Unit 2—Lesson 3: Structures

Structures

```
struct Person {
  var name: String
}
```

Capitalize type names

Use lowercase for property names

Structures

Accessing property values

```
struct Person {
  var name: String
}

let person = Person(name: "Jasmine")
print(person.name)
```

```
Jasmine
```

Structures

Adding functionality

```
struct Person {
  var name: String

 func sayHello() {
    print("Hello there! My name is \(name)!")
  }

}

let person = Person(name: "Jasmine")
person.sayHello()
```

```
Hello there! My name is Jasmine!
```

Instances

```
struct Shirt {
  var size: String
  var color: String
}

let myShirt = Shirt(size: "XL", color: "blue")

let yourShirt = Shirt(size: "M", color: "red")
```

```
struct Car {
  var make: String
  var year: Int
  var color: String

  func startEngine() {...}

  func drive() {...}

  func park() {...}

  func steer(direction: Direction) {...}
}

let firstCar = Car(make: "Honda", year: 2010, color: "blue")
let secondCar = Car(make: "Ford", year: 2013, color: "black")

firstCar.startEngine()
firstCar.drive()
```

Initializers

```
let string = String.init() // ""
let integer = Int.init() // 0
let bool = Bool.init() // false
```

Initializers

```
var string = String() // ""
var integer = Int() // 0
var bool = Bool() // false
```

Initializers

Default values

```
struct Odometer {
  var count: Int = 0
}

let odometer = Odometer()
print(odometer.count)
```

```
0
```

Initializers

Memberwise initializers

```
let odometer = Odometer(count: 27000)
print(odometer.count)
```

```
27000
```

Initializers

Memberwise initializers

```
struct Person {
  var name: String
}
```

Initializers

Memberwise initializers

```
struct Person {
  var name: String

  func sayHello() {
    print("Hello there!")
  }
}

let person = Person(name: "Jasmine") // Memberwise initializer
```

```swift
struct Shirt {
  let size: String
  let color: String
}

let myShirt = Shirt(size: "XL", color: "blue") // Memberwise initializer


struct Car {
  let make: String
  let year: Int
  let color: String
}

let firstCar = Car(make: "Honda", year: 2010, color: "blue") // Memberwise initializer
```

Initializers

Custom initializers

```
struct Temperature {
  var celsius: Double
}

let temperature = Temperature(celsius: 30.0)
```

```
let fahrenheitValue = 98.6
let celsiusValue = (fahrenheitValue - 32) / 1.8

let newTemperature = Temperature(celsius: celsiusValue)
```

```
struct Temperature {
  var celsius: Double

  init(celsius: Double) {
    self.celsius = celsius
  }

  init(fahrenheit: Double) {
    celsius = (fahrenheit - 32) / 1.8
  }
}

let currentTemperature = Temperature(celsius: 18.5)
let boiling = Temperature(fahrenheit: 212.0)

print(currentTemperature.celsius)
print(boiling.celsius)

18.5
100.0
```

Unit 2—Lesson 3
Lab: Structures

Open and complete the following exercises in `Lab – Structures.playground`:

- Exercise - Structs, Instances, and Default Values
- App Exercise - Workout Tracking

Instance methods

```
struct Size {
  var width: Double
  var height: Double

  func area() -> Double {
    return width * height
  }
}

var someSize = Size(width: 10.0, height: 5.5)

let area = someSize.area() // Area is assigned a value of 55.0
```

Mutating methods

```
struct Odometer {
  var count: Int = 0 // Assigns a default value to the 'count' property.
}
```

Need to

- Increment the mileage
- Reset the mileage

```
struct Odometer {
  var count: Int = 0 // Assigns a default value to the 'count' property.

  mutating func increment() {
    count += 1
  }

  mutating func increment(by amount: Int) {
    count += amount
  }

  mutating func reset() {
    count = 0
  }
}

var odometer = Odometer() // odometer.count defaults to 0
odometer.increment() // odometer.count is incremented to 1
odometer.increment(by: 15) // odometer.count is incremented to 16
odometer.reset() // odometer.count is reset to 0
```

Computed properties

```
struct Temperature {
  let celsius: Double
  let fahrenheit: Double
  let kelvin: Double
}

let temperature = Temperature(celsius: 0, fahrenheit: 32, kelvin: 273.15)
```

```swift
struct Temperature {
  var celsius: Double
  var fahrenheit: Double
  var kelvin: Double

  init(celsius: Double) {
    self.celsius = celsius
    fahrenheit = celsius * 1.8 + 32
    kelvin = celsius + 273.15
  }

  init(fahrenheit: Double) {
    self.fahrenheit = fahrenheit
    celsius = (fahrenheit - 32) / 1.8
    kelvin = celsius + 273.15
  }

  init(kelvin: Double) {
    self.kelvin = kelvin
    celsius = kelvin - 273.15
    fahrenheit = celsius * 1.8 + 32
  }
}

let currentTemperature = Temperature(celsius: 18.5)
let boiling = Temperature(fahrenheit: 212.0)
let freezing = Temperature(kelvin: 273.15)
```

```
struct Temperature {
  var celsius: Double

  var fahrenheit: Double {
    return celsius * 1.8 + 32
  }
}

let currentTemperature = Temperature(celsius: 0.0)
print(currentTemperature.fahrenheit)

32.0
```

Challenge

Add support for Kelvin

Modify the following to allow the temperature to be read as Kelvin

```
struct Temperature {
  let celsius: Double

  var fahrenheit: Double {
    return celsius * 1.8 + 32
  }

}
```

Hint: Temperature in Kelvin is Celsius + 273.15

```
struct Temperature {
  let celsius: Double

  var fahrenheit: Double {
    return celsius * 1.8 + 32
  }

  var kelvin: Double {
    return celsius + 273.15
  }

}

let currentTemperature = Temperature(celsius: 0.0)
print(currentTemperature.kelvin)

273.15
```

Property observers

```
struct StepCounter {
    var totalSteps: Int = 0 {
        willSet {
            print("About to set totalSteps to \(newValue)")
        }
        didSet {
            if totalSteps > oldValue  {
                print("Added \(totalSteps - oldValue) steps")
            }
        }
    }
}
```

Property observers

```
var stepCounter = StepCounter()
stepCounter.totalSteps = 40
stepCounter.totalSteps = 100
```

```
About to set totalSteps to 40
Added 40 steps
About to set totalSteps to 100
Added 60 steps
```

Type properties and methods

```
struct Temperature {
  static var boilingPoint = 100.0

  static func convertedFromFahrenheit(_ temperatureInFahrenheit: Double) -> Double {
    return(((temperatureInFahrenheit - 32) * 5) / 9)
  }

}

let boilingPoint = Temperature.boilingPoint

let currentTemperature = Temperature.convertedFromFahrenheit(99)

let positiveNumber = abs(-4.14)
```

Copying

```
var someSize = Size(width: 250, height: 1000)
var anotherSize = someSize

someSize.width = 500

print(someSize.width)
print(anotherSize.width)
```

```
500
250
```

self

```
struct Car {
  var color: Color

  var description: String {
    return "This is a \(self.color) car."
  }
}
```

self

When not required

Not required when property or method names exist on the current object

```
struct Car {
  var color: Color

  var description: String {
    return "This is a \(color) car."
  }
}
```

self

When required

```
struct Temperature {
  var celsius: Double

  init(celsius: Double) {
    self.celsius = celsius
  }
}
```

Unit 2—Lesson 3

Lab: Structures

Open and complete the remaining exercises in
`Lab - Structures.playground`