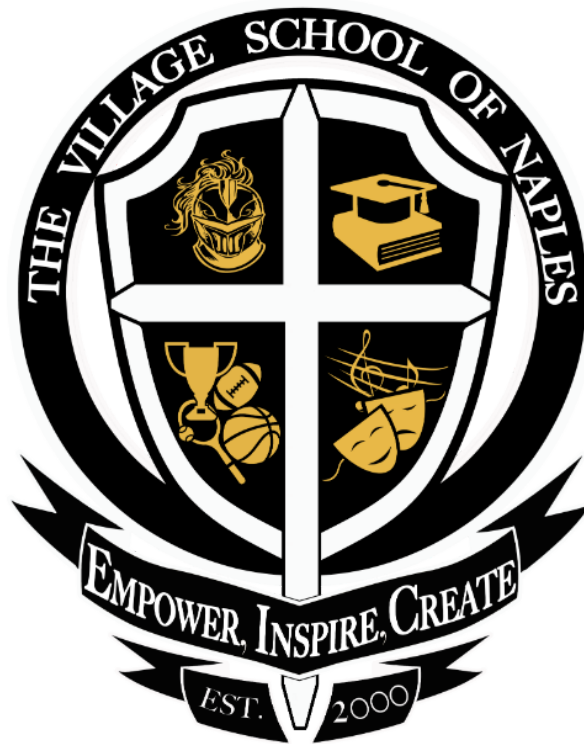


The Village School's Precalculus Summer Math Packet



Welcome to Precalculus (CP and Honors) at The Village School of Naples. This packet consists of important concepts necessary for success in Precalculus. **Completion of this packet is optional but highly recommended for all Precalculus students and should be done in pencil.** As you complete this packet, show all steps used to arrive at your final answer. This packet contains mathematical practice problems to keep your math skills sharp.

Show your work and answers on separate paper.

Part 1: Mathematical practice problems to keep your math skills sharp.

Lines

Write a linear equation for the function.

1. With slope $\frac{3}{2}$ and y-intercept 7.
2. With slope -2 through $(-4, 5)$.
3. Through $(-1, 2)$ and $(4, 5)$.
4. With x-intercept -1 and y-intercept 3.
5. Parallel to $x + 2y = 5$ through $(1, 4)$.
6. Perpendicular to $x = 2y = 5$ through $(-3, 2)$.

Functions

Evaluate and simplify each function as directed.

7. $f(x) = 3x - 5$
 - a. $f(-3)$
 - b. $f(a)$
 - c. $f(\text{dog})$
 - d. $f(x + h)$
8. $f(x) = x^2 - 5x + 2$
 - a. $f(0)$
 - b. $f(3)$
 - c. $f(4y)$
 - d. $f(x + h)$
9. $g(x) = \frac{x+2}{1-x}$
 - a. $f(-2)$
 - b. $f(1)$
 - c. $f(5)$
 - d. $f(x + h)$
10. $y(x) = \sqrt{2x + 6}$
 - a. $f(-5)$
 - b. $f(0)$
 - c. $f(a - 3)$
 - d. $f(x + h)$

Find the domain and range for each of the following functions.

Write your answers in interval notation.

11. $f(x) = x^2 - 8x + 5$
12. $f(x) = 6x - x^2$
13. $y = \sqrt{x} + 6$
14. $g(x) = |x + 4|$
15. $f(x) = \sqrt{16 - x^2}$
16. $f(x) = \frac{x}{x+3}$

THIS PACKET IS OPTIONAL AND WILL NOT BE GRADED.

$$17. f(x) = \frac{x^2-4}{x-2}$$

Simplify the following expressions.

Rationalize denominators when the denominator has a root.

$$18. 5^0(3xy^2)^3(4x^2y)^4$$

$$22. \frac{1}{\sqrt{2}}$$

$$19. \frac{(x^{-1}y^2)^{-2}}{(x^{-3}y)(x^2y^{-1})}$$

$$23. \frac{\sqrt{75x^3}}{\sqrt{16xy^2}}$$

$$20. \sqrt{72}$$

$$24. \frac{5}{\sqrt[3]{5x^2}}$$

$$21. \sqrt{12x^5y^6}$$

$$25. \frac{2x}{\sqrt{x+1}}$$

Find the inverse of each function. Verify your inverse by computing $(f \circ g)(x)$ or $(g \circ f)(x)$ which will equal x if they are indeed inverses of each other.

$$26. f(x) = 5x + 3$$

$$28. f(x) = \sqrt{x + 4}$$

$$27. g(x) = (x - 1)^2 + 2$$

$$29. f(x) = 2^{x-3}$$

Factor each of the following expressions.

$$30. x^2 - 81$$

$$33. 6x^4 - 5x^3 - 4x^2$$

$$31. x^2 + 10x + 25$$

$$34. x^4 - 10x^2 + 9$$

$$32. x^2 + 2x - 8$$

$$35. 9x^3 + 6x^2y - 3xy^2$$

Solve each of the following equations.

$$36. 6x + 14 = 2(x - 3)$$

$$37. y^2 = 5y + 14$$

$$38. 2x^2 - 4x - 5 = 0$$

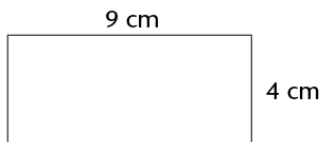
39. $x^3 + 5x^2 = 4x + 20$

Geometry

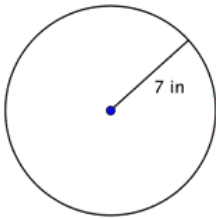
Find the specified values. Look up any formulas that you do not remember.

40. Find the length of a rectangle with area, $A = 56 \text{ cm}^2$, and width, $w = 7 \text{ cm}$.

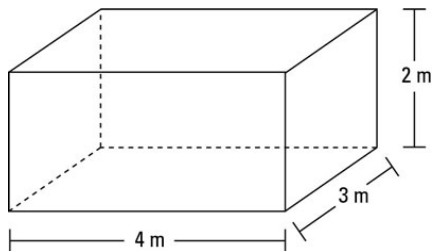
41. Find the area and perimeter.



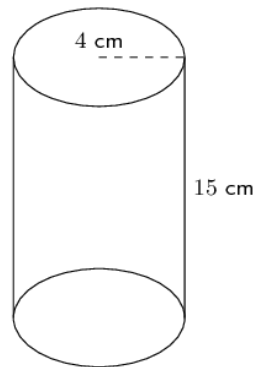
42. Find the area and circumference.



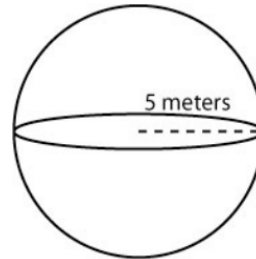
43. Find the volume and surface area.



44. Find the volume and surface area.



45. Find the volume and surface area.



Sketch each of the following functions and equations, without the use of a graphing calculator or Desmos.

46. $f(x) = -2x + 7$

48. $f(x) = |x + 2| - 4$

47. $2x - 3y = 12$

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

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50. $f(x) = x^2 + 6x + 5$

52. $f(x) = 2^x$

51. $g(x) = (x - 3)^2 + 1$

53. $y = \sin\left(x - \frac{\pi}{2}\right) + 2$