**Statics:**

* Static fields and static methods do not belong to a single instance of a class
* Common explanation is that statics belong to the entire class, not just one instance
* Main is static because the class needs to access that
  + Main is also global, and apparently globals are bad
* Static fields and methods are properties of a class
  + Static methods are good for utility i.e. it will be used from multiple classes, multiple instances
* Non-static fields and methods are properties of an instance
  + Non-static or instance is the same thing
  + Every time new is used, it’s a new instance of a method i.e. new int[4];
* Example, every math method is static because it makes much more sense to have a static method available to every class than to force a new instance of math class every single time there needs to be a math call. Math.sqrt(25.0); instead of Math myMath = new Math(); myMath.sqrt(25.0);
* You can access statics anywhere, and since global is bad, don’t have static unless its for utilitarian stuff
* Primitive static fields are initialized to 0 if no initialization is performed
* All instances of class shares the same static fields
  + I feel like that would explain some bad behavior in some of my code
* Ask yourself, does it make sense to call this method without constructing an Object?
* Static can’t access instance fields
  + Reason why I add static to everything but apparently that’s bad
* Reasons why statics are bad:
  + Static is global, and the memory exists the entire runtime of the program
  + No thread safety
  + Not good security

**Objects:**

* Objects passed to methods as arguments
* Java passes arguments by value
* When an object is passed as an argument, the value of the reference is passed
* Basically any type that isn’t the primitive 8 types are just passed as a pointer to the object
* In the example, r is just a pointer to globalRect
  + public Rectangle globalRect;
  + public void displayRectangle(Rectangle r){ System.out.println(r.getLength()); }
* Methods can return any object type, not just primatives

**Strings:**

* Good programming practive for each class is to have a **toString()** method in each class, which will return the “state” of an object created in a class
  + In RobotTorso.java, RobotHead.java, etc, there is a toString function that returns how many arms or color of eye, etc.
    - If you try and System.out.println() a class object, it will look for **toString()**, else it will print the name and address of the object
* Strings are immutable
  + Changing String dog = “Rex”; 🡪 dog = “fido”; doesn’t actually change the string stored at location dog, it points dog to a brand new address that has a brand new address. STRINGS ARE IMMUTABLE. PERIOD
  + Brand new address every time a string is changed, pointed to a new location
* StringBuilder can change specific characters, insert, delete, etc, without creating new object and address

**Inheritance:**

* Every single Java class inherits from Object, which provides toString() and equals()

**Copies:**

* The best way to copy is by making a copy constructor
  + Don’t just make a new object with the same arguments
* Make a method that returns type of class
  + For example,
    - public Car copy(){
      * Car copyCar = new Car(color, engine, name, doors, ….”);
      * return copyCar;
    - }

**Aggregation:**

* An object made up of other objects
  + House has door, window, room, etc
* In a UML diagram, an object that contains some other class will be represented by a diamond
  + Left box contains right box

**This:**

* Why would we ever need this?
  + You can live without ‘this’, but it makes some code clearer
* In constructor, when you set a class variable equal to a constructor argument, using this.myVar = myVar; will set the class var equal to the constructor argument myVar
* ‘this’ references itself inside its own class
  + Basically, MY variable = argument variable

**Primatives:**

* byte, short, int, long, float, double, boolean, char

**Enums:**

* enum typeName { (one or more enum constants}
  + enum Day {SUNDAY, MONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SATURDAY}
    - Day dayOfWeek = Day.WEDNESDAY;

**Autoboxing (boxing), Unboxing:**

* Autoboxing (boxing)
  + Converting a primitive valye into an object of the corresponding wrapper class is called autoboxing. For example, converting int to Integer class
    - Passed as a parameter to a method that expects an object of the corresponding wrapper class
* Unboxing
  + Converting from wrapper class to primitive
* Types
  + char, Character
  + byte, Byte
  + short, Short
  + int, Integer
  + long, Long
  + float, Float
  + double, Double
  + boolean, Boolean
* Only reason to use class wrapper instead of primitive is to use a lot of prebuilt methods
  + Integer.parseInt(double a); is an example