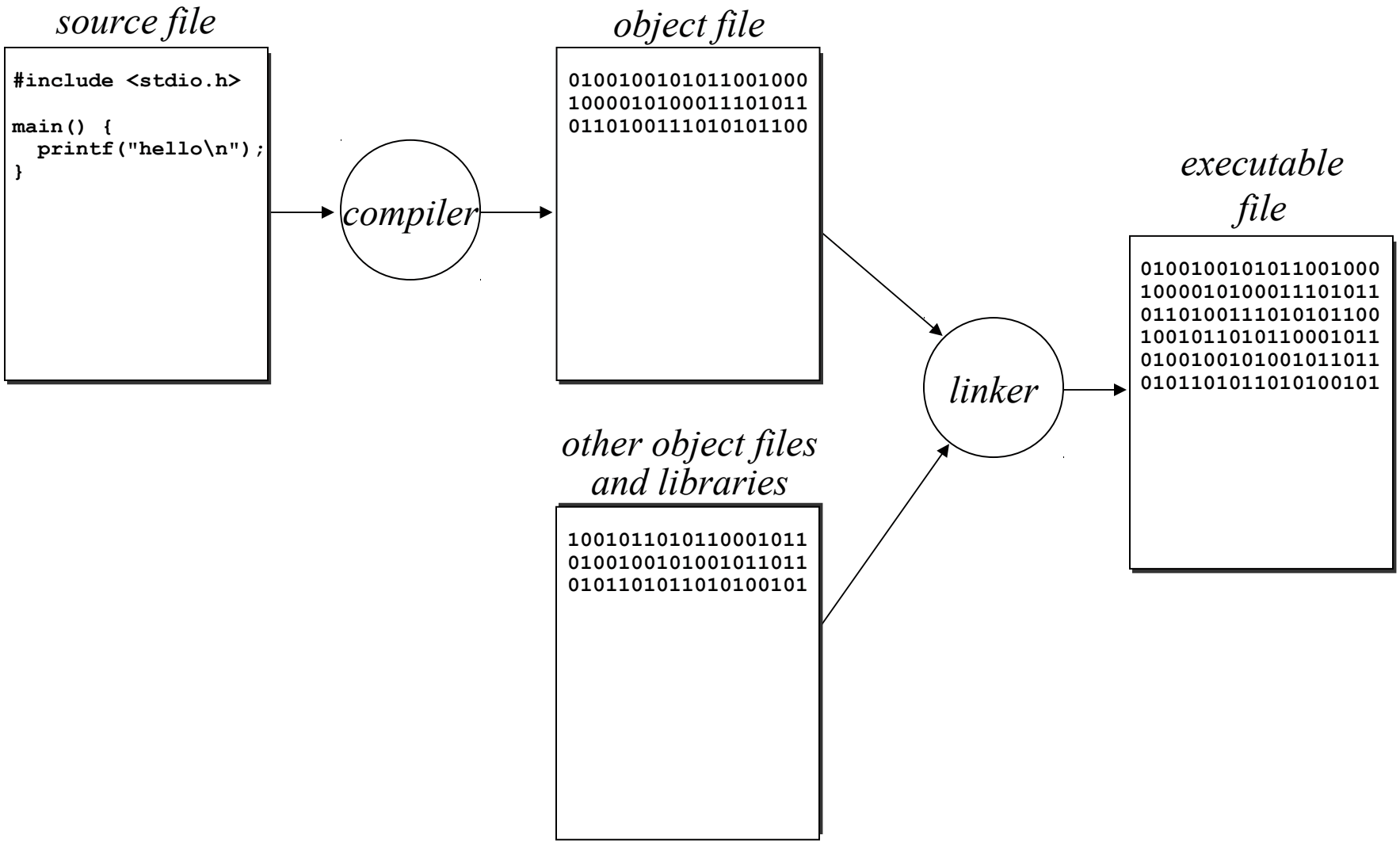
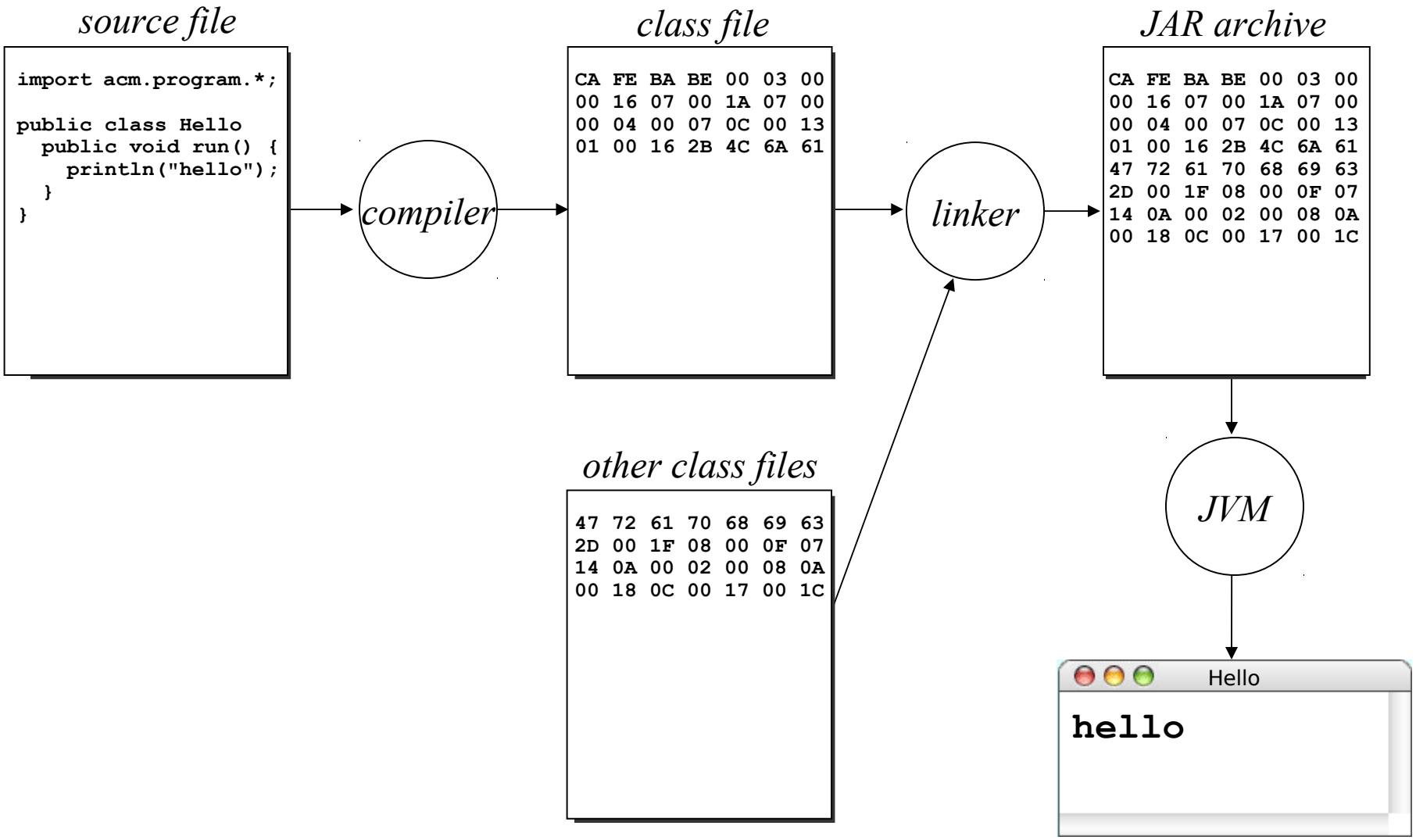
# Classical Compilation Process



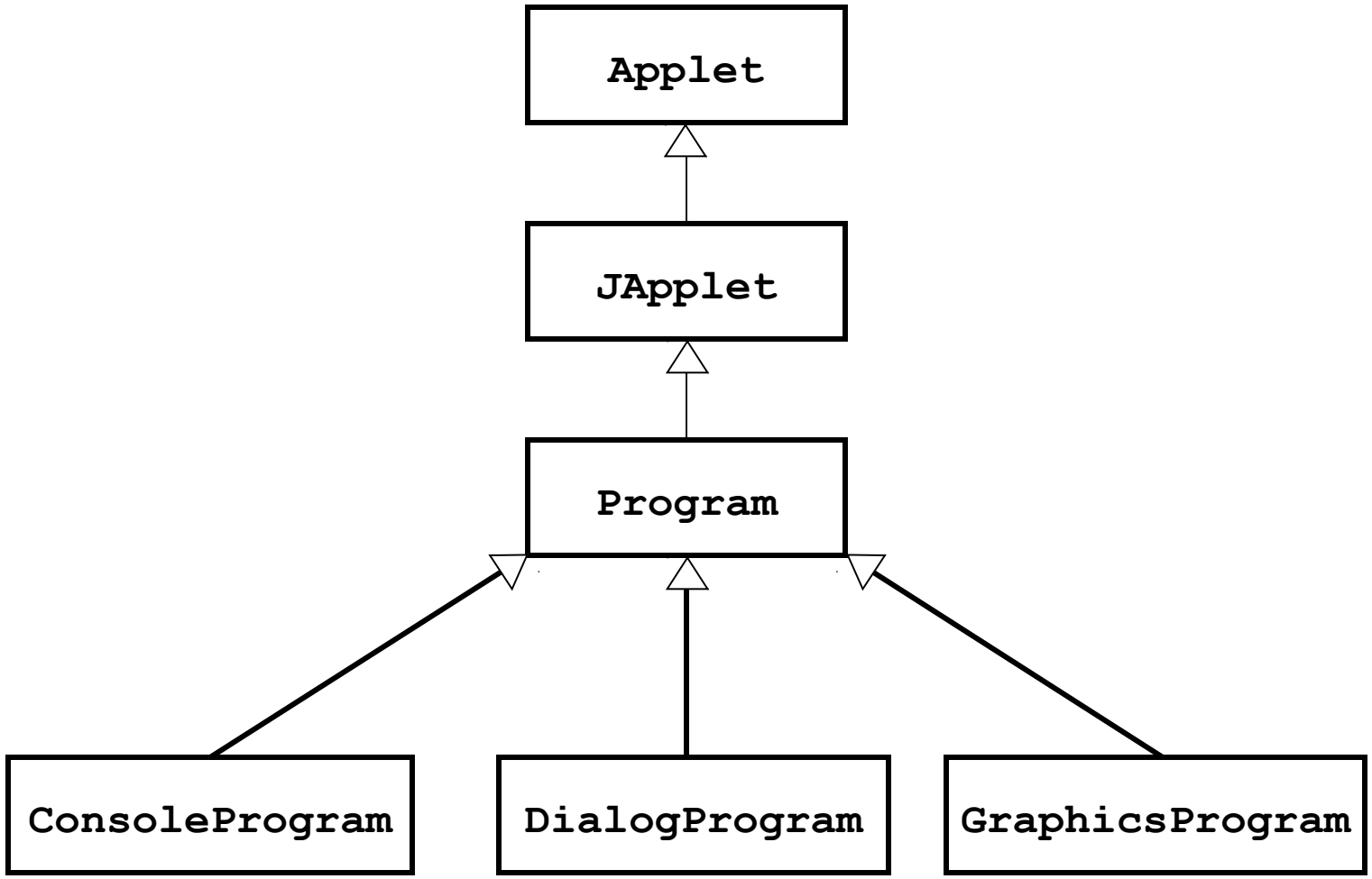

*Graphic courtesy of Eric Roberts*

# Java Interpretation Process




*Graphic courtesy of Eric Roberts*

# `acm.program` Hierarchy

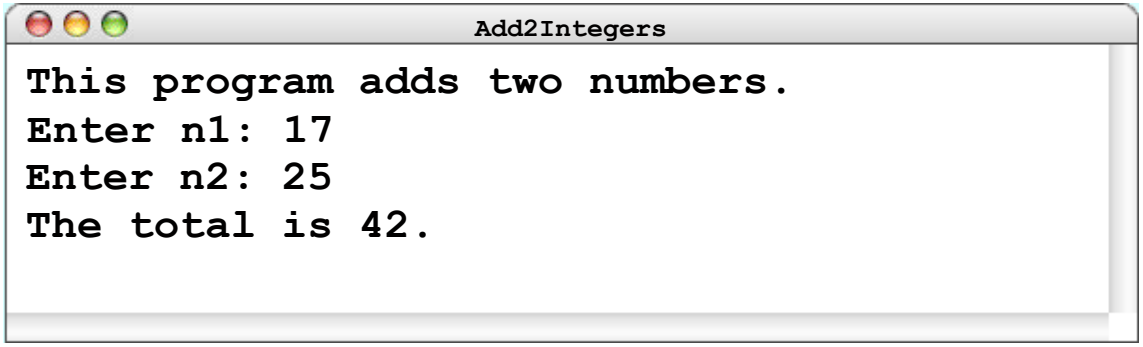



*Graphic courtesy of Eric Roberts*

# The Add2Integers Program

```
class Add2Integers extends ConsoleProgram {
   public void run() {
      println("This program adds two numbers.");
      int n1 = readInt("Enter n1: ");
      int n2 = readInt("Enter n2: ");
      int total = n1 + n2;
      println("The total is " + total + ".");
   }
}
```

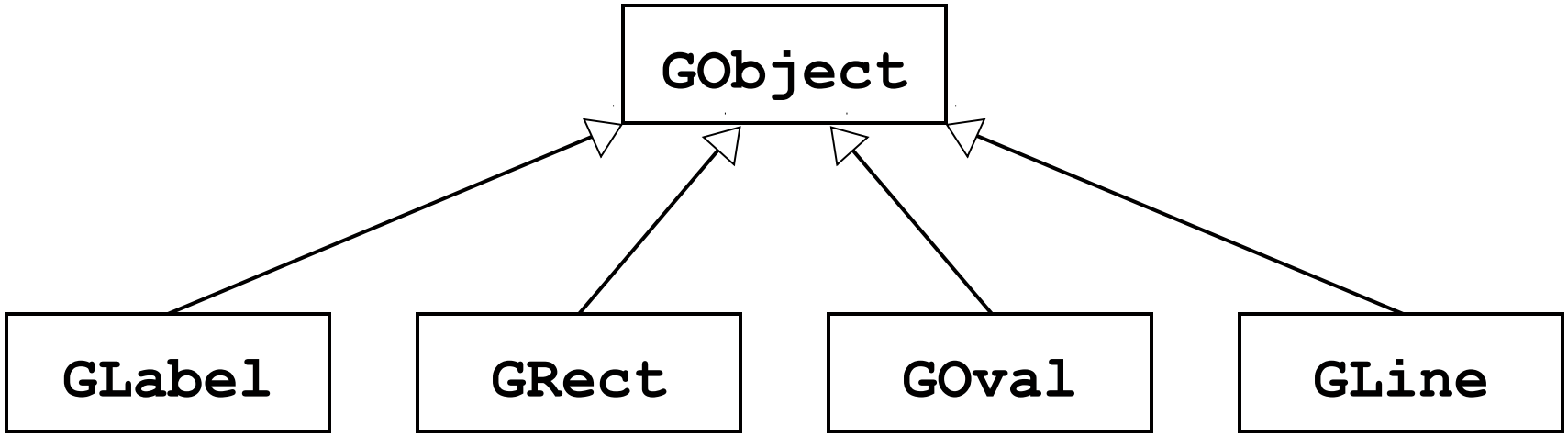
| n1 | n2 | total |
|---|---|---|
| 17 | 25 | 42 |




*Graphic courtesy of Eric Roberts*

# The `GObject` Hierarchy

The classes that represent graphical objects form a hierarchy, part of which looks like this:




*Graphic courtesy of Eric Roberts*

# Sending Messages to a `GLabel`

The following program illustrates sending a message to an object. Note that the label doesn't appear until it is added to the canvas.

```
public class HelloProgram extends GraphicsProgram {
   public void run() {
      GLabel label = new GLabel("hello, world", 100, 75);
      label.setFont("SansSerif-36");
      label.setColor(Color.RED);
      add(label);
   }
}
```

label

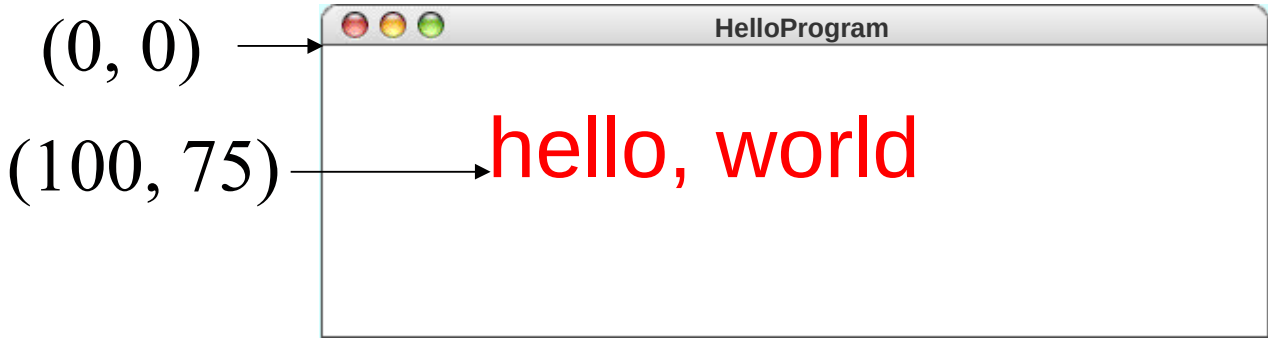
hello, world

*skip simulation*

*Graphic courtesy of Eric Roberts*

# Graphics Coordinates

- Origin is upper left
- Everything measured in pixels (dots on the screen)
- x coordinates increase to the right
- y coordinates increase going down
- **`GLabel`** coordinates are baseline of first character




*Graphic courtesy of Eric Roberts*

# Operations on the `GObject` Class

The following operations apply to all **`GObject`**s:

| |
|---|
| *object*`.`**`setColor`**`(`*color*`)`<br>Sets the color of the object to the specified color constant. |
| *object*`.`**`setLocation`**`(`*x*`, `*y*`)`<br>Changes the location of the object to the point (*x*, *y*). |
| *object*`.`**`move`**`(`*dx*`, `*dy*`)`<br>Moves the object on the screen by adding *dx* and *dy* to its current coordinates. |

The standard color names are defined in the **`java.awt`** package:

| | | |
|---|---|---|
| **`Color.BLACK`** | **`Color.RED`** | **`Color.BLUE`** |
| **`Color.DARK_GRAY`** | **`Color.YELLOW`** | **`Color.MAGENTA`** |
| **`Color.GRAY`** | **`Color.GREEN`** | **`Color.ORANGE`** |
| **`Color.LIGHT_GRAY`** | **`Color.CYAN`** | **`Color.PINK`** |
| **`Color.WHITE`** | | |

*Graphic courtesy of Eric Roberts*

# Operations on the `GLabel` Class

Constructor

**`new GLabel(`***text*`, `*x*`, `*y*`)`**
Creates a label containing the specified text that begins at the point (*x*, *y*).

Methods specific to the **`GLabel`** class

*label*`.`**`setFont(`***font*`)`**
Sets the font used to display the label as specified by the font string.

The font is typically specified as a string in the form

"*family*`-`*style*`-`*size*"

*family* is the name of a font family
*style* is either **`PLAIN`**, **`BOLD`**, **`ITALIC`**, or **`BOLDITALIC`**
*size* is an integer indicating the point size

*Graphic courtesy of Eric Roberts*

# Drawing Geometrical Objects

## Constructors

**`new GRect(`** *x*`,` *y*`,` *width*`,` *height*`)`
Creates a rectangle whose upper left corner is at (*x*, *y*) of the specified size.

**`new GOval(`** *x*`,` *y*`,` *width*`,` *height*`)`
Creates an oval that fits inside the rectangle with the same dimensions.

**`new GLine(`** $x_0$`,` $y_0$`,` $x_1$`,` $y_1$`)`
Creates a line extending from $(x_0, y_0)$ to $(x_1, y_1)$.

## Methods shared by the **`GRect`** and **`GOval`** classes

*object*`.`**`setFilled(`***fill*`)`
If *fill* is **`true`**, fills in the interior of the object; if **`false`**, shows only the outline.

*object*`.`**`setFillColor(`***color*`)`
Sets the color used to fill the interior, which can be different from the border.