

MATHEMATICS

A Summer Review of Algebra

Designed for the Student Entering
Pre-Calculus Honors

- Please print this packet in its entirety to be completed for evaluation on the second day of school
- All problems in this packet reflect concepts that you have learned in Algebra 1 and Algebra 2
- Complete each problem in the space provided on this packet
- Show all steps/work clearly. **CIRCLE** final answers.
- A separate Note Guideline is available on the Math website to help you with each concept

Name _____

Solving Equations in One Variable

Solve.

1. $\frac{3y - 2(y - 1)}{6} = -1$

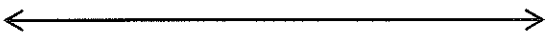
2. $3(x - 2) - x = 2(2x + 1)$

Solving Inequalities in One Variable

Solve and Graph on a number line.

3. $3x \geq 11x + 4$

4. $-2(x + 3) < 4x - 7$



Solving Combined Inequalities

Solve and Graph on a number line.

5. $2x + 7 \geq 13$ or $5x - 4 < 6$

6. $x - 7 < 3x - 5 < x + 11$



Solving Absolute Value Equations and Inequalities

Solve.

7. $|3x + 2| = 4$

Solve and Graph on a number line.

8. $\left|1 - \frac{x}{2}\right| \leq 2$

9. $4 - |3x + 1| < 2$



The Slope of a Line

Given two points, find the slope.

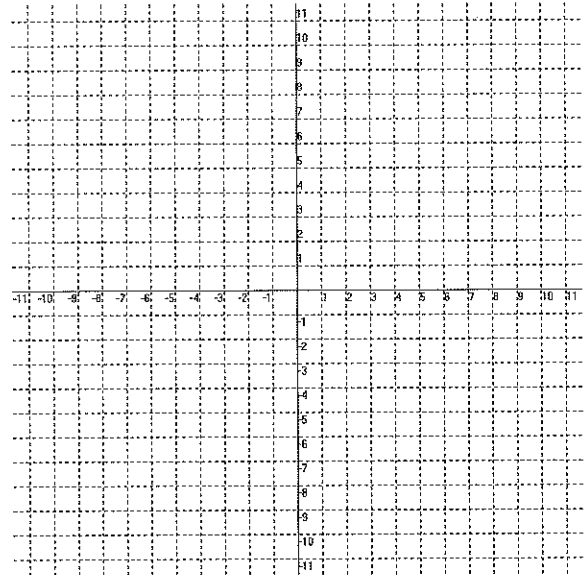
10. $(3, -4)$ and $(3, -2)$

11. $\left(\frac{3}{2}, -3\right)$ and $\left(\frac{1}{2}, -7\right)$

Graphs of Linear Equations in Two Variables

Graph the following.

12. $2x + 5y = 15$

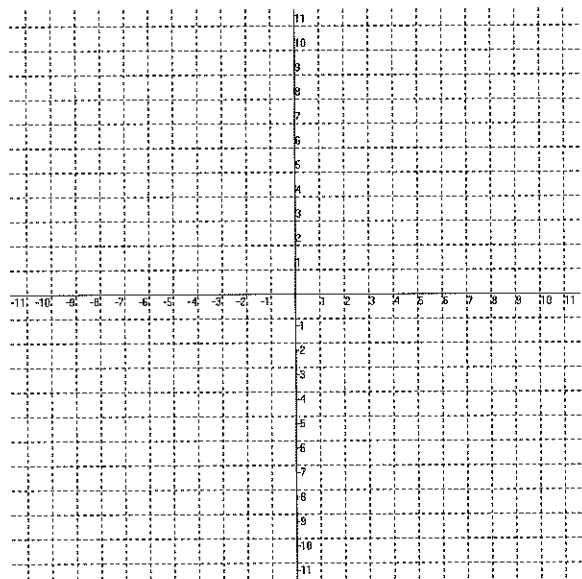
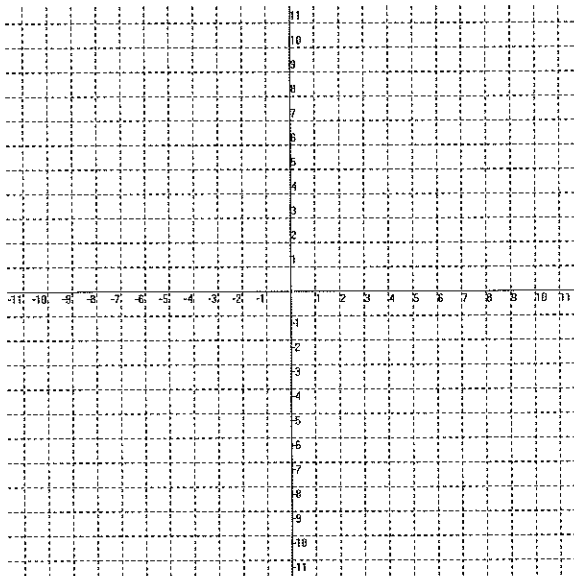


Graphs of Linear Inequalities in Two Variables

Graph the following.

13. $y < 5$

14. $2x - y \leq 2$



Finding the Equation of a Line

Write the equation of the line in standard form that has the given conditions.

15. Contains the point $(-4, -2)$
and has slope $= \frac{1}{2}$

16. Contains the points $(3, -2)$ and $(2, -3)$

17. Perpendicular to the line $4x - y = -3$
and passes through the point $(-8, 3)$

18. Has x-intercept -3 and y-intercept -1

Algebraic Solving of Systems of Linear Equations in Two Variables

Solve the system of equations algebraically.

19. $8x - 3y = 3$
 $3x - 2y + 5 = 0$

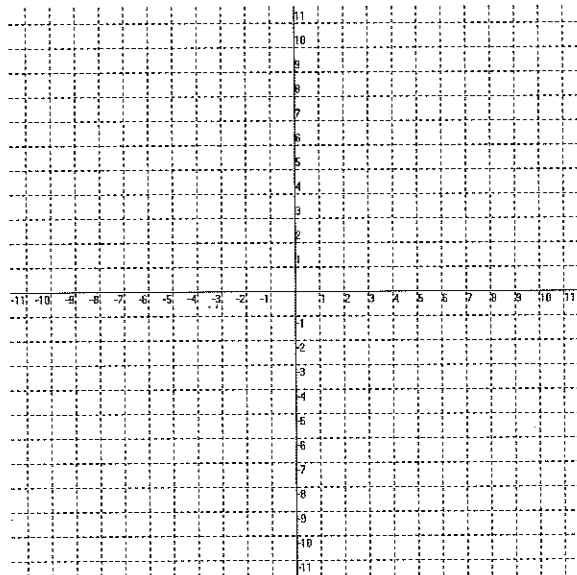
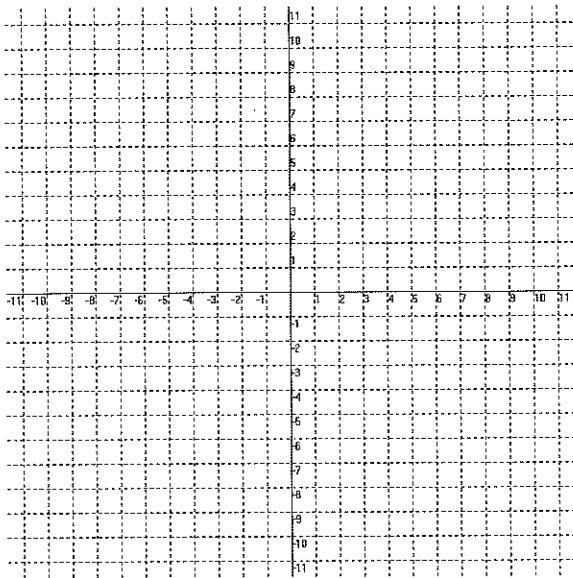
20. $6x = 4y + 5$
 $6y = 9x - 5$

Graphs of Systems of Linear Inequalities in Two Variables

Graph the systems.

21. $3x - y = 4$
 $x + 2y = -8$

22. $x + 2y \leq 6$
 $x - 3y > 4$



Relations and Functions

23. Given $f(x) = 2x^2 - 1$ with a domain $D = \{-1, 0, 1\}$, find the range of f .
Is the relation a function? How do you know?

Give the domain of each.

24. $f(x) = \frac{3}{x}$

25. $f(x) = \sqrt{2-x}$

Addition and Scalar Multiplication of Matrices

Use the following matrices to perform the given operations:

$$A = \begin{bmatrix} 5 & 7 \\ -6 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 3 & 5 \\ -1 & 8 \end{bmatrix}$$

$$E = \begin{bmatrix} 8 & -4 & 2 \\ 3 & 1 & -5 \end{bmatrix}$$

$$F = \begin{bmatrix} -6 & -1 & 0 \\ 1 & 4 & 0 \end{bmatrix}$$

26. $A+B$

27. $F-E$

28. $B+F$

29. $-2E$

Laws of Exponents

Simplify.

30. $\left(\frac{-4a^2}{3b}\right)^2 \left(\frac{-b}{2a}\right)^3$

31. $a^2 \cdot a^{x+7} \cdot a^{x-3}$

32. $(y^h-k)^h \cdot (y^h+k)^k$

33. $2x^0 y^{-2}$

34. $\frac{(pq^2r^3)^3}{(p^3qr^2)^2}$

35. $\left(\frac{2a^3b}{a^2b^2}\right)^{-4}$

36. $\frac{4x^{-2}y^3}{32x^5y^{-6}}$

Factoring

Factor.

GCF

37. $14x^5y^3z + 10x^2y - 2x^3yz^2$

Difference of two Squares

38. $c^2 - 4d^2$

39. $36a^2 - 49b^2$

Sum/Difference of two Cubes

40. $x^3 - 216$

Perfect Square Trinomials

41. $4k^2 + 20k + 25$

42. $25j^2 - 80j + 64$

General Trinomials

43. $5x^2 + 13x + 6$

44. $x^2 - 10xy + 24y^2$

Factor by Grouping:

45. $x^3 + 5x^2 - 9x - 45$

Factor Completely

46. $100a^2 - 36b^2$

47. $8u^3 + 1$

48. $16x^2 + 40xy + 25y^2$

49. $8nm - 10n + 12m - 15$

50. $6x^2 - 7x - 3$

51. $x^4 - 2x^2 + 1$

52. $16x^3 - 64x^2$

53. $16x^4 - y^{12}$

Solve/Find the Roots by Factoring

Solve by factoring.
Indicate multiple solutions.

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

Find the roots by factoring.

55. $3t(t + 1) = 4(t + 1)$

Find the Zeros by Factoring

Find the zeros by factoring.

56. $f(x) = x^3 - x$

Simplifying Rational Algebraic Expressions/Determining Domain

57. Simplify. $\frac{x^2 + x - 20}{x^2 + 2x - 15}$

58. State the zeros and domain of $f(x) = \frac{x-2}{x^2 + 2x - 35}$

Products and Quotients of Rational Expressions

Simplify.

59. $\frac{xy^2}{6} \div \frac{x^2y^{-1}}{9}$

60. $\frac{x^2y}{x^2 - y^2} \cdot \frac{2x + 2y}{xy}$

61. $\frac{x^2 + 5x - 6}{3x - 3} \div \frac{3x + 18}{x^2 - x}$

Simplifying Complex Fractions

Simplify.

$$62. \frac{\frac{3}{x+1} - \frac{4}{x}}{\frac{4}{x+1} + \frac{3}{x}}$$

Adding or Subtracting Rational Expressions

Simplify.

$$63. \frac{3}{x^2 - 4x - 12} + \frac{4}{x^2 - 4}$$

$$64. \frac{1}{x-4} - \frac{2}{x+4}$$

Solving Fractional Equations

Solve.

$$65. \frac{3}{x+2} = \frac{6}{x-1}$$

$$66. \frac{3}{x^2 - 7x + 10} + 2 = \frac{x-4}{x-5}$$

Solving Fractional Inequalities

Solve.

$$67. \frac{x}{8} - \frac{x-2}{3} \geq \frac{x+1}{6} - 1$$

Roots of Real Numbers

Simplify.

68. $\sqrt{\frac{16}{25}}$

69. $-\sqrt{9}$

70. $\pm\sqrt[3]{64}$

71. $\sqrt[4]{\frac{81}{16}}$

72. $\sqrt[3]{-135a^{15}}$

Find the real roots of each equation.

73. $25y^2 + 16 = 17$

74. $5 = 9 + 16x^2$

Properties of Radicals

Simplify.

75. $\sqrt[3]{20} \cdot \sqrt[3]{14}$

76. $\frac{\sqrt[3]{175}}{\sqrt[3]{50}}$

Sums/Differences of Radicals

Simplify.

77. $\sqrt{18} + \sqrt{24} - \sqrt{54}$

78. $\sqrt{15}(\sqrt{3} + 2\sqrt{5})$

79. $\frac{\sqrt{40} - 2\sqrt{5}}{\sqrt{10}}$

Binomials Containing Radicals

Simplify.

80. $(3\sqrt{6} + \sqrt{2})(\sqrt{6} - 4\sqrt{3})$

81. $(2\sqrt{5} + \sqrt{7})^2$

82. $\frac{\sqrt{5} + 1}{\sqrt{5} - 3}$

The Imaginary Number i

Simplify.

83. $\sqrt{-75}$

84. $\sqrt{-3} \cdot \sqrt{-6}$

85. $(3i\sqrt{5})^2$

86. $\frac{\sqrt{18}}{2i\sqrt{6}}$

87. $i\sqrt{-98} - \sqrt{98}$

Solve.

88. $x^2 + 144 = 0$

89. $3u^2 + 40 = 4$

Complex Numbers

Simplify.

90. $3(-2+i) - 4(3-2i)$

91. $(6-7i)^2$

92. $\frac{8-i\sqrt{2}}{6+i\sqrt{2}}$

The Quadratic Formula

Solve using the Quadratic Formula.

93. $8x = 1 - x^2$

The Discriminant

Give the nature of the roots without solving.

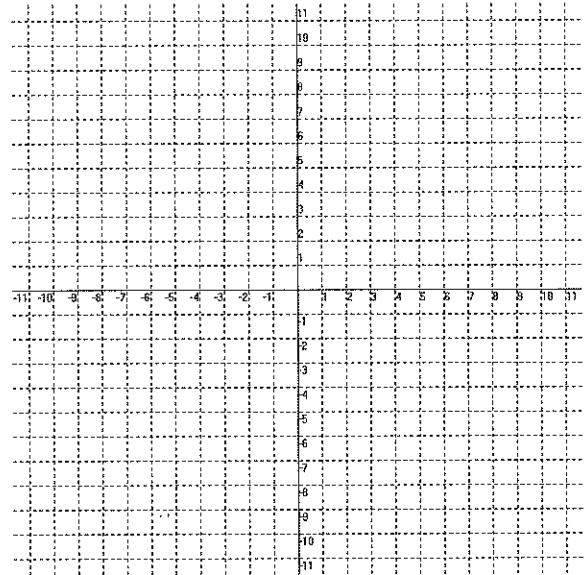
94. $3m^2 - 8m - 5 = 0$

95. $-20 = t^2 + 8t$

Quadratic Functions

96. Graph the quadratic function by calculating the vertex and making a table of values. Then, answer the questions below.

$$f(x) = -x^2 - 2x + 8$$



Is the vertex a max or a min?

Give the domain of the function.

Give the range of the function.

Dividing Polynomials (Long Division)

Find the quotient using Long Division.

97.
$$\frac{x^3 - 3x^2 - 13x + 6}{x - 2}$$

98.
$$\frac{2x^3 - 29x + 13}{x + 4}$$

Synthetic Division

Find the quotient using Synthetic Division.

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

100. $\frac{x^4 + 5x^3 - 2x - 7}{x + 5}$

Rational Exponents

Simplify.

101. $(-125)^{\frac{2}{3}}$

102. $32^{-0.2}$

103. $-81^{\frac{3}{4}}$

104. Write in Exponential Form.

$$\sqrt[4]{\frac{16^3 a^{-2}}{b^6}}$$

Solve.

105. $2y^{\frac{1}{2}} = 10$

106. $(3n-1)^{\frac{2}{3}} = \frac{1}{4}$

Composition of Functions

Given: $f(x) = x + 6$ and $g(x) = -x^2 - 3$, find:

107. $g(f(1))$

108. $f(g(-2))$

109. $g(f(x))$

Inverses of Functions

110. Find the inverse.

$$f(x) = 5x + 1$$

111. Verify that the functions are inverses by composition

$$f(x) = \frac{x+6}{3} \quad \text{and} \quad f^{-1}(x) = 3x - 6$$