March 2, 1983 WOCOMAL FRESHMAN MEET

ROUND I: ALGEBRAIC WORD PROBLEMS

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Twelve years ago a boy was $\frac{1}{3}$ as old as he will be 2 years hence. How old is he now?

2. Becky has some nickels and quarters. The number of nickels is 6 less than 4 times the number of quarters. The value of the coins is \$2.40. Find the number of quarters Becky has.

3. Yesterday Paul and George together had \$100. Today, after giving George \$10, Paul finds that he has \$4 more than $\frac{1}{5}$ the amount George has now. How much does Paul have now?

SWERS: (1 point) 1._____

(2 points) 2._____

(3 points) 3. \$_____

Auburn, Bartlett, Hudson

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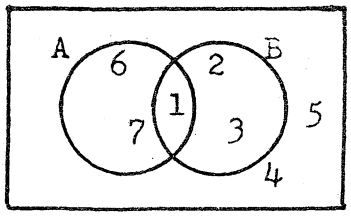
ROUND II: SET THEORY

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM

1. If this Venn diagram represents two sets A and B which are subsets of a universal set $\{1, 2, 3, \ldots, 7\}$, what is the complement of $A \cap B$?



2. Let the universal set $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, $A = \{2, 3, 4, 5, 7, 9\}$, $B = \{3, 4, 6, 9, 10\}$, $C = \{1, 4, 5, 7\}$, and C' is the complement of C. Find $(A \cap B) \cap C'$.

3. In a surey of 50 students, the following data were collected: There were 19 taking biology, 20 taking chemistry, 19 taking physics, 7 taking physics and chemistry, 8 taking biology and chemistry, 9 taking biology and physics, and 5 taking all three subjects. How many of the group are not taking any of the three subjects?

ISWERS: (1 point) 1.{_____

(2 points) 2.{_____

(3 points) 3._____

Marlboro, Shepherd Hill, Southbridge

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ROUND III: OPEN

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

. Express as a formula: The fractional part, F_s, of silver in an alloy containing x units of silver and c units of copper.

2. Using quarters, dimes, nickels and pennies, in how many different ways can a person receive 25¢ in change?

3. A map of Maine is such that $\frac{7}{16}$ of an inch represents a distance of $2\frac{5}{8}$ miles. If a map distance is measured to be $12\frac{3}{4}$ inches, what is the actual mileage it represents?

ISWERS: (1 point) 1. $F_s =$ _____

(2 points) 2. _____

(3 points) 3. _____ miles

Assabet Valley, Bartlett, Leicester

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ROUND IV: OPERATIONS ON POLYNOMIALS

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM

1. What polynomial must be added to $5x^2 - 3x + 7$ to obtain $x^3 + 4x + 8$ as the sum.

2. Find the number c for which $x - 5$ is a factor of $4x^3 - 17x^2 - 20x + c$.

3. A rectangle whose width is $7x + 1$ has a perimeter of $2(2x + 1)(x + 3)$. Find the area of the rectangle expressed as a polynomial in x.

ANSWERS: (1 point) 1._____

(2 points) 2. c = _____

(3 points) 3._____

Shrewsbury, Tantasqua, Worcester Academy

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TEAM ROUND: FACTORING

EACH QUESTION COUNTS THREE POINTS

FACTOR COMPLETELY AND SIMPLIFY EACH FACTOR WHEN POSSIBLE

1. $6s^2 - 11s + 3$ 1._____

2. $x^5 - 18x^3 + 81x$ 2._____

3. $2n^2 - c + cn - 2n$ 3._____

4. $81x^4 - 16y^4$ 4._____

5. $a^2 - b^2 - c^2 - 2bc$ 5._____

6. $(x^2 - 4) - (x + 2)^2$ 6._____

7. $6x^4 - x^3 - 77x^2$ 7._____

8. $12ax + 8bc - 16ac - 6bx$ 8._____

Auburn, Bromfield, Hudson, Marlboro, St. Peter-Marian, Shepherd Hill
Tantasqua, Worcester Academy

March 2, 1983 WOCOMAL FRESHMAN MEET ANSWERS

ROUND I

(1 point) 1. 19

(2 points) 2. 6

(3 points) 3. $20

ROUND II

(1 point) 1. $\{2, 3, 4, 5, 6, 7\}$

(2 points) 2. $\{3, 9\}$

(3 points) 3. 11

ROUND III

(1 point) 1. $F_s = \frac{x}{x + c}$

(2 points) 2. 13

(3 points) 3. $76\frac{1}{2}$ or 76.5 or $\frac{153}{2}$ miles

ROUND IV

(1 point) 1. $x^3 - 5x^2 + 7x + 1$

(2 points) 2. $c = 25$

(3 points) 3. $14x^3 + 2x^2 + 14x + 2$

TEAM ROUND
(3 points each)

1. $(3s - 1)(2s - 3)$

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

3. $(2n + c)(n - 1)$

4. $(9x^2 + 4y^2)(3x + 2y)(3x - 2y)$

5. $(a + b + c)(a - b - c)$

6. $-4(x + 2)$

7. $x^2(2x + 7)(3x - 11)$

8. $2(2a - b)(3x - 4c)$ or $2(b - 2a)(4c - 3x)$