

Algebra Foundations

CW 1 Order of Operations with Integers

This problem is about using the digits 1, 2, 3, and 4, in any order you choose, to create arithmetic expressions with different numerical values according to the rules for **order of operations**. For this problem, a 1-2-3-4 expression is any expression written using each of these digits exactly once, according to the following rules.

- You may use any of the four basic arithmetic operations—addition, subtraction, multiplication, and division. For example, $2 + 1 \cdot 3 - 4$ is a correct expression for the number 1.
- You may use exponents. For example, $2^3 - 4 - 1$ is a correct expression for the number 3.
- You may use radicals. For example, $3 + \sqrt{4 \cdot 2 + 1}$ is a correct expression for the number 6.
- You may juxtapose two or more digits (that is, put them next to each other) to form a number such as 12. For example, $43 - 12$ is a correct expression for the number 31.
- You may use parentheses to change the meaning of an expression. For example, according to the rules for order of operations, $1 + 4 \cdot 3^2$ is an expression for the number 37. You can add parentheses to get $1 + (4 \cdot 3)^2$, which is an expression for the number 145.

Order of Operations

- 1. Parentheses**
- 2. Exponents**
- 3. Multiplication and Division (left to right)**
- 4. Addition and Subtraction (left to right)**

Your task in this problem is to create a 1-2-3-4 expression for each of the numbers from 1 to 24.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

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10 _____

11 _____

12 _____

13 _____

14 _____

15 _____

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24 _____