AP Precalculus

Summer Packet

This packet is intended to prepare you for AP Precalculus by reviewing and strengthening the algebra, geometry, and function concepts that are essential for success in the course. Since this may be the first AP mathematics course you take, you are expected to have mastered the algebra skills and concepts learned in previous math classes. Therefore, it is important that you begin the year with a solid foundation in these prerequisite skills.

This packet is due on the first day of school and will count as a graded summative assignment based on completion and accuracy. Please complete all work neatly, in pencil, and in your own handwriting. If you need help, you are encouraged to review notes from previous math classes and use appropriate online resources, such as Khan Academy, to refresh your understanding of the material.

The topics in this packet will be used throughout the year and will not be retaught. A strong understanding of these skills will help you succeed in AP Precalculus and prepare you for future mathematics courses.

I am excited to have you in AP Precalculus and look forward to a successful year together!

– Mrs. Strellman

Name_____

AP Precalculus

Summer Packet

Linear Equations

Write an equation of the line passing through the points $(-2, 5)$ and $(3, 8)$ in all three forms below.

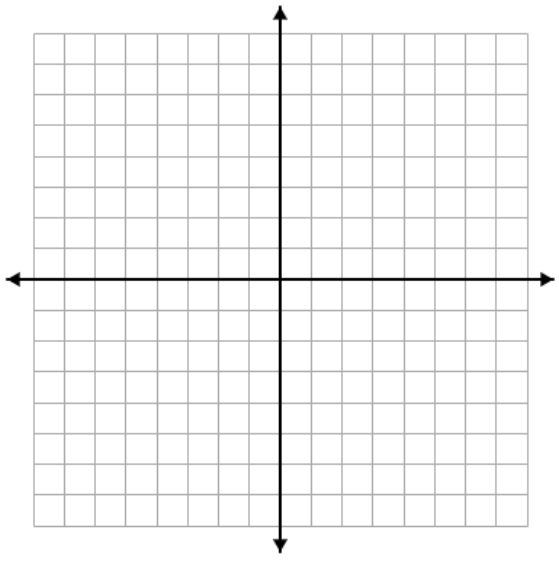
1. Point Slope Form

2. Slope Intercept Form

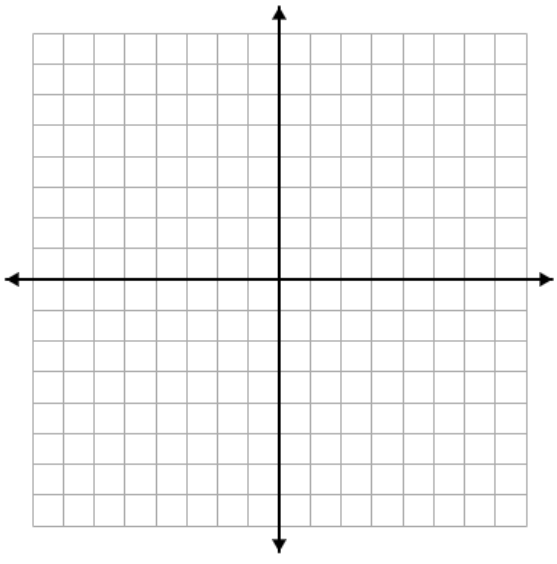
3. Standard Form

Graph the following linear equations on the graphs below each.

4. $y = \frac{2}{3}x - 5$



5. $2x + 5y = 10$



AP Precalculus

Summer Packet

Solving Linear Equations and Inequalities

Solve the following linear equations and inequalities

6. $3(x - 2) + 7 = 5 - 4(2x - 1)$

7. $\frac{2}{3}x - 5 = \frac{1}{4}x - 6$

8. $3x - 7 > 2 + 5x$

9. $-2(x - 3) \geq 5(x - 2)$

AP Precalculus

Summer Packet

Adding and Multiplying Polynomials

Add or Subtract the following Polynomials and write in standard form.

10. $(3x^2 + 2x - 7) + (x^3 - 5x^2 + 8x)$

11. $(2x^3 - 4x + 3) - (3x^3 - 2x^2 + 5)$

Multiply the following polynomials and write in standard form.

12. $2x(3x^2 - 4x + 5)$

13. $(3x - 6)(2x + 5)$

14. $(x - 3)(3x^2 + 2x - 7)$

15. $-3(x - 3)(2x^2 - 5x)$

Summer Packet

Factoring Polynomials

Factor each of the following difference of squares

16. $x^2 - 25$

17. $4x^2 - 81$

18. $x^2 - 7$

Factor each of the following trinomials

19. $x^2 + 5x - 14$

20. $2x^2 - 9x + 4$

21. $3x^2 + 13x - 10$

22. $15x^2 - 11x + 2$

23. $x^3 - 4x^2 - 12x$

24. $3x^3 - 3x^2 - 36x$

Summer Packet

Solving Quadratic Equations

Solve the following quadratic equations by factoring

25. $3x^2 + 10x - 8 = 0$

26. $x^2 - 2x + 13 = 3x + 7$

Solve the following quadratic equations with the quadratic formula.

27. $2x^2 - 2x - 5 = 0$

28. $x^2 + 3x - 7 = 0$

Solving Quadratic Inequalities

Solve the following quadratic inequalities for an interval containing all solutions.

29. $3x^2 - 17x + 10 > 0$

30. $x^2 + 5x - 28 \leq 4x - 8$

Summer Packet

Real World Context for Quadratics

A tennis ball is launched straight up with a velocity of 56 feet per second. The ball's height, H, above the ground can be modeled by the the function $H(t) = -16t^2 + 56t + 6$, where t is the amount of time in seconds the ball is in the air. Answer the following.

31. How high above the ground is the tennis ball at 1.5 seconds?

32. In how many seconds will the tennis ball reach 25 feet above the ground?

33. How high above the ground is the tennis ball when it is released.

34. How many seconds does it take the tennis ball to reach its maximum height above the ground?

35. What is the tennis ball's maximum height above the ground?

36. How many seconds does it take the tennis ball to hit the ground?

Solving Systems of Equations

Solve the following system of equations using the substitution method.

37. $\begin{cases} 3x - 2y = 5 \\ 2x - y = 7 \end{cases}$

Solve the following system of equations using linear combinations.

38. $\begin{cases} 3x - 2y = 9 \\ x + 3y = -8 \end{cases}$

Summer Packet

Combining/Simplifying Rational Expressions

Add or subtract the following expressions combining into a single rational expression.

39. $\frac{3x}{x-2} + \frac{4}{x-3}$

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

41. $\frac{2x}{x-3} + \frac{x-2}{x+4}$

42. $3x - \frac{x-1}{x+5}$

Simplify the following rational expressions

43. $\frac{x^2-x-6}{x^2-7x+12}$

44. $\frac{3x^3-12x}{x^3+3x^2-10x}$

Exponential Functions

A certain bacteria sample contains 250 bacteria and grows by 30% every hour if left untreated.

45. Create an equation that models the amount of bacteria after t hours.

46. How many bacteria are in the sample after 5 hours? 8.5 hours?

47. Write an equation that models this scenario but where the t is measured in minutes?

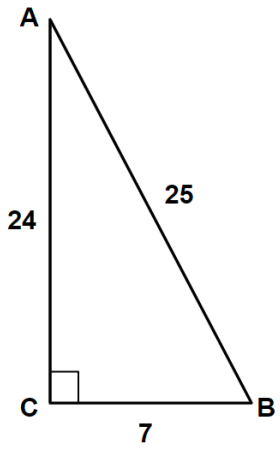
The population of a city that has 25,500 people is decreasing by 4% each year.

48. Create an equation that models the population of the town after t years.

49. What is the population after 10 years? 25 years?

Right Triangle Trigonometry

Use the triangle below to identify each ratio.



50. $sin\, A\ =$

51. $sin\, B\ =$

52. $cos\, A\ =$

53. $cos\, B\ =$

54. $tan\, A\ =$

55. $tan\, B\ =$

56. Calculate the measure of angle B in the diagram above.

57. A piece of wood is leaning up against a wall. The angle formed by the floor and the piece of wood is 72 degrees. If the distance between the base of the wall and the bottom of the piece of wood is 2.5 feet, how long is the piece of wood?

Summer Packet

Exponent Rules

Simplify each of the following expressions. Write answers with positive exponents only.

58. x^3x^5

59. x^4x^{-6}

60. $x^2\left(x^2\right)^3$

61. $\left(x^3w^{-2}\right)^4$

62. $\left(cr^2\right)^3\left(c^{-2}r^{-10}\right)$

63. $\frac{x^3y^4}{x^2y^{-5}} \cdot \frac{(xy)^3}{x^{-4}y^2}$

Summer Packet

Simplifying Radicals

Simplify the following radical expressions.

64. $\sqrt{75}$

65. $\sqrt{28}$

66. $\sqrt{36x^3}$

67. $\sqrt{20x^5y^6}$

68. $\sqrt[3]{8x^7}$

69. $3\sqrt{2} + 2\sqrt{18}$

70. $2\sqrt{20} - \sqrt{45}$

71. $\frac{2\sqrt{3}}{4\sqrt{2}}$

72. $\frac{\sqrt{100x^5}}{\sqrt{5x^8}}$

Summer Packet

Complex Numbers

Simplify the following expressions, rationalize the denominator when needed.

73. $(3 + 2i) + (5 - 6i)$

74. $(4 + 5i) - (2 - 3i)$

75. $(3 - 5i)(2 + 4i)$

76. $4i(-2 + 6i)$

77. $\frac{3+7i}{2-i}$

78. $\frac{5-8i}{3+2i}$

Summer Packet

Piecewise Functions

Consider the piecewise function below:

$$f(x)=\begin{cases}2x+10 & x<-2\\ (x-1)^2-6 & x\geq -2\end{cases}$$

Evaluate the following

79. $f(-4)$

80. $f(-2)$

81. $f(0)$

82. $f(5)$

83. Solve $f(x)=-2$