

Exponent Practice

Name: _____

Date: _____

Question 1

Simplify

I. $2^3 \cdot 2^8 =$

V. $(8n)(8n)^9 =$

II. $(x + y)^7(x + y)^6 =$

VI. $\frac{4^7}{4^3} =$

III. $(a^3b^5)(a^3b^2) =$

VII. $\frac{(x + y)^{12}}{(x + y)^4} =$

IV. $8^4 \cdot 8^3 =$

VIII. $\frac{12x^9}{15x^2} =$

Exponent Practice

IX. $\frac{(x+y)^8}{(x+y)^8} =$

XIV. $7^0 + 4^0 =$

X. $\frac{10x^7}{15x^3} =$

XV. $(-3)^1 - (-3)^0 =$

XI. $(5p)^0(5p)^1 =$

XVI. $(x^3)^{11} =$

XII. $\frac{x^{12}y^9}{x^0y^2} =$

XVII. $(5^8)^4 =$

XIII. $15^0 =$

XVIII. $(10x)^2 =$

Exponent Practice

XIX. $(xy^4)^9 =$

XXIV. $\left(\frac{x}{5}\right)^3 =$

XX. $(-5n^7)^2 =$

XXV. $\left(\frac{x^5}{y^2}\right)^7 =$

XXI. $(x^2y)^7 =$

XXVI. $\left(\frac{5x^7y}{-2z^4}\right)^3 =$

XXII. $(x^5y)^3(x^2y^8) =$

XXVII. $\left(\frac{4x^3y^5}{3z^7}\right)^0 =$

XXIII. $(5x^3)^2(2x^7) =$

XXVIII. $2^{-3} =$

Exponent Practice

XXIX. $x^{-7} =$

XXXIV. $\left(\frac{x}{-5}\right)^{-3} =$

XXX. $xy^{-9} =$

XXXV. $\left(\frac{x}{-5}\right)^{-2} =$

XXXI. $\frac{1}{x^{-8}} =$

XXXVI. $\frac{y^{-4}}{3x^5} =$

XXXII. $3x^8y^{-6} =$

XXXVII. $\frac{y^{-5}}{x^{-3}} =$

XXXIII. $\left(\frac{x}{2}\right)^{-5} =$

XXXVIII. $2^{-5} \cdot 2^8 =$

Exponent Practice

XXXIX. $(5x^{-2}y^{-3})(2x^{-4}y) =$

XLIV. $\frac{x^{-7}}{x^{-3}} =$

XL. $(n^{-5})^3 =$

XLV. $\frac{15x^{-7}}{3x^{-10}} =$

XLI. $(xy)^{-9} =$

XLVI. $\frac{12x^{-6}}{8y^{-10}} =$

XLII. $(5x^{-4}y^3)^2 =$

XLVII. $\frac{x^{-6}}{x^{-6}} =$

XLIII. $\frac{x^{12}}{x^{-2}} =$

XLVIII. $\frac{3x^4}{y^2z^{-4}} =$

Exponent Practice

XLIX. $(x^4y^5)^{-3} =$

LIV. $\left(\frac{x^2y}{2z^3}\right)^{-5} =$

L. $(3x^{-5}y^{-3})^{-2} =$

LV. $\frac{9x^6y^4z^7}{27x^{-4}y^5z^9} =$

LI. $(x^3y^{-4}z^{-5})(x^{-4}y^{-2}z^9) =$

LII. $\left(\frac{x^{-1}}{y^{-4}}\right)^3 =$

LIII. $\left(\frac{x^4}{3}\right)^{-2} =$

Exponent Practice

Name: Key

Date: _____

Question 1

Simplify

I. $2^3 \cdot 2^8 = 2,048$

$$2^3 \cdot 2^8 \rightarrow 2^{3+8} \rightarrow 2^{11} \rightarrow 2,048$$

product rule

V. $(8n)(8n)^9 = 1,073,741,824n^{10}$

$$(8n)(8n)^9 \rightarrow (8n)^{1+9} \rightarrow (8n)^{10}$$

product rule

$$1,073,741,824n^{10} \leftarrow 8^{10}n^{10}$$

raising a product to a power

II. $(x+y)^7(x+y)^6 = (x+y)^{13}$

$$(x+y)^7(x+y)^6 \rightarrow (x+y)^{7+6} \rightarrow (x+y)^{13}$$

product rule

VI. $\frac{4^7}{4^3} = 256$

$$\frac{4^7}{4^3} \rightarrow 4^{7-3} \rightarrow 4^4 \rightarrow 256$$

quotient rule

III. $(a^3b^5)(a^3b^2) = a^6b^7$

$$(a^3b^5)(a^3b^2) \rightarrow a^3a^3b^5b^2 \rightarrow a^{3+3}b^{5+2} \rightarrow a^6b^7$$

product rule
associative/commutative

VII. $\frac{(x+y)^{12}}{(x+y)^4} = (x+y)^8$

$$\frac{(x+y)^{12}}{(x+y)^4} \rightarrow (x+y)^{12-4} \rightarrow (x+y)^8$$

quotient rule

IV. $8^4 \cdot 8^3 = 2,097,152$

$$8^4 \cdot 8^3 \rightarrow 8^{4+3} \rightarrow 8^7 \rightarrow 2,097,152$$

product rule

VIII. $\frac{12x^9}{15x^2} = \frac{4}{5}x^7$

$$\frac{12x^9}{15x^2} \rightarrow \frac{12}{15}x^{9-2} \rightarrow \frac{4}{5}x^7$$

quotient rule

Exponent Practice

IX. $\frac{(x+y)^8}{(x+y)^8} = 1$

$$\frac{(x+y)^8}{(x+y)^8} \rightarrow (x+y)^{8-8} \xrightarrow{\text{exponent zero}} (x+y)^0 \rightarrow 1$$

quotient rule

XIV. $7^0 + 4^0 = 2$

$$7^0 + 4^0 \rightarrow 1 + 1 \rightarrow 2$$

X. $\frac{10x^7}{15x^3} = \frac{2}{3}x^4$

$$\frac{10x^7}{15x^3} \rightarrow \frac{10}{15}x^{7-3} \rightarrow \frac{2}{3}x^4$$

quotient rule

XV. $(-3)^1 - (-3)^0 = -4$

$$(-3)^1 - (-3)^0 \rightarrow -3 - (-3)^0 \xrightarrow{\text{exponent zero}} -3 - 1 \xrightarrow{\text{exponent one}} -4$$

XI. $(5p)^0(5p)^1 = 5p$

$$(5p)^0(5p)^1 \xrightarrow{\text{exponent one}} 1 \cdot (5p)^1 \xrightarrow{\text{exponent zero}} 1 \cdot 5p \rightarrow 5p$$

XVI. $(x^3)^{11} = x^{33}$

$$(x^3)^{11} \rightarrow x^{3 \cdot 11} \rightarrow x^{33}$$

power rule

XII. $\frac{x^{12}y^9}{x^0y^2} = x^{12}y^7$

$$\frac{x^{12}y^9}{x^0y^2} \rightarrow x^{12-0}y^{9-2} \rightarrow x^{12}y^7$$

quotient rule

XVII. $(5^8)^4 = 2.32830643 \times 10^{22}$

$$(5^8)^4 \rightarrow 5^{8 \cdot 4} \rightarrow 5^{32} \rightarrow 2.32830643 \times 10^{22}$$

power rule

XIII. $15^0 = 1$
exponent zero

XVIII. $(10x)^2 = 100x^2$

$$(10x)^2 \rightarrow (10)^2(x)^2 \rightarrow 100x^2$$

raising a product to a power

Exponent Practice

XIX. $(xy^4)^9 = x^9y^{36}$

$$(xy^4)^9 \rightarrow (x)^9 (y^4)^9 \rightarrow x^9y^{36}$$

raising a product to a power

XXIV. $\left(\frac{x}{5}\right)^3 = \frac{x^3}{125}$

$$\left(\frac{x}{5}\right)^3 \rightarrow \frac{x^3}{5^3} \rightarrow \frac{x^3}{125}$$

raising a quotient to a power

XX. $(-5n^7)^2 = 25n^{14}$

$$(-5n^7)^2 \rightarrow (-5)^2(n^7)^2 \rightarrow 25n^{14}$$

raising a product to a power

XXV. $\left(\frac{x^5}{y^2}\right)^7 = \frac{x^{35}}{y^{14}}$

$$\left(\frac{x^5}{y^2}\right)^7 \rightarrow \frac{(x^5)^7}{(y^2)^7} \rightarrow \frac{x^{35}}{y^{14}}$$

raising a quotient to a power

XXI. $(x^2y)^7 = x^{14}y^7$

$$(x^2y)^7 \rightarrow (x^2)^7(y)^7 \rightarrow x^{14}y^7$$

raising a product to a power

XXVI. $\left(\frac{5x^7y}{-2z^4}\right)^3 = \frac{125x^{21}y^3}{-8z^{12}}$

raising a product to a power

$$\left(\frac{5x^7y}{-2z^4}\right)^3 \rightarrow \frac{(5x^7y)^3}{(-2z^4)^3} \rightarrow \frac{(5)^3(x^7)^3(y)^3}{(-2)^3(z^4)^3} \rightarrow \frac{125x^{21}y^3}{-8z^{12}}$$

raising a quotient to a power

XXII. $(x^5y)^3(x^2y^8) = x^{17}y^{11}$

$$(x^5y)^3(x^2y^8) \rightarrow (x^5)^3(y)^3(x^2)(y^8)$$

raising a product to a power



$$x^{15}x^2y^3y^8 \leftarrow x^{15}y^3x^2y^8$$

associative/commutative



product rule $x^{15+2}y^{3+8} \rightarrow x^{17}y^{11}$

XXVII. $\left(\frac{4x^3y^5}{3z^7}\right)^0 = 1$

exponent zero

XXIII. $(5x^3)^2(2x^7) = 50x^{13}$

$$(5x^3)^2(2x^7) \rightarrow (5)^2(x^3)^2(2)^1(x^7)^1$$

raising a product to a power



$$(25)(2)x^6x^7 \leftarrow 25x^62x^7$$

associative/commutative



product rule $50x^{6+7} \rightarrow 50x^{13}$

XXVIII. $2^{-3} = \frac{1}{8}$

$$2^{-3} \rightarrow \frac{1}{2^3} \rightarrow \frac{1}{8}$$

negative exponent

Exponent Practice

XXIX. $x^{-7} = \frac{1}{x^7}$
negative exponent

XXXIV. $\left(\frac{x}{-5}\right)^{-3} = \frac{-125}{x^3}$

raising a quotient to a power

$$\left(\frac{x}{-5}\right)^{-3} \rightarrow \left(\frac{-5}{x}\right)^3 \rightarrow \frac{(-5)^3}{x^3} \rightarrow \frac{-125}{x^3}$$

negative exponent

XXX. $xy^{-9} = \frac{x}{y^9}$

$$xy^{-9} \rightarrow x \frac{1}{y^9} \rightarrow \frac{x}{y^9}$$

negative exponent

XXXV. $\left(\frac{x}{-5}\right)^{-2} = \frac{25}{x^2}$

raising a quotient to a power

$$\left(\frac{x}{-5}\right)^{-2} \rightarrow \left(\frac{-5}{x}\right)^2 \rightarrow \frac{(-5)^2}{x^2} \rightarrow \frac{25}{x^2}$$

negative exponent

XXXI. $\frac{1}{x^{-8}} = x^8$
negative exponent

XXXVI. $\frac{y^4}{3x^5} = \frac{1}{3x^5y^4}$

negative exponent

XXXII. $3x^8y^{-6} = \frac{3x^8}{y^6}$

$$3x^8y^{-6} \rightarrow 3x^8 \frac{1}{y^6} \rightarrow \frac{3x^8}{y^6}$$

negative exponent

XXXVII. $\frac{y^{-5}}{x^{-3}} = \frac{x^3}{y^5}$

negative exponent

XXXIII. $\left(\frac{x}{2}\right)^{-5} = \frac{32}{x^5}$

raising a quotient to a power

$$\left(\frac{x}{2}\right)^{-5} \rightarrow \left(\frac{2}{x}\right)^5 \rightarrow \frac{(2)^5}{(x)^5} \rightarrow \frac{32}{x^5}$$

negative exponent

XXXVIII. $2^{-5} \cdot 2^8 = 8$

$$2^{-5} \cdot 2^8 \rightarrow 2^{-5+8} \rightarrow 2^3 \rightarrow 8$$

product rule

Exponent Practice

XXXIX. $(5x^{-2}y^{-3})(2x^{-4}y) = \frac{10}{x^6y^2}$

associative/commutative

$$(5x^{-2}y^{-3})(2x^{-4}y) \rightarrow 10x^{-2}x^{-4}y^{-3}y$$

↓

$$\frac{10}{x^6y^2} \leftarrow 10x^{-6}y^{-2} \leftarrow 10x^{-2+(-4)}y^{-3+1}$$

product rule

negative exponent

XLIV. $\frac{x^{-7}}{x^{-3}} = \frac{1}{x^4}$

negative exponent

$$\frac{x^{-7}}{x^{-3}} \rightarrow x^{-7-(-3)} \rightarrow x^{-4} \rightarrow \frac{1}{x^4}$$

quotient rule

XL. $(n^{-5})^3 = \frac{1}{n^{15}}$

$$(n^{-5})^3 \rightarrow n^{-5 \cdot 3} \rightarrow n^{-15} \rightarrow \frac{1}{n^{15}}$$

power rule

negative exponent

XLV. $\frac{15x^{-7}}{3x^{-10}} = 5x^3$

$$\frac{15x^{-7}}{3x^{-10}} \rightarrow 5x^{-7-(-10)} \rightarrow 5x^3$$

quotient rule

XLI. $(xy)^{-9} = \frac{1}{x^9y^9}$

raising a product to a power

$$(xy)^{-9} \rightarrow \frac{1}{(xy)^9} \rightarrow \frac{1}{(x)^9(y)^9}$$

negative exponent

↓

$$\frac{1}{x^9y^9}$$

XLVI. $\frac{12x^{-6}}{8y^{-10}} = \frac{3y^{10}}{2x^6}$

negative exponent

XLII. $(5x^{-4}y^3)^2 = \frac{25y^6}{x^8}$

raising a product to a power

$$(5x^{-4}y^3)^2 \rightarrow (5)^2(x^{-4})^2(y^3)^2$$

↓

$$\frac{25y^6}{x^8} \leftarrow 25x^{-8}y^6$$

negative exponent

XLVII. $\frac{x^{-6}}{x^{-6}} = 1$

exponent zero

$$\frac{x^{-6}}{x^{-6}} \rightarrow x^{-6-(-6)} \rightarrow x^0 \rightarrow 1$$

quotient rule

XLIII. $\frac{x^{12}}{x^{-2}} = x^{14}$

$$\frac{x^{12}}{x^{-2}} \rightarrow x^{12-(-2)} \rightarrow x^{14}$$

quotient rule

XLVIII. $\frac{3x^4}{y^{-2}z^{-4}} = 3y^2x^4z^4$

negative exponent

Exponent Practice

XLIX. $(x^4y^5)^{-3} = \frac{1}{x^{12}y^{15}}$

$$(x^4y^5)^{-3} \rightarrow (x^4)^{-3}(y^5)^{-3} \rightarrow x^{-12}y^{-15}$$

raising a product to a power

$$\downarrow$$

$$\frac{1}{x^{12}y^{15}}$$

negative exponent

L. $(3x^{-5}y^{-3})^{-2} = \frac{x^{10}y^6}{9}$

$$(3x^{-5}y^{-3})^{-2} \rightarrow (3)^{-2}(x^{-5})^{-2}(y^{-3})^{-2}$$

raising a product to a power

$$\downarrow$$

$$\frac{x^{10}y^6}{9}$$

negative exponent

LI. $(x^3y^{-4}z^{-5})(x^{-4}y^{-2}z^9) = \frac{z^4}{xy^6}$

$$(x^3y^{-4}z^{-5})(x^{-4}y^{-2}z^9)$$

product rule

$$\downarrow$$

$$x^3x^{-4}y^{-4}y^{-2}z^{-5}z^9 \rightarrow x^{3+(-4)}y^{-4+(-2)}z^{-5+9}$$

associative/commutative

$$\downarrow$$

$$\text{negative exponent } \frac{z^4}{xy^6} \leftarrow x^{-1}y^{-6}z^4$$

LII. $\left(\frac{x^{-1}}{y^{-4}}\right)^3 = \frac{y^{12}}{x^3}$

$$\left(\frac{x^{-1}}{y^{-4}}\right)^3 \rightarrow \frac{(x^{-1})^3}{(y^{-4})^3} \rightarrow \frac{x^{-3}}{y^{-12}} \rightarrow \frac{y^{12}}{x^3}$$

raising a quotient to a power

negative exponent

LIII. $\left(\frac{x^4}{3}\right)^{-2} = \frac{9}{x^8}$

$$\left(\frac{x^4}{3}\right)^{-2} \rightarrow \left(\frac{3}{x^4}\right)^2 \rightarrow \frac{(3)^2}{(x^4)^2} \rightarrow \frac{9}{x^8}$$

negative exponent

raising a quotient to a power

LIV. $\left(\frac{x^2y}{2z^3}\right)^{-5} = \frac{32z^{15}}{x^{10}y^5}$

$$\left(\frac{x^2y}{2z^3}\right)^{-5} \rightarrow \left(\frac{2z^3}{x^2y}\right)^5 \rightarrow \frac{(2)^5(z^3)^5}{(x^2)^5(y)^5} \rightarrow \frac{32z^{15}}{x^{10}y^5}$$

raising a quotient to a power

negative exponent

LV. $\frac{9x^6y^{-4}z^7}{27x^{-4}y^5z^9} = \frac{x^{10}}{3y^9z^2}$

$$\frac{9x^6y^{-4}z^7}{27x^{-4}y^5z^9} \rightarrow \frac{1}{3}x^{6-(-4)}y^{-4-5}z^{7-9} \rightarrow \frac{x^{10}}{3y^9z^2}$$

negative exponent

quotient rule