

FAIRFIELD COUNTY MATH LEAGUE 2017-2018

Match 1 Round 1
Arithmetic:
Percents

1.) 3

2.) 260

1.) $(10N)\%$ of 15 is $\frac{15}{2}$ less than $4N$. Find N .
3.) 8.3 %

2) $M\%$ of 30 is P and $P\%$ of 400 is $M+40$. Find $M+P$.

3.) 1% of a given population has a certain disease and 99% of the population does not have the disease. The test for the disease is 90% accurate: 90% of the time it gives the correct result and 10% of the time it gives the incorrect result. All members of the population are tested. To the nearest tenth of a percent, what percent of the group that tests positive for the disease actually has the disease?

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Match 1 Round 2
Algebra 1: Equations

1) $a = \frac{31}{7}$

2.) 15

3.) $b = 2, -\frac{9}{2}$

1) Solve for a: $\frac{1}{5}a - 4(3 - a) = 0.7(a + 5)$

2) x and y are natural numbers such that $1 \leq x \leq 100$ and $1 \leq y \leq 100$.
How many distinct ordered pairs solve the equation $7x - 5y = 4$?

3) Solve for b: $b(b - 0.5)(b + 5.5) = (b - 1.5)(b + 3)(b + 7)$.

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Match 1 Round 3
 Geometry: Triangles
 And Quadrilaterals

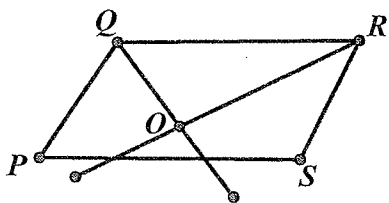
1.) 12 cm

2.) $5 + 5\sqrt{3}$ cm

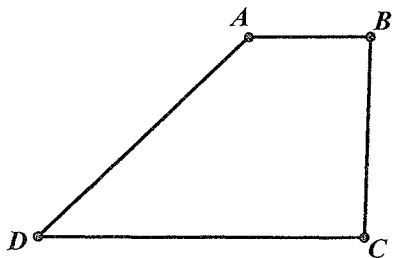
3.) 56 cm

1. In a right triangle, the hypotenuse is 7 cm longer than the shorter leg. The longer leg has length $\sqrt{119}$ cm. What is the length of the hypotenuse?

2. In parallelogram PQRS, angle P measures 60 degrees. The angle bisector of Q meets the angle bisector of R at point O. If QR=10 cm, find the sum of QO and RO.



3) In trapezoid ABCD as shown, \overline{AB} is parallel to \overline{CD} and the length of \overline{CD} is 4 times the length of \overline{AB} . \overline{AB} is perpendicular to \overline{BC} . The length of \overline{BC} equals the length of \overline{CD} . If the area is 160 square cm, find the perimeter.



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Match 1 Round 4
Algebra 2
Simultaneous
Equations

1.) $a = \frac{14}{5}$ $b = \frac{3}{5}$

2.) $k = -6$

3.) $x = \frac{1}{3}$ $y = \frac{1}{4}$ $z = \frac{1}{5}$

1.) Solve for a and b:

$$3a - 4b = 6$$

$$b = 2a - 5$$

2. For what values of k does the following system have infinitely many solutions (x,y)?

$$4x - ky = k + 2$$

$$kx - 9y = -k$$

3. Solve for x, y, and z:

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

$$\frac{5}{6x} + \frac{1}{8y} + \frac{1}{z} = 8$$

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

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Match 1 Round 5
 Trig
 Right Triangles

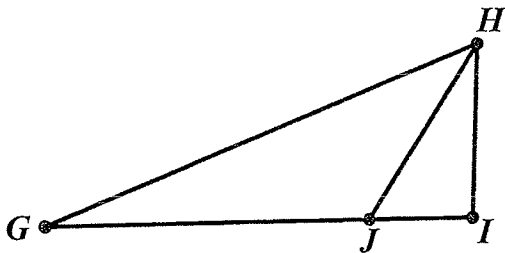
1.) $\frac{28\sqrt{13}}{13}$

2.) $50\sqrt{3} - 50$ feet

3.) $25\sqrt{241}$

1.) In right triangle ABC, the right angle is at C. $\sin(\angle A) = \frac{\sqrt{13}}{7}$ and BC=4. Find AB.

2.) A kite is flying at an altitude lower than 100 feet. From the bottom of a 100 foot tall building, the angle of elevation to the kite is 45 degrees. From the top of the 100 foot tall building, the angle of depression to the kite is 60 degrees. What is the altitude of the kite in feet?



3.) In the diagram above, \overline{HI} is perpendicular to \overline{GI} .
 $HI = 100$, $GJ = 250$ and $\tan(\angle HJI)$ is three times the measure of $\tan(\angle HGI)$. Find GH.

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Match 1 Round 6
Coordinate Geometry

1) $y = \frac{2}{3}x - \frac{22}{3}$

2) $9, -15$

3) $(-\frac{1}{12}, \frac{123}{16})$

1.)_ Give the equation of the line parallel to $2x-3y=12$ passing through the point $(5,-4)$. Express your answer as $y=mx+b$ for constants m and b .

2.)_ Find all values of x such that the length of the line segment connecting $(-3, 4)$ and $(x, -5)$ is 15.

3.) Find the point where the perpendicular bisector of the line segment from $(2,3)$ to $(5,7)$ intersects the perpendicular bisector of the line segment from $(2,3)$ to $(-4,11)$. Express your answer as an ordered pair (x,y)

FAIRFIELD COUNTY MATH LEAGUE 2017-2018 Team Round Match 1

1.) $\frac{11}{20}$ 4.) 29

2.) $\frac{26}{3}$ 5.) $x = 5$ $y = 4$; $x = \frac{-17}{5}$, $y = \frac{-8}{5}$

3.) Center: $(1, 3)$ Radius: $\sqrt{5}$ 6.) $\frac{475}{34}$

1.) The perimeter of a parallelogram is 40 cm and its altitudes measure 4 cm and 7 cm. Find the sine of any angle of the parallelogram.

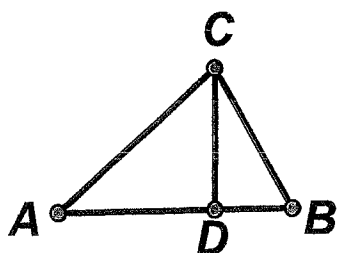
2.) A triangle has vertices at (0,0), (16,0), and (8,6). Find the length of the segment whose endpoints are its orthocenter and centroid.

3.) Find the center and radius of the circle passing through the points (2,1), (0,5), and (-1,2).

4.) The senior class has 200 students. C% of the senior class takes Calculus, P% of the class takes Physics, (C-P+25) students take both, and 20% of the class takes neither. C, P, and C-P+25 must be whole numbers. What is the smallest possible value of C?

$$3y - 2x = 2$$

5.) Give the 2 ordered pair solutions for x and y: $x^2 - y^2 = 9$



6.) In $\triangle ABC$, an altitude is drawn from C to \overline{AB} at D. $\cos(\angle CBA) = \frac{3}{5}$, $\tan(\angle CAB) = \frac{1}{4}$ and $AC=10$. What is the area of $\triangle ABC$?