ROUND I: ALGEBRAIC WORD PROBLEMS

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. I have two mixtures of a certain chemical and water, the one
    containing 50% of the chemical, the other 10%. I would like
    8 ounces of a mixture which shall contain 25% of the chemical.
    How many ounces of the 10% mixture must I use?

2. 1½ hours after a bus leaves Boston, a motorist leaves to over-
    take the bus. If the motorist leaves at 2:30 P.M. and averages
    40 miles per hour, at what time will the motorist overtake the
    bus? The average speed of the bus is 30 miles per hour.

3. Five years ago, Jerry was $\frac{2}{3}$ as old as Jeff. Ten years from
    now, he will be $\frac{5}{6}$ as old as Jeff. How old is Jerry now?

ANSWERS: (2 points) 1. _____ oz._

          (2 points) 2. _____ P.M._

          (2 points) 3. _____

Shepherd Hill, Southbridge, Tantasqua

ROUND II: STATISTICS

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. If a woman buys 3 bananas at 7¢ each and 8 apples at 15¢ each, what
    is the average cost of one piece of fruit to the nearest cent?

2. This is a graph of the   miles in
    number of miles of railroad   thousands
    tracks produced during the
    19th century (measured in
    thousands of miles) by
    United States ——————————
    Great Britain ———— - ————— -
    Germany   — — — — — — — —
    India   +++++++++++++
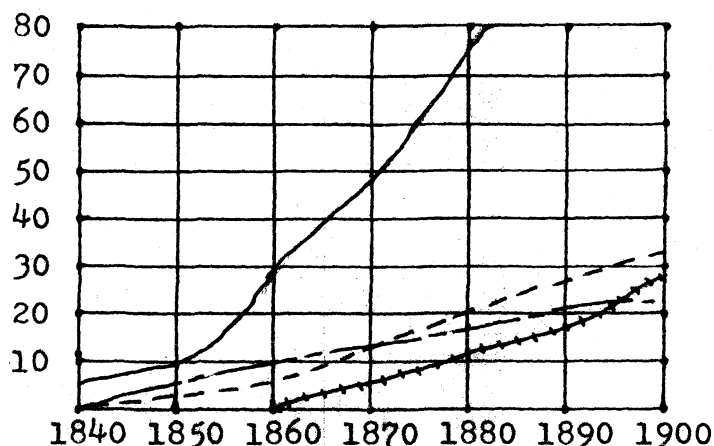
    a) What country was second
    in RR mileage in 1880?

    b) What country was last
    to reach 10,000 miles?

3. If the mean of the following set of numbers is 76, find the mode.
    $\{85, \quad x+3, \quad x-6, \quad 92, \quad x+8, \quad x-6\}$

ANSWERS: (1 point) 1._____¢___

           (2 points) 2.a)_____

                       b)_____

           (3 points) 3._____
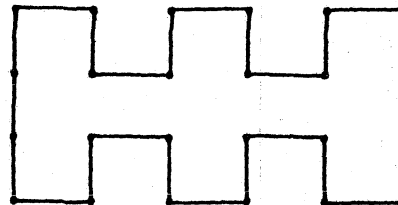
Auburn, Hudson, Hudson Catholic

ROUND III: OPEN

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Determine the next two elements in the sequence
    1, 4, 9, 61, 52, 63, __, __.

2. Express 7.0×10^{-5} as a decimal without exponents.

3. Find the solution set of $|x| \geq 7$.

4. Eleven equal squares are arranged
    to form this pattern. Find the
    area of the eleven squares if the
    perimeter is 48 inches.

5. If one penny is 2 centimeters in diameter, how many pennies
    can be placed next to each other in a row with their edges
    touching for a distance of one kilometer?

6. A cog wheel having 6 cogs plays into a larger cog wheel having
    18 cogs. When the small wheel has made 42 revolutions, how
    many revolutions has the larger wheel made?

ANSWERS: 1._____   3.{x:_____}5._____
(1 point)
           2._____   4._____ sq. in. 6._____

St. Peter-Marian, Shepherd Hill, Southbridge, Tantasqua

ROUND IV: OPERATIONS ON POLYNOMIALS

IN QUESTIONS 1, 2 and 3 PERFORM THE INDICATED OPERATIONS, SIMPLIFY AND
EXPRESS YOUR ANSWER AS A POLYNOMIAL WITHOUT THE USE OF PARENTHESES.

1. $(xyz - 4xy) - (3xy + 7) + (2xyz - 5z + 9)$

2. $[(2m)(5m^2n^3 - 4mn^5)] \div 2mn^2$

3. $(3 - 5x)^2 - (3 - 5x)(3 + 5x) - (3 - 5x)(9 + 15x + 25x^2)$

4. If $(ax^2 + bx + c)(x^2 - 3x) = 3x^4 - 5x^3 - 17x^2 + 15x$,
    find the sum of a, b, and c.

ANSWERS: (1 point) 1._____

          (1 point) 2._____

          (2 points) 3._____

          (2 points) 4. a+b+c = _____

Auburn, Hudson, Marlboro

TEAM ROUND: FACTORING

EACH QUESTION COUNTS THREE POINTS

IN QUESTIONS 1 THROUGH 7 FACTOR COMPLETELY AND SIMPLIFY EACH FACTOR

1. $x^2 + 5x - 6$ 1. _____

2. $5ax^2 - by^2 + bx^2 - 5ay^2$ 2. _____

3. $3(x + y)^2 - 8(x + y) + 4$ 3. _____

4. $4x^2 - a^2 - 12x + 9$ 4. _____

5. $a^{2m + 2} - a^2c^{2m}$ 5. _____

6. $(x - 4)^3 - (x - 4)^5$ 6. _____

7. $a^3b + a^2b - ab^3 - ab^2$ 7. _____

8. For what value of c is $3x + 2$ 8. ____ c = _____
    a factor of $15x^2 + x + c$?

March 3, 1982   WOCOMAL FRESHMAN MEET ANSWERS

ROUND I

1. (2 points)   5 oz.

2. (2 points)   7:00 P.M.

3. (2 points)   15

ROUND II

1. (1 point)   13¢

2. (2 points) a) Germany

               b) India

3. (3 points)   64

ROUND III

1. (1 point)   94, 46

2. (1 point)   0.00007

3. (1 point) $\{x: x \geq 7 \text{ or } x \leq -7\}$

4. (1 point)   44 sq. in.

5. (1 point)   50,000

6. (1 point)   14

ROUND IV

1. (1 point) $3xyz - 7xy - 5z + 2$

2. (1 point) $5m^2n - 4mn^3$

3. (2 points) $125x^3 + 50x^2 - 30x - 27$

4. (2 points) $a + b + c = 2$

TEAM ROUND

(3 points each)

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

2. $(5a + b)(x + y)(x - y)$

3. $(3x + 3y - 2)(x + y - 2)$

4. $(2x - 3 + a)(2x - 3 - a)$

5. $a^2(a^m - c^m)(a^m + c^m)$

6. $(x - 4)^3(x - 3)(-x + 5)$

7. $ab(a - b)(a + b + 1)$

8. $c = -6$