

March 6, 1996

WOCOMAL FRESHMAN MEET

ROUND I: Algebraic word problems

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. For every two widgets I buy at the regular price, I get a third widget for 2¢. I spent 90¢ for nine widgets. Find, in cents, the regular price of a widget.

2. If a certain number is decreased by 23, one-fourth the result is as much less than 37 as the number is greater than 56. What is the number?

3. Phil O. Dendron has some money to spend so he goes to his sister Rhoda's store and says, "Give me as much money as I have and I will spend \$10 here." She does this. The next day and the day after that, he does the same thing. He then has no money left. How much money did Phil start with?

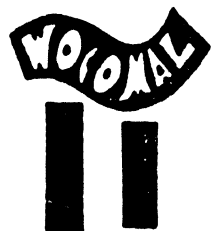
ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Bromfield, South, Westboro



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ROUND II: Operations on polynomials

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Simplify: $(x + 2)^2 - (x - 2)^2$

2. Rewrite as a polynomial in y : $(y - 1)^3 + (y - 1)^2 + (y - 1) + 1$

3. Find the quotient: $(z^4 - z^3 + z^2 - 2z - 2) \div (z^2 + 2)$

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Doherty, South, Westboro

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ROUND III: Ratio, proportion, and variation

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. If $3x = 5y$, what is the ratio of x to y ?

2. One day at the Tulip Bowl the ratio of occupied seats to unoccupied seats was 13:2. If there were 9,000 unoccupied seats, how many seats are in the Tulip Bowl?

3. A certain mineral's price varies directly as the square of its mass. If a sample with a mass of 4.2 grams is worth \$61.74, what is the value of a sample with a mass of 100 grams?

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Hudson, Notre Dame, QSC

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ROUND IV: Perimeter, area, and volume

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. The volume of a rectangular block is 480 cubic cm. If the block is 12 cm long and 8 cm wide, find the area of one of its two smallest surfaces. Include units!

2. A single story house is to be built on a rectangular lot 75 ft wide by 100 ft deep. The shorter side of the lot is along the street. The house must be set back 25 feet from the street. It must be 20 ft from the back lot line and 10 ft from each side lot line. What is the maximum square footage (area) the house can have?

3. A trapezoid of area 100 sq ft has bases of 6 ft and 14 ft. Find the area of the triangle formed by extending the legs until they intersect and using the 6 ft base as its third side.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____ *sq. ft.*

(3 pts) 3. _____ *sq. ft.*

Doherty, Notre Dame, Shrewsbury

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TEAM ROUND: Topics of previous rounds and open

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM OR AS DIRECTED IN THE PROBLEM AND ON THE SEPARATE TEAM ANSWER SHEET

3 points each

1. An airplane flies 1,062 km with the wind. In the same amount of time it can fly 738 km against the wind. The speed of the plane in still air is 200 km/hr. Find the speed of the wind.
Include Units!
2. Factor completely: $3(x - 3)^2 + 2(3x - 6) - 30$
3. The volume of a spherical bubble varies as the cube of its radius. If the bubble's volume increases by 20%, by what percent has the radius increased? Give your answer to the nearest tenth of a percent.
4. The perimeter of rectangle ABCD is 14. If all its side lengths are whole numbers, list all possible numbers which could be the area of ABCD.
5. In working a problem a student first added 10 instead of subtracting 10, then divided by 10 instead of multiplying by 10. The answer obtained was 120. What should the correct answer have been?
6. Find n if $5^n + 5^n + 5^n + 5^n = 100 \cdot 25^{10}$
7. A plane is tiled with 3 types of regular polygons, all having the same length sides. Some are triangles; others are squares. What are the third type?
8. If the numbers 2, 5, 8, and 9 are substituted for the four distinct letters in the addition expression of 3-digit numbers $BAD + MAD + DAM$, what is the largest possible sum the expression can have?

Algonquin, Bartlett, Hudson, Leicester, Southbridge, Tahanto, Worcester Academy

March 6, 1996

WOCOMAL FRESHMAN MEET ANSWERS

ROUND I 1 pt 1. 14
word
prob 2 pts 2. 79
3 pts 3. \$8.75

TEAM ROUND

3 points each

1. 36 km/hr NEED
UNITS

2. $3(x+1)(x-5)$

3. 6.3 %

4. 6, 10, 12 ANY
ORDER

5. 11,800

6. 22

7. hexagons

8. 2,286

ROUND II 1 pt 1. $8x$
polys 2 pts 2. $y^3 - 2y^2 + 2y$
3 pts 3. $z^2 - z - 1$

ROUND III 1 pt 1. 5:3 or $\frac{5}{3}$
ratio
prop 2 pts 2. 67,500
var 3 pts 3. \$35,000

NEED UNITS

ROUND IV 1 pt 1. 40 cm^2 or 40 sq cm
perim
area 2 pts 2. 3,025
vol 3 pts 3. $22\frac{1}{2}$ or 22.5