Quadratics and Polynomial Test Practice Problems **Name:**

Next class will be a test on all the material from quarter 1 (100 pts), with an emphasis on the new material below. Do this whole packet, check answers on-line, and then work through all the past practice packets.

1) Answer these questions in writing:
What makes an equation quadratic? What are the four methods we've used to solve a quadratic equation? Why can't we factor every quadratic equation? Why can't we just use our graphing calculator to solve every quadratic equation? What method(s) **can** solve every quadratic equation?

Solve the quadratic equation below using four methods: graphing, factoring, completing the square, and the quadratic formula.

2) $x^2 - 8x + 15 = 0$

Graphing (Show $y_1 =$ and make sketch)

Factoring

Completing the Square

Quadratic Formula

Solve using the quadratic formula. Leave answers in simplest form.

3) $x^2 - 8 = 0$

4) $5x^2 = -10x - 1$

Solve the following quadratic inequality. State solution set and graph solution on a number line.

5) $x^2 - 3x > 0$

Solve for x:

6) $\left|x^2\right| = 5x - 6$

7) A ball is thrown straight upward where its height *h* meters above the ground after *t* seconds is given by $h(t) = 100t - 4.9t^2$. Answer the questions below. Show and/or describe all your work.

Round all times to the nearest tenth of a second and all heights to the nearest tenth of a meter.

a) When does the ball hit the ground?

b) At what time does the ball reach its maximum height? What is its maximum height?

c) Find the time interval when the ball is at least 300 meters above the ground.

Factoring Fun! Factor completely each polynomial expression below. Remember: These are just expressions, not equations. So we're not solving anything; we're just factoring.

8) Factor: $x^3 - 9x$

9) Factor: $x^2 - 8x - 9$

10) Factor: $5x^2 - 3x - 2$

11) Factor: $2x^2 + 7x + 3$

12) Factor: $2x^3 - 12x^2$

13) Factor: $2x^4 + 3x^3 + 4x + 6$

14) Factor: $3x^3 - 5x^2 + 6x - 10$

15) Factor: $3x^7 + x^5 - 6x^2 - 2$

16) Factor: $15x^6 - 3x^4 - 25x^3 + 5x$

Solve each equation below using the strategy asked for. (<u>Remember</u>: On the test, if you can't solve using the strategy asked for, solve the equation using another strategy. You'll at least get partial credit as long as you show your work clearly!)

17) Solve by factoring: $x^3 - 9x^2 - 10x = 0$

18) Solve by factoring: $2x^2 + 14x = 36$

19) Solve by factoring: $x^4 - 10x^2 + 9 = 0$

20) Solve by factoring: $x^3 - 7x^2 = -12x$

21) Solve by factoring: $x^3 + 5x^2 - 9x - 45 = 0$

22) **For each trinomial below, fill in the blank to create a perfect square trinomial:**

a) $x^2 - 8x + \_\_\_\_\_$ b) $x^2 + 20x + \_\_\_\_\_$ c) $x^2 - \frac{4}{9}x + \_\_\_\_\_$

For the problems below, solve by completing the square. If appropriate, leave answers in simplest radical form.

23) Solve by completing the square: $x^2 - 12x + 34 = 0$

24) Solve by completing the square: $2x^2 - 7x = 14$

25) Write a possible quadratic equation in the form $ax^2 + bx + c = 0$ with the given roots. Write a quadratic with integral coefficients (in other words, *a*, *b*, and *c* must be integers).

a) roots: x = 6, x = 7

b) roots: $\{-1, 9\}$

c) roots: $\left\{\frac{1}{5}, -\frac{3}{5}\right\}$

26) Find the sum of the roots and the product of the roots of each quadratic below:

a) $x^2 - 6x + 11$ b) $3x^2 - 15x - 21$ c) $9x^2 + 1$

27) Re-write each quadratic equation below so that you can clearly see how $y = x^2$ has been transformed. In other words, write in the form $y = (x-h)^2 + k$. Then describe how the parabola has been transformed.

a) $y = x^2 - 12x + 34$

b) $y = x^2 + 10x - 11$

28) Re-write the circles below, by completing the square, so that you can clearly identify the center and the radius of each circle.

a) $x^2 - 8x + y^2 + 6y = 14$

b) $2x^2 + 8x + 2y^2 + 4y = 22$

29) Solve the system of equations: $\begin{cases} y = -x^2 + 5x - 4 \\ y + x = 3 \end{cases}$