

Part 4: Loops

For: Runs a loop until a condition becomes true. I.E counting the number of times through a loop and exiting the loop once a counter gets to a certain value.

While: Runs a loop as long as a certain condition is true.

We will add a for loop in this program to have a person enter 4 numbers and find the average. 1st we need to make 4 new variables

1. counter
2. average
3. number
4. total

Note the use of a common next to the age variable. We can add , next to a variable to add more on a single line. This helps reduce the length of the code. We also have to declare a value for the counter. We will make the average, total, and number a real number which is declared as double type of variable so the program can output a value with decimals and or values that exceed the display limit and need to go to a power of 10 (i.e 2.53253×10^{10}). This resets the counter each time the program is run. `#include <iostream>`

```
using namespace std;
```

```
int main()
```

```
{
```

```
string firstname;
```

```
int age;
```

```
double average=0, number=0, total=0;           //variables for finding average of 4 numbers cout
```

```
cout << "Hello World" << endl;
```

```
cout << "What is your name?";
```

```
cin >> firstname;
```

```
cout << "Hello " << firstname << " my name is PC" << endl;
```

```

// CODE FOR ASKING YOUR AGE HERE
cout << "\nWhat is your Age?";
cin >> age;
if (age <= 40)
{
cout <<"You are a youngster\n";
}
else
{
cout << "You are Over the Hill!\n";
}
cout << "You will enter 4 numbers and we will find the average for you." << endl;
for (int counter =1; counter <= 4; counter++)
{
cout << "enter #" << counter << " .:";
cin >> number;
total = number + total;
}
average = total / 4;    //counter can not be used at this point because it does not exist outside of the for loop
cout << "The summation of numbers entered is: "<< total << endl;
cout << "The average of your numbers is: " << average << endl;
return 0;
}

```

Save File

Assignment: Change the Program to allow the user to input the total numbers to be added. Note: New Variable will have to be created and for loop will change.

Part 5: Do/While Loop

Checks to see if the comparison of user or sensor data is true at the end of the loop to check if it should run proceeding times. Loop is guaranteed to run one time. Imagine this being an if/then statement on repeat.

```
#include <iostream>

using namespace std;

int main()
{
    char userexit; //variable used to end the do/while loop when the correct character is entered
    string firstname;
    int age;
    double average=0, number=0, total=0; //variables for finding average
    int userinput;
    cout << "Hello World" << endl;  cout << "What is your name?";
    cin >> firstname;
    cout << "Hello " << firstname << " my name is PC" << endl;
    // CODE FOR ASKING YOUR AGE HERE
    /*cout << "\nWhat is your Age?"; // /* ... */: Comments out the all of the if statements related to age;
    cin >> age;
    if (age <= 40)
    {
        cout <<"You are a youngster\n";
    }
    else
    {
        cout << "You are Over the Hill!\n";
    } */ // /* ... */: Comments out the all of the if statements related to age;

    do
    {
        total = 0; // Reinitializes total to 0 to it does not add the previous amount to the
                  // new amount if the program is ran a second time
```

```

cout << "You will enter 4 numbers and we will find the average for you." << endl;
cin >> userinput;
for (int counter =1; counter <= userinput (Code Changes from User Input; counter++)
{
cout << "enter #" << counter << ":";
cin >> number;
total = number + total;
}
average = total/userinput;
cout << "The summation of numbers entered is: "<< total << endl;
cout << "The average of your numbers is:" << average << endl;
cout << " Press any key to continue or press x to exit";
cin >> userexit;
}
while (userexit != 'x');           // Compares the input of variable a to see if the loop should continue. Loop
                                   // will continue as long as the variable a does not equal x

return 0;
}

```

Save File

Assignment: Add to the while statement so X (capital) will also exit the program

Part 6: While Loop

Checks to see if the comparison of user or sensor data is true at the beginning of the loop to determine if it should run the first time and proceeding times. Loop is not guaranteed to run given what the data is before being passed to the loop. Imagine this being an if/then statement on repeat.

NOTE: Uncomment the Age Code and If Statements (See Below in Bold)

NOTE: While Statement in this program will be used to check for good input. i.e. age greater than 0

```
#include <iostream>

using namespace std;

int main()
{
    char userexit;                //variable used to end the do/while loop when the correct character is entered
    string firstname;
    int age;
    double average=0, number=0, total=0;    //variables for finding average
    int userinput;

    cout << "Hello World" << endl;   cout << "What is your name?";

    cin >> firstname;

    cout << "Hello " << firstname << " my name is PC" << endl;

    // CODE FOR ASKING YOUR AGE HERE

    cout << "\nWhat is your Age?";

    cin >> age;
```

```
//While Statement checks to see if a proper age is inputted. User will be trapped until they enter an age greater than 0.  
// remove the if statement for error when less than age of 0
```

```
while (age <=0)
```

```
{
```

```
cout << "Error";
```

```
cout << "\nEnter a real age: );
```

```
cin >> age;
```

```
}
```

```
//NOTE the assignment age range will be still placed here.
```

```
if (age <= 40)
```

```
{
```

```
cout <<"You are a youngster\n";
```

```
}
```

```
else
```

```
{
```

```
cout << "You are Over the Hill!\n";
```

```
}
```

```
do
```

```
{
```

```
total = 0; // Reinitializes total to 0 to it does not add the previous amount to the  
// new amount if the program is ran a second time
```

```
cout << "You will enter 4 numbers and we will find the average for you." << endl;
```

```
cin >> userInput;
```

```
for (int counter =1; counter <= userInput (Code Changes from User Input; counter++)
```

```
{
```

```
cout << "enter #" << counter << ":";
```

```
cin >> number;
```

```
total = number + total;
```

```
}
```

```
average = total/userinput;
```

```
cout << "The summation of numbers entered is: "<< total << endl;
cout << "The average of your numbers is:" << average << endl;
cout << " Press any key to continue or press x to exit";
cin >> userexit;
}
while (userexit != 'x' && userexit !='X');           // Compares the input of variable a to see if the loop should continue. Loop
                                                    // will continue as long as the variable a does not equal x or X

return 0;
}
```

Save File > Share/Email Program to the Teacher