



Functions & Abstraction

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

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Example Function

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

```
function worthInAu (weight) {
  return weight*12*566.99;
}
```

This computation is what's being packaged

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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

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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);
}
```

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Declarations

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

```
function BMI ( units, height, weight ) {
  // Compute BMI in either metric or English
  if (units == "English")
    return bmiE(weight, height);
  else
    return bmiM(weight, height);
}
```

Declaration

Calls

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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 ⁷



Gold Function

Suppose we compute “weight in Au”
 $\text{worth in gold} = (\text{weight} * 12) * 566.99$

```
function ( ) {
}

```

Begin with the form ...

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Gold Function

Suppose we compute “weight in Au”
 $\text{worthInAu} = (\text{weight} * 12) * 566.99$

```
function worthInAu ( ) {
  // Compute the dollar value
  // of weight at $566.99/tz
}

```

Pick a Name

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Gold Function

Suppose we compute “weight in Au”
 $\text{worthInAu} = (\text{weight} * 12) * 566.99$

```
function worthInAu ( weight ) {
  // Compute the dollar value
  // of weight at $566.99/tz
}

```

Pick a Name

Pick the Parameter

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Gold Function

Suppose we compute “weight in Au”
 $\text{worthInAu} = (\text{weight} * 12) * 566.99$

```
function worthInAu ( weight ) {
  // Compute the dollar value
  // of weight at $566.99/tz
  return weight * 12 * 566.99;
}

```

Pick a Name

Pick the Parameter

Define the Computation

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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>

```

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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 $566.99/troy oz
    return weight * 12 * 566.99;
  }
  alert(worthInAu(1/12));
</script>
</body>
</html>
```



Try The Function



Unquestionably, the best
practice is to test everything.



Demonstration

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Summary

Functions are packages for algorithms

- They follow a series of rules, that quickly become routine
- 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

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