Test 2 Review & Study Guide

Modeling with Quadratics **Show ALL work for credit! Use extra paper, if needed.**

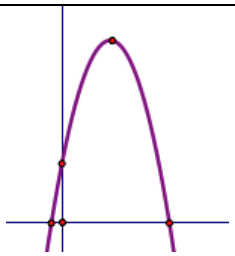
Factor Completely:

1. Factor $x^2+8x+15$ Answer: _____	2. Factor $x^2-11x+24$ Answer: _____
3. Factor x^2+x-12 Answer: _____	4. Factor $3x^2+8x+5$ Answer: _____

Factor And Solve:

5. Solve $(5x-4)(x+3)=0$ Answer: _____	6. Solve $x^2-8x+12=0$ Answer: _____
7. Solve $x^2+12=7x$ Answer: _____	8. The quadratic formula is
9. A quadratic has a. 2 real solutions when _____ b. 1 real solution when _____ c. 0 real solutions when _____	10. Find the exact value of the solution(s) of a. $-4x+3=x^2$ b. $3=3x^2+4x$
11. How many real solutions does each quadratic have? *a.* $y=x^2+x+5$ *b.* $y=x^2+6x+9$ *c.* $y=x^2+6x+8$	12. How many times will a parabola touch the x-axis if its quadratic has a. 2 real solutions _____ b. 1 real solution _____ c. 0 real solutions _____

Graphs of Quadratics

13. Label the graph to show the y-intercept zeros vertex	
14. To find the x-value of the vertex by hand, you use the formula _____.	15. What are two other vocabulary terms for x-intercept?

16. The vertex of $y=-x^2+8x-13$ is at	17. The x-intercepts of $y=x^2+2x-8$ are
18. A parabola opens up (like a smile) if	19. A parabola opens down (like a frown) if
20. Which parabolas will open up? *a.* $y=-x^2+3x-5$ *b.* $y=x^2-3x+5$ *c.* $y=x^2+3x-5$ *d.* $y=-x^2-3x+5$	21. Which parabolas will open down? *a.* $y=-x^2+3x-5$ *b.* $y=x^2-3x+5$ *c.* $y=x^2+3x-5$ *d.* $y=-x^2-3x+5$
22. Determine the amount and type of solutions of $y=-x^2+8x-13$.	23. Describe how the graph of $y=x^2$ is translated for each equation. *a.* $y=x^2+4$ *b.* $y=x^2-5$ *c.* $y=(x-3)^2$ *d.* $y=3(x+2)^2$ *e.* $y=(x+6)^2+2$

Applications

24. A rocket is launched into the air. Its height in feet, after x seconds, is given by the equation $h(x)=-16x^2+300x+20$.	The starting height of the rocket is _____. The maximum height is _____. The rocket hits the ground after _____ seconds.
25. Two teenagers throw pennies from the top of the school. The quadratics at the right show how high each penny over time. What are the maximum heights of each penny? When did each penny hit the ground?	Emily: $y=-16x^2+20x+47$ Isaiah: $y=-16x^2+15x+47$
26. Solve the equation by completing the square: $x^2 + 6x = -22$	

27. Find the vertex form of $y = x^2 + 4x + 1$

Answer _____

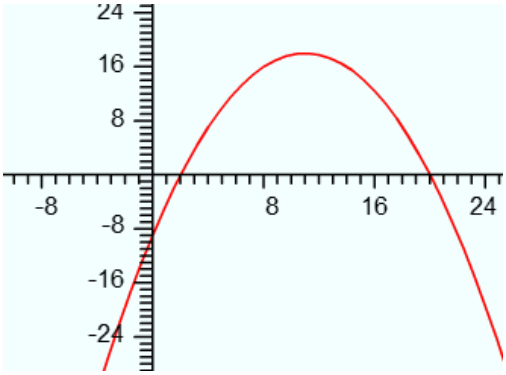
28. Find the vertex form of $y = -2x^2 + 6x + 1$

Answer _____

29. Solve by hand $-4x^2 + 80 = 0$

Answer _____

30. Write the equation, in standard form, of the parabola in the graph below. The vertex is at (11, 18). Show ALL your work by hand.



_____

31. Meg is building a garden up against one side of her house. She has 150 feet of fencing. Find the dimensions of the dog's pen to maximize the area.

Solve each quadratic inequality. Express your solutions using set notation.

32. $x^2 + 5x \geq 24$

33. $5x^2 + 10 \geq 27x$

For each of the following, determine the equation for the transformation shown below, from the parent graph $y = x^2$. Then write the equation in standard form.

34. Translated left 4, down 3

35. Translated right 3 and reflected over the x-axis

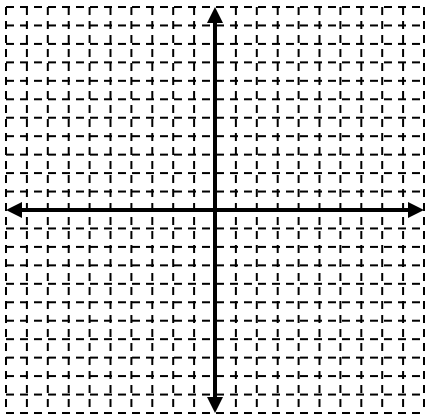
36. Translated left 5, up 2, and vertically stretched by 3

Graph each quadratic inequality or system. Fill in the values requested. Remember to show your work algebraically to receive full credit!

37. $y > -x^2 + 4x + 5$

38. $y \geq x^2 - 2x - 8$

$y \geq -x^2 - 2x + 8$



x-intercepts: _____

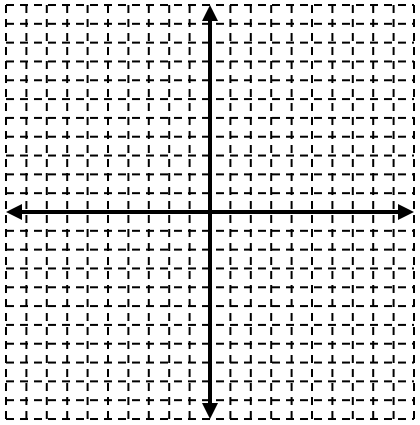
vertex: _____

is vertex a max or min?

_____

y-intercept: _____

AoS: _____



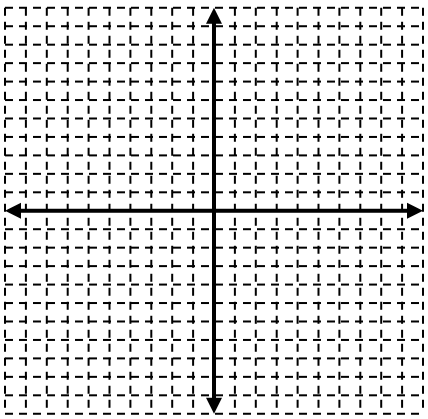
Solve each system of equations. Remember to show your work by hand algebraically to receive full credit!

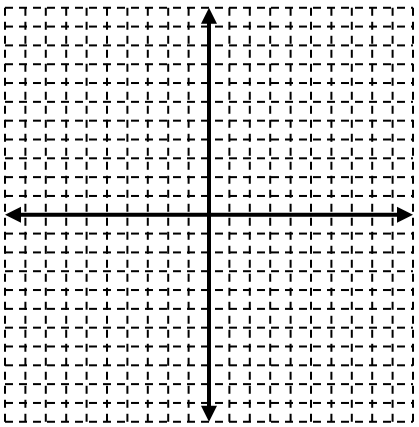
39. $y = -x^2 + 2x$

$y = x^2 + 2x$

40. $y = x^2$

$y = -x + 2$





Selected Answers:

1. (x + 3)(x + 5)
2. (x – 8)(x – 3)
3. (x + 4)(x – 3)
4. (3x + 5)(x + 1)

5. x = 4/5, x = -3
6. x = 2, x = 6
7. x = 3, x = 4

8. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

9a. $b^2 - 4ac$ is positive
9b. $b^2 - 4ac$ is zero
9c. $b^2 - 4ac$ is negative

10.
a.
$$x = \frac{-4 \pm \sqrt{28}}{2} = \frac{-4 \pm 2\sqrt{7}}{2} = -2 \pm \sqrt{7}$$
b.
$$x = \frac{-4 \pm \sqrt{52}}{6} = \frac{-4 \pm 2\sqrt{13}}{6} = \frac{-2 \pm \sqrt{13}}{3}$$

11a. 0, 11b. 1, 11c. 2
12a. 2, 12b. 1, 12c. 0
14. use x = -b/2a
15. zero, root
16. (4, 3)
17. (-4, 0), (2, 0)
18. if x^2 is positive
19. if x^2 is negative
20. b and c
21. a and d
22. 2 real irrational roots

23a. up 4
23b. down 5
23c. right 3
23d. 3 times narrower, and left 2
23e. left 6 and up 2

24. starting height = 20 feet
max height = 1426 feet
hits ground in 18.8 sec

25. Emily height 53.25 feet
Isaiah height 50.52 feet
Emily time 2.45 sec
Isaiah time 2.25 sec
26. $-3 \pm i\sqrt{3}$

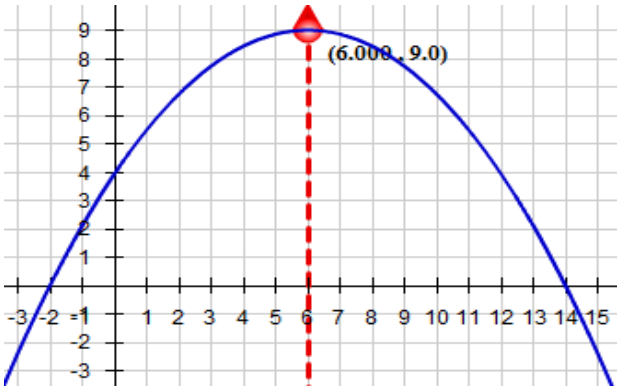
27. $y = (x + 2)^2 - 3$
28. $y = -2(x - 3/2)^2 + 11/2$
29. $2\sqrt{5}, -2\sqrt{5}$
30.
$y = -18/81x^2 + 44/9x - 80/9$
31. 37.5 ft by 75 ft
32. a. $\{x \mid x \le -8 \text{ or } x \ge 3\}$
b. $\{x \mid x \le \frac{2}{5} \text{ or } x \ge 5\}$

Review and Practice of application problems.

1. Which one of these is the standard form of $y = (x - 2)^2 + 3$?

   a) $y = x^2 + 4x + 7$ b) $y = x^2 - 4x + 7$ c) $y = x^2 - 4x + 4$ d) $y = x^2 + 7$

2. Write Equation of the Parabola in Standard Form. Show ALL work by hand!!



3. A rectangular floor has a rectangular rug on it. The floor's width is 5 feet greater than the floor's length, x. The rug's width is 3 feet less than the floor's width. The rug's length is 6 feet less than the rug's width. Write a function, R(x), in simplified form to represent the area of the floor not covered by the rug.

4. A piece of cardboard that is 14 inches by 18 inches is used to form a box with an open top by cutting away congruent squares with side lengths, x, from the corners. Write an equation y, in terms of x, in standard form to model the surface area of the open box after the corners are cut away.

5. Each year, a local school's Rock the Vote committee organizes a public rally. Based on previous years, the organizers decided that the Income from ticket sales, I(t) is related to ticket price *t* by the equation $I(t) = 400t - 40t^2$.

   a. What ticket price(s) would generate the greatest income? What is the greatest income possible? Explain how you obtained the value you got.

      Ticket price(s) _____ Income _____

   b. At what ticket price(s) would there be no income from the ticket sales. Explain how you obtained the answer.