

February 6, 1991

WOCOMAL VARSITY MEET

ROUND II: Algebra 1 - open

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM

1. Jean exchanged a \$10 bill for an equal number of nickels, dimes, and quarters. How many of each type coin did Jean receive?

2. If $\frac{a+13b}{3a-b} = 3$, find the value of $\frac{a^3}{b^3}$.

3. Years ago Gerry bought a horse for \$24. After paying for the horse's keep for a while, he sold the horse for \$60. That appeared profitable, but after the horse's keep costs, Gerry had lost an amount equal to half of what he had paid for the horse plus one fourth the cost of his keep. How much did Gerry lose?

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

St. John's, Tahanto, Westboro

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WOCOMAL VARSITY MEET

ROUND III: Logs, exponents, radicals

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM

1. If $x = \log_2 \sqrt{2}$ and $\log_{\frac{1}{3}} y = 2$, find the product xy .

2. Solve for x :

$$(\sqrt{x} + \sqrt{11-x})(\sqrt{x} - \sqrt{11-x}) + 8 = \sqrt{2x^2 - 1}$$

3. Find all real values of x for which

$$\frac{3^{\sqrt{12x}} + 3}{4} = 3^{\sqrt{3x}}$$

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

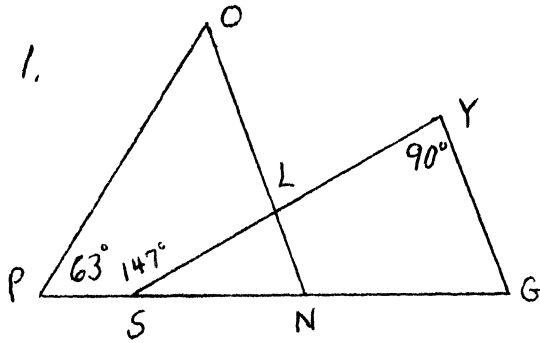
Auburn, Notre Dame, Tahanto

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WOCOMAL VARSITY MEET

ROUND IV: Parallel lines and polygons

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM



If $\overline{ON} \parallel \overline{YG}$ and three angles are as indicated, find the measure of angle GNO .

2. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$; \overleftrightarrow{AD} and \overleftrightarrow{BC} intersect at Q ; and $AB = 12$, $AQ = 6$, $DQ = 4$. Find CD .

3. An equilateral triangle and a regular hexagon have equal perimeters. If the area of the triangle is 2, find the area of the hexagon.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Bromfield, St. John's, Southbridge

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WOCOMAL VARSITY MEET

ROUND V: Analytic geometry of straight lines and conics

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM

1. Write the equation of the circle with center in the first quadrant, radius 2, and tangent to the y-axis at $(0,1)$ in the form $(x-h)^2 + (y-k)^2 = r^2$.

2. Write the $y = mx + b$ form equation of line \overleftrightarrow{PQ} for $P(2,5)$ and Q the point dividing \overline{AB} in the ratio $\frac{AQ}{BQ} = \frac{2}{1}$ for $A(-1,-2)$ and $B(8,4)$.

3. There are two lines tangent to the hyperbola $y = \frac{4}{x}$ through the point $(3,1)$. Find the y-intercept of the one with the smaller y intercept. The slope of a tangent line to $y = \frac{4}{x}$ at any point (x,y) on it is given by the expression $\frac{-4}{x^2}$.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Burncoat, Doherty, Marlboro

February 6, 1991

WOCOMAL VARSITY MEET

TEAM ROUND: Topics of previous rounds and open

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

2 points each

1. In Megabucks you choose exactly 6 of 36 different numbers. How many combinations are possible? Do multiply it out.
2. Find x if $\frac{x+2}{x+4} = 20\%$.
3. Let $a = \log_{16} 125$ and $b = \log_2 5$. Find $\frac{a}{b}$ in simplest form.
4. ABCDE is a regular pentagon and $\triangle APE$ is equilateral with P inside the pentagon. Find the measure of angle BPD.
5. Find the coordinates of the vertex of the curve with equation $x^2 + 6x + 12y = 15$.
6. What is the average of all 3-digit numbers formed by using the digits 1, 2, and 8 exactly once in each?
7. How many integers greater than 1 million and less than 9 million are perfect squares?
8. Given square ABCD with side 8 inches. Find the radius of a circle drawn through vertices A and D and tangent to side \overline{BC} .
9. A harmonic sequence is a sequence in which the reciprocals of the terms form an arithmetic sequence. If the first two terms of a harmonic sequence are $1+2i$ and $2+i$, find the third term.

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WOCOMAL VARSITY MEET ANSWERS

ROUND I

comb, perm

- 1 pt 1. 60
 2 pts 2. 144
 3 pts 3. ~~1620~~ 690

ROUND II

alg I

- 1 pt 1. 25
 2 pts 2. 8
 3 pts 3. $\sqrt{28}$

ROUND III

logs, exp. $\sqrt{\quad}$

- 1 pt 1. $\frac{1}{18}$
 2 pts 2. ~~1~~, $x=5$
 3 pts 3. $x=0$, $x=\frac{1}{3}$

ROUND IV

llines, polygons

- 1 pt 1. 123°
 2 pts 2. 8
 3 pts 3. 3

ROUND V

analytic geom.

- 1 pt 1. $(x-2)^2 + (y-1)^2 = 2^2$ or 4
 2 pts 2. $y = -x + 7$
 3 pts 3. $\frac{4}{3}$ or $1\frac{1}{3}$ or $1\bar{3}$

TEAM ROUND 2 pts each

1. 1,947,792
 2. $-1\frac{1}{2}$ or $-\frac{3}{2}$ or -1.5
 3. $\frac{3}{4}$ or 0.75
 4. 168°
 5. $(-3, 2)$
 6. 407
 7. 1,999
 8. 5
 9. $\frac{5}{3}$ or $1\frac{2}{3}$ or 1