Review: Variables, Values, Assignment

- Variables
  - Locations in memory
- Variable names
  - The way we refer to the locations in memory in our program
- Variable declaration
  - Listing the names of variables to be used in a program
- Data types of variables
  - String, Number, Boolean
  - There are other types but we won’t cover them in this course
- Variable initialization
  - Assigning a value to a variable to begin with so that we control content
- Variable values
  - The data stored in those memory locations, subject to change
- Assignment statements
  - The command to change the value of a variable
  
  \[
  \text{<VariableName> <Assignment Symbol> <Expression>}
  \]

  \[
  x = 127;
  \]
  
- Variable values

A Series of Assignments

- Work it out on paper ...
  
  - var rock;
  - var paper;
  - var scissor;
  - rock = 2;
  - scissor = 8;
  - rock = 4;
  - rock = scissor;
  - scissor = 10;
  - paper = scissor;
  - rock = scissor + paper;
  - rock = scissor / paper;

What is the Value of Dude?

- var dude = 0; //you can also declare variables and assign them values at the same time
  
  - dude = dude + 1;
  - dude = dude + 1;
  - dude = dude + 1;

Questions:
1. What value does the variable dude contain at the end of this code?
2. What is this code doing?
3. What would be a better variable name for dude?

Expressions

- CONCEPT: Expressions are a means of performing the actual computation in a program. They are formulae made from variables and operators, e.g. calculator operations: +, -, *, /, ^
  
  - weeks = days / 7; //divide value of days by 7
  - totalAfterTax = totalPrice * 1.087; //multiply the two values
  - FullName = “Grace “ + “ Whiteaker”; // add 2 strings together
    // this is called // concatenation
    // result: “Grace Whiteaker” // stored in FullName
Assignment and Expressions

- Assigning values to variables using expressions is a basic task used throughout programming.

- But assignment doesn’t just place or change the values of variables.
  - It is more general than that.
  - Any task that requires a change or manipulation of a value will use the idea of assignment.

Remember this?

```html
<BODY BGCOLOR="red"> <H1 ALIGN="center">
```

JavaScript, Objects and Events

JavaScript is a scripting language that is used to create dynamic web pages. This is done through the control and manipulation of property values of objects on a web page in response to certain events.

What the HECK does all that mean?

What is JavaScript?

- A scripting language built into most web browsers.
  - So they already have an understanding of the language you will use!
  - JavaScript is CASE-SENSITIVE, while HTML is NOT.

- Scripting languages, like JavaScript, VBScript, Perl, etc. are interpreted.

- C, C++, Java, Visual Basic and others are compiled languages.

- JavaScript (and other scripting languages) allow us to make dynamic web pages. Pages that change on the fly and/or interact with a user.

Dynamic Web Pages

- For web pages to be dynamic, code needs to be used to interact with “things” on the page.

- Those “things” are called Objects.
  - Some objects you can see: a text box, radio button, check box.
  - Some are built-in, but you can make use of them: Date, Math, String.

- Objects have properties
  -.Objects can also have sub-objects, which have properties.

- Properties contain Values
  - Properties and values are similar to variables and values, but properties are for objects that are part of the web page.
  - Variables are created as we need them and are not seen.
How are all the objects accounted for?

- The Document Object Model
- An abstract way to look at all elements of a file
- For our purposes, it is a way to identify the location of every single element (object) on a webpage
  - And allows us to use code (JavaScript in this case) to manipulate each object and its properties
- Always double check on how the object and its properties are referenced by JavaScript
  - A big help in debugging

How do you reference an object?

- Dot syntax
- An example using something in the real world:
  - You are an instance of a human, an object. You each have properties, each of which has particular values.
  - To reference the color of Jason’s hair, using dot syntax: Jason.Hair.hairColor.value
  - To assign Jason a new hair color: Jason.Hair.hairColor.value = “blond”
- Examples in JavaScript:
  ```javascript
  document.bgColor = “red”; // the document is the HTML file we are currently in and we’re assigning the body background color
  ```

Objects also do things

- Sometimes the objects on a page must do something
- Actions by Objects are called Methods
- Methods often look just like Properties, but they are followed by ( ) so you know the difference:
  - lastModified is a property:
    ```javascript
    document.lastModified
    ```
  - Write is a method, an action that an object can take:
    ```javascript
    document.write(“Hello World”)
    ```
Objects, cont’d:
- There are MANY, MANY objects, properties and methods
- We will work with some, not all of them
- Think of objects and properties as nouns and methods as verbs, or actions.
- A list of some of them is linked on our web reference page
  - Also a list in the back of the JavaScript book

Events
- Much of JavaScript’s power is the ability to respond to specific events that occur on a web page.
  - Some events are triggered by users, some by the web page itself
    - What are some familiar events that you trigger when using a web page?
    - What are events that the web page can take care of?
  - When the web page or a user triggers an event, then we can write code in an “event handler” to respond to it

Some Common Event Handlers
- onClick (triggered by a mouse click)
- onMouseover (triggered by a mouseover)
- onMouseout (triggered by mouseout)
- onLoad (triggered when page loads, goes with the <body> tag)
- onSubmit (triggered when a form is submitted)
- onMousemove (triggered when mouse is moved)
  - There are many more, but they aren’t necessarily cross-browser friendly and we won’t necessarily be using them

Common uses of JavaScript
- Dynamic interaction with users
  - Giving feedback to their use of page
- Form validation
  - Did the user enter anything into the name text box before submitting the form?
  - Did they remember the required information?
    - Name
    - Address
    - Email
    - Answer quiz questions correctly…?
**Summary**

- Programming Concepts:
  - Variable must be declared
  - Variables have Names and Values
  - Assignment is how values of variables are changed
  - Expressions are used to perform computations in programs and manipulate values in variables

- Other important concepts:
  - Web Pages are Objects that contain other objects
  - Objects have Names and Properties
  - Properties have Values
  - Assignment is used to change values of Properties
  - Expressions…
  - Objects can perform certain actions, called Methods
  - Events are actions by users or the system on the web page.
  - Event handlers contain code to execute specific instructions

Notice anything here????