

Conic Sections, Reflection and Applications

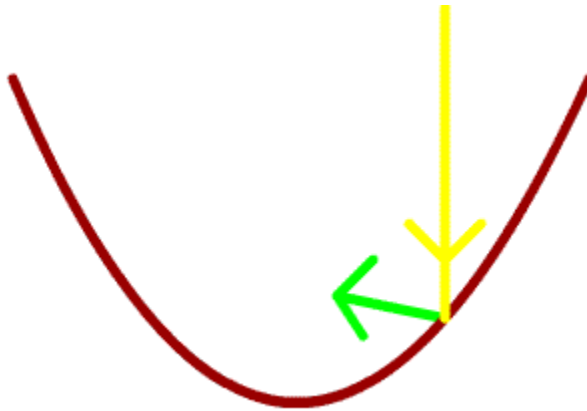
Name _____

Date _____

Purpose: This assignment will assess your understanding of the reflective properties of the conic sections and how the conic sections can be used.

Note: This activity was written to correspond with animations found on the Manipula Mathematics site found at (<http://www.ies.co.jp/math/java/conics/index.html>).

1. Consider the parabola shown below. If a ray of light is beamed vertically downward and reflected by the parabola, what special point will the light shine towards?



2. A flashlight has a curved mirror with the light source at the focus. Sketch the appropriate diagram and explain the benefits of having a parabolic mirror rather than a lens with a different shape.
3. Explain how the ancient Greeks used a giant parabolic mirror as a weapon against incoming ships. Draw a schematic on this weapon.

4. Suppose two people are in a room with an elliptical dome shaped ceiling. If they want to hold a conversation so that they will be able to hear each other, but others in the same room will have a more difficult time eavesdropping, where should they stand? Sketch a picture and label the points where the two people should stand.

5. An elliptical shaped sound reflector is positioned so that a speaker is located at one of the foci and kidney stone is located at the other foci. Sketch a diagram of such a device and explain why doctors can use this contraption to break the kidney stone apart.

6. When we look at the night sky, we can think of the starlight as coming in from points on the surface of a large sphere. If we want to create a dish that collects the beams of light from the stars, what shape should the dish be and where should the light receptor be located? Sketch the corresponding diagram.

7. Suppose a light bulb is placed at one of the foci of a hyperbola and the branch of the hyperbola that corresponds to this focus is a mirror. Explain what the shape of the curve that is hit by the light beams be after one second. Back up your explanation with a sketch.