

Topic/Notes	Classwork Or Homework Title/Name of page
Exponents	<input type="checkbox"/> Notes pages 1-2 <input type="checkbox"/> HW day 1 page 3A <input type="checkbox"/> Notes pages 3B-5A <input type="checkbox"/> HW day 2 page 5B <input type="checkbox"/> Exponent practice page 6 <input type="checkbox"/> Exponents with geometry page 7 <input type="checkbox"/> Exponent challenge questions page 8A <input type="checkbox"/> Exponent HW page 8B
Order of Operations	<input type="checkbox"/> Notes pages page 9A <input type="checkbox"/> O of O practice page 9B <input type="checkbox"/> Notes page 10A <input type="checkbox"/> More practice 10B <input type="checkbox"/> Order of Ops crossword page 11 <input type="checkbox"/> Order of ops practice page 12 <input type="checkbox"/> O of O problem solving page 13A <input type="checkbox"/> O of O Calculator inquiry page 13B
Substitution with order of operations	<input type="checkbox"/> Notes page 14A <input type="checkbox"/> Practice page 14B <input type="checkbox"/> Evaluating expressions page 15 <input type="checkbox"/> Where can you see...Riddle page 16A <input type="checkbox"/> According to Astronomers...Riddle page 16B

Extra Practice:

Exponents and order of ops games and review

Baseball exponents

<http://www.xpmath.com/forums/arcade.php?do=play&gameid=95>

Pyramid math

<http://www.mathnook.com/math/pyramidmath.html>

Exponent jeopardy

<http://www.math-play.com/Exponents-Jeopardy/exponents-jeopardy-math-game.html>

http://www.mangahigh.com/en_us/games/pemdasblaster

<http://mrnussbaum.com/orderops/>

http://www.mathplayground.com/order_of_operations.html

Exponent Notes

With a partner, discuss how these two examples are the same or different.

$$2^6 \qquad 2 \cdot 6$$

Justify your answers with pictures, numbers or words

What does 5^3 mean mathematically?

An exponent tells us how many times a number is multiplied by itself. The number being multiplied is the base.

$$\text{base} \longrightarrow 5^3 \longleftarrow \text{exponent} \quad 5 \cdot 5 \cdot 5$$

This can be spoken as 5 to the power of three or five cubed

If you see an exponent of 2, you say _____

If you see an exponent of 3, you say _____

Exponential notation is written with a base and exponent

Example:

Expanded Form is when you write out the multiplication problem (no exponents)

Example:

Write each example from exponential form to expanded form.

Exponential form	Expanded Form
5^2	
3^5	
4^2	
8^4	

Write each example from expanded form to exponential form

Expanded form	Exponential Form
$6 \cdot 6 \cdot 6$	
$7 \cdot 7$	
$2 \cdot 2 \cdot 2 \cdot 2$	
$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$	

Write each example in exponential form then in word form. Read it to a partner when you have finished.

Expanded form	Exponential Form	Word form
$3 \cdot 3 \cdot 3$		
$8 \cdot 8$		
$2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$		

Exponents with variables

Exponents can be used with variables (letters) the same way they are used with numbers.

Write the following in exponential notation.

Expanded form	Exponential Form
$h \cdot h \cdot h$	
$g \cdot g$	
$d \cdot d \cdot p \cdot p$	
$b \cdot b \cdot k \cdot k \cdot b \cdot b$	

Power of zero

How can you find the answer to a number or variable raised to the power of zero?

Fill in the table

Exponential form	Expanded form	Answer
10^4		
10^3		
10^2		
10^1		
10^0		

Exponential form	Expanded form	Answer
3^4		
3^3		
3^2		
3^1		
3^0		

B

M

Exponent Homework Day 1 Name _____

Write each of the expression in expanded form and solve

1) 2^3

2) $(\frac{1}{3})^3$

3) $(2.2)^2$

4) $(\frac{1}{8})^2$

5.) 15^0

6.) $(9.1)^0$

Write each statement in exponential notation and solve

7.) $\frac{1}{5} \cdot \frac{1}{5} \cdot \frac{1}{5}$

8.) $0.3 \cdot 0.3 \cdot 0.3 \cdot 0.3$

9.) $0.4 \cdot 0.4$

10) $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$

Exponents with fractions and decimals

Remember: An exponent tells us how many times a number is multiplied by itself. The number being multiplied is the base.

Write the following in expanded form

Example) $(0.3)^3$

Example) $(\frac{1}{4})^2$

Let's take a look at variables...

Write the following in expanded form

Exponential form	Expanded form	Answer
$(\frac{n}{3})^3$		
$(\frac{7}{g})^2$		

Write each example from exponential form to expanded form and solve.

Exponential form	Expanded form	Answer
$(0.9)^2$		
$(0.3)^5$		
$(\frac{d}{3})^2$		
$(\frac{2}{k})^4$		

Write each example from expanded form to exponential form

Expanded form	Exponential Form
$6.1 \cdot 6.1 \cdot 6.1$	
$0.7 \cdot 0.7$	
$\frac{b}{8} \cdot \frac{b}{8} \cdot \frac{b}{8} \cdot \frac{b}{8}$	
$\frac{4}{9} \cdot \frac{4}{9} \cdot \frac{4}{9} \cdot \frac{4}{9} \cdot \frac{4}{9}$	

Write each example in exponential form then in word form. Read it to a partner when you have finished.

Expanded form	Exponential Form	Word form
$\frac{1}{8} \cdot \frac{1}{8} \cdot \frac{1}{8}$		^
$\frac{x}{5} \cdot \frac{x}{5}$		
$\frac{k}{4} \cdot \frac{k}{4} \cdot \frac{k}{4} \cdot \frac{k}{4} \cdot \frac{k}{4}$		

Power of zero

How can you find the answer to a number or variable raised to the power of zero?

Fill in the table

Exponential form	Expanded form	Answer
2^4		
2^3		
2^2		
2^1		
2^0		
2^{-1}		
2^{-2}		

5

A

B

19

Practice

Write each of the following in expanded form and solve

Exponential form	Expanded form	Answer
$(\frac{b}{4})^3$		
$(\frac{2}{5})^2$		
$(\frac{d}{2})^4$		
$(\frac{8}{k})^2$		

Exponent HW Day 2

Name _____

Write each of the expression in expanded form and solve

1) $(0.3)^3$

2) $(\frac{1}{2})^3$

3) $(1.5)^2$

4) $(\frac{1}{6})^2$

Write each statement in exponential notation and solve

5) $\frac{1}{4} \cdot \frac{1}{4} \cdot \frac{1}{4}$

6) $0.6 \cdot 0.6 \cdot 0.6 \cdot 0.6$

7) $0.9 \cdot 0.9$

8) $\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3}$

Write the following in exponential form and solve

Expanded form	Exponential Form	Solve
$\frac{1}{5} \cdot \frac{1}{5} \cdot \frac{1}{5}$		
$\frac{x}{2} \cdot \frac{x}{2} \cdot \frac{x}{2} \cdot \frac{x}{2}$		
$\frac{1}{4} \cdot \frac{1}{4}$		

Name: _____

Exponents Practice

Write each of the expressions in expanded form and solve.

1.) 3^5

2.) 7^4

3.) 8^3

4.) 10^5

5.) $2^3 4^2$

Write each statement in exponential notation and solve.

6.) $6 \times 6 \times 6 \times 6$

7.) 7×7

8.) $3 \cdot 3 \cdot 3 \cdot 5 \cdot 5$

Solve the following

9.) 15^1

10.) 200^0

Write down the following expressions in expanded form:

11.) $a^5 b^8$

12.) $p^3 k^5$

Write down the following statements in exponential notation:

13.) $h \cdot h \cdot g \cdot g \cdot g \cdot g$

14.) $v \cdot v \cdot v \cdot v \cdot j$

Write each of the numbers using a base and an exponent. For example, 25 can be written with a base of 5 and an exponent of 2. That is $25 = 5 \cdot 5 = 5^2$

15.) 16

16.) 4

17.) 36

18.) 49

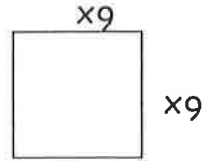
Come up with two of your own examples of numbers that can be written as a base with an exponent.

19.)

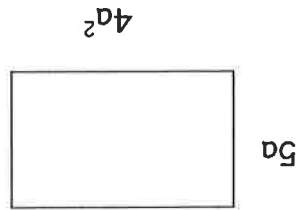
20.)

Exponents With Geometry

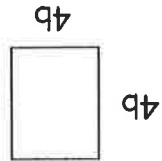
1. What is the area of a square with a side length of $6x$?



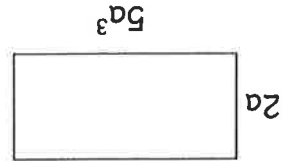
2. What is the area of a rectangle with side lengths of $5a$ and $4a^2$?



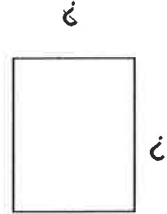
3. What is the area of a square with a side length of $4b$?



4. What is the area of a rectangle with side lengths of $2a$ and $5a^3$?



5. A square has an area of $9y^2$. What is the side length of the square?



6. A rectangle has an area of $10p^2$. The width of the rectangle is $5p$. Find the length of the rectangle.



8

Exponents Challenge Questions

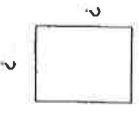
A

1. Suppose your dog has puppies at 2:00 p.m. and you call two friends. In 20 minutes they each call 2 friends to tell them the news. In 20 minutes, these friends each call 2 others. This continues all afternoon. Assuming that no one calls someone that already knows, how many people will know by 6:00 p.m.?

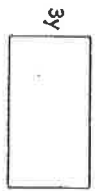
2. Which of these numbers is a result of squaring the base?

- a. 35
- b. 40
- c. 44
- d. 49

3. A square has an area of $16x^2$. What is the side length of the square?



4. A rectangle has an area of $12y^2$. The width of the rectangle is $3y$. Find the length of the rectangle.



Exponents Homework Day 2

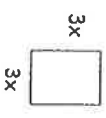
B

I. Find the missing numbers. Show work.

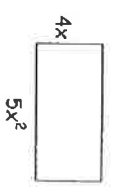
- a. $6^2 = 36$
- b. $3^2 = 81$
- c. $2^2 = 64$

II. Find the area of each shape

a. What is the area of a square with a side length of $3x^2$



b. What is the area of a rectangle with side lengths of $4x$ and $5x^2$?



III. Review

- a. $(\frac{2}{3})^2$
- b. $3 \cdot 2^3$

6

B

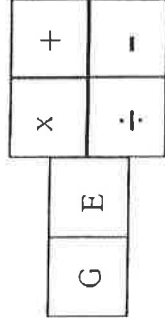
A

Order of Operations

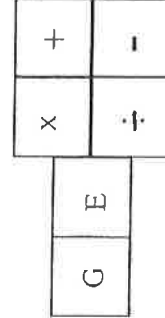
Solve the following problems

Ex)

12 + 3^2 - 7 • 2 + 9



4^2 + 48 ÷ (10 - 4)

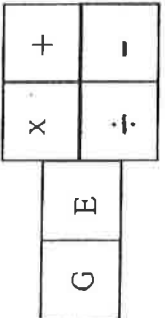
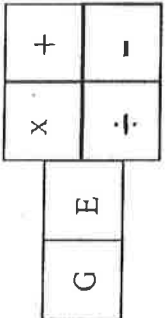


10 • (28-23) + 7^2 - 37

Practice

2 [72 - (3+4)^2 + 2] + (5-3)^3

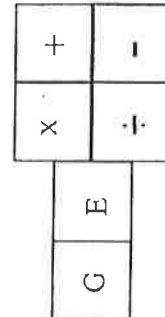
2 + [5(15-7) - 6^2]^3 - 16



4[(8 + 4) • 10] + = 24 ÷ 2^3

2 • [(1 + 3) • 9] + 27 ÷ 3^2

8 ÷ (1 + 3) • 5^2 - 2



Skills Check

6^2 - 12 ÷ 3 + (15-7)

A

Solve each of the following. Make sure you show all your steps.

1) $5 \cdot 3 - 4 \div 2 \cdot 3 + 10$

2) $24 \div 8 \cdot 2 \div 3 + 5$

3) $18 - 6 + 4 + 6 - 2$

4) $30 - 18 \div 6 \cdot 4$

5) $15 - (5 + 3) \div 2$

6) $64 \div 8 \cdot 4 - 1 + 7$

7) $55 \cdot 3 \div (5 + 6)$

8) $62 + 3 \cdot 7 - 4 + 8$

B

More Practice

1) $4^2 + 48 \div (10 - 4)$

2) $81 \div (9 \cdot 9) + 4^3$

3) $61 + 5 \cdot 10 \div 2 - 70$

4) $(2^2 + 18) + 3 - 5 \cdot 4$

5) $21 \div (3 + 4) \cdot 9 - 2^3$

6) $10 \div 2 \cdot 2 + 4^2$

7) Regina bought 5 carved wooden beads for \$3 each and 8 glass beads for \$2 each. Write and evaluate the expression.

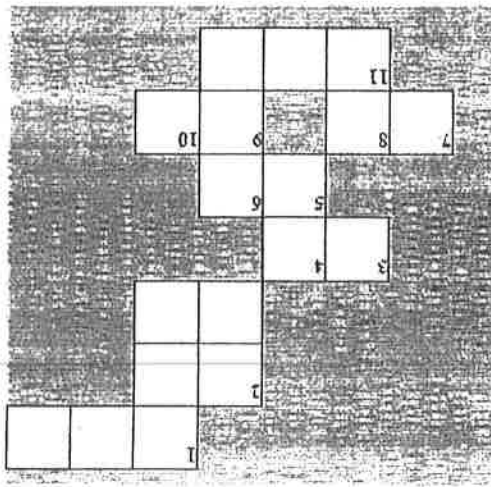
8) Tyler walked 2 miles a day for the first week of his exercise plan. Then he walked 3 miles for the next 9 days. How many miles did Tyler walk?

	6. $350 \div 5 + 12 \cdot 7$	8. $10^2 - 25 \cdot 3 \div 5$	10. $65 - 4^3 \cdot 17$
	1. $25 \cdot 3 + 60 \cdot 2$	2. $(16 \div 4) + 4 \cdot (2^2 - 2)$	3. $2^4 + 8 + 5$
			4. $(1 + 2)^2 \cdot (3 - 1)^2 + 2$

Down

	7. $40 - (5 \cdot 2) + 8$	8. $(6^2 + 4) \div 5$	9. $3 \cdot 9 + 96 \div 4$
	1. $(5 + 6)^2 + 18 + 2$	2. $3(20 - 4^2) + 7$	3. $77 - 42 + 7^1$
			5. $270 \div 6 + 6^2$
			11. $532 - 2^5 + 4$

Across



Order of Operations: Crossword Puzzle

Name: _____ Date: _____ Core: _____

Order of Operations Practice

Name _____ Date _____

I. Simplify the following. (Show each step for questions 1 and 2)

1. $21 + 9 \div 3 + 9$

2. $4\{3^3 - 5(8 - 6)\} + 2 + 11$



IV. Writing on the Order of Operations

1. Why do we need an order of operations?

2. Why is our "order of operations" in the order it is?

Make the following expressions equal to 21 by placing parenthesis.

3. $4 + 5 \cdot 3 - 6$

4. $15 \div 5 + 2 \cdot 4 + 10$

II. Simplify the following. (Show each step for questions 5 and 6)

5. $24 \div 3(5 - 3)$

6. $2^3 \{[(15 - 7) \div 2]\}$

Make the following expressions equal to 35 by placing parenthesis.

7. $8 - 3 \cdot 9 - 2$

8. $15 + 10 \cdot 8 \div 4$

III. Order of Operations problem solving

Insert the proper operation signs (+, -, x, \div) and grouping symbols, when needed, to make each sentence true.

4 2 1 = 1 4 2 1 = 2

4 2 1 = 3 4 2 1 = 4

4 2 1 = 5 4 2 1 = 6

A

Order of Operations Problem Solving

Order of Operations
Insert parentheses, if needed, in each of the following expressions so the answer for all problems will be the same.

Suggestion: Find all the possibilities for each problem by placing parenthesis in different places.

Prove your answer by showing your work!

$4 + 3 \cdot 7 - 4$

$2 \cdot 5 - \frac{1}{2} \cdot 10 \cdot 9$

$2 \cdot 3 + 3 \cdot 5$

$3^2 \div \frac{1}{3} + 3 \cdot 6$

How will you remember to use Order of Operations?

B



Order of Operations Calculator Inquiry

Do the following problems without the calculator. Then check on the calculator.

Problem	Student Answer	Calculator Answer	What are the steps the calculator used to get the answers?
$8 + 2 \cdot 5$			
$4 + 3 \cdot 5$			
$2 \cdot 5^2$			
$3 \cdot 10^2$			
$17 - 12 + 5$			
$15 - 3 + 10$			
$2(6 + 4) + 5$			
$4(7 - 3) - 10$			
$18 \div 6 \cdot 3$			
$12 \div 3 \cdot 2$			
$3(2 + 8)^2$			
$2(10 - 7)^3$			

13

A

Evaluating Expressions with Substitution and order of operations

Johnny was working on a problem and said....

If $a = 6$ $b = 12$ and $c = 5$

Then $a + b - c = 13$

Explain how Johnny got the answer of 13. Use words or numbers to prove

Variable: _____

 Substitution: _____

Evaluate xyz when $x = 1$, $y = 3$, and $z = 5$

Note: xyz means "x times y times z"

$M = 6$ $p = 7$ $r = 3$

ex) $4 + m + r \cdot p$ $r^2 - p + (m + r)$

$X = 4$ $y = 2$

$2x + 3y - 1$

$y^4 - x^2$

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

B

Evaluate using fractions and decimals

ex) $3x + 2y$ when $x = 4$ and $y = 2.4$

ex) $7xy$ when $x = 2.5$ and $y = 9$

ex) $5(n + 3) - 7n$ when $n = \frac{1}{2}$

ex) $x^2 + y$ when $x = \frac{2}{3}$ and $y = \frac{1}{2}$

ex) $3x + 2y$ when $x = \frac{1}{6}$ and $y = \frac{2}{3}$

ex) $4xy$ when $x = 2.7$ and $y = 0.9$

ex) $3x + 5y$ when $x = 4.5$ and $y = 0.7$

ex) $4(n + 3) - 2n$ when $n = \frac{2}{3}$

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Evaluating Expressions – Worksheet #1



Evaluate the expression. For questions 1 – 8, use: $a = 7$, $b = 4$, $x = 10$, $y = 5$

1) $9b - 5y$

2) $(16 \div b \cdot y - 8)^2$

3) $aby - x^2$

4) $\frac{3x + 2y}{b}$

5) $19 - (xy - a^2)$

6) $\frac{a+y}{b} - \frac{b+x}{a}$

Evaluating Expressions – Worksheet #1

7) $3^b - x$

8) $abxy$

Choose the correct answer.

Which value of “x” would make the following expression equal to 13?

$36 - 7x + 5$

- A. 8
- B. 4
- C. 1
- D. 11

Which value of “y” would make the following expression equal to 24?

$7y - 2y + 9$

- A. 3
- B. 5
- C. 7
- D. 9

Which value of “p” would make the following expression equal to 52?

$(10^2 - 8) \div p + 6$

- A. 6
- B. 4
- C. 2
- D. 1

Which value of “k” would make the following expression equal to 0?

$42 - (15 + 3^k)$

- A. 2
- B. 3
- C. 4
- D. 0

Where Can You See the World's Biggest Rock Group?

Evaluate each formula below for the given values of the variables. Find each answer at the bottom of the page and cross out the letters above it. When you finish, the answer to the title question will remain.

- $V = hw^2$
where V is the volume of a square prism with a square base of side w and with height h . Find V if $h = 8$ cm, $w = 6$ cm. cm³
- $A = \frac{1}{2}h(a + b)$
where A is the area of a trapezoid with height h , and bases of lengths a and b . Find A if $h = 12$ cm, $a = 24$ cm, $b = 18$ cm. cm²
- $V = C\left(1 - \frac{n}{N}\right)$
where V is the value of an asset, depreciated over N years, at the end of n years; C is the original cost of the asset. Find V if $C = \$800$, $n = 5$ years, $N = 20$ years. \$
- $h = rt - 4.9t^2$
where h is the height in meters that an object will reach in t seconds when it is projected upward with an initial speed of r meters per second. Find h if $r = 75$ m/sec, $t = 10$ sec. m
- $w = 0.8e^3$
where w is the approximate weight in grams of an ice cube with edges of length e centimeters. Find w if $e = 5$ cm. g
- $R = \frac{rst}{rs + st + rt}$
where R is the total resistance of three resistances r , s , and t , in parallel. Find R if $r = 4$ ohms, $s = 10$ ohms, $t = 15$ ohms. ohms
- $V = \frac{1}{3}\pi r^2 h$
where V is the volume of a right circular cone with a base of radius r and with height h . Find V if $r = 6$ cm, $h = 10$ cm. Use 3.14 as the value of π . cm³

GE	MT	TA	OP	RU	ST	IN	SH	MO	FI	VE	RE
260	4.5	288	376.8	112	600	2.4	341.5	275	252	100	628

OBJECTIVE 2-a. To evaluate formulas.

ALGEBRA WITH PIZZAZZ!
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According to Astronomers, What Is a "Light Year"?



Write the letter of each exercise in the box containing the answer. Answers for the top half of the page are in the top row of boxes.

- | | | | |
|---|--|--------------------------|---------------------------------|
| Evaluate for $a = 5$, $b = 2$, $c = 6$. | Evaluate for $w = 9$, $x = 10$, $y = 3$. | | |
| E. $8a$ | S. $a + b + c$ | E. $5(x + 2)$ | H. $\frac{6x}{5y}$ |
| O. $12b$ | I. $50 - c$ | I. $(4w) \div y$ | T. $100 - (x + y)$ |
| T. ab | W. $7(a + c)$ | M. $8(x + y)$ | N. $x \cdot x$ |
| V. $4bc$ | T. $\frac{c}{b}$ | S. $\frac{wx}{y}$ | L. $\frac{w + x + y}{2}$ |

12	10	96	44	30	8	87	77	40	11	48	60	17	104	24	100	3	4	13
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- | | | | |
|--|--|-----------------------------------|---------------------------|
| Evaluate for $k = 2.5$, $m = 4$, $n = 12$. | Evaluate for $d = 10$, $u = 7$, $e = 3.2$. | | |
| S. $2km$ | H. $\frac{m + n}{m}$ | I. de | C. $9du$ |
| E. $n - (m + k)$ | A. $9(m + n)$ | W. $\frac{u \cdot u}{d}$ | L. $d(e + 5)$ |
| I. $m \cdot m \cdot m$ | S. $\frac{n \cdot n}{m}$ | S. $\frac{500}{d \cdot d}$ | R. $15(d - u)$ |
| O. $\frac{km}{5}$ | E. $\frac{150}{km}$ | T. $u - e$ | L. $\frac{ue}{eu}$ |

28	4.9	64	3.8	4	75	82	15	5	20	9	630	48	1	6	45	32	5.5	36
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Tools for Algebra:
Evaluating Expressions

1.2

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