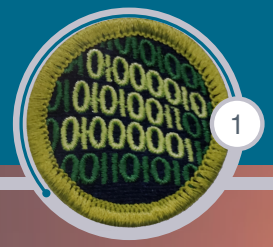
Basic Programming Concepts



Welcome!

main.c

Run

```c
const float LOW_TEMP_F_WARNING=0.; // Program constants
const float HIGH_TEMP_F_WARNING=100.;
const int MAX_LOOP=5.;

float temp_F_to_C( float tF ) {
    return (tF - 32)/1.8; // Math formula to convert Fahrenheit to Celsius
}

int main() // Declaration of program
{

  float temp_f; // Declaration of variables that the program will use
  float temp_c;
  int i;
  for(i=0; i<MAX_LOOP; i++){   // loop
    printf("\nEnter the temperature in degrees F : ");     // Input the temperature to convert
    scanf("%f",&temp_f);      // Reads the user input

    temp_c = (temp_f- 32)/1.8; // Math formula to convert Fahrenheit to Celsius

    printf("The temperature in Celsius (C) is  %f\n",temp_c); // Output the Celsius result

    printf("The temperature in Celsius (C) is  %f\n", temp_F_to_C( temp_f ));

    if(temp_f > HIGH_TEMP_F_WARNING){ // Check for high temperature
      printf("Remember to hydrate\n");
    }

    if(temp_f < LOW_TEMP_F_WARNING ){ // Check for low temperature
      printf("Remember to pack Long underwear\n");
    }
  }

```

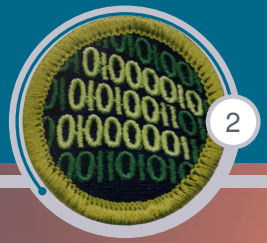
Output

```
/tmp/iF0Gg1ZYqV.o
Enter the temperature in degrees F : 120
The temperature in Celsius (C) is  48.888889
The temperature in Celsius (C) is  48.888889
Remember to hydrate

Enter the temperature in degrees F : 100
The temperature in Celsius (C) is  37.777779
The temperature in Celsius (C) is  37.777779

Enter the temperature in degrees F :
```

Who has programmed?



- What languages have you tried to program in?
- Do you have a favorite? Why?
- Do you know how to type?
- What computer experience do you have?

Starting a Program

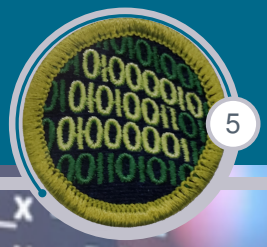
- The best programmers don't start by coding.
- The best programmers plan first. They write the requirements and generate diagrams to help plan out the code they write.
- Then they use this to generate pseudo code.
- Then the actual programming begins.

Pseudo Code

Listing 1: Sample Code Listing Python

```
'''
-------------------------------------------------------------
    File: calc_adder.py
    Description: Calculator to Add two integers.
    Revision: 1.0
    Date:  06DEC2021
    Author: Sparkineer
-------------------------------------------------------------
'''
# Request two integers from the program user.
# Store the first integer.
# Store the second integer.
# Add integer1 and integer2.
# Display result.
# Ask – Quit or Repeat?
```

Variables

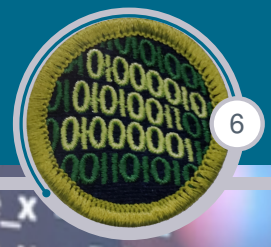


Variables are the backbone of all programming languages. They are used to store important information for the programmer. The programmer can then use this stored information at a later point in the program.

Examples

- We store names in memory to recall them later to obtain that person's attention.
- When hiking we store the path color or the the next direction we need to head in memory so when we see the next marker or trail we can make a decision of the direction to head.

Control Structures



Decision Making (conditionals)

- **If, If/Else**: Used to compare variables aganist a value or another variable to make a decision.
- **Case/Switch**: Similar to several stacked single if tests.

Loops (iteration)

- **While loops** execute and continue to execute repeated time at the onset and verification of a logical condition. The condition is tested at the start of every loop iteration.
- **For loops** execute for a prescribed number of times, as controlled by a counter or an index.

Pseudo Code

Listing 2: Sample Code Listing Python

```
'''
-------------------------------------------------------------
    File: calc_adder.py
    Description: Calculator to Add two integers.
    Revision: 1.0
    Date:  06DEC2021
    Author: Sparkineer
-------------------------------------------------------------
'''
# Request two integers from the program user.
# Store the first integer.
# Store the second integer.
# Add integer1 and integer2.
# Display result.
# Ask – Quit or Repeat?
```

File Header

Listing 3: Sample Code Listing Python

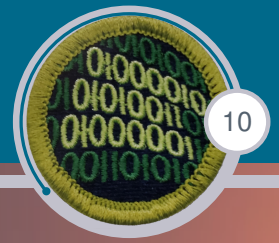
```
'''
-----------------------------------------------------------
    File: calc_adder.py
    Description: Calculator to Add two integers.
    Revision: 1.0
    Date:  06DEC2021
    Author: Sparkineer
-----------------------------------------------------------
'''
```

Pseudo Code

Listing 4: Sample Code Listing Python

```
# Request two integers from the program user.
# Store the first integer.
# Store the second integer.
# Add integer1 and integer2.
# Display result.
# Ask – Quit or Repeat?
```

LETS CODE: Implement User Input...



Listing 5: Sample Code Listing Python

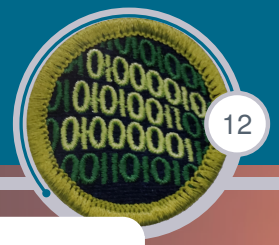
```
1    # Request two integers from the program user.
2    # Store the first integer.
3    intA = input("Please enter first integer: ")
4    # Store the second integer.
5    intB = input("Please enter second integer: ")
6
7    print(intA, "+", intB) # test input
```

LETS CODE: Perform the Math.

Listing 6: Sample Code Listing Python

```
1    # Add integer1 and integer2.
2    result = int(intA) + int(intB)
3    # Display result.
4    print(intA, "+", intB, "=", result)
5    # Ask - Quit or Repeat?
```

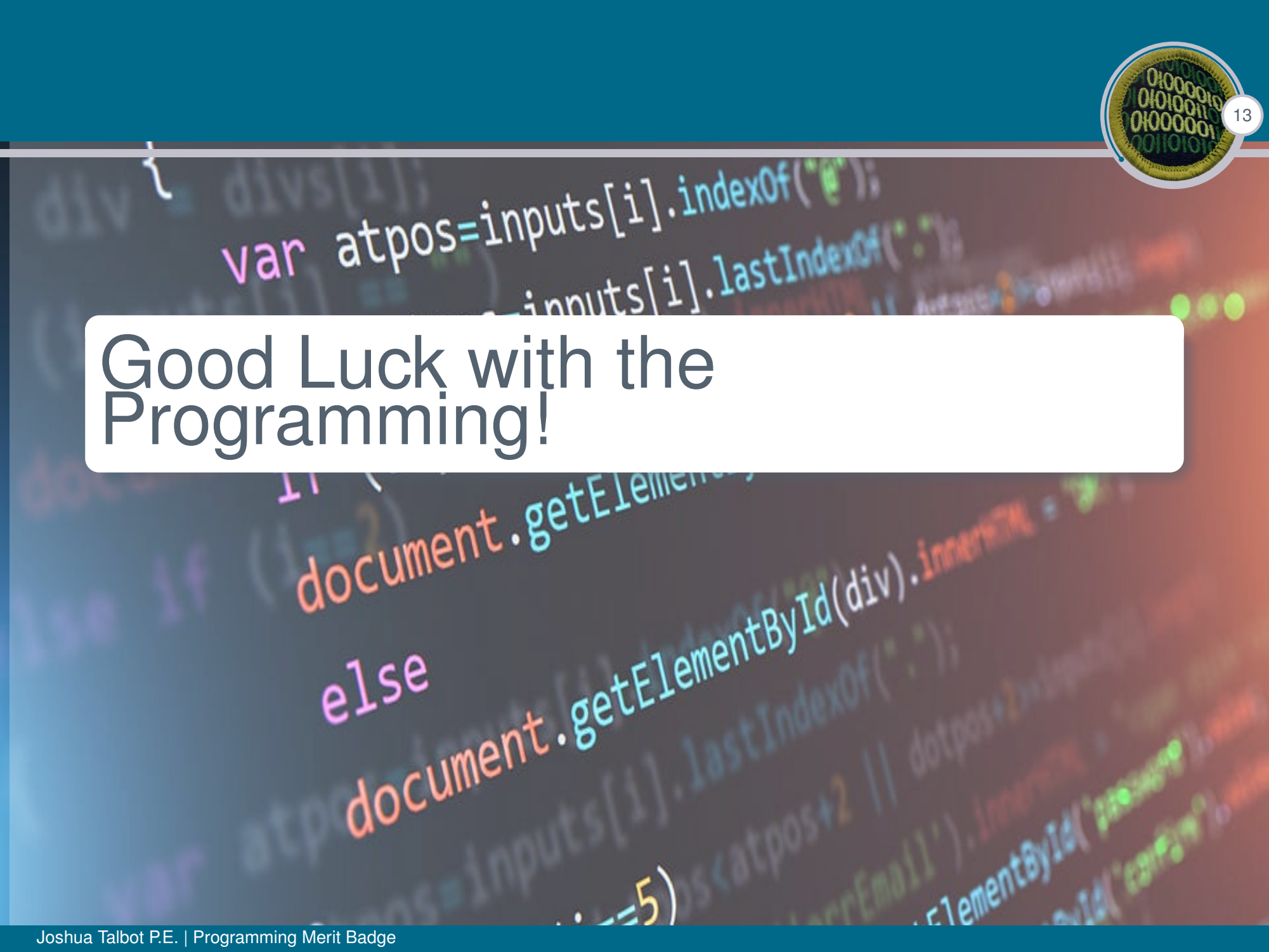
Addition Calculator




```
'''
-------------------------------------------------------
    File: calc_adder.py
    Description: Calculator to Add two integers.
    Revision: 1.0
    Date:  06DEC2021
    Author: Sparkineer
-------------------------------------------------------
'''
def main():

    # Request two integers from the program user.
    # Store the first integer.
    intA = input("Please enter first integer: ")
    # Store the second integer.
    intB = input("Please enter second integer: ")
    # Add integer1 and integer2.
    result = int(intA) + int(intB)
    # Display result.
    print(intA, "+", intB, "=", result)
    # Ask - Quit or Repeat?

if __name__ == '__main__':
    main()
```



Good Luck with the Programming!