November 6, 1996 WOCOMAL FRESHMAN MEET

ROUND I: Evaluation of algebraic expressions and order of operations

ALL ANSWERS MUST BE EXPRESSES IN SIMPLEST EXACT FORM

1. If $a \sqcap b = -a^2 - b^2$, evaluate $3 \sqcap -1$.

2. If $x = \frac{1}{2}$, evaluate $2x^2 - x(2-2x) - \frac{1}{x}(2-\frac{1}{x})$.

3. For $a \diamond b = \frac{ab}{b-10}$ and $c \infty d = c^2d - 4$,
evaluate $[2 \diamond (3 \infty 6)] \infty 2$.

ANSWERS
(1 pt.) 1._____

(2 pts) 2._____

(3 pts) 3._____

Algonquin, Bancroft, Bartlett

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ROUND II: Solving linear equations

ALL ANSWERS MUST BE EXPRESSED IN SIMPLEST EXACT FORM

Solve each equation.

1. $3 + 2(3x + 1) = 2 + 3(x + 1)$

2. $0.4\,(y - 0.4) = .04y - 0.4$

3. $\frac{1}{2}x - \frac{1}{3} + \frac{1}{4}x + \frac{1}{5} = -\frac{1}{6}x$

ANSWERS

(1 pt.) 1._____

(2 pts) 2._____

(3 pts) 3._____

Notre Dame, South, Tahanto

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ROUND III: Logic Problems

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. I have three types of animals as pets. All my pets are dogs except two, all my pets are cats except two, and all my pets are hamsters except two. How many dogs do I have?

2. Five students enter a room containing 2 chairs and 3 stools.
Figure out who sits on which type if:
Roy and Sally sit on the same type of seat.
Sally and Randy sit on different types.
Randy and Jim sit on different types.
The fifth student in Chris.

3. What is the product (the answer) in this multiplication problem? There are digits in the underlined positions only.

```
      3 _ _ _
        1 _ _
  -------------
      9 _ 4 _
    _ _ _ 6
  _ _ 8 3
  -------------
  _ _ 3 8 _ _
```

ANSWERS
(1 pt.) 1._____

On chairs: _____

(2 pts) 2.On stools: _____

(3 pts) 3._____

Bartlett, Bromfield, Westboro

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ROUND IV: Number Theory

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM

1. Disregarding order, in how many ways can 24 be expressed as a sum of two prime numbers?

2. Find the set of consecutive whole numbers with the first as a small as possible which fit the pattern: prime, composite, prime, composite, perfect square, composite, prime, composite, prime. (Your answer should be nine consecutive whole numbers.)

3. $4321_{\text{five}} - 1234_{\text{six}} =$ ____?____ seven Answer below!

ANSWERS

(1 pt.) 1._____

(2 pts) 2._____

(3 pts) 3. seven

Bromfield, Quaboag, Westboro

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TEAM ROUND: Topics of previous rounds and open

ALL ANSWERS MUST BE IN SIMPLEST EXACT FORM AND ON THE SEPARATE TEAM ANSWER SHEET 3 Points Each

1. If $x \Delta y = (x + y) + (xy) + y$, evaluate $(5 \Delta 7) \Delta 3$.

2. Solve for g in terms of x: $\frac{3}{4}(g - 2x) = \frac{2}{3}(x - \frac{1}{2}g)$

3. How many rectangles with area 36 are possible such that all lengths and widths are whole numbers and no two rectangles have the same perimeter?

4. Is 817 a prime number? Answer "Yes" if so, or "No" and give its prime factorization if not.

5. The arithmetic mean of Kim's ten test scores is 87. The teacher throws out the top and bottom scores, which are 95 and 55. What is the mean of the remaining scores?

6. Sam has \$42,000 in savings. If he invests half the money at $p\%$ for 2.5 years, he will obtain \$3255 in interest. If he invests two-thirds of it at $q\%$ for 1.5 years, he will get \$3150 in interest. How much interest will he receive if he invests all the money at $\frac{p+q}{2}\%$ for one year?

7. Find the smallest positive integer n such that the value of the expression $n^2 - 26n + 30$ is at least 1000.

8. Through how many degrees does the hour hand of a circular clock move in 5.5 hours?

Nov. 6, 1996 WOCOMAL FRESHMAN MEET ANSWERS

ROUND I Evaluating

1 pt 1. -10

2 pts 2. 0

3 pts 3. $8\frac{1}{2}$ or 8.5

ROUND II Linear eq

1 pt 1. 0

2 pts 2. $-\frac{2}{3}$ or $-.\overline{6}$

3 pts 3. $\frac{8}{55}$ or $.1\overline{45}$

ROUND III Logic

1 pt 1. 1

chairs: Chris, Randy

2 pts 2. stools: Roy, Sally, Jim

3 pts 3. 403 809

ROUND IV # theory

1 pt 1. 3

2 pts 2. 5, 6, 7, 8, 9, 10, 11, 12, 13

3 pts 3. 543

TEAM ROUND

3 points each

1. 222

2. $g = 2x$

3. 5

4. No 19.43

5. 90

6. $2877

7. 47

8. 165° OK without degrees symbol