Each problem is worth 4 points. You must show all your work to receive full credit. You must do all your own work. Calculators are NOT permitted.

Name: ________________________ Solutions ________________________ Section ________

Good Luck!

1. Convert the following phrase into a mathematical expression. Use \( x \) as the variable, and combine like terms:
   Seven times a number, added to the sum of the number and eight.
   \[ 7x + (x + 8) = 8x + 8 \]

2. A minor league baseball team plays 97 games in a season. If the team won 13 more than twice as many games as they lost, how many wins and losses did the team have? How many games did the team lose? How many games did they win?

   \[ \frac{W}{13+2L} + \frac{L}{L} = 97 \]
   \[ 3L = 84 \]
   \[ L = 28 \]

   \( W = 13 + 2(28) = 99 \)

3. Solve the equation \( \frac{1}{6}(x-12) + \frac{1}{3}(x+3) = x + 3 \)

   \[ -\frac{1}{6}x + 2 + \frac{1}{3}x + 1 = x + 3 \]
   \[ -\frac{1}{6}x + \frac{1}{3}x + 3 = x + 3 \]
   \[ -\frac{1}{6}x + \frac{2}{3}x + 3 = x + 3 \]
   \[ \frac{3x}{6} + \frac{2x}{3} + 3 = x + 3 \]
   \[ \frac{1}{2}x + 3 = x + 3 \]
   \[ -\frac{1}{2}x = 0 \]
   \[ x = 0 \]
4. Solve the equation, and check the solution \((\sqrt{4x+10})^2 = (\sqrt{19-5x})^2\)

\[4x + 10 = 19 - 5x\]
\[9x = 9\]
\[x = 1\]

5. A midwestern music competition awarded 35 ribbons. The number of blue ribbons awarded was 3 less than the number of white ribbons. The number of red ribbons was 2 more than the number of white ribbons. How many of each kind of ribbon was awarded?

\[
\frac{B}{w - 3} + \frac{W}{w} + \frac{R}{w + 2} = 35
\]

\[3w - 1 = 35\]
\[3w = 36\]
\[w = 12.\]

B: \(w - 3 = 9\)

R: \(w + 2 = 14\)

12 white
9 blue
14 red.

6. Write the solution in the interval notation \(7x + 4 < 5x - 6\).

\((-\infty, -5)\)

\[2x < -10\]
\[x < -5\]
7. Solve the equation: $7x^2 + 27x - 13 = -20x + 1$

$$7x^2 + 47x - 14 = 0$$

$$(7x - 2)(x + 7) = 0$$

$$x = \frac{2}{7}, \quad x = -7$$

8. Plot the following points on the coordinate axes (5,3), (-2,-4), (0,-3), (-5/2,2).

9. Simplify. Assume that all expressions under radicals represent nonnegative numbers:

$$\sqrt{36x^4y^{36}} = 6x^2y^{18}$$

10. Factor the following expressions:

a. $t^2 + 2t - 63$

$$= (t + 9)(t - 7)$$

b. $w^2 - 18w + 81$

$$= (w - 9)^2$$
c. \(3x^2 - 11x - 4\)

\((3x + 1)(x - 4)\)

\[
\begin{array}{c|c|c}
\text{Num} & \text{Num}^2 \\
\hline
x, x+1 & \\
\end{array}
\]

11. The product of two consecutive positive integers is 5 more than their sum. Find the integers.

\(x(x+1) = 5 + 2(x + x+1)\)
\(\therefore x = 3, 4\)

\(x^2 + 2x = 5 + 2x + 1\)
\(x^2 + 2x = 6 + 2x\)
\(x^2 - x - 6 = 0\)

\((x - 3)(x + 2)\)
\(x = 3, x = -2\)

12. Use a combination of rules for exponents to simplify the expression. Give your answer in exponential form, using only positive exponents:

\(\left(\frac{x^3 y^2}{z^2}\right)^4 = \left(\frac{z^2}{x^3 y}\right)^4\)

13. Subtract \((6x^3 y - 10xy + 9xy^2) - (8x^2 y + 6xy + 5xy^2)\) and simplify your answer.

\(6x^3 y - 10xy + 9xy^2 - 8x^2 y - 6xy - 5xy^2\)

\(-2x^2 y - 16xy + 4xy^2\)
14. Multiply:

a. \(5y^3(7y^3 + 9y - 3) = 35y^6 + 45y^4 - 15y^3\)

b. \((8x + 3)(3x - 5) = 24x^2 - 40x + 9x - 15\)
   \(= 24x^2 - 31x - 15\)

(c) \((2x + 3)^4 = \left(\frac{2x + 3)(2x + 3)}{2x + 3}\right)^2\)
   \(= \left[\frac{4x^2 + 12x + 9}{4x^2 + 12x + 9}\right] \cdot \left[\frac{4x^2 + 12x + 9}{4x^2 + 12x + 9}\right]\)
   \(= 16x^4 + 48x^3 + 36x^2 + 48x^3 + \frac{144x^2}{8} + \frac{108x}{8} + 81\)
   \(= 16x^4 + 96x^3 + 216x^2 + 216x + 81\)

(d) \((4x^3 + 3x^2 + 2)(6x - 1) = 24x^4 - 4x^3 + 18x^3 - 3x^2 - 12x - 2\)

16. Divide: \(\frac{5x^4 - 6x^3 + 4x}{2x^2}\)

\(= \frac{5}{2}x^2 - 3x + \frac{7}{2}\)