

March 2, 1994

WOCOMAL FRESHMAN MEET

ROUND I: Algebraic word problems

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Jon has 16 coins. Some are dimes and the rest are nickels. What is the greatest number of dimes he can have if the value of the nickels is greater than that of the dimes?
2. Jack, who can do a job in 20 hours, is joined by Jill who can do the job in 10 hours after Jack was on the job for 10 hours. How long will it take them working together to finish the job?
3. Kate and Lynne started from home hiking along a road up a hill at 7:45 a.m. at a rate of 4 km/hr. After going  $1/2$  km they realized that they had forgotten something and went back home. After spending 5 minutes at home, they set out again. Two hours later they rested for 10 minutes, then went on. Their mom decided to bring them lunches and started after them on the same road in her car at 11:15 a.m. at 64 km/hr. At what exact time did she catch up to them? Indicate a.m. or p.m.

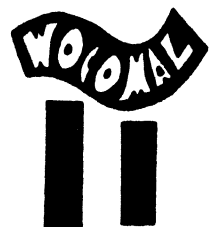
ANSWERS

(1 pt) 1. \_\_\_\_\_

(2 pts) 2. \_\_\_\_\_ hours

(3 pts) 3. \_\_\_\_\_

Barncoat, Quaboag, Westborough



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ROUND II: Operations on polynomials, including factoring

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Multiply:  $(x+1)(x-2)(x+3)$

2. Factor:  $4x^2-25y^2+2x+5y$

3. Subtract the product of  $\frac{1}{2}x-1$  and  $2+4x$  from  $\frac{1}{2}$  the sum of  $3x^2+4x-8$ ,  $x^2+4x-7$ , and  $2x-9$ . Write your answer as a polynomial.

ANSWERS

(1 pt) 1. \_\_\_\_\_

(2 pts) 2. \_\_\_\_\_

(3 pts) 3. \_\_\_\_\_

Algonquin, Auburn, Bartlett

March 2, 1994

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ROUND III: Co-ordinate geometry involving linear equations

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. What is the slope of the line having a y-intercept of -2 and an x-intercept of 5?

2. The line segment joining  $(-2, -1)$  and  $(8, 3)$  is rotated  $90^\circ$  clockwise about  $(-2, -1)$ . Into what point is  $(8, 3)$  rotated?

3. Find the x-intercept of the line containing  $(-3, 80)$  and  $(5, 76)$ .

ANSWERS

(1 pt) 1. \_\_\_\_\_

(2 pts) 2. (       ,       )

(3 pts) 3. \_\_\_\_\_

Shrewsbury, South, Worcester Academy

March 2, 1994

WOCOMAL FRESHMAN MEET

ROUND IV: Techniques of counting: permutations and combinations

ALL ANSWERS MUST BE EXPRESSED AS POSITIVE INTEGERS

1. If Henry has 1 white shirt, 1 blue shirt, 1 red shirt, 5 neckties, and 2 vests, how many different outfits can he invent?
  
  
  
  
  
  
  
  
  
  
2. In how many ways can 10 people be divided into two teams of 5 players each?
  
  
  
  
  
  
  
  
  
  
3. How many 3-digit even numbers can be formed using the digits 0, 1, 2, 3 if no digit is repeated in a number?

ANSWERS

(1 pt) 1. \_\_\_\_\_

(2 pts) 2. \_\_\_\_\_

(3 pts) 3. \_\_\_\_\_

Bartlett, Doherty

March 2, 1994

WOCOMAL FRESHMAN MEET

TEAM ROUND: Topics of previous rounds and open

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM  
AND ON THE SEPARATE TEAM ANSWER SHEET

3 points each

1. A trip was planned for all the members of a golf club. Each member's share of the cost was to have been \$248. When three members could not make the trip, the remaining ones had to be charged an additional \$23.25 each. How many members belong to the club?
2. Multiply and simplify to polynomial form:  
$$(x^2+1)(x-1)(x^8+1)(x^4+1)(x+1)$$
3. A line segment connects points S(1,7) and T(2,10). Write an equation in the form  $Ax + By = C$  of the perpendicular bisector of  $\overline{ST}$ . Make  $A > 0$  and so that A, B, and C have no common factor  $> 1$ .
4. Find the number of distinct permutations of SASSAFRAS.
5. Find the average of the first fifty positive integers.
6. If  $\angle A$  is an acute angle and its degree measure equals  $3(x-16)$ , specify permissible values of  $x$  by an inequality of the form  $a < x < b$ .
7. The sum of the digits of a certain whole number is 7. What is the least possible value for the sum of the digits of the number which is 300 more than the original number?
3. One owl hoots every 3 hours, a second owl hoots every 8 hours, and a third owl hoots every 12 hours. If they all hoot together at the start, how many times during the next 72 hours will exactly two owls hoot together?

Auburn, Bartlett, Notre Dame, St. John's, South, Tahanto, Worcester Academy, QSC