

Exponent Laws (Notes)

Review of the exponent laws

If m and n are any real numbers, then

1) $a^m \times a^n = a^{m+n}$

2) $\frac{a^m}{a^n} = a^{m-n} \quad (a \neq 0)$

3) $(a^m)^n = a^{mn}$

4) $(abc)^n = a^n b^n c^n$

5) $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n} \quad (b \neq 0)$

Negative Exponents

6) $a^{-m} = \frac{1}{a^m} \quad (a \neq 0) \quad (m \in \mathbb{N})$

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

Zero Exponents

8) $a^0 = 1 \quad (a \neq 0)$

Example 1: Evaluate

a) 4^{-2}

b) -4^2

c) $(-4)^2$

d) $(-4)^{-2}$

e) -4^{-2}

Example 2: Express answers in positive exponent

a) $a^5 \cdot a^7$

b) $a^7 \cdot a^{-4}$

c) $a^{-5} \times a^{-2}$

d) a^0

Example 3: Express answers in positive exponent

a) $(a^2)^4$

b) $(a^{-2})^4$

c) $(ab^3)^2$

d) $\left(\frac{a^2}{b^3}\right)^2$

e) $(2a^{-2}b^3)^5$

Example 4: Simplify

$$\frac{10a^5b^3c^2}{2a^7bc^2}$$