Functions

Content Learning Objectives

After completing this activity, students should be able to:

- Explain the meaning and purpose of a function that does not return a value
- Explain the meaning and purpose of a value returning function
- Recognize a function definition, function header, and function call in a program
- Explain programs that use the same function multiple times

Process Skill Goals

- Write code that includes function definitions and functions calls
- Write programs that incorporate functions and if/else statements

Part 1: Functions

- A function is a segment of code that performs a single task
- Functions allow for code reusability while saving space in your program

Parts of a Function:

- A function definition is the segment of code that creates the function and tells the program what to do when the function is called
- The line that has the function definition is known as the function header
- A function call uses the function name outside of the function to direct
 Python to the function

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```
In [ ]: def printRain(): #Function Definition
       #A function definition creates the function
       #by specifying a function name
           #Whatever the function does is indented just like if statements
           #Function Body
           print(' (
                              ) ')
           print(' ///////////)
           print(' /It is Raining/')
           print(' //////////)
       def main(): #Function Definition
           printRain() #Function Call
           #This directs Python to the function to do whatever
           #the function specifies
       main() #Function Call
```

Look at the code above and answer the questions below.

1. What Python *keyword* is used to indicate that a code segment is a *function definition*?

2. What are the two *function headers* in the Python code?

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3.	The name of the functions are in the function headers . What are the function names ?
4.	Add the code to a new Python file and run it. What is the output?
5.	What line of code would you add to print another cloud?
6.	Where would you add the line?

Part 2: Functions with Arguments

So far we have three parts of a function: function definition, function header, and function call. Now we'll be looking at *function arguments/parameters*.

Function arguments/parameters allow for variables outside the scope of a function to be used in the function.

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Look at the functions below then answer the questions.

```
In []:
    def FahrenheitToCelsius(tempF): #Function Definition
        #This function calculates the temperature in Celsius
        #given a Fahrenheit temperature
        tempC = (tempF - 32) * 5/9
        print(tempC, "C")

def CelsiusToFahrenheit(tempC): #Function Definition
        #This function calculates the temperature in Fahrenheit
        #given a Celsius temperature
        tempF = tempC*9/5 + 32
        print(tempF, "F")

def main():
        tempF = int(input("Enter a Fahrenheit temperature: "))
        FahrenheitToCelsius(tempF) #Function Call
        tempC = int(input("Enter a Celsius temperature: "))

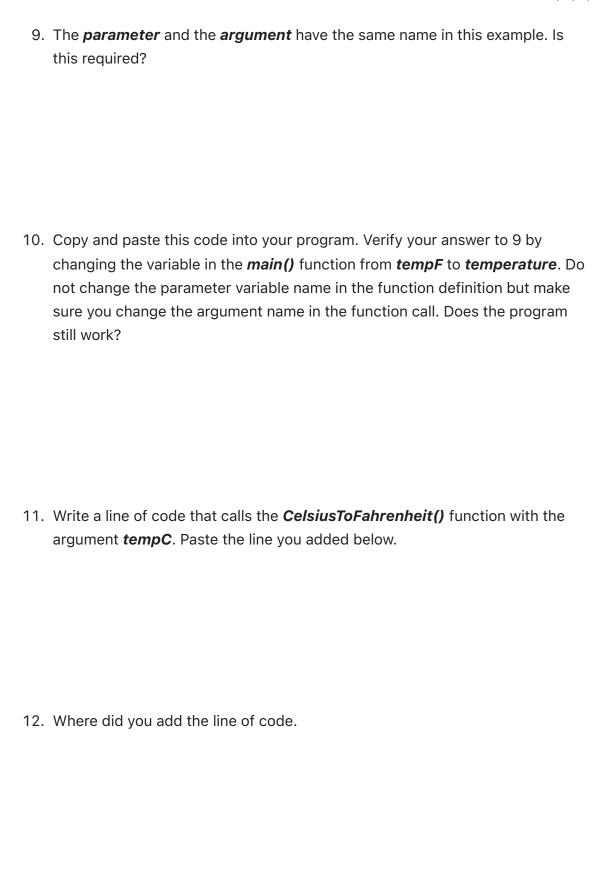
main()
```

The function call and the function definition for *FahrenheitToCelsius* each include a variable within the parentheses. The variable in the function call is known as an *argument*. The variable in the function definition is called a *parameter*.

7. What is the parameter in the *FahrenheitToCelsius()* function definition?

8. What is the purpose of a parameter?

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14. Add another line of code in the *main()* function that calls the function created in question 13. Paste the line in the textbox below.

15. Try calling the **feetToKilometers()** function with no argument. Does it work? If not, what do you need to add to make it work?

Part 3: Value Returning Functions

Some functions do not send back any information to the line that called the function. This is called a *void function*. Functions that do send back information are called *value returning functions*.

Now we have four parts of a function: function definitions, function headers, function calls, and function arguments/parameters. We will be adding one last part, *function returns*.

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```
In []: def kilometersToFeet(km):
    #add conversion
    feet = km * 3281
    return feet

def main():
    feet_distance = kilometersToFeet()

main()
```

16. What is the new keyword used in the function body?

17. What does this new keyword tell the program to do?

18. What line of code calls the function *kilometersToFeet()*?

19. What is different about this line compared to previous void function calls?

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20. Why is the function call on the right side of an assignment statement?

Part 4: Write Your Own Function

The best way to learn something is through practice. For this you will be creating a function called *distanceConversion()* that can convert between distance units.

distanceConversion() shall:

- have three parameters dist (int), start_unit (str), and end_unit (str)
- · convert from kilometers to feet
- convert from kilometers to miles
- · convert from feet to kilometers
- · convert from feet to miles
- · convert from miles to kilometers
- · convert from miles to feet
- use if/else statements
- return the converted distance, end_value

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