

Basic Rules of Exponents - Notes & Class Examples

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***The Product Rule: $x^a \cdot x^b = x^{a+b}$

1) $2x^2 \cdot -3x$
 $-6x^3$

2) $-3b^3 \cdot 2a^3b^2$
 $-6a^3b^5$

Simplify.

3) $-3n^2 \cdot 4n$
 $-12n^3$

4) $-4k^4 \cdot k^3$
 $-4k^7$

5) $-x \cdot 4x$
 $-4x^2$

6) $2n^3 \cdot n^2$
 $2n^5$

7) $-2uv^4 \cdot -uv^4$
 $2u^2v^8$

8) $2x^4y^2 \cdot -2y^3$
 $-4x^4y^5$

***Power raised to a Power: $(x^a)^b = x^{a \cdot b}$

9) $(r^3)^2$

~~scribble~~ r^6

10) $(a^3)^7$

~~scribble~~ a^{21}

***Product to a Power: $(xy)^a = x^a y^a$

11) $(3n^4)^2$
 $9n^8$

12) $(-3k^4)^4$

$81k^{16}$

Simplify.

13) $(-2u^4)^4$
 $16u^{16}$

14) $(-xy^4)^2$

$x^2 y^8$

15) $(x^4y^2)^3$
 $x^{12}y^6$

16) $(-3u^5v^2)^2$

$9u^{10}v^4$

Combination Problems : Simplify.

17) $(-2x^4)^3 \cdot x^4$

remember: order of operations

$-8x^{12} \cdot x^4$
 $-8x^{16}$

18) $(2b^2)^4 \cdot 2b^3$

$16b^8 \cdot 2b^3$

$32b^{11}$

$$19) (x^2 y^3)^4 \cdot 2y^2$$

$$x^8 y^{12} \cdot 2y^2 \quad 2x^8 y^{14}$$

***The Quotient Rule: $\frac{x^a}{x^b} = x^{a-b}$

$$21) \frac{-4n^3}{-3n^2}$$

$$\frac{-4}{-3}$$

$$\cdot \frac{n^3}{n^2} \rightarrow \frac{n \cdot n \cdot n}{n \cdot n}$$

$$\frac{4n}{3}$$

$$20) \frac{(m^3 \cdot -m^3 n^4)^3}{(-m^6 n^4)}$$

$$-m^{18} n^{12}$$

$$22) \frac{1xy^3}{3x^3 y^2}$$

$$\rightarrow \frac{1}{3} \cdot \frac{x}{x^3} \cdot \frac{y^3}{y^2}$$

$$-\frac{y}{3x^2}$$

$$-\frac{1}{3} \cdot \frac{1}{x^2} \cdot y^1 = \frac{-y}{3x^2}$$

Simplify. Your answer should contain only positive exponents.

$$23) -\frac{2n}{4n}$$

$$-\frac{1}{2}$$

$$24) \frac{2a^4}{3a^2}$$

$$\frac{2}{3} a^2$$

$$25) \frac{-a^3}{-a^2}$$

$$a$$

$$26) \frac{4n^3}{-2n^2}$$

$$-\frac{1}{2} n$$

$$27) \frac{2x^3 y^2}{4y^2}$$

$$\frac{1}{2} x^3$$

$$28) \frac{3x^2 y^4}{x}$$

$$3xy^4$$

***Zero Exponent Property: $x^0 = 1$

$$29) \frac{2x^3}{6x^3}$$

$$\frac{1}{3} x^0 \cdot \frac{1}{3} \cdot 1 = \frac{1}{3}$$

$$30) (4yx^4)^0 \cdot 3xy^0$$

$$1 \cdot 3x(1)$$

$$3x$$

Simplify.

$$31) (2x^4)^2 \cdot (x^0)^4$$

$$4x^8 \cdot x^0$$

$$4x^8 \cdot 1$$

$$32) p^0 \cdot 2p^3$$

$$1 \cdot 2p^3$$

$$2p^3$$

$$33) \frac{2n^0}{(n^2)^3}$$

$$\frac{2 \cdot 1}{n^6} = \frac{2}{n^6}$$

$$34) \frac{2x}{(2x)^0}$$

$$2x$$