

# M9 - 3.6 - Exponents Negative Brackets Notes

## Simplify without Brackets

$$\begin{aligned} (-2x)^2 &= \\ ((-2)^1 x)^2 & \text{ Multiply Exponents} \\ (-2)^2 x^2 & \quad (-2)^{\text{even}} = +ve \\ \boxed{4x^2} & \quad (-2)^2 = 4 \end{aligned}$$

# Brackets

$$\begin{aligned} (-2x)^3 &= \\ ((-2)^1 x)^3 & \text{ Multiply Exponents} \\ (-2)^3 x^3 & \quad (-2)^{\text{odd}} = -ve \\ \boxed{-8x^3} & \quad (-2)^3 = -8 \end{aligned}$$

Check Answer! Arbitrary Numbers! $x = 3$	$(-2x)^3$ $(-2(3))^3$ $(-6)^3$ -216	Write Question/Answer Substitute Arbitrary # Solve Compare $-216 = -216$ ✓	$-8x^3$ $-8(3)^3$ $-8 \times 27$ -216
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$$\begin{aligned} (-2x^2y^3)^3 &= \\ (-2)^3 x^6 y^9 & \text{ Multiply Exponents} \\ \boxed{-8x^6y^9} & \text{ Simplify} \end{aligned}$$

## Simplify without Brackets

$$\begin{aligned} \left(\frac{6x^2}{2x^1}\right)^3 &= \\ \frac{(3^1 x^1)^3}{3^3 x^3} & \\ \boxed{27x^3} & \end{aligned}$$

Simplify 1st
Divide, Subtract Exponents
Multiply Exponents
Solve

$$\begin{aligned} \frac{6}{2} &= 3^1 \\ \frac{x^2}{x} &= x^1 \end{aligned}$$

OR

$$\begin{aligned} \left(\frac{6^1 x^2}{2^1 x^1}\right)^3 &= \\ \frac{6^3 x^6}{2^3 x^3} & \\ \frac{216x^6}{8x^3} & \\ \boxed{27x^3} & \end{aligned}$$

Don't Expand 1st
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$$\begin{aligned} 6^3 &= 216 \\ 2^3 &= 8 \end{aligned} \quad \frac{216}{8} = 27$$

## Simplify without Brackets

$$\begin{aligned} (-2x)^{-2} &= \\ \frac{1}{(-2x)^2} & \text{ Negative Exponents} \\ \frac{1}{(-2)^2 x^2} & \text{ Multiply Exponents} \\ \boxed{\frac{1}{4x^2}} & \text{ Simplify} \end{aligned}$$

$$\begin{aligned} \left(\frac{5x}{-2x^2}\right)^{-2} &= \\ \frac{5^{-2} x^{-2}}{(-2)^{-2} x^{-4}} & \text{ Multiply Exponents} \\ \frac{1}{4x^2} & \text{ Start off with "OVER"} \\ \frac{(-2)^2 x^4}{5^2 x^2} & \text{ Negative Exponents} \\ \frac{4x^4}{25x^2} & \text{ Subtract Exponents} \\ \boxed{\frac{4x^2}{25}} & \end{aligned}$$

OR

$$(-2)^2 = 4$$

$\frac{x^4}{x^2}$
$x^{4-2}$
$x^2$

$$\begin{aligned} \left(\frac{5x}{-2x^2}\right)^{-2} &= \\ \frac{5x}{2^2 x^4} & \text{ Flip it} \\ \frac{5x}{5^2 x^2} & \text{ Make Exponent} \\ \frac{4x^4}{25x^2} & \text{ Positive} \\ \boxed{\frac{4x^2}{25}} & \end{aligned}$$

$\left(\frac{a}{b}\right)^{-c} = \left(\frac{b}{a}\right)^c$
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