Exposants entiers

$a^n = \underbrace{a \cdot a \dots a}_{n \text{ fois}}$ $\quad n \in \mathbb{N} = \{1, 2, \dots\}$, $a \in \mathbb{R}$.

$a^0 = 1$ pour $a \neq 0$.

$a^n \cdot a^m = a^{n+m}$ $\qquad (a \cdot b)^n = a^n \cdot b^n$

$(a^n)^m = a^{n \cdot m}$ $\qquad \left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$

$a^{-n} = \frac{1}{a^n}$ $\qquad \left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$

① Ecrire sous la forme d'une puissance.

$\cdot \quad (3a^3)^{-4} = \frac{1}{(3a^3)^4} = \frac{1}{3^4 \cdot (a^3)^4} = \frac{1}{3^4 \cdot a^{12}} = \frac{1}{3^4} \cdot \frac{1}{a^{12}} = \frac{1}{81} a^{-12}$

$\cdot\cdot \quad (-5a^{-1})^{-4} = (-5)^{-4} (a^{-1})^{-4} = \frac{1}{(-5)^4} \cdot a^{(-1)\cdot(-4)} = \frac{1}{25^2} \cdot a^4$

$\therefore \quad \frac{\left(\frac{1}{3} a^{-2}\right)^{-1}}{a^5} = \left(\frac{1}{3} a^{-2}\right)^{-1} \cdot \frac{1}{a^5} = \left(\frac{1}{3}\right)^{-1} (a^{-2})^{-1} a^{-5} = \left(\frac{3}{1}\right)^1 a^{(-2)(-1)+(-5)}$

$= 3a^{-3}$

② Simplifier :

$(-20 x^5 y^8)\left(\frac{1}{5} x^7 y^7\right) = (-20)\left(\frac{1}{5}\right) \cdot (x^5 \cdot x^7) \cdot (y^8 \cdot y^7)$

$= -4 x^{5+7} \cdot y^{8+7} = -4 x^{12} \cdot y^{15}$

③ Eliminer la puissance negative.

$\left(\frac{y^6 x^{-10}}{y^7 x^{-9}}\right) \cdot \left(\frac{x^{-11}}{y^{-5}}\right)^3 = \frac{y^6 \cdot x^{-10}}{y^7 \, x^{-9}} \cdot \frac{x^{-33}}{y^{-15}}$

$= \frac{y^6}{y^7 \cdot y^{-15}} \cdot \frac{x^{-10} \cdot x^{-33}}{x^{-9}}$

$= y^6 \cdot y^{-7} y^{-(-15)} \cdot x^{-10} \cdot x^{-33} \cdot x^{-(-9)} = y^{6-7+15} x^{-10-33+9}$

$= y^{14} \cdot x^{-34} = \frac{y^{14}}{x^{34}}$