Main Properties of Integer Exponents

1. $a^n a^m = a^{n+m}$ Example : $a^{-9}a^4 = a^{-9+4} = a^{-5}$

2. $\left(a^n\right)^m = a^{nm}$ Example : $\left(a^7\right)^3 = a^{(7)(3)} = a^{21}$

3. $\dfrac{a^n}{a^m} = \begin{cases} a^{n-m} \\ \dfrac{1}{a^{m-n}} \end{cases}, \quad a \neq 0$ Example : $\dfrac{a^4}{a^{11}} = a^{4-11} = a^{-7}$

$\dfrac{a^4}{a^{11}} = \dfrac{1}{a^{11-4}} = \dfrac{1}{a^7} = a^{-7}$

4. $\left(ab\right)^n = a^n b^n$ Example : $\left(ab\right)^{-4} = a^{-4}b^{-4}$

5. $\left(\dfrac{a}{b}\right)^n = \dfrac{a^n}{b^n}, \quad b \neq 0$ Example : $\left(\dfrac{a}{b}\right)^8 = \dfrac{a^8}{b^8}$

6. $\left(\dfrac{a}{b}\right)^{-n} = \left(\dfrac{b}{a}\right)^n = \dfrac{b^n}{a^n}$ Example : $\left(\dfrac{a}{b}\right)^{-10} = \left(\dfrac{b}{a}\right)^{10} = \dfrac{b^{10}}{a^{10}}$

7. $\left(ab\right)^{-n} = \dfrac{1}{\left(ab\right)^n}$ Example : $\left(ab\right)^{-20} = \dfrac{1}{\left(ab\right)^{20}}$

8. $\dfrac{1}{a^{-n}} = a^n$ Example : $\dfrac{1}{a^{-2}} = a^2$

9. $\dfrac{a^{-n}}{b^{-m}} = \dfrac{b^m}{a^n}$ Example : $\dfrac{a^{-6}}{b^{-17}} = \dfrac{b^{17}}{a^6}$

10. $\left(a^n b^m\right)^k = a^{nk} b^{mk}$ Example : $\left(a^4 b^{-9}\right)^3 = a^{(4)(3)} b^{(-9)(3)} = a^{12} b^{-27}$

11. $\left(\dfrac{a^n}{b^m}\right)^k = \dfrac{a^{nk}}{b^{mk}}$ Example : $\left(\dfrac{a^6}{b^5}\right)^2 = \dfrac{a^{(6)(2)}}{b^{(5)(2)}} = \dfrac{a^{12}}{b^{10}}$