

November 3, 1982

WOCOMAL FRESHMAN MEET

ROUND I: ARITHMETIC - ORDER OF OPERATIONS & EVALUATION

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Evaluate $5x^5 + 4y^4 + 3x^3 + 2y^2 + x + 7$, when $x = -1$ and $y = 0$.

2. If $x = -\frac{1}{3}$ and $y = 3$, find the value of
$$\frac{16y - 7(3 - x \cdot y + 4 - 2)}{3 \div x + y}.$$

3. If $a \# b = \frac{ab + b}{a}$ and $a * b = a + \frac{b}{a}$, evaluate $a * (b \# c)$ when $a = 1$, $b = 2$, and $c = 3$.

ANSWERS: (1 point) 1. _____

(2 points) 2. _____

(3 points) 3. _____

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ROUND II: LINEAR EQUATIONS

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Solve the equation $x + 2y = 6$ for y .

2. If $\frac{1}{3}(u + 8) - \frac{1}{4}(3 - 2u) = \frac{1}{6}$, solve for u .

3. Yesterday Tim had \$5 and Ed had \$13. Today Ed spent twice as much as Tim and now has three times as much money as Tim. How much money did Ed spend?

ANSWERS: (1 point) 1. $y =$ _____

(2 points) 2. $u =$ _____

(3 points) 3. $\$$ _____

St. Peter-Marian, Shepherd Hill, Worcester Academy

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ROUND III: OPEN

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. If p pencils cost c cents, how much will x pencils cost?

2. Ken always sits in the same pew at church - the third from the front and the twelfth from the back on the right hand side of the center aisle. If each pew seats 10 persons on each side of the center aisle, what is the total capacity of the church?

3. A supermarket has 128 crates of apples. Each crate contains at least 120 apples and at most 144 apples. What is the largest integer n such that there must be at least n crates containing the same number of apples?

ANSWERS: (1 point) 1. cents

(2 points) 2. people

(3 points) 3. n =

Auburn, Bromfield, Hudson

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ROUND IV: GEOMETRY - PERIMETER & AREA; VOLUME OF RECTANGULAR SOLIDS

ALL ANSWERS MUST BE IN SIMPLEST FORM

- .. If the perimeter of a square in feet is equal to the number of square feet in the area of the square, find the number of feet in a side of the square.
2. A rectangular tank with a square base of side 40 cms contains water to a height of 30 cms. When a solid cube of side 20 cms is totally submerged in the water, to what height (in cms) will the level of the water in the tank rise?
3. A circular flower bed 12 feet in diameter is bordered on the outside by shrubs set 1 foot from the edge of the bed. If the shrubs are 16 inches apart and cost 3 for \$5.00, what is the total cost of the shrubs? (Use $\pi = \frac{22}{7}$)

ANSWERS: (1 point) 1. _____ feet

(2 points) 2. _____ cms

(3 points) 3. \$ _____

Auburn, Hudson, Shepherd Hill

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TEAM ROUND: NUMBER THEORY, PRIMES, DIVISIBILITY, LCM, GCF, SEQUENCES

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM

EACH ANSWER COUNTS THREE POINTS

ANSWERS

1. Find the sum of the next three terms of the sequence $-3, -2, 1, 6, 13, 22, \dots$ 1. _____
2. Three ex-teenagers (older than 19) find that the product of their ages is 22,330. What is the sum of their ages? 2. _____
3. Twin primes are a pair of prime numbers whose difference is two. The sum of a pair of twin primes is 276. What are the two numbers? 3. _____
4. Find the next term of the sequence $11, 12, 10, 14, 6, 22, -10, \dots$ 4. _____
5. How many integers from 1 to 402 (inclusive) are multiples of 5 or are perfect squares (or both)? 5. _____
6. How many pairs of positive integers have a greatest common factor of 52 and a least common multiple of 1560? 6. _____
7. A sequence starts with 3 and ends with 71. There are five numbers in-between. The rule of the sequence is that each term (after the first two) is the sum of the two preceding terms. Find the complete sequence. 7. _____
8. Find the ^{smallest} positive integer N, which when divided by any single digit prime number or by any single digit odd composite number, leaves a remainder of 1. 8. _____

Assabet Valley, Auburn, Bromfield, Hudson,
Shepherd Hill, Tantasqua, Worcester Academy

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WOCOMAL FRESHMAN MEET ANSWERS

ROUND I

(1 point) 1. -2

(2 points) 2. -1

(3 points) 3. $5\frac{1}{2}$

TEAM ROUND

3 points each

1. 140

2. 86

ROUND II

(1 point) 1. $y = \frac{6-x}{2}$ or $3 - \frac{1}{2}x$ etc

(2 points) 2. $u = -\frac{21}{10}$ or -2.1 etc.

(3 points) 3. \$4.00

3. 137 and 139

4. 54

ROUND III

(1 point) 1. $\frac{CX}{P}$ cents

(2 points) 2. 280 people

(3 points) 3. $n = 6$

5. 96

6. 4

7. 3, 7, 10, 17, 27, 44, 71

ROUND IV

(1 point) 1. 4 feet

(2 points) 2. 35 cms

(3 points) 3. \$55

8. 631