumière représente environ $9,46 \times 10^{12}$ km

2) Distance Terre-Proxima du Centaure en km :

$$d = 4,3 \times 9,46 \times 10^{12} \simeq 4,07 \times 10^{13}$$

Proxima est située à environ $4,07 \times 10^{13}$ km

3) Distance Terre-Grand Nuage de Magellan en km :

$$d = 170\,000 \times 9,46 \times 10^{12} \simeq 1,61 \times 10^{18}$$

Le Grand Nuage de Magellan est situé à environ $1,61 \times 10^{18}$ km

Exercice 6 :

$$\begin{aligned} B &= \frac{36^7 \times 50^3 \times 9^{11}}{45^6 \times 21^{17}} \\ &= \frac{(2^2 \times 3^2)^7 \times (2 \times 5^2)^3 \times (3^2)^{11}}{(3^2 \times 5)^6 \times (3 \times 7)^{17}} \\ &= \frac{2^{14} \times 3^{14} \times 2^3 \times \cancel{5^6} \times 3^{22}}{3^{12} \times \cancel{5^6} \times 3^{17} \times 7^{17}} \\ &= \frac{2^{17} \times 3^{36}}{3^{29} \times 7^{17}} \\ &= \underline{2^{17} \times 3^7 \times 5^0 \times 7^{-17}} \end{aligned}$$