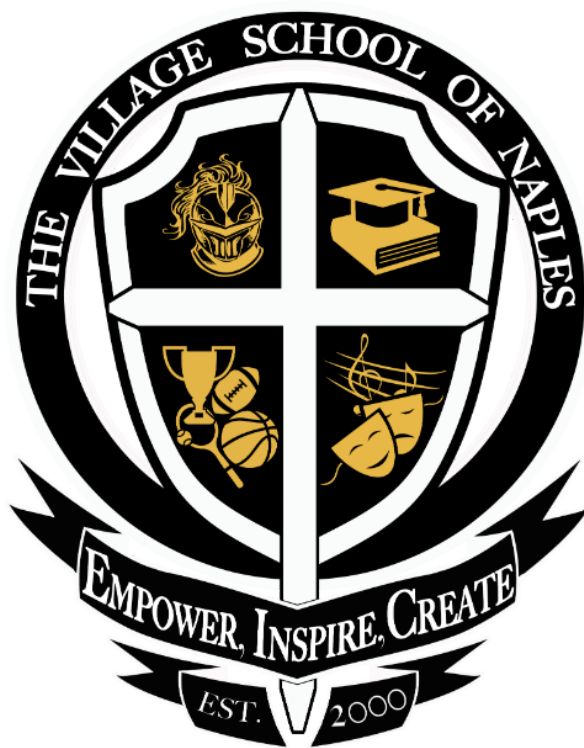# The Village School's Precalculus Summer Math Packet

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 NOT optional 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.

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. $f(dog)$
   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. $f(x) = \frac{x}{x+3}$

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

Simplify the following expressions.
Rationalize denominators when the denominator has a root.

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

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

19. $\dfrac{\left(x^{-1}y^2\right)^{-2}}{\left(x^{-3}y\right)\left(x^2y^{-1}\right)}$

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

20. $\sqrt{72}$

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

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

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

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. $6x + 14 = 2(x - 3)$
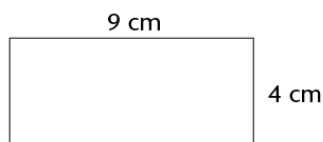
39. $x^3 + 5x^2 = 4x + 20$
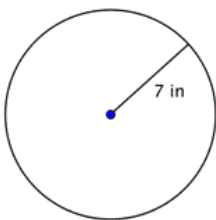
37. $y^2 = 5y + 14$

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

Geometry

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

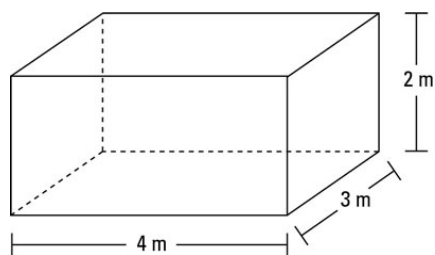40. Find the length of a rectangle with area, $A = 56\ cm^2$, and width, $w = 7\ cm$.

41. Find the area and perimeter.

9 cm

4 cm
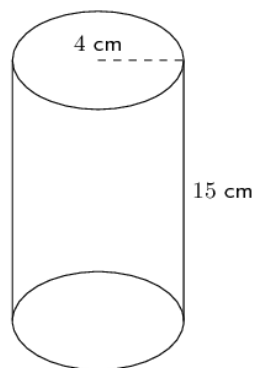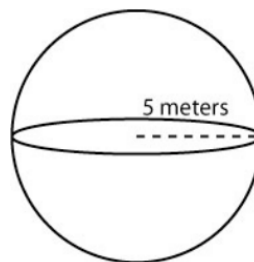
42. Find the area and circumference.

7 in

43. Find the volume and surface area.

2 m

3 m

4 m

44. Find the volume and surface area.

4 cm

15 cm

45. Find the volume and surface area.

5 meters

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

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

47. $2x - 3y = 12$

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

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

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

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

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

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