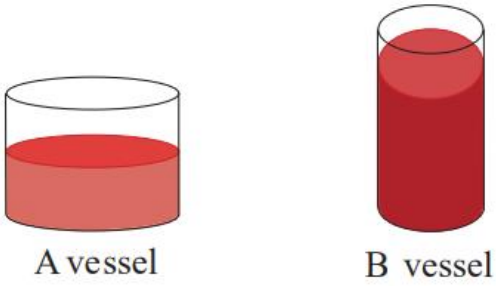
Computer Programming – Variables

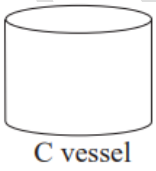
Variables are the names you give to computer memory locations which are used to store values in a computer program.

Let's consider a situation where two types of coloured liquid have been poured into two separate glass vessels.

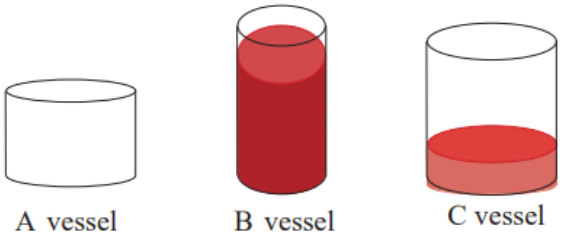


Now let's consider changing liquid in A vessel into B vessel and liquid in B vessel into A vessel.

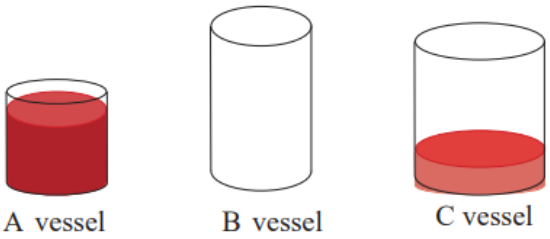
In this way, in order to change the liquid from one vessel to the other, it is necessary to have an extra vessel. Let's name that vessel as C vessel.



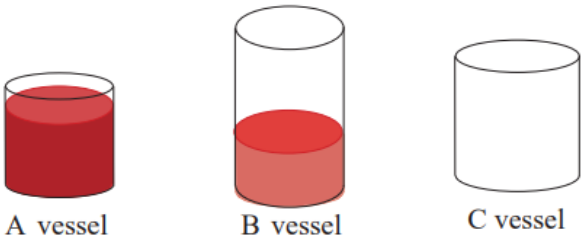
step 1 : Changing liquid in A vessel to C vessel



step 2 : Changing liquid in B vessel to A vessel



step 3 : Changing liquid in C vessel to B vessel



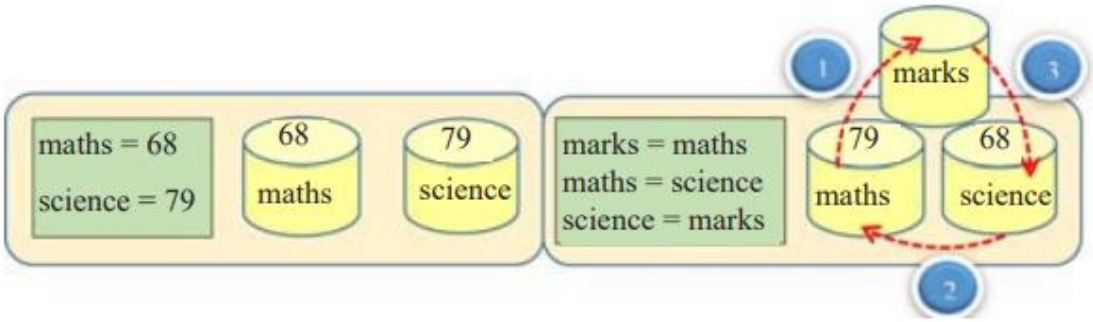
As a vessel can store liquid, so a variable can store a value. The above vessels named as A, B and C can be considered as variables and the liquid poured into them can be considered as values of the variables.

Assign Values to Variables

When assigning values to variables, variable name is written on the left to the equal sign and the value is written on the right to the equal sign.

Changing values of variables

e.g. Let's change the values of variables in maths and science.



The data stored in a variable can be changed during the course of the program, which is why it's named a "variable".

In a variable program, you can store different data types such as integers, floating-point numbers, characters, strings or even more complex data structures. Variables serve as a way to name and access the values contained within them.

Variables are indispensable in programming for several reasons:

- **Storing and manipulating data:** By using variables, you can efficiently store and manage data in your programs, allowing you to perform calculations and other data manipulations easily.
- **Code readability and maintainability:** Variables help make your code easier to read and understand by assigning meaningful names to the data being used in your program. This makes it easier to maintain and update the code in the future.
- **Dynamic behavior:** Variables allow your program to change its behavior based on the data stored in them. For example, you can write a program that asks users to input their age and then display a personalized message depending on the user's age.
- **Reuse of code:** Variables can be used to store intermediate results and reuse them in later parts of your program, reducing code redundancy and improving performance.

Examples of Variables in Programming and Their Uses

Variables are extensively used in real-world programming applications to store and process data, enable dynamic behaviour, and enhance the readability of the code.

Let's delve into some real-life examples of variables in programming:

1. User input handling: In applications where user input is required, variables can help store the user's inputs and process them accordingly. For example, a calculator application may use variables to store numbers entered by the user, as well as the results of calculations.

```
num1 = float(input("Enter the first number: "))

num2 = float(input("Enter the second number: "))

sum = num1 + num2

print("The sum of the two numbers is: ", sum)
```

In this example, 'num1' and 'num2' are variables, which store the numbers entered by the user, while 'sum' is another variable used to store the result of the addition.

2. E-commerce website: In an online shopping website, variables can be used to store information about products, customers, and orders. `

```
let productId = "P12345";

let productName = "Laptop";

let price = 999.99;

let stockAvailable = 150;
```

Here, 'productId', 'productName', 'price', and 'stockAvailable' are variables that store different data types to represent the product's properties.

3. Gaming applications: In video games, variables can be employed to track and manipulate various aspects, such as the player's health, score, and position.

```
 int playerHealth = 100;

 int playerScore = 0;

 Vector3 playerPosition = new Vector3(0, 0, 0);
```

In this example, 'playerHealth' and 'playerScore' store integer values, while 'playerPosition' is a variable of type Vector3 that represents the player's position in a 3D space.

1. Basic Variable Understanding:

a. Question: What is a variable in programming?

b. Activity: Write your name on a piece of paper. Assign your name to a variable named student_name. Write down the line of code to represent your name. For example: student_name = "John".

2. Assigning Values:

a. Question: Imagine you have a variable called "age." What could be a possible value for your age?

b. Activity: Choose a number for your age and write it down. Now, imagine you had a birthday. Can you change the value of your "age" variable to reflect your new age?

3. Changing Variables:

a. Question: If you have a variable called "favorite_color," what color would you assign to it?

b. Activity: Choose a color and write it down. Now, pretend your favorite color changed. Can you update the value of your "favorite_color" variable to the new color?

4. Using Variables in Sentences:

a. Question: If you had a variable called "animal" and another called "sound," how would you use them in a sentence?

b. Activity: Choose an animal and the sound it makes. Create a sentence like, "The [animal] makes a [sound]." Now, try changing the variables to talk about a different animal and sound.

5. Variable Arithmetic:

a. Question: If you have a variable "number_of_toys" with a value of 5, and you get 3 more toys, what would be the new value?

b. Activity: Write down the current number of toys. Now, add 3 more toys. Can you update the value of your "number_of_toys" variable to show the new total?

6. Combining Variables:

a. Question: Suppose you have variables "first_name" and "last_name." How would you use them to create a full name?

b. Activity: Choose a first name and a last name. Create a full name by combining the variables. Can you change the first or last name to see how the full name changes?

7. Sharing Variables:

a. Question: If you and your friend both have a variable called "favourite_food," can your favourite foods be different?

b. Activity: Share your friend's favorite food with you. Discuss how your variables might have different values. Can you change your "favourite_food" variables to friend's favourite?