

## FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 1 Round 1  
Arithmetic: Percents

1)  $N = \underline{1000}$

2.)  $\underline{\$500}$

3.)  $C = \underline{252}$        $R = \underline{120}$

1.) 30% of 40% of 50% of N is 60. Find N.

2) The price of an item was decreased by 10%, then increased by \$20, then decreased by 30%, then increased by \$51, then decreased by 40%. If the final price was \$228, what was the original price?

3.) In Buford's exercise program, he burns 5% more calories per minute when he cycles than when he runs. He cycles for half an hour and burns C calories. He runs for 15 minutes and burns R calories. Three more than twice the total number of minutes Buford exercised is numerically 25% of the total number of calories burned. Find C and R.

# FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 1 Round 2  
Arithmetic: Equations

1)  $x = \frac{119}{39}$

2.)  $9$

3.)  $y = 6, \frac{1}{7}$

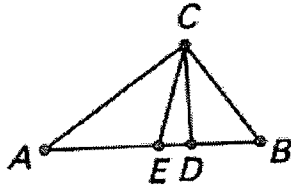
1) Solve for x:  $6x - 5(x - 4(x - 3(x - 2))) = 1$

2) m and n are natural numbers such that  $1 \leq m \leq 100$  and  $1 \leq n \leq 100$ .  
How many distinct ordered pairs (m,n) solve the equation  
 $m^2 - 4n = 1$  ?

3) Solve for y:  $(y+1)(y+2)(2y-3) = 2y(y+8)(y-3)$ .

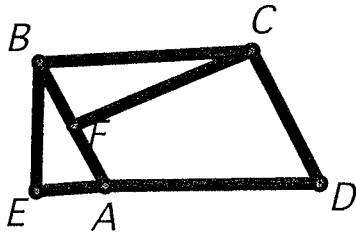
**FAIRFIELD COUNTY MATH LEAGUE 2019-2020**

Match 1 Round 3 Geometry: Triangles and Quadrilaterals

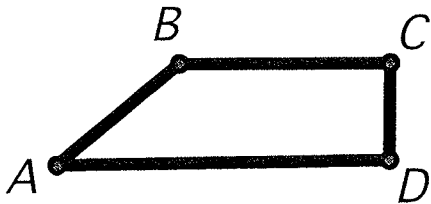


- 1.)  $\frac{7}{10}$  in
- 2.) 65 cm
- 3.)  $\frac{12 + 28\sqrt{3}}{3}$  cm

1. In right  $\triangle ABC$  of sides 3", 4", and 5". the right angle is at C. An altitude is drawn from C and meets  $\overline{AB}$  at D. A median is drawn from C and meets  $\overline{AB}$  at E. Find the distance DE.



2. In the figure above,  $\overline{ABCD}$  is a parallelogram. A lies on  $\overline{DE}$ , F lies on  $\overline{BA}$ ,  $\overline{BE} \perp \overline{AE}$ , and  $\overline{BF} \perp \overline{CF}$ .  $BE = 10$  cm and  $CF = 16$  cm. The area ABCD is  $200 \text{ cm}^2$ . Find the perimeter of ABCD.



3. In trapezoid ABCD above,  $AB=BC$ ,  $\overline{AD}$  is parallel to  $\overline{BC}$ ,  $\angle B = 120^\circ$ ,  $\angle C = \angle D = 90^\circ$ ,  $CD=4$  cm Find the perimeter of the trapezoid.

# FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 1 Round 4  
Algebra 2  
Simultaneous  
Equations

1.)  $x = 24$   $y = -9$

2.)  $(0.6, 0.8), (1, 0)$

3.)  $x = -2$   $y = \frac{2}{5}$

1.) Solve for x and y:

$$\frac{x}{4} - \frac{y}{3} = 9$$

$$y = \frac{x}{6} - 13$$

2. Solve for all ordered pairs (a,b)

$$2a + b = 2$$

$$a^2 + b^2 = 1$$

3. Solve for x and y:

$$\frac{xy}{x+y} = \frac{1}{2}$$

$$\frac{xy}{x-y} = \frac{1}{3}$$

# FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 1 Round 5

Trig  
Right Triangles

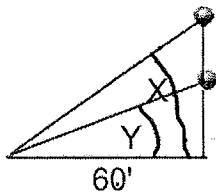
1.)  $\frac{13}{27}$

Note: Diagrams are not necessarily drawn to scale. 2.)  $\frac{5}{2}$  ft/sec

3.) 15

1. In right triangle ABC, the right angle is at C.

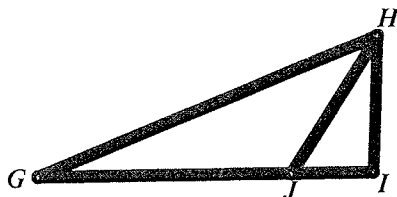
$BC = \frac{4}{9}, \sin(B) = \frac{5}{13}$ . Find AB.



2. A balloon is rising vertically. You are 60 feet away from the balloon horizontally. At a given time, the angle of elevation to the balloon is Y. Three seconds later, the angle of elevation to the

balloon is X.  $\sin(X) = \frac{5}{13}, \sin(Y) = \frac{7}{25}$

What is the average rate of change in height of the balloon in feet per second during the three seconds?



3. In right  $\triangle HIG$  above, where  $\angle I$  is a right angle,  $HI=4$ ,  $JI=1$ , and  $\cos(\angle HGI) = 4 \cos(\angle HJI)$   
Find GJ.

FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 1 Round 6  
Coordinate Geometry

1)  $y = -\frac{3}{4}x + \frac{5}{2}$

2) 12

3) -4, 0, 2, 6

1.) Give the equation of the line parallel to  $3x+4y=24$  passing through the point  $(6,-2)$ . Express your answer as  $y=mx+b$  for constants  $m$  and  $b$

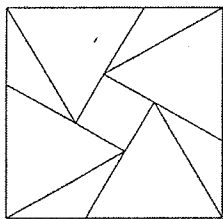
2.) How many distinct ordered pairs  $(a,b)$  exist such that  $a$  and  $b$  are both integers, and the length of the segment connecting  $(a,2)$  and  $(3,b)$  is 5?

3)  $\overline{AB}$  has length  $2\sqrt{5}$ . The perpendicular bisector of  $\overline{AB}$  is the line  $y = -2x + 13$ . The distance from  $(1,11)$  to the midpoint of  $\overline{AB}$  is  $3\sqrt{5}$ . Give the four possible values for the x-coordinate of point A.

**FAIRFIELD COUNTY MATH LEAGUE 2019-2020 Team Round Match 1**  
**Diagrams are not necessarily drawn to scale.**

- 1.) M= 20 N= 40 P= 80      4.)  $-\frac{5}{3}, -1$   
 2.)  $\frac{3-\sqrt{3}}{2}$       5.) 32 cm  
 3.) 45      6.)  $(-3, 1), (6, 4), (6, -2)$

1.) M ≠ N ≠ P ≠ 0. M% of P is 24 less than N. N% of M is one-tenth of P. P% of N is eight-fifths of M. Find M, N, and P.

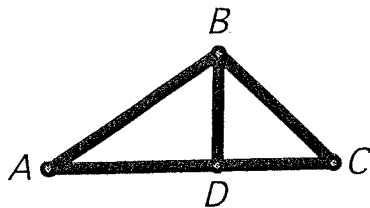


2.) A square of side 1 cm has four congruent equilateral triangles constructed in it as shown. Find the largest side of any of the triangles in the diagram.

3.) Find the area of the quadrilateral whose vertices are the pairwise intersections of  $y = \frac{1}{2}x - 3, y = -2x + 12, x - 2y = -9,$  and  $8x - y = -12$

4.) Solve for x:

$$x^2(x-1)(3x+1) - 7x + 11 = (((3x-2)x+2)x+1)x + 16$$



5.) Altitude  $\overline{BD}$  is drawn for  $\triangle ABC$ . A and C are acute angles.

BD = 4 cm.  $\cos(\angle A) = \frac{4}{5}, \cos(\angle C) = \frac{12}{13}$ . Find the perimeter of  $\triangle ABC$

6.) Give all ordered pair solutions (x,y) for the system

$$x^2 - 4x + (y-1)^2 = 21$$

$$x - 2 = y^2 - 2y - 4$$