This code contains two main functions namely main() and main1().

Main() function contains code for the parabolic mirror type. The code starts by creating a path object which is a container for the complete path the rays will follow. The important methods or functions in this path class are append to append the object like mirror or parabola into the path. This class also contains draw and trace functions. Draw function takes various inputs and is a generic way to draw the objects in the particular instance if the class path. Trace method takes in ray as an input which traces through each element of the path objects calculates intersection of the same with the object and append the rays object to the newly created center and direction of rays.

After creating the class, lens1 is an instance of parabola class which inherits from surface class. So surface class has some basic properties common to all surfaces viz. parabola and mirror and their implementations is different in both the cases. Coming to parabola important functions are it’s constructor and draw method. Draw method draws the parabola, and constructor initializes its variables.

Now the next line in main() code is lens.rotate which basically rotates the lens at 45 degree with respect to the z axis.

Just for explanation purpose and to show the versatility of code I have included one more mirror object in the bench object. This will append the bench with a new mirror. So now my bench object which is an instance of class path contains one parabola and one mirror in one single x-y-z space. To remove it you can comment it out.

Next thing is creating the rays object. Nrays is number of rays that can be maximum accommodated in hexagonal or square fit. Here two types of initialization can take place first by using source in which case the rays will originate at a point source or using collimated in which case the rays will come from infinite.

Next, bench.trace is used to trace the path of the rays after intersection with each of th surface which is present in the bench object. Here in this case first rays will originate at location [0 0 0 ] and move in direction [1 0 0] and then calculate intersection with parabola to give normal and center of new generated rays. These rays will further moves from the new origin to new normal diection and will intersect with the mirror object.

Finally the last line of code will draw all the objects along with the traced rays information.

The second funation is main1() function which does similar things but it traces rays for a single mirror object.