Order of Operations

Objectives: The students will be able to solve problems using order of operations.

Jordan solved the problem 5 + 4 * 2 and got the answer of 18. David solved the same problem and got 13. Can both be correct? Is there only one correct order to perform operations? Who is correct?

Don't forget the different symbols for multiplication:

5*2 5(2) ~~5x2~~ 5·2

Jordan
5 + 4 * 2
9 * 2
18

David
5 + 4 * 2
5 + 8
13

P (Level 1) Parentheses : Grouping Symbols

E (Level 2) Exponents $2^3 = 2 \cdot 2 \cdot 2 = 8$

D & M (Level 3) Divide & Multiply from left to right

S & A (Level 4) Subtract & Add from left to right

Practice

Steps must be shown so that each line of work is equal to the line above.

1. $5 * 10 + \bar{6} * -2$

$50 + 12$

62

2. $24 \div -6 * 2$

$-4 \cdot 2$

-8

3. $-3 + \bar{5}(7 + \bar{5})$

$-3 + \bar{5}(2)$

$-3 + -10$

-13

4. $18 + \bar{5} * -3$

$18 + 15$

33

5. $\frac{(9 + 7 * 5)}{4}$

$\frac{9+35}{4} = \frac{44}{4} = 11$

6. $2\,[9\,(-6 + \bar{4})] + 4$

$2[9(-10)] + 4$

$-180 + 4$

-176

7. $30 - 2^3$

$30 + \bar{8}$

22

8. $3(8 + \bar{14})^2$

$3(-6)^2$

$3 \cdot 36$

108

9. $25 - (2 + 2) * -3$

$25 + \bar{4} : -3$

$25 + +12$

37

10. $\frac{(8-(7-1)^2)}{(-20+9\cdot 2)}$

$\frac{8 + \bar{6}^2}{-\blacksquare + 18} = \frac{8 + \bar{36}}{-2} = \frac{-28}{-2} =$

14

11. $-5[4^3 + \bar{2}(-9 + 6)]$

$-5(4^3 + -2(-3)]$

$-5[64 + -2(-3)]$

$-5(64 + 6)$

$-5(70) = -350$

12. $9(-15 + \bar{3} + 14)$

$9(-4)$

-36

Evaluating Expressions

Objectives: The students will be able to evaluate expressions and solve problems by evaluating expressions.

We have learned that, in an algebraic expression, letters can stand for numbers. When we substitute a specific value for each **variable**, and then perform the operations, it's called **evaluating** the expression.

Evaluating a variable expression

Example 1

Evaluate 18 + 2g, for g = 3.

18 + 2g Replace the variable

18 + 2*3 Use the order of operations to solve.

18 + 6

24

Example 2

Evaluate $2ab - \frac{c}{3}$, for a = 3, b = 4, c = 9

$2ab - \frac{c}{3}$ Replace the variable

$2*3*4 - \frac{9}{3}$ Use the order of operations

24 – 3

21

Practice

Remember that a number beside a variable is multiplied. **2a means 2 * a**

Evaluate each expression.

1. 63 – 5x, for x = -7

$63 + -5(-7)$

$63 + 35$

98

2. 4(t + 3) + 1, for t = 8

$4(8+3)+1$

$4(11)+1$

$44+1$

45

3. 6(g + h), for g = -18 & h = 7

$6(-18+7)$

$6(-11)$

-66

4. 2xy – z, for x = 4, y = 3, and z = -1

$2 \cdot 4 \cdot 3 + +1$

$24+1$

25

5. $\frac{r+s}{2}$, for r = -13 and s = -11

$\frac{(-13 + -11)}{2} = \frac{-24}{2} = -12$

6. Becky saves $125 each year since her first birthday.

a. Write an expression for Becky's savings after 3 years. 125·3

b. Write an expression for Becky's savings after *y* years 125y

c. When Becky is 14 years old, how much will she have saved? 125·14