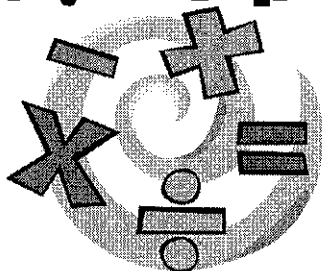


Name: _____ Date: _____ Core: _____

Order of Operations



- Order of Operations

- Exponents/Powers

- Other Grouping Symbols [] { }

Name: _____ Date: _____ Class: _____

Order of Operations Introduction Activity

Evaluate each numerical expression below:

a) $2 + 3 \cdot 4$

b) $24 - 8 \div 2 \cdot 4 + 3$

c) $40 - 4 \cdot (2 + 2^3)$

Name: _____ Date: _____ Class: _____

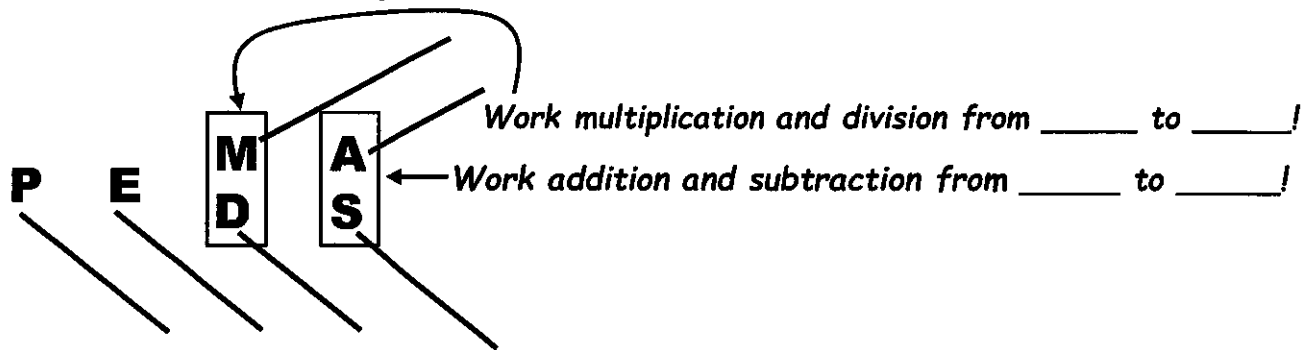
Order of Operations Notes

_____ - a collection of _____, _____, and _____, combined to form a mathematical phrase.

Examples of _____ include:

To evaluate _____, the mathematicians of old agreed that they would follow a particular _____ that can be described using **PEMDAS!**

Correct Order of Operations:



Evaluating numerical expressions using correct order of operations

a. Use **PEMDAS** to select the operations in order. Remember, work multiplication and division from left to right!

b. Evaluate one step at a time using goalposts. Rewrite everything with every step.

c. Circle your answer and draw your "V" for "victory".

$$2 + 3 \cdot 4$$

$$2 + 12$$

$$\textcircled{14}$$

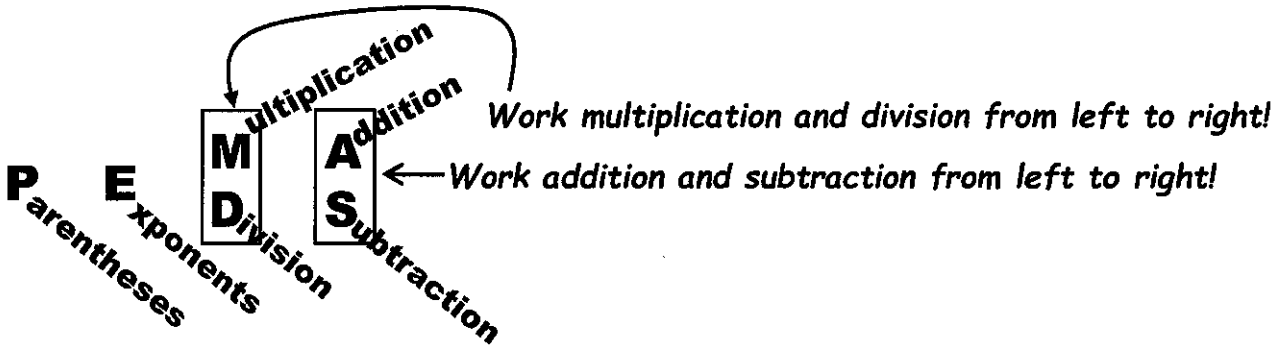
$$24 - 8 \div 2 \cdot 4 + 3$$

$$24 - 4 \cdot 4 + 3$$

- Key things to remember when evaluating numerical expressions:**
- ALWAYS do _____ step at a time.
 - NEVER try to _____ steps.
 - ALWAYS _____ all un-evaluated pieces with each step!
 - NEVER _____ the order of the numbers!

Order of Operations Worksheet - No Exponents

Remember **PEMDAS**:



1. State which operation (addition, subtraction, multiplication, or division) you would perform first.

- | | | | |
|--|------------------------------|--------------------------------|--------------------------------|
| a. $(7 + 3) \div 2$
<u>addition</u> | b. $10 - 2 \cdot 3$
_____ | c. $4 + 8 \div 2$
_____ | d. $3 \cdot (10 - 2)$
_____ |
| e. $15 - 3 + 2$
_____ | f. $12 + 5 - 8$
_____ | g. $9 \cdot 6 \div 3$
_____ | h. $8 \div 4 \cdot 2$
_____ |

2. Evaluate each numerical expression below. Study problem "a" closely and show your work as displayed; step-by-step, using goalposts!

1. Use **PEMDAS** to select the operations in order.

a. $(7 + 3) \div 2$ b. $4 \cdot (6 - 2)$ c. $6 \cdot 9 \div 3$

2. Evaluate one step at a time using goalposts.

3. Circle your answer and draw your V for "victory".

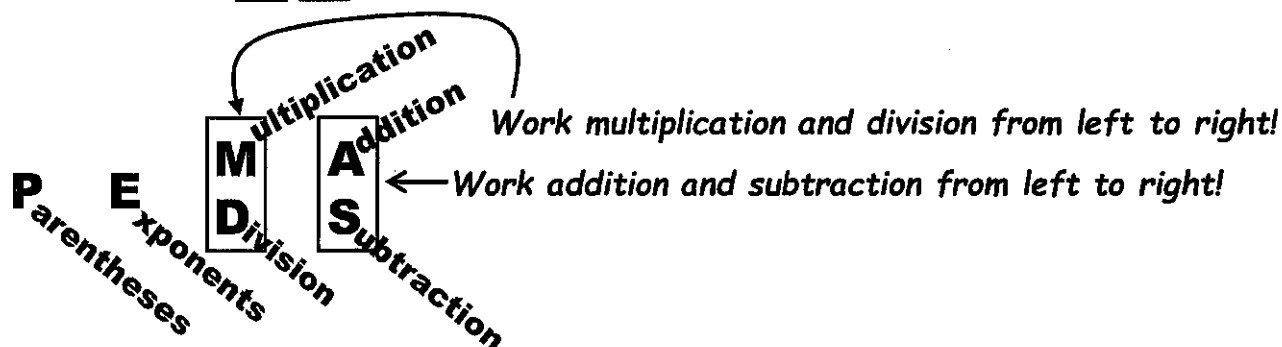
Remember:

- Rewrite all un-evaluated pieces with each step!
- Never change the order of the numbers!

- | | | |
|-------------------|------------------------|--------------------|
| d. $25 - 7 + 10$ | e. $18 \div 9 \cdot 2$ | f. $8 - 2 \cdot 3$ |
| g. $14 - (3 + 7)$ | h. $17 + 16 - 2$ | i. $16 + 8 \div 2$ |

Order of Operations Worksheet - No Exponents (continued)

Remember **PEMDAS**:



3. Evaluate each numerical expression below. Show all work, step-by-step, using goalposts!

a. $27 - 9 \div 3$

b. $(27 - 9) \div 3$

c. $7 + 14 \cdot 2$

d. $(7 + 14) \cdot 2$

e. $8 + 4 \cdot 9 - 6$

f. $20 - 8 \div 2 \cdot 2$

g. $4 \cdot (3 + 6) - 12$

h. $(16 + 8) \div (4 - 2)$

i. $30 - 9 \div 3 + 6 \cdot 9$

4. Insert parentheses to make each statement true:

a. $8 + 7 \div 9 - 2 = 9$

b. $7 \cdot 7 - 2 - 1 = 34$

c. $29 - 2 \div 9 + 1 = 4$

Name: _____ Date: _____ Class: _____

Order of Operations Exponent Warm-Up

Evaluate each numerical expression below:

a) $8 + 6 \div 2$

b) $36 \div (3 + 3) - 3 \cdot 2$

c) 2^3

d) 3^2

e) $6 + 3^2 \div 3$

Exponents/Powers Notes

Understanding exponents and powers:

1. 3^2 ("three to the second power" or "three squared") is **NOT 6!!!**

- 3 is called the _____.
- 2 is called the _____.
- The _____ tells you how many times to write the _____ before putting dots in between the bases:

a. Write the 3 (the *base*) _____ times because the *exponent* is ____!

$$3^2 = \underline{\quad} \overset{\bullet}{\cdot} \underline{\quad} = \underline{\quad}$$

b. Put a dot between the 3's (*bases*)! c. Calculate the result.

- So $3^2 = \underline{\quad}$

2. 2^3 ("two to the third power" or "two cubed") is **NOT 6!!!**

- 2 is called the _____
- 3 is called the _____
- The _____ tells you how many times to write the _____ before putting dots in between the bases:

a. Write the 2 (the *base*) three times because the *exponent* is 3!

$$2^3 = \underline{\quad} \overset{\bullet}{\cdot} \underline{\quad} \overset{\bullet}{\cdot} \underline{\quad} = \underline{\quad}$$

b. Put dots between the 2's (*bases*)! c. Calculate the result.

- So $2^3 = \underline{\quad}$

Using exponents and powers:

1. 4^2 is NOT 8!!

$$4^2 = \underline{\quad} \cdot \underline{\quad} = \underline{\quad}$$

2. 3^3 is NOT 9!!

$$3^3 = \underline{\quad} \cdot \underline{\quad} \cdot \underline{\quad} = \underline{\quad}$$

3. 5^2 is NOT 10!!

$$5^2 = \underline{\quad} \cdot \underline{\quad} = \underline{\quad}$$

4. 4^3 is NOT 12!!

$$4^3 = \underline{\quad} \cdot \underline{\quad} \cdot \underline{\quad} = \underline{\quad}$$

5. 6^2 is NOT 12!!

$$6^2 = \underline{\quad} \cdot \underline{\quad} = \underline{\quad}$$

6. 5^3 is NOT 15!!

$$5^3 = \underline{\quad} \cdot \underline{\quad} \cdot \underline{\quad} = \underline{\quad}$$

7. 2^4 is NOT 8!!

$$2^4 = \underline{\quad} \cdot \underline{\quad} \cdot \underline{\quad} \cdot \underline{\quad} = \underline{\quad}$$

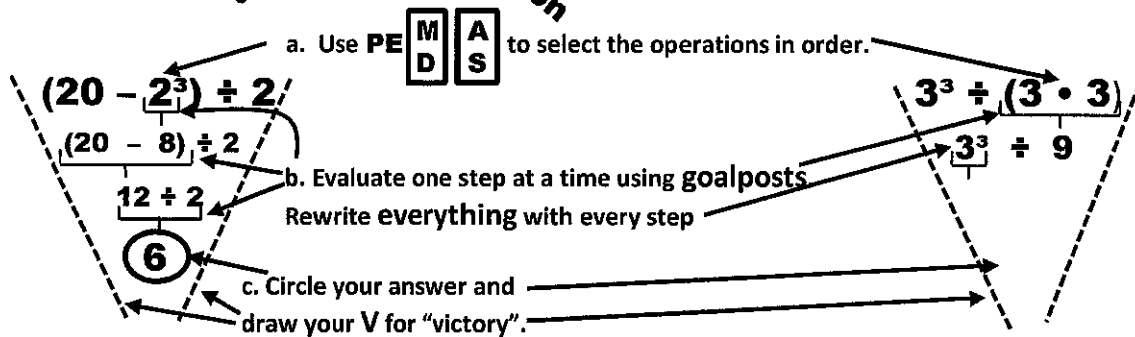
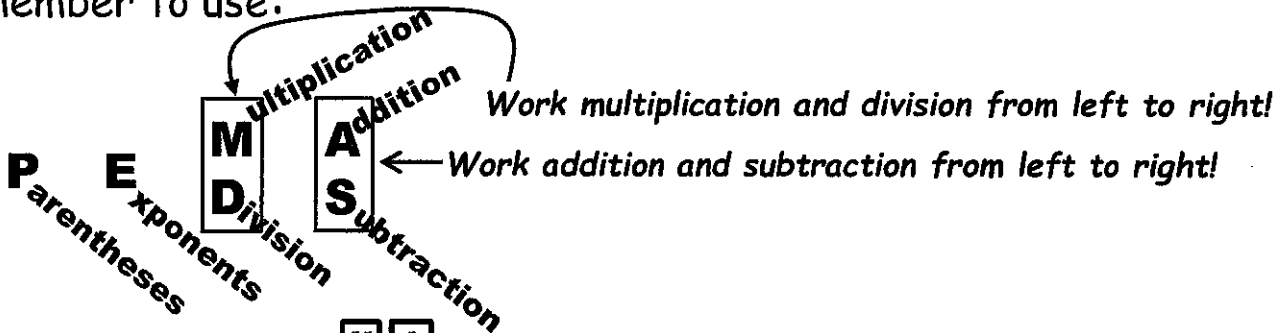
8. 3^4 is NOT 12!!

$$3^4 = \underline{\quad} \cdot \underline{\quad} \cdot \underline{\quad} \cdot \underline{\quad} = \underline{\quad}$$

Exponents/Powers Notes and Examples

Using exponents and powers with order of operations

Remember to use:



Key things to remember when evaluating numerical expressions with exponents:

- ALWAYS do _____ step at a time.
- NEVER try to _____ steps.
- ALWAYS _____ all un-evaluated pieces with each step!
- NEVER _____ the order of the numbers!
- Keep _____ parentheses until all calculations in them have been _____.

More practice!

a. $18 \div 2 + 4^2$

b. $(5^2 + 2) \cdot 3$

c. $8 + 3^2 - 7$

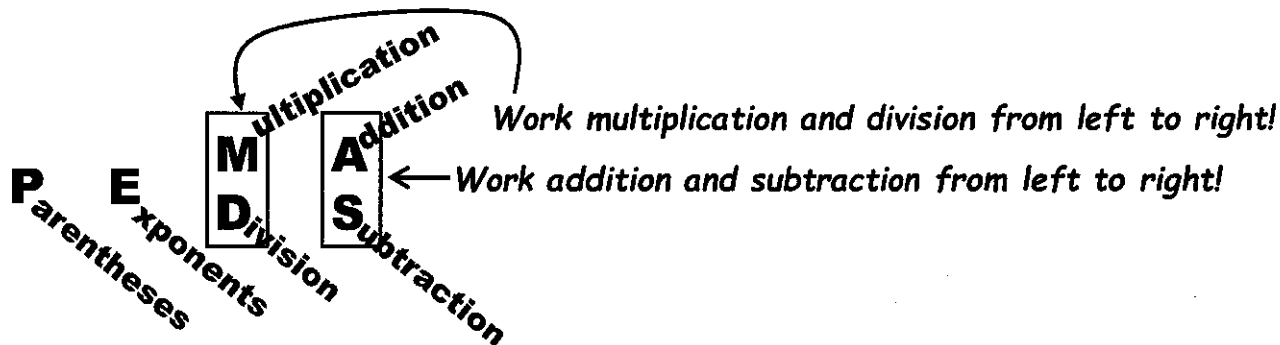
d. $4^2 + 16 \div 8 \cdot 2$

e. $(2 + 5 \cdot 3^2) - 2^3$

f. $(5^2 + 2) \div (2 + 1)$

Order of Operations Worksheet - With Exponents

Remember **PEMDAS**:



Evaluate each numerical expression below. Study problem "a" closely and show your work as displayed; step-by-step, using goalposts!

1. Use **PEMDAS** to select the operations in order.

a. $(3 + 9) \div 2$

$12 \div 2$

6

2. Evaluate one step at a time using goalposts.

3. Circle your answer and draw your V for "victory".

b. $18 - 6 \div 2$

c. $4 \cdot 3 + 4^2$

Remember to:

- Rewrite all un-evaluated pieces with each step!
- Never change the order of the numbers!

d. $6^2 - 9 \cdot 4$

e. $(3 + 2) \div 5 \cdot 2^3$

f. $30 - 3^2 + 4 \cdot 5$

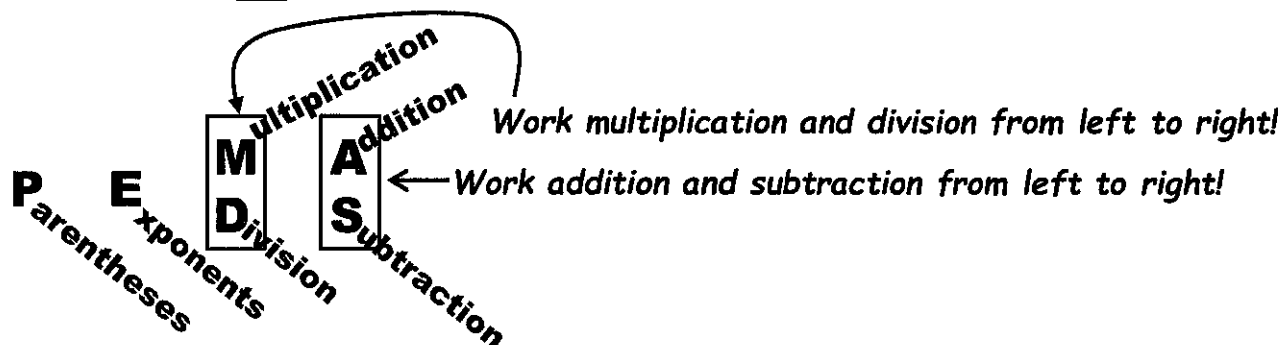
g. $3 \cdot (2^4 \div 4 - 2)$

h. $16 \div 8 \cdot 2 \cdot 6$

i. $24 + 4^2 \cdot 2$

Order of Operations Worksheet - With Exponents (continued)

Remember **PEMDAS**:



Evaluate each numerical expression below. Study problem "j" closely and show your work as displayed; step-by-step, using goalposts!

1. Use **PEMDAS** to select the operations in order.

j. $(24 - 4^2) \div 2$

k. $64 \div 2 \cdot 8 + 12$

l. $(2 + 3 \cdot 2 + 3^2) - 4^2$

$(24 - 16) \div 2$

2. Evaluate one step at a time using goalposts.

$8 \div 2$

4

3. Circle your answer and draw your V for "victory".

Remember to:

- Rewrite all un-evaluated pieces with each step!
- Keep re-writing parentheses until all calculations inside them have been completed!
- Never change the order of the numbers!

m. $5^2 \cdot (4 + 6 \div 2)$

n. $24 + (3^2 \div 3) \cdot 10$

o. $(4^2 + 2) \div 2 + (10 - 2)$

Name: _____ Date: _____ Class: _____

The "TWO-THREE" Order of Operations Challenge

Okay, here it is ... the game you have all been waiting for! Time to put your order of operations skills to the test, and all using nothing but twos and threes! Here is the challenge:

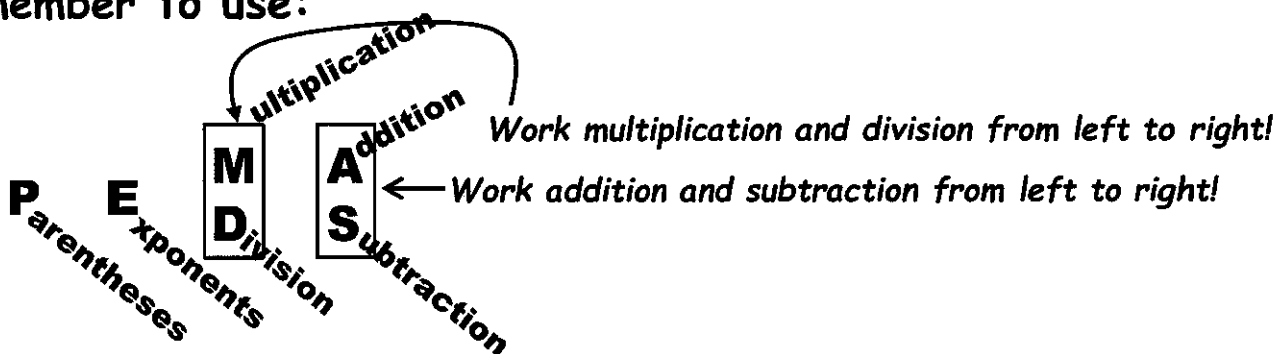
- Use A TOTAL of exactly FOUR 2's and 3's along with any operations you choose (addition, subtraction, multiplication, division, exponents) to make as many whole numbers as you can from 1 through 36.
- Any exponents used must be 2's or 3's and each one counts as one of your total of FOUR 2's and 3's.
- You may, and should, use parentheses, as often as needed.
- You must show your work using goalposts AND PROPER ORDER OF OPERATIONS for each result you get.

The winner gets the thrill of knowing he or she is a master of order of operations!

A couple of examples to get you started:

A total of exactly four 2's and 3's!

Remember to use:



Show your work on the back of this sheet or a separate sheet of paper and check off your results here:

1 <input checked="" type="checkbox"/>	5 <input type="checkbox"/>	9 <input type="checkbox"/>	13 <input type="checkbox"/>	17 <input type="checkbox"/>	21 <input type="checkbox"/>	25 <input type="checkbox"/>	29 <input type="checkbox"/>	33 <input type="checkbox"/>
2 <input type="checkbox"/>	6 <input type="checkbox"/>	10 <input type="checkbox"/>	14 <input type="checkbox"/>	18 <input type="checkbox"/>	22 <input checked="" type="checkbox"/>	26 <input type="checkbox"/>	30 <input type="checkbox"/>	34 <input type="checkbox"/>
3 <input type="checkbox"/>	7 <input type="checkbox"/>	11 <input type="checkbox"/>	15 <input type="checkbox"/>	19 <input type="checkbox"/>	23 <input type="checkbox"/>	27 <input type="checkbox"/>	31 <input type="checkbox"/>	35 <input type="checkbox"/>
4 <input type="checkbox"/>	8 <input type="checkbox"/>	12 <input type="checkbox"/>	16 <input type="checkbox"/>	20 <input type="checkbox"/>	24 <input type="checkbox"/>	28 <input type="checkbox"/>	32 <input type="checkbox"/>	36 <input type="checkbox"/>

Name: _____ Date: _____ Class: _____

Order of Operations Other Grouping Symbol Warm-Up

Evaluate each numerical expression below:

a. $24 - 3^2 \div 3 \cdot 3 + 3$

b. $2 \cdot (2^4 - 3^2) - 4 \div 2$

c. $10 + [(9 - 3) \div 3]$

d. $\frac{3^2 \cdot (2 + 3)}{(2 + 1) \cdot 3}$

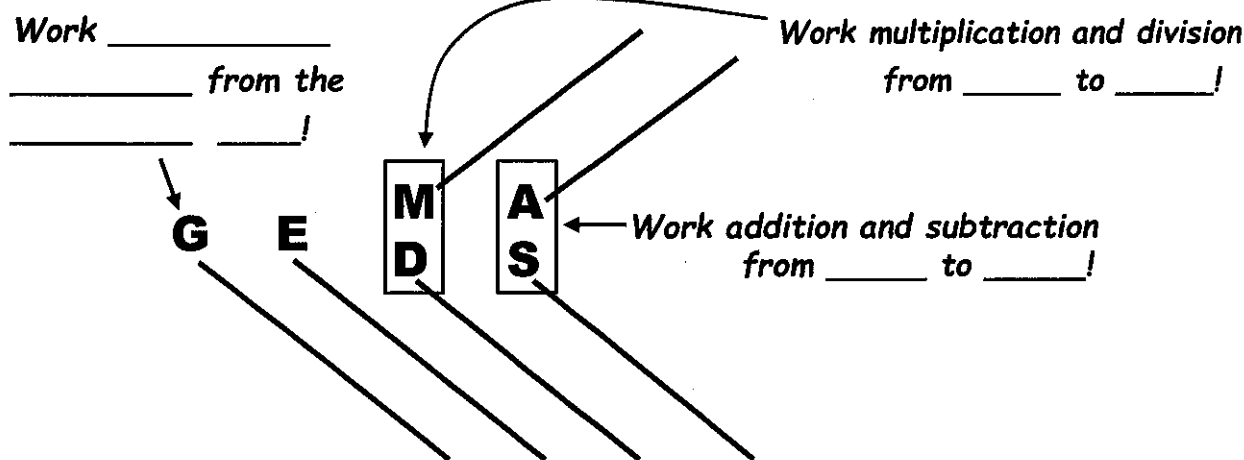
Name: _____ Date: _____ Class: _____

Order of Operations Notes - Other Grouping Symbols

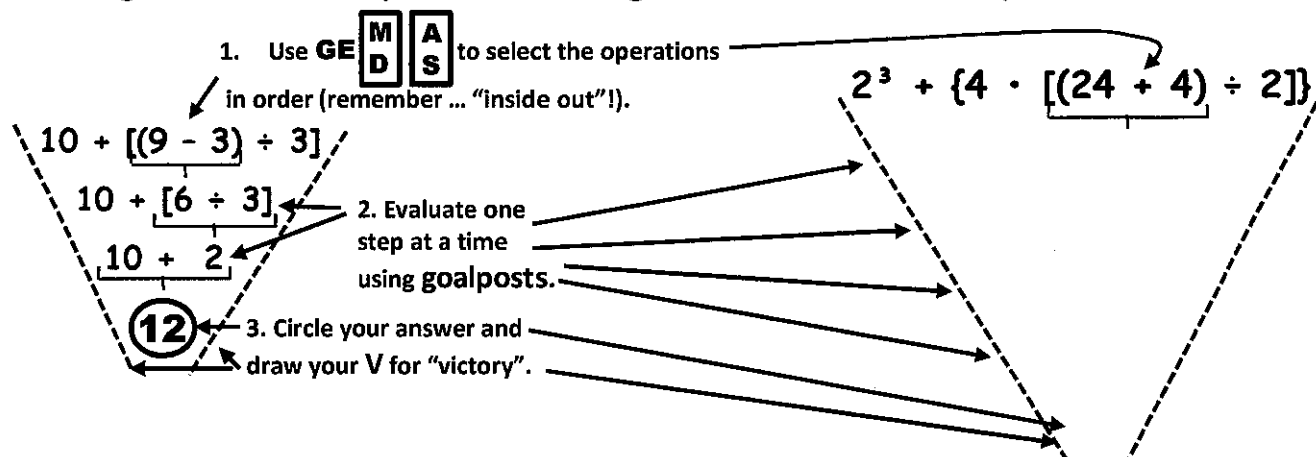
Sometimes, _____ have more than just parentheses, including _____, _____, and even _____.

So we change **PEMDAS** to **GEDMAS** so that we can include all _____, rather than just parentheses.

New Correct Order of Operations:



Evaluating numerical expressions using correct order of operations



Key things to remember when evaluating numerical expressions with grouping symbols:

- ALWAYS do _____ step at a time!
- ALWAYS _____ all un-evaluated pieces (including grouping symbols) with each step!
- NEVER _____ the order of the numbers!
- ALWAYS work _____ from the inside out!

Name: _____ Date: _____ Class: _____

Order of Operations Notes - Other Grouping Symbols

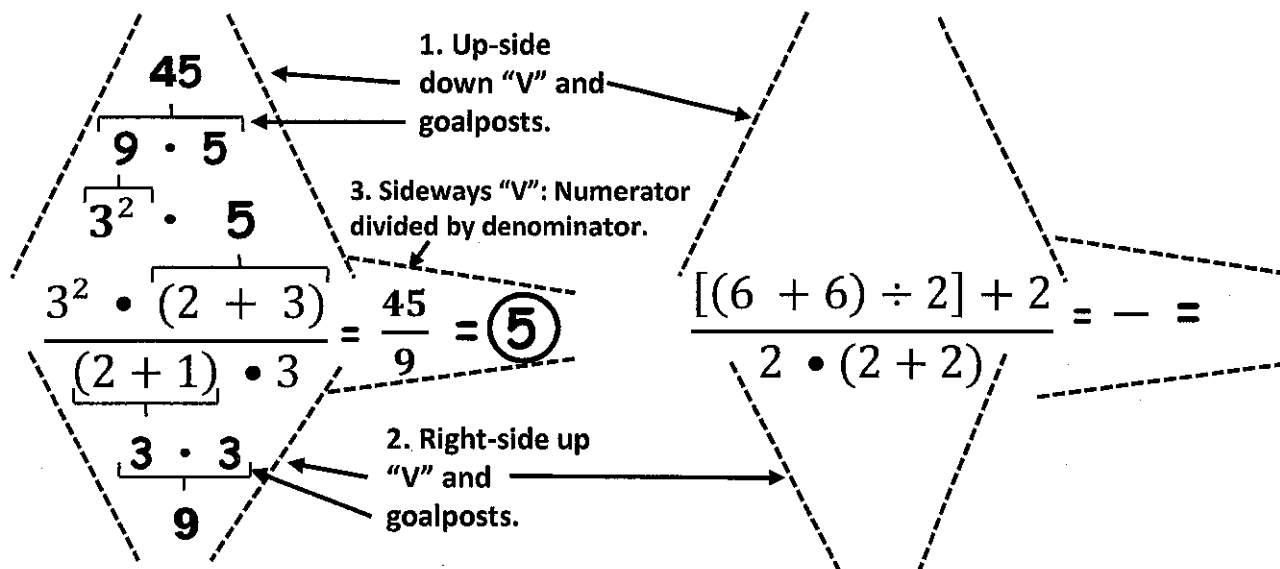
When evaluating numerical expressions, fraction bars tell you to _____ !

However, you must first _____ the _____ and

_____ the _____ before dividing.

We do this by following **GE** **M** **A** **D** **S** and using "V's gone wild!":

V's Gone Wild:



Key things to remember when evaluating numerical expressions with fraction bars:

- ALWAYS do _____ step at a time!
- Evaluate _____ and _____ first, then divide through!
- NEVER _____ the order of the numbers!
- ALWAYS _____ all unevaluated numbers and symbols with each step!

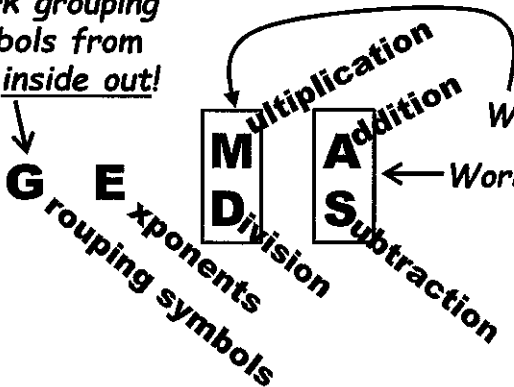
Order of Operations Worksheet - Other Grouping Symbols

Remember **GE**

M	A
D	S

:

Work grouping symbols from the *inside out!*



Work multiplication and division from left to right!

Work addition and subtraction from left to right!

Evaluate each numerical expression below. Study problem "a" closely and show your work as displayed; step-by-step, using goalposts!

1. Use **GE**

M	A
D	S

 to select the operations in order.

a. $10 + [(9 - 3) \div 3]$

b. $[(14 + 4) \div 3^2] \cdot 7$

c. $[2 \cdot (1 + 4)^2] \div 10$

$10 + [6 \div 3]$

2. Evaluate one step at a time using goalposts.

$10 + 2$

12

3. Circle your answer and draw your V for "victory".

Remember to:

- Rewrite all un-evaluated pieces with each step!
- Never change the order of the numbers!

d. $4 \cdot [50 - 3(1 + 3)^2]$

e. $3^3 \div [27 \div (3 \cdot 3)]$

f. $15 - [(3^2 + 6) \div 5]$

g. $(4 - 4) \div [(4 + 4) \cdot 4]$

h. $7^2 - [7(7 - 1^7)]$

i. $[(5^2 + 2) \div (2^2 + 5)]$

Order of Operations Worksheet - Other Grouping Symbols

Evaluate each numerical expression below. Study problem "a" closely and show your work as displayed; step-by-step, using goalposts!

1. Use **GE** **M** **A** **S** to select the operations in order.

a. $3 \cdot \{5 + [(12 - 6) \div 6]\}$

$3 \cdot \{5 + [6 \div 6]\}$

$3 \cdot \{5 + 1\}$

$3 \cdot 6$

18

2. Evaluate one step at a time using goalposts.

3. Circle your answer and draw your V for "victory".

Remember to:

- Rewrite all un-evaluated pieces with each step!
- Never change the order of the numbers!

b. $\{[6 \cdot (2 + 3)] \div 10\} + 7$

c. $\{[(15 + 3) \div 3^2] \cdot 6\} \div 4$

d. $4 \cdot \{[7(1 + 2)^2 - 23] \div 2\}$

e. $\{3 + [3^3 \div (3^2 \div 3)]\} \cdot 3$

f. $\{12 - [(15 + 6) \div 3]\} - 5$

g. $\{222 - [(2 + 2) \cdot 2]\} \div 2$

h. $\{[4 \cdot (2 + 3)^2] - 15\} \div 5$

i. $\{[(4^2 + 16) \div (3^2 - 1^7) + 2]\} - 4$

Name: _____ Date: _____ Class: _____

Order of Operations Worksheet - Other Grouping Symbols

Evaluate each numerical expression below. Remember, use an "up-side down V" on the top and a "regular V" on the bottom, then divide top by bottom!

a. $\frac{4 \cdot (6 + 3)}{2 \cdot (1 + 2)}$

b. $\frac{2^4 \cdot (2 + 3)}{(12 - 2) \div 2}$

c. $\frac{[5 \cdot (2 + 3)] - 1}{9 - (8 - 7)}$

d. $\frac{[4^2 \div (8 - 6)] \cdot 5}{[(7 - 4) \cdot 4] + 8}$

