

ANSWERS → Exercise 3 - EXPONENTS

$$\begin{aligned} 1. \quad & 11^{-2} \\ & = \frac{1}{11^2} \\ & = \frac{1}{121} \end{aligned}$$

$$2. \quad (-123)^0 = 1$$

$$\begin{aligned} 3. \quad & (-5)^{-2} \\ & = \frac{1}{(-5)^2} \\ & = \frac{1}{25} \end{aligned}$$

$$\begin{aligned} 4. \quad & -13^{-1} \\ & = -\frac{1}{13^1} \\ & = -\frac{1}{13} \end{aligned}$$

$$\begin{aligned} 5. \quad & -5^{-2} \\ & = \frac{1}{-5^2} \\ & = \frac{1}{-25} \end{aligned}$$

$$\begin{aligned} 6. \quad & (2^{-3})(4^{-1}) \\ & = \left(\frac{1}{2^3}\right)\left(\frac{1}{4^1}\right) \\ & = \left(\frac{1}{8}\right)\left(\frac{1}{4}\right) \\ & = \frac{1}{32} \end{aligned}$$

$$\begin{aligned} 7. \quad & 2^{-3} + 4^{-1} \\ & = \frac{1}{2^3} + \frac{1}{4^1} \\ & = \frac{1}{8} + \frac{1}{4} \\ & = \frac{1}{8} + \frac{2}{8} \\ & = \frac{3}{8} \end{aligned}$$

(common denominator)

$$\begin{aligned} 8. \quad & -15^0 \\ & = -1 \end{aligned}$$

$$\begin{aligned} 9. & -(-13)^0 + 6^0 - 12^0 + (12)^0 \\ & = -(1) + 1 - 1 + 1 \\ & = -1 + 1 - 1 + 1 \\ & = 0 \end{aligned}$$

$$\begin{aligned} 10. & \frac{(5^3)(4^3)}{(10^2)(2^2)(3^1)} \\ & = \frac{(125)(64)}{(100)(4)(3)} \\ & = \frac{8000}{1200} \\ & = \frac{20}{3} \end{aligned}$$

$$\begin{aligned} 11. \quad & \frac{1}{5^{-2}} \\ & = 5^2 \\ & = 25 \end{aligned}$$

$$\begin{aligned} 12. \quad & \frac{x^{-5} y^{11} z^{-5}}{w^4 x^{-6}} \\ & = \frac{x^6 y^{11}}{x^5 w^4 z^5} \\ & = \frac{x y^{11}}{w^4 z^5} \end{aligned}$$

$$\begin{aligned} 13. \quad & \frac{y^{-5}}{y^6} \\ & = y^{-11} \\ & = \frac{1}{y^{11}} \end{aligned}$$

$$\begin{aligned} 14. \quad & x^{-2} + y^{-2} \\ & = \frac{1}{x^2} + \frac{1}{y^2} \\ & = \frac{y^2 + x^2}{x^2 y^2} \quad \left\{ \begin{array}{l} \text{common} \\ \text{denominator} \end{array} \right\} \end{aligned}$$

$$\begin{aligned}
 15. & (x+y)^{-3} \\
 &= \frac{1}{(x+y)^3} \\
 &= \frac{1}{(x+y)(x+y)(x+y)} \\
 &= \frac{1}{(x^2+2xy+y^2)(x+y)} \\
 &= \frac{1}{x^3+x^2y+2x^2y+2xy^2+xy^2+y^3} \\
 &= \frac{1}{x^3+3x^2y+3xy^2+y^3}
 \end{aligned}$$

$$\begin{aligned}
 16. & (x^{-4}+y^{-2})^{-1} \\
 &= \left(\frac{1}{x^4} + \frac{1}{y^2}\right)^{-1} \\
 &= \left(\frac{y^2+x^4}{x^4y^2}\right)^{-1} \\
 &= \frac{x^4y^2}{y^2+x^4}
 \end{aligned}$$

$$\begin{aligned}
 17. & \left(\frac{2}{5}\right)^{-2} \\
 &= \left(\frac{5}{2}\right)^2 \\
 &= \frac{5^2}{2^2} \\
 &= \frac{25}{4}
 \end{aligned}$$

$$19. \frac{6^{-1} + 6^2}{6^{-1} - 6^2}$$

$$= \frac{1 + 36}{6}$$

$$\frac{1 - 36}{6}$$

$$= \frac{1 + \frac{216}{6}}{6}$$

$$\frac{1 - \frac{216}{6}}{6}$$

$$= \frac{217}{6}$$

$$\frac{-215}{6}$$

$$= \frac{217 \times 6}{6 \cdot -215}$$

$$= -\frac{217}{215}$$

$$20. \left(\frac{a^{-2}}{b^{-3}} \right)^{-4}$$

$$= \frac{a^8}{b^{12}}$$

$$21. \left(\frac{2m^2}{n^3} \right)^{-2}$$

$$= \left(\frac{n^3}{2m^2} \right)^2$$

$$= \frac{n^6}{4m^4}$$

$$\begin{aligned}
 22. \quad & \frac{-34x^{-4}y^5}{2x^5y^{-7}z^2} \\
 &= \frac{-34y^5y^7}{2x^5x^4z^2} \\
 &= \frac{-17y^{12}}{x^9z^2}
 \end{aligned}$$

$$\begin{aligned}
 23. \quad & (-3xy^{-5})(2x^{-4}y^{-2}) \\
 &= -6x^{-3}y^{-7} \\
 &= \frac{-6}{x^3y^7}
 \end{aligned}$$

$$\begin{aligned}
 24. \quad & \frac{(-2x^{-3})(-12x^{-4}y^{-2})}{6xy^{-3}} \\
 &= \frac{24x^{-7}y^{-2}}{6xy^{-3}} \\
 &= 4x^{-8}y^1 \\
 &= \frac{4y}{x^8}
 \end{aligned}$$

$$\begin{aligned}
 25. \quad & (w^{-3} + x^{-4})^{-2} \\
 &= \left(\frac{1}{w^3} + \frac{1}{x^4} \right)^{-2} \\
 &= \left(\frac{x^4 + w^3}{w^3x^4} \right)^{-2} \\
 &= \left(\frac{w^3x^4}{x^4 + w^3} \right)^2 \\
 &= \frac{w^6x^8}{(x^4 + w^3)^2}
 \end{aligned}$$

$$\begin{aligned}
 26. \quad & -(x^{12}y^{-89}z^{-4})^0 \\
 &= -(1) \\
 &= -1
 \end{aligned}$$

$$\begin{aligned}
 27. & \left(\frac{4x^{-3}y^4}{8x^2y^{-2}} \right)^{-2} \\
 & = \left(\frac{8x^2y^{-2}}{4x^{-3}y^4} \right)^2 \\
 & = \frac{64x^4y^{-4}}{16x^{-6}y^8} \\
 & = \frac{4x^4x^6}{y^4y^8} \\
 & = \frac{4x^{10}}{y^{12}}
 \end{aligned}$$

$$\begin{aligned}
 28. & \left(\frac{6}{x^0 + y^0} \right) \\
 & = \frac{6}{1+1} \\
 & = \frac{6}{2} \\
 & = 3
 \end{aligned}$$

$$\begin{aligned}
 29. & \left(\frac{-12x^{-7}y^2}{36x^9y^{-5}z^5} \right) \\
 & = \frac{-12y^2y^5}{36x^7x^9z^5} \\
 & = \frac{-y^7}{3x^{16}z^5}
 \end{aligned}$$