Support all answers with work and circle your answers. Follow all directions. Use pencil.

1. **GRAPHING.** Graph the functions:

   a. \( y = -|x| \)

   b. \( y = (x - 3)^2 - 1 \)

2. **SOLVING EQUATIONS.** Solve each equation for \( x \):

   a. \( x^2 - 2x = 15 \)

   b. \( \frac{3}{2x} = \frac{x + 2}{x + 1} \)

3. **A FEW THINGS.**

   a. Write 75 trillion in scientific notation

   c. Simplify: \( \sqrt[3]{x^2} \cdot \sqrt[3]{x^7} \)

   b. Rationalize the denominator: \( \frac{2}{y\sqrt{5}} \)

   d. Simplify: \( \frac{\sqrt{39x^2}}{\sqrt{3}} \)
4. READING GRAPHS.

Given the function, f(x) shown in the graph:

a. State the domain:__________

b. State the range:___________

c. f(-2) = ___________

d. The y-intercept(s) (as point(s) in the form (a,b)): _______

e. For what x is f(x) = 4? ______________________

5. EXPONENTS. Simplify with positive exponents:

a. \((-3x^3y^4)^2(2x^2y)^3\)

b. \(\frac{x^2y^2z}{x^4y^3z^{-2}}\)

c. \((2^{-1} - 2^{-2})^2\)

6. MULTIPLICATION. Multiply these. The answer should be simplified and written in standard form.

a. \((3x + 2)(2x - 5)\)

b. \((2x - 5)^2\)

c. \((3x + 5)(3x - 5)\)
7. RATIONAL FUNCTIONS: State where the expression is undefined. Then, simplify, showing work and leaving in factored form.

\[ \frac{9}{2x} - \frac{3}{x-4} \]

a. Undefined:

\[ \frac{3x^3(2x+1)}{12x(x-2)} \div \frac{2x+1}{2-x} \]

b. Undefined:

8. WRITE AND SOLVE EQUATIONS.

a. Write two equations using x for length and y for width:

The length of a rectangle is 2cm more than twice its width. ___________________

The perimeter of a rectangle is 34 cm. ___________________

b. Solve the system. (Show work!)

c. Use the Pythagorean theorem to find the length of the diagonal.
9. SYSTEMS OF EQUATIONS. Solve the systems of equations.

a. \[5x + 2y = 3\]
   \[2x + 3y = 10\]
b. \[x = 2y + 3\]
   \[x - 2y = 5\]
c. \[2x + y = 4\]
   \[-4x - 2y = -8\]

10. POLYNOMIALS. Given: \[f(x) = 5x - 3x^2 + 2x^3 - 4\] and \[g(x) = 2x^3 - 3x^2 + 6\]. Perform the operation, put each answer in descending form, and then state its degree and leading coefficient.

a. \[f(x) - g(x) = \]
   Degree:______  
   LC:______

b. \[5x^3 \cdot f(x) = \]
   Degree:_____  
   LC:_____