

Name \_\_\_\_\_

## Honors Pre-Calculus Summer Packet

**Welcome to Honors Pre-Calculus!** Based on your performance in Algebra II or the results of the placement test, you have been selected to take Honors Pre-Calculus next school year. This course assumes that you have mastered the core skills of Algebra II. We will use these skills to solve problems in Pre-Calculus over the next school year. If you feel that you have been placed incorrectly, please contact [oa@jcarroll.org](mailto:oa@jcarroll.org) to update your roster.

To keep your Algebra II skills fresh over the summer, I have prepared a review packet for you to complete. It is due on the FIRST day of school! I expect that all problems will be attempted. If you do not know how to solve a certain type of problem, please go to Khan Academy ([www.khanacademy.org](http://www.khanacademy.org)) which provides online tutorials, demonstrations, and step-by-step practice problems. There will be a quiz on these types of problems during the second week of school.

I look forward to meeting and working with all of you next school year. Please email me with any questions ([evolpe@jcarroll.org](mailto:evolpe@jcarroll.org))

Sincerely,  
Mrs. Volpe

*Please Note:* ALL students registered for Honors Pre-Calculus are required to complete this summer packet, regardless of the teacher assigned on their roster.

**Directions:** Complete the following problems on loose-leaf paper and attach it to the back of the packet.

Graph the following equations and inequalities

1.  $y = -\frac{1}{2}x - 5$
2.  $2x + 3y = 12$
3.  $3x + 12y \geq 4$
4.  $y < -2x + 1$

5. Determine if the following lines are parallel, perpendicular, or neither  
Line 1: through (-3, 3) and (3, -1)  
Line 2: through (-2, -3) and (2, 3)

Solve the following systems of equations using any method

6. 
$$\begin{aligned} 2x + 3y &= 5 \\ x - 5y &= 9 \end{aligned}$$

7. 
$$\begin{aligned} -2x + y &= 6 \\ 4x - 2y &= 5 \end{aligned}$$

8. 
$$\begin{aligned} 3x + 2y &= 6 \\ -6x - 3y &= -6 \end{aligned}$$

9. 
$$\begin{aligned} 3x - 7y &= 20 \\ -11x + 10y &= 5 \end{aligned}$$

10. 
$$\begin{aligned} 3x + 2y - z &= 8 \\ -3x + 4y + 5z &= -14 \\ x - 3y + 4z &= -14 \end{aligned}$$

Graph the following systems of inequalities

11. 
$$\begin{aligned} x + y &\geq -2 \\ -5x + y &< -3 \end{aligned}$$

12. 
$$\begin{aligned} y &> 2x - 7 \\ 4x + 4y &< -12 \end{aligned}$$

Simplify the following matrices using the appropriate matrix operations

13. 
$$\begin{bmatrix} 4 & 7 \\ -5 & 1 \end{bmatrix} - 6 \begin{bmatrix} -3 & -2 \\ 0 & 6 \end{bmatrix}$$

14. 
$$\begin{bmatrix} 4 & 5 \\ 2 & -3 \\ 1 & 9 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ -3 & 4 \end{bmatrix}$$

15. 
$$\det \begin{bmatrix} 4 & 5 \\ 1 & 3 \end{bmatrix}$$

16. 
$$\det \begin{bmatrix} 8 & 5 & 4 \\ -7 & 2 & 4 \\ 11 & 2 & 9 \end{bmatrix}$$

17. Graph the following quadratic function. Identify the minimum or maximum value then state the domain and range.

- a.  $y = 2x^2 - 12x + 19$
- b.  $y = -(x - 2)^2 - 1$
- c.  $y = (x + 1)(x + 2)$

18. Solve the following quadratic function using any method

- a.  $x^2 + 6x - 27 = 0$
- b.  $x^2 - 25 = 0$
- c.  $-x^2 - 12 = -87$
- d.  $5x^2 = -5x + 10$
- e.  $(2x - 5)^2 = 81$
- f.  $x^2 + 3x - 2 = 0$

19. Simplify the following complex numbers using appropriate complex number operations

- a.  $(6 + 2i) + (5 - i)$
- b.  $(-1 - i) + (9 - 3i)$
- c.  $(7 + 5i)(7 - 5i)$
- d.  $\frac{2i}{1-i}$

20. Graph the following complex numbers

- a.  $6 + 2i$
- b.  $3 - 4i$
- c.  $-2 + 4i$

21. Classify the following polynomial by degree and number of terms, write the polynomial in standard form, and identify the lead coefficient.

- a.  $f(x) = 2x + \frac{3}{4}x^4 + 9$
- b.  $f(x) = -2x^3 + 4x - 5$
- c.  $f(x) = 12 - 5x$

22. Simplify the following polynomials using the appropriate polynomial operations

- a.  $(3x^3 + 10x + 5) - (x^3 - 4x + 6)$
- b.  $8x(14x + 3) + (41x^2 + 3x^3)$
- c.  $(2x + 5)(3x^3 - x^2 + x)$

23. Divide the following polynomials using any method

a.  $(3x^2 + 11x + 1) \div (x - 3)$

b.  $(x^4 - 6x^3 - 40x + 33) \div (x - 7)$

24. Determine if the following binomial is a factor of the given polynomial

a.  $f(x) = 15x^3 - 119x^2 - 10x + 16; (x - 8)$

25. Find the inverse of the following polynomial

a.  $y = -9x - 4$

b.  $y = 5x^3 + 7$

c.  $y = \sqrt[5]{x - 3} - 2$

26. Solve the following compositions:  $f(x) = 6x + 4$  and  $g(x) = x^2 + 3x - 2$

a.  $f(g(x))$

b.  $g(f(2))$

c.  $f(x) - g(x)$

27. Simplify the following rational expressions

a.  $7^{\frac{1}{2}} * 7^{\frac{1}{4}}$

b.  $\frac{\sqrt[5]{x^{10}}}{\sqrt{y^5}}$

c.  $(\sqrt[3]{x^2} * \sqrt[3]{x^4})^2$

d.  $\frac{xy^{5/3}}{x^{-1/2}y^{1/3}}$

e.  $\sqrt[3]{-27x^9y^{15}}$

28. Rewrite the following exponentials in logarithmic form

a.  $2^3 = 8$

b.  $4^3 = 64$

29. Rewrite the following logarithms in exponential form

a.  $\log_4 1024 = 5$

b.  $\log_{12} 144 = 2$

30. Solve the following exponential and logarithmic equations

a.  $5^{3-2x} = 5^{-x}$

b.  $64^a = 8^{a+2}$

c.  $3^x = 17$

d.  $16^{n-7} + 5 = 24$

e.  $e^{x-1} - 5 = 5$

31. Lea invests \$5000 in a savings account with a fixed annual interest rate of 6%. Find the balance after 10 years if the interest is compounded:

a. annually

b. quarterly

c. daily

d. continuously

