CHAT Algebra 2 – First Semester Extra Credit

First Semester Review

Instructions: Complete the following problems on separate paper (except for the graphing, which is to be done on the 6 graphs provided), numbering each problem and neatly showing all work. (Make sure to show 5 steps on any word problems.) Fill in the answers only on the answer sheet.

Note: This is an open book activity. You can use your notes and your textbook.

Extra Credit Amount:

> 10 points for scores of 50% - 60%
>
> 15 points for scores of 61% - 75%
>
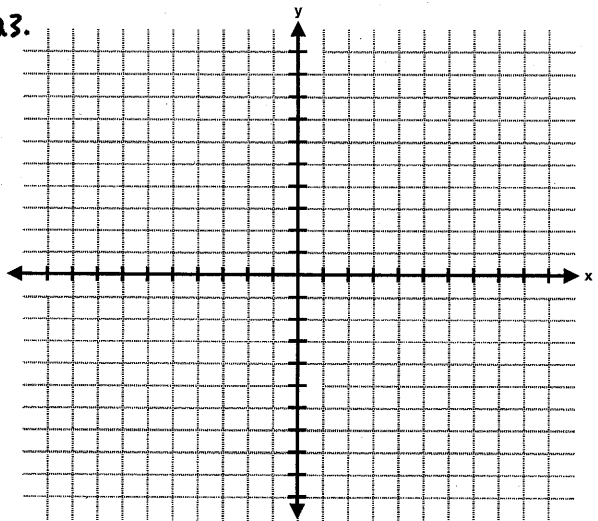> 18 points for scores of 76% - 90%
>
> 20 points for scores of 91% - 100%

CHAT Algebra 2 Extra Credit   Name_____

1 . _____   21 . _____   41 . _____

2 . _____   22 . _____   42 . (on graph provided)

3 . _____   23 . (on graph provided)   43 . _____

4 . _____   24 . _____   44 . _____

5 . _____   25 . _____   45 . _____

6 . _____   26 . _____   46 . _____

7 . _____   27 . _____   47 . _____

8 . _____   28 . _____   48 . _____

9 . _____   29 . _____   49 . _____

10 . _____   30 . _____   50 . _____

11 . _____   31 . (on graph provided)   51 . _____

12 . _____   32 . _____   52 . _____

13 . _____   33 . _____   53 . (on graph provided)

14 . _____   34 . _____   54 . _____

15 . _____   35 . _____   55 . _____

16 . _____   36 . _____   56 . _____

17 . (on graph provided) 37 . _____   57 . _____

18 . _____   38 . _____   58 . _____

19 . _____   39 . (on graph provided)   59 . _____

20 . _____   40 . _____   60 . _____

17.

23.

31.

39.

42.

53.
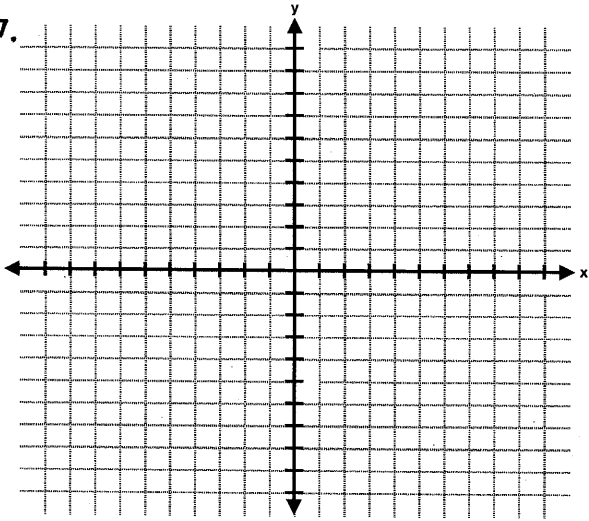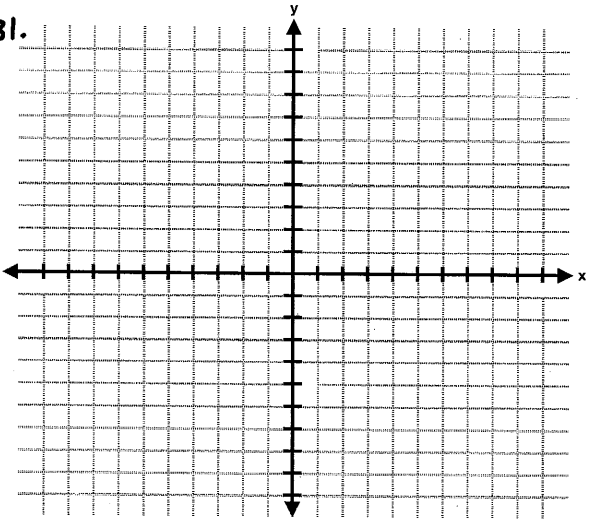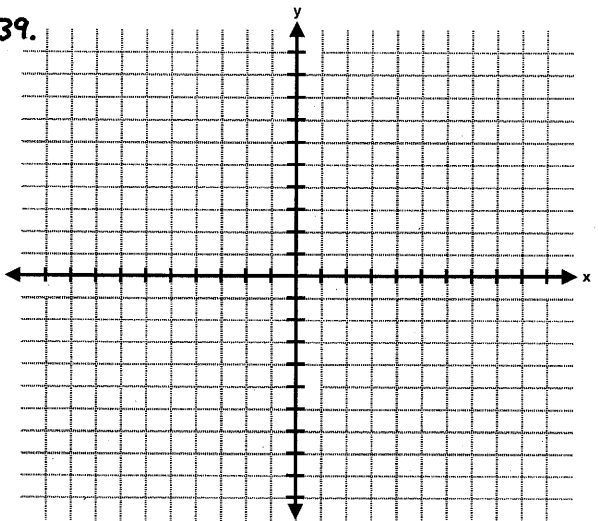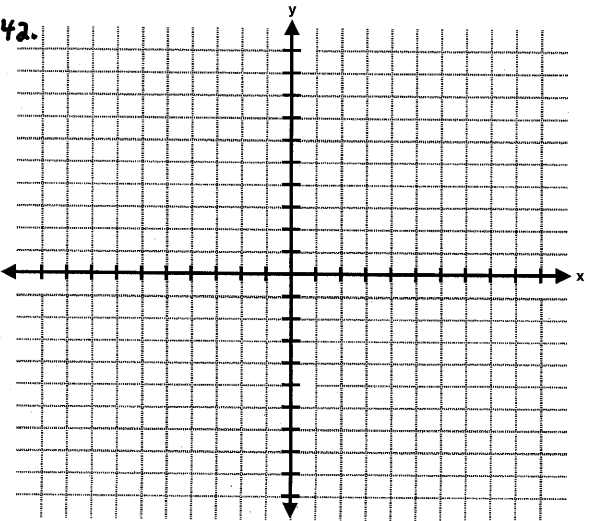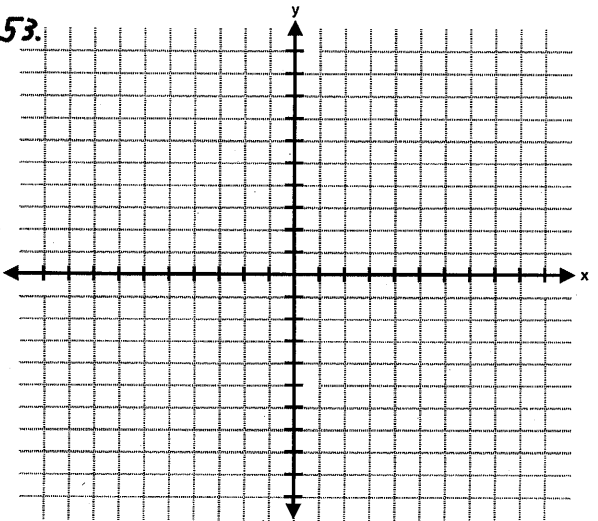
Note: Some of Questions 1–60 on this practice exam are free-response.

1. To which set(s) of numbers does $\sqrt{2}$ belong?

2. Evaluate $\sqrt{b^2 - 4ac}$ for $a = 3$, $b = -4$, and $c = -2$.

A. -8

B. $2\sqrt{10}$

C. 40

D. $2i\sqrt{2}$

3. Which is a simplified form of the expression

$$\frac{2}{3}(3x + 6) - (6x - 18)?$$

A. -2

B. $-2x + 16$

C. $-4x - 14$

D. $-4x + 22$

4. What is the value of n if $\dfrac{3}{4}n + \dfrac{2}{3} = \dfrac{5}{9}$?

A. $-\dfrac{4}{27}$

B. $\dfrac{14}{27}$

C. 1

D. $\dfrac{12}{9}$

5. Rewrite the linear equation below to solve for the x-coordinate, x_2.

$$y_2 - y_1 = m(x_2 - x_1)$$

A. $x_2 = \dfrac{y_2 - y_1}{m} + x_1$

B. $x_2 = \dfrac{y_2 - y_1 + x_1}{m}$

C. $x_2 = y_2 - y_1 + mx_1$

D. $x_2 = \dfrac{y_2 - y_1}{mx_1}$

6. Which is a solution for y in the equation $2x + 5y = 10x - 8 + y$?

A. $y = 8x - 8$

B. $y = 2x - 2$

C. $y = 3x - 2$

D. $y = 2x - 4$

7. Rewrite the absolute value inequality as a compound inequality for $|x+8| > 5$.

    A. $x > -3$

    B. $-13 < x < -3$

    C. $x < -13$ or $x > -3$

    D. no solution

8. Which of the following expresses all of the solutions for the compound inequality below?

    $$3(5-z) \geq 3 \text{ or } 5 \geq 3 - 2z$$

    A. $z \leq -1$ or $z \geq 4$

    B. $-1 \leq z \leq 4$

    C. no solution

    D. all real numbers

9. In the year 2000 the average price of a home in Clark County was $197,000. By the year 2007, the average price of a home was $323,000.

    Which is a linear model for the price of a home, P, in Clark County in terms of the year, t? Let $t = 0$ correspond to the year 2000. Hint: Draw a graph.

    A. $P = 323,000 + 126,000t$

    B. $P = 323,000 - 18,000t$

    C. $P = 197,000 + 126,000t$

    D. $P = 197,000 + 18,000t$

10. Which of the following is a function?

    A. $\{(6, -5), (6, 2), (2, -1)\}$

    B. $\{(-2, 6), (3, 6), (6, 6)\}$

    C. $y^2 = x - 4$

    D. $3x^2 - 2x - 6y^2 + 5y - 1 = 0$

11. What is the domain of the following relation?

    $$\{(-2, 0), (1, -3), (5, -2)\}$$

    A. $\{-3, -2, 0\}$

    B. $\{-2, 1, 5\}$

    C. $\{-5, -1, 2\}$

    D. $\{0, 2, 3\}$

12. Write the standard form of the equation of the line that passes through the point $(-1, 2)$ and is perpendicular to the line $5x + 2y = -1$.

    A. $2x - 5y = -1$

    B. $5x + 2y = 8$

    C. $2x - 5y = -12$

    D. $2x + 5y = 8$

13. Write an equation in slope-intercept form of the line that passes through the point $(2, -4)$ and has a slope of $\dfrac{2}{5}$.

14. Calculate the slope of a line that passes through the points $(-6,5)$ and $(1,4)$.

17. Graph the linear equation $9x + 7y = 63$.

15. A traveler is in the desert. When the drive begins at 11:00 a.m. the temperature is $82°$ F. When the traveler returns at 4:00 p.m., the temperature is $97°$ F. What is the average rate of change in the temperature?

A. $-15°$F per hour

B. $-3°$F per hour

C. $3°$F per hour

D. $15°$F per hour

16. Determine if the following lines are parallel, perpendicular, or neither.

$$y = \frac{1}{3}x + 5$$

$$\frac{1}{3}x + y = 5$$

18. The value of y varies directly with x, and $y = 15$ when $x = 9$. What is the value of x when $y = 20$?

19. Evaluate $f(2)$ for the piecewise function:

$$f(x) = \begin{cases} x, & x \le 0 \\ x^2 - 3x, & x > 0 \end{cases}$$

A. $f(2) = -4$

B. $f(2) = -2$

C. $f(2) = 2$

D. $f(2) = 10$

20. Solve the following linear system:

$$\begin{cases} 5x - 2y = 8 \\ 10x - 16 = 4y \end{cases}$$

A. $(-4, 0)$

B. $(2, 9)$

C. infinitely many solutions

D. no solution

21. What is the value of x in the solution of the following system of linear equations?

$$\begin{cases} 2x - 4y = 13 \\ 4x - 5y = 8 \end{cases}$$

A. -5.5

B. 2

C. 6.5

D. no solution

22. What is the y-coordinate of the solution to the following system of equations?

$$\begin{cases} 2x + y - z = 5 \\ x + 3z = 14 \\ -2x - 3y + 2z = 2 \end{cases}$$

A. -2

B. 0

C. 3

D. 5

23. Graph the system of inequalities.

$$\begin{cases} y \geq 2x + 1 \\ x + y \geq 3 \end{cases}$$

24. A jar contains 24 coins made up of quarters and dimes. When 3 quarters and 4 dimes are removed, the total value of the coins remaining in the jar is $2.75. How many quarters and dimes were originally in the jar?

25. Using linear programming procedures, the equation $C = 5x + 9y$ is to be maximized subject to the following constraints.

$$\begin{cases} x \geq 0 \\ y \geq 2 \\ x + y \leq 10 \\ 2x - 3y \geq -15 \end{cases}$$

1) Graph the system
2) Check all vertices (corners) Of the shaded region in The equation for C.
3) Choose the largest value of C.

The grid may be used to graph the feasible region.
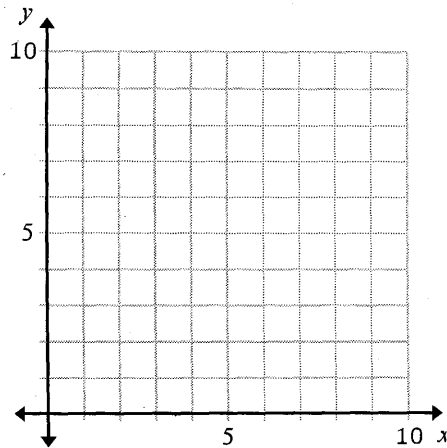
What is the maximum value for the objective function?

A. 88

B. 78

C. 73

D. 53

26. A rectangular piece of cardboard is 18 inches by 13 inches. Four equal squares are cut from each corner, and the cardboard is folded up to make a box whose bottom has an area of 126 square inches. What is the length of each square that is cut from the corners?

27. Sue wants to make a mix of peanuts, almonds and pecans. Peanuts sell for $1.20 per pound, almonds sell for $3.50 per pound, and pecans sell for $4.25 per pound. If she wants to us equal amounts of pecans and almonds, how many pounds of each of the 3 nuts should she use in order to get 20 pounds of mixed nuts that sell for $2.80 per pound? Round your answers to the nearest pound.

28. John invests $10,000 in 2 accounts. One pays 6% interest and the other pays 8%. , If his total annual interest is $710, how much is invested in each account?

29. A chemist has a solution that is 4 % acid and another solution that is 9% acid. How many gallons of each should he mix to make 10 gallons of a 5% acid solution? Round your answers to the nearest tenth of a gallon.

30. The tens digit of a two-digit number is 2 less than 3 times the units digit. The sum of the number and the number with the digits reversed is 110. Find the number.

31. Graph the equation $y = x^2 + 4x - 5$

32. Solve the quadratic equation
$2x^2 - 15x + 13 = 0$ by factoring.

A. $x = \dfrac{1}{2},\ x = 13$

B. $x = 1,\ x = 13$

C. $x = 1,\ x = \dfrac{13}{2}$

D. no solution

33. What is the solution set of $(3x + 4)^2 = 27$?

A. $\left\{ \dfrac{4 - 3\sqrt{3}}{3}, \dfrac{4 + 3\sqrt{3}}{3} \right\}$

B. $\left\{ \dfrac{4 - 3\sqrt{3}}{6}, \dfrac{4 + 3\sqrt{3}}{6} \right\}$

C. $\left\{ \dfrac{-4 - 3\sqrt{3}}{3}, \dfrac{-4 + 3\sqrt{3}}{3} \right\}$

D. $\left\{ \dfrac{-4 - 3\sqrt{3}}{6}, \dfrac{-4 + 3\sqrt{3}}{6} \right\}$

34. Which is one of the appropriate steps in finding solutions for $x^2 + 8x - 9 = 0$ when solved by completing the square?

A. $(x + 4)^2 = 25$

B. $(x + 4)^2 = 9$

C. $(x + 8)^2 = 9$

D. $(x + 9)(x - 1) = 0$

35. Which shows the solutions for $3x^2 - 7x = 1$ using the quadratic formula?

A. $\left\{ \dfrac{-7 + \sqrt{61}}{6}, \dfrac{-7 - \sqrt{61}}{6} \right\}$

B. $\left\{ \dfrac{7 + \sqrt{61}}{6}, \dfrac{7 - \sqrt{61}}{6} \right\}$

C. $\left\{ \dfrac{-7 + \sqrt{35}}{6}, \dfrac{-7 - \sqrt{35}}{6} \right\}$

D. $\left\{ \dfrac{7 + \sqrt{35}}{6}, \dfrac{7 - \sqrt{35}}{6} \right\}$

36. Use the discriminant to determine the number and type of solutions of the equation $7x^2 - 5x = 6$.

A. 1 real solution, 1 imaginary solution

B. no real solutions, 2 imaginary solutions

C. 2 real solutions

D. 1 real solution, no imaginary solutions

37. Simplify the radical expression. Assume all variables are positive real numbers.

$$\sqrt{720x^7 y^3 z^8}$$

38. Do the indicated operation and simplify. Variables represent positive real numbers.

$$\sqrt{192} + \sqrt{300} + \sqrt{75}$$

39. Graph $y \geq 4x - x^2$.

40. A coin is dropped from a balcony located 300 feet above the street. How many seconds will it take to hit the ground?
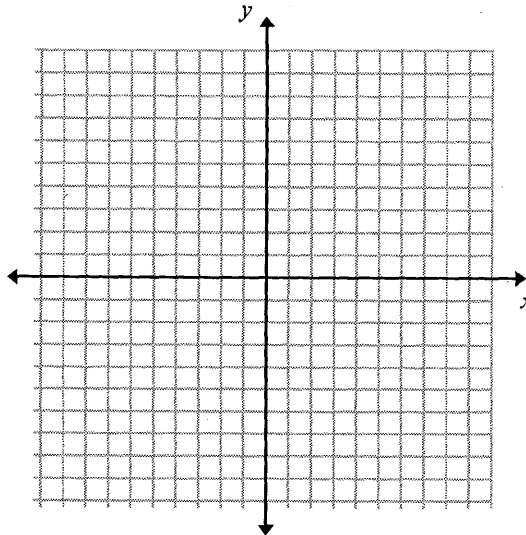
Use the formula $h = -16t^2 + h_0$ where h is the height (in feet) of the coin after t seconds and h_0 is the coin's initial height.

Hint: What does h equal when the coin hits the ground?

41. Factor completely.

$$12x^3y + 104x^2y - 36xy$$

42. Sketch a graph of the polynomial
$y = -x^3 - 3x^2 + 4x + 12$. Find intercepts.

43. Multiply the following polynomials.

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

A. $x^4 + 81$

B. $x^4 - 27x + 81$

C. $x^4 - 3x^3 + 81$

D. $x^4 - 3x^3 - 27x + 81$

44. Solve the polynomial equation. Hint: Solve
$x^4 - 8x^2 + 7 = 0$. by factoring using backwards FOIL.

45. Factor the polynomial $27x^3 + 64$.

46. Which is the set of all <u>real</u> zeros of the polynomial function
$f(x) = 3x^3 - 6x^2 + 3x - 6$?

A. $\{2\}$

B. $\{2, 3\}$

C. $\{1, 3\}$

D. $\{-1, 1, 2, 3\}$

47. Use synthetic division to factor the polynomial $x^3 + 3x^2 - 10x - 24$.

48. According to the *Remainder Theorem*, which of the following is the remainder when the polynomial $f(x) = 3x^3 - 4x + 8$ is divided by $x - 3$?

A. -59

B. -31

C. 23

D. 77

49. Describe the parabola $y = 3(x - 5)^2 + 2$. Write down all correct answers.

A. Opens upward
B. Opens downward
C. Vertex is (-5,2)
D. Vertex is (2, -5)
E. Vertex is (5, 2)
F. Graph is the standard shape
G. Graph is narrower than the standard shape
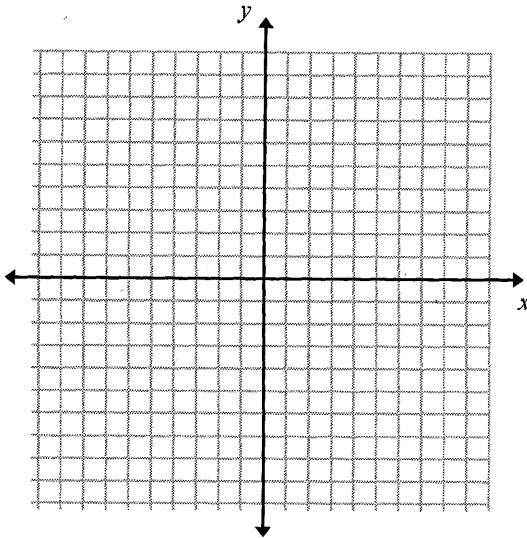H. Graph is flatter than the standard shape

50. Rationalize the denominator of the expression.

$$\frac{\sqrt{3}-4}{2-\sqrt{3}}$$

51. Find the solution set of $|2x - 5| > 7$.

52. Find the solution set of $26 < -3x + 5 \le 11$.

53. Graph the function $y = 2|x - 1| + 3$.

54. Which of the following linear equations has the steepest slope?

A. $y = \dfrac{2}{3}x + 7$

B. $y = -1.5x + 1$

C. $y = 3x + 2$

D. $y = -\dfrac{x}{3} - 4$

.55. Tickets for a seat on a charter bus to a football game are sold in advance for $45 each and on the day of the event for $55 each. For the charter bus to be booked, at least 25 of the 55 tickets must be sold in advance. Let a represent the number of advance tickets sold and h represent the number sold on the day of the game. Write a system of inequalities that represents the number of tickets sold.

Beware of extra info (handwritten, vertical in left margin)

56. Solve the radical equation.

$$3\sqrt{2x + 1} + 8 = 23$$

57. Jim is headed to Chicago. He leaves at noon and travels 60 miles per hour. An hour later his mom discovers that Jim left his wallet (and driver's license) at home. She hops in her car and travels 80 miles per hour. *At what time will she* catch up to him?

58. Write the equation, in vertex form, for the parabola whose vertex is at $(1, 2)$ and passes through the origin.

59. One factor of $x^4 - x^3 - 11x^2 + 9x + 18$ is $(x + 3)$. What are the remaining factors?

60. What are all the possible rational roots of $f(x) = 2x^3 - 5x^2 + x - 8$?