

**Worcester County Mathematics
League**

WOCOMAL Varsity Meet #1

Coaches' Booklet

October 12, 2005

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WOCOMAL Varsity Meet

Round 1: Arithmetic (NO CALCULATORS)

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM.

1. Evaluate $9 - 5 \div (8 - 3) \times 2 + 6$ using the order of operations.
2. Evaluate $x/3 + 4x$ for the given values of x ($x = -3, 0, 6$). If you add the results of your three evaluations and the sum is A , then what is the value of A ?
3. If $\mathbf{a*b = a + 2b}$ and $\mathbf{a\#b = a + 2*b}$, determine the value of $\mathbf{(-3\#1) \# (5\#2)}$.

ANSWERS

(1 pt.) 1. _____

(2 pts.) 2. A=_____

(3 pts.) 3. _____

Doherty, Bromfield, Worcester Academy

October 12, 2005

WOCOMAL Varsity Meet

Round 2: Algebra 1 (open)

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM.

1. Solve for x : $2x - \frac{1}{2}x + 6(x + \frac{1}{4}) = 12(x - \frac{1}{4})$

2. A man born in the year x^2 will be 89 in the year $(x + 1)^2$. In what year was he born?

3. If $n = 3^x + 3^x + 3^x$, then $n^2 = A^{x+1}$. Determine the value of A .

ANSWERS

(1 pt.) 1. $x =$

(2 pts.) 2. _____

(3 pts.) 3. $A =$

Bancroft, Shrewsbury, and Burncoat

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WOCOMAL Varsity Meet

Round 3: Set Theory

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM.

1. Let set $A = \{ 2,4,6,8 \}$. How many subsets do **NOT** contain the number 4?

2. Solve for x : $\{ x: 3x + 12 \geq -6 \} \cup \{ x: -7x - 7 \leq -28 \}$.

3. Of the members of three athletic teams at Euclid High School, 21 are on the hockey team, 26 are on the baseball team, and 29 are on the football team. Fourteen play both baseball and hockey; 15 play both baseball and football; 12 play both football and hockey. Eight are on all three teams. How many distinct members are there all together on these athletic teams?

ANSWERS

(1 pt.) 1. _____

(2 pts.) 2. {x: _____}

(3 pts.) 3. _____

Bromfield, Millbury, Hudson

October 12, 2005

WOCOMAL Varsity Meet

Round 4: Measurement

ALL ANSWERS MUST BE AS DIRECTED IN THE PROBLEM. RADICALS MUST BE WRITTEN IN SIMPLEST RADICAL FORM.

1. A cone sits on top of a cylinder. Both have a radius of 3. The heights of the cylinder and cone are 8 and 4 respectively. Determine the exact volume of the combined solid.
2. Determine the exact area of an isosceles trapezoid whose legs measure 8, smaller base measures 8, and whose base angles measure 60° .
3. A right cone with a height of 9 is inscribed in a sphere of radius 6. Determine the exact volume of the region inside the sphere, but outside the cone.

ANSWERS

(1 pt.) 1. _____ units³

(2 pts.) 2. _____ units²

(3 pts.) 3. _____ units³

Algonquin, Oxford, and Hudson

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Round 5: Polynomial Equations (NO CALCULATORS)

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM.

1. If a quadratic equation in the form $x^2 + Bx + C = 0$, where B and C are integers, has roots of $5 + 2\sqrt{3}$ and $5 - 2\sqrt{3}$, then determine the value of B + C.

2. If $x + 2$ is a factor of $x^5 + 2x^4 + 3x^3 + 4x^2 + 5x + k$, then determine the value of **k**.

3. If **a** and **b** are the roots of the equation $2x^2 + 7x + 13 = 0$, determine the value of **$a^2 + b^2$** .

ANSWERS

(1 pt.) 1. $B+C=$ _____

(2 pts.) 2. $k=$ _____

(3 pts.) 3. $a^2 + b^2 =$ _____

Bartlett, Quaboag, and Worcester Academy

October 12, 2005

WOCOMAL Varsity Meet

TEAM ROUND

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM AND ON THE SEPARATE TEAM ANSWER SHEET. (2 points each)

1. When simplifying the following expression completely, the final result is a fraction in the form $\frac{a}{b}$ where a and b are relatively prime, that is, $\text{gcf}(a,b) = 1$. Determine the value of $a + b$.

$$(((1^{-1} + 1)^{-1} + 1)^{-1} + 1)^{-1}$$

2. Steve ate 100 peanut butter cups in 5 days. Each day he ate six more than the previous day. Determine how many peanut butter cups he ate on the first day.
3. How many 3-element subsets can be formed from a set with 5 elements?
4. How many cubes, each 2 inches on an edge, are needed to make a volume equal to that of a rectangular solid with dimensions of 1 ft by 2 ft by 4 ft ?
5. Determine the value of n so that the roots of $nx^2 - 8x + 10 = 0$ are equal.
6. How many pairs of natural numbers (x,y) are there that solve the equation

$$2x + 3y = 100 ?$$

7. What value of p would make the following points collinear?

$$(11,2), (9,-1), \text{ and } (5,p)$$

8. If the money in my pocket was divided equally among the students in my room, each would receive \$1.47. If two more students arrived, each student would then receive \$1.05. Determine how much money I have in my pocket.
9. The sum of 22^2 and 19^2 equals the sum of the squares of another pair of two-digit, positive, whole numbers. Determine the numbers.

St. John's, Bromfield, Algonquin, West Boylston, Uxbridge, Shrewsbury, Mass Academy, and Burncoat

October 12, 2005

WOCOMAL Varsity Meet ANSWERS

Round 1: Arithmetic

1. (1 pt.) 13
2. (2 pts.) 13
3. (3 pts.) 25

Round 2: Algebra-open

1. (1 pt.) $x = 1$
2. (2 pts.) 1936
3. (3 pts.) $A = 9$

Round 3: Set Theory

1. (1 pt.) 8
2. (2 pts.) $\{x: x \geq -6\}$
3. (3 pts.) 43

Round 4: Measurement

1. (1 pt.) $84\pi \text{ units}^3$
 2. (2 pts.) $48\sqrt{3} \text{ units}^2$
 3. (3 pts.) $207\pi \text{ units}^3$
-

Round 5: Polynomial Equations

1. (1 pt.) 3
 2. (2 pts.) 18
 3. (3 pts.) $-3/4$ or $-.75$
-

TEAM ROUND (2 pts. Each)

1. 8

2. 8

3. 10

4. 1728

5. $\frac{8}{5}$ or 1.6

6. 16

7. -7

8. \$7.35

9. 13 and 26

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TEAM ROUND

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM AND ON THIS SEPARATE TEAM ANSWER SHEET. (2 points each)

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

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WOCOMAL Varsity Meet

TEAM ROUND

School: _____

Team #: _____

Team Members:

1. _____

2. _____

3. _____

4. _____

5. _____

Total Points for Team Round: _____