

WHAT IS A FUNCTION?

Functions let you group a series of statements together to perform a specific task. If different parts of a script repeat the same task, you can reuse the function (rather than repeating the same set of statements).

Grouping together the statements that are required to answer a question or perform a task helps organize your code.

Furthermore, the statements in a function are not always executed when a page loads, so functions also offer a way to store the steps needed to achieve a task. The script can then ask the function to perform all of those steps as and when they are required. For example, you might have a task that you only want to perform if the user clicks on a specific element in the page.

If you are going to ask the function to perform its task later, you need to give your function a name. That name should describe the task it is performing. When you ask it to perform its task, it is known as **calling** the function.

The steps that the function needs to perform in order to perform its task are packaged up in a code block. You may remember from the last chapter that a code block consists of one or more statements contained within curly braces. (And you do not write a semicolon after the closing curly brace – like you do after a statement.)

Some functions need to be provided with information in order to achieve a given task. For example, a function to calculate the area of a box would need to know its width and height. Pieces of information passed to a function are known as **parameters**.

When you write a function and you expect it to provide you with an answer, the response is known as a **return value**.

On the right, there is an example of a function in the JavaScript file. It is called `updateMessage()`.

Don't worry if you do not understand the syntax of the example on the right; you will take a closer look at how to write and use functions in the pages that follow.

Remember that programming languages often rely upon on name/value pairs. The function has a name, `updateMessage`, and the value is the code block (which consists of statements). When you call the function by its name, those statements will run.

You can also have anonymous functions. They do not have a name, so they cannot be called. Instead, they are executed as soon as the interpreter comes across them.

A BASIC FUNCTION

In this example, the user is shown a message at the top of the page. The message is held in an HTML element whose `id` attribute has a value of `message`. The message is going to be changed using JavaScript.

Before the closing `</body>` tag, you can see the link to the JavaScript file. The JavaScript file starts with a variable used to hold a new message, and is followed by a function called `updateMessage()`.

You do not need to worry about *how* this function works yet – you will learn about that over the next few pages. For the moment, it is just worth noting that inside the curly braces of the function are two statements.

HTML

c03/basic-function.html


```
<!DOCTYPE html>
<html>
  <head>
    <title>Basic Function</title>
    <link rel="stylesheet" href="css/c03.css" />
  </head>
  <body>
    <h1>TravelWorthy</h1>
    <div id="message">Welcome to our site!</div>
    <script src="js/basic-function.js"></script>
  </body>
</html>
```

JAVASCRIPT

c03/js/basic-function.js

```
var msg = 'Sign up to receive our newsletter for 10% off!';
function updateMessage() {
  var el = document.getElementById('message');
  el.textContent = msg;
}
updateMessage();
```

RESULT



Sign up to receive our
newsletter for 10% off!

These statements update the message at the top of the page. The function acts like a store; it holds the statements that are contained in the curly braces until you are ready to use them. Those statements are not run until the function is **called**. The function is only called on the last line of this script.

DECLARING A FUNCTION

To create a function, you give it a name and then write the statements needed to achieve its task inside the curly braces.

This is known as a **function declaration**.

You declare a **function** using the **function** keyword.

You give the function a **name** (sometimes called an **identifier**) followed by parentheses.

The **statements** that perform the task sit in a code block. (They are inside curly braces.)

```
function sayHello() {  
    document.write('Hello!');  
}
```

The diagram shows the code with three labels and brackets: 'FUNCTION KEYWORD' points to 'function', 'FUNCTION NAME' points to 'sayHello()', and 'CODE BLOCK (IN CURLY BRACES)' points to the entire block between the curly braces.

This function is very basic (it only contains one statement), but it illustrates how to write a function. Most functions that you will see or write are likely to consist of more statements.

The point to remember is that functions store the code required to perform a specific task, and that the script can ask the function to perform that task whenever needed.

If different parts of a script need to perform the same task, you do not need to repeat the same statements multiple times - you use a function to do it (and reuse the same code).

CALLING A FUNCTION

Having declared the function, you can then execute all of the statements between its curly braces with just one line of code. This is known as **calling the function**.

To run the code in the function, you use the function name followed by parentheses.

In programmer-speak, you would say that this code **calls** a function.

You can call the same function as many times as you want within the same JavaScript file.

FUNCTION NAME
sayHello();

1. The function can store the instructions for a specific task.
2. When you need the script to perform that task, you call the function.
3. The function executes the code in that code block.
4. When it has finished, the code continues to run from the point where it was initially called.

```
① function sayHello() {  
③   document.write('Hello!');  
  }  
  // Code before hello...  
② sayHello();  
④ // Code after hello...  
  
```

Sometimes you will see a function called *before* it has been declared. This still works because the interpreter runs through a script before executing each statement, so it will know that a function declaration appears later in the script. But for the moment, we will declare the function before calling it.

DECLARING FUNCTIONS THAT NEED INFORMATION

Sometimes a function needs specific information to perform its task. In such cases, when you declare the function you give it **parameters**. Inside the function, the parameters act like variables.

If a function needs information to work, you indicate what it needs to know in parentheses after the function name.

The items that appear inside these parentheses are known as the **parameters** of the function. Inside the function those words act like variable names.

PARAMETERS

```
function getArea(width, height) {  
  return width * height;  
}
```

THE PARAMETERS ARE USED LIKE
VARIABLES WITHIN THE FUNCTION

This function will calculate and return the area of a rectangle. To do this, it needs the rectangle's width and height. Each time you call the function these values could be different.

This demonstrates how the code can perform a task without knowing the *exact* details in advance, as long as it has rules it can follow to achieve the task.

So, when you design a script, you need to note the information the function will require in order to perform its task.

If you look inside the function, the parameter names are used just as you would use variables. Here, the parameter names **width** and **height** represent the width and height of the wall.

CALLING FUNCTIONS THAT NEED INFORMATION

When you call a function that has parameters, you specify the values it should use in the parentheses that follow its name. The values are called **arguments**, and they can be provided as values or as variables.

ARGUMENTS AS VALUES

When the function below is called, the number 3 will be used for the width of the wall, and 5 will be used for its height.

```
getArea(3, 5);
```

ARGUMENTS AS VARIABLES

You do not have to specify actual values when calling a function - you can use variables in their place. So the following does the same thing.

```
wallWidth = 3;  
wallHeight = 5;  
getArea(wallWidth, wallHeight);
```

PARAMETERS VS ARGUMENTS

People often use the terms **parameter** and **argument** interchangeably, but there *is* a subtle difference.

On the left-hand page, when the function is declared, you can see the words **width** and **height** used (in parentheses on the first line). Inside the curly braces of the function, those words act like variables. These names are the parameters.

On this page, you can see that the **getArea()** function is being called and the code specifies real numbers that will be used to perform the calculation (or variables that hold real numbers).

These values that you pass into the code (the information it needs to calculate the size of this particular wall) are called arguments.

GETTING A SINGLE VALUE OUT OF A FUNCTION

Some functions return information to the code that called them. For example, when they perform a calculation, they return the result.

This `calculateArea()` function returns the area of a rectangle to the code that called it.

Inside the function, a variable called `area` is created. It holds the calculated area of the box.

The `return` keyword is used to return a value to the code that called the function.

```
function calculateArea(width, height) {  
    var area = width * height;  
    return area;  
}  
var wallOne = calculateArea(3, 5);  
var wallTwo = calculateArea(8, 5);
```

Note that the interpreter leaves the function when `return` is used. It goes back to the statement that called it. If there had been any subsequent statements in this function, they would not be processed.

The `wallOne` variable holds the value 15, which was calculated by the `calculateArea()` function.

The `wallTwo` variable holds the value 40, which was calculated by the same `calculateArea()` function.

This also demonstrates how the same function can be used to perform the same steps with different values.