Junior-Senior Individual Test

Directions: Please answer all questions on the answer sheet provided. All answers must be written legibly in the correct blanks on the answer sheet and in simplest form. **<u>Exact</u>** answers are to be given unless otherwise specified in the question. No units of measurement are required. Each problem has the same point-value.

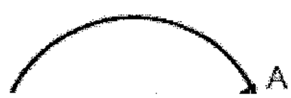
1. Find the sum of all distinct values of x such that $\left[\log_k\left(x^2\right)\right]\left(\log_{12} k\right) = 2$.

2. Let $i = \sqrt{-1}$. Then $-2i^2 + \left(\sqrt{-4}\right)\left(\sqrt{4}\right) - \left(\sqrt{-3}\right)\left(\sqrt{-3}\right) - 2i^5 = a + bi$, where a and b are real numbers. Find

   the value of $(3a + 2b)$.

3. If x is an integer, find the sum of all distinct values of x such that $\dfrac{x-4}{x-9} - 3 \geq 0$.

4. In the diagram, A, B, and D lie on the circle with center O



10. Find the value of $\log_{27}\left(9\left(\frac{1}{27}\right)^{-2}\right)$. Give your answer as a fully reduced **improper** fraction.

11. Find the eighth term of an arithmetic progression whose first term is 3 and whose 31st term is 73. Give your answer as a fully reduced **improper** fraction.

12. Suppose that $\frac{8!}{3!k!} = 56$. Find the value of k.

13. When 1, 2, 3, 4, and 5 are substituted for x in a polynomial expression for x, the results are, respectively

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1. ______________________ 11. ______________________

2. ______________________ 12. ______________________

3. ______________________ 13. ______________________

4. ______________________ 14. ______________________

5. ______________________ 15. ______________________

6. ______________________ 16. ______________________

7. ______________________ 17. ______________________

8. ______________________ 18. ______________________

9. ______________________ 19. ______________________

10. ______________________ 20. ______________________

Name: ______ANSWERS______ Team Code: ________

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