# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015

Match 6 Round 1
Geometry: Lines and Angles

1.) $m(\angle J) =$ 19 °, $m(\angle K) =$ 71 °

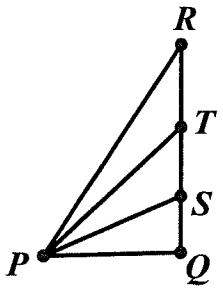
2.) 240

Note: Figures not necessarily Drawn to scale

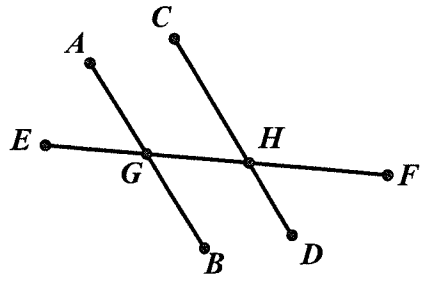
3.) 140

1.)_Angle J is complementary to angle K. Twice the degree measure of the supplement of angle J is 5 less than 3 times the degree measure of the supplement of angle K. Find the degree measures of angle J and angle K.

2.)_ In right triangle PQR, the right angle is at Q. $\overrightarrow{PT}$ and $\overrightarrow{PS}$ serve to trisect $\angle RPQ$. If the measure of $\angle RTP$ is 10 less than 7 times the measure of $\angle SPQ$, find the sum of the measures of $\angle TSP$ and $\angle RTP$ in degrees.




3.) $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{CD}$. The lines are cut by transversal $\overleftrightarrow{EF}$, which intersects line $\overleftrightarrow{AB}$ at G and $\overleftrightarrow{CD}$ at H. If $m\angle AGE = (5x-10)$ degrees and $m\angle CHF = (x^2+40)$ degrees, find all possible values of $m\angle CHF$ in degrees.



# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015

Match 6 Round 2
Algebra: Literal Equations

1.) ___y= $-\frac{3}{5}x+\frac{13}{5}$

2.) ___x= $\frac{-5\pm\sqrt{25-4f}}{2}$

3.) ___b= $a+4$

1.)_ If x=-5t+1 and y=3t+2 represent the parametric equations of a line, express y in terms of x. Give your answer in y=mx+b form.

2.)_ If no denominators are equal to zero and f<0 , solve for x in terms of f:

$$\frac{1}{x+3}=\frac{1}{f-6}+\frac{1}{x+2}$$

3.) If a≠2 and b≠-2, solve $(a-2)b^2-4a=a^2b-4b+2(a^2-8)$ for b in terms of a.

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015

Match 6 Round 3
Geometry:
Solids and
Volumes

1.) 36

2.) $13824 - 2304\pi$

3.) $\frac{4\sqrt{6}}{3}$

1) A cone of radius 2 cm and height 3 cm is used to scoop water into an empty cylinder of radius 6 cm and height 4 cm. How many full scoops of water from the cone will it take to fill up the cylinder?

2) A cubical box with sides 2 feet long is used to pack 27 spherical cannonballs that each have diameter 8 inches. How many cubic inches of the volume of the box will not be taken up by the cannonballs? Express your answer in terms of $\pi$.

3) The lateral area of a cone is its surface area without the area of the base. The line segment from (0,0) to (4,4) is rotated around the y-axis to create a cone. The plane y=k intersects the cone such that the lateral area of the part of the cone from y=0 to y=k is twice the lateral area of part of the cone from y=k to y=4. What is the value of k?

**FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015**

Match 6 Round 4
Radical Expressions and Equations

1.) $\frac{737\sqrt{3}}{36}$

2.) $2^6\sqrt{54}$

3.) 66

1) Simplify as much as possible: $4\sqrt{75}+\frac{8}{\sqrt{27}}-5\sqrt{\frac{1}{48}}$

2) Express the following as the product of an integer greater than 1 and the sixth root of an integer: $\sqrt[3]{4}\sqrt{6}$

3) Solve for all real values of x: $\sqrt[3]{x-2}-\sqrt[6]{x-2}=2$

**FAIRFIELD COUNTY**
**MATH LEAGUE**
**(FCML) 2013-2014**

Match 6 Round 5
Polynomials and
Advanced
Factoring

1.) $-2, 4, 5$

2.) $b = -11, c = 40$

3.) $0$

1.)Find all real zeros of $x^3 - 7x^2 + 2x + 40$.

2.)A cubic polynomial in x with integer coefficients and leading coefficient 1 has one of its complex zeros equal to 3+i, and the constant term of the polynomial is -50.
If the polynomial is expanded as $x^3 + bx^2 + cx - 50$, what are b and c?

3) Give the sum of the six complex zeros of $a^6 - 7a^3 - 8$.

# FAIRFIELD COUNTY MATH LEAGUE (FCML)

Match 6 Round 6
Counting and Probability

**2014-2015**

1.) 25

2.) $\frac{5}{9}$

3.) $\frac{31}{42}$

1) What is the smallest value of n such that n! is evenly divisible by one million?

2) A couple has two children. Assume that it is equally likely that a child will be a boy or a girl, and it is equally likely that a child will be born before noon and after noon. If you know that at least one child is a boy and at least one child was born after 12:00 noon, what is the probability that both children are boys or both children were born after 12:00 noon?

3) A regional commission has 5 members from Town A, 3 members from Town B, and 2 members from Town C. If they randomly choose a committee of 4 members, what is the probability that there are at least 2 members from Town A on the committee?

**FAIRFIELD COUNTY MATH LEAGUE (FCML) 2014-2015**

Match 6 Team Round

1.) _C= $2A$ 4.) $(a+5)(a-1)(x-2)(x-1)$

2.) $\frac{7\pi}{12}$ 5.) $\frac{2}{5}$

3.) $9$ 6.) _N= $4$ B= $3$

1) Four times the measure of $\angle A$ is equal to the sum of the measures of the supplements of $\angle B$ and $\angle C$. Half the measure of $\angle B$ is equal to the sum of the measures of the complements of $\angle A$ and $\angle C$. Solve for the measure of $\angle C$ in terms of the measure of the $\angle A$ if all measurements are in degrees. Use C for the measure of $\angle C$ and A for the measure of $\angle A$.

2) A cylinder with height R is inscribed in a sphere of radius R. The volume that is inside the sphere but outside the cylinder is some constant multiplied by $R^3$. Give the value of that constant.

3) Solve for all real numbers x such that $\sqrt{x+6}-\sqrt{x+1}=\sqrt{x-2}$.

4) Factor into 4 first degree polynomials with integer coefficients:
$a^2x(x-3)+2a(a+2x^2)-4a(3x-2)-5(x^2+2)+15x$

5.) The letters of the word ANAGRAM are jumbled and rearranged randomly. If you know that the first letter of the rearrangement is A, what is the probability that the rearrangement contains no A's that are adjacent to each other?

6.) A set of N marbles contains exactly B blue marbles. The probability of drawing exactly 2 blue marbles from the set of N marbles is 0.5. If $N \leq 20$, what are the values of N and B?