

Asteroids Instructions

You are going to make a version of the 1979 classic arcade game Asteroids. If you haven't played it before, you can try it online at: <http://games.cellbiol.com/asteroids.html>

Some code has already been written for you. This code displays a black screen, on which you will make the spaceship and asteroids appear. It also currently updates a counter in the upper left-hand corner of the screen each time it updates the screen.

Milestone 1: Make the ship appear on the screen.

There are two things to work out:

- i) how are we going to *internally represent* the ship (i.e. how are we going to store information about the ship, such as its shape, its location on the screen, etc., within the program; and
- ii) where in the existing program do we write the code to make the ship appear on the screen.

To answer the first question, look at the class `Polygon`. Remember that triangles, rectangles, hexagons, etc. are all polygons. This class can hold the following information about a polygon: its shape, its position on the game canvas, and the amount it is rotated.

Which class variable in `Polygon` corresponds to each of these pieces of information? What type are these variables?

Read the class description and usage at the top of the `Polygon` class file to understand how the shape of a polygon is represented as an array of `Points`. A object of type `Point` represents a 2-D coordinate. Read the class description and look at the `Point` class to understand how to use it.

Since we will also use the class `Polygon` as a base class for other objects in our game, like the asteroids, we don't want to put any code specific to the ship, such as how to move it in response to key presses, into the `Polygon` class. Instead, make a new class called `Ship`, which is a subclass of `Polygon`.

Write the constructor for the subclass `Ship`.

Next we need to create an instance of `Ship`, and make it appear on the screen.

First look at the classes `Game.java` and `Asteroids.java`. What is the relation between these two classes? Are either of them Abstract classes? Which class contains the `main()` method? What does the constructor of `Asteroids` do?

Notice that `Game` is a subclass of `Canvas`, which is part of the user interface toolkit `AWT`. `Asteroids` includes a method `paint(Graphics brush)` which is called every tenth of a second and draws the new frame of animation on the canvas (the black screen that you see when you run the program). Everything is drawn on the canvas using methods in the class `Graphics` (<http://docs.oracle.com/javase/7/docs/api/java/awt/Graphics.html>). For example, to draw a line, you would use `brush.drawLine(...)`, passing in the appropriate parameters. To draw the ship, we will write a **NON-STATIC** `paint(Graphics brush)` method, and call this method from inside the `Asteroids.paint(Graphics brush)` method, passing that same brush to the new method.

Now we can answer the question: in what class should our `Ship` object be instantiated? Create an instance of `Ship`. Do **NOT** make it a static variable.

Next write the `paint(Graphics brush)` method to draw the ship's polygon. Which class should this be in? It should NOT be a static method. The ship should start at the center of the screen. Look in the `Graphics` API (<http://docs.oracle.com/javase/7/docs/api/java/awt/Graphics.html>) for appropriate methods to use to draw the `Ship`. Pay attention to the parameters of the methods. Look in `Polygon` for a method that you can use to get the `Points` representing the outline of your ship at its current position and orientation.