

PLANT CITY HIGH SCHOOL
MU ALPHA THETA INVITATIONAL
FEBRUARY 24, 2001
ALGEBRA II TEAM

1. If the area of a rectangle is represented by $(a^2 - b^2)$ and the length is represented by $\frac{a-b}{a^2+ab}$ what expression represents the width?

2. A two-digit number is equal to four times the sum of its digits. The number obtained by reversing the digits is 6 less than twice the original number. Find the original number.

3. Find the area of the intersecting region of:

$$\begin{aligned} 2x + y &\leq 4 \\ 4x - y &\geq -4 \\ y &\geq 0 \end{aligned}$$

4. Find all real values of x : $\sqrt{2x-5} = \sqrt[3]{2x-5}$

5. A is the length of the major axis in $4(x-1)^2 + 9(y+1)^2 = 1$

B is the length of the line segment with endpoints $(1, 4)$ and $(2, 3)$

C is the 25th term of $8, 6\frac{1}{2}, 5, 3\frac{1}{2}, \dots$

Find $2A - C + B^2$

6. The endpoints of a line segment are $(4, b)$ and $(a, 3)$. Find $a + b$ if the midpoint of the line segment is $(-3, 5)$.

7. Write the equation, in slope intercept form, for the line that is the perpendicular bisector of the line segment with the endpoints $(2, 1)$ and $(6, -7)$.

8. A is the set of all values for the range of $y = [x]$ where $[]$ represents the greatest integer function.

B is the set of all values for the domain of $y = \sqrt{1-x}$

C is the set of all values for the range of $y = x^2 - 2$

List all values of $(A \cap B) \cap C$.

9. When moving in still water at full force, a motorboat can attain a maximum speed of S mph. When moving upstream at full force, the boat travels at 36 mph. When the boat is driven downstream at one-fourth of full force, it moves at 14 mph. Find S , the boat's maximum speed in still water.

10. Find the distance between the center of the circle $x^2 + y^2 - 2x + 8y + 12 = 0$ and the focus of the parabola $x = y^2 + 4y + 3$.

11. For $\frac{2x-38}{x^2-2x-8} = \frac{A}{x+2} + \frac{B}{x-4}$ where A and B are integers. Find $A - B$.

12. A is the characteristic of $\log 347.6$

B is the discriminant of $2x^2 - 4x = 7$

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

C = $2 \log_3 4$

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13. If the 4th term of an arithmetic sequence is $8\frac{1}{2}$ and the 8th term is 16, find the 22nd term.
14. For $x^3 - 7x + 6 = 0$ what is the sum of the roots plus the product of the roots minus the sum of the reciprocals of the roots.
15. Solve for x : $8^{4x-5} = 4^{x+3} + 4^{x+3}$