

8.3 Practice A

Date _____ Period _____

8.3 INTRODUCTION TO CONVERTING NEGATIVE TO POSITIVE EXPONENTS.

Simplify. Answer using only positive exponents.

$$1) \frac{4x^1}{8x^4} = \frac{1x^{1-4}}{2} = \frac{x^{-3}}{2} = \boxed{\frac{1}{2x^3}}$$

$$2) \frac{3x^2}{4x^{-4}} = \frac{3x^{2-(-4)}}{4} = \boxed{\frac{3x^6}{4}}$$

$$3) \frac{4n^2}{2n^{-4}} = \frac{2n^{2-(-4)}}{1} = \boxed{2n^6}$$

$$4) \frac{3x^{-3}}{7x^{-1}} = \frac{3x^{-3-(-1)}}{7} = \frac{3x^{-2}}{7} = \boxed{\frac{3x^2}{7}}$$

$$5) \frac{6x^{-3}}{8x} = \frac{3x^{-3-1}}{4} = \frac{3x^{-4}}{4} = \boxed{\frac{3}{4x^4}}$$

$$6) \frac{5v^{-2}}{8v^3} = \frac{5v^{-2-3}}{8} = \frac{5v^{-5}}{8} = \boxed{\frac{5}{8v^5}}$$

$$7) \frac{3x^{-4}}{9x^2} = \frac{1x^{-4-2}}{3} = \frac{x^{-6}}{3} = \boxed{\frac{1}{3x^6}}$$

$$8) \frac{3n^{-2}}{n^{-3}} = \frac{3n^{-2-(-3)}}{1} = \frac{3n}{1} = \boxed{3n}$$

$$9) \frac{5x^{-4}}{6x^4} = \frac{5x^{-4-4}}{6} = \frac{5x^{-8}}{6} = \boxed{\frac{5}{6x^8}}$$

$$10) \frac{2x^{-2}}{3x^{-4}} = \frac{2x^{-2-(-4)}}{3} = \boxed{\frac{2x^2}{3}}$$

Rule for Division for the same base

is to subtract exponents $\boxed{\text{Ex}} \frac{x^{10}}{x^4} = x^{10-4} = \boxed{x^6}$

NAQ.c.3 Evaluate complex numeric expressions with whole number exponents demonstrating the ability to use the product, power, and quotient properties

8.3A (continued)

#'s 11-14, SHOW THE FOLLOWING WORK - (1) SHOW +, -, * EXPONENTS, (2) EXPAND, then (3) EVALUATE

11) $\frac{10^7}{10^2}$

$10^{7-2} = 10^5 = \boxed{100,000}$

12) $\frac{(-12)^7}{(-12)^5}$

$(-12)^{7-5} = (-12)^2 = \boxed{144}$

remember (-)'s with negative #'s !!

13) $\frac{(-18)^4}{(-18)^4}$

$(-18)^{4-4} = (-18)^0 = \boxed{1}$

14) $((-2)^3)^3$

$(-2)^{3 \cdot 3} = (-2)^9 = \boxed{-512}$

REVIEW EXPONENTS WITH NUMBERS AND VARIABLE. Simplify. Clearly show work.

15) $(3b^3)^4$

$3^4 \cdot b^{3 \cdot 4}$ ← required work
 $\boxed{81b^{12}}$

16) $\frac{3x^2}{(4x)^0}$

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

17) $\left(\frac{2n^4}{n^2}\right)^3$

2 methods to simplify
option 1
 $\frac{2^3 n^{4 \cdot 3}}{n^{2 \cdot 3}} = \frac{8n^{12}}{n^6} = \boxed{8n^{12-6}} = \boxed{8n^6}$

18) $\left(\frac{-3y^2}{4x^3}\right)^3 = \frac{(-3)^3 y^{2 \cdot 3}}{4^3 x^{3 \cdot 3}} = \boxed{\frac{-27y^6}{64x^9}}$

19) $(3x^0y^3)^2$

$3^2 x^{0 \cdot 2} y^{3 \cdot 2}$
 $9 x^0 y^6 = \boxed{9y^6}$

20) $(5xy^4)^3 = 5^3 x^{1 \cdot 3} y^{4 \cdot 3}$

$\boxed{125x^3y^{12}}$

21) $(-x^4y^3)^4$

implied -1
 $(-1)^4 x^{4 \cdot 4} y^{3 \cdot 4}$
 $x^{16} y^{12}$
 $(-1)^4 = 1$
 $\boxed{x^{16} y^{12}}$

22) $(-x^2)^3$

implied -1
 $(-1)^3 x^{2 \cdot 3} = \boxed{-x^6}$
 $(-1)^3 = -1$

23) $(-12x^3y^2)^0$

anything to the 0 is 1 -->
 $(-12)^0 \cdot x^0 y^0 = \boxed{1}$

24) $(-5x^4y^3)^2$

$(-5)^2 x^{4 \cdot 2} y^{3 \cdot 2} = \boxed{25x^8y^6}$

25) $(-3x^4y^0)^4$

$(-3)^4 x^{4 \cdot 4} y^{0 \cdot 4}$
 $+81 x^{16} y^0 = \boxed{81x^{16}}$

26) $(-4x^3y^2)^3$

$(-4)^3 x^{3 \cdot 3} y^{2 \cdot 3} = \boxed{-64x^9y^6}$

8.3 Practice B

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WORKING WITH DIVISION. Simplify. Clearly show work. Use only positive exponents.

$$1) \frac{2x^4y^4}{4x^5y^{-1}} = \frac{1 \overset{4-5}{x^{-1}} \overset{4-(-1)}{y^5}}{2}$$

$$= \frac{1 \overset{4-5}{x^{-1}} \overset{4-(-1)}{y^5}}{2}$$

$$= \boxed{\frac{y^5}{2x}}$$

$$2) \frac{90yx^{-4}}{500x^4y^{-1}} = \frac{9 \overset{-4-4}{x^{-8}} \overset{1-(-1)}{y^2}}{5}$$

$$= \frac{9 \overset{-4-4}{x^{-8}} \overset{1-(-1)}{y^2}}{5}$$

$$= \boxed{\frac{9y^2}{5x^8}}$$

$$3) \frac{4x^2y^5}{2x^4y^{-1}} = \frac{2 \overset{2-4}{x^{-2}} \overset{5-(-1)}{y^6}}{1}$$

$$= \frac{2 \overset{2-4}{x^{-2}} \overset{5-(-1)}{y^6}}{1}$$

$$= \boxed{\frac{2y^6}{x^2}}$$

$$4) \frac{6x^2y^{-4}}{8x^{-1}y^2} = \frac{3 \overset{2-(-1)}{x^3} \overset{-4-2}{y^{-6}}}{4}$$

$$= \frac{3 \overset{2-(-1)}{x^3} \overset{-4-2}{y^{-6}}}{4}$$

$$= \boxed{\frac{3x^3}{4y^6}}$$

$$5) \frac{3y^{-4}}{8x^5y^5} = \frac{3 \overset{-4-5}{y^{-9}}}{8x^5} = \frac{3 \overset{-4-5}{y^{-9}}}{8x^5}$$

remember to put variables in ABC order!!

$$= \boxed{\frac{3}{8x^5y^9}}$$

$$6) \left(\frac{-3xy^{-3}}{4x^{-1}y^3} \right)^4 = \frac{(-3)^4 \overset{1-4}{x^{-4}} \overset{-3-4}{y^{-7}}}{4^4 \overset{-1-4}{x^{-5}} \overset{3-4}{y^{-1}}}$$

$$= \frac{4^4 \overset{1-4}{x^{-4}} \overset{-3-4}{y^{-7}}}{(-3)^4 \overset{-1-4}{x^{-5}} \overset{3-4}{y^{-1}}}$$

$$= \frac{256 \overset{-4-4}{x^{-8}} \overset{12-(-12)}{y^{24}}}{81}$$

$$= \frac{256 \overset{-8}{x^{-8}} \overset{24}{y^{24}}}{81}$$

$$= \boxed{\frac{256y^{24}}{81x^8}}$$

$$7) \left(\frac{3yx^2}{-x^{-3}} \right)^3 = \frac{3^3 \overset{2+3}{x^5} \overset{1+3}{y^4}}{(-1)^3 \overset{3+3}{x^6}}$$

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

$$= \frac{27 \overset{2+3}{x^5} \overset{1+3}{y^4}}{(-1) \overset{3+3}{x^6}}$$

$$= \frac{27 \overset{2+3}{x^5} \overset{1+3}{y^4}}{(-1) \overset{3+3}{x^6}}$$

$$= \boxed{-27x^{15}y^3}$$

8.3B (continued)

Simplify. Clearly show work. Your answer should contain only positive exponents.

$$8) \frac{5n^{-2}}{1 \downarrow} = \boxed{\frac{5}{n^2}}$$

$$9) (3x^{-1})^3 = 3^3 x^{-1 \cdot 3} = \frac{27x^{-3}}{1 \downarrow} = \boxed{\frac{27}{x^3}}$$

$$10) (3x^{-3}y^2)^4 = 3^4 x^{-3 \cdot 4} y^{2 \cdot 4} \\ = \frac{81 x^{-12} y^8}{1 \downarrow} = \boxed{\frac{81y^8}{x^{12}}}$$

$$11) (-4x^{-2}y^{-4})^3 = (-4)^3 x^{-2 \cdot 3} y^{-4 \cdot 3} \\ = \frac{-64 x^{-6} y^{-12}}{1 \downarrow} = \boxed{\frac{-64}{x^6 y^{12}}}$$

$$12) (5x^{-3}y^{-4})^2 = 5^2 x^{-3 \cdot 2} y^{-4 \cdot 2} \\ = \frac{25 x^{-6} y^{-8}}{1 \downarrow} = \boxed{\frac{25}{x^6 y^8}}$$

$$13) (-3x^{-4}y^3)^{-2} = (-3)^{-2} \cdot x^{-4 \cdot -2} y^{3 \cdot -2} \\ = \frac{x^8 y^{-6}}{(-3)^2} = \boxed{\frac{x^8}{9y^6}}$$

$$14) (2x^4y^{-2})^{-2} = (2)^{-2} x^{4 \cdot -2} y^{-2 \cdot -2} \\ = \frac{(2)^{-2} x^{-8} y^4}{1 \downarrow} = \boxed{\frac{y^4}{4x^8}}$$

$$15) (-3nm^3)^{-3} = (-3)^{-3} n^{1 \cdot -3} m^{3 \cdot -3} \\ = \frac{(-3)^{-3} n^{-3} m^{-9}}{1 \downarrow} = \boxed{\frac{1}{-27 n^3 m^9}}$$

$$16) (-7xy^{-1})^2 = (-7)^2 x^{1 \cdot 2} y^{-1 \cdot 2} \\ = \frac{49 x^2 y^{-2}}{1 \downarrow} = \boxed{\frac{49x^2}{y^2}}$$

$$17) (-2x^2y^{-3})^{-3} = (-2)^{-3} x^{2 \cdot -3} y^{-3 \cdot -3} \\ = \frac{(-2)^{-3} x^{-6} y^9}{1 \downarrow} = \boxed{\frac{y^9}{-8x^6}}$$