

Partie 1 : fractions :

1) $\frac{3}{5} \times \frac{\frac{1}{3} + \frac{2}{7}}{\frac{7}{4}}$ 3) $(\frac{9}{2} + \frac{5}{7}) \div 5$

2) $\frac{5}{3} \times (\frac{1}{3} + \frac{7}{2})$ 4) **Case tête** : 1; 5; 6; 7.
 Trouvez un nombre qui donne 21 en utilisant 1 seule fois les chiffres donnés et les opérations élémentaires.

1) $\frac{3}{5} \times \frac{\frac{1}{3} + \frac{2}{7}}{\frac{7}{4}}$
 $= \frac{3}{5} \times \frac{\frac{4}{11} + \frac{6}{12}}{\frac{7}{4}}$
 $= \frac{3}{5} \times \frac{\frac{10}{12} + \frac{6}{12}}{\frac{7}{4}}$
 $= \frac{3}{5} \times \frac{\frac{16}{12}}{\frac{7}{4}}$

2) $\frac{5}{3} \times (\frac{1 \times 2}{3 \times 2} + \frac{7 \times 3}{2 \times 3})$
 $= \frac{5}{3} \times (\frac{2}{6} + \frac{21}{6})$
 $= \frac{5}{3} \times (\frac{23}{6})$
 $= \frac{115}{18}$

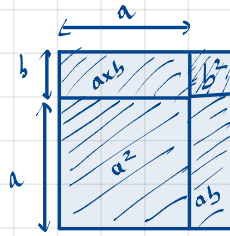
3) $(\frac{9}{2} + \frac{5}{7}) \div 5$
 $= (\frac{9 \times 7}{2 \times 7} + \frac{5 \times 2}{7 \times 2}) \div 5$
 $= \frac{46}{14} \div 5$
 $= \frac{46}{14} \times \frac{1}{5}$
 $= \frac{46}{70}$
 $= \frac{23}{35}$

4) $6 \div (1 - 5 \div 7) = \frac{6}{\frac{1 \times 7}{7} - \frac{5}{7}}$
 $= \frac{6}{\frac{7}{7} - \frac{5}{7}} = \frac{6}{\frac{2}{7}} = 6 \times \frac{7}{2} = \frac{42}{2} = 21$

$x^2 = 4$
 $x^2 - 4 = 0$
 $x^2 - 2^2 = 0$
 $(x-2)(x+2) = 0$
 $x-2=0 \Rightarrow x=2$
 $x+2=0 \Rightarrow x=-2$
 $A \times B = 0 \Rightarrow A=0 \text{ ou } B=0$
 $x = -2$

Partie 2. Calcul littéral : Identités remarquables :

1) $(a+b)^2 = a^2 + 2ab + b^2$



$(a+b)^2 = (a+b) \times (a+b)$
 $= a^2 + ab + ab + b^2$
 $= a^2 + 2ab + b^2$

$(2x+3)^2 = (2x)^2 + 2 \times 2x \times 3 + 3^2$
 $= 4x^2 + 12x + 9$

$(ax)^c = a^c \times b^c$
 $(2x)^2 \neq 2x^2$
 $2x \times 2x \neq 2x \times x \times x$

2) $(a-b)^2 = a^2 - 2ab + b^2$

3) $(a+b)(a-b) = a^2 - b^2$
 développer produit à somme
 factoriser somme à produit.

$2x \times x + 2x \times 4 = 2x(x+4)$
 $(a+b)^2 = a^2 + 2ab + b^2$

Exercice 1 : développer les expressions suivantes :
 $A = (3x+2)^2 = (3x)^2 + 2 \times 3x \times 2 + 2^2 = 9x^2 + 12x + 4$
 $B = (2x-4)^2 = (2x)^2 - 2 \times 2 \times x \times 4 + 4^2 = 4x^2 - 16x + 16$
 $C = 5x \times (2x-1) = 5x \times 2x + 5x \times (-1) = 10x^2 - 5x$
 $D = (3x+2) \times (3x-2) = (3x)^2 - 2^2 = 9x^2 - 4$

Rappels : $(a+b)^2 = a^2 + 2ab + b^2$
 $(2x+3)^2 = (2x)^2 + 2 \times 2x \times 3 + 3^2 = 4x^2 + 12x + 9$
 $(a-b)^2 = a^2 - 2ab + b^2$
 $(a+b)(a-b) = a^2 - b^2$
 $a \times (b+c) = ab + ac$
 $(a+b)(c+d) = ac + ad + bc + bd$

Exemples de factorisation :
 1) $x^2 - 25 = x^2 - 5^2 = (x+5)(x-5)$ 3^{ème} identité rem $a^2 - b^2 = (a+b)(a-b)$
 2) $x^2 + 4x = x \times x + x \times 4 = x(x+4)$ factor en commun.
 3) $4x^2 + 12x + 9 = (2x)^2 + 2 \times 2x \times 3 + 3^2 = (2x+3)^2$ 1^{ère} identité rem.
 4) $9x^2 - 12x + 4 = (3x)^2 - 2 \times 3x \times 2 + 2^2 = (3x-2)^2$

Exercice d'application :
 $A = 16x^2 - 64$ $B = (2x+3)(5x-2) + (2x+3)(7x-5)$
 $C = (4x-1) \times (3x-2) - (4x-1) \times (8x+7)$ $D = (8x+4)(2x+1) - (2x+1)(-2x+3)$

$$A = 16x^2 - 64$$

$$A = (4x)^2 - 8^2$$

$$A = (4x+8)(4x-8)$$

$$a^2 - b^2 = (a+b)(a-b)$$

$$B = (2x+3)(5x-2) + (2x+3)(7x-5)$$

$$B = (2x+3)(5x-2+7x-5)$$

$$B = (2x+3)(12x-7)$$

$$C = (4x-1)(3x-2) - (4x-1)(8x+7)$$

$$C = (4x-1)(3x-2-(8x+7))$$

$$C = (4x-1)(3x-2-8x-7)$$

$$C = (4x-1)(-5x-9)$$

$$D = (8x+4)(x+1) - (2x+1)(-2x+3)$$

$$D = (2x \times 4 + 1 \times 4)(x+1) - (2x+1)(-2x+3)$$

$$D = 4(2x+1)(x+1) - (2x+1)(-2x+3)$$

$$D = (2x+1) \times (4(x+1) - (-2x+3))$$

$$D = (2x+1)(4x+4+2x-3)$$

$$D = (2x+1)(6x+1)$$

$$15 = 16 - 1$$

$$E = x^2 + 8x + 15$$

$$a^2 - 2ab + b^2$$

$$E = (x)^2 + 2 \times x \times 4 + 4^2 - 1$$

$$E = (x+4)^2 - 1^2$$

$$E = (x+4)^2 - 1^2 \quad a^2 - b^2 = (a-b)(a+b)$$

$$E = (x+4+1)(x+4-1)$$

$$E = (x+5)(x+3)$$

Factoriser.

$$A = 9x^2 - 5x$$

$$F = x^2 + 8x + 16$$

$$B = 6x + 9$$

$$G = 4 - x^2$$

$$C = x(x+5) + x(3x-2)$$

$$H = 9x^2 - 30x + 25$$

$$D = (x+4)(x-6) - (-1+x)(x-6) \quad I = 25 - 36x^2$$

$$E = (3x-1) - (3x-1)^2$$

$$J = (4x-3)^2 - 1$$

$$A = x \times 9x - x \times 5$$

$$B = 3 \times 2x + 3 \times 3$$

$$A = x(9x-5)$$

$$B = 3(2x+3)$$

$$C = x(x+5+3x-2) \quad D = (x-6)(x+4-(-1+x))$$

$$C = x(4x+3) \quad D = (x-6)(x+4+1-x)$$

$$D = (x-6)(5)$$

$$D = 5(x-6)$$

$$E = x^2 + 8x + 15$$