Simple Order of Operations

Section 2.1
Introduction to Order of Operations

If addition, subtraction, multiplication, and division are the simple math operations, what happens when you are given a math problem that includes more than one of these operations? You have to determine which to do first. The rules that determine what sequence to follow are called **order of operations**.

Example 1: $2 + 4 \bullet 5 = ?$

Can you see that there are two different ways of solving this problem? You can add first and then multiply, or you can multiple first and then add. Which way is the correct way? You get two different answers depending on how you solve this problem.

Add First, Then Multiply

$6 \bullet 5 \stackrel{?}{=} 30$ ☒

If you add first, 2 + 4 is 6. Then once you multiply, you get 6 • 5, which is 30.

Multiply First, Then Add

$2 + 20 \stackrel{?}{=} 22$ ☑

If you multiply first, 4 • 5 is 20. Then once you add, you get 20 + 2, which is 22.

Which is right? This example shows why order of operations is so important. It tells you the correct sequence for solving math problems with mixed operations. The correct answer is 22. That means multiplication is to be done before addition.

The rules for simple arithmetic operations is to work the following order :

1. Multiplication or Division
2. Addition or Subtraction

As you can see, multiplication and division are on the same level, and addition and subtraction are on the same level. As long as you are deciding between operations on different levels, the order is clear. But what if you have multiple operations on the same level? Then a rule called the ***Left Hand Rule*** becomes very important. It says that when you have multiple operations on the same level, you simplify them from left to right. Consider the following example.

Example 2: $10 - 3 + 60 \div 6 \bullet 5$

In this problem, there is a division and a multiplication operation, and there is a subtraction and an addition operation. Remember, multiplication and division must be done first. To solve this problem, find the left most multiplication or division operation and solve. Repeat until there are no more multiplication or division operations. Then do the same thing for the addition and subtraction operations. The correct order for solving this problem is given below.

$10 - 3 + \boxed{60 \div 6} \bullet 5$

$10 - 3 + \boxed{10 \bullet 5}$

According to the order of operations, 60 ÷ 6 and 6 • 5 are the two operations that must be performed first. According to the left hand rule, 60 ÷ 6 should be done first because it is farther left than 6 • 5.

Now perform the next left-most multiplication or division operation. There is only one left, 10 • 5.

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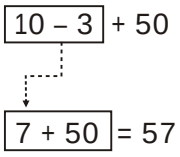

Once all the multiplication and division operations are done, you can perform the addition or subtraction operations starting at the left. Repeat until the problem is completely solved.

Practice 1

Solve the following math problems by using the correct order of operations. Show all of your work and write your final answers in the blanks.

1. $7 - 2 \cdot 3$ _____	2. $12 \div 3 + 6$ _____	3. $7 \cdot 4 - 9 + 4$ _____	4. $6 + 5 \cdot 4 \div 2$ _____
5. $6 \cdot 2 \div 4 + 9$ _____	6. $8 \cdot 3 - 21 \div 3$ _____	7. $36 \div 9 \cdot 3 + 8$ _____	8. $1 + 24 \div 6 - 2$ _____
9. $10 - 2 \cdot 4 + 7$ _____	10. $15 \div 3 + 5 \cdot 2$ _____	11. $3 \cdot 4 \div 2 - 3 + 4$ _____	12. $12 + 4 - 5 \cdot 4 \div 2$ _____

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