

Due on the first day of school

College Algebra is the first freshman level college course in mathematics; hence a thorough understanding of the material and applications of the concepts is the goal. In order to ensure you are successful from the start of the course, it is important that you have reviewed the fundamental components of Algebra II. This includes

- Algebra Essentials (Inequalities, Domain, Exponents, Roots, Factoring)
- Polynomials
- Rational Expressions
- Solving Equations
- Complex Numbers
- Roots and Rational Exponents

You are to complete this packet and turn it in on the first day of school. It will be scored and entered.

You may use the internet, Algebra textbook, friends and tutors as guides as needed to complete the packet. The intention is for you to review and learn the material that will be essential for your success in this course.

You must show your work, simplify, and box your answers. Calculators are allowed.

Evaluate if $x = -2$ and $y = 4$:

1. $-2x + xy$

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

3. $|x - y|$

4. $|x| - |y|$

5. $||4x| - |5y||$

6. $-3x^{-1}y$

7. $(x + y)^2$

8. $\sqrt{x^2 + y^2}$

9. $\left(\frac{5x^{-2}}{6y^{-2}}\right)^{-3}$

Determine the domain of each expression:

10. $\frac{x-2}{x-6}$

11. $\frac{x}{x^2-9}$

12. $\frac{x^2+5x-10}{x^3-x}$

Simplify each expression:

13. $3^{-6} \cdot 3^4$

14. $\frac{(-2)^3 x^4 (yz)^{-1}}{3^2 xy^3 z}$

Express your answer as a single polynomial in standard form:

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

16. $4x^2(x^3 - x + 2)$

17. $(2x - 3)(2x + 3)$

18. $(3x - 4)^2$

19. $3x^3 - x^2 + x - 2$ divided by $x + 2$

20. $5x^4 - x^2 + x - 2$ divided by $x^2 + 2$

Factor Completely. If the polynomial cannot be factored, say it is prime.

21. $2 - 8x^2$

22. $x^2 - 10x + 21$

23. $3x^2 - 12x + 15$

24. $9x^2 - 12x + 4$

25. $5 + 16x - 16x^2$

26. $x(x + 3) - 6(x + 3)$

27. $(3x - 2)^3 - 27$

28. $x^3 - 3x^2 - x + 3$

29. $2x(2x + 5) + x^2 \cdot 2$

Simplify:

30. $\frac{4x^2 + 8x}{12x + 24}$

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

32. $\frac{3}{2x} \cdot \frac{x^2}{6x + 10}$

33. $\frac{6x - 27}{5x} \cdot \frac{2}{4x - 18}$

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

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

$$36. \frac{\frac{x^2 + 7x + 6}{x^2 + x - 6}}{\frac{x^2 + 5x - 6}{x^2 + 5x + 6}}$$

$$37. \frac{x}{x-3} - \frac{x+1}{x^2 + 5x - 24}$$

$$38. \frac{4 + \frac{1}{x^2}}{3 - \frac{1}{x^2}}$$

$$39. \frac{\frac{2x+5}{x} - \frac{x}{x-3}}{\frac{x^2}{x-3} - \frac{(x+1)^2}{x+3}}$$

Solve each equation or inequality:

$$40. 5 - (2x - 1) = 10$$

$$41. \frac{-2}{x+4} \geq \frac{-3}{x+1}$$

$$42. |3x - 1| < 2$$

$$43. v^2 + 7v + 12 = 0$$

$$44. \frac{5}{x+4} = 4 + \frac{3}{x-2}$$

Solve by completing the square.

$$45. x^2 - 6x = 13$$

$$46. 2x^2 - 3x - 1 = 0$$

$$47. \text{Find the real solutions. } 4t^2 + t + 1 = 0$$

Simplify. Write each expression in the standard form $a+bi$:

48. $(-8+4i)-(2-2i)$

49. $3i(-3+4i)$

50. $(-3+i)(3+i)$

51. $\frac{2-i}{-2i}$

52. i^{14}

53. $4+i^3$

Solve each equation in the complex number system:

54. $x^2 + 4x + 8 = 0$

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

Simplify. Assume all variables are positive when they appear:

56. $\sqrt[3]{-8x^4}$

57. $\sqrt[3]{\frac{3xy^2}{81x^4y^2}}$

58. $\sqrt{5x}\sqrt{20x^3}$

60. $(5\sqrt{8})(-3\sqrt{3})$

61. $2\sqrt{12} - 3\sqrt{27}$

62. $3x\sqrt{9y} + 4\sqrt{25y}$

63. $\left(\frac{8}{27}\right)^{-2/3}$

Rationalize the expression:

64. $\frac{\sqrt{2}}{\sqrt{7}+2}$

65. $\frac{\sqrt{3}-1}{2\sqrt{3}+3}$

Solve each equation.

66. $\log_x 64 = 3$

67. $\log_4(2x-1) = \log_4 16$

68. $\log_5 0.2 = x$

69. $3^{5x} = 85$

70. $5^{1-2x} = 5^{2x}$