There are rules for evaluating expressions. These rules are called the ***order of operations.***

First, we do what is in parentheses. Then, we multiply. Finally, we add and subtract from left to right.

In expressions without parentheses, we always multiply before adding and subtracting.

EXAMPLES

$3+4\times2+5=3+8+5=\mathbf{16}$.

$(3+4)\times2+5=7\times2+5=14+5=\mathbf{19}$.

$3+4\times(2+5)=3+4\times7=3+28=\mathbf{31}$.

$(3+4)\times(2+5)=7\times7=\mathbf{49}$.

PRACTICE Evaluate each of the expressions below.

1. $3-2+4+6=$____

2. $6-4+2\times3=$____

3. $3+2+(6-4)=$____

4. $3\times(6-4+2)=$____

5. $(6-4)-(3-2)=$____

6. $(3+6-4)\times2=$____

7. $4\times3-(6+2)=$____

8. $6\times2-(3+4)=$____

9. $6+3-(4+2)=$____

10. $(4-2)\times(6-3)=$____

11. $6+4-(3-2)=$____

12. $(6-4)\times(3-2)=$____

Missing Parentheses

Calamitous Clod has stolen all of the parentheses in the equations below!

EXAMPLE

Place parentheses in the equation below to make a true statement.

$$3 + 3 \times 8 - 4 = 24$$

$3+3\times8-4=3+24-4=27-4=23$, so the equation is not true without parentheses.

We know that $24=6\times4$. Notice that $3+3=6$, and $8-4=4$. We place two pairs of parentheses to get

$$(3+3)\times(8-4)=6\times4=24.$$

The correct equation, with parentheses, is

$$(3+3)\times(8-4)=24.$$

PRACTICE

Place parentheses in the equations below to make each a true statement. In some problems, more than one pair of parentheses may be needed.

13. $5 \times 2 + 3 = 25$

14. $6 - 4 + 18 \times 20 = 400$

15. $7 \times 9 - 3 = 42$

16. $2 \times 4 + 1 \times 18 = 180$

17. $3 \times 9 - 2 - 1 = 20$

18. $2 + 6 \times 9 - 7 = 16$

19. $6 \times 2 + 3 - 4 = 26$

20. $20 - 13 - 1 \times 5 = 12$

21. $42 - 17 \times 523 - 521 = 50$

22. $17 + 3 \times 9 + 3 - 2 = 200$

Missing Parentheses

Grogg used the digits 2, 3, 5, and 8 to create expressions equal to each number from 1 to 12.

When he copied the twelve equations below, he forgot to include parentheses!

PRACTICE Help Grogg fix each equation by inserting missing parentheses. If no parentheses are needed, circle the equation.

In problems without parentheses, we multiply first. Then, we add and subtract from left to right.

23. $5 - 2 \times 3 - 8 = 1$

24. $2 + 3 + 5 - 8 = 2$

25. $8 - 5 \times 3 - 2 = 3$

26. $8 - 5 + 2 + 3 = 4$

27. $3 \times 5 - 8 + 2 = 5$

28. $2 \times 5 - 8 \times 3 = 6$

29. $8 - 3 \times 2 + 5 = 7$

30. $8 + 5 - 3 + 2 = 8$

31. $3 \times 2 - 5 + 8 = 9$

32. $8 - 2 \times 3 \times 5 = 10$

33. $8 - 5 \times 3 + 2 = 11$

34. $5 - 3 \times 8 - 2 = 12$