DC FELLOWS PROGRAM
MATH IMMERSION SUMMER COURSE

ALGEBRA AND NUMBER THEORY PRACTICE
JUNE 2, 2008

EXERCISES

(1) Find the equation of the line that has the same y-intercept, but is perpendicular, to the line $3x - 6y = 8$.

(2) Find the equation of the line parallel to the line through the origin that passes through the point $(-3, 4)$, and that passes through the vertex of the parabola given by $y = -3x^2 + 2x + 17$.

(3) Solve for x:
- $8x^2 - 10x - 3 = 0$.

- $7 + \sqrt[3]{2x + 4} = 0$

- $\sqrt[4]{x} = \sqrt[3]{x}$

- $7\sqrt[4]{x} = 9\sqrt[6]{x}$

(4) Graph the following inequality: $y + 5 > x^2 + 4x$.

(5) The YMCA wants to sell raffle tickets to raise at least \$32,000. If they must pay \$7,250 in expenses and prizes out of the money collected and are charging \$25 per ticket, how many tickets do they need to sell?

(6) For delivering packages, a courier charges \$8 for the first 6 ounces and 75 cents for each additional ounce. Write down an expression giving p, the price (in dollars) of shipping a package that weighs x ounces.

(7) Solve for n: $13 = 7 \mod n$

(8) Solve for x:
- $3 > 5 + \dfrac{|2x - 3|}{-4}$

- $3|2x + 11| - 1 > 14$

(9) My father starts driving due north at 8am, travelling at 55mph. My mother leaves at 10am, following him, and is driving 85mph. How many hours will it take for her to catch up?