Advanced Math CP Summer Assignment Name_____

DUE: August 9, 2021

This assignment is for students who have completed Algebra 2 or Algebra 2 Honors and are taking Advanced Math CP in the 2021-2022 school year.

Did you read the instructions? _____

What math are you taking in the 2021-2022 school year? _____

The expectation of the Math Department at Archbishop Hannan High School is that its students become Tenacious Problem Solvers! Thus, as you work on these problems be sure and document your strategies, your mathematical explanations, any drawings, tables or graphs that you use, and the best, complete answer you can find. We hope that you are challenged by these problems and enjoy them. We look forward to the discussion of these problems that we will have in the first weeks of school. Come prepared to defend your solution!

1. If k stands for an integer, then is it possible for $k^2 + k$ to stand for an odd integer? Explain.

2. Can you think of a number k for which $k^2 < k$ is true? Graph all such numbers on a number line. Also describe them using words and using algebraic notation.

3. A farmer wants to build a rectangular fence near a river, and will use 120 ft of fencing. What are the dimensions of the largest region that can be enclosed if the side next to the river is not fenced?

4. Explain why $y = \log_5 -25$ has no solution. Be specific using proper terminology.

5. If you were given an equation $y = 2(x-5)^3 + 4$ and asked to state how it was transformed from its parent graph $y = x^3$, how would you describe its transformations? Be specific and use proper terminology.

Essential Skills

The following problems represent the essential skills you need to be successful in Advanced Math.

Simplify. Rationalize if necessary.

1) $\dfrac{10 + 3i}{-i}$

2) $\dfrac{\sqrt{10}}{-1 + \sqrt{6}}$

Solve each equation.

3) $4^{2-2b} \cdot 4^{2b-1} = \dfrac{1}{4}$

4) $81^{-2n} \cdot 81^{-2n} = \dfrac{1}{243}$

Solve each equation. You will need to rewrite as a log then use your calculator for these.

5) $9^{x-8.5} - 2 = 53$

6) $-7 \cdot 11^{a-6} + 7.8 = -61.6$

Solve each equation.

7) $\log_7 (4p^2 - 10p) = \log_7 (-9 + 3p^2)$

8) $-6 \log_{12} -9k = -6$

9) $\log_8 -x + \log_8 9 = \log_8 43$

10) $\log_6 (x + 7) - \log_6 3 = 1$

Solve each equation by completing the square.

11) $x^2 + 14x + 40 = 0$

12) $r^2 - 4r - 64 = 0$

Solve each equation by factoring. Give answers as integers or fractions.

13) $r^2 + 15r + 56 = 0$

14) $10p^2 - 43p + 28 = 0$

15) $3n^2 + 5n = 0$

16) $5x^2 + 33x - 56 = 0$

Solve each equation with the quadratic formula.

17) $6a^2 - 124 = 7a$

18) $6a^2 = -3a + 135$

Solve each equation. Remember to check for extraneous solutions.

19) $\sqrt{28 - 2k} = 4$

20) $3\sqrt{3b + 3} = 9$

21) $\sqrt{18 + 3x} = x$

22) $250 = 7 + b^{\frac{5}{4}}$

Find the inverse of each function.

23) $f(x) = 2x - 4$

24) $y = 9\log_4 x$

25) $y = 3^x - 6$