Instructions:

- Write all your responses to the following on separate paper.
- Show your work for credit.
- Take as much space as you need. Do not crowd into corners.
- Do not use an electronic calculator.

1. Simplify the following expression by using the properties of exponents
   a. $x^2 (x^3)^5$
   b. $\left(\dfrac{3}{2} a^3 b \right)^4$

2. Multiply and combine like terms:
   a. $(2x-1)(x^2 - 4x + 3)$
   b. $(8x-5)(8x+5)$

3. Find the quotient and remainder for each division using the long division algorithm. Then relate the dividend, divisor, quotient and remainder in an equation.
   a. $\dfrac{x^2 - 4x - 5}{x - 6}$
   b. $\dfrac{x^3 - 125}{x - 5}$

4. Factor completely:
   a. $xy - 3x - 2y + 6$
   b. $3x^3 + 3x^2 - 36x$

5. Factor the sum or difference of cubes:
   a. $8x^3 - 27$
   b. $x^3 + 64y^6$

6. Solve the equation:
   a. $2x^2 - 7x + 3 = 0$
   b. $x(3x + 4) = 4$

Use the algebraic method to solve the following problems. Remember to define your variable:

7. The base of a rectangle is three more than twice the height. The area is 4 square inches. Find the base.

8. The length of the hypotenuse of a right triangle is 17. The longer leg is 1 less than twice the shorter leg. Find the lengths of the legs.