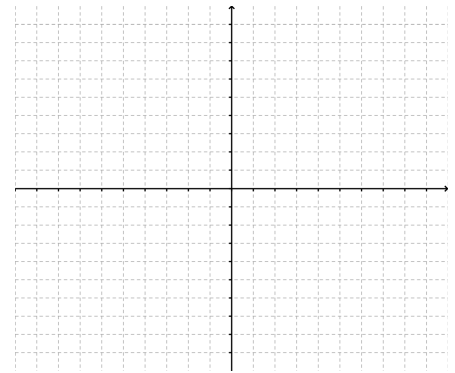
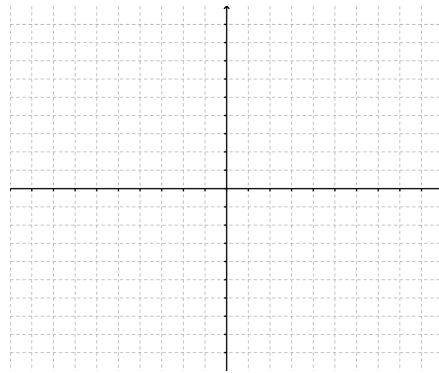
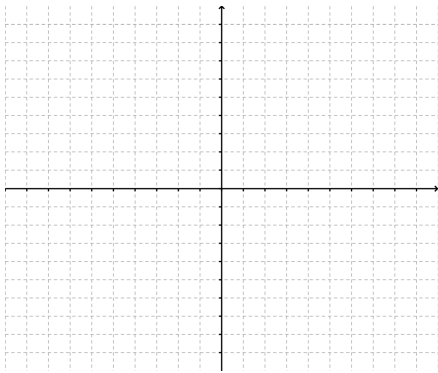


Rewrite the function in vertex form. Show all work. Then use transformations of $f(x) = x^2$ to graph. Label at least 5 points.

1. $f(x) = x^2 + 4x + 2$

2. $f(x) = 2x^2 - 4x + 1$

3. $f(x) = -x^2 - 2x$



* What you are about to read is based on a true story. Details have been changed to protect those involved.*

4. Police have been called to a grocery store to investigate a fishy story. A man has been accused of trying to steal tilapia by stuffing 4 pounds in his jacket. The policemen only have 350 feet of caution tape to mark off the "scene of the crime." They will be using one of the store's walls as a barrier. Find the dimensions of the rectangle they should use to enclose the largest area in order to collect the most evidence. What is the maximum enclosable area?

5. One sunny afternoon, a group of Pre-Calculus students found themselves wandering around the zoo. Since it was so hot outside, they stopped by the seals to rest. As they were chatting, one of them pointed to a water fountain in excitement. **"A Parabola!! - math is everywhere, we can't escape it!!!"** The students were so intrigued, they decided to find the equation of the parabola made by the water's trajectory.

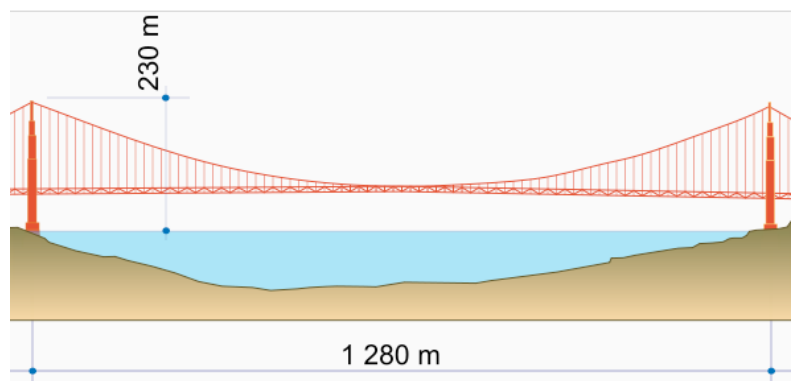
Since they knew they only needed to know the _____ and a _____ they could find the equation. One of the students was so overcome with joy, he hopped into the water and pulled out his tape measure. The height of the stream of water was

150 cm above the water's surface and the stream of water hit the surface 240 cm from the spout.

What is the equation of the parabola?



6. The Golden Gate Bridge is a suspension bridge with 2 towers that are 1280 meters apart. The height of the towers from the water's surface is 230 meters and the cable touches the road's surface at the center of the bridge creating a parabolic shape. The road is 75 meters above the water's surface. Assuming the road is level, find the height of the cables at points 250 meters and 500 meters from the center.



7. A rancher needs to build a rectangular pen with 2 parallel partitions using only 660 feet of fencing. He needs to be able to separate sheep, pigs, and goats with the partitions. What dimensions will maximize the total area of the pen?