

FAIRFIELD COUNTY MATH LEAGUE 2026–2027

Match 1

Individual Section

Please write your answers on the answer sheet provided.

Round 1: Percentages

- 1-1 On Monday, 10% of the students at FCML High School were absent.
- On Tuesday, 10% of those absent on Monday were present, and the rest were still absent. Also, 10% of those who were present on Monday were absent, and the rest were still present.
 - On Wednesday, 25% of those absent on Tuesday were present, and the rest were still absent. Also, 25% of those who were present on Tuesday were absent, and the rest were still present.
- What percentage of the school's students were present on Wednesday?
- 1-2 If $\frac{31}{111}$ is expressed as a percentage, what digit occurs in the 100th place after the decimal point?
- 1-3 Consider the ordered pair (x, y) which has the following properties: increasing the quantity $y + 3$ by $x\%$ is the same as doubling y , and increasing the quantity $x + 1$ by $y\%$ is the same as quadrupling x . The quantity $y - 3x = \frac{a}{b}$, where a and b are positive whole numbers with no common factors greater than 1. Find $a + b$.

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Round 2: Solving Equations

2-1 The number $a + 5$ has the same distance between the distinct numbers $4a - 19$ and $2a - 7$ for real number a . Find the value of a .

2-2 There exists a two-digit number with its ten's digit triple that of the unit's digit. When the digits are reversed and the new number is added to twice the original number, the result is 150. Find the original two-digit number.

2-3 Solve for x : $(2x^2 - 5)(x^2 + 3x + 1) = x(3 - x(5 - 2x(x + 1))) + (2x^2 - 1)(2x + 1) - 308$

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Round 3: Triangles and Quadrilaterals

- 3-1 The measure of the vertex angle of an isosceles triangle is double the measure of one of the base angles, and one side of the triangle has length 32 units. If a median is drawn from the vertex angle to the base, then the sum of the possible lengths of this median can be expressed $a + b\sqrt{c}$ where a , b , and c are positive integers and c has no perfect square factors greater than 1. Find $a + b + c$.
- 3-2 $ABCD$ is a parallelogram with point E at the midpoint of $\overline{BC}$ and F at the midpoint of $\overline{AD}$. $BEDF$ forms a rhombus with $BD = 16$ and $EF = 12$. The length of the altitude (height) from point B to $\overline{AD}$ is $\frac{a}{b}$ where a and b are whole numbers with no common factors greater than 1. Find $a + b$.
- 3-3 Equilateral triangle ABC has side length 15. Points P and Q lie on $\overline{AB}$ and $\overline{AC}$ respectively such that $\overline{PQ} \parallel \overline{BC}$ and $PQ = 12$. Equilateral triangle PQR has sides $\overline{PR}$ which intersects $\overline{BC}$ at M and $\overline{QR}$ which intersects $\overline{BC}$ at N . The area of trapezoid $PQNM$ is $k\%$ of the area of triangle ABC . What is the value of k ?

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Round 4: Systems of Equations

4-1 A field is filled with healthy sheep and geese. There are 127 animals in the field with a total of 350 legs. How many geese are in the field?

4-2 What is the distance between the intersections of $f(x) = x^2$ and $g(x) = 2x + 4$?

4-3 If x and y solve the system $\begin{cases} \frac{1}{x} + \frac{1}{y} = 9 \\ (x + y)^3 = x^3 + y^3 + 15 \end{cases}$, then $x^2 + y^2 = \frac{a-b\sqrt{c}}{d}$ where a , b , and d have no common factors greater than 1 and c has no perfect square factors greater than 1. Find $a + b + c + d$.

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Round 5: Right Triangles

- 5-1 In right triangle DEF with right angle E , the altitude drawn from E to hypotenuse $\overline{DF}$ divides $\overline{DF}$ into two segments of length 9 and 16. Find the perimeter of triangle DEF .
- 5-2 A right triangle has integer side lengths that form an arithmetic sequence (the three sides increase by a constant common difference). If the perimeter is less than 100, find the largest possible area of the triangle.
- 5-3 There exists a right triangle with a leg of length 20 whose perimeter and area are both equal to k . Find the value of k .

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FAIRFIELD COUNTY MATH LEAGUE 2026–2027

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Round 6: Coordinate Geometry

6-1 Line $ax + 3y = 7$ is perpendicular to line $x - by = 5$. Find $\frac{a^2}{b^2}$.

6-2 Given $A = (0,12)$ and $C = (25,12)$, find all points B on the x -axis such that $m\angle ABC = 90^\circ$. What is the product of the x -coordinates of such points?

6-3 A point P is reflected about the line $y = x$, shifted left 34 units and down 14 units, rotated 90 degrees counterclockwise about the origin, and then reflected once more about the line $y = -x$ to make the point P' . If the coordinates of P and P' are the same, find the distance of point P from the origin.

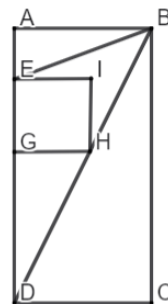
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Match 1

Team Round

Please write your answers on the answer sheet provided.

1. I'm thinking of two whole numbers a and b . The value of b is $k\%$ of the value of a . The quantity $10a + b$ is 210% greater than the quantity $10b + a$. What is the value of k ?
2. There is a number p such that the equation $(x - 4)^3 = (x + 2)(x - 5)(x - p)$ is linear in x . The solution to this linear equation is $x = \frac{a}{b}$, where a and b are whole numbers with no common factors greater than 1. Find $a + b + p$.
3. Consider rectangle $FCML$ with point P on FC and point Q on FL . Triangle PQM occupies 20% of the area of $FCML$. If $FQ:QL = 2:9$, then $FP:PC = a:b$ where a and b are whole numbers with no common factors greater than 1. Find $a + b$.
4. Let x and y be complex numbers such that the quantities $x + y$ and $x^3 + y^3$ are positive integers and $x^2 + y^2 = 100$. If the largest possible value of $x + y$ is a and $x^3 + y^3 = b$ when $x + y = a$, find $a + b$.
5. See the diagram (not drawn to scale). $ABCD$ is a rectangle, $EIHG$ is a square, and H lies on $\overline{BD}$. If $AE = 3$, $\tan(\angle ABE) = \frac{3}{8}$, and the area of $EIHG$ is 36, then $\tan(\angle CBD) = \frac{a}{b}$ where a and b are whole numbers with no common factors greater than 1. Find $a + b$.



6. Consider circles C_1 , C_2 , and C_3 whose centers are all in Quadrant I and are increasing in distance away from the origin with the center of C_1 being closest and the center of C_3 being furthest away. C_1 is centered at $(1,1)$ and is tangent to the x - and y -axes. Circle C_2 is tangent to both positive axes and C_1 . Circle C_3 is tangent to both positive axes and C_2 . The circumference of C_3 is $(a + b\sqrt{c})\pi$ where a, b , and c are positive integers and c has no perfect square factors greater than 1. Find $a + b + c$.