Advanced Algebra with Trigonometry, Honors
Second Semester Final Exam Review Packet

Name_____
Date_____Pd:_____

Show work within the packet for questions 1 – 44, but use a separate piece of paper for all other problems.

Chapter 5

Simplify the following expressions as far as possible. *Present your answers in descending order of degree, where possible.*

1. $(2^3)(2^5)$

2. $5xy(3x^4)^2$

3. $\dfrac{-15ab^{-3}(a^3b^2)}{20a^2b^9}$

4. $\dfrac{5gh^{-2}k(6g^5h^3k)^2}{10g^8h^4k^5}$

5. $3a^2b^3(4ab^2 - 3a^4b^7 + 2ab)$

6. $2q^{-5}(q^7 - 4q^5 + 5q^3)$

7. $5x^2 - 1 - 3(x + 12)$

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

9. $(7x^2 - 3x^3 + 3x - 6) - (4x + 5x^3 - 3 - 2x^2)$

10. $(x - 5)(2x + 3)$

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

12. $(6x - 5)^2$

13. $(4x - 9)(x^2 - 3x + 2)$

14. $\dfrac{3x^3yz^2 - 4xy^3z}{x^2yz}$

15. Solve by long division: $(6q^4 + 15q^3 - 28q - 32) \div (q + 2)$.

Simplify the following radical expressions (by hand) to the extent possible.

16. $\pm\sqrt{\dfrac{4}{9}}$

17. $\sqrt[3]{-125}$

18. $\sqrt[4]{81c^{12}}$

19. $\sqrt[3]{16}$

20. $\sqrt{50x^{10}}$

21. $\sqrt{\dfrac{4y}{3}}$

22. $(4+\sqrt{8})(6+\sqrt{2})$

23. $\dfrac{5}{2+\sqrt{5}}$

24. $5\sqrt{12} - \sqrt{5} + \sqrt{108}$

25. $125^{2/3}$

26. $8^{-2/3}$

27. $625^{1/2}$

28. $\sqrt{250a^4b^2c^5}$

29. $x^{-1/2}$

Solve the following radical equations.

30. $\sqrt{b-5} = 4$

31. $\sqrt{3n+1} = 5$

32. $2 + \sqrt{3p+7} = 6$

33. $5 + \sqrt{2x-1} = 3$

34. $\sqrt[3]{3r-6} = 3$

35. $\sqrt[3]{6u-5} + 2 = -3$

36. $\sqrt{2d-5} = \sqrt{d-1}$

37. $\sqrt{2x+5} = \sqrt{2x+1}$

Simplify and/or solve the following statements using *i*, the imaginary unit.

38. $3x^2 + 14 = 2$

39. $\sqrt{-121}$

40. $\sqrt{-120}$

41. $(3 + 2i) + (7 - 5i)$

42. $(3 + 2i) - (7 - 5i)$

43. $(3 + 2i)(7 - 5i)$

44. $\dfrac{5-4i}{2+3i}$

Quadratics Unit: Chapter 6

45. Find the y-intercept of the parabola given by $y = 3x^2 - 18x + 4$.

46. Find the equation for the axis of symmetry of the parabola given by $y = 3x^2 - 18x + 4$.

47. State the minimum value of the function $y = 3x^2 - 18x + 4$ (by finding the y-coordinate of its vertex).

48. Determine the y-intercept in the equation $y = 3(x - 3)^2 - 23$ (not obvious from the equation…).

49. Does the graph of the parabola $y = 3x^2 - 18x + 4$ open upwards or downwards?

50. The solutions/zeroes/roots to a quadratic equation can be found by looking at what part of the graphed parabola?

51. Write the equation of a parabola with a vertex at (5, 4) and passing through the point (3, -8).

52. Find the value of the discriminant for the equation $-4x^2 - 14x + 3 = 0$.

53. If the discriminant of a quadratic equation is equal to 0, how many & what kinds of roots / x-intercepts / solutions / zeroes will it have? (There will be 1 or 2; they will be Real or Imaginary; if Real, they will be Rational or Irrational.)

54. If the discriminant of a quadratic equation is equal to 100, how many and what kinds of roots / x-intercepts / zeroes / solutions will it have?

55. If the discriminant of a quadratic equation is equal to -11, how many and what kinds of roots / zeroes will it have?

56. If the discriminant of a quadratic equation is equal to 10, state the number & nature of solutions.

57. Solve for the solutions / roots / zeroes of the quadratic equation $-x^2 + 7x + 8 = -3$.

58. Use the quadratic formula to solve for x: $x^2 - 4x + 1 = 0$

59. Use the quadratic formula to solve for x: $x^2 + 34 = 6x$

Factoring Unit: Sections 5-4, 6-7, 9-1 & 9-2

Factor the following expressions as completely as possible.

60. $18q^3r + 24q^2r^4$

61. $20c^5d^4 - 15c^2d + 10cd$

62. $ef - 3e + 5fg - 15g$

63. $8a^2b - 4abc + 2a - c$

64. $x^2 - x - 12$

65. $x^2 - 3x - 15$

66. $4x^2 + 11x + 6$

67. $6x^2 - 13x - 5$

68. $3x^2 + 9x - 30$

69. $4x^2 - 25$

70. $x^2 + 9$

71. $90x^2 - 1{,}000$

72. Solve the inequality: $x^2 - x - 20 > 0$.

73. Solve the inequality: $-x^2 - 15 \geq 8x$.

74. Simplify: $\frac{5x^2y^3}{3a^5b^4} \cdot \frac{15a^7b^3}{20x^5y^6}$

75. Simplify: $\frac{x^2 - 6x + 8}{x + 5} \div \frac{2x - 8}{x + 5}$

Chapter 10

76. Solve the equation $8^{n-2} = 16$.

77. Solve the equation $10^{8n-6} = \frac{1}{10,000}$.

78. Determine whether the equation $y = 4(3)^x$ demonstrates exponential growth or decay.

79. Determine whether the equation $y = 4(0.3)^x$ demonstrates exponential growth or decay.

80. Write the equation for an exponential function that passes through points (0, -4) and (-4, -64).

81. Write the equation $7^4 = 2{,}401$ in its logarithmic form.

82. Write the equation $\log_6 \frac{1}{1,296} = -4$ in its exponential form.

83. Evaluate the expression $\log_2 4$.

84. Evaluate the expression $\log_5 \frac{1}{125}$.

85. Solve the equation $\log_{243} n = \frac{4}{5}$.

86. Solve the equation $\log_5 n = 5$.

87. Solve the equation: $\log_2 9 + \log_2 a = \log_2 11$.

88. Solve the equation: $\log_5 (x + 2) - \log_5 7 = \log_5 49$.

89. Use a calculator to find $\log_7 6.3$.

90. Use a calculator to find $\log_3 12$.

91. Solve the equation $3^k = 38$.

92. Solve the equation $5^{6x} = 28$.

93. Solve $4e^x - 7 = 25$.

94. If you make an investment of $10,000 that appreciates at an annual rate of 3.5%, how much money would you have after 8 years? How long would it be until its value doubles? Use the equation $y = a(1 + r)^t$ to determine your solutions.

95. If you deposit $5,000 in a savings account paying 4% interest compounded continuously, how much money will you have after 6 years? How long will it take until you have $7,000 in the account? Use the equation $A = Pe^{rt}$ to determine your solutions.

96. A particular compound decays according to the equation $y = ae^{-0.0736t}$, where t represents days. If there are 12 grams of the compound initially, in how many days will there be half that amount remaining?

Chapter 7

97. Sketch a function of even degree that has a negative lead term.

98. Sketch a function of odd degree that has a negative lead term.

99. What is the maximum amount of solutions of the equation $0 = 4x^5+2x^3 - 3x^2 + 1$?

Completing the Square: Sections 6-4 & 6-6

100. What would be the ideal number to use as "C" when completing the square for $x^2 + 8x + C$?

101. Solve the following equation by completing the square: $x^2 + 10x = 22$. (Of course, on a multiple-choice test, you don't *have to* do it any particular way, but Section 6-4 was about completing the square…)

102. Write the equation of the given parabola in vertex form. Then state the location of the vertex, axis of symmetry, and direction of opening: $y = x^2 - 6x + 1$.

103. Rewrite this equation in vertex form (by completing the square): $y = 5x^2 + 20x + 18$.

104. Find the vertex and state the direction of opening of the equation: $y = -3(x - 4)^2 + 7$.

105. Complete the square to write the equation in vertex form. Then state the vertex and direction of opening: $y = 2x^2 + 20x + 49$.

Second Semester Final Exam Review Packet Answer Key

Chapter 5

1. 2^8
2. $45x^9y$
3. $(-3a^2)/(4b^{10})$
4. $(18g^3)/(k^2)$
5. $12a^3b^5 – 9a^6b^{10} + 6a^3b^4$
6. $2q^2 – 8 + (10)/q^2$ (only the 10 is over q^2)
7. $5x^2 – 3x – 37$
8. $2x^2 – 2x + 8$
9. $-8x^3 + 9x^2 – x – 3$
10. $2x^2 – 7x – 15$
11. $12x^2 – 11x – 15$
12. $36x^2 – 60x + 25$
13. $4x^3 – 21x^2 + 35x – 18$
14. $3xz – (4y^2)/x$ (only the $4y^2$ is over x)
15. $6q^3 + 3q^2 – 6q – 16$
16. $\pm 2/3$
17. -5
18. $3|c^3|$
19. $2\sqrt[3]{2}$
20. $5|x^5|\sqrt{2}$
21. $\frac{2\sqrt{3y}}{3}$
22. $28 + 16\sqrt{2}$
23. $-10 + 5\sqrt{5}$
24. $16\sqrt{3} - \sqrt{5}$
25. 25
26. ¼
27. 25
28. $5a^2|b|c^2\sqrt{10c}$
29. $\frac{\sqrt{x}}{x}$
30. 21
31. 8
32. 3
33. No solution
34. 11
35. -20
36. 4
37. No Solution
38. $\pm 2i$
39. $11i$
40. $2i\sqrt{30}$
41. $10 – 3i$
42. $-4 + 7i$
43. $31 – i$
44. $\frac{-2 - 23i}{13}$

Quadratics Unit

45. (0,4)
46. x = 3
47. -23
48. y = 4
49. up
50. The x-axis
51. $y = -3(x – 5)^2 + 4$
52. 148
53. 1 Real, Rational
54. 2 Real, Rational
55. 2 Imaginary
56. 2 Real, Irrational
57. $\frac{7 \pm \sqrt{93}}{2}$ (When you get the negative out of the bottom of the fraction, it changes the sign on 7.)
58. $2 \pm \sqrt{3}$
59. $3 \pm 5i$

Factoring Unit

60. $6q^2r(3q + 4r^3)$
61. $5cd(4c^4d^3 – 3c + 2)$
62. $(f – 3)(e + 5g)$
63. $(2a – c)(4ab + 1)$
64. $(x + 3)(x – 4)$
65. Prime
66. $(x + 2)(4x + 3)$
67. $(3x + 1)(2x – 5)$
68. $3(x + 5)(x – 2)$
69. $(2x – 5)(2x + 5)$
70. Prime
71. $10(3x – 10)(3x + 10)$
72. $\{x \mid x < -4 \text{ or } x > 5\}$
73. $\{x \mid -5 \leq x \leq -3\}$
74. $(5a^2)/(4bx^3y^3)$
75. $(x – 2)/2$

Chapter 10

76. $3\frac{1}{3}$
77. ¼
78. Growth
79. Decay
80. $y = -4(½)^x$
81. $\log_7 2{,}401 = 4$
82. $6^{-4} = \frac{1}{1{,}296}$
83. 2
84. -3
85. 81
86. 3,125
87. 11/9
88. 341
89. 0.9459
90. 2.2619
91. 3.3111
92. 0.3451
93. 2.0794
94. $13,168.09; 20.15 years
95. $6,356.25; 8.4 years
96. 9.4178 days

Chapter 7

97. Graphs will vary, but end behaviors should match

98. Graphs will vary, but end behaviors should match

99. 5

Completing the Square

100. 16
101. $-5 \pm \sqrt{47}$
102. (3,-8); x = 3; opens upward
103. $y = 5(x + 2)^2 – 2$
104. (4, 7); opens down
105. $y = 2(x + 5)^2 – 1$; (-5, -1); opens up