

FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 5 Round 1
Algebra I:
Fractions and
Exponents

1.) _____

2.) _____

3.) _____

1. Express as a decimal, correct to three decimal places.

$$1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + 1}}}}$$

2) Simplify: $\frac{(55)^3(121)^4}{(1331)^3(275)^2}$

3.)_ If $x - 3y = -2$, express the following as a single fraction without negative exponents.

$$\frac{(a^x b^{3y})^4 ((a^{3x} + b^{2y})^2 - b^{2y}(2a^{3x} + b^{2y}))(a^{-2x} b^{-3y})^{-4}}{(a^{3x})^5 (ab^7)^{3y} (a^2 b)^x}$$

FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 5 Round 2
Algebra I:
Fractional
Expressions and
Equations

Assume no values of x
make any denominator equal to zero.

1.) _____

2.) _____

3.) _____

1). Multiply and simplify: $\frac{x^2 - 18x + 80}{x^2 - 17x + 72} * \frac{9x - x^2}{x^2 - 100}$

2). Solve for x : $\frac{3}{3x+1} - \frac{1}{4} = \frac{x-2}{7x-1}$

3.): Solve for x : $\frac{5}{x + \frac{3}{x+4}} - \frac{4}{x + \frac{2}{x+3}} = \frac{1}{\frac{x^2 + 5x + 6}{x+1}}$

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2019-2020

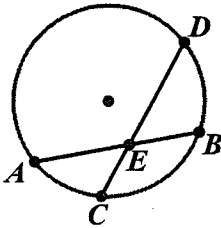
Match 5 Round 3
 Geometry:
 Circles

1.) _____

2.) _____

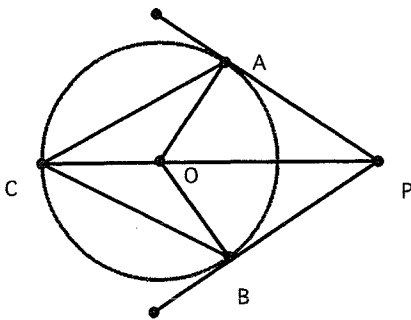
Note: Diagrams not necessarily to scale

3.) _____



1.) In the picture above, \overline{AB} and \overline{CD} are chords of a circle that intersect at E. $AE=x-1$, $AB=2x$, $CE=x-4$, and $DE=3x-5$. Find the difference $CD - AB$.

2) Two circles with circles P and Q are tangent to the same line at points A and B and tangent to each other. If the radius of circle P is 9 and the radius of circle Q is 4, what is the length of segment \overline{AB} ?



3.) For the circle with center O above, \overrightarrow{PA} and \overrightarrow{PB} are tangent to circle O at A and B. The line from P through O intersects the circle at C as shown above. If $OA = x-20$, $OP=x-15$, and $AP=\sqrt{3x}$, find the perimeter of quadrilateral APBC.

FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 5 Round 4
Quadratic
Equations and
Complex
Numbers

1.) _____

2.) _____

3.) _____

- 1) Find the two complex solutions of $x^2 + bx + c = 0$ if the sum of the solutions is 6 and the product of the solutions is 13.

2.) Simplify: $\frac{(2+i)^3}{3-i} - \frac{(2-i)^3}{3+i}$

3) Solve for all complex x : $x^2 + (3-4i)x - 12i = 0$

FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 5 Round 5
Solving Trig
Equations

1.) _____ degrees

2.) _____

3.) _____

1) Solve for all x $0^\circ \leq x \leq 180^\circ$: $\sin(5x) = \frac{1}{2}$

2) Solve for all x : $0 \leq x < 2\pi$ $\tan^2(x) - \sec(x) = 1$

3.) Solve for all x $0 \leq x < \pi$: $\sin(4x) + \cos(2x) = 0$

FAIRFIELD COUNTY MATH LEAGUE (FCML) 2019-2020

Match 5 Round 6
Sequences and
Series

1.) _____

2.) _____

3.) _____

1.) For what natural number n is $0.76 < \sum_{k=1}^n \frac{(-1)^{k+1}}{k^2} < 0.80$

2.) An arithmetic sequence has first term -2. The ~~second~~^{fourth} term is the square ~~of the~~^{second} ~~fourth~~ term. Find all possible values of the sixth term.

3.) An infinite geometric series converges to 6.25. The second term of the original geometric sequence is 4 less than the first term. Give all possible values for the fourth term of the sequence.

FAIRFIELD COUNTY MATH LEAGUE 2019-2020

Match 5
 Team Round

1.) _____ 4.) _____

Note: Diagrams not necessarily drawn to scale.

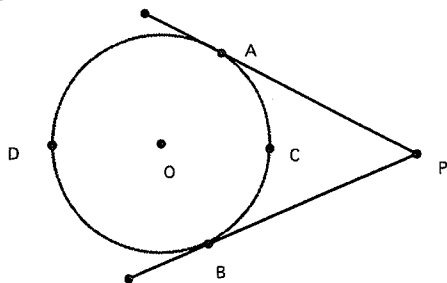
2.) _____ 5.) _____

3.) _____ degrees 6.) _____

1.) Simplify: $\frac{1}{7} * \frac{1}{8} + \frac{1}{8} * \frac{1}{9} + \frac{1}{9} * \frac{1}{10} + \frac{1}{10} * \frac{1}{11}$

2.) Solve for x:

$$2 - \frac{x}{3 - \frac{x}{4 - \frac{x}{5 - \frac{x}{6}}}} = 4$$



3.) In the diagram above, \overrightarrow{PA} and \overrightarrow{PB} are tangent to the circle with center O at points A and B. The measure of arc ACB is $2x^2 - 3$ and the measure of arc ADB is $4x^2 - 2x - 5$. Find the degree measure of $\angle APB$.

4.) Find the two complex square roots of $-1 + i\sqrt{3}$.

5.) What are all possible values for $\sin(x)$ if $\cos(x + \frac{\pi}{4}) = \frac{3}{4}$?

6.) A geometric sequence $\{a_n\}$ of complex numbers has the property that $a_4 = -64a_1$. Find all possible values for the common ratio of the sequence.