FAIRFIELD COUNTY MATH LEAGUE (FCML) 2015-2016

| Match 1 Round 1 |
| Arithmetic: Percents |

1) _____ 5 _____

2.) _____ 16 _____

3.) _____ 7.5 _____

1) X% of 60 is equal to 60% of (4X-15).   Find X.

2) How many integers N between 1 and 1000 satisfy the condition that 20% of N, 25% of N, and $33\frac{1}{3}$% of N are all integers?

3) The price of an item is increased by x% and then decreased by y%. The final price was 90% of the original price.   If the item had been increased by y% and then decreased by x%, the final price would have been 105% of the original price. Find y-x.

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Match 1 Round 2
Algebra I: Equations

1.) $\dfrac{-5}{4}$

2.) $\dfrac{50}{17}$

3.) $10, \dfrac{-18}{3}$

1.) Solve for a:
$$5 - 0.2a = 6 - (a + 2)$$

2) Solve for b:
$$\frac{1}{b-5} + \frac{5}{b} = \frac{6}{b+2}$$

3) Solve for c:
$$c(c-6)(c-4) = (c+2)(c-9)(c+10)$$

Match 1 Round 3
Geometry: Triangles
And Quadrilaterals

1.)_____$\sqrt{36}$_____cm

2.)_____48_____cm^2

3.) _Perimeter:_____$10\sqrt{5}+10\sqrt{2}$____ cm

Area: _____75_____cm^2

1) $\triangle ABC$ is equilateral.   The altitude drawn from A to BC has length $6\sqrt{3}$ cm. Find the perimeter of $\triangle ABC$.

2.) An isosceles trapezoid has one angle of 45 degrees.   The difference in length between the two bases is 12 cm, and one base is 7 times longer than the other. Find the area of the trapezoid.
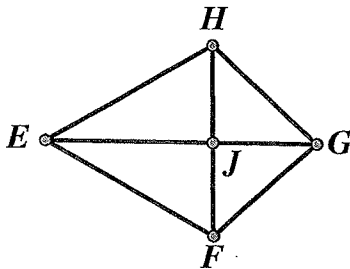
3. In kite EFGH, FJ=JG and EJ = 2(FJ).   If EH=$5\sqrt{5}$ cm, give the perimeter and the area of EFGH.

Match 1 Round 4
Algebra 2:
Simultaneous Equations

1.) _a= $-.2$ b= -2_

2.) ___k= -3___

3.) _x = $\frac{1}{3}$_ , y= $\frac{1}{2}$, z= 4___

1.) Solve for a and b:

$5a - 3b = 5$

$b = 15a + 1$

2.) Find all values of k such that the system

2kx $= 5 - 0.5y$

ky$= 30 - 36x$

has no solution (x,y).

3) Solve for (x,y,z):

$$\frac{2}{x} + \frac{3}{y} + z = 16$$

$$\frac{3}{x} - \frac{1}{y} + 2z = 15$$

$$\frac{1}{x} + \frac{2}{y} - 3z = -5$$

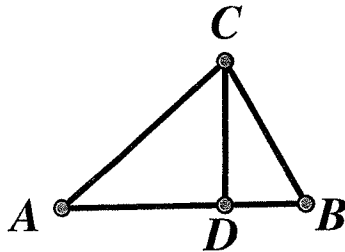| Match 1 Round 5 |
|---|
| Trig: Right Triangles |

1.) $\dfrac{\sqrt{33}}{7}$

2.) $\dfrac{\sqrt{3}}{3}$

3.) $2\sqrt{3}$

1.),   In right triangle XYZ, the right angle is at Y.   XY=4 and XZ=7. What is the sine of angle X?

2.) In right triangle ABC, the right angle is at C. An altitude from C intersects $\overline{AB}$ at D such that AD = 2(DB). Find the cosine of angle B.

3.) As viewed from an incoming plane, the angle of depression to the top of a tower is 30 degrees.   As viewed by a ground observer, the angle of elevation to the top of the tower is 60 degrees. If the plane is 1000 feet directly above the observer, what is the horizontal distance from the plane to the tower in feet?
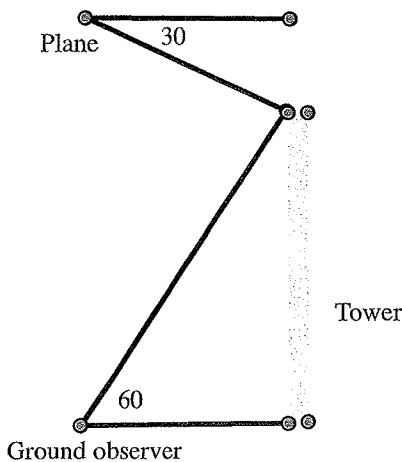
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1.) (___4___ , ___4___)

2.) ___10,3___

3.) ___$\frac{14\sqrt{5}}{5}$___

1.) A parallelogram has three of its vertices at (-3,2), (1,10), and (-6,8). If the fourth vertex is in the first quadrant, find its coordinates.

2.) Find all values of k such that the segment connecting (k,4) and (9,k) has length $\sqrt{37}$.

3.) The line x+2y=15 is the perpendicular bisector of line segment $\overline{AB}$ where A has coordinates (2,3). Find the length of $\overline{AB}$.

1.) $\dfrac{120}{169}$ 4.) $\dfrac{2}{3}$

2.) $\$14500$ 5.) $\dfrac{-421}{1326}$

3.) 15 6.) $2\sqrt{5}$ cm

1.) The diagonals of a rhombus are 10 cm and 24 cm long. Give the sine of any of the interior angles of the rhombus.

2.) Carly had $24,500 to invest. She divided the money into three different accounts. At the end of the year, she had made $1,300 in interest. The annual yield on each of the three accounts was 4%, 5.5%, and 6%. If the amount of money in the 4% account was four times the amount of money in the 5.5% account, how much money had she placed in the account earning 6% interest?

3.) A surveyor sighted a tree such that the angle of elevation to the top of the tree was 16.7 degrees. If she moved back 100 feet, the angle of elevation to the top of the tree would be 5.71 degrees. If the tangent of 5.71 degrees is 0.1 and the tangent of 16.7 degrees is 0.3, what is the height of the tree in feet?

4.) The perpendicular bisectors of a triangle intersect at the circumcenter A. The medians of a triangle intersect at the centroid B. Find the length of $\overline{AB}$ for the triangle whose vertices are (6, 4), (8,10), and (10,4).

5.) Solve for x:
$$x - \frac{2}{3}\left(x - \frac{4}{5}\left(x - \frac{5}{6}\right)\right) = \frac{1}{2}x - \frac{3}{4}\left(x - \frac{7}{8}\left(x - \frac{9}{10}\right)\right)$$

6.) A right triangle $\triangle ABC$ has its right angle at C. If BC were 20% greater than it is and $\overline{AC}$ remained the same length, the tangent of angle A would be 0.2 greater than if BC were 20% shorter than it is and $\overline{AC}$ remained the same length. If AB=10 cm, find the length of BC.