Name _____

Algebra II Honors Teacher _____

HONORS PRE-CALCULUS

As instructors of Honors Pre-Calculus, we have extremely high expectations of students taking our course. We expect a certain level of independence to be demonstrated by anyone taking Honors Pre-Calculus. Your first opportunity to demonstrate your capabilities and resourcefulness to us is through this summer work packet. We expect you stay current on your skills as well as improve upon them. Therefore, this packet is a requirement for Honors Pre-Calculus. It will serve as your review guide for the test over this material which will be given *within the first couple classes* of school. ***SHOW US YOUR BEST WORK.*** It needs to be completed on the first day of class.

Requirements:

The following are guidelines for completing the summer work packet....

- SHOW ALL WORK ON THE FOLLOWING PAGES. Please include all the steps used to answer each question. Your work should lead to the correct answer. **Please circle or box each answer!!**
- Be sure all problems are neatly organized, and all writing is legible.
- Try your best. Be resourceful! This might include looking back to your notes from previous years or even finding a book or website such as khanacademy.org with formulas or explanations.
- **Come to class prepared with questions** especially over the topics you aren't as familiar with. We will spend a class reviewing the material before you take the test over the material. If you don't ask questions, we will assume you completely understand it.
- In the event that you are unsure how to perform functions on your calculator, you may need to read through your calculator manual (or google it) to understand the necessary syntax or keystrokes. You must be familiar with certain built-in calculator functions such as finding intersection points and zeros of a function.
- We expect you to come in with certain understandings that are prerequisite to Honors Pre-Calculus. A list of these topical understandings can be found below. Please be familiar with all of these and ready to apply them to a higher level.
    - Factoring
    - Solving equations (quadratic, rational, and equations with radicals)
    - Quadratics (solving by factoring, quadratic formula and completing the square)
    - Use SOH-CAH-TOA and Pythagorean Theorem to solve right triangles.
    - Use your calculator to find zeros and points of intersection
    - Definitions of functions, combinations and composites of functions
    - Inverse Functions
    - Solving exponential and logarithmic equations.

Finally, we suggest not waiting until the last two weeks of summer to begin on this packet. If you spread it out, you will most likely retain the information much better.

Once again this is due, completed with quality, on the first day of class. It is your ticket into the class. Best of luck, and if you have any questions, feel free to contact us.

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First impressions are lasting impressions...impress us!!

If I have seen farther than others it is because I have stood on the shoulders of giants"
--Newton

"In most sciences, one generation tears down what another has built. In mathematics, each generation builds a new story to the old structure."

Solve the following equations for ALL solutions (real and imaginary) such that y=0. Do these with NO calculator.

1. $y = 2x^2 + 5x + 1$

2. $y - 2 = 3x^2 + 3x$

3. $y = (x-6)^2 - 25$

4. $y = x^3 - 3x^2 + 2x - 6$

Solve for x.

5. $\sqrt{x-2} + 1 = x - 1$

6. $\frac{3}{x-5} - \frac{2}{x} = 1$

Factor the following. If not possible, state "not factorable".

7. $2x^2 + 6x - 20$

8. $36x^4 - 16$

9. $25 - x^3$

10. $x^3 + 5x^2 + 4x + 12$

Solve the following by using the quadratic formula and letting y=0.

11. $y - 4 = 3x^2 + 7x$

12. $x^2 + 5x = 7 + y$

Use your graphing calculator zero feature to find the x-intercepts of the following.

13. $y = 3x^3 + 15x^2 - 11$

14. $y = \dfrac{2x + 7}{2x^2} - 5$

Use your graphing calculator's intersect feature to find the solutions to the following.

15. $-x^2+5=x^3$

16. $|x|+4=-x^2+3x+6$

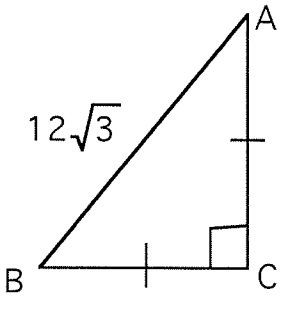
Simplify to one fraction.

17. $\dfrac{2}{x-3}+\dfrac{5}{x-3}+2$

18. $\dfrac{\dfrac{5}{x+2}-\dfrac{x}{2}}{3x}$

Use your knowledge of right triangles to solve the following triangles (find all 3 side lengths and 3 angle measures.)

19.



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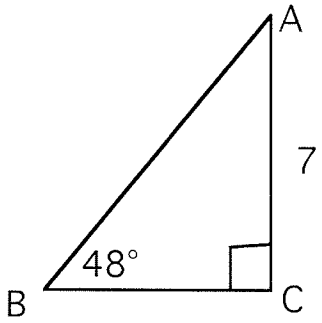

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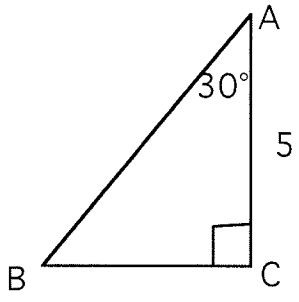

Find the following combinations and compositions of functions.

Given $f(x) = x^2 - 3x + 2$
$g(x) = x - 5$

22. $(f+g)(x)$ 23. $(f-g)(x)$ 24. $(fg)(x)$ 25. $\left(\frac{f}{g}\right)(x)$

Given $f(x) = x^2 - 3$
$g(x) = x - 2$

26. f(-5) = Write your answer as an ordered pair _____

27. g(0) = Write your answer as ordered pair _____
What is this point called? _____

28. $f(g(x)) =$ 29. $g(f(x)) =$

30. $f(g(-1)) =$ 31. $g(f(-2)) =$

32. y = 7

State the line's slope _____

State a line perpendicular: _____ parallel: _____

Name 2 points on this graph _____

33. 3x – 2y = 7x – 8

State the line's slope _____

State a line perpendicular _____ and parallel _____

Name 2 points on this graph _____

34. Solve each absolute value inequality.

a) $-2|x-4| \leq -10$

b) $|2x-7| \leq 9$

c) $5|x+3| \leq 20$

35. Determine the end behavior of the following functions **without** graphing.

a) $f(x) = -\frac{3}{4}x^5 + 2x^2$

b) $f(x) = 4x^6 + 3x^3 - 1$

c) $f(x) = x^3 + 2x^2 - 7x + 10$

d) $f(x) = -x^4 + 3x^2 + 1$

36. Divide using synthetic division: $\frac{2x^4-5x^2-3}{x-2}$.

37. Use synthetic division to show that $x=\sqrt{3}$ is a zero of $f(x)=4x^3-x^2-12x+3$. Then, use the result to factor the polynomial function completely and list all the real zeros of the function.

38. Perform each operation and write the result in standard form $(a \pm bi)$

a) $10i-\left(3+\sqrt{-25}\right)$ b) $\left(2+i\sqrt{3}\right)\left(2-i\sqrt{3}\right)$ c) $\frac{5}{2+i}$

39. Find a polynomial function with real coefficients that has the given zeros.

a) $0,3,3+i,3-i$

b) $1+i\sqrt{3},1-i\sqrt{3},2,2$

40. Find all the zeros of the function. (Use the rational root test.)

a) $f(x)=x^3+2x^2+5x+10$

b) $f(x)=x^4-9x^2-22x-24$

41. For each of the following: a) Find the inverse function of $f(x)$.
b) State the domain and range of $f(x)$ and $f^{-1}(x)$

A) $f(x) = 2x - 3$

B) $f(x) = \sqrt{x}$

42. Evaluate the following.

a) $\log_2 64$

b) $\ln e$

c) $\ln e^{2x}$

d) $\log 1000$

e) $\log_5 \frac{1}{125}$

f) $\log_2 \sqrt[4]{8}$

43. Write the following log expressions in expanded form.

a) $\ln \frac{xy^2}{z^3}$

b) $\log\left(\frac{x^2 - 1}{4}\right)$

c) $\ln \sqrt{\frac{x}{y}}$

44. Write the following log expressions as a single log expression.

a) $2\ln x - \frac{1}{2}\ln y$

b) $4\ln x - \left(2\ln y + \frac{1}{3}\ln z\right)$

Solve the following exponential and logarithmic equations. When necessary, round to two decimal places.

45. $3^{2x} - 7 = 10$

46. $e^{4x} + 5 = 8$

47. $9 = 81^{3x-2}$

48. $5^{\frac{x}{2}} = 12$

49. $3\ln x = -2$

50. $3\log 2x + 1 = 13$

51. $2\log_2 5x = 6$

52. $\ln(2x+4) + \ln(x-3) = 2\ln x$

53. $\log_3 x + \log_3(x+2) = \log_3 15$