Signed Numbers and Order of Operations

ADDITION:

To add numbers with the same sign, add their absolute values. The sum has the same sign as the original numbers being added.

$$6 + 3 = 9 \qquad\qquad (-6) + (-3) = (-9)$$

To add numbers with different signs, subtract the smaller absolute value from the larger absolute value. The answer has the sign of the number with the larger absolute value.

$$6 + (-3) = 3 \qquad\qquad (-6) + 3 = -3$$

SUBTRACTION:

To subtract signed numbers, add the opposite of the number being subtracted. Follow addition rules.

$$6 - 3 = 6 + (-3) = 3 \qquad 6 - (-3) = 6 + (+3) = 9 \qquad -6 - 3 = -6 + (-3) = -9$$

MULTIPLICATION:

Multiplying two numbers with the same sign has positive answer. Multiplying two numbers with different signs has a negative answer.

$$(6)(3) = 18 \qquad (-6)(-3) = 18 \qquad (-6)(3) = -18 \qquad (6)(-3) = -18$$

Note: Multiplication by zero always gives an answer of zero.

DIVISION:

Dividing two numbers with the same sign has a positive answer. Dividing two numbers with different signs has a negative answer. Remember division can also be written as a fraction.

$$6 \div 3 = 2 \text{ or } \frac{6}{3} = 2 \qquad\qquad\qquad (-6) \div (-3) = 2 \text{ or } \frac{(-6)}{(-3)} = 2$$

$$(-6) \div (3) = -2 \text{ or } \frac{(-6)}{(3)} = -2 \qquad\qquad (6) \div (-3) = -2 \text{ or } \frac{(6)}{(-3)} = -2$$

Note: Zero divided by a number is zero. A number divided by zero is undefined.

$$0 \div 5 = \frac{0}{5} = 0 \qquad\qquad\qquad 5 \div 0 = \frac{5}{0} = Undefined$$

STEPS FOR ORDER OF OPERATIONS:

1. Evaluate information within grouping symbols (parentheses, brackets, braces, or fraction bars). If one pair of grouping symbols occurs within another pair, evaluate the operation in the innermost set of symbols first.
2. Evaluate all exponents.
3. Evaluate all multiplications or divisions as they occur, working left to right. When working multiplications or divisions do NOT do all multiplications first, then divisions. These must be done at the same time.
4. Evaluate all additions or subtractions as they occur, working left to right. Again, do both operations at the same time.

Practice Problems – Signed Numbers

1. $-10 + 2 =$
2. $-7 + 16 =$
3. $8 + (-14) =$
4. $-17 + 19 =$
5. $-8 + (-5) =$
6. $19 + (-8) =$
7. $(-10) + (-3) =$
8. $-8 + 7 =$
9. $(-14) + (-2) =$
10. $8 + (4) =$
11. $-16 - 10 =$
12. $-21 - (-10) =$
13. $(-10) - (-6) =$
14. $-8 - 6 =$
15. $4 - 19 =$
16. $3 - (-15) =$
17. $19 - 29 - 10 =$
18. $-5 + (-6) - 8 =$
19. $-7 - (-2) - (-10) =$
20. $9 - 4 - (-11) =$
21. $27 - 18 + (-4) - 6 =$
22. $-6 + (-8) + (+9) - (-3) =$
23. $-2 - (-12) + (-5) + 6 =$
24. $-4 + 3 - (-1) - 5 =$
25. $18 + (-2) - 7 - (-4) =$
26. $(-7)(-5) =$
27. $-3(8) =$
28. $6(4) =$

29. $(-4)(4)(-3) =$
30. $(-1)(4)(-6) =$
31. $(-2)(-5)(-3) =$
32. $(-2)(0)(7)(-4) =$
33. $\left(-\frac{3}{5}\right)\left(-\frac{2}{3}\right) =$
34. $\left(-\frac{2}{11}\right)\left(\frac{9}{12}\right) =$
35. $\left(-\frac{9}{11}\right)\left(\frac{12}{-2}\right) =$
36. $-48 \div 6 =$
37. $(-18) \div (-3) =$
38. $\left(-\frac{31}{31}\right) =$
39. $\left(\frac{-38}{-2}\right) =$
40. $\left(\frac{-6}{7}\right) \div \left(\frac{-41}{42}\right) =$
41. $\left(-\frac{8}{9}\right) \div \frac{71}{72} =$
42. $\frac{-4}{0} =$
43. $0 \div 7 =$
44. $\frac{0}{-5} =$
45. $\left(-\frac{3}{4}\right) + \left(-\frac{2}{5}\right) =$
46. $\left(-\frac{1}{8}\right) - \left(\frac{4}{5}\right) =$
47. $\frac{3}{7} - \left(-\frac{2}{5}\right) =$
48. $-\frac{2}{7} + \frac{3}{5} =$
49. $-\frac{5}{8} - \left(-\frac{1}{3}\right) =$
50. $\frac{1}{5} + \left(-\frac{5}{9}\right) =$

Practice Problems – Order of Operations

1. 2^5
2. $(-3)^2$
3. $(-4)^3$
4. $3 \cdot 4^2$
5. -6^2
6. $8 \cdot 8^2 - 4 \cdot 5^2$
7. $25 \div 5 \cdot 5 + 8 - 5$
8. $4 \div 2 \cdot 2 + 6 - 3$
9. $-[12 - (-4 - 3)]^2$
10. $\left(-180 \cdot \frac{1}{4}\right) \div 5$
11. $(3 - 5)^2 \div 4 + (8 - 3)^2$
12. $4 \cdot 3 + 8 \div 4 \cdot 2^2$
13. $-4^2 + 8 \div 2 \cdot 5 + 3$
14. $-4 - (-12 + 4) \div 2 + 1$
15. $[-2(2 - 4)^2]^2 - 6$
16. $(-2)^2 + 4^2 \div 2^2 + 3$
17. $(3^2 - 1) \div (3 + 1)^2$
18. $4[6 + (6 \div 2)^2] - 1$
19. $10 - [8 - (3 + 4)]^2$
20. $2[3(8 - 2^2) - 6]$
21. $[7 - \{3(8 \div 4)\}^2 + 9 \cdot 4]^2$
22. $[-3(4 - 2)^2]^2 - [-3(3 - 5)^2]$
23. $3[9 - (4^2 + 3)] \cdot 2$
24. $(4 - 6^2) \div [4(2 + 3) - 4]$
25. $[(3 - 6)^2 + 4]^2 + 3 \cdot 4 - 12 \div 3$

ANSWERS:

SIGNED NUMBERS

1.	-8	12.	-11	23.	11	34.	$-\frac{3}{22}$	44.	0
2.	9	13.	-4	24.	-5	35.	$\frac{54}{11}$	45.	$-\frac{23}{20}$
3.	-6	14.	-14	25.	13	36.	-8	46.	$-\frac{37}{40}$
4.	2	15.	-15	26.	35	37.	6	47.	$\frac{29}{35}$
5.	-13	16.	18	27.	-24	38.	-1	48.	$\frac{11}{35}$
6.	11	17.	-20	28.	24	39.	19	49.	$-\frac{7}{24}$
7.	-13	18.	-19	29.	48	40.	$\frac{36}{41}$	50.	$-\frac{16}{45}$
8.	-1	19.	5	30.	24	41.	$-\frac{64}{71}$		
9.	-16	20.	16	31.	-30	42.	Undefined		
10.	12	21.	-1	32.	0	43.	0		
11.	-26	22.	-2	33.	$\frac{2}{5}$				

ORDER OF OPERATIONS

1.	32	7.	28	13.	7	19.	9	25.	177
2.	9	8.	7	14.	1	20.	12		
3.	-64	9.	-361	15.	58	21.	49		
4.	48	10.	-9	16.	11	22.	156		
5.	-36	11.	26	17.	$\frac{1}{2}$	23.	-60		
6.	412	12.	20	18.	59	24.	-2		