

# WORCESTER COUNTY MATHEMATICS LEAGUE



## Freshman Meet 1 - October 28, 2015

### Round 1: Evaluation of Algebraic Expressions and Order of Operations

*All answers must be in simplest exact form in the answer section*

**NO CALCULATOR ALLOWED**

1. Evaluate the following expression:  $2 \times \left[ 5 + \frac{4(3+7)}{5} \right]$

2. If  $a = -\frac{1}{2}$  and  $b = -\frac{3}{4}$ , evaluate  $b^2 - (a^3 - [a - b])$ .

3. If  $a \diamond b = \frac{a}{b} + a$ , evaluate:  $2 \diamond ([3 \diamond 4] \diamond 5)$

## ANSWERS

(1 pt.) 1. \_\_\_\_\_

(2 pts.) 2. \_\_\_\_\_

(3 pts.) 3. \_\_\_\_\_

# WORCESTER COUNTY MATHEMATICS LEAGUE



## Freshman Meet 1 - October 28, 2015 Round 2: Solving Linear Equations

*All answers must be in simplest exact form in the answer section*

**NO CALCULATOR ALLOWED**

1. Solve for y:  $-3y = -8y - 15$

2. Solve for x:  $\frac{x-4}{4} + \frac{x-5}{5} - \frac{x-2}{2} = 2$

3. Suppose a and c are non-zero real numbers. Solve for x in terms of the other variables. Simplify your answer.

$$\frac{2cx+c}{3} - a(x+c) = -ax$$

### ANSWERS

(1 pt.) 1. \_\_\_\_\_

(2 pts.) 2. \_\_\_\_\_

(3 pts.) 3. \_\_\_\_\_

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## Freshman Meet 1 - October 28, 2015

### Round 3: Logic Problems

*All answers must be in simplest exact form in the answer section*

**NO CALCULATOR ALLOWED**

1. Seven people at a meeting each shake hands with every other person exactly once. How many handshakes take place in total?

2. In a basketball league, suppose there are a total of 8 teams denoted by A, B, C, D, E, F, G and H. One morning, three experts picked the following teams to win games that night: {A, B, C, D}, {A, E, F, C}, and {D, A, G, F}. If no expert picked H to win a game, which team will play team D?

3. Suppose T, A, and P each represent a distinct digit between 0 and 9, inclusive. What 3 digit number is represented by TAP if

$$\begin{array}{r} \text{TAP} \\ +\text{TAT} \\ \hline \text{APT} \end{array}$$

## ANSWERS

(1 pt.) 1. \_\_\_\_\_ handshakes

(2 pts.) 2. Team \_\_\_\_

(3 pts.) 3. TAP = \_\_\_\_\_

# WORCESTER COUNTY MATHEMATICS LEAGUE



## Freshman Meet 1 - October 28, 2015 Round 4: Ratios, Proportions, and Variation

*All answers must be in simplest exact form in the answer section*

**NO CALCULATOR ALLOWED**

1. If \$2700 is divided between George and Mary in the ratio 4 to 5, respectively, how many dollars does Mary receive?

2. The area of a rectangle is 360 square meters. The lengths of the rectangle's sides are in the ratio 2:5. Find the length of the longer side.

3. Tim took 22 hours to drive from Town A to Town B and back again. If his average speed was 50 mph from A to B and was 60 mph from B to A, what is the distance in miles between Towns A and B?

### ANSWERS

(1 pt.) 1. \$ \_\_\_\_\_

(2 pts.) 2. \_\_\_\_\_ meters

(3 pts.) 3. \_\_\_\_\_ miles

# **WORCESTER COUNTY MATHEMATICS LEAGUE**



## **Freshman Meet 1 - October 28, 2015**

### **Team Round**

*All answers must either be in simplest exact form or rounded to EXACTLY three decimal places, unless stated otherwise. (3 points each)*

#### **APPROVED CALCULATORS ALLOWED**

1. If  $a$  and  $b$  are positive integers, then let  $a\Delta b$  be equal to the greatest common factor of  $a$  and  $b$  and let  $a\star b$  be equal to the least common multiple of  $a$  and  $b$ . Evaluate

$$(12\star 32)\Delta(36\star 126)$$

2. There are four consecutive even numbers such that if the first three are divided by 2, 3, and 4, respectively, the sum of their quotients will equal the fourth number. What is the smallest of these even numbers?

3. What is the sum of the first 100 strictly positive multiples of 3?

4. Suppose  $x$  varies directly with the square of  $y$ . If  $x = 8$  when  $y = 2$ , find  $x$  when  $y = 5$ .

5. Amy's goal is to finish a 5 mile race with an average speed of 6 miles per hour. If she runs the first 2 miles at an average speed of 8 miles per hour, what does her average speed need to be for the remainder of the race in order to achieve her goal?

6. A customer asks a bank teller for change for a 10 dollar bill. The customer only wants quarters, dimes, and nickels and wants the same number of each coin. How many coins in total does the customer receive?

7. Suppose the population of a town doubles every 10 years. What is the ratio of the town's population in year  $x+120$  to the town's population in year  $x$ ?

8. The average weight of 3 toddlers is 63 pounds. No two toddlers have a weight difference of more than 18 pounds, nor a weight difference less than 3 pounds. What is maximum possible weight of any one child?

**WORCESTER COUNTY MATHEMATICS LEAGUE**



**Freshman Meet 1 - October 29, 2014  
Team Round Answer Sheet**

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_ miles per hour

6. \_\_\_\_\_ coins

7. \_\_\_\_\_ : \_\_\_\_\_

8. \_\_\_\_\_ pounds