March 4, 1987 WOCOMAL FRESHMAN MEET

ROUND I: ALGEBRAIC WORD PROBLEMS

EACH ANSWER MUST BE IN SIMPLEST EXACT FORM

1. Fifteen less than ten times a number is -105. What is the number?

2. The ages of three sisters are consecutive multiples of 4. Three years ago the sum of their ages was 39. Find their present ages.

3. Jane had twice as many nickles as Joe and 2 more dimes than Joe had nickles. Joe had no dimes. They both had 3 quarters. Together their money totaled \$5.45. What was the total of Jane's money?

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____, _____ and _____

(3 pts) 3. \$_____

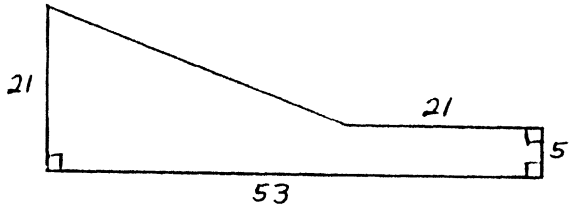
Bartlett, Shrewsbury, West Boylston

March 4, 1987 WOCOMAL FRESHMAN MEET

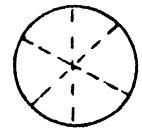
ROUND II: PERIMETER AND AREA OF PLANE FIGURES, VOLUME OF RECTANGULAR SOLIDS, CIRCUMFERENCE AND AREA OF CIRCLES

EACH ANSWER MUST BE IN SIMPLEST EXACT FORM

1. Find the area of this figure



2. If a circular pie is cut into 6 equal pieces, what is the ratio of the length of the circular arc part of each piece to the length which was formerly a radius of the pie? Use the symbol π in your answer if appropriate.



3. A cake with two rectangular layers has one layer measuring 12" by 12" by 2" and the second layer measuring 8" by 8" by 2". How many cubical pieces each 2" by 2" by 2" can the whole cake be cut into?

ANSWERS

(1 pt) 1. _____ sq units

(2 pts) 2. _____ : _____

(3 pts) 3. _____

Auburn, Bartlett, West Boylston

March 4, 1987 WOCOMAL FRESHMAN MEET

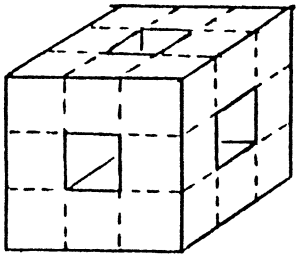
ROUND III: OPEN

EACH ANSWER MUST BE IN SIMPLEST EXACT FORM

1. Write the product in scientific notation, that is as a number between 1 and 10 times a power of 10.

$$(3.0 \times 10^{5})(1.6 \times 10^{-4})(5.0 \times 10^{7})$$

2. Two positive integers are in the ratio 3:7. If their sum is less than 60, what is the greatest possible value that the difference of the two integers can be?

3. 

Twenty cubes are glued together to form this space lattice, with "holes" which you can see through. If the total lattice measures 3×3×3, how many square units of surface area would be painted if the lattice were fully dipped in a bucket of paint?

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Bromfield, Quaboag, Worcester Academy

March 4, 1987 WOCOMAL FRESHMAN MEET

ROUND IV: OPERATIONS ON POLYNOMIALS

EACH ANSWER MUST BE IN THE FORM SPECIFIED - POLYNOMIALS FOR 1. AND 2.

1. Simplify. Write the result in descending order of exponents

$$9x^3 - (4 - 3x^2 - 10x^5) - 8x^3 - (6x^2 - 5)$$

2. Simplify. Write the result in descending order of exponents

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

3. Find the value of k for which $y-2$ is a factor of

$$y^3 - 4y^2 + ky + 6.$$

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. $k =$ _____

Algonquin, Doherty, Shrewsbury

March 4, 1987 WOCOMAL FRESHMAN MEET

EAM ROUND: FACTORING

FACTOR EACH EXPRESSION AS COMPLETELY AS POSSIBLE OVER THE INTEGERS AND SIMPLIFY EACH FACTOR WHEN POSSIBLE

3 pts each

1. $5x^3 - 4x^2 - x$

2. $x^3 - 9xy^2 + 2x^2 - 18y^2$

3 $2(3x-1)^2 - 3(3x-1)$

4. $6x^3y^3 - 150xy^5$

5. $x(x^2 + xy - y^2) - y(x^2 - xy - y^2)$

6. $x^3 + 9x^2 - 20x$

7. $x^4 + 4$

8. $4y^4 - 2x + 2xy^2 - 4y^2$

Auburn. Bartlett, Doherty, Notre Dame, St.John's, Southbridge, West Boylston, Worcester Academy

March 6, 1987 WCCOMAL FRESHMAN MEET ANSWERS

Round I WORD PROB.

1 pt 1. -9

2 pts 2. 12, 16 and 20

3 pts 3. $3.95

Round II GEOM

1 pt 1. 521.59 units

2 pts 2. $\pi : 3$

3 pts 3. 52

Round III OPEN

1 pt 1. 2.4×10^9

2 pts 2. 20

3 pts 3. 72

Round IV OPNS on POLYS

1 pt 1. $10x^5 + x^3 - 3x^2 + 1$

2 pts 2. $2x^3 + 32x - 41$

3 pts 3. $k = 1$

Team Round FACTORING

3 pts each

1. $x(5x+1)(x-1)$
2. $(x+2)(x+3y)(x-3y)$
3. $(3x-1)(6x-5)$
4. $6xy^3(x+5y)(x-5y)$
5. $(x+y)(x^2-xy+y^2)$
6. $x(x^2+9x-20)$
7. $(x^2+2x+2)(x^2-2x+2)$
8. $2(2y^2+x)(y+1)(y-1)$