

18 19
FAIRFIELD COUNTY MATH LEAGUE 2017-2018

Match 6 Round 1
 Geometry: Lines
 and Angles

1.) _____ degrees

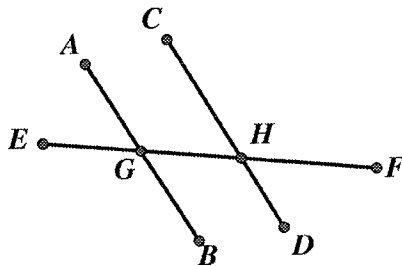
2.) _____ degrees

3.) _____ degrees

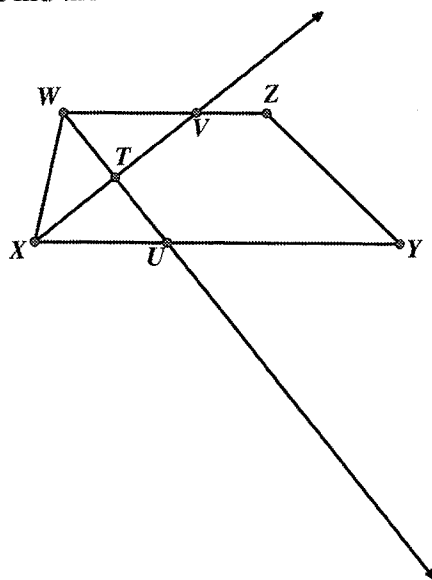
Note: Figures not necessarily
 Drawn to scale

1.)_ A triangle is formed by connecting points A(-2,1), B(1,3), and C(5,-3). What is the sum of the measures of $\angle BAC$ and $\angle BCA$?

2.)_ \overline{AB} is parallel to \overline{CD} . The lines are cut by transversal \overline{EF} , which intersects line \overline{AB} at G and \overline{CD} at H. If $m(\angle HGB) = (31 + 3x)^\circ$ $m(\angle CHF) = (6x + 29)^\circ$, find $m(\angle AGE) + m(\angle FHD)$.



3.) In trapezoid WXYZ, \overline{WZ} is parallel to \overline{XY} , \overline{XV} bisects $\angle WXY$ and \overline{WU} bisects $\angle XWZ$. The bisectors meet at T. $\angle WXT = (6x - 5)^\circ$ and $\angle XWT = (x^2 - 17)^\circ$. Find the measure of $\angle ZWX$



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Match 6 Round 2
Algebra: Literal
Equations

1.) $z =$ _____

2.) $R_3 =$ _____

3.) $y =$ _____

1.)_ Solve for z in terms of x and y :

$$3x + 5y - z = 15 + 2z - 6x - 7y$$

2.)_ If three resistors with resistance R_1, R_2 , and R_3 are arranged in an electric circuit in parallel, the formula for the equivalent resistance R is found by the formula $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$. Solve this equation for R_3 in terms of R, R_1 , and R_2 . Express your answer as a single fraction.

3.)_ If $x \neq 2$, solve for y in terms of x :

$$x^4 - x^3y - 2yx + 8y + x^2y = 2yx - x^2y + 16$$

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Match 6 Round 3 Geometry: Solids and Volumes

1.) _____ in³ _____

2.) _____ cm³ _____

3.) k = _____

1. _ The lateral area of a cylinder (the surface area not including the bases) with height 8 inches is 48 in^2 . What is the volume of the cylinder?

2. A cube is inscribed in a sphere of radius 6 cm. What volume is inside the sphere but outside the cube?

3. A cone is formed by rotating the line $y = \frac{2}{5}x$ from $x=0$ to $x=10$ around the y -axis. The plane $y=k$ cuts the cone so that half of its volume is above the plane $y=k$. Find the value of k .

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Match 6 Round 4
Radical
Expressions and
Equations

1.) _____

2.) _____

3.) _____

1.)_ Express as a single reduced fraction in simplest radical form:

$$3\sqrt{45} + \frac{4}{\sqrt{5}} - \sqrt{80}$$

2) Express as a single radical: $\sqrt[3]{3}\sqrt{5}$

3._Solve for all real values of x:

$$\sqrt{2x+1} - \sqrt{x-3} = \sqrt{5x-16}$$

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Match 6 Round 5
Polynomials and
Advanced
Factoring

1.) _____

2.) _____

3.) _____

1.) What is the remainder when $x^5 - 4x^3 + x^2 - x + 3$ is divided by $x - 3$?

2.) $x^3 + ax^2 + bx + 7$ factors into three binomials with integer coefficients. Find all possible values of ab .

3) A quartic polynomial $x^4 + ax^3 + bx^2 + cx + d$ where a , b , c , and d are integers has $1+i$ and $3-2i$ as two of its zeros. Find $a+b+c+d$.

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Match 6 Round 6
Counting and
Probability

1.) _____

2.) _____

3.) _____

1.)_ How many 4 digit numbers N such that $1000 \leq N \leq 9999$ have no repeating digits? (e.g., 4576 has no repeating digits, but 4546 has a repeating 4).

2.)_ The names of five boys and five girls are placed into a hat and three names are drawn out without replacement. What is the probability that the names of exactly two girls were drawn?

3.) ${}_N P_R$ is the number of permutations of N objects taken R at a time. ${}_N C_R$ is the number of combinations of N objects taken R at a time. If $1 \leq N \leq 10$, find all ordered pairs (N, R) such that ${}_N P_R = {}_N C_{R+1}$

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Match 6
Team
Round

1.) $_E =$ _____ 4.) _____

2.) _____ 5.) _____

3.) _____ 6.) $M =$ _____ $N =$ _____

1.)_ Angles A, B, C, D, and E are the five interior angles of a convex pentagon. The measure of $\angle B$ is equal to ten times the measure of the supplement of $\angle A$. Two times the measure of $\angle B$ is eighty degrees more than the measure of $\angle C$. The measure of $\angle D$ is thirty degrees more than the supplement of the measure of $\angle C$. Find the measure of $\angle E$ in terms of measure of $\angle A$. Use E for the measure of $\angle E$ and A for the measure of $\angle A$.

2.) Find all values of x such that $\sqrt{x-2} - 6\sqrt[3]{x-2} + 11\sqrt[6]{x-2} = 6$

3). A tetrahedron has surface area $24A\sqrt{3}$. Give the volume of the tetrahedron in terms of A in simplest radical form.

4.) Factor into three binomials: $a^4 - 6a^3 + 13a^2 - 30a + 40$

5) Naphesa Collier of the UConn women's basketball team makes $\frac{2}{3}$ of her shots.

If the shots are independent and she takes 5 shots in a game, what is the probability that she makes at least 3 of the 5 shots?

6) A semi-regular polyhedron is composed of M pentagons and N hexagons. An edge of the polyhedron is formed when one side of one of the polygons meets a side of another polygon. A vertex of the polyhedron is formed when one corner of a pentagon meets corners of two hexagons. The polyhedron has 90 edges and 60 vertices. Find M and N.