Pre-Calculus Summer Packet



Name: _____Period: _____

The purpose of this packet is to both convey to students the foundational skills needed to be successful in this course and to provide them an opportunity to self-assess and develop these skills prior to entering the class. In order to be successful in this and all subsequent math courses at Servite, students must master and retain the content and skills from all previous math courses. As such, we ask that you please work on this assignment with integrity and diligence always striving to meet the intended purpose and goal of this assignment.

Directions: Please print this packet. You **must show all work** in this packet in the space provided. You **may not** use a calculator except for #54, #60 and #61. For every word problem, write your answer in the form of a sentence. After you make an honest attempt at a problem, check your answer. If your answer is incorrect, try to identify where you went wrong, review the topic, and redo the problem correctly.

This packet will be **collected** 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.

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

I understand that I have to show all my work.

_____ _____

(Student Signature) **(Date)**

I have checked to see that my child have shown all work and completed all problems.

_____ _____

(Parent/Guardian Signature) **(Date)**

Solve the following equations:

1. $\frac{x}{5}+\frac{2}{3}=\frac{2x}{5}-\frac{1}{3}$

2. $6x-3=-4(2x+5)+45$

3. $x-5+4=3(2-x)$

4. $-x+6>5x-12$

5. $-10<3x+2<8$

6. $|3x+3|>9$

7. $|4x-5|\leq 5$

8. $|4n+7|=1$

Graph the following equations. Label the intercepts.

9. $2x+\ y=7$

10. $5x-4y=-2$

Write an equation of a line using the given information.

11. The line that passes through the point $(2, -4)$ and has a slope of $\frac{2}{5}$.

12. The line passing through $(2, -1)$, which is perpendicular to the line $y = \frac{2}{3}x + 5$.

13. The line passing through $(3, 8)$ and $(5, 10)$,

Solve the following equations:

14. $\begin{cases} 6x - 2y = 6 \\ 9x + 3y = 15 \end{cases}$

15. $\begin{cases} x - 3y = 5 \\ -2x + 2y = -6 \end{cases}$

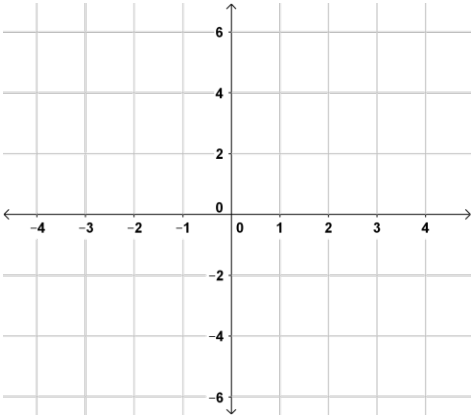
Write an equation of a line using the given information.

16. Solve the quadratic equation $x^2 + 4x = -2$, by completing the square.

17. Solve the following linear system:

$$\begin{cases} 2x + 3y = -8 \\ x + 2y = -3 \end{cases}$$

18. Graph the quadratic equation $y = 2x^2 + 7x + 3$. Label the intercepts and the vertex.



Solve the following quadratic equations by factoring, completing the square or using the quadratic formula. Leave irrational solutions in the form of radicals.

19. $2x^2 + 5 = 11$

20. $3x^2 - 13x - 10 = 0$

21. $2x^2 + x - 5 = 0$

22. $2x^2 + 4x = x^2 - 1$

Factor the following completely.

23. $x^3 - 125$

24. $16x^4 - 1$

25. $6x^5 + 15x^3 + 6x$

26. $3x^7 - 48x^3$

Simplify the following expressions.

27. $(2xy^2)^3$

28. $\dfrac{25x^3y^2}{-5xy}$

Perform the indicated operations.

29. $(x+1)(x^2-x+1)$

30. $(x^3-7x+6) \div (x-2)$

Solve the following equations.

31. $x^4-13x^2+36=0$

32. $x^3+4x^2-x-4=0$

Find all of the zeros of each function.

33. $f(x)=2x^2+9x+10$

34. $f(x)=x^3+x^2-10x+8$

35. Solve the inequality: $2x^2-4x>0$.

36. Write the polynomial function of least degree with zeros of -4, -1, 3, that has 1 as its leading coefficient.

Simplify the following expressions.

37. $\dfrac{15}{\sqrt{5}}$

38. $\sqrt[6]{64}$

39. $(-27)^{\frac{2}{3}}$

40. $\dfrac{12}{\sqrt{7}-2}$

41. Find the domain and range of the function: $y = \sqrt{x+3} - 2$.

Solve the following expressions. Check for any extraneous roots.

42. $x^{\frac{3}{2}} = 125$

43. $2\sqrt{3x+1} + 1 = 11$

44. Express $3^{-2} = \frac{1}{9}$ in logarithmic form.

45. Write $\log_5 125 = 3$ in exponential form.

Evaluate <u>without</u> the use of a calculator.

46. $\log_3 81$

47. $\ln e^3$

48. $\log_{12} 1$

49. $\log_2 \left(\frac{1}{4}\right)$

Solve the following equations.

50. $\log_2 x = 4$

51. $2e^x - 1 = 9$

52. $10^{4x-1} = 1000$

53. $\log_2 (2x + 10) - \log_2 (x - 7) = 3$

54. The value of a new car purchased for $20,000 decreases by 10% each year. Write an exponential decay model to represent the value of the car. Use this model to estimate the value of the car after 2 years.

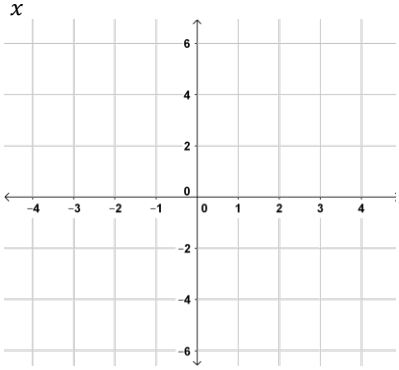
Find the inverse functions.

55. $y = (x - 1)^3 - 2$

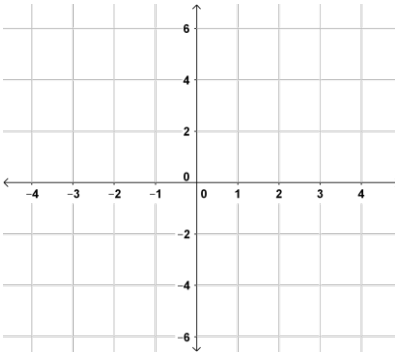
56. $y = \ln(x + 5)$

Graph the functions. State the domain and range.

57. $y = \frac{5}{x}$



58. $y = \frac{x+3}{x+2}$



59. For the points (5,4) and (7,8), find the distance between the points and find the midpoint of the segment.

Solve triangle ABC using the given measurements.

60. $A = 46°,\ C = 90°, b = 8$

61. $B = 24°, C = 90°, c = 13$

62. $A = 30°,\ C = 90°, a = 18$

63. $A = 45°, C = 90°, c = 12$

64. Evaluate the following trigonometric ratios. Answers need to be in exact form.

$\cos\left(-\frac{3\pi}{4}\right)$ $\csc\left(\frac{7\pi}{6}\right)$ $\sec(405^\circ)$

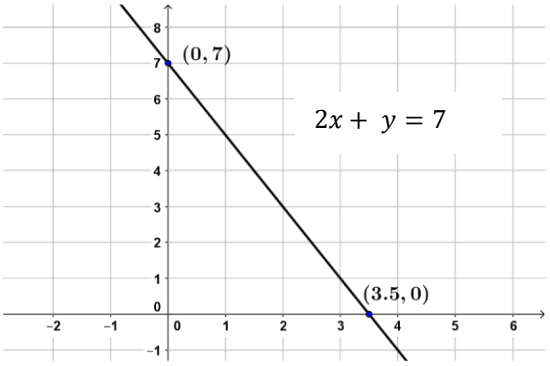
$\sec\left(-\frac{\pi}{2}\right)$ $\sin\left(\frac{11\pi}{3}\right)$ $\sin(-135^\circ)$

$\tan 135^\circ$

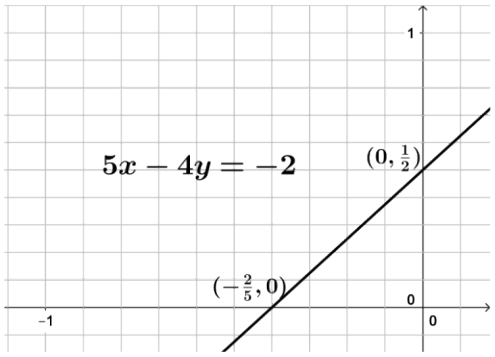
Solutions

1. $x = 5$
2. $x = 2$
3. $x = \frac{7}{4}$
4. $x < 3$
5. $-4 < x < 2$
6. $x > 2$ or $x < -4$
7. $0 \le x \le \frac{5}{2}$
8. $n = -\frac{3}{2}$ or $n = -2$

9.

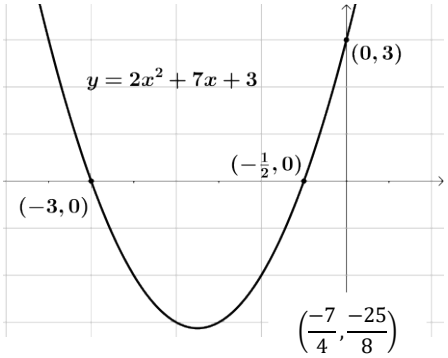


10.



11. $y = \frac{2}{5}x - \frac{24}{5}$
12. $y = -\frac{3}{2}x + 2$
13. $y = x + 5$
14. $\left(\frac{4}{3},\ 1\right)$
15. $(2, -1)$
16. $x = -2 \pm \sqrt{2}$
17. $(-7, 2)$

18.



19. $x = \pm\sqrt{3}$
20. $x = -\frac{2}{3},\ 5$
21. $x = \frac{-1 \pm \sqrt{41}}{4}$
22. $x = -2 \pm \sqrt{3}$
23. $(x - 5)(x^2 + 5x + 25)$
24. $(2x - 1)(2x + 1)(4x^2 + 1)$
25. $3x(2x^2 + 1)(x^2 + 2)$
26. $3x^3(x - 2)(x + 2)(x^2 + 4)$
27. $8x^3y^6$
28. $-5x^2y$
29. $x^3 + 1$
30. $x^2 + 2x - 3$
31. $x = \pm 2,\ \pm 3$
32. $x = \pm 1,\ -4$
33. $x = -2,\ -\frac{5}{2}$
34. $x = -4,\quad 1,\ 2$
35. $x < 0$ or $x > 2$
36. $x^3 + 2x^2 - 11x - 12$

37. $3\sqrt{5}$

38. 2

39. 9

40. $4\sqrt{7}+8$

41. D: $x \geq -3$, R: $y \geq -2$

42. $x = 25$

43. $x = 8$

44. $\log_3 \frac{1}{9} = -2$

45. $5^3 = 125$

46. 4

47. 3

48. 0

49. -2

50. $x = 16$

51. $x = \ln 5 \approx 1.61$

52. $x = 1$

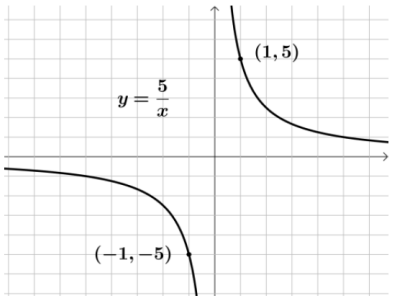
53. $x = 11$

54. $V = 20,000(0.9)^t$, V- value in dollars, t - time in years, 16,200 dollars

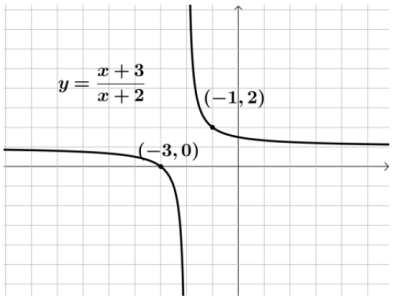
55. $y = \sqrt[3]{x+2} + 1$

56. $y = e^x - 5$

57. D: $x \in \mathbb{R}, x \neq 0$, R: $y \in \mathbb{R}, y \neq 0$



58. D: $x \in \mathbb{R}, x \neq -2$, R: $y \in \mathbb{R}, y \neq 1$



59. Distance = $2\sqrt{5}$, Midpoint = $(6, 6)$

60. $\angle B = 44°$, $a = 8.28$, c = 11.51

61. $\angle A = 66°$, $a = 11.9$, $b = 5.3$

62 $\angle B = 60°$, $b = 18\sqrt{3}$, c = 36

63. $\angle B = 45°$, $a = b = 6\sqrt{2}$,

64. $-\frac{\sqrt{2}}{2}$, -2, $\sqrt{2}$, $undefined$, $-\frac{\sqrt{3}}{2}$, $-\frac{\sqrt{2}}{2}$, -1