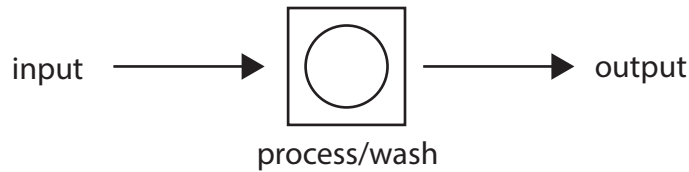


# Input and Output

Java, like many high-level programming languages, allows programmers to get data from an input source, eg a keyboard, process the data, and then send it to an output source, eg a monitor.

We can think of it like a washing machine!



How can we get data from the keyboard? In Python it's quite simple.

```
age = input("How old are you?")
```

However, even in Python, if the input is a number, we need to convert the input to be a number. Then, we can do maths with it:

```
age = input("How old are you?")
age = int(age)
```

In Java, one technique is to create a variable that will communicate with your keyboard. To do this you need to import a library file into your program:

```
import java.util.Scanner; //this will be the very first line of code in our class file
```

`Scanner` is a family of code which helps us get data from somewhere, eg a keyboard, into our program.

But..... we need to create a `Scanner` variable! So, here is some code to consider:

```
import java.util.Scanner;

public class Main{

    public static void main(String[] args){

        //declare a Scanner variable
        Scanner myScan;

        //assign it to communicate with your keyboard
        myScan = new Scanner(System.in);
    }

}
```

Now we are ready to start using our `Scanner` variable, `myScan`. Remember, this is just an identifier. You can call it whatever you want!

## Scanner methods

The Scanner file that you imported has loads of useful functions (often called methods).

For example, there is one called `nextInt()` which will grab a whole number that you type on the keyboard.

But - how can we call this method? Easy! We have a Scanner-type variable to help us:

```
myScan.nextInt();
```

But how can we store this number being input from the keyboard?

Easy!! Declare a variable and use it to store the number being input from the keyboard:

```
int num; //declare a variable to store an integer

num = myScan.nextInt(); //get the integer and store it!
```

The full program will look like:

```
import java.util.Scanner;

public class Main{

    public static void main(String[] args){

        //declare a Scanner variable
        Scanner myScan;

        //assign it to communicate with your keyboard
        myScan = new Scanner(System.in);

        int num;

        num = myScan.nextInt();

        System.out.println("You entered the number " + num);

        num = num + 1;

        System.out.println("The number has increased by 1!");

    }

}
```

The Scanner family of code (which you imported) has many useful methods for you to use. Library files like this are very useful. You can import them and use the code - it has already been written for you and tested. All you need to do is figure out how to use it!

## Example

A program calls a function, addTwo. The purpose of addTwo is to get two integers from the keyboard, add them together and output the result. Here is the code. Fill in the blanks.

```
import java.util.Scanner;

public class Main{

    public static void main(String[] args){

        //call the addTwo function
        _____

    }

    public static void addTwo(){

        //declare a Scanner variable
        _____ kbin;

        //assign it to communicate with your keyboard
        kbin= new Scanner(_____);

        int num1, _____, total; //declare variables used in the solution

        System.out.println("Enter the first number: ");
        num1 = kbin._____;

        System.out.println("Enter the second number: ");
        num2 = _____.nextInt();

        total = _____;

        System.out.println(num1+" plus "+num2+"equals "+total+".");

    }

}
```

Annotate the code:

variable declarations

library file import

input

output

finally, underline all identifiers that you can find in the program



## Task 1

A computer program calls a function, `displayBAI()`. This function stores:

- the name of the patient eg "Emma Forbes"
- the weight of the patient in kilograms eg 54.6
- the height of the patient in meters eg 1.67

The function calculates and displays the patient's Body Adiposity Index using the following formula and outputs the result in a meaningful sentence.

$$\text{bai} = \text{kg/m}^2$$

Start a new project in your IDE called BaiProject - remember to include a `main()` function.

Design the `displayBai()` function.

Hint - to get whole numbers from the keyboard, use the `nextInt()` method of the Scanner class.

To get String (text) data from the keyboard, try using the `nextLine()` method of the Scanner class.

To get a double (decimal), try using the `nextDouble()` method

To test your code, call it from your `main` function.

# Concepts covered

Every Java program starts from a `main()` function.

Other functions can be called when needed.

A function should have a specific purpose which contributes to the program's functionality.

Variables are used to store data.

In Java, before using a variable we have to declare it - this involves thinking of an appropriate identifier and determining the data type.

Common data types in Java are: `int`, `double`, `boolean`, `char`, `String`

Syntax refers to the rules relating to writing code in a given programming language. Think of it as coding grammar. If you make a mistake with syntax and you try to run your code, you will get a syntax error which you will need to find and fix!

Library files can be imported into your project. These files contain code that you can use. This code has already been written and tested, hence it will save you time when you write your own programs.