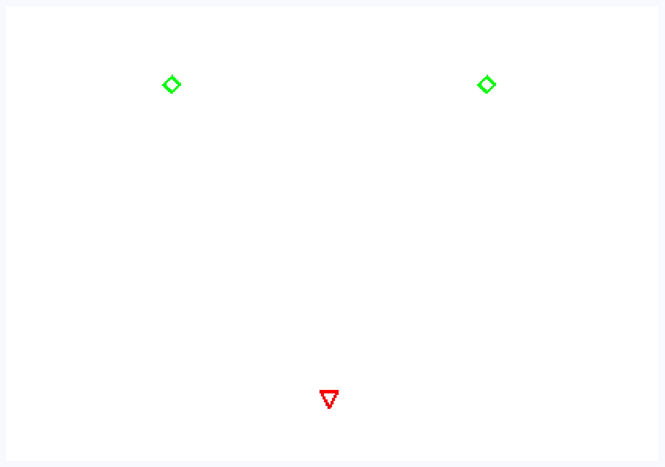
Model 1 Drawing and Tracing

Open *Drawing.java* and run the program. Keep an eye on both the Drawing window and the Console output. Notice the order in which the shapes are drawn. Run the program again, as needed, so that all team members can see its behavior. Then answer the questions below to explore and discuss the source code as a team.

Drawing (cropped)



Console output

```
diamond(300, 200)
    triangle(400, 400)
diamond(500, 200)
```

Questions (15 min)

Start time:

1. Fill in each blank with IS-A, HAS-A, or USES-A:

a) Drawing IS-A Canvas

b) Drawing HAS-A Graphics2D

c) Drawing USES-A Color

d) Drawing USES-A JFrame

2. Based on the `Drawing()` constructor:

a) What is the Canvas width? 800

b) What is the Canvas height? 600

c) What is the JFrame title? `"Drawing"`

d) What is "in" the JFrame? `this`
Hint: see Line 33.

3. Summarize in your own words what each method does:

a) `paint(Graphics g)`

Called by the window toolkit to paint this Canvas. Initializes `this.g2` and calls the `draw()` method. Prevents the `draw()` method from being called multiple times.

b) `draw()`

Calls the `diamond`, `triangle`, and `trace` methods to draw the shapes and debugging output. Uses specific coordinates for each of the shapes.

4. What is the purpose of the g2 attribute? (i.e., How is it used in the program?)

The diamond and triangle methods use g2 to do the actual drawing. It provides methods like setColor and drawLine.

5. Consider the "Console output" (from Model 1) and the trace() method:

a) Why is the "triangle" line indented?

The trace method was called with level set to 1.

b) Why are the "diamond" lines ***not*** indented?

The level was 0, and the loop (in trace) repeats level times.

c) How long is the delay after drawing each shape?

500 milliseconds (i.e., 1/2 second).

6. Modify the draw() method to draw and trace many diamonds and triangles. Use for loops to put each shape at a different (x, y) location. Reduce the DELAY so you can see the final result. Paste your source code below:

Answers will vary; this one fills up most of the canvas:

```
for (int x = 20; x < 780; x += 20) {
    for (int y = 20; y < 580; y += 20) {
        diamond(x, y);
        trace(0, "diamond(%d, %d)", x, y);

        triangle(x + 10, y + 10);
        trace(1, "triangle(%d, %d)", x + 10, y + 10);
    }
}
```