Functions & Abstraction

A function is a package for an algorithm; once written, it can be use over and over.

Example Function

A function to compute a person's weight in gold would be

```
Function worthInAu(weight) {
    return weight*12*651.50;
}
```

This computation is what's being packaged

The Package

Functions have a specific syntax

function <*name*> (<*parameter list*>) {
<*function definition*>
}

- <*name*> names are identifiers; start w/letter
- <*parameter list*> is the input variables, a list separated by commas
- <*function definition*> is just the program to do the work

Brackets appear here by convention

A Sample Function

Compute the Body Mass Index when the inputs are in metric

```
function <name> ( <parameter list> ) {
        <function definition>
}
```

```
function bmiM ( weightKg, heightM ) {

    // Figure Body Mass Index in metric units

    return weightKg / (heightM * heightM);
}
```

Identify the corresponding parts

Writing Functions

Most programming is done by writing functions, so learning the form is key

```
function bmiE ( weightLBS, heightIn ) {
   // Figure Body Mass Index in English units
   var heightFt = heightIn / 12; // Change to feet
   return 4.89 * weightLBS / (heightFt * heightFt);
}
```

Declarations

A function is declared by writing down the "package" ... the function is used when it is *called*

Calls

Declaration

```
function BMI (units, height, weight ) {

   // Compute BMI in either metric or English

   if (units == "English")
      return bmiE(weight, height);
   else
      return bmiM(weight, height);
}
```

Summarizing

Declaration: the function "package," says what happens when the function runs

Call: the function use, asks for the computation to be run

- There is only one function declaration
- There can be many calls … functions are reusable
- In JS, functions tend to be grouped together but the calls go where they are needed

Gold Function

Suppose we compute “weight in Au”

Worth in gold = (weight*12)*651.5

```
function          (          )  {




}
```

Begin with the form ...

Gold Function

Suppose we compute “weight in Au”

Worth = (Weight*12)*651.5

```
function worthInAu (          ) {
// Compute the dollar value
//  of weight at $651.50/tz



}
```

Pick a Name

Gold Function

Suppose we compute “weight in Au”

Worth = (Weight*12)*651.5

```
function worthInAu ( weight )  {
// Compute the dollar value
//  of weight at $651.50/tz



}
```

Pick a Name

Pick the Parameter

Gold Function

Suppose we compute “weight in Au”

Worth = (Weight*12)*651.5

```
function worthInAu ( weight )  {
// Compute the dollar value
//  of weight at $651.50/tz

   return weight * 12 * 651.5;

}
```

Pick a Name

Pick the Parameter

Define the Computation

Testing Template

No one writes perfect programs the first time ... smart programmers check

To test, have a standard page handy

```
<html><head><title>My Test Page</title></head>
  <body>
    <script language="JavaScript">
          Put your JavaScript code here
    </script>
  </body>
</html>
```

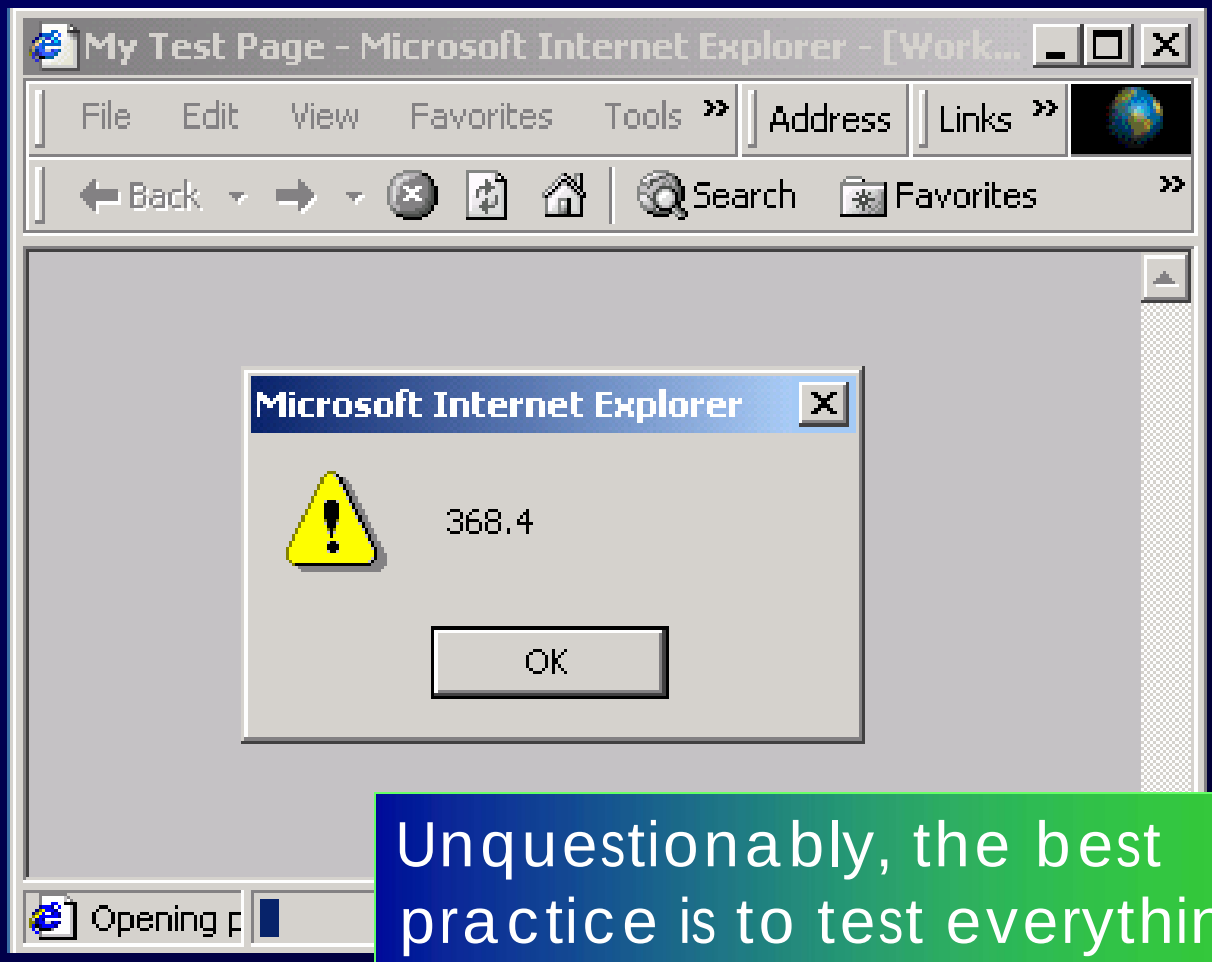
Declare the Function

Put a function declaration in <script>

Testing Template

```
<html><head><title>My Test Page</title></head>
 <body>
  <script language="JavaScript">
       function worthInAu ( weight )  {
       // Compute the dollar value
       //  of weight at $651.50/troy oz
            return weight * 12 * 651.5;
       }
       alert(worthInAu(1/12));
  </script>
 </body>
</html>
```

Try The Function



Unquestionably, the best practice is to test everything

Summary

Functions are packages for algorithms

- They follow a series of rules, that quickly become intuitive
- Functions have both a declaration and a call
- Functions have both parameters (in the declaration) and arguments (in the call)
- Scope refers to the region of a program where a variable is “known”

Functions are the secret to building complex systems