

Algebra II Team Question #1**February Regional 2005**

Karol throws a softball directly upwards from a height of 10 feet above the ground and with an initial velocity of 36 feet per second. So, the height of the ball is

$$h(t) = -16t^2 + 36t + 10 \text{ where } h \text{ is measured in feet and } t \text{ is seconds.}$$

Let A be the time (in seconds after the ball is thrown) when the ball reaches its maximum height

Let B be the time (in seconds after the ball is thrown) when the ball is once again 10 meters above the ground.

Let C be the time (in seconds after the ball is thrown) when the ball hits the ground.

Find the sum $A + B + C$

Algebra II Team Question #2**February Regional**

For $f(x) = ix^2 - 6ix + 8$ (where $i = \sqrt{-1}$)

Let A = The sum of the complex roots of $f(x)$

Let B = The product of the complex roots of $f(x)$

Find $A + B$.

Algebra II Team Question #3**February Regional**

For $f(x) = Ax^2 + Bx + C$, given that $f(0) = 4$, $f(1) = 8$, $f(-1) = 12$ write a line equation in the form $Ax + By = C$ (using the A, B , and C from the quadratic function.)

Let the intercepts of this line be the points $(R, 0)$ and $(0, Q)$. Find the value of the product $9RQ$.

Algebra II Team Question #4**February Regional**

$f(x) = 2x + A$ and $g(x) = 7x + B$ intersect at $(4, -3)$. Let $(C, 0)$ be the x -intercept of $f(x)$ and $(D, 0)$ be the x -intercept of $g(x)$. Find the product $ABCD$ as a fraction in lowest terms $\frac{N}{D}$. Give the value of the sum $N + D$.

Algebra II Team Question #5**February Regional**

Let $A = (\log_2 3)(\log_3 4)(\log_4 5)(\log_5 6)(\log_6 7)(\log_7 8)$

Let B = the positive x -intercept of $y = 6x^2 + 3x - 30$

Let C = The minimum y value of $y = 3|x - 5| - 7$

Let D = The x coordinate of the center of $4x^2 + 4y^2 - 16x - 20y - 10 = 0$

Find the value of the product $ABCD$.

Algebra II Team Question #6 **February Regional**

Two numbers are drawn without replacement from the set $\{2, 3, 5, 7, 11\}$

Let A = the probability that the sum of the two numbers drawn is even

Let B = the probability that the product of the two numbers drawn is even

Let C = the probability that $\log_x y$ is greater than 1 (Let x be the first number drawn and y be the second number drawn.)

Find $A+B+C$ as a fraction in lowest terms.

Algebra II Team Question #7 **February Regional**

The area of one right triangle is 44 square meters. Find the lengths of the legs of the triangle if one leg is 3 meters longer than the other. Another right triangle has a hypotenuse which is 25 meters long. Find the lengths of the legs of this second triangle if one leg of this second triangle is 10 meters less than twice the second. What is the sum of the lengths of the legs of these two triangles?

Algebra II Team Question #8 **February Regional**

Find the equation of the perpendicular bisector line of the chord whose endpoints are the common solutions of $x^2 + y^2 = 36$ and $x + y = 6$.

Algebra II Team Question #9 **February Regional**

If $x + xi + 2y - yi = 11 + i$ (where $i = \sqrt{-1}$), find the value of x^y accurate to three decimal places.

Algebra II Team Question #10 **February Regional**

The Mets won x games in May and they lost three fewer games than they won. The ratio of wins to losses for the month was 5:4

Let A = The number of games they won in May

Let B = The number of games they lost in May

Let C = The number of games they played in May

Find $\frac{A+B}{C}$.

Algebra II Team Question #11 February Regional

Personal computer A has a printer that can print a page every 30 seconds. Personal computer B has a printer that can print a page every 20 seconds. A 500 page document needs to be printed as quickly as possible. Both printers print pages in increasing page number order from the page that they begin. If printer A starts on page 1, on what page should printer B start to have the machines finish at approximately the same time? Call that page number D. Additionally, how many seconds will it take to complete the job? Call this time S.

Give the sum of $D + S$

Algebra II Team Question #12 February Regional

Sonya rode her bike for 3 hours at a steady rate and walked for 2 hours at a different steady rate. The next day she rode her bike for 4 hours and walked for 1 hour at the same biking and walking rates of the previous day. She traveled 42 miles the first day and 51 miles the second day. If her biking rate is B miles per hour and her walking rate is W

miles per hour, find $\frac{W}{B}$ in lowest terms.

Algebra II Team Question #13 February Regional

Ralph, an appliance salesman, earns a commission of \$50 for each washing machine he sells and \$100 for each refrigerator he sells. One week he earns \$500 in commission selling only washing machines and refrigerators. If x = the number of washing machines sold and y = the number of refrigerators sold, find the ordered pair (x, y) of all ordered pairs (x, y) that satisfy the conditions above, give the ordered pair that is closest to the point $(5,5)$.

Algebra II Team Question #14 February Regional

Find the coordinates of all of the vertices of the region bounded by

$$x \geq 0$$

$$y \geq 1$$

$$y \leq \frac{-1}{2}x + 5$$

$$y \geq x - 3$$

Find the sum of the ordinates and abscissas of the ordered pairs that you found.

Algebra II Team Question #15 February Regional

Let $f(x) = \frac{1}{x+3}$. Find $f(f(f(f(5))))$. Express your answer as a fraction in reduced form.