ROUND I: ALGEBRAIC WORD PROBLEMS - MOTION,   ANSWERS
         MIXTURE, AGE, COIN, ANGLE, INTEGERS

(2 points) 1. _____

(2 points) 2. _____

(2 points) 3. _____ yards

1. If Gladys Hoopenholler were four times as old as she will be
   five years from now, she would be sixty years old. How old is
   Gladys Hoopenholler today?

2. Find three consecutive odd integers such that the sum of the
   largest and three times the smallest is 64.

3. A boy who can run at 8 yards per second gave another boy whose
   rate is 6 yards per second a start of 8½ seconds. The race
   was a tie. How long was the course?

Auburn, Holy Name, Wachusett

(1 point) 1. (___ , ___) _____

(2 points) 2. k = _____

(3 points) 3. _____

1. Determine the coordinates of the point where the line
   $4x - 5y = 20$ intersects the y-axis.

2. If (7,k), (1,2), and (-3,5) are collinear points, find k.

3. Find the equation of the line perpendicular to the line
   $4x - 5y = 20$ and passing through its x-intercept. Write the
   equation in standard form ax + by = c with integral coefficients
   having no common factors.

(1 point) 1. _____

(2 points) 2. ___ seconds ___

(3 points) 3. ___ ¢ ___

1. What is the least positive integer by which 108 should be
multiplied so that the product will be a perfect square?

2. It takes 10 seconds for a clock to strike 6 o'clock beginning
at 6:00 precisely. If the strikings are uniformly spaced, how long
in seconds does it take to strike 12 o'clock?

3. 3 dozen cucumbers cost the same as 2 dozen rutabagas.
5 dozen rutabagas cost the same as 4 dozen artichokes.
1 artichoke costs 30¢.
What does one cucumber cost?

Auburn, Wachusett

(1 point) 1._____

(1 point) 2._____

(2 points) 3. P = _____

A = _____

(2 points) 4._____

1. From the sum of $x^2 - x + 6$ and $2x^2 - 4x - 7$, subtract $5x^2 - 7x - 1$.

2. $(x^3 - x^2 + x - 1) \div (x - 1) = ?$

3. Find both the perimeter P and the area A of this rectangle.

3a + 2b
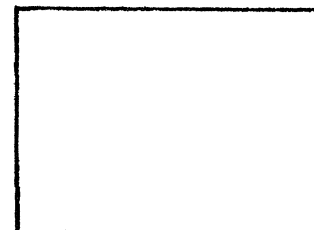
8a - 2b

4. Simplify: $[3(x + 2)(x - 3) - 2(4x - 9)]^2$

Auburn, South, Ware, Worcester Academy

TEAM ROUND: FACTORING

FACTOR COMPLETELY OVER THE SET OF POLYNOMIALS WITH INTEGER COEFFICIENTS.
EACH CORRECT ANSWER IS WORTH TWO POINTS.

1. $ab - cd - ad + bc$ 1. _____

2. $x^8 - x^6$ 2. _____

3. $xy^2 + 10xy + 25x$ 4. _____

4. $x^4 - 3x^2 - 4$ 4. _____

5. $2x^3 + 6x^2 - 10x$ 5. _____

6. $ab^3 - abc^2$ 6. _____

7. $x^2(a - b) + x(b - a) + 2(b - a)$ 7. _____

8. $2b - ab + a - 2b^2$ 8. _____

9. $52x^4 - 65x^2 + 13$ 9. _____

10. $(a + 2)^2 - a^4$ 10. _____

11. $15x^3a - 45x^2a^2 + 30xa^3$ 11. _____

12. $16x^4 - 409x^2 + 225$ 12. _____

Auburn, Hudson Catholic, Marlborough, Shrewsbury, South,
Southbridge, Wachusett, Worcester Academy

ROUND I

(2 pts.) 1.   10

(2 pts.) 2.   15, 17, 19

(2 pts.) 3.   204 yards

ROUND II

(1 pt.) 1. $(0, -4)$

(2 pts.) 2. $k = -2\frac{1}{2}$

(3 pts.) 3. $5x + 4y = 25$

ROUND III

(1 pt.) 1.   3

(2 pts.) 2.   22 seconds

(3 pts.) 3.   16¢

ROUND IV

(1 pt.) 1. $-2x^2 + 2x$

(1 pt.) 2. $x^2 + 1$

(1 pt.) 3. $P = 22a$

(1 pt.) $A = 24a^2 + 10ab - 4b^2$

(2 pts.) 4. $9x^4 - 66x^3 + 121x^2$

TEAM ROUND
TWO POINTS EACH

1. $(a + c)(b - d)$

2. $x^6(x + 1)(x - 1)$

3. $x(y + 5)^2$

4. $(x^2 + 1)(x + 2)(x - 2)$

5. $2x(x^2 + 3x - 5)$

6. $ab(b + c)(b - c)$

7. $(a - b)(x - 2)(x + 1)$

8. $(2b + a)(1 - b)$

9. $13(2x + 1)(2x - 1)(x + 1)(x - 1)$

10. $(a^2 + a + 2)(a + 1)(2 - a)$
     or $-(a^2 + a + 2)(a + 1)(a - 2)$

11. $15ax(x - 2a)(x - a)$

12. $(4x + 3)(4x - 3)(x + 5)(x - 5)$