

# Basic Rules of Exponents

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

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

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

Simplify.

3)  $-3n^2 \cdot 4n^1$   
 $-12n^3$

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

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

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

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

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

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

9)  $(r^3)^2 = r^6$

10)  $(a^3)^7$   
 $a^{21}$

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

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

12)  $(-3k^4)^4$   
 $(-3k^4)(-3k^4)(-3k^4)(-3k^4)$   
 $81k^{16}$

Simplify.

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

14)  $(-xy^4)^2$   
 $x^2y^8$

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

16)  $(-3u^3v^2)^2$   
 $9u^6v^4$   
 $-3 \cdot -3 = 9$

Combination Problems : Simplify.

17)  $(-2x^4)^3 \cdot x^4$   
 $-2 \cdot -2 \cdot -2 \cdot x^4$   
 $-8x^{12} \cdot x^4$   
 $-8x^{16}$

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

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

$$x^{2 \cdot 4} y^{3 \cdot 4} \cdot 2y^2$$

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

$$2x^8 y^{14}$$

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

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

$$20) (m^3 \cdot -m^3 n^4)^3$$

$$m^{3 \cdot 3} \cdot -m^{3 \cdot 3} n^{4 \cdot 3}$$

$$m^9 \cdot -m^9 n^{12}$$

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

$$22) \frac{-1xy^3}{3x^3 y^2} = \frac{-y}{3x^2} \cdot \frac{x}{xxx}$$

**Simplify. Your answer should contain only positive exponents.**

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

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

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

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

$$27) \frac{12x^3 y^2}{24y^2} = \frac{x^3}{2}$$

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

Stop  
here  
day 1

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

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

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

**Simplify.**

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

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

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

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

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Date \_\_\_\_\_ Period \_\_\_\_\_

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$-6x^3$

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

$-6b^5a^3$

**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)  $-2uv^4 \cdot -uv^4$

$2u^2v^8$

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**Combination Problems : Simplify.**

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

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

$32b^{11}$

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

$$2x^8y^{14}$$

$$20) (m^3 \cdot -m^3n^4)^3$$

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

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

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

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

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

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

**Simplify. Your answer should contain only positive exponents.**

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

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

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

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

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

$$a$$

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

$$-2n$$

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

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

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

$$3xy^4$$

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

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

$$\frac{1}{3}$$

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

$$3x$$

**Simplify.**

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

$$4x^8$$

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

$$2p^3$$

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

$$\frac{2}{n^6}$$

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

$$2x$$