Conic Application Supplement

1. A searchlight is shaped like a paraboloid of revolution. If the light source is located 2 feet from the base along the axis of symmetry and the depth of the searchlight is four feet, what should the width of the opening be?
2. A mirror is shaped like a paraboloid of revolution and will be used to concentrate the rays of the sun at its focus, creating a heat source. If the mirror is 20 feet across at its opening and is six feet deep, where with the heat source be concentrated?
3. A reflecting telescope contains a mirror shaped like a paraboloid of revolution. If the mirror is four inches across at its opening and is three feet deep, where will the light collected be concentrated?
4. A bridge spanning a river is built in the shape of a parabolic arch. The bridge has a span of 120 feet and a maximum height of 25 feet. Choose a suitable rectangular coordinate system and find the height of the arch above the water at distances of 10, 30, and 50 feet from the center of the bridge.
5. A bridge (shaped somewhat like the bridge from problem four above) is built in the shape of a parabolic arch and is to have a span of 100 feet. The height of the arch a distance of 40 feet from the center is to be 10 feet. Find the height of the arch at its center.
6. The arch of a bridge is a semi-ellipse with a horizontal major axis. The span is 30 feet and the top of the arch is 10 feet above the water (which is also the major axis). The roadway is horizontal and two feet above the top of the arch. Find the vertical distance from the roadway to the top of the arch at 5 foot intervals along the roadway from the center.
7. An ellipse is drawn on an open field such that the major axis is 100 feet and the focus points are twenty-five feet from the center. How wide is the ellipse (the minor axis) and how wide will it be ten feet from each end?

*The aphelion of a planet is its greatest distance from the sun and the perihelion is its shortest distance. The mean distance of a planet from the sun is the length of the semi-major axis of the elliptical orbit.*

1. The mean distance of the Earth from the sun is 93 million miles. If the aphelion of Earth is 94.5 million miles, what is the perihelion? Write an equation for the orbit of Earth around the sun.