FAIRFIELD COUNTY MATH LEAGUE (FCML) 2016-2017

Match 3 Round 1
Arithmetic: Scientific
Notation and Bases

1.) _____

2.) _____ $_5$ _____

3.) _____

1.) When $(((4 \times 10^4)^2)^2)^2$ is expressed in scientific notation $M \times 10^n$ where $1 \leq M < 10$, what is the exponent n?

2.) Simplify $(1234_9 - 2341_8) + 3421_7$.
Express your solution as a base 5 number

3.) b is a whole number base between 2 and 12 inclusive. For which values of b is the expression 111_b divisible by 7 ?

Match 3 Round 2
Algebra: Word Problems

1.) _____

2.) _____

3.) _____

3

1.) The senior class sold tickets for the school play. Tickets were $8 for students were $12 for adults.   400 people attended the play and the senior class made $3800.   How many students came to the play?

2.) Older sister Judy and little brother Johnny are having a race to a pole that is 25 meters from Judy's starting point, and then back to Judy's starting point. Judy runs at 12 m/s, but since Johnny only runs at 10 m/s, she gives him a 5 meter headstart before they start running. Judy runs toward the pole and meets Johnny coming back from the pole. How far from the pole are they when this happens?

3) If you add 40 ml of a solution of 80% acid to x ml of solution that has y %   acid, the resulting solution has a concentration 36% acid. If you had added 40 ml of solution of 20% acid to the solution of x ml with y% acid , the concentration would have been 24% acid.   Find x and y. Do not write an additional % sign when giving your answer for y.

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1.) _____

2.) _____

3.) _____

1.) The measure of one interior angle of a regular polygon is 172 degrees. How many sides does the polygon have?

2.) The number of diagonals of a convex hexagon is 9, and 9 is a perfect square. Find one other convex N-gon with N<30 such that the number of diagonals is a perfect square.

3.) M angles of an N-gon measure 120 degrees and the rest measure 144 degrees. If M and N are both greater than 0 and M<N, find the value of M+N.

Match 3 Round 4
Algebra 2: Functions and
Inverses

1.) $f^{-1}(x)=$ _____

Note: The inverse of a function
is not necessarily itself a function.

2). _____

3.) _____ _____

1.) $f(x)=\dfrac{-2x}{3x+2}$. Find $f^{-1}(x)$. Express your answer as $f^{-1}(x)=....$

2.) If $g(x)=\dfrac{5x^2+2}{x^2-4}$, give the range of g(x). Either use interval notation or use g(x) in your inequality.

3.) p(x)=x² +5x + 7. q(x)=3x+11. If h(x) =p(q(x)), give the domain of $h^{-1}(x)$. Either use interval notation or use the variable x in your inequality.

Match 3 Round 5
Advanced Math:
Exponents and Logarithms

1.) _____

2.) _____

3.) _____

1.) If $\log_{10} 3 = 0.477$ and $\log_{10} 5 = 0.699$ and $\log_{10} 7 = 0.845$,

find $\log_{10}(\dfrac{1500}{49})$

2.) Simplify as much as possible:

$(\log_7 3)(\log_{27} 4)(\log_5 49)(\log_4 25)$

3.)_ If $z = \log_3(y)$, solve for all possible values of y:

$\dfrac{25^{2z^2+2}}{(0.2)^{z-1}} = 125^{4z+2}$.

Express any radical answers in simplest radical form.

1.) _____

2.) ___|‾‾‾|___|‾‾‾___

3.) _____

1.) Find all values of k such that

$$\begin{vmatrix} k & 3 \\ 2 & 1 \end{vmatrix} \begin{vmatrix} k & -1 \\ 3 & -k \end{vmatrix} = \begin{vmatrix} 25 & 2k+24 \\ k-1 & 2 \end{vmatrix}$$

2.) If $A=\begin{vmatrix} 5 & -4 \\ -6 & 5 \end{vmatrix}$ and $ABA = \begin{vmatrix} -6 & 7 \\ 8 & -9 \end{vmatrix}$, find B

3.) Give the sum of the nine entries of the inverse of

$$\begin{vmatrix} 0 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$$

Note: The inverse of a function or relation is not necessarily a function.

1.) _____ 12   4.) _____

2.) _____ minutes   5.) _____

3.) _____   6.) _____

1.)_In base 12, A=10 and B=11. Simplify the following and express your answer in base 12. $\dfrac{(3100x10^8)(2000x10^{-12})}{(2400x10^6)(0.2x10^{-7})}$

2.) Moe deLaune can mow the lawn in 40 minutes. If his friend Larry helps him, it takes 5 minutes less time than if his friend Curly helps him.   The time it takes Larry to mow the lawn by himself is 16 minutes less than the time it takes Curly to mow than the lawn by herself. How long would it take Larry to mow the lawn by himself?

3.) For how many values of N does a regular N-gon have an interior angle that is a whole number of degrees?

4.) Find all values of x such that the matrix $\begin{bmatrix} 2^{2x} & 4^{x+2} \\ 8^{-\frac{1}{3}x+2} & 0.5^{3x-2} \end{bmatrix}$ does not have an inverse.

5.) Solve for x: $\log_9(4x^2+17)-\log_3(8x-5)=-1$

6.) $f(2x)=2\sqrt{x-1}+4$ and $g(\frac{x}{3})=\frac{1}{4}(x+2)$. Find all points (x,y) where $f^{-1}(x)$ and $g^{-1}(x)$ intersect.