FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015

| Match 2 Round 1 |
| Arithmetic: Factors |
| And Multiples |

1) _28_

2.) _39 37_

3.) _300, 900, 2700_

1) Find the sum of all of the prime factors of 2310.

2) If N can take on any integer value from 1 through 10, find the least common multiple of all numbers of the form $2^N - 1$ which are divisible by neither 3 nor 7.

3) The greatest common factor of N and 840 is 60. The least common multiple of N and 135 is 2700. Find all possible values of N.

Match 2 Round 2
Algebra: Polynomials
And Factoring

1.) $\underline{\ 12a^2b + 16b^3 \ \underline{OR}\ 4b(3a^2 + 4b^2)\ }$

2.) $\underline{\ (8x + 3y)(3x - 8y)\ }$

3.) $\underline{\ mk^2n^3(k+2n)(m+1)(m-1)\ }$

1) Simplify as much as possible: $(a+2b)^3 - (a-2b)^3$

2) Factor into two binomials: $24x^2 - 55xy - 24y^2$

3) Factor as much as possible: $m^3k^3n^3 - mk^3n^3 + 2m^3k^2n^4 - 2mk^2n^4$

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Match 2 Round 3
Geometry: Pyth. Thm,
Area, Perimeter

1) _____60_____ cm

2.) _____12_____

3.) ___$6x+48$, $15x+120$___

1.)The lengths of the two legs of a right triangle differ by 14 cm. The area of the triangle is 120 cm^2. Find the perimeter of the triangle.

2.) In right triangle ABC, the right angle is at C. $AB = x\sqrt{13}$, BC=4x-2, and AC=5x-6. Find the area of the triangle.

3) The two bases of an isosceles trapezoid have lengths x and (x+16). The sides of the trapezoid all have whole number lengths. Find all possible expressions for the area of the trapezoid in terms of x. *(The height of the trapezoid is a whole number.)*

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Match 2 Round 4
Algebra 2: Inequalities
And Absolute value

1) $X < 0$ or $X > \frac{2}{3}$

Remember to use AND or OR or
the shorthand notation for a conjunction
if you answer with $<, >, \leq$ or $\geq$.
You may use union and intersection
symbols if you answer using interval
notation.

2.) $2.5, \cap 1.5$

3.) $\frac{-1}{3} < X < \frac{10}{3}$

1) Find all values of x such that the expression $\dfrac{4x}{3x-2}$ is positive.

2) Find all values of x such that $|x-2| = 3|x-1| - 4$.

3) Find all values of x such that $5 + |7 - 3x| < 16 - |3x - 2|$
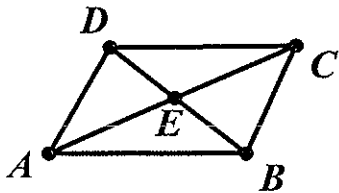
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1.) _____ 10 _____

2.) _____ $2\sqrt{61} + 2\sqrt{151}$ _____ cm

3.) _____ $\sqrt{55}$ _____

1.) In $\triangle XYZ$, $\sin\angle YXZ = \dfrac{1}{7\frac{1}{2}}$ and $\sin\angle XYZ = \dfrac{1}{3\frac{1}{2}}$. If $YZ=k$ and $XZ=k^2-2$, find the numerical value of YZ+XZ.

2.)The diagonals of parallelogram ABCD have length 18 cm and 10 cm and meet at E. Angle CEB measures 60 degrees. Find the perimeter of the parallelogram.
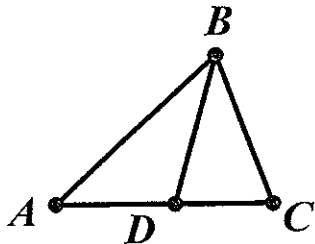
3.) $\overline{BD}$ is a median of $\triangle ABC$. If BD=6, BC=7, and AD=4, find the length of $\overline{AB}$.

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1.) $y = 4x - \frac{21}{20}$

2.) $y = \frac{9}{4}x + \frac{31}{4}$

3) $y = -\frac{1}{3}x + 4$

and $y = -3x + 12$

1.) $x = \frac{1}{6}t + \frac{1}{5}$ and $y = \frac{2}{3}t - \frac{1}{4}$ represent the parametric equations of a line. Find the equation of the line in the form y=mx+b.

2.) A circle of radius 5 is centered at (2,3). A radius of the circle lies on the line 4x+3y=17 and intersects the circle at a point in the second quadrant. Find the equation of the tangent line to the circle through this point. Express your answer in the form y=mx+b.

3) The length of the segment connecting the points (1,x) and (x,5) is $\sqrt{10}$. Find the two possible equations for the perpendicular bisector of the segment. Express your answers in the form y=mx+b.

1.) $12(2x+5)(x+7)$

4.) $8-2\sqrt{3}$

2.) $z < -2$ or $2 < z \le 3$

5.) 20

3.) $2, -4$

6.) $y = \frac{5}{3}x - \frac{3+\sqrt{2}}{3}$

1.) A quadratic polynomial has form $Dx^2 + Ex + F$. D is the greatest common factor of 96 and 216. E is the least common multiple of 57 and 76. F is the smallest natural number that is evenly divisible by 2,3,4,5,6, and 7.
Give the complete factoring of $Dx^2 + Ex + F$ with natural number coefficients.

2.) Find all real values of z such that $-z^3 + 3z^2 + 4z - 9 \ge 3$

3.) Find all integers m such that $|m+2| + |m-1| = |m^2-9|$
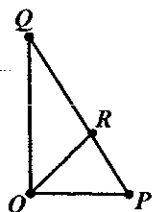
4.) In right triangle OPQ, the right angle is at O, O has coordinates (2,2), P has coordinates (6,2), $\angle OPQ = 60°$, and $\overline{OR}$ is the angle bisector of $\angle POQ$. If R lies on $\overline{PQ}$, find the x-coordinate of point R.
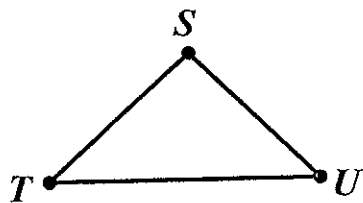
5.) In $\triangle STU$, SU=6, ST=x, TU=x+2.
The cosine of $\angle SUT$ is six times the cosine of $\angle TSU$. Find the perimeter of $\triangle STU$.

6.) Line m has equation $x+y = 10\sqrt{2}$ and line n has equation $x-y = 2\sqrt{2}$. The two lines intersect at point A. A third line intersects line m at point B and intersects line n at point C. The x-coordinates of B and C are each greater than the x-coordinate of A, the area of $\triangle ABC$ is 32, and the length of $\overline{AC}$ is four times the length of $\overline{AB}$. Give the equation of $\overleftrightarrow{BC}$ in slope-intercept form.