



## 2019 Summer Math Packet (completed Pre-Calculus → going into Calculus)

Congratulations, you made it through your math class this year! Your fabulous prize will be an even more challenging and interesting math class for next year. Yay!

Here is a packet to do over the summer to keep your math skills sharp, because we want you to be ready for your new math class in the fall. Do the indicated page(s) each week during the summer. You will find dates on the pages.

**Complete your summer packet on separate paper without using a calculator, and remember to show all of your work.** Do not do the whole packet right away, or you will forget some of the concepts before the fall. Do not leave the packet until the end of the summer, or you will have forgotten some of the concepts.

You have learned how to do everything in this packet at some point during the year, there is nothing new. Use your notes to help you with the packet. If you get completely stuck, then give one of us a call.

Bring the packet with you to your new math class in the fall. You will have a quiz during the first week of class to make sure you have done the packet and are ready for your new math class. Your math teacher might even give you extra credit for your summer math packet. Who doesn't love extra credit?

Have a wonderful and slightly mathematical summer!

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1. Solve for the variable by factoring. Do not use the quadratic formula.

$$a^2 - 4a - 12 = 0$$

**6/9-6/15**

2. Simplify.

$$\frac{100b^2c^4}{5b^3c^2}$$

3. Solve for the variable using natural logarithms.

$$e^{d+5} = 7 \cdot 2^d$$

4. Complete the square to find the vertex of the parabola.

$$y = x^2 - 10x$$

5. Simplify the expression.

$$\frac{\sin \theta}{\tan \theta}$$

6. Find the sum of the series.

$$\sum_{n=1}^5 4n - 3$$

7. Solve for the variable by factoring. Do not use the quadratic formula.

$$f^2 + 7f + 6 = 0$$

**6/16-6/22**

8. Simplify.

$$\frac{4g^2 + 8g}{g^3 + 8}$$

9. Solve for the variable using natural logarithms.

$$\ln(1-h) - \ln(1+h) = 2$$

10. Complete the square to find the vertex of the parabola.

$$y = x^2 + 4x$$

11. Simplify the expression.

$$\frac{1 - \cos 2\phi}{2 \cos \phi \sin \phi}$$

12. Find the sum of the series.

$$\sum_{i=1}^{10} 4(2^i)$$

13. Solve for the variable by factoring. Do not use the quadratic formula.

**6/23-6/29**

$$j^2 - 5j - 6 = 0$$

14. Simplify.

$$\frac{6k^2 - 5k - 6}{10k^2 - 11k - 6}$$

15. Solve for the variable using natural logarithms.

$$\ln(2x + 5) \cdot \ln(9x^2) = 0$$

16. Complete the square to find the vertex of the parabola.

$$y = x^2 - 9x$$

17. Simplify the expression.

$$(\sin^2 t + \cos^2 t)^3$$

18. Find the sum of the series.

$$\sum_{n=4}^{\infty} \left(\frac{1}{3}\right)^n$$

19. Solve for the variable by factoring. Do not use the quadratic formula.

**6/30-7/6**

$$2l^2 + l - 10 = 0$$

20. Simplify.

$$\frac{15mn^3}{8n} \cdot \frac{12m^3}{-10mn^2}$$

21. Solve for the variable using natural logarithms.

$$e^{p+4} = 10$$

22. Complete the square to find the vertex of the parabola.

$$y = x^2 + 8x - 7$$

23. Simplify the expression.

$$\sin^4 \theta - \cos^4 \theta$$

24. Find the sum of the series.

$$\sum_{i=1}^{50} 3i$$

25. Solve for the variable by factoring. Do not use the quadratic formula.

7/7-7/13

$$4q^2 + 7q - 15 = 0$$

26. Simplify.

$$\frac{r^4 - 16}{6r + 12} \cdot \frac{3r^2 - 6r}{r^2 - 2r + 4}$$

27. Solve for the variable using natural logarithms.

$$3 \cdot 2^x + 8 = 25$$

28. Complete the square to find the vertex of the parabola.

$$y = x^2 - 12x + 15$$

29. Simplify the expression.

$$\frac{\cos \phi}{1 - \sin \phi} - \tan \phi$$

30. Find the sum of the series.

$$\sum_{n=0}^7 2 \left( \frac{3}{4} \right)^n$$

31. Solve for the variable by factoring. Do not use the quadratic formula.

7/14-7/20

$$u^2 - 2u - 3 = 2u(u - 3)$$

32. Simplify.

$$\frac{3v^2}{4w^2} \div \frac{w}{2}$$

33. Solve for the variable using natural logarithms.

$$3 \ln(2x + 6) = 6$$

34. Complete the square to find the vertex of the parabola.

$$y = x^2 + 5x + 4$$

35. Simplify the expression.

$$\frac{\tan x + \tan y}{1 - \tan x \tan y}$$

36. Find the sum of the series.

$$\sum_{i=0}^{\infty} \frac{3^i + 5}{4^i}$$

37. Solve for the variable by factoring. Do not use the quadratic formula.

7/21-7/27

$$y^2 + 1 = 2y$$

38. Simplify.

$$\frac{8}{za} \div \frac{16z^2}{a}$$

39. Solve for the variable using natural logarithms.

$$5(1.031)^b = 8$$

40. Complete the square to find the vertex of the parabola.

$$f(x) = x^2 + \frac{1}{2}x - \frac{3}{4}$$

41. Simplify the expression.

$$\frac{1 - (\cos \theta)^2}{\cos \theta}$$

42. Find the sum of the series.

$$\sum_{n=0}^{15} \left( 2 + \frac{1}{2}n \right)$$

43. Solve for the variable by factoring. Do not use the quadratic formula.

7/28-8/3

$$4c^2 - 13c - 12 = 0$$

44. Simplify.

$$\frac{2d^2 + 4d}{d^2 - 25} \cdot \frac{2d - 10}{3d^2 + 5d - 2}$$

45. Solve for the variable using natural logarithms.

$$121e^{-0.112f} = 88$$

46. Complete the square to find the vertex of the parabola.

$$f(x) = x^2 + 0.6x - 11$$

47. Simplify the expression.

$$\frac{\sin 2\phi}{1 + \cos(2\phi)}$$

48. Find the sum of the series.

$$\sum_{i=0}^5 3(-3)^i$$

49. Solve for the variable by factoring. Do not use the quadratic formula.

**8/4-8/10**

$$23 = -3g^2 - 63g - 301$$

50. Simplify.

$$\frac{h^2 + 3h}{9h^2} \div \frac{h^2 - 9}{12}$$

51. Solve for the variable using natural logarithms.

$$58e^{4j+1} = 30$$

52. Complete the square to find the vertex of the parabola.

$$f(x) = 4x^2 + 16x + 1$$

53. Simplify the expression.

$$\frac{2 \tan t}{1 + (\tan t)^2}$$

54. Find the sum of the series.

$$-2 + 1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} - \dots$$

55. Solve for the variable by factoring. Do not use the quadratic formula.

**8/11-8/17**

$$k^2 - 20k = -91$$

56. Simplify.

$$\frac{l^2 - 4l - 5}{l^2 + 4l + 4} \cdot \frac{l^2 + l - 2}{l^2 - 1}$$

57. Solve for the variable using natural logarithms.

$$17e^{0.02m} = 18e^{0.03m}$$

58. Complete the square to find the vertex of the parabola.

$$f(x) = -x^2 - 3x - 0.25$$

59. Simplify the expression.

$$\frac{\cos 2\theta}{\cos \theta + \sin \theta}$$

60. Find the sum of the series.

$$\sum_{n=0}^{10} (8 - 4n)$$

61. Solve for the variable by factoring. Do not use the quadratic formula.

**8/18-8/24**

$$n^2 + 3n - 28 = 0$$

62. Simplify.

$$\frac{2p^2 + 3p + 1}{2p^2 - p - 3} \cdot \frac{2p^2 - 3p}{p + 2}$$

63. Solve for the variable using natural logarithms.

$$44e^{0.15q} = 50(1.2)^q$$

64. Complete the square to find the vertex of the parabola.

$$y = 3x(x + 2) + 7$$

65. Simplify the expression.

$$\frac{1}{1 - \sin \phi} + \frac{1}{1 + \sin \phi}$$

66. Find the sum of the series.

$$\sum_{i=0}^5 32 \left( -\frac{1}{2} \right)^i$$

67. Solve for the variable by factoring. Do not use the quadratic formula.

**8/25-8/31**

$$r(r - 4) = 32$$

68. Simplify.

$$\frac{4u^2}{u + 2} \div \frac{u^2 + 4u + 4}{2u^3 - 8u}$$

69. Solve for the variable using natural logarithms.

$$e^{2v} + e^{2v} = 1$$

70. Complete the square to find the vertex of the parabola.

$$y + 2 = x^2 + \frac{3}{4}x + 6$$

71. Simplify the expression.

$$\frac{\cos t - 1}{\sin t} + \frac{\sin t}{\cos t + 1}$$

72. Find the sum of the series.

$$y^2 + y^3 + y^4 + y^5 + \dots$$

73. Solve for the variable by factoring. Do not use the quadratic formula.

**Extra**

$$(w+3)^2 - 16 = 0$$

74. Simplify.

$$\frac{x^2 - 6x + 5}{x^2 + 3x + 2} \div \frac{x^2 - 25}{x^2 + 6x + 5}$$

75. Solve for the variable using natural logarithms.

$$2e^{3y} + e^{3y} = 25$$

76. Complete the square to find the vertex of the parabola.

$$y = -2x^2 + 20x - 3$$

77. Simplify the expression.

$$\frac{1}{\sin \theta \cos \theta} - \frac{1}{\tan \theta}$$

78. Find the sum of the series.

$$\sum_{n=1}^{50} 5i + 10$$



## Pre-Calculus Summer Packet Answers

1.  $a = 6, a = -2$
2.  $\frac{20c^2}{b}$
3.  $d \approx -9.953$
4.  $(5, -25)$
5.  $\cos \theta$
6. 45
7.  $f = -6, f = -1$
8.  $\frac{4g}{g^2 - 2g + 4}$
9.  $h \approx -0.762$
10.  $(-2, -4)$
11.  $\tan \phi$
12. 8184
13.  $j = 6, j = -1$
14.  $\frac{3k + 2}{5k + 2}$
15.  $x = -2, x = \frac{1}{3}, x = -\frac{1}{3}$
16.  $\left(\frac{9}{2}, \frac{-81}{4}\right)$
17. 1
18.  $\frac{1}{54}$
19.  $l = -\frac{5}{2}, l = 2$
20.  $-\frac{9m^3}{4}$
21.  $p \approx -1.697$
22.  $(-4, -23)$
23.  $(\sin \theta + \cos \theta)(\sin \theta - \cos \theta)$
24. 3825
25.  $q = \frac{5}{4}, q = -3$
26.  $\frac{r(r^2 + 4)(r - 2)^2}{2(r^2 - 2r + 4)}$
27.  $x \approx 2.503$
28.  $(6, -21)$
29.  $\frac{1}{\cos \phi}$
30. 7.199
31.  $u = 3, u = 1$
32.  $\frac{3v^2}{2w^3}$
33.  $x \approx 0.695$
34.  $\left(-\frac{5}{2}, -\frac{9}{4}\right)$
35.  $\frac{\sin x \cos y + \sin y \cos x}{\cos x \cos y - \sin x \sin y}$
36.  $\frac{32}{3}$
37.  $y = 1$
38.  $\frac{1}{2z^3}$
39.  $b \approx 15.395$
40.  $\left(-\frac{1}{4}, -\frac{13}{16}\right)$
41.  $\tan \theta \sin \theta$
42. 92
43.  $c = -\frac{3}{4}, c = 4$
44.  $\frac{4d}{(d + 5)(3d - 1)}$
45.  $f \approx 2.843$
46.  $\left(-\frac{3}{10}, -\frac{1109}{100}\right)$
47.  $\tan \phi$
48. -546
49.  $g = -9, g = -12$
50.  $\frac{4}{3h(h - 3)}$
51.  $j \approx -0.415$
52.  $(-2, -15)$
53.  $2 \sin t \cos t$
54.  $-\frac{4}{3}$
55.  $k = 7, k = 13$
56.  $\frac{l - 5}{l + 2}$
57.  $m \approx -5.716$
58.  $\left(-\frac{3}{2}, 2\right)$
59.  $\cos \theta - \sin \theta$
60. -132
61.  $n = -7, n = 4$
62.  $\frac{p(2p + 1)}{p + 2}$
63.  $q \approx -3.955$
64.  $(-1, 4)$
65.  $\frac{2}{\cos^2 \phi}$
66. 21
67.  $r = -4, r = 8$
68.  $\frac{8u^3(u - 2)}{(u + 2)^2}$
69.  $v \approx -0.347$
70.  $\left(-\frac{3}{8}, \frac{247}{64}\right)$
71. 0
72.  $\frac{y^2}{1 - y}$  when  $|y| < 1$
73.  $w = -7, w = 1$
74.  $\frac{x - 1}{x + 2}$
75.  $y \approx 0.707$
76.  $(5, 47)$
77.  $\tan \theta$
78. 6,875