Attributes and Modes
Student Presentation
What are Shape Primitives?

- Shapes included in the library as a building block for more complex shapes
- Pieces that can be rasterized to screen based on pixel coordinates and other information about shape definition
What Are Attributes?

- Modify the appearance of shape primitives
- Apply to all primitives displayed after attribute
- Update the declared attribute to update the primitive’s display properties
Fill and Stroke

- `background()` sets the background color of the screen
- `fill()` sets the fill color for a shape
- `stroke()` sets the outline color for a shape
- `noFill()` and `noStroke()` prevents fill and stroke from filling a shape or drawing the stroke respectively
Consider...

fill(255);
stroke(0);
rect(0, 0, 50, 50);
fill(0);
stroke(255);
rect(50, 50, 50, 50);
What Are Modes?

- Change the functionality of shape primitive parameters
  - Same function will have a different outcome
- Applies to all shapes declared after the mode
- Update mode to update how a shape is created
rectMode() and ellipseMode() take a parameter:

- CORNER, CORNERS, CENTER, RADIUS

Mode parameter dictates how rect() and ellipse() parameters affect the shape

- Changes shape’s parameter value interpretation
Consider...

```cpp
rectMode(CORNER);  // default mode for rects
rect(50, 50, 100, 100);
rectMode(CORNERS);
rect(50, 50, 100, 100);
rectMode(RADIUS);
rect(50, 50, 100, 100);
rectMode(CENTER);
rect(50, 50, 100, 100);
```
Other Modes

❖ Modes allow for different structural models within the same method
❖ Important concept in graphics!
❖ Other modes in Processing:
  ❖ colorMode
  ❖ textureMode
  ❖ imageMode
  ❖ shapeMode
  ❖ blendMode
  ❖ textMode
The order of attribute and mode commands affects the output appearance!

```javascript
stroke(100);
rect(80, 120, 150, 40);
stroke(200);
rect(50, 100, 150, 40);
```
Draw Order

- The order of draw commands also affects the appearance of the output!

```plaintext
rect(50, 100, 150, 40);
rect(80, 120, 150, 40);
```

vs

```plaintext
rect(80, 120, 150, 40);
rect(50, 100, 150, 40);
```
Hands-on: Using Attributes

❖ Today’s activities:

1. Experiment with attributes `stroke()`, `fill()`, `noStroke()`, and `noFill()`
2. Draw a rectangle and an ellipse then try out alternate modes on these shapes
3. Experiment with attribute draw order
4. Consider the following questions:
   1. How can attribute order create the illusion of depth?
   2. How can primitive modes help us build images?