Negative Integer Exponent

Understanding of Negative Integer Exponent

- A negative exponent means the reciprocal of the base raised to the positive of that exponent.
- In simple words, $a^{-n} = \frac{1}{a^n}$ where a ≠ 0.
- It helps in writing very small numbers in a compact form.
- Negative exponents do not make the result negative unless the base itself is negative.

Important Points

- $a^{-n} = \frac{1}{a^n}$
- $\left(\frac{p}{q}\right)^{-n} = \left(\frac{q}{p}\right)^{n}$
- Negative exponents indicate reciprocal, not negativity.
- Always simplify the answer after removing the negative exponent.
- If the base is a fraction, invert it and make exponent positive.

Examples with Solutions

Example: Negative Exponent of a Positive Number

➢ **Find 2^{-3}.**

Solution: $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

Example: Negative Exponent of a Fraction

➢ **Find $\left(\frac{3}{5}\right)^{-2}$.**

Solution: $\left(\frac{3}{5}\right)^{-2} = \left(\frac{5}{3}\right)^{2} = \frac{25}{9}$

Example: Negative Exponent of a Negative Base

➢ **Find $(-2)^{-3}$.**

Solution: $(-2)^{-3} = \frac{1}{(-2)^3} = \frac{1}{-8} = -\frac{1}{8}$

Example: Simplifying with Variables

➢ **Simplify x^{-2} when x = 2.**

Solution: $x^{-2} = \frac{1}{x^2} = \frac{1}{2^2} = \frac{1}{4}$

Example: Complex Fractional Base

➢ **Find $\left(\frac{4}{7}\right)^{-3}$.**

Solution: $\left(\frac{4}{7}\right)^{-3} = \left(\frac{7}{4}\right)^{3} = \frac{7^3}{4^3} = \frac{343}{64}$

Summary Points

- Negative exponent means reciprocal with positive power.
- $a^{-n} = \frac{1}{a^n} and \left(\frac{p}{q}\right)^{-n} = \left(\frac{q}{p}\right)^{n}$.
- Always simplify the expression after changing the exponent to positive.
- Watch the sign of the base carefully.
- Final answers should be properly reduced if possible.