Coding 101 – web-based introduction to programming

<u>Overview</u>

Learn all the basic building blocks of a computer program via Javascript

<u>Prerequisites</u>

Create an account at http://codepen.io

DAY 1

<u>What is code?</u>

Input –> computation –> output

Written in a language with a certain syntax but all share similar ideas – variables, control, scope, subprograms.

Look at how starting from simple building blocks we can put things together to make complicated structures and build complex calculations.

<u>What is the web environment?</u>

Web development has 3 pillars – HTML (structure), CSS(presentation/style), Javascript(programming)

Like all environments it is constantly changing as new ideas and technologies evolve and it's hard to keep up.

<u>Looking at three finished finished program</u>

PEN - Hello World
PEN - Fibonacci Sequence
PEN - Guessing Game

These programs uses all of the techniques that will be presented on day 1.

<u>Let's write some code..</u>

<u>Storing and Retrieving Data</u>

Introduce variables with var statement. Any program needs to hold state. Whether that is input from the user or part of an ongoing calculation/procedure.

Programming languages use variables to hold this state and some are stricter than others. The term Type is used to distinguish between different kinds of data.

In Javascript there are easy types String, Number, Boolean, Array, Object. It is called a dynamically typed language and we don't have to specify what we plan to put into a variable before we do.

Other languages make us choose before we put things into the variable and tell us if we are putting the wrong type of data in.

Let's look at variables and how we store and get at the data. How do the values change when we assign to other variables and use operators.

PEN - Variables
PEN - Exercise - Variable assignments

Once we have stored data in a variable we want to do something with it. Operators let us change the data in a multitude of ways.

Using PEN – Code 101 – Operators
Using PEN – Code 101 – Exercise - Using variables in calculations with operators

If we want to store information about a number of similar items we could use a new variable for each one but it becomes cumbersome. An array of data is a list of similar items.

PEN - Arrays
PEN - Code 101 – Exercise – Array Assignment

How do we actually get at the data and what new pitfalls await. How do we access items, how do we change items and how do we add/remove items from the array. Assigning other variable from the array values

PEN - Array Access
PEN – Exercise Array Access

What if we have different types of data to store about each item. Let's say it's a person and we want to store lots of things about them or it's a button that was clicked on a website and we want to know who pushed it and when.

PEN - Objects
PEN - Exercise – Objects

Controlling the flow of a program

As a program runs we want to affect the direction it takes based on the state of data at any particular point. We also want the computer to do the work rather than us.

PEN - Loops
PEN – Exercise Loops

Give an example where we are adding 1 to a variable over and over. This can be replaced with a loop. Give examples of for, while and do-while.

PEN - If
PEN – Exercise If

Writing a Program

The art of examining the inputs and outputs of a situation. The state that needs to be held. The steps needs in the computation and the control flows.

PEN – Coding Challenges 1

Functions

Functions allow programs to be split into smaller sections that can be easily reasoned about.

PEN - Functions
PEN – Exercise Functions

Methods and Built In Objects

Methods are functions that operate on the state of an object. They package up functionality that can be carried around with data.

PEN - Methods
PEN – Exercise Methods
PEN – Coding Challenges 2