Order of Operations and Signed Numbers

Order of Operations

In algebra, every problem should be worked out following the order of operations.
1. You always start with the operations in the parentheses.
2. Then work out the exponents in the problem.
3. After that, work out the multiplication and division from left to right.
4. Finally, add and subtract from left to right.

You can remember the order of operations with the acronym PEMDAS.
Please **E**xcuse **M**y **D**ear **A**unt **S**ally.

P-Parentheses	Example:	$6+8(6-80/20)-3^2$
E-Exponents		$6+8(6-4)-3^2$
M-Multiplication		$6+8(2)-3^2$
D-Division		$6+8(2)-9$
A-Addition		$6+16-9$
S-Subtraction		$22-9$
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Signed Numbers

There are two rules when adding and subtracting signed numbers.
1. If the two numbers have the **same** sign, then you add the numbers together and use the sign the numbers had in front of the sum.
   Examples: 3 + 4 = 7
   $\qquad$ -5 + -7 = -12
   $\qquad$ -5 – 4 = -5 + -4 = - 9
2. If the two numbers have **different** signs, then you subtract the smaller number from the larger number and put the sign of the larger number in front of the answer.
   Examples: 3 – 4 = 3 + - 4 = -1
   $\qquad$ -2 + 5 = 3
   $\qquad$ 7 + -10 = -3

There are two rules when multiplying and dividing signed numbers.
1. The product/quotient of two positive or two negative numbers is positive.
   Hint: If there's an even number of negative numbers in the problem, the answer will be positive.
   Example: 2 * 3 = 6
   $\qquad$ -9 * -2 = 18
2. The product/quotient of a positive and a negative number is negative.
   Hint: If there's an odd number of negative numbers in the problem, the answer will be negative.
   Example: -3 * 5 = -15

Sample Problems

Order of Operations

1. $8 + 9 * 8 / 2 - 6$
2. $2[2 + 3(5 * 3 - 9) / 2 - 7]$
3. $10^2 / 5 + 6 / 3 - 2^2$
4. $15 / 3 + (3 - 6 / 2)$
5. $18 - 2(2^8 / 4^2 - 2^3)$
6. $50 / (2 + 3)^2 - 2 * 4$
7. $2 * [(5 + 6 / 3)^2 - 40] + 2$
8. $66 / 33 * 8 / 4[4 - 9 * 4(2^2) + 1]$
9. $25^2 + 25^2 / 5^3 - 600$
10. $[2 * 2 * 8 / 4 * 5(2^2) - 3 * 3 / 3 * 2] / 2 + 23$

Signed Numbers

1. $-7 - 4 - (-2)$
2. $5 - (-5) - (-6)$
3. $-4 - 9 - (-3)$
4. $9 - 7 - (-5)$
5. $(9 - 4) - (1 - 3) + (7 + 10)$
6. $(5 - 1) - (3 + 2) - (3 - 9)$
7. $(2 - 8) - 8 - (9 - 4)$
8. $(7 - 3) - (7 - 11) + 7$
9. $-81(-3 + 6) / 9$
10. $6(4 + 1) - 7(5 - 4) + (3 + 2)$
11. $-2(5 - 6) + 10(6 - 7) - (25/5)$
12. $6(5 - 3) + 2(2 - 6) / 3(9 - 3)$
13. $2(7 - 3) + 8(5 + 2) / 2(10 - 2)$

Solutions

Order of Operations

1. 38
2. 8
3. 18
4. 5
5. 2
6. -6
7. 20
8. -556
9. 30
10. 100

Signed Numbers

1. -9
2. 16
3. -10
4. 7
5. 24
6. 5
7. -19
8. 15
9. -27
10. 28
11. -13
12. -4
13. 232