

**MONTGOMERY COLLEGE
GERMANTOWN CAMPUS**

MA091 Final Exam Review Sheet

(Revised Spring 2010)

This is a review sheet. The actual final exam will be different.

Questions 1-18: Use the various equation solving techniques taught in the course to solve for x.

1. $\frac{x}{5} - \frac{x}{6} = 1$

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

3. $-9 - 5x = 3(6x - 1)$

4. $8(x + 5) = 7(x - 2)$

5. $3x - 8 = x - 14$

6. $9 - \frac{x}{3} = \frac{7(x+1)}{7}$

7. $x^2 - 25 = 0$

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

9. $5x^2 + 7x = 2$

10. $x^2 - 5x = 6$

11. $\frac{1}{3}x^2 - \frac{1}{6}x - 1 = 0$

12. $x^2 + 4x = 0$

13. $x^2 - x - 11 = (x + 4)^2$

14. $x^2 - 11x + 28 = 0$

15. $x(7x + 1) = 2$

16. $(x - 2)^2 = 15x$

17. $x + \frac{4}{x} = -5$

18. $\frac{1}{3a} - \frac{2}{a} = 10$

Questions 19-20: Solve each inequality and graph the solution.

19. $3x + 8 < 20$

20. $9 - 5(x - 2) \geq 4$

Questions 21-26: Solve each of the following systems of equations.

21.
$$\begin{cases} 2x - y = 13 \\ y = 5x - 31 \end{cases}$$

22.
$$\begin{cases} 3x - 3y = -3 \\ -2x - 2y = 2 \end{cases}$$

23.
$$\begin{cases} x + 2y = -3 \\ 4x + 2y = -2 \end{cases}$$

24.
$$\begin{cases} 4x + y = 14 \\ -7x - 5y = -31 \end{cases}$$

25.
$$\begin{cases} 3x + y = 5 \\ 6x + 2y = 7 \end{cases}$$

26.
$$\begin{cases} 3x + y = 5 \\ 6x + 2y = 10 \end{cases}$$

Questions 27-32: Perform the following operations and simplify.

27. $(-4x^2 + 4x - 2) + (-3x^2 - 3x - 2)$

28. $(3x^3 - 2x^2 + 5x) - (x^3 - 2x - 8)$

29. $(3x - 2y)^2$

30. $2x^4(5x^2 - 5y)$

31. $(7x + 9)(7x - 9)$

32. $(x + 1)(x - 3)$

Questions 33 – 47: Simplify the expression where possible. Express answers without using negative exponents.

33. $x^5 x^4$

34. $(x^5)^4$

35. $x^5 + x^4$

36. $(-2x)^3$

37. $-2x^{-3}$

38. $\frac{x^2 y^4}{x^7 y}$

39. $\frac{x^{-2}}{x^{-5}}$

40. $3x^0$

41. $(3x)^0$

42. $(x^{-2})^{-4}$

43. $(-2x^2 y^{-1})^3$

44. $(-2xy^2)^3(-3xy^2)$

45. $\frac{9x^8 y^{-3}}{12x^2 y^{12}}$

46. $\frac{3xy^{-2}}{12x^{-6} y^3}$

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

Questions 48-51: Evaluate following expressions.

48. Evaluate: $2^{-3} + 7^0$

49. Evaluate: $4^{-1} + (-4)^2$

50. Evaluate $x^0 + x^{-1}$ for $x = 4$

51. Evaluate $2y^3 - 3y^2 - y$ for $y = -3$

52. Express using scientific notation: 42,000,000

53. Express using scientific notation: 0.0064

54. Express in standard form without exponents: 6.64×10^4

55. Express in standard form without exponents: 2.14×10^{-6}

56. Solve for y: $5x - 6y = 9$

57. Solve for h: $S = 2\pi h + 2\pi r^2$

Questions 58-66: Factor each algebraic expression completely. If not possible, write "Prime."

58. $18x^2y - 12x^2 + 6x$

59. $x^2 - 8xy + 12y^2$

60. $x^2 + 3x - 10$

61. $7x^2 - 22x + 3$

62. $x^2y^2 - 8xy + 16$

63. $x^2 - 16y^2$

64. $4x^2 + 9$

65. $x^{14} - y^4$

66. $-3x^4 + 75x^2$

Questions 67-74: Perform the indicated operation on the rational expressions. Be sure to simplify your final answer wherever possible. (OPTIONAL)

67. $\frac{3x+2}{7x} - \frac{x-3}{7x}$

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

69. $\frac{3}{x^2} \cdot \frac{x^9}{12}$

70. $\frac{f^2}{gh} \cdot \frac{7g^3h}{3f}$

71. $\frac{x^2 - 12x + 36}{-10x} \div \frac{x-6}{-2x}$

72. $\frac{14x^2yz}{6x} \div \frac{3xz^2}{2xy}$

73. $\frac{4x}{9} \cdot \left(\frac{9}{x} - \frac{9}{5x} \right)$

74. $\frac{2x^2y + 8x^2y^2 - xy^2}{2xy}$

75. Graph the following equations and find the slope, if exists:

a. $y = 3x$

b. $y = -4$

c. $x = 3$

76. Graph the linear equation given by finding 3 ordered pair solutions: $y = 3x - 1$

77. Graph the given line by plotting the intercepts: $-2x + y = 2$

78. Find the x intercept, y intercept, and slope of the given line: $3x + 8y = 9$

79. Find the slope and the y-intercept of the given line: $y = -\frac{1}{6}x + 2$

80. Find the slope of the line going through the points $(-9, -2)$ and $(8, 6)$.
Also, write the equation of this line in standard form: $Ax + By = C$.

81. Sketch a graph of the line with its y-intercept at $(0, -2)$ and a slope of $\frac{7}{2}$.
Also, find the equation of this line in slope-intercept form.

82. Find the equation of the line in slope-intercept form for a line passing through a point $(4, 2)$ and perpendicular to $y = \frac{3}{2}x + 4$. Also, sketch the line.

Questions 83-88: Simplify. Assume that variables represent positive real numbers.

83. $\sqrt{400}$

84. $-\sqrt{\frac{81}{49}}$

85. $\sqrt{x^{10}}$

86. $\sqrt{x^{44}}$

87. $\sqrt{0.04}$

88. $\sqrt{25a^6b^8}$

89. $\sqrt{160}$ is closest to: (a) 10 (b) 13 (c) 20 (d) 40

90. A board measuring 20 meters needs to be cut so that the larger piece is five meters longer than twice the smaller piece. Find the length of each piece.

91. The length of a rectangle is 3 inches longer than the width. If the area of the rectangle is 108 square inches, find the length and the width.

92. If the product of a number and 9 is increased by 72, the result is 27. Find the number.

93. The sum of three consecutive odd integers is 675. Find the integers.

94. Winona County and Adams County together have annual budgets totaling \$56.6 million. If Winona County spends \$2.2 million more than Adams County each year, what is the annual budget of each county?

95. A rectangle has a length of 12 inches and a width of 9 inches. Find the exact length of its diagonal.

96. Mr. Jones has \$20,000 to invest. He invests part at 6% and the rest at 7%. If he earns \$1280 interest after one year, how much did he invest at each rate?

97. An object is dropped off the 576-foot-tall Casino Royale. The height h of the object after t seconds is given by the equation $h = -16t^2 + 576$. Find out how many seconds pass before the object hits the ground.

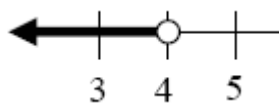
SOLUTIONS

1. 30 2. $\frac{19}{11}$ 3. $-\frac{6}{23}$ 4. -54 5. -3

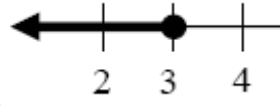
6. 6 7. -5, 5 8. -5, 0, 2 9. $\frac{-7 \pm \sqrt{89}}{10}$

10. 6, -1 11. $-\frac{3}{2}, 2$ 12. 0, -4 13. -3 14. 4, 7

15. $\frac{-1 \pm \sqrt{57}}{14}$ 16. $\frac{19 \pm \sqrt{345}}{2}$ 17. $x = -4, -1$ 18. $a = -\frac{1}{6}$



19. $x < 4$



20. $x \leq 3$

21. (6, -1) 22. (-1, 0) 23. $\left(\frac{1}{3}, -\frac{5}{3}\right)$ 24. (3, 2) 25. no solution

26. infinitely many solution; all points on the line $3x + y = 5$; they are same line.

27. $-7x^2 + x - 4$ 28. $2x^3 - 2x^2 + 7x + 8$ 29. $9x^2 - 12xy + 4y^2$

30. $10x^6 - 10x^4y$ 31. $49x^2 - 81$ 32. $x^2 - 2x - 3$ 33. x^9

34. x^{20} 35. can't be simplified 36. $-8x^3$ 37. $\frac{-2}{x^3}$

38. $\frac{y^3}{x^5}$ 39. x^3 40. 3 41. 1 42. x^8

43. $\frac{-8x^6}{y^3}$ 44. $24x^4y^8$ 45. $\frac{3x^6}{4y^{15}}$ 46. $\frac{x^7}{4y^5}$ 47. $\frac{x-3}{x+3}$

48. $\frac{9}{8}$ 49. $\frac{65}{4}$ 50. 1.25 51. -78 52. 4.2×10^7

53. 6.4×10^{-3} 54. 66,400 55. 0.00000214 56. $y = \frac{5}{6}x - \frac{3}{2}$

57. $h = \frac{S - 2\pi r^2}{2\pi}$ 58. $6x(3xy - 2x + 1)$ 59. $(x - 2y)(x - 6y)$

60. $(x + 5)(x - 2)$ 61. $(7x - 1)(x - 3)$ 62. $(xy - 4)^2$

63. $(x + 4y)(x - 4y)$ 64. Prime 65. $(x^7 - y^2)(x^7 + y^2)$

66. $-3x^2(x + 5)(x - 5)$ 67. $\frac{2x + 5}{7x}$ 68. $\frac{10x + 3}{2x^2}$

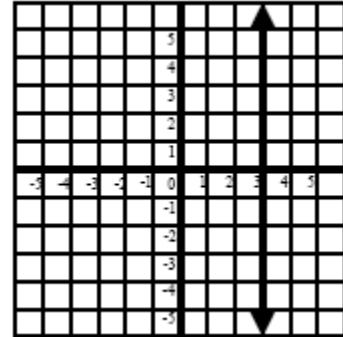
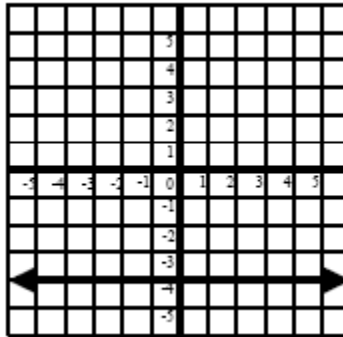
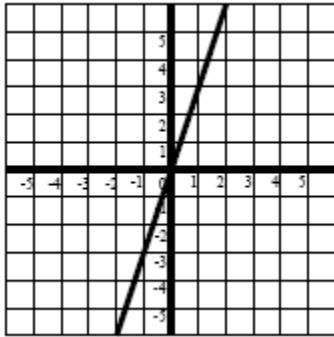
69. $\frac{x^7}{4}$ 70. $\frac{7fg^2}{3}$ 71. $\frac{x - 6}{5}$

72. $\frac{14xy^2}{9z}$ 73. $\frac{16}{5}$ 74. $x^2 + 4xy - \frac{y}{2}$

75. a. slope = 3,

b. slope = 0,

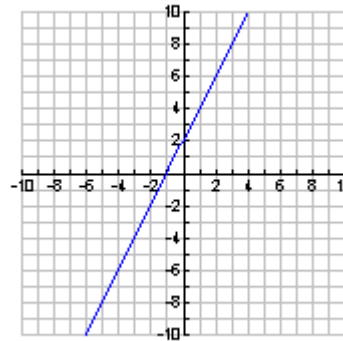
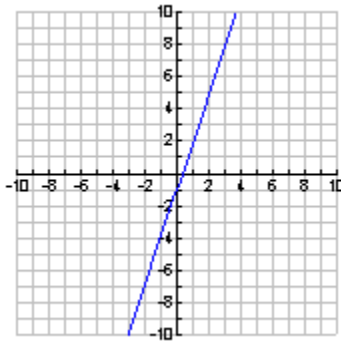
c. slope: undefined



76.

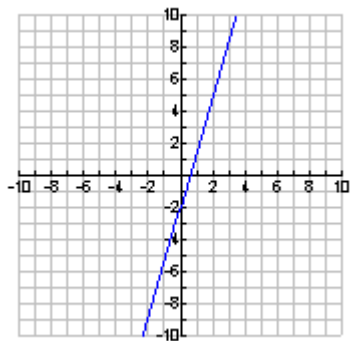
77.

78. $(3,0)$ and $(0, \frac{9}{8})$ slope = $-\frac{3}{8}$



79. $-\frac{1}{6}, 2$ 80. Slope = $\frac{8}{17}$; $8x - 17y = -38$

81. $y = \frac{7}{2}x - 2$ 82. $y = \frac{3}{2}x - 4$



83. 20 84. $-\frac{9}{7}$ 85. x^5 86. x^{22} 87. $\frac{2}{10}$ 88. $5a^3b^4$

89. (b) 90. 5 m and 15 m 91. W = 9 in. L = 12 in. 92. -5

93. 223, 225, 227 94. Adams: \$27.2 mil. Winona: \$29.4 mil.

95. 15 in.

96. \$12,000 @ 6%, \$8,000 @ 7%

97. 6 sec.