

**Lesson #1: Understanding and Using the Properties of Real Numbers to Simplify Expressions**  
(Reference: Lesson #1 & #2 in book)**Problem**

1. For each of the following determine the properties of real numbers that are being used.

1.  $(-8 + 13) + 2 = -8 + (13 + 2)$

2.  $8(x - y) = 8x - 8y$

3.  $-5 \cdot 1 = -5$

4.  $8 + 4 = 4 + 8$

5.  $8 \cdot \frac{1}{8} = 1$

6.  $4(3x + 5y) = 12x + 20y$

7.  $\left(\frac{5}{8}\right) \cdot \left(\frac{8}{5}\right) = 1$

8.  $-8.456 + 0 = -8.456$

9.  $\left(\frac{7}{8}\right) \cdot \left(\frac{4}{7}\right) = \left(\frac{4}{7}\right) \cdot \left(\frac{7}{8}\right)$

10.  $(-8 + 4) + (-12) = (-12) + (-8 + 4)$

11.  $7 \cdot (5 \cdot 9) = (7 \cdot 5) \cdot 9$

12.  $1 \cdot \left(-\frac{2}{3}\right) = -\frac{2}{3}$

13.  $abc = cab$

14.  $ab(cx - dy) = abcx - abdy$

15.  $xy \cdot (ab \cdot cd) = (xy \cdot ab) \cdot cd$

16. Simplify each of the following equations using the properties of real numbers and the concept of collecting like terms.

$$16. 4(y+7) - 3y - 10$$

$$17. 8(3x+4) - 20x + 9y - 17$$

$$18. -2(3x+2y+4) - 3(x+y+1)$$

$$19. -2xy - 3x + 4 - 4xy - 2x$$

$$20. 5n^3 + nx^2 - 2n^3 - 4nx^2$$

$$21. 2xy + 4x^2z + 3xy - 5x^2z$$

$$22. 5xyz^3 - 3x^3z^2 - 4xy + 3x^3z^2 + 3xy - 2xyz^3$$

$$23. 2x(3y - 4z + 8) - 3xy - 12x + 6xz$$

$$24. 4(3x - xyz - 5) + 3x(5yz - 5)$$

$$25. 4ax(3by - 2cz + 5) - 8abxy - 20ax$$

$$26. 3[2x(y - 2y + 4) + 4xy - 6x + 2]$$