PEMDAS 11

Facts and Reminders

In algebra, there is a specific order in which operations are performed when evaluating an expression or solving equations.

This is the algebraic order of operations:

1. Do any work within parentheses ( ) or other grouping symbols [ ] first.
2. Do any work with exponents (powers) or roots.
3. Do any multiplication or division in order from left to right.
4. Do any addition and subtraction in order from left to right.

The acronym for this order of operations is PEMDAS.

Parentheses Exponents Multiplication Division Addition Subtraction

A popular expression for remembering this is: Please Excuse My Dear Aunt Sally.

Sample A

Read the problem. $4^2 + (9 - 3) = ?$

Do the work in the parentheses first. $4^2 + 6 = ?$

Do the exponents next. $4^2 = 4 \times 4 = 16$, so $16 + 6 = ?$

Finally, add the numbers together. $16 + 6 = 22$

Write your answer. $4^2 + (9 - 3) = 22$

Sample B

Read the problem. $5^2 - (4 \times 3) + 9 \div 3 \times 4 = ?$

Do work in the parentheses first. $5^2 - 12 + 9 \div 3 \times 4 = ?$

Do exponents next. $5^2 = 5 \times 5 = 25$, so $25 - 12 + 9 \div 3 \times 4 = ?$

Multiply and divide in order from left to right. $25 - 12 + 3 \times 4 = ?$

9 divided by 3 is 3, and 3 times 4 equals 12. $25 - 12 + 12 = ?$

Add and subtract in order from left to right. $13 + 12 = ?$

25 minus 12 is 13 and 13 plus 12 equals 25. $13 + 12 = 25$

Write down your answer. $5^2 - (4 \times 3) + 9 \div 3 \times 4 = 25$

Using the Calculator

Many calculators are designed to follow the algebraic order of operations. You can use the following problem to see if your calculator is programmed to follow the algebraic order of operations.

$8 \times 4 \div 2 + 3 \times 8 \div 4 = ?$

If your calculator answer was 22, it follows the order of operations. (Unprogrammed calculators get an incorrect answer of 38.)

PEMDAS

Easy Applications

The acronym for this order of operations is PEMDAS.

Parentheses Exponents Multiplication Division Addition Subtraction

A popular expression for remembering this is Please Excuse My Dear Aunt Sally.

Directions: Study the Facts and Reminders page for this unit. Then find the numerical value of the following expressions using the correct order of operations.

1. $9 \times 5 - 4 + 3 \times 4 =$ _____
2. $12 + 8 \times 6 \div 2 \times 8 =$ _____
3. $3 + 6 \times 8 - 5 \times 2 =$ _____
4. $7 + 8 \div 4 + 3 - 2 =$ _____
5. $22 \div 11 + 12 - 3 =$ _____
6. $9 \times 8 - 6 \times 3 + 7 =$ _____
7. $13 + 5 \times 6 \div 2 + 10 =$ _____
8. $35 \div 7 \times 8 + 2 - 4 \times 2 =$ _____
9. $100 \div 5 \times 5 + 4 - 9 =$ _____
10. $88 \div 11 + 56 \div 8 + 12 - 5 =$ _____

Remember the following facts:

- The fraction bar (—) means division.
- The raised dot (•) means multiplication.
- Numbers written next to parenthesis or parentheses next to each other also require multiplication.

Directions: Find the numerical value of these expressions.

11. $5(8) - \frac{30}{5} + 4 \times 3 =$ _____
12. $(7)(9) + \frac{9}{3} - 20 \times 3 =$ _____
13. $8(9) + 10 \cdot 5 + 8 \cdot 2 =$ _____
14. $3 + 8 \cdot 10 - 13 \times 3 =$ _____
15. $17 + 5 - 6 \cdot 4 + \frac{12}{3} =$ _____
16. $9 + \frac{44}{4} - 8 \times 2 + 20 - 3 =$ _____

Parentheses and Exponents

Sample

Read the problem.	$3 + (2 \times 4) - 2^2 + 3 = ?$
Do the work in the parentheses first.	$3 + 8 - 2^2 + 3 = ?$
Get the numerical value of the exponent next.	$3 + 8 - 4 + 3 = ?$
Add and subtract in order from left to right.	$11 - 4 + 3 = ?$
	$7 + 3 = ?$
Record your answer.	$3 + (2 \times 4) - 2^2 + 3 = 10$

Directions: Study the Facts and Reminders page for this unit. Find the numerical value of each expression.

1. $(2 \times 3) + 3^2 - 5 \times 3 =$ _____

2. $10^2 - (3 \times 30) + 8 =$ _____

3. $4 + (2 \times 10) - 2^2 =$ _____

4. $8 + (5 \times 5) - 3^2 =$ _____

5. $4^2 - 13 + (12 \times 2) =$ _____

6. $7^2 + 3(2 \times 4) - 3 =$ _____

7. $3 + 5^2 - (12 + 3) =$ _____

8. $9 + 4^2 - (5 \times 5) + 2 =$ _____

9. $11 - 2^2 + (3 \times 2) - 4 =$ _____

10. $2(4 \times 5) + 3^2 - 2^2 =$ _____

11. $18 - (3 \times 4) + 5^2 - 2 =$ _____

12. $7(4 \times 2) - 4^2 + (2 \times 9) =$ _____

13. $10^2 - 3 \times 4 + (6 \times 4) - 5 =$ _____

14. $12^2 + 3 - 2(2 \times 4) - 5^2 + 11 =$ _____

15. $(15 + 7) \times 2 \times 3 - 6(4 \times 3) + 12 =$ _____

16. $(12 - 5) + (2 + 13) - 2^2 + 30 =$ _____

PEMDAS

1. $7 \times 3 + 6 - 5 \times 4 - 2 + 11 \times 3 =$ _____

2. $10 \times 14 - 6 + 15 \times 8 - 20 + 52 \div 2 + 13 =$ _____

3. $27 - 16 + 3 \times 16 - 6 \times 12 \div 3 + 59 - 18 =$ _____

4. $16 \times 3 - 7 \times 12 + 13 \times 6 + 21 \div 3 + 29 =$ _____

5. $28 \times 10 + 12 \times 17 - 13(5 + 2) - 19 + 38 =$ _____

6. $20(4 \times 5) - 12^2 + 6(9 \times 4) - 11 =$ _____

7. $7(5 - 2) + (7 \times 9) \div 3(2 + 5) + 13(2 + 1) =$ _____

8. $(12 \times 8) + (15 \times 4) - 6^2 + 5(9 + 1) + 17 =$ _____

9. $12 + 5(30 - 5) - 3^3 + 15(10 + 2) - 18 + 4 \times 2 =$ _____

10. $4(5 \times 3) - 2^2 + 3^2 - (3 \times 9) - 23 + 5 \times 3 + 16 =$ _____