

SERVITE HIGH SCHOOL

CP Calculus
Summer
Packet



NAME: _____

PERIOD: _____

Calculus is a “capstone” math class. To be successful in this class the precursor skills must be mastered and retained. To assure that this is the case, we have created a summer packet for all students entering CP Calculus.

Directions: Please print this packet. The packet is intended to be like a textbook, providing problems but not the space to complete them. You will do your work on separate pages and **must show all work**. You **may** use a calculator **only on #89 - 100**. Give your final answers on the answer sheets provided and attach your work to those answer sheets.

This packet will be **collected and corrected** on the **second day** of school. You will be given a homework grade for completing this packet. Per Servite School policy, if this packet is not turned in on the second day of school, you will receive half credit if it is turned in the following day. After that, you will receive a zero for this packet.

An assessment will be given at the beginning of the school year to make sure you have mastered all pre-requisites covered in this packet. This assessment will count as a test grade. If you earn less than a 75% on the assessment, a meeting with the counseling staff will be held to reevaluate your goals and ability to remain in the course.

Have a great summer and we are looking forward to seeing you in August!

I understand I have to show all my work and can only use a calculator on #89 - 100.

(Student Signature)

(Date)

I have checked to see that my child have shown all work and completed all problems without the use of a calculator (except #89 - 100).

(Parent/Guardian Signature)

(Date)

CP Calculus Summer Packet

Equations of Lines

1. Write the equation that describes the line with slope = $-\frac{1}{2}$ and the y-intercept = $\frac{3}{2}$ in **slope-intercept form**.
2. Write the equation that describes the line **in slope-intercept form**: Slope = 4, point (6, -2) is on the line.
3. Write the equation **in point-slope form** for the line that has a slope of 6 and contains the point (-5, 2).
4. Write the equation that describes the line with slope = $-\frac{1}{2}$ and the point (-4, -5) in **slope-intercept form**.
5. Write an equation **in Point-Slope form** for the line perpendicular to $y = 8x - 2$ and passing through (5, -5)

Solving Systems of Equations

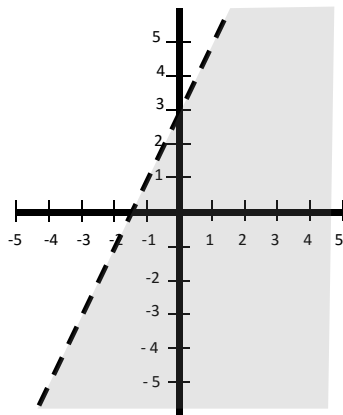
6. Tell whether the ordered pair (5, -3) is a solution of the system

$$\begin{cases} -3x + 2y = -21 \\ -x + y = -2 \end{cases}$$

7. Solve $\begin{cases} 3x + y = 13 \\ y = x - 3 \end{cases}$ by substitution Express your answer as an ordered pair.
8. Solve $\begin{cases} x + 2y = 5 \\ 3x + 2y = 17 \end{cases}$ by elimination Express your answer as an ordered pair.
9. Solve $\begin{cases} 2x - 5y = -7 \\ 5x - 3y = 11 \end{cases}$ by elimination Express your answer as an ordered pair.
10. Solve $\begin{cases} x = 7 - 2y \\ 2x + y = 5 \end{cases}$ using any method. Express your answer as an ordered pair.

Solving and Graphing Inequalities

11. Write an inequality to represent the graph



12. Tell whether the ordered pair (1, 5) is a solution of $y \leq 4x + 1$.

13. Graph the solutions of the linear inequality $-8x + 2y > -6$
Hint: re-write the inequality in the slope-intercept form first!!

Solve each inequality.

14. $-x^2 + 3x + 5 \geq 7$

15. $x^2 - 4x + 1 \geq 1$

Simplifying and Solving Exponential Expressions

16. Simplify 4^{-3}

17. Simplify $(-4)^0$

18. Evaluate $a^{-2}b^0$ for $a = 5$ and $b = -2$

19. Simplify $\frac{9x^0y^{-8}}{z^{-8}}$

20. Simplify the expression $125^{\frac{2}{3}}$

21. Simplify the expression $216^{\frac{1}{3}}$

22. Simplify. All variables represent nonnegative numbers.

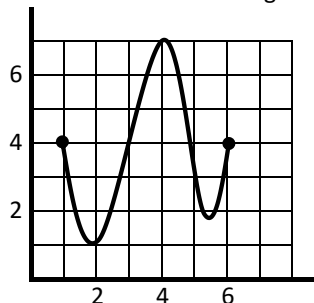
$$\left(a^4 b^{\frac{1}{2}}\right)^4 \quad {}^{12}\sqrt{b^{12}}$$

Functions

23. Give the domain and range of the following relation:

x	y
4	9
6	13
4	0
-5	-9

24. Give the domain and range of the following relation:



If $f(x) = x^2 - 4$ and $g(x) = (x + 2)$:

25. $f(x)g(x) = ?$

26. $f(x) / g(x) = ?$

27. $f(g(x)) = ?$

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

Factoring

29. Factor $12y^3 + 33y^2 - 6y$

30. Factor $5(x - 2) - 9x(x - 2)$ by grouping

31. Factor $15x^3 - 6x^2 - 25x + 10$ by grouping

32. Factor $x^2 + 51x + 50$

33. Factor the trinomial $a^2 + 14a + 48$

34. Factor $r^2 + r - 20$

35. Factor $x^2 + 20x + 36$.

36. Factor $3x^2 + 2x - 8$

37. Factor $2x^2 + 7x + 6$

38. Factor $-3x^2 + 26x - 16$

39. Determine whether $25x^2 - 40x + 16$ is a perfect square. If so, factor it. If not, explain why not.

40. Factor $16 - 49n^4$

41. Factor $27x^2z + 36xz + 12z$ completely.

42. Factor $30x^3 + 22x^2 + 4x$ completely.

Adding, Subtracting, Multiplying, and Dividing Polynomials

Add or subtract. Write your answer in standard form.

43. $(3x^2 - x + 1) + (x - 3)$

44. $(6x^2 - 3x + 2) - (7x^3 + 3x + 7)$

45. $(y^2 - 3y^2 + 2) + (y^4 + y^3 - y^2 + 5)$

46. $(4x^4 + x^2) - (x^3 - x^2 - 1)$

Find each product.

47. $xy(2x^4y + x^2y^2 - 3xy^3)$

48. $(t + 3)(2t^2 - t + 3)$

49. $(2x + 5)^3$

50. $(2y - 3)^4$

Divide using long division.

51. $(5x^2 - 6x - 8) \div (x - 2)$

52. $(2x^3 - 7x^2 + 9x - 4) \div (2x - 1)$

Complex Rational Fractions

53. Simplify $\frac{2}{x-3} + \frac{x+3}{5}$ Assume that all expressions are defined.

$$\frac{\frac{x+3}{x-3}}{\frac{x+3}{x-3}}$$

54. Divide and simplify $\frac{5x^4 - 10x^3}{x^3 - 2x^2}$ Identify any values for which the expression is undefined.

55. Divide and simplify $\frac{16x^3}{3x^2y^2} \div \frac{4}{9xy^7}$ Assume that all expressions are defined.

56. Add $\frac{2}{2-x} + \frac{x}{x^2-4}$

57. Simplify $\frac{3+\sqrt{2}}{3-\sqrt{2}}$

58. Simplify $\frac{\frac{x+3}{1} + \frac{2}{\sqrt{x+3}}}{x+3}$

Multiply or divide and then simplify. Assume that all expressions are defined.

$$59. \frac{4x + 12}{x^2 - x - 6} \cdot \frac{3x + 6}{x^2 - 9}$$

$$60. \frac{3xy^5}{x^2y^3} \div \frac{y^7}{9x^2}$$

$$61. \frac{x^2 + x - 6}{x^2 + 5x - 14} \div \frac{2x^2 + 11x + 15}{2x^2 - 9x - 35}$$

Add or subtract and simplify. Identify any x-values for which the expression is undefined.

$$62. \frac{4}{x + 3} + \frac{3}{x^2 + x - 12}$$

$$63. \frac{1}{3 - x} - \frac{x + 5}{x^2 - 9}$$

Graphing and Finding Roots of Equations

For each function: a) Determine whether it opens upward or downward, b) find the axis of symmetry, c) find the vertex, and d) find the y-intercept

$$64. f(x) = -x^2 + 4x + 1$$

$$65. h(x) = x^2 - 2x + 3$$

Find the roots of each equation using factoring

$$66. x^2 - 2x + 1 = 0$$

$$67. x^2 + 10x = -21$$

Solve each equation:

$$68. x^2 + 4x = 12$$

$$69. x^2 - 12x = 25$$

$$70. x^2 + 25 = 0$$

$$71. x^2 + 12x = -40$$

Find the zeros of each function using the quadratic formula:

$$72. f(x) = (x - 1)^2 + 7$$

$$73. g(x) = 2x^2 - x + 5$$

Logarithmic and Exponential Functions

Write each exponential equation in logarithmic form.

74. $d^{1.2} = y$

75. $\pi^0 = 1$

Write each logarithmic equation in exponential form.

76. $\log_q r = t$

77. $\log_{100} 10,000,000 = 3.5$

Express as a single logarithm and simplify if possible.

78. $\log_4 4 - \log_4 16 =$

79. $\log_5 125 + \log_5 25 =$

Simplify:

80. $\log_7 49^3 =$

81. $\log_2 \frac{1}{16} =$

82. $\ln e^{x+\pi} =$

83. $4^{5x} = 64; x =$

84. $3^x = 9^{x+5}; x =$

85. $\log \frac{1}{5} 25 + \log \frac{1}{5} 5 =$

86. $\log x + \log (x-3) = 1$

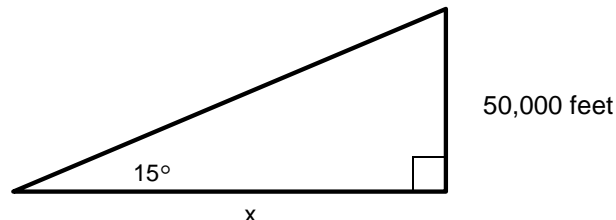
87. $\log_4 x^4 = 2 ; x =$

Trigonometry

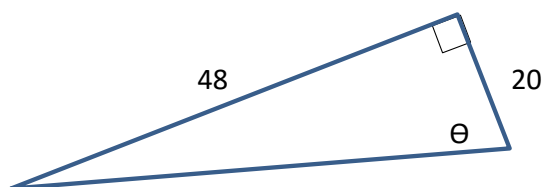
88. Fill in the unit circle table below. You will be given only 10 minutes to do so during the test, so practice until you are **fast!**

	Radians	<u>SIN</u>	<u>COS</u>	<u>TAN</u>	<u>CSC</u>	<u>SEC</u>	<u>COT</u>
Axis	0						
Q 1	$\pi/6$						
	$\pi/4$						
	$\pi/3$						
Axis	$\pi/2$						
Q 2	$2\pi/3$						
	$3\pi/4$						
	$5\pi/6$						
Axis	π						
Q 3	$7\pi/6$						
	$5\pi/4$						
	$4\pi/3$						
Axis	$3\pi/2$						
Q 4	$5\pi/3$						
	$7\pi/4$						
	$11\pi/6$						
Axis	2π						

89. A triangle has a side with length 2.5 feet and another side with length 4 feet. The angle between the two sides measures 58° . Find the area of the triangle to the nearest tenth.
90. After takeoff from an airport, an airplane's angle of ascent is 15° . The airplane climbs to an altitude of 50,000 feet. At that point, what is the land distance (x) between the airplane and the airport? Round your answer to the nearest foot.



91. Find the values of the six trigonometric functions for θ (triangle not to scale).



92. Find the measures of a positive angle and a negative angle that are coterminal with -164° .
93. Convert $\frac{9\pi}{17}$ from radians to degrees (to nearest tenth degree).
94. Use a reference angle to find the exact values of \sin , \cos , and $\tan 315^\circ$.
95. Find all possible values of $\cos^{-1} \frac{\sqrt{3}}{2}$ (answer in radians)
96. The point $(-4, 5)$ is on the terminal side of θ in standard position. What is $\sec \theta$?

Sequences and Series

97. Find the first five terms of the sequence with $a_1 = 4$ and $a_n = 3a_{n-1} + 2$ for $n \geq 2$.

98. Evaluate the series $\sum_{k=1}^{205} 27k + 3$

99. Find the 109th term in the arithmetic sequence $-3, -7, -11, -15, -19, \dots$

100. Find the 7th term in the geometric sequence with $a_4 = 1$ and $a_{11} = 128$

CP Calculus Summer Packet Answer Sheet

Equations of Lines

1. _____ 2. _____
3. _____ 4. _____
5. _____

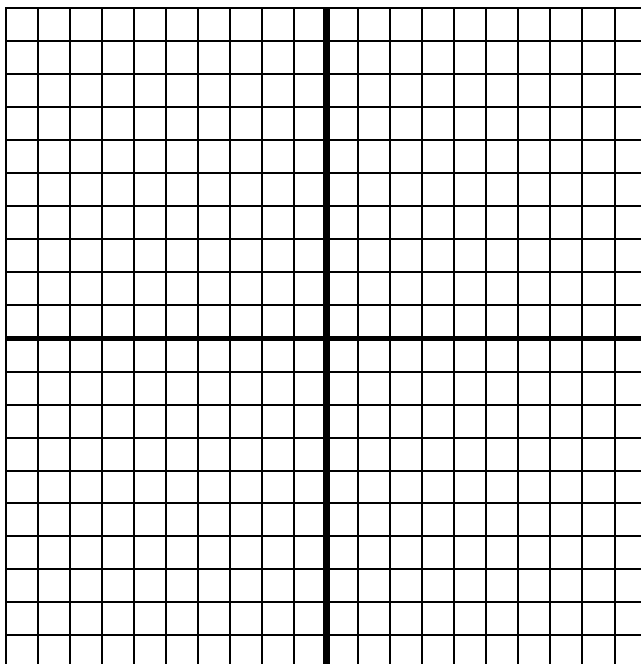
Solving Systems of Equations

6. _____
7. (\quad, \quad) 8. (\quad, \quad)
9. (\quad, \quad) 10. (\quad, \quad)

Solving and Graphing Inequalities

11. _____ 12. _____

13.



14. _____ 15. _____

Simplifying and Solving Exponential Expressions

16. _____ 17. _____

18. _____ 19. _____

20. _____ 21. _____

22. _____

Functions

23. _____ 24. _____

25. _____ 26. _____

27. _____ 28. _____

Factoring

29. _____ 30. _____

31. _____ 32. _____

33. _____ 34. _____

35. _____ 36. _____

37. _____ 38. _____

39. _____ 40. _____

41. _____ 42. _____

Adding, Subtracting, Multiplying, and Dividing Polynomials

- | | |
|-----------|-----------|
| 43. _____ | 44. _____ |
| 45. _____ | 46. _____ |
| 47. _____ | 48. _____ |
| 49. _____ | 50. _____ |
| 51. _____ | 52. _____ |

Complex Rational Fractions

- | | |
|-----------|-----------|
| 53. _____ | 54. _____ |
| 55. _____ | 56. _____ |
| 57. _____ | 58. _____ |
| 59. _____ | 60. _____ |
| 61. _____ | 62. _____ |
| 63. _____ | _____ |

Complex Rational Fractions

- | | |
|-------------------------|-------------------------|
| 64. a): _____ | 65. a): _____ |
| b): _____ | b): _____ |
| c): (,) _____ | c): (,) _____ |
| d): (,) _____ | d): (,) _____ |

66. _____ 67. _____

68. _____ 69. _____

70. _____ 71. _____

72. _____ 73. _____

Logarithmic and Exponential Functions

74. _____ 75. _____

76. _____ 77. _____

78. _____ 79. _____

80. _____ 81. _____

82. _____ 83. $x =$ _____

84. $x =$ _____ 85. _____

86. $x =$ _____ 87. _____

Trigonometry

89. _____ 90. _____

91. $\sin \theta =$ _____ $\csc \theta =$ _____
 $\cos \theta =$ _____ $\sec \theta =$ _____
 $\tan \theta =$ _____ $\cot \theta =$ _____

92. _____, _____ 93. _____

94. $\sin \theta =$ _____
 $\cos \theta =$ _____
 $\tan \theta =$ _____

95. _____ 96. _____

97. _____, _____, _____, _____

98. _____ 99. _____

100. _____