FAIRFIELD COUNTY MATH LEAGUE 2020-2021

Match 2 Round 1 Arithmetic: Factors And Multiples

1.) ___________________

2.)_________________

3.)_________________

1. How many natural numbers $N \le \{100, 150, 200\}$ have exactly 3 distinct factors? (Note: Factors must be positive.)

2.) How many natural numbers $N \le \{100,80,50\}$ are multiples of exactly two of the following numbers: 2, 3, 5?

3.) A and B are positive integers. The greatest common factor of A and B is 4. The least common multiple of A and B is {15620,14740,16060}. What is the smallest possible value of A+B?

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Match 2 Round 2 Algebra: Polynomials And Factoring

1.)_____________

2.) ______________

3.) _______________________

1.)_ Suppose that, for any value of x,

$$(4x+5)(\{3,2,4\}x-20)-(x-4)(Ax+B)=\{-42x,-63x,-21x\}$$

Find AB.

2.) For what positive value of k does $x^3-7x^2+(k^2-\{22,21,20\}k)x-\{26,24,22\}=0$ have solution $x=2$?

3.) For how many distinct integers B does $16x^2+Bx+81$ factor into two binomials with integer coefficients?

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Match 2 Round 3 Geometry: Area and Perimeter

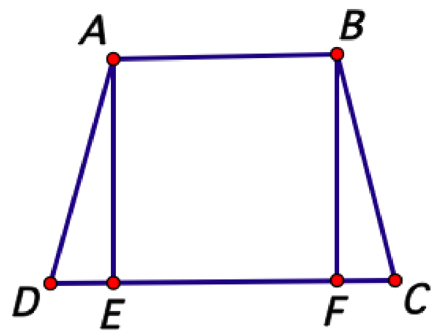
1.___________

2. _________

3.______________

1. The length of a rectangular swimming pool is twice its width. The pool is surrounded by a sidewalk that is 3 feet wide. The area enclosed by the sidewalk and the pool is {416,176, 308} square feet. What is the perimeter of the pool? (Do not include a unit in your answer.)

2. The trapezoid ABCD shown in the diagram is isosceles with bases AB and DC. Segments AE and BF are drawn from A and B perpendicular to segment DC. AB=5, DC={15,21,17}, and the area of rectangle ABFE is {60,75,40}. Find the perimeter of trapezoid ABCD.



3.) ΔABC is inscribed in a circle with center O. Segment BC is a diameter of the circle. There is a number x such that AB = {x+5, x+4, x+6}, AC = {3x-5,3x+2,3x-12} and BO = x+3. The area of the circle is Qπ. Find Q.

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Match 2 Round 4 Algebra 2: Inequalities And Absolute value

1) {69, 77, 83}__________

2.) ___{2,4,6}________________

3.) _{_6, 4, 2}___________________

1.) How many integers satisfy the inequality below?

$$x^2 \leq \{1200, 1500, 1700\}$$

2.) If you solve $\frac{3x-5}{x+2} > \{K, \frac{K}{2}, \frac{K}{3}\}$ for x, the solution is "x>9 or x<-2". What is K?

3.) There are two values of K for which |x-{3,2,1}|+|x+K| = 5 has infinitely many solutions. Find the absolute value of the sum of these two values.

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Match 2 Round 5 Trigonometry: Laws of Sine and Cosine

Note: Drawings not necessarily drawn to scale. _

1.) ________________

2.) ________________________

3.)________________

1.) ΔXYZ has XY=8, YZ=8, XZ={13,12,14}. $\cos \cos Y = -\frac{a}{b}$, where a and b are relatively prime positive integers. Find $a + b$.

2.) In ΔJKL, angle KJL is 30 degrees, angle JKL is 105 degrees, and KL = $\{12,14,16\}\sqrt{6}$. JK = $A\sqrt{B}$ in simplest radical form. Find AB.

3.) The median from P to segment QR of ΔPQR meets segment QR at S. PQ = 6, RS=6, PS={8,9,10}. The length of segment PR is $\sqrt{A}$. Find A.

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Match 2 Round 6 Equations of Lines

‘

1.) ________________

2.) ________________

3.) ______________

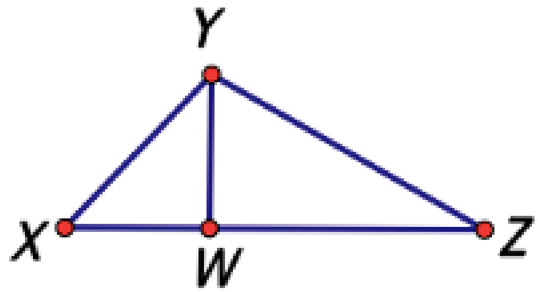
1.) A line is given in parametric form as $x = 2t + \frac{1}{3}$, y={4,10,16}t-$\frac{7}{3}$. If the equation of the line is expressed as y=mx+b, what is the value of $m^2 + b^2$?

2.) A line of slope 0.5 intersects the parabola y=2x^2 +5x +3 at (-2,1) and (A,B). Find (8,16,24)(A+B).

3.)_ A circle of radius 1 is centered at (0,0). The points of intersection of the circle with the perpendicular bisector of the segment whose endpoints are (2,3) and (4,-1) are (A,B) and (C,D). What is the absolute value of (30,20,10)(A+B+C+D) ?

FAIRFIELD COUNTY MATH LEAGUE 2020-21 Match 2 Team Round

1.)_ The diagram shows ΔXYZ, in which 2*(XY)=XZ. The altitude from Y to segment XZ meets segment XZ at W and has length 12. The area of ΔXYZ is 180. The perimeter of ΔXYZ is $M+3\sqrt{N}$, where *M* and *N* are positive integers and *N* is not divisible by the square of any prime. Find M + N.



2.) Find the sum of the squares of all integer values of n such that $n^2 - 28n - 29$ is a prime number. (Note: Prime numbers must be positive.)

3.) $3x^3 + Cx^2 + Dx - 225$ factored completely over the integers is $3(x+A)(x+B)(x-B)$ for some values of A and B. Find the sum of all possible values of C.

4.)_ The solution to $5x^3 - 15x^2 - 20x + 72 < K$ is "x<-2 or 2<x<3" Find K.

5.) In triangle ABC, the ratio $\sin A : \sin B : \sin C$ is 5:6:7. The perimeter of the triangle is 27. The length of the longest side of the triangle is $\frac{a}{b}$, where a and b are relatively prime positive integers. Find $a + b$.

6.) For ΔPQR, P is at the origin, Q is at the intersection of $y = \frac{-\sqrt{3}}{3}x$ and $y = \frac{5\sqrt{3}}{3}x - 36$, and R is at the intersection of $y = \frac{\sqrt{3}}{3}x$ and $y = \frac{5\sqrt{3}}{3}x - 36$. The sine of angle PRQ is $\frac{\sqrt{a}}{b}$, where a and b are positive integers and a is not divisible by the square of any prime. Find $a + b$.