Chapter 5 Review

In chapter 5, we looked at simplifying algebraic expressions by adding and subtracting like terms and by using the associative and distributive properties. Remember like terms have the exact same variable part. We cannot add $7f$ to $5w$. They are not like. If the terms are like, then we can add or subtract the numerical coefficients and keep the variable the same.

$(8p - 3p = 5p)$ We can always multiply terms by simply multiplying the numerical coefficients and putting the variables together $(7a \times 8b = 56ab)$. When we want to multiply a number or term times a sum or difference, we need to use the distributive property like $3(4v + 5w) = 12v + 15w$.

We also looked at solving equations. Remember the solution to an equation is the number or numbers that make the equation true. For example, the solution to $3n + 1 = 13$ is $n = 4$ because when we plug in 4 for $n$ we get $3(4)+1 = 12+1 = 13$ (a true statement). Some equations have no solution and some equations have a solution of All Real Numbers.

The steps to solving equations are critical to remember. Here are the steps again in order. Remember that after each step, always add or subtract like terms that lie on the same side of the equation.

Steps to Solving a Linear Equation

1. Eliminate parenthesis by using the distributive property.
2. Eliminate fractions by multiplying both sides of the equation by the LCD.
3. Eliminate decimals by multiplying both sides of the equation by a power of 10 ($10, 100, 1000...$)
4. Use the addition property to eliminate variable terms so that there are only variables on one side of the equation.
5. Use the addition property to eliminate constants so that there are only constants on one side of the equation. The constants should be on the opposite side of the variables.
6. Use the multiplication property to multiply or divide both sides of the equation in order to isolate the variable by creating a coefficient of 1 for the variable.
7. Check your answer by plugging it into the original equation and see if the two sides are equal.

We looked at two equal fractions called a proportion. We say that we can solve a proportion by setting the cross products equal to each other and solving.
We also went over the meaning of the inequality symbols and learned to graph and understand them. Remember the following.

“<“ means “less than”. Notice the symbol looks like an arrow pointing to the left. For example $-5 < +9$ is true and $x < +4$ means all real numbers less than 4. The graph would be a parenthesis at 4 shaded to the left.

“≤ “ means “less than or equal to”. This symbol works like a “less than” with the added criteria that if the two numbers were equal it would still be true. For example: $-7 \leq +13$ is true and $+19 \leq +19$ is also true! (Remember that without the equal to part, $+19 < +19$ is not true.) $x \leq +24$ means all real numbers less than or equal to 24. The graph would be a bracket at 24 shaded to the left.

“>“ means “greater than”. Notice the symbol looks like an arrow pointing to the right, For example $+5 > +1$ is true and $x > -3$ means all real numbers greater than $-3$. The graph would be a parenthesis at $-3$ shaded to the right.

“≥ “ means “greater than or equal to”. This symbol works like a “greater than” with the added criteria that if the two numbers were equal it would still be true. For example: $+19 \geq +6$ is true and $+11 \geq +11$ is also true! (Remember that without the equal to part, $+11 > +11$ is not true.) $x \geq +15$ means all real numbers greater than or equal to 15. The graph would be a bracket at 15 shaded to the right.

“≠ “ means “not equal to”. Notice the symbol looks like an equal sign with a line drawn through it. This symbol is only true if the two numbers are not equal. For example $+1 ≠ +12$ is true but $+8 ≠ +8$ is not true! Also $x ≠ +7$ represents all real numbers except $-7$. To graph $x ≠ -7$ shade the entire number line and put a parenthesis at $-7$.

Finally, we learned that to solve for an inequality, we will use the same steps to solving as we did equations, but if we have to multiply or divide both sides by a negative number, we must switch the sign.
Chapter 5 Review Problems

Simplify the following algebraic expressions. Tell how many terms the answer has and label it as monomial (1 term), binomial (2 terms), trinomial (3 terms) or multinomial (4 or more terms).

1. \(-3c + 7c - 8c\)  
2. \(6a - 9b + 11a - 3b\)  
3. \(7(5cd)\)

4. \(\frac{1}{2}(6w)\)  
5. \(-7(4x - 9)\)  
6. \(3a(b + 4)\)

7. \(-5(2g + 7) - 3g + 19\)  
8. \(3h + 19 - (-2h + 7)\)  
9. \(-2(4q + 7) - (3q - 8)\)

Solve the following equations. Simplify fraction answers completely.

10. \(3x + 6 = 12\)  
11. \(9 - 4y = 7\)

12. \(-3z + 6 = -4z - 8\)  
13. \(-7c + 3 + 5c = 2 + 3c + 8\)

14. \(7(9a - 2) = 63a + 8\)  
15. \(-6(d - 3) = d - 7d + 18\)

16. \(-\frac{1}{3}w + 1 = \frac{1}{2}w + \frac{1}{2}\)  
17. \(\frac{1}{5}y - \frac{2}{3} = \frac{1}{3}y + \frac{1}{5}\)

18. \(-\frac{3}{4}p + 2 = -\frac{1}{2}p + \frac{5}{4}\)  
19. \(-\frac{3}{5}v - \frac{1}{4} = \frac{3}{5}v - \frac{3}{4}\)

20. \(0.45x - 0.9 = 0.35x + 0.4\)  
21. \(0.08y + 0.012 = -1.92y - 0.034\)

22. \(0.05a + 1.9 = 0.03x - 0.4\)  
23. \(1.5b + 3 = -2.5b - 7\)

24. \(0.04(p + 3) = 0.15p + 0.12 - 0.11p\)  
25. \(\frac{2}{3}(2x + 1) = \frac{1}{6}x\)
Solve the following proportions. Simplify fraction answers completely.

26. \( \frac{-4}{w} = \frac{3}{8} \)  
27. \( \frac{7}{9} = \frac{x+1}{18} \)  
28. \( \frac{3}{F+4} = \frac{5}{F-1} \)

29. \( \frac{6}{-7} = \frac{g+4}{2} \)  
30. \( \frac{-2w-1}{5} = \frac{w+1}{4} \)

Determine if the inequality symbol is used correctly or incorrectly?

31. \( +3 > +19 \)  
32. \( -13 \geq +3 \)  
33. \( -23 < -10 \leq +1 \)  
34. \( +11 \leq +11 \)  
35. \( +1.5 \neq +\frac{1}{2} \)  
36. \( -5 < -7 \leq 0 \)

Graph the following inequalities on the number line.

37. \( x \leq -6 \)  
38. \( x > +\frac{1}{2} \)

39. \( -7 \geq x \)  
40. \( +1.75 \leq x \)

41. \( -5 < x \leq +8 \)  
42. \( -5 \leq x \leq 0 \)

43. \( +15 < x < +18 \)  
44. \( -3.5 < x \leq +4.5 \)

45. \( x \neq +9 \)  
46. \( x \neq 0 \)

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For each of the following graphs, write an inequality with “x” that represents it.

47. \[ \begin{array}{cccccccccccc}
-6 & -5 & -4 & -3 & -2 & -1 & 0 & +1 & \\
\end{array} \]

48. \[ \begin{array}{cccccccccccc}
-2 & -1 & 0 & +1 & +2 & +3 & +4 & +5 & +6 & +7 \\
\end{array} \]

49. \[ \begin{array}{cccccccccccc}
-6 & -5 & -4 & -3 & -2 & -1 & 0 & +1 & +2 & +3 & +4 \\
\end{array} \]

50. \[ \begin{array}{cccccccccccc}
-6 & -5 & -4 & -3 & -2 & -1 & 0 & +1 & +2 & +3 & +4 \\
\end{array} \]

51. \[ \begin{array}{cccccccccccc}
-6 & -5 & -4 & -3 & -2 & -1 & 0 & +1 & +2 & +3 & +4 \\
\end{array} \]

52. Is a P-value of 0.0843 less or greater than 0.05? Use an inequality symbol to show your answer symbolically.

53. Is a P-value of \(6.24 \times 10^{-5}\) less or greater than 0.05? Use an inequality symbol to show your answer symbolically.

Solve the following inequalities for the variable.

54. \(2x - 1 > 5\)  
55. \(3n + 1 \leq 13\)  
56. \(-4x + 5 < 1\)

57. \(-2x + 7 > 3\)  
58. \(2d + 5 \leq -1\)  
59. \(-2d + 5 \leq 5\)

60. \(-1 < 3x + 2 < -7\)