

**DO YOUR ALGEBRA AND SKETCHES ON A SEPARATE PAGE!**

1. (*Use your calculator*) The height in feet,  $h$ , of a fireworks rocket,  $t$  seconds after being fired, is given by the equation  $h = -16t^2 + 115t + 1$ .

a) What is the maximum height attained by the rocket? [*NOT 205 ft*]

b) How long does it take for the rocket to fall to the ground?

2. a) What are the center and radius of the circle:  $4x^2 - 4x + 61 = 4y(8 - y)$

b) What are the y-intercepts? [*Hint: the y-intercepts occur when  $x = \dots$  ]*

3. The following questions refer to the parabola:  $y = -x^2 + 2x + 3$

a) Write the equation of this parabola after a reflection over the x-axis.  
(*Hint: Sketch the parabola first*)

b) Write the equation of this parabola after a reflection over the y-axis.

c) Write the equation of this parabola after a *vertical* translation of +5.

4. *Sketch* the pair of equations. Then find their intersections algebraically.

$$x^2 - 14x + y^2 + 6y + 13 = 0 \quad \text{and} \quad y = 2x - 2$$

5. *Graph* each of the following equations on a piece of graph paper. Then solve for the intersection(s) algebraically.

$$y = -\frac{1}{2}x^2 + 4x - 4 \quad \text{and} \quad y = \frac{1}{2}x + 2$$

6. Write an equation for the locus of points whose distance from the point (9, -13) is equal to  $\sqrt{30}$ . Determine whether the point (5, -9) is part of this locus.

7. Write an equation for a parabola with vertex (-7, 2) and y-intercept at 100. Determine whether the point (4, 244) is on this parabola.

8. A parabola has its vertex in the third quadrant and has no roots, a circle has its center in the fourth quadrant and has no y-intercepts. What is the maximum number of intersections between the two graphs?