EXPONENTS

ALGEBRA WORKSHEETS

$$(4a^5\ b^2)(2b^{-5}\ c^2)(3a^7\ c^4)$$

PROBLEMS WITH ANSWERS

$$\frac{(4h^2k^2)^2(h^3k)^4}{(2hk^3)^2}$$

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HOW TO USE THESE WORKSHEETS

EXPONENTS

The study of Mathematics requires understanding of the concepts taught as well as practicing what is learned. It is advisable to practice mathematical problems using pencil and paper to allow the student to follow their train of thoughts as they write each step for the solutions.

This workbook provides many worksheets that list EXPONENTS problems.

When working out each problem, it is important to learn, understand and apply the rules of order of operations in order to evaluate the mathematical expressions correctly.

The workbook is divided into Four sections:

1. A summary about the rules used to solve problems involving Exponents.

2. Worksheets with problems pertaining to Exponents.

3. Worksheets with the answer key to every problem listed in section 2.

4. Blank Worksheets to practice.

PROPERTIES OF EXPONENTS

When working on a mathematical expression it is important to understand how to evaluate each expression in order to obtain the correct answer.

In order to learn about "EXPONENTS", it is important to first understand how to identify them and what they mean. This knowledge can then be transferred when learning to evaluate the properties associated with Exponents and how to use them to solve a problem.

Explanation

An "Exponent" is a number written just above and to the right of another number or variable which is called a "base".

An Exponent is used to show repeated multiplication of a certain base.

An Exponent is also called a Power.

A mathematical expression that involves an exponent is written in the following format:

$$b^n$$

Where **"b"** is the called the base and **"n"** is the Exponent which represents the number of multiplications that the base undergoes. This means that the base **"b"** is multiplied by itself **"n"** times depending on what number "n" is.

Example: 3^2

The Base is **3**.

The Exponent is **2**.

In order to evaluate the above expression, the base **"3"** must be multiplied by itself twice to get the answer as follows: $3^2 = 3 \cdot 3 = 9$

Hint:

A "base" can be a number or a variable. The following example shows this: x^2

The above expression is evaluated the same way as if the base was a number. Therefore, the variable ***"x"*** *is multiplied by itself twice.*

Properties of Exponents:

Property (1)

When multiplying two or more mathematical expressions with the same base, the exponents are added while keeping the same base.

Example: $\mathbf{3^2 \cdot 3^4 = 3^{2+4} = 3^6 = 729}$

The above property cannot be applied if the bases are different numbers. When the bases are different, each base will have to be evaluated separately before the operation is completed.

Example: $\mathbf{2^2 \cdot 3^4 = 4.81 = 324}$

The above property applies to variable bases also.

Example: $\boldsymbol{x^2 \cdot x^4 = x^{2+4} = x^6}$

The above property cannot be applied if the bases are different variables. When the bases are different variables, each base will have to be evaluated separately before the operation is completed.

Example: $\boldsymbol{x^2 \cdot y^4 = x^2\ y^4}$

Hint:

It is important to notice the following when evaluating bases with different variables:

Example: $\boldsymbol{x^2 \cdot y^4 x^3 = x^{2+3}\, y^4 = x^5 y^4}$

As seen in the above example, the exponents are added only for the base **(x)** variable and not for the base **(y)** variable.

Property (2)

When an expression (base) containing an exponent raised to another power, that base is raised to the product of the powers.

Example: $\mathbf{(3^2)^3 = \ 3^{2.3} = 3^6}$

The above property applies to variable bases also.

Example: $\mathbf{(x^2)^3 = \ x^{2.3} = x^6}$

Property (3)

The product of two numbers or variables that are raised to an exponent (power) will result in the exponent being distributed over the product of the expression.

Example: $(2x)^3 = 2^3 \cdot x^3 = 8x^3$

The above property applies to variable bases also.

Example: $(yx)^3 = y^3.x^3 = y^3\,x^3$

Property (4)

When dividing two or more mathematical expressions with the same base, the exponent in the denominator is subtracted from the exponent in the numerator and the base is raised to the exponent that results.

Example: $\frac{2^5}{2^2} = 2^{5-2} = 2^3$

The above property applies to variable bases also.

Example: $\frac{x^5}{x^2} = x^{5-2} = x^3$

Property (5)

When a quotient (two integers divided) is raised to an exponent or a power, each of the integers is each raised to the power in the result.

Example: $\left(\frac{x}{2}\right)^3 = \frac{x^3}{2^3} = \frac{x^3}{8}$

Hints to remember:

1. *A base (whether a number or a variable) raised to the power of 1 equals itself.*

   Example: $x^1 = x$

2. *A base raised to a negative exponent will always result in the reciprocal of the base raise to the positive exponent.*

   Example: $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

   *It is important to remember that the base must not equal **0** since a division by **0** results in an undefined answer.* $\frac{1}{0} = UNDEFINED$

The above applies to variable bases also.

Example: $\boldsymbol{x^{-3} = \frac{1}{x^3}}$

3. *A base (whether a number or a variable) raised to the power of **(0)** equals **(1)***

   Example: $\boldsymbol{2^0 = 1}$

   The above applies to variable bases also.

   Example: $\boldsymbol{x^0 = 1}$

4. *A base of **(1)** raised to any power equals itself.*

   Example: $\boldsymbol{1^3 = 1}$

5. *Positive and negative signs included within a mathematical expression are raised to the exponent (power) that the expression is raised to also.*

   It is important to remember how to multiply signs when working on expressions that include signs.

   Example: $\boldsymbol{-3^2 = (-3)(-3) = 9}$

   The above applies to variable bases also.

   Example: $\boldsymbol{-x^2 = (-x)(-x) = +x}$

Name: **Date:**

EXPONENTS Worksheet # 1- Problems

No.	Problem	Answer Key
1.	4^2	
2.	4^3	
3.	$(5)^{-2}$	
4.	-3^4	
5.	$(-3)^4$	
6.	-2^3	
7.	-5^4	
8.	$(-5)^4$	
9.	$\left(-\frac{5}{6}\right)^2$	
10.	$\left(-\frac{5}{6}\right)^3$	
11.	-28^0	
12.	$(2^3)^2$	
13.	$3 \cdot 2^4$	
14.	$3^4 \cdot 3^8 \cdot 3^5$	
15.	$7^6 \cdot 7^1$	

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EXPONENTS Worksheet # 2- Problems

No.	Problem	Answer Key
1.	$\left(\frac{3}{4}\right)^{-2}$	
2.	$\left(\frac{2}{3}\right)^{2}$	
3.	$2^5 \cdot 2^4 \cdot 2^3$	
4.	$\frac{2^2}{3}$	
5.	$\frac{2^{-5}}{2^3}$	
6.	$(5^3)^2$	
7.	$\frac{5^3}{5^1}$	
8.	$\left(-\frac{1}{2}\right)^{3}$	
9.	$4^5 \cdot 4^9$	
10.	$\left(\frac{2}{3}\right)^{3}\left(\frac{2}{3}\right)$	
11.	$\frac{3^5}{3}$	
12.	$\frac{5^3 \cdot 5^8}{5}$	
13.	$2 \cdot 0^5$	
14.	$\frac{2^8 \cdot 2^{10}}{2^3 \cdot 2^7}$	
15.	20^1	

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EXPONENTS Worksheet # 3- Problems

No.	Problem	Answer Key
1.	$(x^3)^5$	
2.	$\left(\frac{a}{b}\right)^2$	
3.	$(5x)^2$	
4.	$(5y)^{-2}$	
5.	$x^4 \cdot x^5$	
6.	$\frac{a^4}{a^{-6}}$	
7.	$\frac{x^{-8}}{(x^2)^3}$	
8.	$(2xy)^3$	
9.	$(p^4p^2)^3$	
10.	$\frac{m^8}{m^6}$	
11.	$x^4 \cdot x^6 \cdot x^8 \cdot x^{10}$	
12.	$(-3t)^4$	
13.	$(3x^2)^3$	
14.	$(2n^{-3})^4$	
15.	$\frac{h^3h^8}{h^7}$	

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EXPONENTS Worksheet # 4- Problems

No.	Problem	Answer Key
1.	$\left(\frac{1}{y}\right)\left(\frac{1}{y}\right)^2$	
2.	$(2x^4)^3$	
3.	$\frac{t^6}{t^4}$	
4.	$\frac{x^5x^6}{x^3}$	
5.	$(w^{19})^0(w)^6$	
6.	$\frac{t^{-10}}{t^{-4}}$	
7.	$(2x^2y^4)^0$	
8.	$(x^3)^5$	
9.	$\frac{(x^0)^5}{x^3}$	
10.	$(3x^2)^3\,(2x)^4$	
11.	$\frac{x^9}{x^6}$	
12.	$\frac{(m^3)^2m^5}{(m^4)^3}$	
13.	$\frac{x^4}{x^{10}}$	
14.	$-3a^2(2a^4)$	
15.	$6x^2(-3x^4)(2x^5)$	

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EXPONENTS Worksheet # 5- Problems

No.	Problem	Answer Key
1.	0^4	
2.	$\frac{w^{12}w^2}{w^4w^5}$	
3.	$(0.7)^3$	
4.	$(2^5b^{-3})^{-3}$	
5.	$\frac{3^{15}}{3^2 \cdot 3^{10}}$	
6.	$(c^5d^4)^{10}$	
7.	$\left(\frac{6c}{5d^3}\right)^{-2}$	
8.	$\frac{13w^8z^3}{26w^2z}$	
9.	$(3^{-2}y^3)^{-2}$	
10.	$(-5a^4bc)(-10a^2b\,)$	
11.	$\left(\frac{7}{10}\right)^3$	
12.	$\frac{-2}{t \cdot t \cdot t}$	
13.	$(-1)^{22}$	
14.	$4 \cdot n \cdot n \cdot n$	
15.	$(-1)^{21}$	

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EXPONENTS Worksheet # 6- Problems

No.	Problem	Answer Key
1.	$(2a^2b)^0$	
2.	$\frac{t^{-8}m^2}{m^{-3}}$	
3.	$(5x^3y^6)(6x^2y^5)$	
4.	$\left(-\frac{2}{3}x^2\right)^3$	
5.	$\frac{(3x)^{-5}}{(3x)^{-8}}$	
6.	$(4x^2y)^3(2xy)^2$	
7.	$\frac{(a^3)^2\,(a^4)^5}{(a^5)^2}$	
8.	$(2x^2y^5)^3(3x^4y)^2$	
9.	$\left(-\frac{1}{3}n\right)^4(2n^3)^2\left(\frac{3}{2}n^6\right)^4$	
10.	$(3x^2)(2x^3)(5x^4)$	
11.	$\left(\frac{1}{2}x^{-3}\right)^3(6x^4)$	
12.	$\frac{35x^2y^4z}{70x^6y^2z}$	
13.	$3x^2y^5\left(\frac{2x^2y}{6x^4y^4}\right)^{-2}$	
14.	$(2x^{-4}y^2)(3x^{-4}y^{-4})$	
15.	$\frac{(x^{-2})^3\,(x^3)^{-2}}{x^{10}}$	

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EXPONENTS Worksheet # 7- Problems

No.	Problem	Answer Key
1.	$\frac{27x^3y^{-4}z}{9x^7y^{-6}z^4}$	
2.	$\frac{12r^{-6}s^0t^{-3}}{3\,r^{-4}s^{-3}t^{-5}}$	
3.	$\frac{(4x^{-5}y^3)^2}{(x^4y^{-6})^{-3}}$	
4.	$(5y^4)^{-3}(2y^{-2})^3$	
5.	$\left(\frac{8x^2}{4x^4\,y^{-3}}\right)^4$	
6.	$\frac{(x^{-7})^3\ \ (x^4)^5}{(x^3)^2\ (x^{-1})^8}$	
7.	$(2x^2y^{-5})^3(3x^{-4}y^2)^{-4}$	
8.	$2x^2y^3\left(\frac{7xy^4}{14x^3y^6}\right)^{-2}$	
9.	$\frac{(x^3)^{-2}(x^4)^5}{(x^{-2})^7}$	
10.	$\frac{(2a^3b^{-2}c)^5}{(a^{-2}b^4c^{-3})^{-2}}$	
11.	$(-5a^4bc)(-10a^2b\,)$	
12.	$\frac{13w^8z^3}{26w^2z}$	

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EXPONENTS Worksheet # 8- Problems

No.	Problem	Answer Key
1.	$\frac{(3x^{-2}y^{8})^{4}}{(9x^{4}\ y^{-3})^{2}}$	
2.	$(5x^{-2}\ y^{3})^{2}(2x^{4}y^{-5}\ )^{-3}$	
3.	$\left(\frac{x^{-5}y^{2}}{x^{-3}y^{5}}\right)^{-2}$	
4.	$\frac{(a^{-2})^{3}\ (a^{4})^{2}}{(a^{-3})^{-2}}$	
5.	$(2x^{4}y^{-3})(7x^{-8}y^{5})$	
6.	$8x^{4}y^{-3}\left(\frac{12x^{-3}y^{-2}}{24x^{4}y^{-5}}\right)^{0}$	
7.	$(4a^{5}\ b^{2})(2b^{-5}\ c^{2})(3a^{7}\ c^{4})$	
8.	$\left(\frac{1}{2}\ x^{3}\right)\left(\frac{2}{3}\ x^{4}\right)(\frac{3}{5}\ x^{-7})$	
9.	$\frac{5a^{8}b^{3}}{20a^{5}b^{-4}}$	
10.	$\left(\frac{ab^{-3}c^{-2}}{a^{-3}b^{0}c^{-5}}\right)^{-1}$	
11.	$(10xy^{3})(3x^{4}\ y)$	
12.	$\frac{-12s^{2}tu^{3}}{4su^{2}}$	

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EXPONENTS Worksheet # 9- Problems

No.	Problem	Answer Key
1.	$\frac{r^7 \cdot r^{11} \cdot r^{60}}{r}$	
2.	$\frac{15m^5np^{12}}{4mp^9}$	
3.	$\frac{y^8(y^3)^4}{(y^2)^3}$	
4.	$\frac{25h^3jk^5}{12h^2k}$	
5.	$\left(\frac{x^3y^5z}{5xy^2}\right)^2$	
6.	$\frac{r^7 \cdot r^{11} \cdot r^{60}}{x}$	
7.	$(6xy^{-11})^{-3}$	
8.	$\frac{5^{-1}}{5}$	
9.	$(t+3)(t+3)(t+3)$	
10.	$b^{20}b^{-14}$	
11.	$(r^6s^4)(13r^2s)$	
12.	$\frac{36h^5k^2}{9h^3k}$	

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EXPONENTS Worksheet # 10- Problems

No.	Problem	Answer Key
1.	$(3u^2v^0)^{-3}$	
2.	$18(x^3 \cdot y^4)^2$	
3.	$\left(\frac{2c^3d^4}{3c^2d}\right)^2$	
4.	$(\frac{1}{4}\ c^6d^6)(28c^2d^7)$	
5.	$\left(\frac{-4x^2}{y^4z}\right)^3$	
6.	$\frac{(t^{-2})^3}{t^{-4}}$	
7.	$(6p^2q^8)\ (7p^5q^3)$	
8.	$\frac{(s^3t^{-2})^4}{(3s^{-4}t^6)^{-2}}$	
9.	$(-8y^{-12})(2y^{16}z^{-2})$	
10.	$\frac{w^{-8}(w^2)^{-5}}{w^3}$	
11.	$\left(\frac{(4h^2k^2)^2(h^3k)^4}{(2hk^3)^2}\right)^0$	
12.	$\frac{(k^{-6})^{-2}(k^3)}{5k^6k^0}$	

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EXPONENTS Worksheet # 11- Problems

No.	Problem	Answer Key
1.	$\left(\frac{4m^{10}n^4}{2m^{12}n^2}\right)^{-1}$	
2.	$(a^2b)^3(a^4b^3)^5$	
3.	$\left(\frac{2}{p^6p^3}\right)^{-3}$	
4.	$(2c^3d^2)^5\left(\frac{c^6d^8}{4c^2d}\right)^3$	
5.	$(y^3)^4(y^2)^5$	
6.	$(5h^{-2}k^0)^3(5k^{-2})^{-4}$	
7.	$\left(\frac{-3x^{-4}y^3}{2x^5y^{-3}}\right)$	
8.	$(4x^2y^3)^3(xy^2)$	
9.	$\frac{(4h^2k^2)^2(h^3k)^4}{(2hk^3)^2}$	
10.	$[(5h^{-2}k^0)^3(5k^{-2})^{-4}]^0$	
11.	$\frac{(-4c^{12}d^7)^2}{(5c^{-3}d^{10)-1}}$	
12.	$\frac{(21x^5y)(2x^8y^4)}{14xy}$	

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EXPONENTS Worksheet # 1- Answers

No.	Problem	Answer Key
1.	4^2	16
2.	4^3	64
3.	$(5)^{-2}$	$\frac{1}{5^2} = \frac{1}{25}$
4.	-3^4	-81
5.	$(-3)^4$	81
6.	-2^3	-8
7.	-5^4	-625
8.	$(-5)^4$	625
9.	$\left(-\frac{5}{6}\right)^2$	$\left(\frac{25}{36}\right)$
10.	$\left(-\frac{5}{6}\right)^3$	$\left(-\frac{125}{216}\right)$
11.	-28^0	-1
12.	$(2^3)^2$	64
13.	$3 \cdot 2^4$	48
14.	$3^4 \cdot 3^8 \cdot 3^5$	3^{17}
15.	$7^6 \cdot 7^1$	7^7

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EXPONENTS Worksheet # 2- Answers

No.	Problem	Answer Key
1.	$\left(\frac{3}{4}\right)^{-2}$	$\frac{16}{9}$
2.	$\left(\frac{2}{3}\right)^{2}$	$\frac{4}{9}$
3.	$2^5 \cdot 2^4 \cdot 2^3$	2^{12}
4.	$\frac{2^2}{3}$	$\frac{4}{3}$
5.	$\frac{2^{-5}}{2^3}$	$\frac{1}{2^8}$
6.	$(5^3)^2$	5^6
7.	$\frac{5^3}{5^1}$	$5^2 = 25$
8.	$\left(-\frac{1}{2}\right)^{3}$	$-\frac{1}{8}$
9.	$4^5 \cdot 4^9$	4^{14}
10.	$\left(\frac{2}{3}\right)^{3}\left(\frac{2}{3}\right)$	$\left(\frac{2}{3}\right)^{4}$
11.	$\frac{3^5}{3}$	3^4
12.	$\frac{5^3 \cdot 5^8}{5}$	5^{10}
13.	$2 \cdot 0^5$	0
14.	$\frac{2^8 \cdot 2^{10}}{2^3 \cdot 2^7}$	2^8
15.	20^1	20

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EXPONENTS Worksheet # 3- Answers

No.	Problem	Answer Key
1.	$(x^3)^5$	x^{15}
2.	$\left(\frac{a}{b}\right)^2$	$\frac{a^2}{b^2}$
3.	$(5x)^2$	$25x^2$
4.	$(5y)^{-2}$	$\frac{1}{5^2y^2} = \frac{1}{25y^2}$
5.	$x^4 \cdot x^5$	x^9
6.	$\frac{a^4}{a^{-6}}$	a^{10}
7.	$\frac{x^{-8}}{(x^2)^3}$	$\frac{1}{x^{14}}$
8.	$(2xy)^3$	$8x^3y^3$
9.	$(p^4p^2)^3$	p^{18}
10.	$\frac{m^8}{m^6}$	m^{28}
11.	$x^4 \cdot x^6 \cdot x^8 \cdot x^{10}$	x^{28}
12.	$(-3t)^4$	$81t$
13.	$(3x^2)^3$	$27x^6$
14.	$(2n^{-3})^4$	$\frac{16}{n^{12}}$
15.	$\frac{h^3h^8}{h^7}$	h^4

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EXPONENTS Worksheet # 4- Answers

No.	Problem	Answer Key
1.	$\left(\frac{1}{y}\right)\left(\frac{1}{y}\right)^2$	$\left(\frac{1}{y}\right)^3$
2.	$(2x^4)^3$	$8x^{12}$
3.	$\frac{t^6}{t^4}$	t^2
4.	$\frac{x^5x^6}{x^3}$	x^8
5.	$(w^{19})^0(w)^6$	w^6
6.	$\frac{t^{-10}}{t^{-4}}$	$\frac{1}{t^6}$
7.	$(2x^2y^4)^0$	1
8.	$(x^3)^5$	x^{15}
9.	$\frac{(x^0)^5}{x^3}$	$\frac{1}{x^3}$
10.	$(3x^2)^3\ (2x)^4$	$432\ x^{10}$
11.	$\frac{x^9}{x^6}$	x^3
12.	$\frac{(m^3)^2m^5}{(m^4)^3}$	$\frac{1}{m}$
13.	$\frac{x^4}{x^{10}}$	$\frac{1}{x^6}$
14.	$-3a^2(2a^4)$	$-6a^6$
15.	$6x^2(-3x^4)(2x^5)$	$-36\ x^{11}$

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EXPONENTS Worksheet # 5- Answers

No.	Problem	Answer Key
1.	0^4	0
2.	$\frac{w^{12}w^2}{w^4w^5}$	w^5
3.	$(0.7)^3$	0.343
4.	$(2^5b^{-3})^{-3}$	$\frac{b^9}{2^{15}}$
5.	$\frac{3^{15}}{3^2 \cdot 3^{10}}$	3^3
6.	$(c^5d^4)^{10}$	$c^{50}d^{40}$
7.	$\left(\frac{6c}{5d^3}\right)^{-2}$	$\frac{25d^6}{36^2}$
8.	$\frac{13w^8z^3}{26w^2z}$	$\frac{w^6z^2}{2}$
9.	$(3^{-2}y^3)^{-2}$	$\frac{81}{y^6}$
10.	$(-5a^4bc)(-10a^2b\ )$	$50a^6b^2c$
11.	$\left(\frac{7}{10}\right)^3$	$\frac{343}{100}$
12.	$\frac{-2}{t \cdot t \cdot t}$	$\frac{-2}{t^3}$
13.	$(-1)^{22}$	1
14.	$4 \cdot n \cdot n \cdot n$	$4n^3$
15.	$(-1)^{21}$	-1

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EXPONENTS Worksheet # 6- Answers

No.	Problem	Answer Key
1.	$(2a^2b)^0$	1
2.	$\frac{t^{-8}m^2}{m^{-3}}$	$\frac{m^5}{t^8}$
3.	$(5x^3y^6)(6x^2y^5)$	$30x^5y^{11}$
4.	$\left(-\frac{2}{3}x^2\right)^3$	$-\frac{8}{27}x^6$
5.	$\frac{(3x)^{-5}}{(3x)^{-8}}$	$27x^3$
6.	$(4x^2y)^3(2xy)^2$	$256x^8y^5$
7.	$\frac{(a^3)^2(a^4)^5}{(a^5)^2}$	a^{16}
8.	$(2x^2y^5)^3(3x^4y)^2$	$72x^{14}y^{17}$
9.	$\left(-\frac{1}{3}n\right)^4(2n^3)^2\left(\frac{3}{2}n^6\right)^4$	$\frac{1}{4}\mathrm{n}^{34}$
10.	$(3x^2)(2x^3)(5x^4)$	$30x^9$
11.	$\left(\frac{1}{2}x^{-3}\right)^3(6x^4)$	$\frac{3}{4x^5}$
12.	$\frac{35x^2y^4z}{70x^6y^2z}$	$\frac{1y^2}{2x^4}$
13.	$3x^2y^5\left(\frac{2x^2y}{6x^4y^4}\right)^{-2}$	$27x^6y^{11}$
14.	$(2x^{-4}y^2)(3x^{-4}y^{-4})$	$\frac{6}{x^8y^2}$
15.	$\frac{(x^{-2})^3(x^3)^{-2}}{x^{10}}$	$\frac{1}{x^{22}}$

Name: **Date:**

EXPONENTS Worksheet # 7- Answers

No.	Problem	Answer Key
1.	$\frac{27x^3y^{-4}z}{9x^7y^{-6}z^4}$	$\frac{3y^2}{x^4z^3}$
2.	$\frac{12r^{-6}s^0t^{-3}}{3\,r^{-4}s^{-3}t^{-5}}$	$\frac{4\,s^3t^2}{r^2}$
3.	$\frac{(4x^{-5}y^3)^2}{(x^4y^{-6})^{-3}}$	$\frac{16x^2}{y^{12}}$
4.	$(5y^4)^{-3}(2y^{-2})^3$	$\left(\frac{8}{125y^{18}}\right)$
5.	$\left(\frac{8x^2}{4x^4\,y^{-3}}\right)^4$	$\frac{16y^{12}}{x^8}$
6.	$\frac{(x^{-7})^3\ \ (x^4)^5}{(x^3)^2\ (x^{-1})^8}$	x
7.	$(2x^2y^{-5})^3(3x^{-4}y^2)^{-4}$	$\frac{8x^{22}}{81y^{23}}$
8.	$2x^2y^3\left(\frac{7xy^4}{14x^3y^6}\right)^{-2}$	$8\,x^6\,y^7$
9.	$\frac{(x^3)^{-2}(x^4)^5}{(x^{-2})^7}$	x^{28}
10.	$\frac{(2a^3b^{-2}c)^5}{(a^{-2}b^4c^{-3})^{-2}}$	$\frac{32a^{11}}{b^2c}$
11.	$(-5a^4bc)(-10a^2b\,)$	$50a^6b^2c$
12.	$\frac{13w^8z^3}{26w^2z}$	$\frac{w^6z^2}{2}$

Name: **Date:**

EXPONENTS Worksheet # 8- Answers

No.	Problem	Answer Key
1.	$\frac{(3x^{-2}y^{8})^{4}}{(9x^{4}\ y^{-3})^{2}}$	$\frac{y^{38}}{x^{16}}$
2.	$(5x^{-2}\ y^{3})^{2}(2x^{4}y^{-5}\ )^{-3}$	$\frac{25y^{21}}{8x^{16}}$
3.	$\left(\frac{x^{-5}y^{2}}{x^{-3}y^{5}}\right)^{-2}$	$x^{4}y^{6}$
4.	$\frac{(a^{-2})^{3}\ (a^{4})^{2}}{(a^{-3})^{-2}}$	$\frac{1}{a^{4}}$
5.	$(2x^{4}y^{-3})(7x^{-8}y^{5})$	$\frac{14y^{2}}{x^{4}}$
6.	$8x^{4}y^{-3}\left(\frac{12x^{-3}y^{-2}}{24x^{4}y^{-5}}\right)^{0}$	$\frac{8x^{4}}{y^{3}}$
7.	$(4a^{5}\ b^{2})(2b^{-5}\ c^{2})(3a^{7}\ c^{4})$	$\frac{24a^{12}c^{6}}{b^{3}}$
8.	$\left(\frac{1}{2}\ x^{3}\right)\left(\frac{2}{3}\ x^{4}\right)(\frac{3}{5}\ x^{-7})$	$\frac{1}{5}$
9.	$\frac{5a^{8}b^{3}}{20a^{5}b^{-4}}$	$\frac{a^{3}\ b^{7}}{4}$
10.	$\left(\frac{ab^{-3}c^{-2}}{a^{-3}b^{0}c^{-5}}\right)^{-1}$	$\frac{b^{3}}{a^{4}c^{3}}$
11.	$(10xy^{3})(3x^{4}\ y)$	$30x^{5}y^{4}$
12.	$\frac{-12s^{2}tu^{3}}{4su^{2}}$	$-3stu$

Name: **Date:**

EXPONENTS Worksheet # 9- Answers

No.	Problem	Answer Key
1.	$\frac{r^7 \cdot r^{11} \cdot r^{60}}{r}$	r^{77}
2.	$\frac{15m^5np^{12}}{4mp^9}$	$\frac{15m^4np^3}{4}$
3.	$\frac{y^8(y^3)^4}{(y^2)^3}$	y^{14}
4.	$\frac{25h^3jk^5}{12h^2k}$	$\frac{25h\,jk^4}{12}$
5.	$\left(\frac{x^3y^5z}{5xy^2}\right)^2$	$\frac{x^4y^6z^2}{25}$
6.	$\frac{r^7 \cdot r^{11} \cdot r^{60}}{x}$	$\frac{r^{78}}{x}$
7.	$(6xy^{-11})^{-3}$	$\frac{y^{33}}{216x^3}$
8.	$\frac{5^{-1}}{5}$	$\frac{1}{25}$
9.	$(t+3)(t+3)(t+3)$	$(t+3)^3$
10.	$b^{20}b^{-14}$	b^6
11.	$(r^6s^4)(13r^2s)$	$13r^8s^5$
12.	$\frac{36h^5k^2}{9h^3k}$	$4h^2k$

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EXPONENTS Worksheet # 10- Answers

No.	Problem	Answer Key
1.	$(3u^2v^0)^{-3}$	$\frac{1}{27u^6}$
2.	$18(x^3 \cdot y^4)^2$	$18x^6y^8$
3.	$\left(\frac{2c^3d^4}{3c^2d}\right)^2$	$\frac{4}{9}\,c^2d^6$
4.	$(\frac{1}{4}\,c^6d^6)(28c^2d^7)$	$7c^8d^3$
5.	$\left(\frac{-4x^2}{y^4z}\right)^3$	$-\frac{64x^6}{y^{12}z^3}$
6.	$\frac{(t^{-2})^3}{t^{-4}}$	$\frac{1}{t^2}$
7.	$(6p^2q^8)\,(7p^5q^3)$	$42p^7q^{11}$
8.	$\frac{(s^3t^{-2})^4}{(3s^{-4}t^6)^{-2}}$	$9s^4t^4$
9.	$(-8y^{-12})(2y^{16}z^{-2})$	$\frac{-16y^4}{z^2}$
10.	$\frac{w^{-8}(w^2)^{-5}}{w^3}$	$\frac{1}{w^{21}}$
11.	$\left(\frac{(4h^2k^2)^2(h^3k)^4}{(2hk^3)^2}\right)^0$	1
12.	$\frac{(k^{-6})^{-2}(k^3)}{5k^6k^0}$	$\frac{k^{21}}{5}$

Name: **Date:**

EXPONENTS Worksheet # 11- Answers

No.	Problem	Answer Key
1.	$\left(\frac{4m^{10}n^4}{2m^{12}n^2}\right)^{-1}$	$\frac{m^2}{2n^6}$
2.	$(a^2b)^3(a^4b^3)^5$	$a^{26}b^{18}$
3.	$\left(\frac{2}{p^6p^3}\right)^{-3}$	$\frac{p^{27}}{8}$
4.	$(2c^3d^2)^5\left(\frac{c^6d^8}{4c^2d}\right)^3$	$\frac{c^{27}d^{31}}{2}$
5.	$(y^3)^4(y^2)^5$	y^{22}
6.	$(5h^{-2}k^0)^3(5k^{-2})^{-4}$	$\frac{k^8}{5h^6}$
7.	$\left(\frac{-3x^{-4}y^3}{2x^5y^{-3}}\right)$	$\frac{4x^{18}}{9y^{10}}$
8.	$(4x^2y^3)^3(xy^2)$	$64x^7y^{11}$
9.	$\frac{(4h^2k^2)^2(h^3k)^4}{(2hk^3)^2}$	$4h^{14}$
10.	$[(5h^{-2}k^0)^3(5k^{-2})^{-4}]^0$	1
11.	$\frac{(-4c^{12}d^7)^2}{(5c^{-3}d^{10)-1}}$	$80c^{12}d^{24}$
12.	$\frac{(21x^5y)(2x^8y^4)}{14xy}$	$3x^{12}y^4$

Name: **Date:**

EXPONENTS Blank Worksheet # 1

No.	Problem	Answer Key
1.		
2.		
3.		
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8.		
9.		
10.		
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12.		

Name: **Date:**

EXPONENTS Blank Worksheet # 2

No.	Problem	Answer Key
1.		
2.		
3.		
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10.		
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12.		

Name: **Date:**

EXPONENTS Blank Worksheet # 3

No.	Problem	Answer Key
1.		
2.		
3.		
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12.		

Name: **Date:**

EXPONENTS Blank Worksheet # 4

No.	Problem	Answer Key
1.		
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12.		

Name: **Date:**

EXPONENTS Blank Worksheet # 5

No.	Problem	Answer Key
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12.		

ABOUT THE AUTHOR

Najwa Hirn holds a Bachelor of Science degree with honors in Engineering Technology. She has been working with Mathematics for over 25 years both professionally and privately. She taught math for many years.

Najwa is passionate about helping students succeed in Mathematics. She prides herself in being able to simplify math concept for students and teach every them according to their levels. Her step-by-step approach to solving problems has helped many students understand concepts better. She does not eliminate a step no matter how simple it may be since eliminating steps is what confuses many students.