FAIRFIELD COUNTY MATH LEAGUE 2026–2027
Match 2
Individual Section

Please write your answers on the answer sheet provided.

Round 1: Factors and Multiples

1-1 Find the average (the arithmetic mean) of all multiples of 5 between 5 and 555, inclusive.

1-2 Determine the largest possible value of $m + n$ such that $2^m \cdot 3^n$ is a factor of $100!$

1-3 A set A contains the numbers 1, 2, and 3, and has the following property: if n is an element in A, the smallest whole number that is both divisible by n and also has n factors including 1 and itself is also in A. Find the sum of all perfect square elements of A.

FAIRFIELD COUNTY MATH LEAGUE 2026–2027
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Round 2: Polynomials and Factoring

2-1 Find the sum of all (not necessarily distinct) zeros for the polynomial function $y = (2x - 5)^2(3x^3 - 12x^2 - 12x + 48)$.

2-2 The polynomial expression $64x^a y^b - 1$ is factorable for integers a and b with $0 < b < a < 7$. Let all ordered pairs of a and b that satisfy the information above be in the form (a, b). For all such ordered pairs, if A is the sum of all non-distinct a-values and B is the sum of all non-distinct b-values, Find $A \div B$.

2-3 The polynomial $f(x) = x^3 - 14x^2 + ax + b$, where a and b are integer constants, has only positive integer zeros, each with a multiplicity of 1. Find the positive difference between the lowest and highest possible values of b.

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Match 2
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Round 3: Area and Perimeter

3-1 Charlie is out walking his dog on a leash and he stops at his neighbor Lucy's house. While talking in the yard, Charlie ties the end of the leash to the corner of Lucy's shed, which is a 20 ft by 10 ft rectangle. If the leash is 12 feet long and there are no other obstacles, then the area of the space in which Charlie's dog can run in square feet can be expressed in the form $a\pi$. Find a.

3-2 The diagonal of a rectangle is 8 units longer than one of the sides. If the perimeter of the rectangle is 82, find the area.

3-3 The circumference of a circle with area 100π is unraveled and used to make two squares, one of which has integer side lengths, whose perimeters are as close as possible. The square with non-integer side lengths has area $a\pi^2 + b\pi + c$, where $a, b,$ and c are integers. Find $a + b + c$.

FAIRFIELD COUNTY MATH LEAGUE 2026–2027
Match 2
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Round 4: Absolute Value & Inequalities

4-1 The solutions to $|4x - a| = 8$ are plotted on a number line. If a is a real number, what is the distance between the two points?

4-2 What is the sum of all integer solutions to $|x - 2| \geq 4|x - 1| - 7$?

4-3 The set $(a, b) \cup (c, d)$ is the set of all values k such that the equation $\Big||x| - 12\Big| - 6\Big| = k^2 - 5k$ has 8 solutions for x. Find $a + b + c + d$.

FAIRFIELD COUNTY MATH LEAGUE 2026–2027
Match 2
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Round 5: Law of Sines and Cosines

5-1 In triangle ABC, $AB = 8$ and $BC = 15$. The area of the triangle is $30\sqrt{3}$, and $\angle B$ is acute. Find $(AC)^2$.

5-2 In triangle ABC, $\cos(A) = \frac{3}{4}$, $AB = 10$, and $BC = 8$. Find the sum of all possible perimeters of ABC.

5-3 An acute triangle has side lengths that are three consecutive integers. If the sine of the smallest angle is $\frac{\sqrt{7}}{4}$, find the perimeter of the triangle.

FAIRFIELD COUNTY MATH LEAGUE 2026–2027
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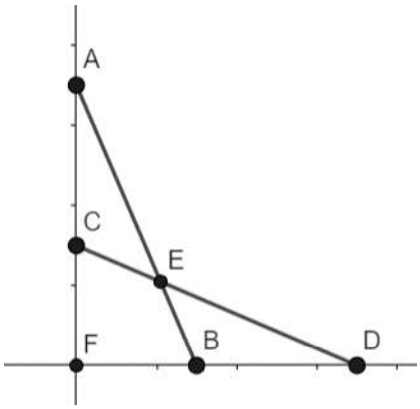
Please write your answers on the answer sheet provided.

Round 6: Equations of Lines

6-1 The points $(4, a)$, $(a, 7)$, and $(8, 13)$ are collinear. Find the sum of all possible values of a.

6-2 The line $3x + 4y = k$ is tangent to Circle O, which has a center of $(2,3)$ and a radius of 1. What is the minimum value of k?

6-3 See the diagram (not drawn to scale). Point F is the origin, points A and C lie on the y-axis, and points B and D lie on the x-axis. Line l contains points A and B, and line m contains the points C and D. If the areas of triangles AEC and DEB and quadrilateral $BFCE$ are all equal and point E has coordinates $(10,20)$, find the y-coordinate of point A.



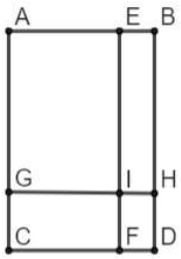
FAIRFIELD COUNTY MATH LEAGUE 2026-2027
Match 2
Team Round

Please write your answers on the answer sheet provided.

TR-1 If N is a positive integer that has a remainder of 5 when divided by 9 and a remainder of 3 when divided by 7, what is the largest possible value of N less than 1000?

TR-2 The polynomial $f(x) = x^4 - 2026x^3 + ax^2 + bx + 2025$, where a and b are integer constants, has a graph that bounces off the x −axis at $x = 3$. Find $f(-1)$.

TR-3 Consider rectangle $ABDC$ with area 300 and two line segments that subdivide it into four smaller rectangles, as shown in the diagram (not drawn to scale). If the area of $IHDF$ is an integer and the areas of $EBHI$ and $GIFC$ are equal (and non-zero), find the sum of all possible integer values of $\frac{area\ AEIG}{area\ IHDF}$.



TR-4 The graphs of the functions $f(x) = |x|$ and $g(x) = -|x - 1| + k$, where $k > 1$, enclose a quadrilateral with area 112. Find the value of k.

TR-5 In acute triangle ABC, $\frac{BC}{AC} = \frac{3}{2}$, $\frac{\cos(A)}{\cos(B)} = \frac{1}{3}$, and $\sin^2(B) = \frac{p}{q}$ where p and q are positive integers with no common factors greater than 1. Find $p + q$.

TR-6 Lines m and n are both tangent to the circle $(x - 5)^2 + (y - 3)^2 = 4$ and both lines have a y-intercept of $(0,2)$. The line that contains both points of tangency has the equation $Ax + By = C$ where A, B, and C are integers with no common factors greater than 1 and $A > 0$. Find $A + B + C$.