

Name: _____

Partner: _____

Python Activity 7: IF-ELIF-ELSE Statements

The syntax we need to write programs that can make decisions!

Learning Objectives

Students will be able to:

Content:

- Implement the Python syntax of an if/else statement
- Determine good test data for programs that include if/else statements
- Implement and identify good test data for if/elif/else statements

Process:

- Write code that includes if statements and if/else statements

Prior Knowledge

- Boolean expressions

Python Program

```
grade = 95
if grade >= 94:
    print("Excellent!")
```

1. What might be the output of the program listed at left?

What might the program print if the value stored in the variable of **grade** was 90?

2. Enter and execute the following code that runs without errors.

Use various values for the original cost and the sale price.

```
def main():
    original_price = input("Enter the original cost of the item: ")
    sale_price = input("Enter the sale price: ")

    percent_reduced = percent_off(float(original_price), float(sale_price))

    print("Original price: $" + original_price)
    print("Sale price: $" + sale_price)
    print("Percent Off: " + str(percent_reduced) + "%")

    if percent_reduced >= 50:
        print("You got a great sale!")

def percent_off(orig, sa):
    return int((orig - sa)/orig * 100)

main()
```


Explain what the following lines of code do. Each line appears in the program above.


a. `original_price = input("Enter the original cost of the item: ")`


b. `percent_reduced = percent_off(float(original_price), float (sale_price))`

c. `print("Original price: $" + original_price)`

d. `print("Percent Off: " + str(percent_reduced) + "%")`

 e. `if(percent_reduced >= 50):`
`print("You got a great sale!")`


 3. Revise the program in #2. If the percent off is 50% or more print “Congratulations!” in addition to what is already printed. Use a second print statement to do this. Rewrite the code for the last part of the program that includes the **if** statement.

 4. Revise the program in #2 so that it prints “Done!” when the program is complete – no matter what the percent off is. How does the placement of this line of code differ from the placement of the code created for #3?

Python Program

```
temperature_str = input("Enter the water temperature in degrees Fahrenheit: ")
temperature = int(temperature_str)
if temperature >= 212:
    print("Water is boiling.")
else:
    print("The water is not boiling.")
```

5. Predict what this code will do (after class, enter and execute the Python program above).
- Circle the new keyword.
 - If you had to *guess* what these new lines of code do, what would you guess? Why?

 c. Pick three test data for input, and predict what will happen. Be sure you test each part of the condition. Explain why the data you chose were the best data to use to thoroughly test for the program.

d. Now add another print statement to the Python program above so that it prints “That’s really hot!” when the water is 212 degrees or hotter. Rewrite the if/else below with this statement included.

- Key** e. If you add another `else` statement to the end of the `if`-block it will throw a `SyntaxError`. Why might `if`-blocks only be able to have one `else` statement?

Python Program

```
1 temperature_str = input("Enter the water temperature in degrees Fahrenheit: ")
2 temperature = int(temperature_str)
3 if temperature >= 212:
4     print("Water is boiling.")
5 elif temperature >= 70:
6     print("Water is room temperature")
7 else:
8     print("The water is not boiling.")
```

6. This code is the same as question 5, but we've added lines 5 and 6.
- Circle the new keyword.
 - If you had to *guess* what these new lines of code do, what would you guess? Why?

- Key** c. If the user inputs 250 for the temperature, *only* "Water is boiling" will print. Why might the line `print("Water is boiling")` not also execute?

- d. Pick three additional test data for input, and predict what will happen. Be sure you test each part of the condition. Explain why the data you chose were the best data to use to thoroughly test for the program.

- Key** e. If we add an additional `elif` to this `if`-block, with the lines `elif temperature < 32: print("Water is frozen")` between lines 6 and 7, this code will still run. How does this differ from the behavior described in 5e, with `else` statements?

FYI: `elif` is the Python keyword that represents **else if** and allows you to test for one of several options. As soon as one of the tests is true, the rest are ignored.

Application Questions: Use the Python Interpreter to check your work

- 1a. Suppose you want to determine if a student is ready to graduate. The three criteria for graduation are that the student has earned at least 120 credits, their major GPA is at least 2.0 and their general GPA is also at least 2.0.

Which Boolean expression would be the correct test for Python code?

- a. num_credits >= 120 **or** majorGPA >= 2.0 **or** overallGPA >= 2.0
- b. num_credits > 120 **and** majorGPA > 2.0 **or** overallGPA > 2.0
- c. num_credits > 119 **and** majorGPA >= 2.0 **and** overallGPA >= 2.0
- d. num_credits >= 120 **and** majorGPA >= 2.0 **and** overallGPA >= 2.0

2.0

```
num_credits = int(input("Enter number of credits: "))
majorGPA = float(input("Enter the GPA for the major: "))
overallGPA = float(input("Enter the overall GPA"))
if _____ MISSING_BOOLEAN_EXPRESSION _____ :
    print("Congratulations!")
    print("You seem to meet all the criteria for graduation.")
else:
    print("Sorry!")
    print("You do not meet all the criteria for graduation.")
print("Done!")
```

- 1b. Enter and execute the program. Include your choice for the correct Boolean expression. Create several sample data sets to test 10 different possibilities for the Boolean expression (There are 27 different combinations of possibilities). List the data you used to test these possibilities for the expression. Each set of sample data should test a different combination of possibilities.

Data Set	num_credits	majorGPA	overallGPA	Expression Result (True or False)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

2. Write the code for an **if** statement that adds 5 to the variable **num1** if the value stored in the variable **testA** equals 25. Otherwise subtract 5 from **num1**.

3. Write a Python program that prompts the user for a word. If the word comes between the words **apple** and **pear** alphabetically, print a message that tells the user that the word is valid, otherwise, tell the user the word is out of range.

4. Write a Python program that prompts the user for the cost of two items to be purchased. Then prompt the user for payment. If the amount entered is less than the total cost of the two items, print a message that states how much is still owed. Otherwise, print a thank you message and state how much change will be given.

5. Write a Python program that prompts the user for a multiple of 5 between 1 and 100. Print a message telling the user whether the number they entered is valid.
