# Lecture 4: Drawing

Introduction: Drawing in Processing is achieved by issuing shape commands. The shapes will be drawn on the coordinate system of your drawing canvas, which starts from the *upper-left corner*. You won't be able to see anything that you draw outside of your canvas. Shapes will assume the *last specified properties*.
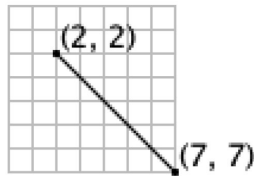

Shapes:

Command: `line`(startX, startY, endX, endY);
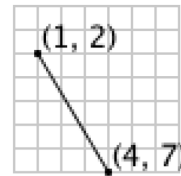Description: Draws a line from (startX, startY) to (endX, endY). Only uses stroke (no fill).
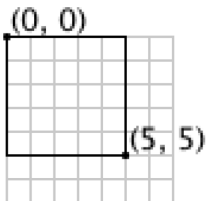
`line`(0, 0, 5, 5);
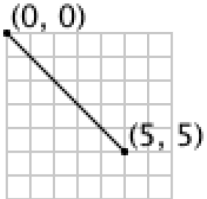
`line`(2, 2, 7, 7);
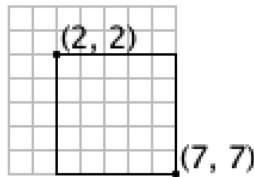
`line`(4, 7, 1, 2);

Command: `rect`(startX, startY, width, height);
Description: Draws a rectangle of size width × height with upper-left corner at point (startX, startY).
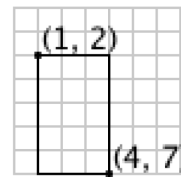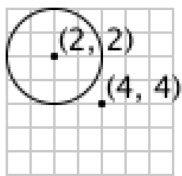
`rect`(0, 0, 5, 5);

`rect`(2, 2, 5, 5);

`rect`(1, 2, 3, 5);

Command: `ellipse`(centerX, centerY, width, height);
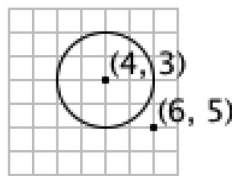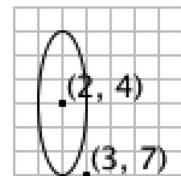Description: Draws an ellipse of specified width and height centered at point (centerX, centerY).
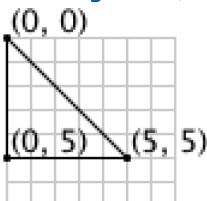
`ellipse`(2, 2, 4, 4);
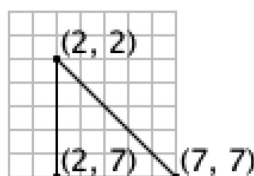
`ellipse`(4, 3, 4, 4);

`ellipse`(2, 4, 2, 6);

Command: `triangle`(x1, y1, x2, y2, x3, y3);
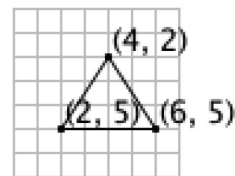Description: Draws a triangle between points (x1, y1), (x2, y2), and (x3, y3).

`triangle`(0,0, 0,5, 5,5);

`triangle`(2,2, 7,7, 2,7);

`triangle`(4,2, 6,5, 2,5);

Color: Colors are represented by a triplet (i.e. 3 numbers) that specifies the amount of red, green, and blue – always in that order – to mix together. Each number ranges from 0 to 255, inclusive. Colors can be applied to your drawing canvas background as well as the fill and stroke of shapes.

In a computer, colors mix like light (i.e. additive color). You can find color triplets by going to [Tools → Color Selector...] in the Processing menu and then copying the values in the R, G, and B fields.

black: `0, 0, 0`	white: `255, 255, 255`	dark-ish grey: `100, 100, 100`
yellow: `255, 255, 0`	cyan: `0, 255, 255`	magenta: `255, 0, 255`
purple: `128, 0, 128`	brown: `150, 75, 0`	orange: `255, 165, 0`

Command: **background**`(red, green, blue);`
Description: Covers the entire drawing canvas with the specified color.

Command: **fill**`(red, green, blue);`
Description: Changes the fill (inside) color for all future shapes.

Command: **stroke**`(red, green, blue);`
Description: Changes the stroke (outline) color for all future shapes.

Opacity: Shapes can be made to be see-through! The **fill**`()` and **stroke**`()` commands can take an optional 4th parameter from 0 to 255 to specify opacity/transparency. 255 means fully opaque (i.e. not transparent at all) and 0 means fully transparent (*i.e.* invisible).

Other Drawing Commands: These may come in handy. More can be found in the Processing Reference.

Command: **size**`(width, height);`
Description: Sets the size of your drawing canvas. Can only be used once (i.e. no resizing).

Command: **noFill**`();`
Description: All future shapes will be drawn with an empty inside. Overridden by future calls to `fill()`.

Command: **noStroke**`();`
Description: All future shapes will be drawn without an outline. Overridden by future calls to `stroke()`.

Command: **strokeWeight**`(weight);`
Description: All future outlines will be drawn with the specified thickness.

Command: **smooth**`();`
Description: All future shapes will be drawn smoothly. This may slow down Processing's drawing speed.