Algebra 2

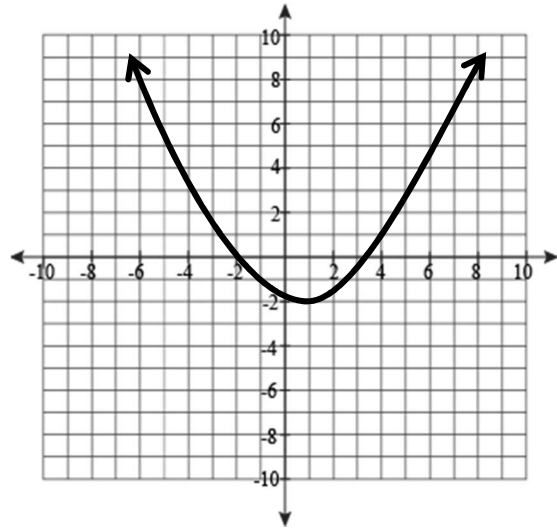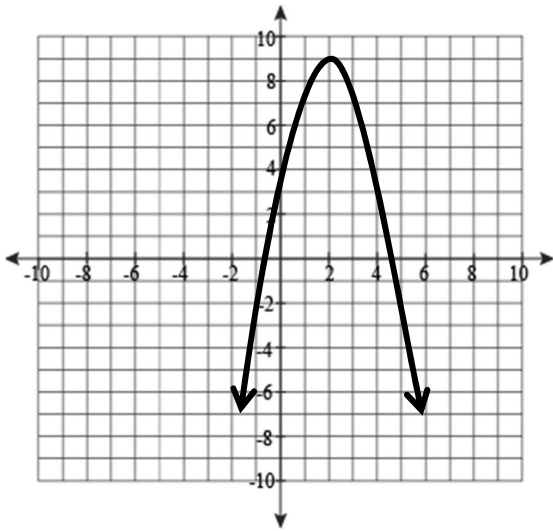# **Algebra 2 Semester 2 Study Guide for Final Exam**

4LT1: Identify and graph quadratic functions (4-1 Pg. 194)

1.) Identify the vertex, axis of symmetry, maximum or minimum, and domain and range of the function below

2.) Give the transformation of the parent function to each of the functions below:

      a.) $f(x) = x^2$ to $f(x) = (x - 6)^2 + 8$ b.) $f(x) = x^2$ to $f(x) = (x + 4)^2 - 10$

4LT2: Model data with quadratic functions (4-3 Pg. 209)

3.) Find the equation of the parabola that passes through the set of points:

      a.) (0 ,0), (1 , -2), and (-1 , -4)   b.) (-2, 9), (-4, 5), and (1 , 0)

4LT3: Find common and binomial factors of quadratic expressions. (4-4 Pg. 216)

4.) Write each of the quadratic equations below in standard form:

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

5.) Factor each of the quadratic expressions below:

a.) $x^2 + 5x + 4$ b.) $x^2 - 5x - 14$ c.) $2x^2 + 13x + 11$ d.) $4x^2 + 15x + 9$

4LT4: Solve quadratic equations by factoring and graphing (4-5 Pg. 226)

7.) Give the solutions for the quadratics below:

a.) $x^2 + 15x + 50$ b.) $3x^2 + 10x + 8$ c.) $x^2 + 7x = 18$ d.) $2x^2 + 8x = -8$

4LT5: Solve quadratic equations using the quadratic formula (4-7 Pg. 240)

9.) Determine the discriminant for each of the quadratic equations below:

      a.) $y = 5x^2 + 4x - 10$ b.) $y = 2x^2 + 3x + 12$

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4LT6: Identify, graph, and perform operations with complex numbers (4-8 Pg. 248)

10.) Simplify each expression and write it in terms of *i*

    a.) $\sqrt{-4}$ b.) a.) $4 + \sqrt{-5}$ c.) a.) $\sqrt{-10} + 9$

11.) Simplify each expression below:

    a.) $(10 + 13i) - (12 - 7i)$ c.) $4 + 10i + 15i - 9$ c.) $(8 + 3i) + (2 - 5i)$

12.) Solve each quadratic below (give the complex answers in terms of i)

    a.) $x^2 + 2x + 3 = 0$ b.) $x^2 - 4x + 5 = 0$

4LT7: Solve and graph systems of equations involving quadratic functions (4-9 Pg. 258)

13.) Give the solution to the system of equations below:

    a.) $\begin{cases} y = -x^2 - x + 6 \\ \quad y = x + 3 \end{cases}$ b.) $\begin{cases} y = x^2 - 2x + 3 \\ \quad y = x + 1 \end{cases}$

5LT1: Classifying and describing polynomial functions from their end behavior. (5-1 Pg. 280)

14.) Classify the polynomial equations below:

a.) $y = 7x^2 + 5x^3 - 8x^5 + 7$ b.) $y = 6x + 10x^2 + 2x^2$ c.) $y = 4x^3 - 10x^4 + x$

15.) Give the end behavior of each polynomial equation:

a.) $y = 10x^4 - 2x^2 + 19$ b.) $y = 6x^2 - 9x^3 + 10$ c.) $y = 5x^2 + 10x + 3x^5$

5LT2: Solve Polynomials by graphing (5-2 Pg. 28)

16.) Give the solution of each polynomial below:

a.) $y = 4x^3 + 12x^2 + 8x$ b.) $y = 6x^3 - 3x^2 - 2x$ c.) $y = 7x^4 + 3x^3 - 2x^2$

18.) Give all of the solutions below that are greater than zero

        a.) $y = 10x^3 + 60x^2 - 50x$ b.) $y = 10x^3 - 5x^2 - 16x + 8$

5LT3: Solve Polynomials by factoring (5-3 Pg. 296)

19.) Give the factored form of the polynomials:

        a.) $y = 7x^3 + 84x^2 + 140x$ b.) $y = 6x^3 + 15x^2 + 8x + 20$

20.) What are the solutions (both real and complex) for the polynomials:

        a.) $8x^3 + 88x^2 + 10x = 0$ b.) $32x^4 + 8x^2 + 16x + 4 = 0$

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Final Exam: Semester 2 Algebra 2 Short Answer Section

LT1: Exponential Functions (CPM Appendix A Lesson 1)

21.) Suppose Aunt Millie gave you $100 when you were born and then increased each successive birthday present by $10. (On your 1st birthday you would receive $110.)

a. How much money will you receive on your 21st birthday?

b. Write an algebraic expression that represents how much money you receive at each birthday.

22.) Leonard wants to show Penny how much he cares for her, so he decides to demonstrate it through roses! On the first day, he gives her one rose. On the second day, he gives Penny four roses. On the third day, Leonard gives her 16 roses. This continues for many days. How many roses did Leonard give Penny on the 34th day? Explain how you know.

23.) A ball is dropped from a height of 3000 cm and rebounds to a height of 2535 cm. Complete the following:

a. What is the rebound ratio of the ball?

b. What is the rebound height after the third bounce?

c. Write an equation that could represent the rebound heights.

d. What is the rebound height after the fifteenth bounce?

24.) Which of the following equations represents the sequence 5, 10, 20, 40, …? Explain your reasoning or show the work that helped you decide on your answer.

A. $t(n) = 2.5(2)^n$

B. $t(n) = 2n$

C. $t(n) = 5n + 5$

D. None of these

25.) A radioactive isotope is decaying at a rate of 18% every hour. Currently there are 100 grams of the substance.

a. Write an equation that will represent the number of grams present after n hours.

b. How much will be left one day from now?

c. When will there only be one gram left?

26.) Sarah was given the following assignment from her math teacher to complete for homework.

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A tetrahedral die has four sides numbered 1, 2, 3, and 4. Suppose you start with 100 such dice and roll them. Remove all the dice that come up with a one. And record how many are left. Repeat this until all of the dice are gone.

Unfortunately, Sarah does not have 100 tetrahedral dice and they are too expensive to buy for just one problem. Help Sarah "fake" the data for her investigation. Explain how you decided on your numbers. Graph the data. Then, decide on an equation that would model the situation. When should Sarah say that all of the dice were gone?