

## Problem Description

This project extends the car drawing example seen on pages 112-116 of Big Java.

You will extend the program so that it is possible to scale a car to any size. Your program will also allow someone to specify a car's color.

## Details

In class, we developed a program that would display a car on the screen. The car was 60 pixels wide and 30 pixels high. When constructing a new car, we specified the  $(x,y)$  coordinates of the upper left corner of the car.

Our program consisted of 3 classes.

1. The `CarViewer` class is responsible for producing the frame in which the cars appear.
2. The `CarComponent` class is the component that creates the car objects and asks them to draw themselves.
3. The `Car` class is responsible for creating the cars and drawing them.

You will be making most of your changes in the `Car` class.

## Replace Existing Constructor

Replace the existing constructor in the `Car` class with one that has the following signature.

```
public Car(double x, double y, Color color)
```

The values for  $x$  and  $y$  are as before. They specify the  $(x,y)$  coordinates of the upper left corner of the car. The parameter `color` is the color that you use to draw the car.

## Scaling Constructor

Add another constructor that allows you to specify a car that is scaled. This constructor will have the following signature.

```
public Car(double x, double y, double xScale, double yScale, Color color)
```

Once again, the  $(x,y)$  values specify the coordinates of the upper left corner of the car. `xScale` and `yScale` indicate how much to scale the car in the  $x$  and  $y$  directions respectively. For example, if `xScale` is 2.0 and `yScale` is 3.0, the car

will be twice the normal size in the  $x$  direction, and three times the normal size in the  $y$  direction. Note that if `xScale` and `yScale` are not the same, the tires will no longer be round. This is OK.

The `color` parameter indicates the car's color.

### Shorthand Scaling Constructor

Add a third constructor that allows you to specify that the scaling factor is the same in both directions.

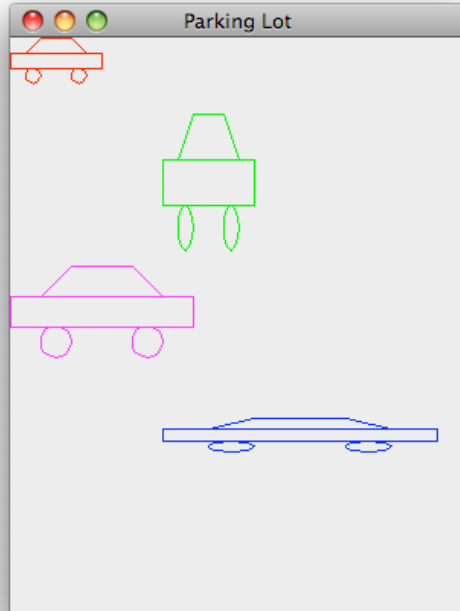
```
public Car(double x, double y, double scale, Color color)
```

This constructor says to create a car whose upper left corner is  $(x,y)$ , is scaled in *both* the  $x$  and  $y$  directions by `scale`, and whose color is `color`.

### Example

The following screen shot contains four cars.

1. A red car positioned at  $(0,0)$  using the first constructor.
2. A green car positioned at  $(100,50)$  using the scaling constructor. The scale factor in the  $x$  direction is 1.0 and in the  $y$  direction it is 3.0.
3. A magenta car positioned at  $(0,150)$  using the shorthand scaling constructor. The scale factor is 2.0.
4. A blue car (stretch limo?) at  $(100,250)$  using the scaling constructor. The  $x$  scale factor is 3.0, and the  $y$  scale factor is 0.75.



### Other Details

- Your component class should produce the four cars shown in the example. Position them using the coordinates we have provided.
- Add a fifth car using a color and scaling of your choice. Make the window larger if necessary.
- Be sure to include Javadoc comments for *all* methods and constructors.
- Avoid magic numbers!
- The car example we did in class is available on the course web page. On LINUX you can get the files from

`~csci203/2009-fall/student/projects/proj3`

You can use these files as a starting point for the project. Don't forget to add your name to the files.

## What to Submit

Drag your [proj3-xyz01](#) folder in the the drop box with your instructor's name, *not* the lab drop box.