```
import java.applet.Applet;
import java.awt.*;


////////////////////////////////////////////////////////////////////////
//                                                                    //
//   The following program creats a fractal called the Mandelbrot set.   //
//              It uses the class Raster to set the pixel.            //
//                                                                    //
//                               WRITTEN BY:                          //
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//                                                                    //
////////////////////////////////////////////////////////////////////////

public class Mandelbrot extends Applet
{
   static final int MAXCOL = 800, MAXROW = 600, MAXCOLOR = 16, LIMIT = 4, MAXITER = 160;
   static double modulus, pmin, pmax, qmin, qmax, dp, dq;
   static colors c[] = new colors [16];

   //-----------------------------------------------------------------------
   // Holds the rgb values of the colors used.
   //-----------------------------------------------------------------------
   public static void setColors()
   {
      c[0] = new colors(0, 0, 0);     //black
      c[1] = new colors(255, 0, 0);   //red
      c[2] = new colors(0, 255, 0);   //green
      c[3] = new colors(0, 0, 255);   //blue
      c[4] = new colors(255, 255, 0);   //yellow
      c[5] = new colors(0, 255, 255);   //cyan
      c[6] = new colors(255, 0, 255);   //magenta
      c[7] = new colors(64, 64, 64);    //dark grey
      c[8] = new colors(128, 128, 128);   //grey
      c[9] = new colors(192, 192, 192);   //light grey
      c[10] = new colors(255, 200, 0);    //orange
      c[11] = new colors(255, 175, 175);  //pink
      c[12] = new colors(64, 192, 255);   //light blue
      c[13] = new colors(174, 29, 29);    //brown
      c[14] = new colors(139, 79, 40);    //burgundy
      c[15] = new colors(55, 153, 17);    //dark green

   }

   //-----------------------------------------------------------------------
   // Initializes pmax, pmin, qmax, and qmin, and does the calc for dp and dq.
   //-----------------------------------------------------------------------
   public void initialize()
   {
      pmax = 0.5;
      pmin = -1.6;
      qmin = -1.1;
      qmax = 1.1;

      dp = (pmax - pmin) / (MAXCOL - 1);
      dq = (qmax - qmin) / (MAXROW - 1);
   }

   public void init()
   {
     setBackground(Color.white);
   }

   public void paint(Graphics g)
   {
      setColors();

      double p, q, xlast, ylast, xcur, ycur;
      int color;
      initialize();
      int col, row;

      for (col = 0; col < MAXCOL; col++)
         for (row = 0; row < MAXROW; row++)
         {
            p = pmin + col * dp;
            q = qmin + row * dq;

            xlast = 0.0;
```

```
            ylast = 0.0;
            modulus = 0.0;
            color = 0;

            while((modulus < LIMIT) && (color < MAXITER))
            {
               color++;
               xcur = p + xlast * xlast - ylast * ylast;
               ycur = q + 2 * xlast * ylast;

               xlast = xcur;
               ylast = ycur;

               modulus = xcur * xcur + ycur * ycur;
            }

            if(color == MAXITER)
               color = 0;

               color %= MAXCOLOR;

            // sets the color for the dot
            g.setColor(new Color(c[color].r, c[color].g, c[color].b));

            // draws the the dot or sets pixel
            g.drawRect(col, row, 1, 1);

         }
      }
}

////////////////////////////////////////////////////////////////////////////
//                                                                        //
//       Creates an object colors to hold the rgb values for the colors.     //
//                                                //
////////////////////////////////////////////////////////////////////////////

class colors
{
   int r, b, g;

   //-------------------------------------------------------------------------
   // Constructor for the colors class.
   //-------------------------------------------------------------------------
   public colors()
   {}

   //-------------------------------------------------------------------------
   // Second Constructor for the colors class it takes in three arguements
   // r, g, b all of type int and is used to store the rgb values of the
   // colors.
   //-------------------------------------------------------------------------
   public colors(int r, int g, int b)
   {
      this.r = r;
      this.g = g;
      this.b = g;
   }
} // end of class colors

////////////////////////////////////////////////////////////////////////////
```