FAIRFIELD COUNTY MATH LEAGUE 2018-2019

Match 1 Round 1 Arithmetic: Percents

1.) _____

2.) _____

3.) _____

1.) If increasing x by 20 percent has the same result as decreasing the quantity 5 more than x by 10 percent, find the value of x.

2.) A rectangular prism has dimensions a, b, and c. If a percent of b is 3, b percent of c is 4, and c percent of a is 2, find the exact volume of the prism.

3.) Mr. Purse and Ms. Cents each give a test to one of their classes (which do not have the same number of students). The average (arithmetic mean) test score in Mr. Purse's class is 80 and the average test score in Ms. Cents's class is 90. Ms. Cents notes that if the average score in Mr. Purse's class were to decrease by 20% and the average score in Ms. Cents's class were to increase by 10%, the combined average would not change. State the exact combined average of both classes as a decimal.

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Match 1 Round 2
Algebra 1: Equations

1.) _____

2.) _____

3.) _____

1.) Find the value of x: $\frac{2}{7}(3x-1) = 4(x-2(x-3))$

2.) Find the value of y: $\frac{y-2}{y-1} = \frac{y}{y+2}$

3.) If $(x+2)(x+4)(x-3) = (x+1)^3$, find the value of x.

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Match 1 Round 3
Geometry: Triangles &
Quadrilaterals

1.) _____

2.) _____

3.) _____

1.) Find the perimeter of a rhombus with area 24 and one diagonal of length 12.

2.) A rectangle whose length is three times its width has the same area as a given square. Find the ratio of the length of one diagonal of the square to the length of one diagonal of the rectangle. Give your answer as a simplified rational expression.

3.) Consider rectangle $ABCD$ with point E on $\overline{AB}$. $\overline{EC}$ intersects diagonal $\overline{BD}$ at point F. If $AD = 6$, the area of rectangle $ABCD$ is 60, and the area of trapezoid $AECD$ is 48, find the exact area of triangle BFC.

FAIRFIELD COUNTY MATH LEAGUE 2018-2019

1.) _____

2.) _____

3.) _____

1.) Solve the following system for y: $\begin{cases} 2x + 3y = 11 \\ y = x + 7 \end{cases}$

2.) Find all solutions as ordered pairs (x, y): $\begin{cases} \dfrac{2}{x+3} - y^2 = 3 \\ \dfrac{4}{x+3} + 3y^2 = 16 \end{cases}$

3.) Find all solutions as ordered pairs (a, b): $\begin{cases} 3a - 5b = 4 \\ \dfrac{1}{a} - \dfrac{1}{b} = 4 \end{cases}$

FAIRFIELD COUNTY MATH LEAGUE 2018-2019

1.) _____

2.) _____

3.) _____

1.) If m is an acute angle measure in degrees and $\sin(m) = \frac{1}{3}$, find $\tan(90 - m)$.

2.) Consider acute triangle ABC with an area of 21. If $AB = 9$, find the value of $\cot(A) + \cot(B)$.

3.) Consider triangle ABC with right angle C and point D on $\overline{AC}$. If $\tan(\angle BAC) = \frac{5}{8}$ and $\sin(\angle BDC) = \frac{4}{7}$, find $\frac{\text{area } \triangle BDC}{\text{area } \triangle ABC}$.

FAIRFIELD COUNTY MATH LEAGUE 2018-2019

Match 1 Round 6 Miscellaneous: Coordinate Geometry

1.) _____

2.) _____

3.) _____

1.) The line $2x - 3y = C$ contains the point $(7, -1)$. Find the equation of the line parallel to this one that contains the point (C, C). Give your answer in slope-intercept form.

2.) Square $ABCD$ has a perimeter of 40. Point A has coordinates $(8,3)$ and point C has a y-coordinate of 5. Find all possible equations for the diagonal that passes through the points B and D. Give your answer(s) in slope-intercept form.

3.) The line $y = 2x$ bisects the angle formed in Quadrant I by the lines $y = x$ and $y = kx$. Find the value of k.

1.) _____   4.) _____

2.) _____   5.) _____

3.) _____   6.) _____

1.) Find all values of a such that the equation $\frac{4x-2}{x+3} + 2 = \frac{ax+5}{x+3}$ has no solutions for x.

2.) A kite with perimeter 10 has a pair of opposite angles measuring 60° and 120°. Find the exact length of the smaller diagonal of the kite.

3.) The point $P(3,7)$ is reflected across the line $y = 2x + b$ to make the point P'. If P' has coordinates $(8, t)$, find $b + t$.

4.) Consider a set of five consecutive integers. If the smallest integer's value is decreased by k percent and the largest integer's value is increased by k percent, the sum of the five values is increased by 10 percent. If $0 < k < 100$, find the largest possible value of the median of the set. (Note: k does not have to be an integer.)

5.) Solve the system for all ordered pairs (x, y): $\begin{cases} \frac{x+1}{y} + \frac{3y}{x+1} = 4 \\ xy = 10 \end{cases}$

6.) Consider trapezoid $TRAP$ with bases $\overline{RA}$ and $\overline{TP}$ and acute angles T and P. It is known that $\cos(T) = \frac{4}{5}$, $\tan(P) = \frac{4}{3}$, the perimeter of the trapezoid is 40 and the midsegment (line segment joining the midpoints of the non-parallel sides) has a length of 13. What is the area of the trapezoid?