

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2013-2014

Match 1 Round 1  
Arithmetic: Percents

1) 27.8 %

2.) 50

3.) 68

- 1) During the first half of the baseball season, Slugger made a hit in 25% of his at-bats, and had a total of 60 hits. During the second half of the season, Slugger made a hit in 30% of his 300 at-bats. What percent of Slugger's at-bats for the entire season were hits? Round your answer to the nearest tenth of a percent.
- 2) 70% of 80% of 90% of Z is equal to (Z-10)% of 30% of 210. What is the value of Z?
- 3) The value of stock PDQ increased by 50% in July, decreased by 40% in August, and increased by 30% in September. The value of stock WOW decreased by 50% in July, increased by 40% in August, and decreased by 30% in September. If the value of each stock was \$57.33 at the end of September, what was the positive difference between the values of the two stocks at the beginning of July?

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2013-2014

Match 1 Round 2  
Algebra I: Equations

1.)           -15          

2.)          -288         

3.)           2, - $\frac{1}{3}$          

1.) Solve for x:  $4 - 3(x + 2(x - 1)) = 1 - 2(x + 3(x - 4))$

2) Solve for y:  $\frac{1}{2}(y+4)(y-5) + \frac{1}{3}(y+6)(y-7) = (y+8)(y-9) - \frac{1}{6}y^2$

3) Solve for z:  
 $\frac{1}{2} - \frac{z-3}{4} = \frac{5}{z + \frac{14}{3}}$

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2013-2014

Match 1 Round 3  
Geometry: Triangles  
And Quadrilaterals

1.) 80

2.) 96

3.)  $\sqrt{130} + \sqrt{39} + 13$

1) 1.) A rhombus has side 10 cm. If the ratio of the lengths of the diagonals of the rhombus is 2:1, what is the area of the rhombus in square cm?

2.) Trapezoid ABCD has right angles at A and B. If a line is drawn from C parallel to AB and meets AD at point E, the ratio of the area of rectangle ABCE to triangle CDE is 8:1, what is the perimeter of the smallest possible trapezoid given that the lengths of all sides of the trapezoid are whole numbers?

2) 3.) Right triangle ABC has AB as the hypotenuse. An altitude is drawn from C to AB and meets AB at D. If  $CD = \sqrt{30}$  and  $AB = 13$ , find the perimeter of triangle ABC.

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2013-2014

Match 1 Round 4  
Algebra 2:  
Simultaneous Equations

1.) a= 11 b= 4

2.) 20, -20

3.) x=  $\frac{1}{3}$  y=  $\frac{1}{2}$  z= 1

1.) Solve for a and b

Solve for a and b

$$2a + 5b = 4a - 0.5b$$

$$a = 52 - (3a + 2b)$$

2.) Solve for all real values of c:

$$c^2 - d^2 = 375$$

$$cd = 100$$

3) Solve for x, y, and z:

$$\frac{2}{x} + \frac{3}{y} + \frac{1}{z-2} = 11$$

$$\frac{3}{x} - \frac{1}{y} + \frac{4}{z-2} = 3$$

$$\frac{4}{x} + \frac{2}{y} - \frac{6}{z-2} = 22$$

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2013-2014

Match 1 Round 5  
Trig: Right Triangles

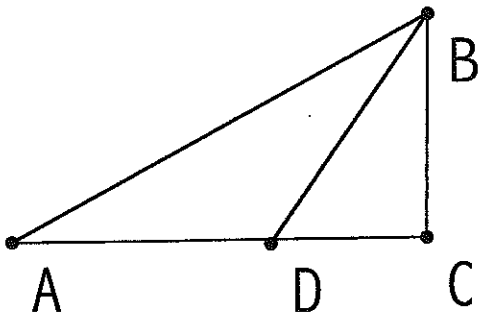
1.)  $\frac{\sqrt{5}}{3}$

2.)  $1 + \sqrt{6}$

3.)  $30\sqrt{3} - 30$

1.) In right triangle ABC, the right angle is at C and  $3 \cos B = 2 \tan A$ . What is  $\sin A$ ?

2.) In triangle ABC below,  $\angle C$  is a right angle,  $\sin(\angle BDC) = \frac{\sqrt{3}}{2}$  and  $\sin(\angle BAC) = \frac{\sqrt{3}}{3}$ . If  $AD=5$ , what is the length of DC?



3.) A tree is located a certain horizontal distance from an observation tower. When viewed from the base of the tower, the angle of elevation to the top of the tree is 30 degrees. When viewed from the roof of the tower, the angle of depression to the top of the tree is 45 degrees. If the tower is 60 feet tall, how tall is the tree (in feet)? Remember to express answers with no radicals in the denominator.

# FAIRFIELD COUNTY MATH LEAGUE (FCML) 2013-2014

Match 1 Round 6  
Coordinate Geometry

1.)  $\frac{2}{3}$

2.)  $-\frac{4}{3}$

3.)  $y = -\frac{4}{3}x - \frac{1}{2}$  and (Should be 4/3, not -4/3)

$y = \frac{3}{4}x + \frac{3}{8}$

- 1) A parallelogram has one vertex in each of the 4 quadrants. Three of the points are (-5,-2), (4, -1), and (-2,5). Find the slope of the line segment connecting (-5,-2) to the opposite vertex of the parallelogram.

- 2) Isosceles trapezoid ABCD has its two bases AD and BC parallel to the x-axis. The coordinates of A are (1,1) and the coordinates of B are (3,  $1 + 2\sqrt{3}$ ). Line segments are drawn from B and C to the midpoint E of AD. If the area of the trapezoid is  $16\sqrt{3}$ , what is the product of the the slopes of BE and CE?

- 3.) The line segment with endpoints (1,x) and (x,2) has length 5. Give both possible equations for its perpendicular bisector. Give your answers in the form  $y=mx+b$ .

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2013-2014 Match 1 Team Round

1.) 180

4.) 4

2.) 20, -39

5.)  $\frac{300}{7}$

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

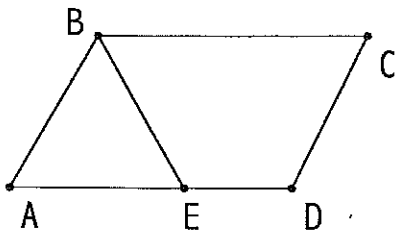
6.)  $-\frac{4\sqrt{3}}{3}$

1)  $(a+20)\%$  of  $(b+30)$  is  $b\%$  of  $(a+40)$ . If  $b=2a$ , what is the sum  $(a+b)$ ?

$$\frac{1}{0.2m-3} - 0.5 = \frac{8}{0.5m+6}$$

2.) Solve for all possible values of  $m$ :

3) Parallelogram ABCD has angles of 60 degrees at points A and C. A line is drawn from B to AD at point E creating an equilateral triangle. The area of the triangle is one-third of the area of the parallelogram. Find the ratio of the perimeter of the triangle to the perimeter of the parallelogram. (Drawing not to scale)



4. For what value of  $k$  does the system

$$\begin{aligned} 2x + 3y + 5z &= 10 \\ x - 4y - 2z &= 8 \\ 7x - 6y + kz &= 44 \end{aligned}$$

have infinitely many solutions  $(x,y,z)$ ?

5. A string is tied to the top of a flagpole. A person on the ground holds the string some distance away from the flagpole. At a certain distance from the base of the flagpole as measured along the ground, the length of the string is  $\sqrt{2}$  times the height of the flagpole. If the person walks back 100 more feet and unwinds more string, the angle of elevation as measured from the ground to the top of the flagpole is 16.7 degrees. Given  $\tan(16.7^\circ) = 0.3$ , how tall is the flagpole in feet?

6. A rhombus with one of its vertices at the origin and one of its bases along the  $x$ -axis has sides of length 5 units each. The angle whose vertex is at the origin is 60 degrees, measured counterclockwise from the positive  $x$ -axis. What is the sum of the slopes of the 4 line segments formed by connecting the midpoints of the original rhombus?