The Village School's
AP Calculus AB Summer Math Packet

Welcome to AP Calculus AB at The Village School. This packet consists of important concepts necessary for success in AP Calculus AB. Completion of this packet is mandatory for all AP Calculus AB students and must be done in pencil. As you complete this packet, show all steps used to arrive at your final answer. It consists of mathematical practice problems to keep your math skills sharp. The exercises are direct and do not take much time. The packet will be graded on completion, so keep trying problems, even if you have trouble.

Mathematical practice problems to keep your math skills sharp.

LINES:

Write a linear equation for the function.

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

FUNCTIONS:

Evaluate and simplify each function as directed.

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

Find the domain and range for each of the following functions.
Write your answers in interval notation.

11. $f(x)=(x-3)^2-4$
12. $y=\sqrt{x-6}+3$
13. $g(x)=2|x-7|-1$
14. $f(x)=\sqrt{25-9x^2}$
15. $f(x)=\frac{2x+3}{x-1}$
16. $f(x)=\frac{x-3}{x^2-9}$
17. $f(x)=\frac{\sqrt{x}}{x-4}$

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.***

18. $f(x) = 4 - 10x$

19. $g(x) = 5x^3 + 2$

20. $f(x) = 3 - \sqrt{x}$

21. $f(x) = \frac{2x+3}{x-1}$

Factor each of the following expressions.

22. $25x^2 - 16y^2$

23. $4x^2 + 12x + 9$

24. $12x^5 - 10x^4 - 8x^3$

25. $x^7 + 6x^4 - 16x$

26. $6x^3y - 26x^2y^2 + 8xy^3$

27. $x^6 - 1$

Solve each of the following equations.

28. $5x + 9 = 2(x + 2)$

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

30. $3x^2 - 6x - 7 = 0$

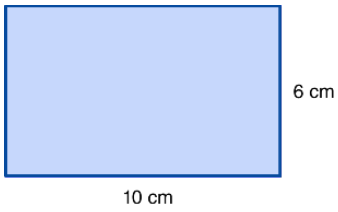
31. $x^3 + 3x^2 = 5x + 15$

GEOMETRY:

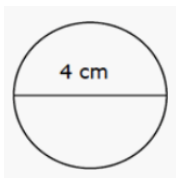
Find the specified values. Look up any formulas that you do not remember.

32. Find the length and width of a rectangle with area, $A = 36\ cm^2$, and perimeter, $P = 26\ cm$.

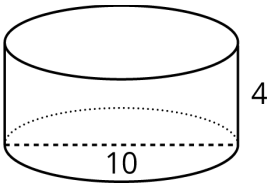
33. Find the area and perimeter.



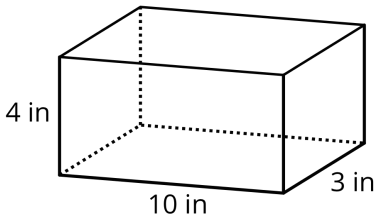
34. Find the area and circumference.



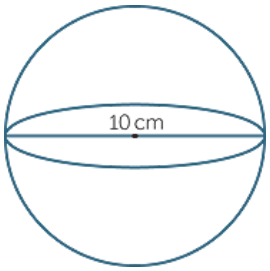
35. Find the volume and surface area.



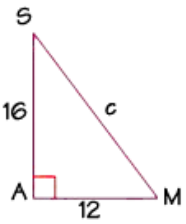
36. Find the volume and surface area.



37. Find the volume and surface area.



38. Find the hypotenuse. Then find $\sin M$, $\cos M$, $\tan M$, $\sec M$, $\csc M$, and $\cot M$.



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

39. $3x + 2y = 18$

40. $f(x) = 2|x + 3| - 5$

41. $y = \sqrt{x - 6} + 3$

42. $f(x) = 2x^2 + 8x + 3$

43. $g(x) = (x + 5)^2 + 3$

44. $f(x) = \ln x$

45. $f(x) = 3^x$

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

47. $y = 2\sin\left(2x - \frac{\pi}{3}\right) - 1$

48. $x^2 - 6x + y^2 + 8y + 24 = 0$

49. $\frac{(x+4)^2}{25} + \frac{(y+2)^2}{9} = 1$

Find the limits.

50. $\lim_{x \to 8} \sqrt{x + 8}$

51. $\lim_{x \to 2^-} \frac{|x-2|}{x-2}$

52. $\lim_{x \to 5} \frac{x^2-25}{x^2-4x-5}$

53. $\lim_{x \to \infty} \frac{x^2-25}{x^2-4x-5}$

54. $\lim_{x \to \infty} \frac{x+2}{x^2-4x+3}$