Optional Algebra 2 Summer Packet

I. Solve for x:

1) \(-4(3 - x) = 2(x + 6)\)  
2) \(3x - 2(x + 1) = 0\)

II. Solve the following systems of equations:

1) \(\begin{align*}
5x + 4y &= 6 \\
-2x - 3y &= -1
\end{align*}\)  
2) \(\begin{align*}
-2x + y &= 8 \\
y &= -3x - 2
\end{align*}\)

III. Factor each of the following polynomials:

1) \(x^2 - x - 72\)  
2) \(a^2 + 20a + 64\)  
3) \(10m^3 n^2 - 15m^2 n + 25m\)  
4) \(x^2 + 12x + 36\)  
5) \(x^2 - 64\)  
6) \(2x^2y - 4xy - 30y\)

IV. Solve the following quadratic equations:

1) \((2x + 1)(x + 3) = 0\)  
2) \(p^2 + 6p = 0\)  
3) \(r^2 + 10r + 9 = 0\)  
4) \(x^2 = 16\)

V. Determine each of the following:

1) Find a formula for the area of a rectangle with \(l = 2x + 3\) and \(w = x - 2\)
2) Find a formula for the area of a square with \(s = 2x + 5\)
3) The area of a square with side 2x - 1 is 49. Find x.
4) Find the diagonal of a rectangle with \(l = 40\) and \(w = 55\).
5) The length of each leg of an isosceles right triangle is 4 cm. What is the length of the hypotenuse?

VI. Simplify each of the following:

1) \((-3x^2 + 4x - 7) + (2x^2 - 7x + 8)\)
2) \((39a^4 - 4a^3 + 2a^2 - a - 7) - (10a^4 + 3a^3 - 2a^2 - a + 8)\)
3) \((3x + 7)(2x + 5)\)  
4) \(-3xy^3(x - 2y)\)  
5) \((3x^2 + x - 1)(2x - 3)\)
6) \((8a^3b^2)(2a^4b^5)\) \hspace{1cm} 7) \((-3x^2y^3z)^3\) \hspace{1cm} 8) \((15a^4b^2c)^0\)

9) \(\frac{3x^3y^2}{6x^2y^5}\) \hspace{1cm} 10) \((x + 6)^2\)

VII. Graph each of the following on graph paper or create your own grid.

1) \(y = -\frac{3}{4}x + 4\) \hspace{1cm} 2) \(y = (x - 2)^2 + 1\) \hspace{1cm} 3) \(y = |x|\)

VIII. Given the following matrices,

\[
A = \begin{bmatrix} 6 & -3 \\ 2 & 1 \end{bmatrix} \hspace{1cm} B = \begin{bmatrix} 5 & 6 \\ 2 & -1 \end{bmatrix} \hspace{1cm} C = \begin{bmatrix} 0 & 5 \end{bmatrix}
\]

determine

1) \(A + B\) \hspace{1cm} 2) \(A - B\) \hspace{1cm} 3) \(-2C\)

IX. Solve the following quadratic equations, using the quadratic formula:

\[x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\]

1) \(2x^2 + 3x - 1 = 0\) \hspace{1cm} 2) \(3x^2 - 8x = -2\) \hspace{1cm} 3) \(3x^2 = 7 - 2x\)

X. Answer each of the following concerning linear equations.

1) Determine the slope of the line containing the points \((6, -2)\) and \((-1, 5)\).

2) Determine an equation for a line with slope \(\frac{1}{2}\) and y-intercept at \((0, -3)\).

3) Determine an equation for a line parallel to \(y = -3x + 4\), containing the point \((2, 1)\).