WORCESTER COUNTY MATHEMATICS LEAGUE

Freshman Meet 1 – November 2021

Round 1: Order of Operations

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

NO CALCULATOR ALLOWED

1. Evaluate $\left(\frac{2}{3}\left[8(a+b)^2 - 3b\right]\right)$ for $a = 5$ and $b = -2$.

2. Simplify $\left(1-\frac{1}{3}\right)\left(1-\frac{1}{4}\right)\left(1-\frac{1}{5}\right)(...)\left(1-\frac{1}{n}\right)$

3. For $a \lozenge b = \frac{ab}{b-10}$ and $c \infty d = c^2 d - 4$,

evaluate $[\,2 \lozenge (3 \infty 6)\,] \infty 2$.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

WORCESTER COUNTY MATHEMATICS LEAGUE

Freshman Meet 1 – November 2021

Round 2: Linear Equations

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

NO CALCULATOR ALLOWED

1. Solve for x: $3 - [3 - (3x - 3)] = 3$

2. If $2(13 + x) = 2x - 7 - (3x + 4)$ solve for x.

3. Solve for y if $y - \{3 - [2y + 3(y - 1)] + 5\} = 2y$.

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

WORCESTER COUNTY MATHEMATICS LEAGUE

Freshman Meet 1 – November 2021

Round 3: Logic Problems

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

NO CALCULATOR ALLOWED

1. If a person wanted to engrave a word onto a piece of metal it costs 5 cents for each of the first three letters and each letter following the first three costs an additional cent more than the preceding letter. What would it cost to engrave the word SWORDFISH ?

2. If x and y are positive integers solve for $x + y$: $15x + 7y = 101$.

3. If 2137^{711} is multiplied out, what will be the units digit in the final product?

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Freshman Meet 1 – November 2021

Round 4: Ratio, Proportion, and Variation

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

NO CALCULATOR ALLOWED

1. A basketball team scores 45 points in the first 24 minutes of a game. Assuming that the team continues to score points at the same rate, how many points will they score in a 40-minute game?

2. The ratio to freshman to sophomores in attendance at yesterday's soccer match was 2:3. The ratio of sophomores to juniors was 12:5 and the ratio of juniors to seniors was 15:8. Find the ratio of seniors to freshmen in attendance. Write your answer as a whole number ratio in lowest terms using the colon in the answer space.

3. The volume V (in cubic meters, m^3) that a gas occupies varies directly as its temperature T (in degrees Kelvin, $°K$) and inversely as its pressure P (in kilograms per square meter, kg / m^2). Currently a certain gas has a volume of 20 m^3 at a pressure of 30 kg / m^2 and a temperature of $300°K$. If the temperature is increased by $20°K$ and the pressure is decreased by 10 kg / m^2, find the new volume of the gas (in cubic meters).

ANSWERS

(1 pt) 1. _____

(2 pts) 2. _____

(3 pts) 3. _____

Freshman Meet 1 – November 2021 - Team Round

All answers must be in simplest exact form in the answer section. (2 points each)

NO CALCULATOR ALLOWED

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

2. Solve $\dfrac{x}{23} + x = \dfrac{x}{87} + 2065$

3. Given the numbers $21, 33, 63, 65,$ and 286, which of these numbers is (are) not divisible into the product of the first twenty-five prime numbers?

4. The digits 1, 2, 3, 4, and 5 are each used once to compose a five digit number abcde, such that the three digit number abc is divisible by 4, bcd is divisible by 5, and cde is divisible by 3. Find the value of digit a.

5. Ms. Zoom, in her 1958 Chevy race car averages 60 mph, 40 mph, and 30 mph on successive runs over a 120 mile course. If she completes the entire 120 miles each time, find her average speed for the three times.

6. According to medical statistics, the average birth weight of a baby in the U. S. is 7.5 lbs. After birth most babies lose an average of one ounce a day for the first five days and then gain an avarage of one ounce a day for the next 13 weeks. If a baby weighs 7.5 lbs at birth, after how many days will the baby weigh 12 pounds? 1 pound = 16 ounces.

7. You have 6 coins in your pocket: 2 dimes, 3 quarters, and 1 nickel. What is the probability that you will pick a quarter both times if you pick one coin, return it, and pick again? Assume that each coin is equally likely to be picked each time.

8. All the even numbers from 2 through 98 inclusive, except those ending in 0, are multiplied together. What is the units digit of the product?

TEAM ROUND ANSWER SHEET

1._____

2._____

3._____

4._____

5._____

6._____

7._____

8._____

Answers

Round 1
1. 52
2. 2/n
3. 8.5 or equivalent

Round 2

1. 2
2. -37/3
3. 11/4

Round 3

1. 66 cents (units not needed)
2. 11
3. 3

Round 4

1. 75
2. 1:3 or equivalent
3. 32

Team Round

1. 222
2. 2001
3. 63 and 286
4. 1
5. 40 mph (units not needed)
6. 82 Days
7. ¼
8. 6