

Order of Operations Examples

When an expression contains more than one operation, you can get different answers depending on the order in which you solve the expression. Mathematicians have agreed on a certain order for evaluating expressions, so we all arrive at the same answers. We often use grouping symbols, like parentheses, to help us organize complicated expressions into simpler ones. Here's the order we use:

1. First, do all operations that lie inside parentheses.
2. Next, do any work with exponents or roots.
3. Working from left to right, do all multiplication and division.
4. Finally, working from left to right, do all addition and subtraction.

Example 1: Evaluate without parenthesis

$$\begin{aligned} 8 - 7 + 3 &= \\ 1 + 3 &= \\ 4 \end{aligned}$$

Example 2: Evaluate with parenthesis

$$\begin{aligned} 8 - (7 + 3) &= \\ 8 - 10 &= \\ -2 \end{aligned}$$

Example 3: Evaluate: $12 \div 3 \cdot 5 - 4^2$

- (a) First – evaluate $4^2 \rightarrow 12 \div 3 \cdot 5 - 16$
- (b) Second – evaluate 12 divided 3 $\rightarrow 4 \cdot 5 - 16$
- (c) Third – evaluate 5 multiplied by 4 $\rightarrow 20 - 16$
- (d) Fourth – evaluate 16 subtracted from 20 $\rightarrow 4$

Example 4: Evaluate: $3(2 + 5)^2 \div 7 + \sqrt{9}$

- (a) First – evaluate 2 added to 5 $\rightarrow 3(7)^2 \div 7 + \sqrt{9}$
- (b) Second – evaluate 7^2 and $\sqrt{9} \rightarrow 3(49) \div 7 + 3$
- (c) Third – evaluate 49 multiplied by 3 $\rightarrow 147 \div 7 + 3$
- (d) Fourth – evaluate $147 \div 7 \rightarrow 21 + 3$
- (e) Fifth – evaluate $21 + 3 \rightarrow 24$

Name: _____
Date: _____

NUTS AND BOLTS
OF MATHEMATICS

Order of Operations Worksheet

Directions: State how to evaluate each expression – then evaluate using mental math and/or paper-and-pencil.

1. $3 + 2 \bullet 4$

2. $8 \div 4 \bullet 2$

3. $12 - 6 \bullet 2 + \sqrt{9}$

4. $(9 - 3)^2$

5. $9^2 - 3^2$

6. $7 \bullet 3^2$

7. $4(5 - 3)^2$

8. $(8 + 6) \div 2 + 2$

9. $12 \div 4 + 15 \bullet 3$

10. $5(9 + 3) - 3 \bullet 4$

11. $29 - 3(9 - 4)$

12. $12 \bullet 6 \div 3 \bullet 2 \div 8$

13. $288 \div [3(9 + 3)]$

14. $5^3 + 6^3 - 5^2$

15. $\frac{38 - 12}{2 \bullet 13}$

16. $\frac{9 \bullet 3 - 4^2}{3^2 + 2^2}$

17. $\frac{2}{3}(16) - \frac{1}{3}(6)$

18. $\frac{1}{2}(8 + 30) - 4$

19. $0.2(0.6) + 3(0.4)$

20. $27 \div 3(5 - 3)^2 - \sqrt{9}$

Order of Operations Worksheet (KEY)

Directions: State how to evaluate each expression – then evaluate using mental math and/or pencil-and-paper.

1) $3 + 2 \cdot 4 = 11$

Multiplication, Addition

2) $8 \div 4 \cdot 2 = 4$

Division, Multiplication

3) $12 - 6 \cdot 2 + \sqrt{9} = 3$

**Square Root, Multiplication,
Subtraction**

4) $(9 - 3)^2 = 36$

Subtraction, Exponents

5) $9^2 - 3^2 = 72$

Exponents, Subtraction

6) $7 \cdot 3^2 = 63$

Exponents, Multiplication

7) $4(5 - 3)^2 = 16$

Subtraction, Exponents, Multiplication

8) $(8 + 6) \div 2 + 2 = 9$

Addition, Division, Addition

9) $12 \div 4 + 15 \cdot 3 = 48$

Division, Multiplication, Addition

10) $5(9 + 3) - 3 \cdot 4 = 48$

Addition, Multiplication, Subtraction

11) $29 - 3(9 - 4) = 14$

Subtraction, Multiplication, Subtraction

12) $12 \cdot 6 \div 3 \cdot 2 \div 8 = 6$

Multiplication, Division, Multiplication, Division

13) $288 \div [3(9 + 3)] = 8$

Addition, Multiplication, Division

14) $5^3 + 6^3 - 5^2 = 316$

Exponents, Addition, Subtraction

15) $\frac{38 - 12}{2 \cdot 13} = 1$

Subtract, Multiply, Divide

16) $\frac{9 \cdot 3 - 4^2}{3^2 + 2^2} = \frac{11}{13}$

Exponents, Multiply, Subtract, Add, Divide

17) $\frac{2}{3}(16) - \frac{1}{3}(6) = 8\frac{2}{3}$

Multiply, Subtract

18) $\frac{1}{2}(8 + 30) - 4 = 14$

Add, Multiply, Subtract

19) $0.2(0.6) + 3(0.4) = 1.32$

Multiply, Add

20) $27 \div 3(5 - 3)^2 - \sqrt{9} = 33$

**Subtract, Exponent and Square Root,
Divide, Multiply**

Student Name: _____

Date: _____

ORDER OF OPERATIONS CHECKLIST

1. On each problem, did the student state “**how**” to evaluate each expression correctly?

- a. All twenty (50 points)
- b. Eighteen or more (46 points)
- c. Sixteen or more (42 points)
- d. Fourteen or more (38 points)
- e. Twelve or more (34 points)
- f. Ten or more (30 points)

If student got less than 10 correct, they receive ‘ZERO’ points and need remediation!

2. On each problem, did the student evaluate the formula correctly?

- a. All twenty (50 points)
- b. Eighteen or more (46 points)
- c. Sixteen or more (42 points)
- d. Fourteen or more (38 points)
- e. Twelve or more (34 points)
- f. Ten or more (30 points)

If student evaluated less than 10 correctly then they receive ZERO points and need remediation!

Total Number of Points _____

A 90 points and above

B 80 points and above

C 70 points and above

D 60 points and above

F 50 points and below

Any score below C needs remediation!