1. Factor \( x^2 - 3x - 28 \).

2. Solve \( x^2 + 6x + 2 = 0 \).

3. Write the equation for the parabola whose graph is
4. You wish to fence in a pasture along a river using 100 yards of fence as shown (note that no fencing is required along the riverbank).

   a) Write the length \( l \) as a function of the width \( w \), remembering that the total fence is 100 yards long.

   b) Write the area \( A \) as a function of the width \( w \) for this situation.

   c) Find the maximum area you can fence in this situation.

5. Compute \((x^2 - 3)(x^2 + 2x - 4)\).
6. The (men’s) world record time for running \( x \) meters (\( 100 \leq x \leq 10,000 \)) can be modeled by the function \( t(x) = 0.054447x^{1.121705} \) where \( t \) is time in seconds.
   
a) What does the model predict should be the world record time for 4000 meters?

b) How much faster does the model predict the record for 6000 meters should be than the record time for 7000 meters?

7. Let \( f(x) = x^2 + 4x - 3 \) on the domain \( x > -2 \). What is \( f^{-1}(x) \)?

8. Solve \( |2x + 3| = 4x - 5 \).
9. Solve $|3x + 5| < 7$.

10. Solve $x + 4 = \sqrt{15x + 6}$.

11. Solve $x^2 + 6x + 2 > -9$. 
12. Solve $x^2 - 4x + 5 < x + 1$.

13. As the price of gas rises, customers become more sensitive to fuel economy. Suppose the average fuel economy of cars purchased in the U.S. can be modeled by $m = 12 + 6g + g^2$ where $g$ is the price of gas and $m$ is the average fuel economy of cars purchased in the U.S in miles per gallon. Larger cars have traditionally earned larger profits for automobile companies, though they have worse fuel economy. Suppose the profits of an automobile company can be modeled by $P = 1,500m^{-0.5} - 200$ where $P$ is profit (in millions of dollars). Write profit as a function of the price of gas.
14. John notices that in solving equations with absolute values of the form \( |ax + b| = cx + d \), if \(|c| > |a|\) then there is exactly one solution, while if \(|c| < |a|\) there are either zero or two solutions. Explain why this is true. Hint: \(a\) and \(c\) are the slopes of the lines \(ax + b\) and \(cx + d\) respectively. Saying \(|c| > |a|\) says the line on the right is steeper than the line inside the absolute value, and \(|c| < |a|\) means the reverse.
15. The graph of \( y = f(x) \) is shown below. On the same sketch, draw the graph of \( y = f^{-1}(x) \).

16. The graph of \( y = g(x) \) is shown at the left below. What function is graphed at the right below? Write your answer in terms of \( g(x) \). Hint, the original graph passes through the lattice points (-6,0), (0,0), (2,-1), and (8,0).
Name: _______________________________________________

Pledge:
On my honor, as a student, I have neither given nor received unauthorized aid on this examination: _______________________________________      ___________

(signature)                                             (date)